Print Control Wizard 24.03

User Guide

04 - 2024

Contents

1. Copyright Notice **4**
1.1. Third party license information 5

2. What is the Print Control Wizard? **21**
2.1. How to Install Print Control Wizard 21
2.2. How Does it Work? 21

3. What is a Printing Condition? **23**
3.1. Curves for Controlling Dot Gain 23
3.1.1. What is Dot Gain? 23
3.1.2. What is Dot Gain Compensation? 24
3.1.3. Dot Gain Compensation Curves 25
3.1.4. Reference Curves 25
3.1.5. PressSync Curves 26
3.1.6. Curve Strategies 28
3.2. Screens for Controlling Ink Lay Down 28
3.2.1. What is Screening? 28
3.2.2. Types of Screens 30

4. The Print Control Wizard User Interface **35**
4.1. General Configuration 35
4.1.1. Connect to Esko server 35
4.1.2. Preferred Units 35
4.1.3. Printing Conditions 36
4.2. Screens Explorer 36
4.3. Curves Explorer 37
4.4. Printing Conditions Explorer 39
4.4.1. Details Pane 40
4.4.2. Selected Item Pane 42

5. Creating and Managing Printing Conditions **43**
5.1. Types of Printing Conditions 43
5.2. Creating a Printing Condition for Flexibles 43
5.2.1. Printing Condition Configuration Steps 44
5.3. Creating a Printing Condition for Labels 113
5.3.1. Printing Condition Configuration Steps 114
5.4. Creating a Printing Condition for Standard Post Print Corrugated 171
5.4.1. Configuration Steps for Standard Post Print 173
5.5. Creating a Printing Condition for High Quality Post Print Corrugated 189
5.5.1. Configuration Steps for High Quality Post Print 191
5.6. Reviewing the Printing Condition 227

5.6.1. Printing Calibration Results....228
5.6.2. Verification....229
5.7. Editing Flexibles or Labels Printing Conditions....232
5.7.1. Change Plate and Press Calibration Settings....232
5.7.2. Edit White....233
5.7.3. Calibrate Printing Again....233
5.7.4. Update Curves....234
5.7.5. Add a Ruling....241
5.7.6. Calibrating One Separation....248
5.8. Editing Corrugated Printing Conditions....259
5.8.1. Editing a Standard Post Print Corrugated Printing Condition....260
5.8.2. Editing a High Quality Corrugated Printing Condition....260
5.9. Saving a Report....287
5.10. Exporting and Importing Printing Conditions....290
5.10.1. Exporting a Printing Condition....290
5.10.2. Exporting the Complete Library....291
5.10.3. Importing a Printing Condition....291
5.10.4. Importing a Complete Library....292

6. Using a Printing Condition in Your Workflow....294
6.1. Using Your Printing Condition in Imaging Engine....294

1. Copyright Notice

© Copyright 2024 Esko Software BV, Gent, Belgium

All rights reserved. This material, information and instructions for use contained herein are the property of Esko Software BV. The material, information and instructions are provided on an AS IS basis without warranty of any kind. There are no warranties granted or extended by this document. Furthermore Esko Software BV does not warrant, guarantee or make any representations regarding the use, or the results of the use of the software or the information contained herein. Esko Software BV shall not be liable for any direct, indirect, consequential or incidental damages arising out of the use or inability to use the software or the information contained herein.

The information contained herein is subject to change without notice. Revisions may be issued from time to time to advise of such changes and/or additions.

No part of this document may be reproduced, stored in a data base or retrieval system, or published, in any form or in any way, electronically, mechanically, by print, photoprint, microfilm or any other means without prior written permission from Esko Software BV.

This document supersedes all previous dated versions.

PANTONE® Colors displayed in the software application or in the user documentation may not match PANTONE-identified standards. Consult current PANTONE Color Publications for accurate color. PANTONE® and other Pantone trademarks are the property of Pantone LLC. © Pantone LLC, 2015

Pantone is the copyright owner of color data and/or software which are licensed to Esko to distribute for use only in combination with Studio Visualizer. PANTONE Color Data and/or Software shall not be copied onto another disk or into memory unless as part of the execution of Studio Visualizer.

This software is based in part on the work of the Independent JPEG Group.

Portions of this software are copyright © 1996-2002 The FreeType Project (www.freetype.org). All rights reserved.

Portions of this software are copyright 2006 Feeling Software, copyright 2005-2006 Autodesk Media Entertainment.

Portions of this software are copyright ©1998-2003 Daniel Veillard. All rights reserved.

Portions of this software are copyright ©1999-2006 The Botan Project. All rights reserved.

Part of the software embedded in this product is gSOAP software. Portions created by gSOAP are Copyright ©2001-2004 Robert A. van Engelen, Genivia inc. All rights reserved.

Portions of this software are copyright ©1998-2008 The OpenSSL Project and ©1995-1998 Eric Young (eay@cryptsoft.com). All rights reserved.

This product includes software developed by the Apache Software Foundation (http://www.apache.org/).

Adobe, the Adobe logo, Acrobat, the Acrobat logo, Adobe Creative Suite, Illustrator, InDesign, PDF, Photoshop, PostScript, XMP and the Powered by XMP logo are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States and/or other countries.

Microsoft and the Microsoft logo are registered trademarks of Microsoft Corporation in the United States and other countries.

SolidWorks is a registered trademark of SolidWorks Corporation.

Portions of this software are owned by Spatial Corp. 1986 2003. All Rights Reserved.

JDF and the JDF logo are trademarks of the CIP4 Organisation. Copyright 2001 The International Cooperation for the Integration of Processes in Prepress, Press and Postpress (CIP4). All rights reserved.

The Esko software contains the RSA Data Security, Inc. MD5 Message-Digest Algorithm.

Java and all Java-based trademarks and logos are trademarks or registered trademarks of Oracle corporation in the U.S. and other countries.

Part of this software uses technology by Best Color Technology (EFI). EFI and Bestcolor are registered trademarks of Electronics For Imaging GmbH in the U.S. Patent and Trademark Office.

Contains PowerNest library Copyrighted and Licensed by Alma, 2005 – 2007.

Part of this software uses technology by GlobalVision. ArtProof and ScanProof are registered trademarks of GlobalVision Inc.

Part of this software uses technology by Qoppa Software. Copyright © 2002-Present. All Rights Reserved.

All other product names are trademarks or registered trademarks of their respective owners.

Correspondence regarding this publication should be forwarded to:

Esko Software BV

Raymonde de Larochelaan 13

B – 9051 Gent

info.eur@esko.com

1.1. Third party license information

```
This product includes lzw-ab.

    Copyright (c) David Bryant
    All rights reserved.

    Redistribution and use in source and binary forms, with or without
    modification, are permitted provided that the following conditions are met:

    * Redistributions of source code must retain the above copyright notice,
      this list of conditions and the following disclaimer.
    * Redistributions in binary form must reproduce the above copyright notice,
      this list of conditions and the following disclaimer in the
      documentation and/or other materials provided with the distribution.
    * Neither the name of Conifer Software nor the names of its contributors
      may be used to endorse or promote products derived from this software
      without specific prior written permission.

    THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS"
    AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE
    IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE
    ARE DISCLAIMED. IN NO EVENT SHALL THE REGENTS OR CONTRIBUTORS BE LIABLE FOR
    ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL
    DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR
    SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER
    CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY,
    OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE
    OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

-------------------------------------------------------------

This product includes ICC Profiles.
```

```
    Some ICC Profiles were created by FFEI Ltd. (www.ffei.co.uk) using Fujifilm
    ColourKit Profiler Suite (www.colourprofiling.com)

------------------------------------------------------------

This product includes ICC Profiles.

    Some ICC profiles are copyright (C) by European Color Initiative, www.eci.org

------------------------------------------------------------

This product includes ICC Profiles.

    Some ICC profiles are copyright (C) of WAN-IFRA, www.wan-ifra.org

------------------------------------------------------------

This product includes ICC Profiles.

    Some ICC profiles are copyright (C) IDEAlliance(R). G7(R), GRACol(R) and
    SWOP(R) are all registered trademarks of IDEAlliance(C).

------------------------------------------------------------

This product includes PANTONE Color Libraries.

    PANTONE® and other Pantone trademarks are the property of Pantone LLC.
    Pantone is a wholly owned subsidiary of X-Rite, Incorporated.

------------------------------------------------------------

This product includes curl.

   COPYRIGHT AND PERMISSION NOTICE

   Copyright (c) 1996 - 2023, Daniel Stenberg, <daniel@haxx.se>, and many
   contributors, see the THANKS file.

   All rights reserved.

   Permission to use, copy, modify, and distribute this software for any purpose
   with or without fee is hereby granted, provided that the above copyright
   notice and this permission notice appear in all copies.

   THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR
   IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY,
   FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT OF THIRD PARTY RIGHTS. IN
   NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM,
   DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR
   OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE
   OR OTHER DEALINGS IN THE SOFTWARE.

   Except as contained in this notice, the name of a copyright holder shall not
   be used in advertising or otherwise to promote the sale, use or other dealings
   in this Software without prior written authorization of the copyright holder.

------------------------------------------------------------

This product includes LibTIFF.

      Copyright (c) 1988-1997 Sam Leffler
      Copyright (c) 1991-1997 Silicon Graphics, Inc.

      Permission to use, copy, modify, distribute, and sell this software and
      its documentation for any purpose is hereby granted without fee, provided
      that (i) the above copyright notices and this permission notice appear in
      all copies of the software and related documentation, and (ii) the names of
      Sam Leffler and Silicon Graphics may not be used in any advertising or
      publicity relating to the software without the specific, prior written
      permission of Sam Leffler and Silicon Graphics.

      THE SOFTWARE IS PROVIDED "AS-IS" AND WITHOUT WARRANTY OF ANY KIND,
      EXPRESS, IMPLIED OR OTHERWISE, INCLUDING WITHOUT LIMITATION, ANY
      WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

      IN NO EVENT SHALL SAM LEFFLER OR SILICON GRAPHICS BE LIABLE FOR
```

```
      ANY SPECIAL, INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES OF ANY KIND,
      OR ANY DAMAGES WHATSOEVER RESULTING FROM LOSS OF USE, DATA OR PROFITS,
      WHETHER OR NOT ADVISED OF THE POSSIBILITY OF DAMAGE, AND ON ANY THEORY OF
      LIABILITY, ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE
      OF THIS SOFTWARE.

-------------------------------------------------------------

This product includes FreeType.

    Portions of this software are copyright (C) 2014 The FreeType
    Project (www.freetype.org) licensed under the Freetype License.
    All rights reserved.

-------------------------------------------------------------

This product includes ICU.

      Copyright (c) 1991-2023 Unicode, Inc. All rights reserved.
      Distributed under the Terms of Use in https://www.unicode.org/copyright.html.

      Permission is hereby granted, free of charge, to any person obtaining
      a copy of the Unicode data files and any associated documentation
      (the "Data Files") or Unicode software and any associated documentation
      (the "Software") to deal in the Data Files or Software
      without restriction, including without limitation the rights to use,
      copy, modify, merge, publish, distribute, and/or sell copies of
      the Data Files or Software, and to permit persons to whom the Data Files
      or Software are furnished to do so, provided that either
      (a) this copyright and permission notice appear with all copies
      of the Data Files or Software, or
      (b) this copyright and permission notice appear in associated
      Documentation.

      THE DATA FILES AND SOFTWARE ARE PROVIDED "AS IS", WITHOUT WARRANTY OF
      ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
      WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND
      NONINFRINGEMENT OF THIRD PARTY RIGHTS.
      IN NO EVENT SHALL THE COPYRIGHT HOLDER OR HOLDERS INCLUDED IN THIS
      NOTICE BE LIABLE FOR ANY CLAIM, OR ANY SPECIAL INDIRECT OR CONSEQUENTIAL
      DAMAGES, OR ANY DAMAGES WHATSOEVER RESULTING FROM LOSS OF USE,
      DATA OR PROFITS, WHETHER IN AN ACTION OF CONTRACT, NEGLIGENCE OR OTHER
      TORTIOUS ACTION, ARISING OUT OF OR IN CONNECTION WITH THE USE OR
      PERFORMANCE OF THE DATA FILES OR SOFTWARE.

      ---------------------------------------------------------------------

      Chinese/Japanese Word Break Dictionary Data (cjdict.txt)

       #     The Google Chrome software developed by Google is licensed under
       # the BSD license. Other software included in this distribution is
       # provided under other licenses, as set forth below.
       #
       #  The BSD License
       #  http://opensource.org/licenses/bsd-license.php
       #  Copyright (C) 2006-2008, Google Inc.
       #
       #  All rights reserved.
       #
       #  Redistribution and use in source and binary forms, with or without
       # modification, are permitted provided that the following conditions are met:
       #
       #  Redistributions of source code must retain the above copyright notice,
       # this list of conditions and the following disclaimer.
       #  Redistributions in binary form must reproduce the above
       # copyright notice, this list of conditions and the following
       # disclaimer in the documentation and/or other materials provided with
       # the distribution.
       #  Neither the name of  Google Inc. nor the names of its
       # contributors may be used to endorse or promote products derived from
       # this software without specific prior written permission.
       #
       #
       #  THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND
       # CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES,
       # INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF
       # MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE
```

```
# DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT OWNER OR CONTRIBUTORS BE
# LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR
# CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF
# SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR
# BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF
# LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING
# NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS
# SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
#
#
#  The word list in cjdict.txt are generated by combining three word lists
# listed below with further processing for compound word breaking. The
# frequency is generated with an iterative training against Google web
# corpora.
#
#  * Libtabe (Chinese)
#    - https://sourceforge.net/project/?group_id=1519
#    - Its license terms and conditions are shown below.
#
#  * IPADIC (Japanese)
#    - http://chasen.aist-nara.ac.jp/chasen/distribution.html
#    - Its license terms and conditions are shown below.
#
#  ---------COPYING.libtabe ---- BEGIN--------------------
#
#  /*
#   * Copyright (c) 1999 TaBE Project.
#   * Copyright (c) 1999 Pai-Hsiang Hsiao.
#   * All rights reserved.
#   *
#   * Redistribution and use in source and binary forms, with or without
#   * modification, are permitted provided that the following conditions
#   * are met:
#   *
#   * . Redistributions of source code must retain the above copyright
#   *   notice, this list of conditions and the following disclaimer.
#   * . Redistributions in binary form must reproduce the above copyright
#   *   notice, this list of conditions and the following disclaimer in
#   *   the documentation and/or other materials provided with the
#   *   distribution.
#   * . Neither the name of the TaBE Project nor the names of its
#   *   contributors may be used to endorse or promote products derived
#   *   from this software without specific prior written permission.
#   *
#   * THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS
#   * "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT
#   * LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS
#   * FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE
#   * REGENTS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT,
#   * INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES
#   * (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR
#   * SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION)
#   * HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT,
#   * STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE)
#   * ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED
#   * OF THE POSSIBILITY OF SUCH DAMAGE.
#   */
#
#  /*
#   * Copyright (c) 1999 Computer Systems and Communication Lab,
#   *                    Institute of Information Science, Academia
#       *                  Sinica. All rights reserved.
#   *
#   * Redistribution and use in source and binary forms, with or without
#   * modification, are permitted provided that the following conditions
#   * are met:
#   *
#   * . Redistributions of source code must retain the above copyright
#   *   notice, this list of conditions and the following disclaimer.
#   * . Redistributions in binary form must reproduce the above copyright
#   *   notice, this list of conditions and the following disclaimer in
#   *   the documentation and/or other materials provided with the
#   *   distribution.
#   * . Neither the name of the Computer Systems and Communication Lab
#   *   nor the names of its contributors may be used to endorse or
#   *   promote products derived from this software without specific
#   *   prior written permission.
```

```
#   *
#   * THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS
#   * "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT
#   * LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS
#   * FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE
#   * REGENTS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT,
#   * INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES
#   * (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR
#   * SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION)
#   * HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT,
#   * STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE)
#   * ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED
#   * OF THE POSSIBILITY OF SUCH DAMAGE.
#   */
#
#  Copyright 1996 Chih-Hao Tsai @ Beckman Institute,
#      University of Illinois
#  c-tsai4@uiuc.edu  http://casper.beckman.uiuc.edu/~c-tsai4
#
#  ---------------COPYING.libtabe-----END--------------------------------
#
#
#  ---------------COPYING.ipadic-----BEGIN-------------------------------
#
#  Copyright 2000, 2001, 2002, 2003 Nara Institute of Science
#  and Technology.  All Rights Reserved.
#
#  Use, reproduction, and distribution of this software is permitted.
#  Any copy of this software, whether in its original form or modified,
#  must include both the above copyright notice and the following
#  paragraphs.
#
#  Nara Institute of Science and Technology (NAIST),
#  the copyright holders, disclaims all warranties with regard to this
#  software, including all implied warranties of merchantability and
#  fitness, in no event shall NAIST be liable for
#  any special, indirect or consequential damages or any damages
#  whatsoever resulting from loss of use, data or profits, whether in an
#  action of contract, negligence or other tortuous action, arising out
#  of or in connection with the use or performance of this software.
#
#  A large portion of the dictionary entries
#  originate from ICOT Free Software.  The following conditions for ICOT
#  Free Software applies to the current dictionary as well.
#
#  Each User may also freely distribute the Program, whether in its
#  original form or modified, to any third party or parties, PROVIDED
#  that the provisions of Section 3 ("NO WARRANTY") will ALWAYS appear
#  on, or be attached to, the Program, which is distributed substantially
#  in the same form as set out herein and that such intended
#  distribution, if actually made, will neither violate or otherwise
#  contravene any of the laws and regulations of the countries having
#  jurisdiction over the User or the intended distribution itself.
#
#  NO WARRANTY
#
#  The program was produced on an experimental basis in the course of the
#  research and development conducted during the project and is provided
#  to users as so produced on an experimental basis.  Accordingly, the
#  program is provided without any warranty whatsoever, whether express,
#  implied, statutory or otherwise.  The term "warranty" used herein
#  includes, but is not limited to, any warranty of the quality,
#  performance, merchantability and fitness for a particular purpose of
#  the program and the nonexistence of any infringement or violation of
#  any right of any third party.
#
#  Each user of the program will agree and understand, and be deemed to
#  have agreed and understood, that there is no warranty whatsoever for
#  the program and, accordingly, the entire risk arising from or
#  otherwise connected with the program is assumed by the user.
#
#  Therefore, neither ICOT, the copyright holder, or any other
#  organization that participated in or was otherwise related to the
#  development of the program and their respective officials, directors,
#  officers and other employees shall be held liable for any and all
#  damages, including, without limitation, general, special, incidental
#  and consequential damages, arising out of or otherwise in connection
```

```
#  with the use or inability to use the program or any product, material
#  or result produced or otherwise obtained by using the program,
#  regardless of whether they have been advised of, or otherwise had
#  knowledge of, the possibility of such damages at any time during the
#  project or thereafter.  Each user will be deemed to have agreed to the
#  foregoing by his or her commencement of use of the program.  The term
#  "use" as used herein includes, but is not limited to, the use,
#  modification, copying and distribution of the program and the
#  production of secondary products from the program.
#
#  In the case where the program, whether in its original form or
#  modified, was distributed or delivered to or received by a user from
#  any person, organization or entity other than ICOT, unless it makes or
#  grants independently of ICOT any specific warranty to the user in
#  writing, such person, organization or entity, will also be exempted
#  from and not be held liable to the user for any such damages as noted
#  above as far as the program is concerned.
#
#  ---------------COPYING.ipadic-----END---------------------------------

-------------------------------------------------------------------

Lao Word Break Dictionary Data (laodict.txt)

# Copyright (C) 2016 and later: Unicode, Inc. and others.
# License & terms of use: http://www.unicode.org/copyright.html
# Copyright (c) 2015 International Business Machines Corporation
# and others. All Rights Reserved.
#
# Project: https://github.com/rober42539/lao-dictionary
# Dictionary: https://github.com/rober42539/lao-dictionary/laodict.txt
# License: https://github.com/rober42539/lao-dictionary/LICENSE.txt
#          (copied below)
#
# This file is derived from the above dictionary version of Nov 22, 2020
#  --------------------------------------------------------------------
#  Copyright (C) 2013 Brian Eugene Wilson, Robert Martin Campbell.
#  All rights reserved.
#
#  Redistribution and use in source and binary forms, with or without
#  modification, are permitted provided that the following conditions are met:
#
#  Redistributions of source code must retain the above copyright notice, this
#  list of conditions and the following disclaimer. Redistributions in binary
#  form must reproduce the above copyright notice, this list of conditions and
#  the following disclaimer in the documentation and/or other materials
#  provided with the distribution.
#
# THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS
# "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT
# LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS
# FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE
# COPYRIGHT HOLDER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT,
# INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES
# (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR
# SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION)
# HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT,
# STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE)
# ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED
# OF THE POSSIBILITY OF SUCH DAMAGE.
#  --------------------------------------------------------------------------

-------------------------------------------------------------------

Burmese Word Break Dictionary Data (burmesedict.txt)

#  Copyright (c) 2014 International Business Machines Corporation
#  and others. All Rights Reserved.
#
#  This list is part of a project hosted at:
#    github.com/kanyawtech/myanmar-karen-word-lists
#
#  ------------------------------------------------------------------------
#  Copyright (c) 2013, LeRoy Benjamin Sharon
#  All rights reserved.
#
#  Redistribution and use in source and binary forms, with or without
```

```
 #  modification, are permitted provided that the following conditions
 #  are met: Redistributions of source code must retain the above
 #  copyright notice, this list of conditions and the following
 #  disclaimer.  Redistributions in binary form must reproduce the
 #  above copyright notice, this list of conditions and the following
 #  disclaimer in the documentation and/or other materials provided
 #  with the distribution.
 #
 #    Neither the name Myanmar Karen Word Lists, nor the names of its
 #    contributors may be used to endorse or promote products derived
 #    from this software without specific prior written permission.
 #
 #  THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND
 #  CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES,
 #  INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF
 #  MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE
 #  DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT HOLDER OR CONTRIBUTORS
 #  BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL,
 #  EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED
 #  TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE,
 #  DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON
 #  ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR
 #  TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF
 #  THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF
 #  SUCH DAMAGE.
 #  ------------------------------------------------------------------------------

---------------------------------------------------------------------

Time Zone Database

  ICU uses the public domain data and code derived from Time Zone
Database for its time zone support. The ownership of the TZ database
is explained in BCP 175: Procedure for Maintaining the Time Zone
Database section 7.

 # 7.  Database Ownership
 #
 #    The TZ database itself is not an IETF Contribution or an IETF
 #    document.  Rather it is a pre-existing and regularly updated work
 #    that is in the public domain, and is intended to remain in the
 #    public domain.  Therefore, BCPs 78 [RFC5378] and 79 [RFC3979] do
 #    not apply to the TZ Database or contributions that individuals make
 #    to it.  Should any claims be made and substantiated against the TZ
 #    Database, the organization that is providing the IANA
 #    Considerations defined in this RFC, under the memorandum of
 #    understanding with the IETF, currently ICANN, may act in accordance
 #    with all competent court orders.  No ownership claims will be made
 #    by ICANN or the IETF Trust on the database or the code.  Any person
 #    making a contribution to the database or code waives all rights to
 #    future claims in that contribution or in the TZ Database.

---------------------------------------------------------------------

Google double-conversion

Copyright 2006-2011, the V8 project authors. All rights reserved.
Redistribution and use in source and binary forms, with or without
modification, are permitted provided that the following conditions are
met:

    * Redistributions of source code must retain the above copyright
      notice, this list of conditions and the following disclaimer.
    * Redistributions in binary form must reproduce the above
      copyright notice, this list of conditions and the following
      disclaimer in the documentation and/or other materials provided
      with the distribution.
    * Neither the name of Google Inc. nor the names of its
      contributors may be used to endorse or promote products derived
      from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS
"AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT
LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR
A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT
OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT
```

```
LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE,
DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY
THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT
(INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE
OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

------------------------------------------------------------------------

File: aclocal.m4 (only for ICU4C)
Section: pkg.m4 - Macros to locate and utilise pkg-config.


Copyright (c) 2004 Scott James Remnant <scott@netsplit.com>.
Copyright (c) 2012-2015 Dan Nicholson <dbn.lists@gmail.com>

This program is free software; you can redistribute it and/or modify
it under the terms of the GNU General Public License as published by
the Free Software Foundation; either version 2 of the License, or
(at your option) any later version.

This program is distributed in the hope that it will be useful, but
WITHOUT ANY WARRANTY; without even the implied warranty of
MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU
General Public License for more details.

You should have received a copy of the GNU General Public License
along with this program; if not, write to the Free Software
Foundation, Inc., 59 Temple Place - Suite 330, Boston, MA
02111-1307, USA.

As a special exception to the GNU General Public License, if you
distribute this file as part of a program that contains a
configuration script generated by Autoconf, you may include it under
the same distribution terms that you use for the rest of that
program.


(The condition for the exception is fulfilled because
ICU4C includes a configuration script generated by Autoconf,
namely the `configure` script.)

------------------------------------------------------------------------

File: config.guess (only for ICU4C)


This file is free software; you can redistribute it and/or modify it
under the terms of the GNU General Public License as published by
the Free Software Foundation; either version 3 of the License, or
(at your option) any later version.

This program is distributed in the hope that it will be useful, but
WITHOUT ANY WARRANTY; without even the implied warranty of
MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the GNU
General Public License for more details.

You should have received a copy of the GNU General Public License
along with this program; if not, see <https://www.gnu.org/licenses/>.

As a special exception to the GNU General Public License, if you
distribute this file as part of a program that contains a
configuration script generated by Autoconf, you may include it under
the same distribution terms that you use for the rest of that
program.  This Exception is an additional permission under section 7
of the GNU General Public License, version 3 ("GPLv3").


(The condition for the exception is fulfilled because
ICU4C includes a configuration script generated by Autoconf,
namely the `configure` script.)

------------------------------------------------------------------------

File: install-sh (only for ICU4C)


Copyright 1991 by the Massachusetts Institute of Technology
```

      Permission to use, copy, modify, distribute, and sell this software and its
      documentation for any purpose is hereby granted without fee, provided that
      the above copyright notice appear in all copies and that both that
      copyright notice and this permission notice appear in supporting
      documentation, and that the name of M.I.T. not be used in advertising or
      publicity pertaining to distribution of the software without specific,
      written prior permission. M.I.T. makes no representations about the
      suitability of this software for any purpose. It is provided "as is"
      without express or implied warranty.

This product includes JBIG2Lib.

    Portions of this product copyrights (C) 2002 Glyph & Cog, LLC.

This product includes JPEGLib.
This software is copyright (C) 1991-2016, Thomas G. Lane, Guido Vollbeding.
      All Rights Reserved.

      This software is based in part on the work of the Independent JPEG Group.

This product includes JSONSpirit.

          Copyright (c) 2007 - 2010 John W. Wilkinson

          Permission is hereby granted, free of charge, to any person
          obtaining a copy of this software and associated documentation
          files (the "Software"), to deal in the Software without
          restriction, including without limitation the rights to use,
          copy, modify, merge, publish, distribute, sublicense, and/or sell
          copies of the Software, and to permit persons to whom the
          Software is furnished to do so, subject to the following
          conditions:

          The above copyright notice and this permission notice shall be
          included in all copies or substantial portions of the Software.

          THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND,
          EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES
          OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND
          NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT
          HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY,
          WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING
          FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR
          OTHER DEALINGS IN THE SOFTWARE.

This product includes Little CMS.

    Little CMS
    Copyright (c) 1998-2020 Marti Maria Saguer

    Permission is hereby granted, free of charge, to any person obtaining
    a copy of this software and associated documentation files (the
    "Software"), to deal in the Software without restriction, including
    without limitation the rights to use, copy, modify, merge, publish,
    distribute, sublicense, and/or sell copies of the Software, and to
    permit persons to whom the Software is furnished to do so, subject
    to the following conditions:

    The above copyright notice and this permission notice shall be
    included in all copies or substantial portions of the Software.

    THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND,
    EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF
    MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT.
    IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY
    CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT,
    TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE
    SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

```
------------------------------------------------------------

This product includes libxml2.

    Copyright (C) 1998-2012 Daniel Veillard.  All Rights Reserved.

    Permission is hereby granted, free of charge, to any person obtaining a copy
    of this software and associated documentation files (the "Software"), to deal
    in the Software without restriction, including without limitation the rights
    to use, copy, modify, merge, publish, distribute, sublicense, and/or sell
    copies of the Software, and to permit persons to whom the Software is fur-
    nished to do so, subject to the following conditions:

    The above copyright notice and this permission notice shall be included in
    all copies or substantial portions of the Software.

    THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR
    IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FIT-
    NESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT.  IN NO EVENT SHALL THE
    AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER
    LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,
    OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN
    THE SOFTWARE.

------------------------------------------------------------

This product includes OpenJPEG.

        The copyright in this software is being made available under the 2-clauses
        BSD License, included below. This software may be subject to other third
        party and contributor rights, including patent rights, and no such rights
        are granted under this license.

        Copyright (c) 2002-2014, Universite catholique de Louvain (UCL), Belgium
        Copyright (c) 2002-2014, Professor Benoit Macq
        Copyright (c) 2003-2014, Antonin Descampe
        Copyright (c) 2003-2009, Francois-Olivier Devaux
        Copyright (c) 2005, Herve Drolon, FreeImage Team
        Copyright (c) 2002-2003, Yannick Verschueren
        Copyright (c) 2001-2003, David Janssens
        Copyright (c) 2011-2012, Centre National d'Etudes Spatiales (CNES), France
        Copyright (c) 2012, CS Systemes d'Information, France

        All rights reserved.

        Redistribution and use in source and binary forms, with or without
        modification, are permitted provided that the following conditions
        are met:
        1. Redistributions of source code must retain the above copyright
           notice, this list of conditions and the following disclaimer.
        2. Redistributions in binary form must reproduce the above copyright
           notice, this list of conditions and the following disclaimer in the
           documentation and/or other materials provided with the distribution.

        THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS `AS IS'
        AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE
        IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE
        ARE DISCLAIMED.  IN NO EVENT SHALL THE COPYRIGHT OWNER OR CONTRIBUTORS BE
        LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR
        CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF
        SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS
        INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN
        CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE)
        ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE
        POSSIBILITY OF SUCH DAMAGE.

------------------------------------------------------------

This product includes OpenSSL.

      Copyright (c) 1998-2019 The OpenSSL Project.  All rights reserved.

      Redistribution and use in source and binary forms, with or without
      modification, are permitted provided that the following conditions
      are met:

      1. Redistributions of source code must retain the above copyright
```

```
         notice, this list of conditions and the following disclaimer.

      2. Redistributions in binary form must reproduce the above copyright
         notice, this list of conditions and the following disclaimer in
         the documentation and/or other materials provided with the
         distribution.

      3. All advertising materials mentioning features or use of this
         software must display the following acknowledgment:
         "This product includes software developed by the OpenSSL Project
         for use in the OpenSSL Toolkit. (http://www.openssl.org/)"

      4. The names "OpenSSL Toolkit" and "OpenSSL Project" must not be used to
         endorse or promote products derived from this software without
         prior written permission. For written permission, please contact
         openssl-core@openssl.org.

      5. Products derived from this software may not be called "OpenSSL"
         nor may "OpenSSL" appear in their names without prior written
         permission of the OpenSSL Project.

      6. Redistributions of any form whatsoever must retain the following
         acknowledgment:
         "This product includes software developed by the OpenSSL Project
         for use in the OpenSSL Toolkit (http://www.openssl.org/)"

      THIS SOFTWARE IS PROVIDED BY THE OpenSSL PROJECT ``AS IS'' AND ANY
      EXPRESSED OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE
      IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR
      PURPOSE ARE DISCLAIMED.  IN NO EVENT SHALL THE OpenSSL PROJECT OR
      ITS CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
      SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT
      NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES;
      LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION)
      HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT,
      STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE)
      ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED
      OF THE POSSIBILITY OF SUCH DAMAGE.

-----------------------------------------------------------

This product includes OpenSSL.

      Copyright (C) 1995-1998 Eric Young (eay@cryptsoft.com)
      All rights reserved.

      Redistribution and use in source and binary forms, with or without
      modification, are permitted provided that the following conditions
      are met:
      1. Redistributions of source code must retain the copyright
         notice, this list of conditions and the following disclaimer.
      2. Redistributions in binary form must reproduce the above copyright
         notice, this list of conditions and the following disclaimer in the
         documentation and/or other materials provided with the distribution.
      3. All advertising materials mentioning features or use of this software
         must display the following acknowledgement:
         "This product includes cryptographic software written by
         Eric Young (eay@cryptsoft.com)"
         The word 'cryptographic' can be left out if the rouines from the library
         being used are not cryptographic related :-).
      4. If you include any Windows specific code (or a derivative thereof) from
         the apps directory (application code) you must include an acknowledgement:
         "This product includes software written by Tim Hudson (tjh@cryptsoft.com)"

      THIS SOFTWARE IS PROVIDED BY ERIC YOUNG ``AS IS'' AND
      ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE
      IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE
      ARE DISCLAIMED.  IN NO EVENT SHALL THE AUTHOR OR CONTRIBUTORS BE LIABLE
      FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL
      DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS
      OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION)
      HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT
      LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY
      OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF
      SUCH DAMAGE.

-----------------------------------------------------------
```

```
This product includes PantoneLIVE.

    PANTONE® Colors displayed here may not match PANTONE-identified standards.
    Consult current PANTONE® Color Publications for accurate color.
    PANTONE®, PantoneLIVE and other Pantone trademarks are the property of Pantone LLC.
    Pantone is a wholly owned subsidiary of X-Rite, Incorporated. © Pantone LLC, 2023.

------------------------------------------------------------

This product includes Qt.

      The software uses Qt, licensed under LGPL v3. The Qt Toolkit is Copyright (C) 2019
 The Qt Company Ltd.

      Portions of this software are copyright (C) 2006-2015 The FreeType Project
 (www.freetype.org). All rights reserved.

      Copyright (C) 1991-2011, Thomas G. Lane, Guido Vollbeding.
      This software is based in part on the work of the Independent JPEG Group.

      Secure Hash Algorithm SHA-3 - brg_endian
      Copyright (c) 1998-2013, Brian Gladman, Worcester, UK. All rights reserved.

      LICENSE TERMS

      The redistribution and use of this software (with or without changes)
      is allowed without the payment of fees or royalties provided that:

       1. source code distributions include the above copyright notice, this
          list of conditions and the following disclaimer;

       2. binary distributions include the above copyright notice, this list
          of conditions and the following disclaimer in their documentation;

       3. the name of the copyright holder is not used to endorse products
          built using this software without specific written permission.

      DISCLAIMER

      This software is provided 'as is' with no explicit or implied warranties
      in respect of its properties, including, but not limited to, correctness
      and/or fitness for purpose.

------------------------------------------------------------

This product includes QtDeclarative.

      The Qt Toolkit is Copyright (C) 2019 The Qt Company Ltd.

------------------------------------------------------------

This product includes QtCopyDialog.

      Copyright (c) 2009 Nokia Corporation and/or its subsidiary(-ies).
      All rights reserved.

      BECAUSE THE LIBRARY IS LICENSED FREE OF CHARGE, THERE IS NO
      WARRANTY FOR THE LIBRARY, TO THE EXTENT PERMITTED BY APPLICABLE LAW.
      EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR
      OTHER PARTIES PROVIDE THE LIBRARY "AS IS" WITHOUT WARRANTY OF ANY
      KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE
      IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR
      PURPOSE.  THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE
      LIBRARY IS WITH YOU.  SHOULD THE LIBRARY PROVE DEFECTIVE, YOU ASSUME
      THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

------------------------------------------------------------

This product includes QtMigration.

        Copyright (C) 2013 Digia Plc and/or its subsidiary(-ies).

        Redistribution and use in source and binary forms, with or without
        modification, are permitted provided that the following conditions are
        met:
          * Redistributions of source code must retain the above copyright
```

notice, this list of conditions and the following disclaimer.
* Redistributions in binary form must reproduce the above copyright
notice, this list of conditions and the following disclaimer in
the documentation and/or other materials provided with the
distribution.
* Neither the name of Digia Plc and its Subsidiary(-ies) nor the names
of its contributors may be used to endorse or promote products derived
from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS
"AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT
LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR
A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT
OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT
LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE,
DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY
THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT
(INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE
OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE."

This product includes QtService.

Copyright (C) 2010 Nokia Corporation and/or its subsidiary(-ies).

Redistribution and use in source and binary forms, with or without
modification, are permitted provided that the following conditions are
met:
* Redistributions of source code must retain the above copyright
notice, this list of conditions and the following disclaimer.
* Redistributions in binary form must reproduce the above copyright
notice, this list of conditions and the following disclaimer in
the documentation and/or other materials provided with the
distribution.
* Neither the name of Nokia Corporation and its Subsidiary(-ies) nor
the names of its contributors may be used to endorse or promote
products derived from this software without specific prior written
permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS
"AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT
LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR
A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT
OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT
LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE,
DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY
THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT
(INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE
OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

This product includes QtSingleApplication.

Copyright (C) 2010 Nokia Corporation and/or its subsidiary(-ies). All rights
reserved.

Redistribution and use in source and binary forms, with or without
modification, are permitted provided that the following conditions are
met:
* Redistributions of source code must retain the above copyright
notice, this list of conditions and the following disclaimer.
* Redistributions in binary form must reproduce the above copyright
notice, this list of conditions and the following disclaimer in
the documentation and/or other materials provided with the
distribution.
* Neither the name of Nokia Corporation and its Subsidiary(-ies) nor
the names of its contributors may be used to endorse or promote
products derived from this software without specific prior written
permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS
"AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT
LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR

```
        A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT
        OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
        SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT
        LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE,
        DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY
        THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT
        (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE
        OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.


------------------------------------------------------------

This product includes QtSql.

      Copyright (c) 2009 Nokia Corporation and/or its subsidiary(-ies).

      BECAUSE THE LIBRARY IS LICENSED FREE OF CHARGE, THERE IS NO
      WARRANTY FOR THE LIBRARY, TO THE EXTENT PERMITTED BY APPLICABLE LAW.
      EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR
      OTHER PARTIES PROVIDE THE LIBRARY "AS IS" WITHOUT WARRANTY OF ANY
      KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE
      IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR
      PURPOSE.  THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE
      LIBRARY IS WITH YOU.  SHOULD THE LIBRARY PROVE DEFECTIVE, YOU ASSUME
      THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

------------------------------------------------------------

This product includes QtWebEngine.

      The software uses QtWebEngine, licensed under LGPL v3. The Qt Toolkit is Copyright
 (C) 2019 The Qt Company Ltd.

------------------------------------------------------------

This product includes chromium.

        Copyright 2015 The Chromium Authors. All rights reserved.

        Redistribution and use in source and binary forms, with or without
        modification, are permitted provided that the following conditions are
        met:

           * Redistributions of source code must retain the above copyright
        notice, this list of conditions and the following disclaimer.
           * Redistributions in binary form must reproduce the above
        copyright notice, this list of conditions and the following disclaimer
        in the documentation and/or other materials provided with the
        distribution.
           * Neither the name of Google Inc. nor the names of its
        contributors may be used to endorse or promote products derived from
        this software without specific prior written permission.

        THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS
        "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT
        LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR
        A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT
        OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
        SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT
        LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE,
        DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY
        THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT
        (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE
        OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

------------------------------------------------------------

This product includes LibTIFF.

      Copyright (c) 1988-1997 Sam Leffler
      Copyright (c) 1991-1997 Silicon Graphics, Inc.

      Permission to use, copy, modify, distribute, and sell this software and
      its documentation for any purpose is hereby granted without fee, provided
      that (i) the above copyright notices and this permission notice appear in
      all copies of the software and related documentation, and (ii) the names of
      Sam Leffler and Silicon Graphics may not be used in any advertising or
```

publicity relating to the software without the specific, prior written
permission of Sam Leffler and Silicon Graphics.

THE SOFTWARE IS PROVIDED "AS-IS" AND WITHOUT WARRANTY OF ANY KIND,
EXPRESS, IMPLIED OR OTHERWISE, INCLUDING WITHOUT LIMITATION, ANY
WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

IN NO EVENT SHALL SAM LEFFLER OR SILICON GRAPHICS BE LIABLE FOR
ANY SPECIAL, INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES OF ANY KIND,
OR ANY DAMAGES WHATSOEVER RESULTING FROM LOSS OF USE, DATA OR PROFITS,
WHETHER OR NOT ADVISED OF THE POSSIBILITY OF DAMAGE, AND ON ANY THEORY OF
LIABILITY, ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE
OF THIS SOFTWARE.

This product includes XercesC.

NOTICE file corresponding to section 4(d) of the Apache License, Version 2.0, in this
case for the Apache Xerces distribution.

This product includes software developed by
The Apache Software Foundation (http://www.apache.org/).

Portions of this software were originally based on the following:
- software copyright (c) 1999, IBM Corporation., http://www.ibm.com.

This product includes XMP Toolkit.
Copyright (c) 2020, Adobe
All rights reserved.

Redistribution and use in source and binary forms, with or without
modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this
list of conditions and the following disclaimer.

2. Redistributions in binary form must reproduce the above copyright notice,
this list of conditions and the following disclaimer in the documentation
and/or other materials provided with the distribution.

3. Neither the name of the copyright holder nor the names of its
contributors may be used to endorse or promote products derived from
this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS"
AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE
IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE
DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT HOLDER OR CONTRIBUTORS BE LIABLE
FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL
DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR
SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER
CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY,
OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE
OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

This product includes zlib.

(C) 1995-2022 Jean-loup Gailly and Mark Adler

This software is provided 'as-is', without any express or implied
warranty. In no event will the authors be held liable for any damages
arising from the use of this software.

Permission is granted to anyone to use this software for any purpose,
including commercial applications, and to alter it and redistribute it
freely, subject to the following restrictions:

1. The origin of this software must not be misrepresented; you must not
claim that you wrote the original software. If you use this software
in a product, an acknowledgment in the product documentation would be
appreciated but is not required.
2. Altered source versions must be plainly marked as such, and must not be
misrepresented as being the original software.

```
  3. This notice may not be removed or altered from any source distribution.

  Jean-loup Gailly        Mark Adler
  jloup@gzip.org          madler@alumni.caltech.edu

------------------------------------------------------------

This product includes ZXing C++ Library.

    Copyright 2016 ZXing authors.
    https://github.com/zxing

------------------------------------------------------------
```

2. What is the Print Control Wizard?

The Print Control Wizard is a set of tools in the Color Pilot application, designed to help you optimize your print quality.

Based on your **exact production workflow**, your current print quality and the **standard** you want to print towards, the Print Control Wizard will calculate the **best possible screens and curves** that you can use to achieve great results on press.

This will help you avoid common problems, for example a lack of smoothness in the transition from highlights to paper, or from shadows to solids, and will make getting good printing quality time after time **easier**.

2.1. How to Install Print Control Wizard

The Print Control Wizard is completely integrated in the **Color Pilot** Application, Esko's default application for creating color data (inks, proofer profiles, press profiles...).

To be able to use all functionality within the Print Control Wizard, you need to also install **Curve Pilot** on the same workstation.

You can install both Color Pilot and Curve Pilot from the Imaging Engine installation DVD. For more information, please see the **Imaging Engine Installation and Configuration** chapter of the *Imaging Engine user guide*. You can also find a direct link to the installation documentation in the DVD itself.

Note:

Until version 18.1.1, Print Control Wizard was a separate application, with its own installation procedure.

If you are using version 18.1.1 or older, please use the Print Control Wizard 18 or 18.1 user guide: *https://www.esko.com/en/support/product?id=Print%20Control%20Wizard*

2.2. How Does it Work?

The Print Control Wizard will help you achieve the best possible printing quality in the following way:

1. Record all the production settings you are using.

   During the setup, you enter all of the settings you use in your production workflow (anilox, plate type, consumables... including the standard you want to print towards).

   See *Printing Condition Configuration Steps* on page 44.

2. Fingerprint your press using the Print Control Wizard.

   The Print Control Wizard guides you through the steps necessary to make and interpret a print sample for your ink set.

Based on your input and the results of the print sample, it gives you the best curve and screen to use for your inks.

See *Plate and Press Calibration* on page 51, *White* on page 62 and *Printing* on page 65.

3. The Print Control Wizard generates a **printing condition** containing curve(s) and screen(s) tailored to your production workflow.

   See *What is a Printing Condition?* on page 23.

4. You use that printing condition when RIP'ing your jobs with Imaging Engine to get great results on press.

   See *Using a Printing Condition in Your Workflow* on page 294.

3. What is a Printing Condition?

The Print Control Wizard will guide you in creating a **printing condition**. This printing condition will:

- describe your exact production workflow (plate-making workflow and printing setup) and the way it prints,
- include the standard you want to print towards (an ISO standard, linear printing...),
- result in the best possible *curves* and *screens* to achieve the quality of that standard with your production workflow.

Important:

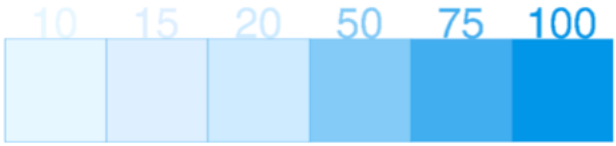
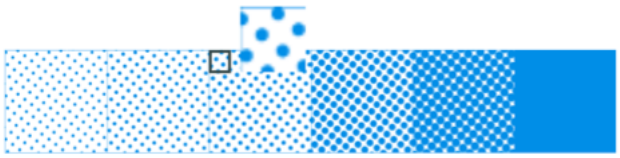
After making a printing condition, you should use it every time you print with that production workflow.

If you make changes to your production workflow (for example you print on a different substrate, or you switch to a different ink vendor), we recommend you edit your printing condition or make a new printing condition and use that instead.

3.1. Curves for Controlling Dot Gain

3.1.1. What is Dot Gain?

When printing a job, the dots tend to print larger on the press than on the plate, which makes the output darker than the original file.

Original job	
Plate	
Print	

This is due to different factors:

- the type of ink: the more fluid the ink is, the more it will spread under pressure of the press.
- the type of substrate: paper with a rougher and more porous surface (like uncoated paper) reflects less light, making the printed area look darker.
- the type of press: flexo presses have a high dot gain as they put significant pressure on the substrate.

3.1.2. What is Dot Gain Compensation?

To compensate for dot gain and have the printed output look like the original file, you use **dot gain compensation (DGC)**. This consists in making the dots on the plate smaller, so that with dot gain they print to the correct density.

	Dot on plate	Dot on press
Without DGC		
With DGC		

You apply dot gain compensation by using a curve, which can be:

- a classic dot gain compensation curve (also called **DGC curve**), which defines which percentage to use on plate for each desired percentage on press.

  See *Dot Gain Compensation Curves* on page 25.

- a **PressSync curve**: PressSync curves are predefined compensation curves that can cover the dot gain compensation needs of most presses, while significantly reducing the complexity of dot gain compensation in workflows.

  See *PressSync Curves* on page 26.

  The Print Control Wizard generates **flexible PressSync curves**, that contain additional parameters to address specific flexo printing challenges in the highlights and shadows.

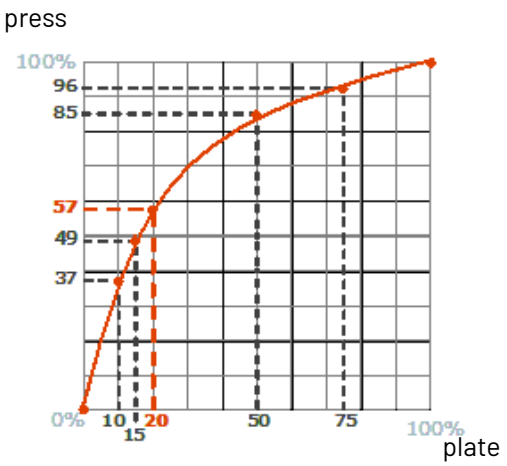
See *Flexible PressSync Curves* on page 27.

3.1.3. Dot Gain Compensation Curves

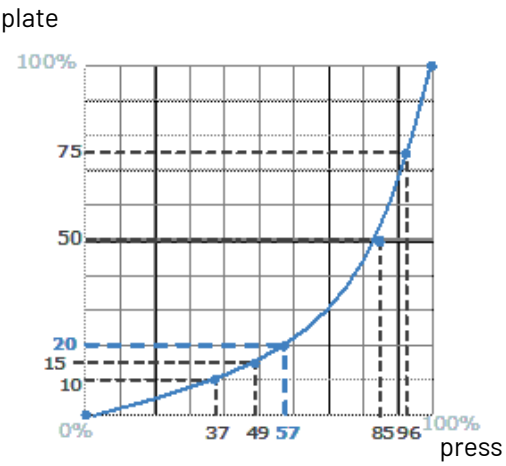
Traditionally, you apply dot gain compensation by using a dot gain compensation curve, which defines which percentage to use on plate for each desired percentage on press.

In the example below, you see how a press prints without any dot gain compensation in the **dot gain curve** at left: a 20% on the plate prints to 57% on press. 57% on the plate would print to almost 90% on press.

At right, you see the **dot gain compensation curve** used to make the press print to the expected value in the job: to print a 57% on press, a 20% will be used on the plate. To print a 20% on press, you would need about 5% on the plate.



Dot gain curve



Dot gain compensation curve

Creating a Dot Gain Compensation Curve

You can create dot gain compensation curves in Curve Pilot (for more information, see the Curve Pilot User Guide: *https://www.esko.com/en/support/product?id=Curve%20Pilot*).

Dot gain compensation curve files have the `.dgc` extension.

3.1.4. Reference Curves

Reference curve is a dot gain compensation curve can serve as your printing reference target. This curve can be used as the desired dot gain compensation curve. The compensation curve is recalculated automatically based on the reference curve.

For more information, see the Curve Pilot User Guide: *https://www.esko.com/en/support/product?id=Curve%20Pilot*.

3.1.5. PressSync Curves

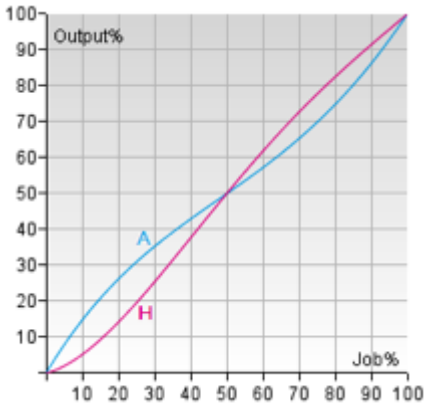
Another type of compensation curve is the PressSync curve.

PressSync curves are predefined compensation curves that can cover the dot gain compensation needs of most presses, while significantly reducing the complexity of dot gain compensation in workflows.

Slope and Mid-tone Compensation

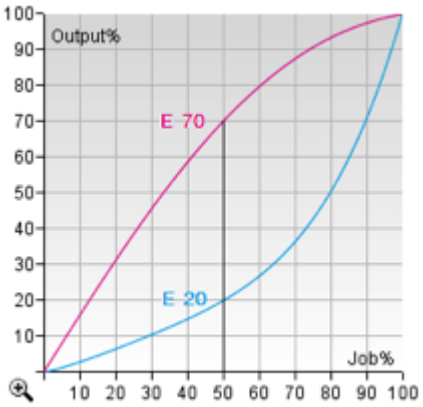
Curves are defined by a letter and a number.

- The letter (A to H) describes how the press behaves in the highlights and shadows (the slope): an A curve makes the press print darker in the highlights and lighter in the shadows (for presses who have the opposite problem), while an H curve, on the contrary, makes the press print lighter in the highlights and darker in the shadows.



An E curve is halfway in between and has a straight slope: it corrects the output the same way throughout the range. Use it for presses whose output is consistent in the highlights, mid-tones and shadows.

- The number indicates how much the 50% dot (mid-tone) prints to: an E20 curve compensates the 50% dot to 20%, while an E70 curve compensates 50% to 70%.



Creating a PressSync Curve

You cannot create PressSync curves, they are predefined. There are 400 different PressSync curves, to match most dot gain compensation needs.

If you wish, you can see each PressSync curve on a graph in PressSync Pilot (for more information, see the Curve Pilot User Guide: *https://www.esko.com/en/support/product?id=Curve%20Pilot*).

Flexible PressSync Curves

A flexible PressSync curve is a specific type of *PressSync curve* made for managing the tone reproduction of flexo printing environments.

On top of the *letter and number* defining the standard PressSync curves, a flexible PressSync curve contains options to address specific flexo printing challenges.

Reproducing Highlights

Flexo highlights are often too sharp against the substrate and/or unstable, which can be difficult to adjust using standard PressSync curves:

- For some ink/substrate combinations, the contrast between the substrate and the lightest printed tone is high: even a very small halftone dot leaves a strong ink impression.
- On top of that, very small dots often don't print in a stable way on flexible substrates, so the minimum dot size is increased to get stable highlights.

Flexible PressSync curves contain parameters to address those highlight issues.

Reproducing Shadows

The most common issue with shadows in flexo is tone reversal, where a high percentage (for example 95%) prints darker than the solid (100%).

Flexible PressSync curves also contain parameters to address tone reversal issues in the shadows.

You can find more information about flexible PressSync curves parameters in the **Curve Pilot documentation**. See *https://www.esko.com/en/support/product?id=Curve%20Pilot*.

Note: Adjustment curves generated by the Print Control Wizard are flexible PressSync curves. They are embedded in a curve strategy (.icpro) to allow the use of multiple curves in a Print Condition.

Note: The flexible options for highlights and shadows are displayed between brackets in the Print Control Wizard, for example F35 **(Min3.38%,h4,s6)**

3.1.6. Curve Strategies

Dot gain within the same print job can vary depending on the screening parameters, inks, and other factors.

A curve strategy allows you to combine different DGC curves and/or PressSync curves in 1 file (.icpro). A complete curve strategy contains a compensation curve for every practical combination of inks, ruling, screens, and/or any other operating parameters affecting dot gain used on your press.

You do not need a separate curve strategy for each new print job. Well-designed strategies are applicable to many jobs as long as the printing conditions are similar.

Note:

Curve strategies (.icpro) generated by the Print Control Wizard contain a PressSync curve per ruling that is added to your printing condition.

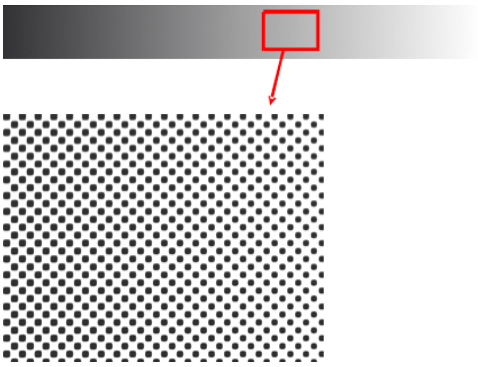
The PressSync curve contains a curve per ink present in the printing condition.

3.2. Screens for Controlling Ink Lay Down

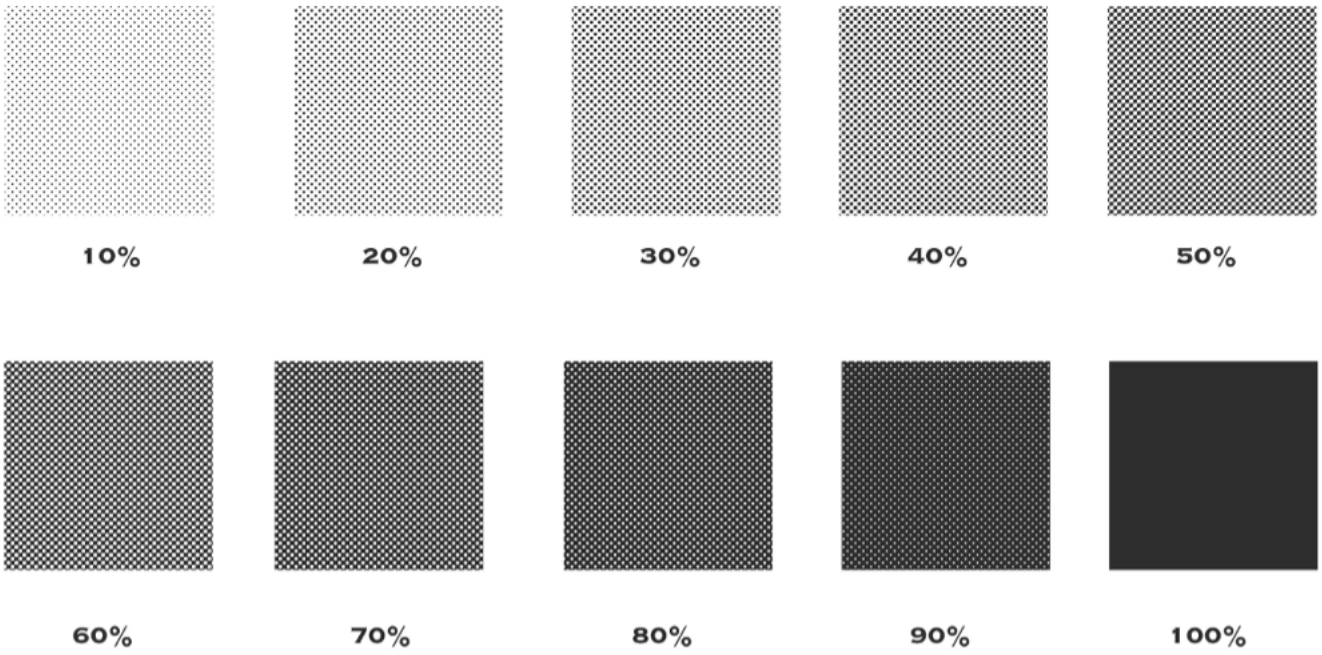
3.2.1. What is Screening?

When printing an image on press, each ink (Cyan, Magenta, Yellow, Black and any additional ink) is laid out separately on the substrate, and the super-imposition gives the final colors.

At a high detail level, the press can either print ink or not print ink, so to create differences of color intensity within one ink, you use a small scale pattern of dots of varying size, called a screen.

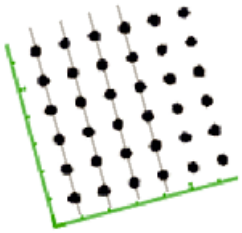


When viewed from a regular distance, this pattern looks like a lighter or darker shade of that color, depending on how big the dots are (what percentage of the area they cover).

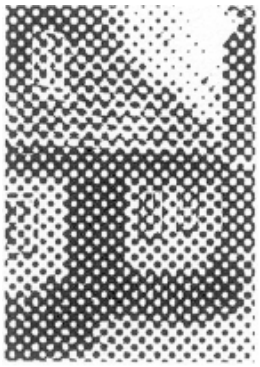


Screen Ruling

The screen can also be coarser or finer, so that you have to be more or less far away to see it as shades of a color. This depends on how many lines of dots can fit in a certain measurement. This is expressed in lines per inch (**lpi**), lines per centimeter (**lpcm**) or lines per millimeter (**lpmm**), and is called the **screen ruling**.



A low screen ruling as below left looks very coarse, and the quality improves as the screen ruling gets higher.



25 Lpi

45 Lpi

85 Lpi

3.2.2. Types of Screens

The Print Control Wizard will generate custom screens for your production workflow, so that you get the best possible printed results.

All screens generated by the Print Control Wizard use 1 or more Esko screening technologies:

- Pixel+ for surface screening in solids
- Pixel+ for Crystal dot shape:
- FM in the highlights
- support dots

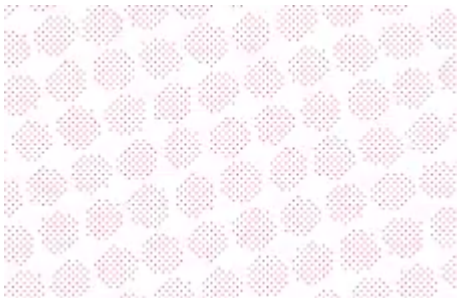
Depending what Esko screening technologies are combined, you get 3 types of screens: Crystal V, Crystal V C or Crystal V NP (NP stands for Non-Pixel+). The Crystal screens without V in the name are legacy screens created in Print Control Wizard version 22.03 or older. See *Legacy Calibration* on page 93.

Crystal V and Crystal V C Screens

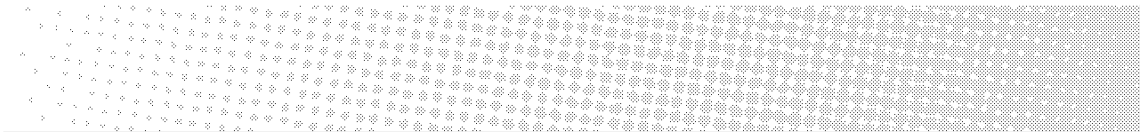
The Crystal V and Crystal V C screens are part of Esko's latest screening family, where the Pixel+ technology is used throughout the tonal range.

Each dot is made of individual pixels, that are "boosted" on the CDI to make printable dots.

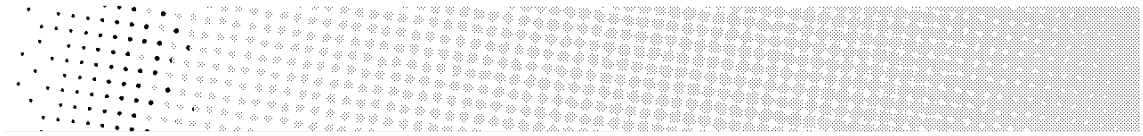
Surface screening in solids, FM in the highlights and support dots are optional, but could be added to further improve quality.



Crystal V screens use the Pixel+ technology throughout the tonal range.



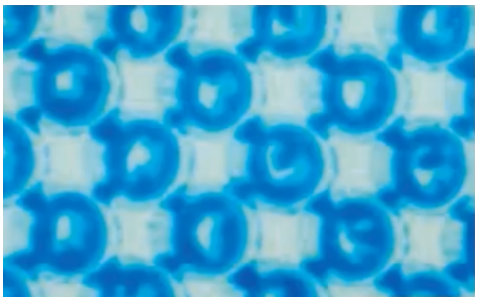
Crystal V C screens use solid dots in the highlights, and transition to Pixel+ dots for the rest of the tonal range.



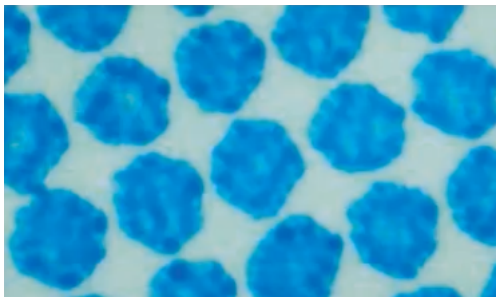
Crystal V C screens can produce finer highlights, but Crystal V screens can be more stable. The optimal screen to use depends of your particular production workflow.

When using Crystal V/Crystal V C screens, you don't need to use object-based screening (different screens for individual objects in your file), as they give good results in all areas:

- They provide a smooth transition from the solids into the shadows and mid-tones, with reduced dot bridging.



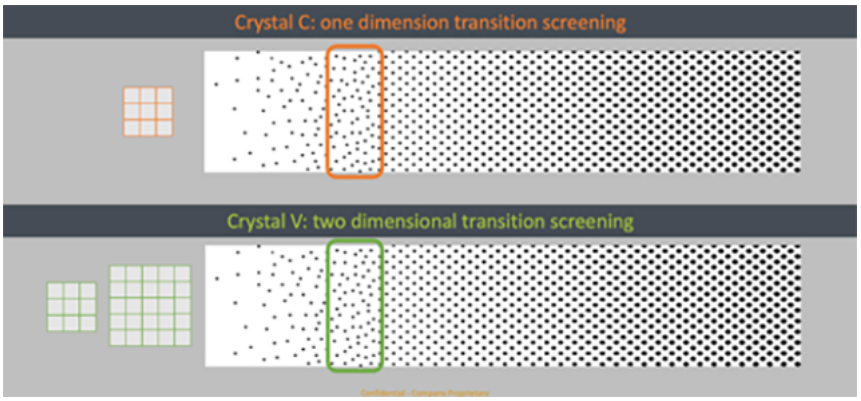
dot bridging with a circular dot



no dot bridging with a crystal screen

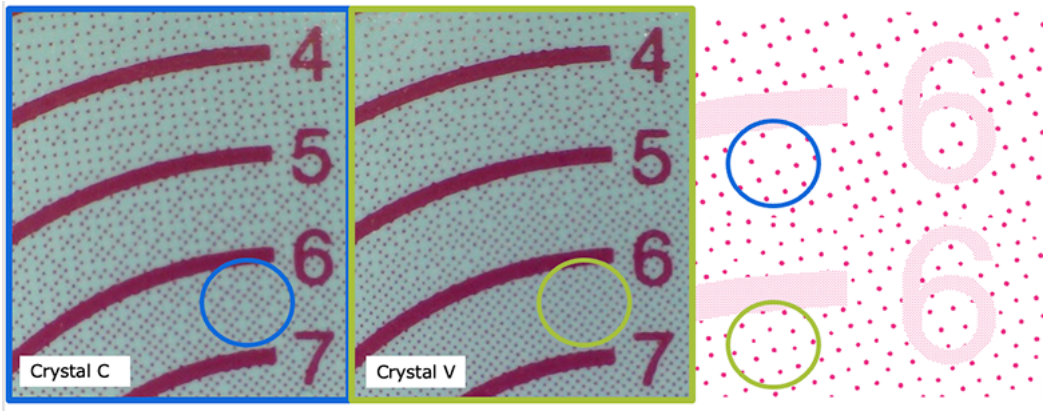
- They produce stable highlights that fade out to zero more smoothly than with other screening technologies.

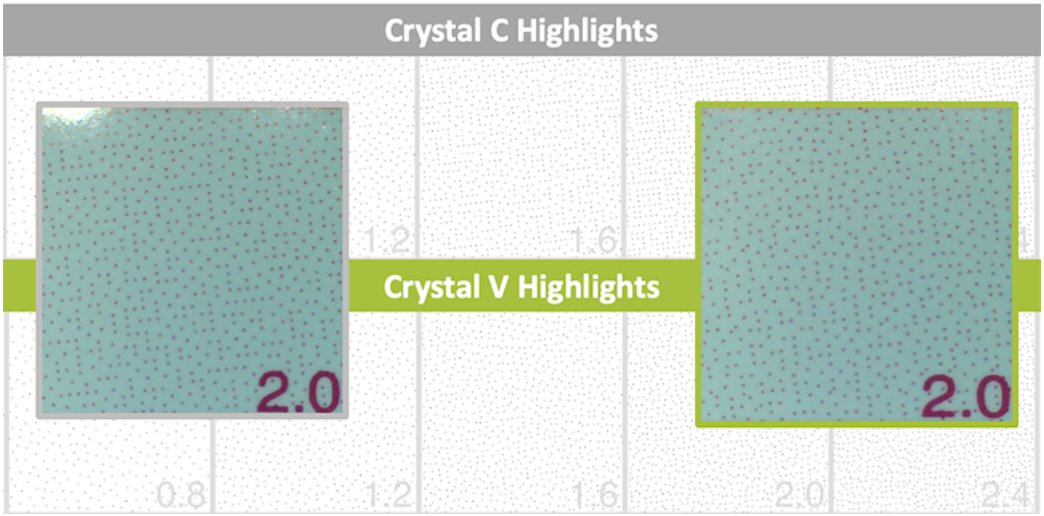
Crystal V is the next generation of Crystal Screens, introduced in 21.11 for Corrugated and in 22.07 for Flexibles and Labels. It's improving the highlights by using 2 mindots (hence the V for variable dot) and by using a dance effect.



The 2 mindots are called **Mindot** and **Transitional Mindot**. See *Evaluating the Highlights* on page 75 for more information.

In the below screenshots, you see the difference between a legacy Crystal C and the current Crystal V (C):





The current Crystal V (C) on the right shows a less grainy effect in the highlights.

Crystal NP screens

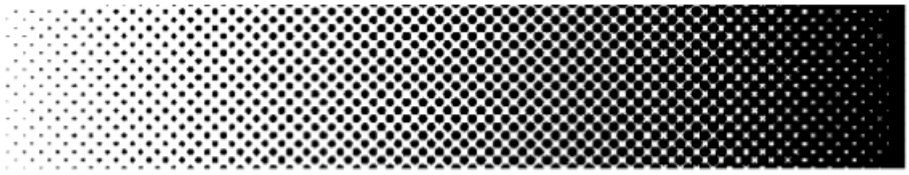
The Crystal NP (Non-Pixel+) screens are using classic dot shapes in the tonal range.

To further improve quality, surface screening in solids, FM in the highlights and support dots could be optionally added.

You can choose between:

Circular (short name: C)

Circular dots grow continuously circular until 100%. They are commonly used in flexography.



This dot shape is also called **Circular (Euclidean)**, and Print Control Wizard screens using this dot shape are called **Crystal NP C (Circular)**.

This dot gives good results in many situations. However in some printing conditions the holes in the shadows can fill in, which can result in unstable or high dot gain, and cause a loss in tonal range.

If you experience this, you should choose the *Round Fogra* dot instead.

Elliptical (short name: E)

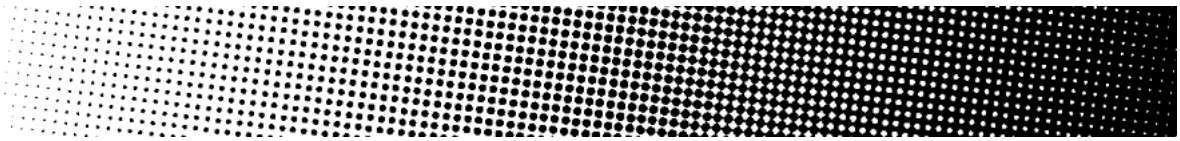
This dot shape is a more elliptical version of the *Round Fogra* dot.

For these dots, the first touching point is around 35%. Between 35% and 65%, a chain is formed with the same orientations as for the Round Fogra dots.

Print Control Wizard screens using this dot shape are called **Crystal NP E (Elliptical)**.

Double Circular (short name: F)

Screens using the Double Circular dot have circular dots in the highlights and mid-tones, and circular holes in the shadows.



Print Control Wizard screens using this dot shape are called **Crystal NP F (Double Circular)**.

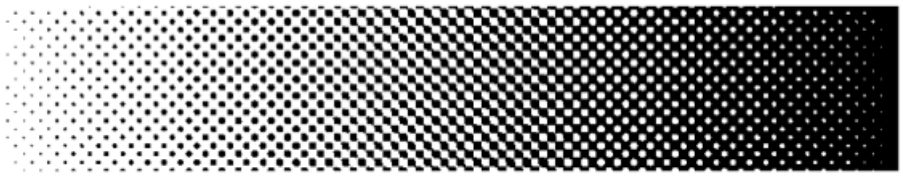
Note that this screen can cause irregular ink bridging ("bridges" between dots) around the mid-tones, which can give unstable dot gain in that tonal range.

If you experience this, you should choose the *Round Fogra* dot instead.

Round Fogra (short name: R)

The Round Fogra dot closely resembles the *Elliptical* and *Circular* dots, and can be used the same way.

It goes from a round dot to a round hole, with a square/diamond shape in the mid-tones.



As with elliptical dots, the touching of the dots at the four corners at 50% (leading to a 50% intensity jump) is avoided by using a more elongated dot shape so that the dots first touch around 45% forming a chain and touching for the second time around 55%. This causes less artefacts and less dot gain when printing.

The Round Fogra dot can be used for virtually all printing processes.

Print Control Wizard screens using this dot shape are called **Crystal NP R (Round Fogra)**.

4. The Print Control Wizard User Interface

The **Print Control Wizard** is completely integrated in the **Color Pilot** application, Esko's application for creating and managing color data (inks, proofer profiles, press profiles...).

In this user guide we only discuss the items related to the Print Control Wizard.

Please consult the Color Pilot user guide for more details on the full interface and features: *https://www.esko.com/en/support/product?id=Color%20Pilot*

Note:

Until version 18.1.1, the Print Control Wizard was a separate application, with its own installation procedure.

If you are using version 18.1.1 or older, please use the 18 or 18.1 user guide: *https://www.esko.com/en/support/product?id=Print%20Control%20Wizard*.

When you have the correct licenses, you will see in the navigation pane (on the right side of the user interface) a view called **Printing**, containing 3 categories:

- **Screens**. See *Screens Explorer* on page 36.
- **Curves**. See *Curves Explorer* on page 37.
- **Printing Conditions**. See *Printing Conditions Explorer* on page 39.

4.1. General Configuration

4.1.1. Connect to Esko server

All data generated by Print Control Wizard should be stored on the Automation Engine server, or the Imaging Engine server if no Automation Engine is present.

Why?

- To be able to use the curves, screens and printing conditions in Imaging Engine.
- The centralized data can be used by other Esko applications, for example editors (ArtPro+, Plato...) and Pilots.
- All data is part of the Automation Engine full back up.

To know more about connecting to Esko server, see the **Servers** section in the *Color Pilot User Guide*.

4.1.2. Preferred Units

1. Go to **Edit** > **Preferences** > **Test Charts**.
2. Choose whether the **Units** shown in the user interface should be **Decimal** or **Imperial**.

4.1.3. Printing Conditions

1. Go to **Edit** > **Preferences** > **Printing Conditions**.
2. You can enable or disable **Legacy Calibration**.

   Legacy Calibration is the calibration method that was available in previous versions of the Print Control Wizard(version 22.03 or older). It supports older Crystal screens like Crystal, Crystal C and Crystal NP. It does not support newer Screening technologies like Crystal V screens which contain variable mindots in the highlights.

4.2. Screens Explorer

When you select **Screens** in the navigation pane, you see a list of all screens available on your server.

For each screen, you can see:

- the **Screen Name**,
- a unique **Code** (short name),
- the **Kind** of screen it is (Crystal, static, custom or HD Flexo),
- any **Keywords** you assigned to the screen.

The library can contain 4 kinds of screens, each with its own specific icon:

- Static screens, installed together with Automation Engine/Imaging Engine.
- HD Flexo screens generated by the HD Flexo application.
- Custom screens generated by the ScreenManager application.
- Crystal screens generated by the Print Control Wizard.

From the **Screens** explorer, you can make changes to your screens database.

Note: If you are *working with a data center*, you will need to unlock the database before making any changes to your screens. See *Making Changes to the Database* for more information.

You can:

- Open a screen: right-click it and select **Open Screen...** (or double-click it).
  - an HD Flexo screen will be opened in the HD Flexo application (and selected in the application's screens list to see its details),
  - a custom screen will be opened in ScreenManager (in edit mode),
  - you cannot open static screens or Crystal screens.

  Opening a screen temporarily disables Color Pilot and launches either HD Flexo or ScreenManager (depending on the screen). After closing this application you can work in Color Pilot again.
- Delete a screen: right-click it and select **Delete** (or select it and press the **Delete** key) then click **Yes** to confirm.

Note:

- Static screens are always locked ( ), you cannot delete, rename, export or import them.
- If the screen has a link to another object (for example, a Crystal screen used by a printing condition), you will see a warning showing where it is being used, and you will not be able to delete or rename it.

  In this case, first delete the printing condition(s) using the screen, then you can delete the screen.

- Rename a screen: right-click it and select **Rename** (or select it then click its name), then enter a new name and click **Enter**.

  Note:

  - You cannot rename HD Flexo screens, as they are predefined in the HD Flexo database.
  - You cannot rename, export or import Crystal screens, as they are created by the Print Control Wizard.

- Export a screen (to share with another Color Pilot application): see *Exporting Single Items*.
- Import a screen that was previously exported: see *Importing Single Items or a Complete Library*.
- See if the screen is used in another object: right-click it and select **Show Links**.
- See where a screen is used: right-click it and select **Show Links** to see which printing condition use it.
- Add/remove keywords to find your screen more easily: see the **Keywords** chapter in the *Color Pilot user guide*.
- Create a new screen.

  You can either:

  - Create a **New HD Flexo Screen** : this creates a blank screen in HD Flexo.
  - Create a **New Custom Screen** : this creates a blank screen in ScreenManager.

  This temporarily disables Color Pilot and launches the relevant application.

  When you are done, save your screen and close your screening application to go back to Color Pilot. You can see your new screen listed in the **Screens** explorer.

4.3. Curves Explorer

When you select **Curves** in the navigation pane, you see a list of all curves available on your server.

For each curve, you can see:

- the **Curve Name**,
- the **Kind** of curve it is (curve, curve strategy or PressSync curve set),

- any **Keywords** you assigned to the curve.

The library can contain 4 kinds of curves, each with his own specific icon:

- **Curve** : a single curve for dot gain compensation, see *Dot Gain Compensation Curves* on page 25.
- **Reference Curve** : a single target dot gain compensation curve, see *Reference Curves* on page 25.
- **PressSync Curve set** : a set of predefined compensation curves, see *PressSync Curves* on page 26.
- **Curve Strategy** : a group of curves and rules for automatic curve selection, see *Curve Strategies* on page 28.

From the **Curves** explorer, you can make changes to your curves database.

Note: If you are *working with a data center*, you will need to unlock the database before making any changes to your curves. See *Making Changes to the Database* for more information.

You can:

- Open a curve in the Curve Pilot application: right-click it and select **Open in Curve Pilot**. This temporarily disables Color Pilot and launches Curve Pilot.

  To know how to view and edit the curve's details, see the *Curve Pilot user guide*.

  Note:

  We **strongly advise against** editing curves and curve strategies created with the Print Control Wizard in Curve Pilot.

  Curve Pilot is an expert tool with a lot of functionality that is not needed and therefore not supported by the Print Control Wizard.

  Wrong usage of the tools could generate issues in your printing condition.

  Use **Update Curves** in your printing condition instead. See *Update Curves* on page 234.

- Delete a curve: right-click it and select **Delete** (or select it and press the **Delete** key), then click **Yes** to confirm.

  Note: If a curve has a link to another object (for example, it is used in a curve strategy), you will see a warning showing where it is being used, and you will not be able to delete or rename it.

- Rename a curve: right-click it and select **Rename** (or select it then click its name), then enter a new name and click **Enter**.
- Duplicate a curve: right-click it and select **Duplicate** (this adds `_(2)` to the name of the duplicate but we recommend you rename it to something meaningful).
- Export a curve (to share with another Color Pilot): see *Exporting Single Items*.
- Import a curve that was previously exported: see *Importing Single Items or a Complete Library*.
- See if the curve is used in another object: right-click it and select **Show Links**.
- Convert reference curves to dot gain compensation curves: right-click the Reference Curve and select **Save as Curve**.
- Convert dot gain compensation curves to reference curves: right-click the Curve and select **Save as Reference Curve**.

- Add/remove keywords to find your curve more easily: see the **Keywords** chapter in the *Color Pilot user guide*.
- Create a new curve in Curve Pilot. This temporarily disables Color Pilot and launches Curve Pilot.

  You can either:

  - **Create a New Curve** : this creates a blank `.dgc` curve in Curve Pilot.
  - **Create a New Curve Strategy** : this creates a blank curve strategy in Curve Pilot.
  - **Create a New PressSync Curve Set** : this creates a blank PressSync curve in Curve Pilot.

  When you are done, save your curve, curve strategy or curve set, and close Curve Pilot to go back to Color Pilot. You can see your new curve listed in the **Curves** explorer.

4.4. Printing Conditions Explorer

When you select **Printing Conditions** in the navigation pane, you will see a list of all printing conditions available on your server. The library can contain:

- Legacy printing conditions from older versions (18.1.1 or lower): these are greyed out and locked ( ), they cannot be edited.
- Unfinished printing conditions ( ): these cannot be used in production yet, but can be edited.
- Finished printing conditions (created with single color calibration , or full ink set calibration): these are ready to use in production, and can be edited.

When you see this icon , the printing condition has an unfinished task (you have saved your progress in a wizard session but not completed the wizard).

The library also shows the essential parameters for each printing condition, if you already filled them in:

- **Ink Set**: the ink set for which you made the printing condition.

  This is filled in for printing conditions made for *Flexibles*, *Labels*, and *High Quality Post Print Corrugated*.

  Printing conditions made for *Standard Post Print Corrugated* are not made for a pre-determined ink set (you typically enter parameters for all inks, and you can enter different parameters for specific inks if desired).
- **Application**: this can be **Flexibles**, **Labels** or **Corrugated**, depending on the *type of printing condition* you made.
- **Substrate**: the substrate for which you made the printing condition (this also depends on the type of printing condition you made).
- **Plate type**: the plate type you use in your printing process, and for which you made the printing condition.
- **Date Modified**: the date and time at which you last made changes to the printing condition.
- **Keywords**: any keywords associated with the printing condition (see the **Keywords** chapter in the *Color Pilot user guide*).

Tip: You can sort the printing conditions according to a parameter: click on the header of that column.

From the library you can:

- Open a printing condition: right-click it and select **Open**, or double-click it.
- Delete a printing condition: right-click it and select **Delete** (or select it and press the **Delete** key), then click **Yes** to confirm.

  Note: When deleting a printing condition:

  - the corresponding curve (`.icpro`) is also deleted (as it is unique for this printing condition),
  - the corresponding screen can only be deleted if it is not used by another printing condition.

- Rename a printing condition: right-click it and select **Rename** (or select it then click its name), then enter a new name and click **Enter**.
- Duplicate a printing condition: right-click it and select **Duplicate** then enter a new name and click **Enter**.
- Export a printing condition (to share it with another Color Pilot application): see *Exporting Single Items*.
- Import a printing condition that was previously exported: see *Importing Single Items or a Complete Library*.
- Show more details about the printing condition. See *Details Pane* on page 40.
- Save a report of that printing condition. See *Saving a Report* on page 287.
- Update curves of that printing condition. See *Update Curves* on page 234.
- Add a ruling to that printing condition. See *Add a Ruling* on page 241.
- Remove unfinished task: cancel an unfinished task ( ) you saved for the printing condition.
- Add/remove keywords to find your printing condition more easily: see the **Keywords** chapter in the *Color Pilot user guide*.

  You can also add or remove keywords from read-only (legacy) printing conditions.

4.4.1. Details Pane

To quickly get more information about a printing condition, you can open the details pane: right click a printing condition and select **Show Details**. You can then see more details on the right-hand side.

All Printing Conditions

For all printing conditions, you can see:

- the printing condition's **Name**,
- the printing condition's **Status** (whether it's ready for production or not). When the printing condition is **Ready for Production**, you can use it in Imaging Engine.

Flexibles and Labels Printing Conditions

For *Flexibles* and *Labels* printing conditions, you can also see:

- which press you made the printing condition for (**Press Brand**),
- which **Substrate** you made the printing condition for,

- the **Printing Standard** you are printing towards,
- your **Imager Type**,
- the **Exposure Type** you are using,
- the **Plate type** you are using.

Note: You can open the *Plate Making* parameters from here: click **Open Plate Making**.

If you have already determined screens and curves for your printing condition, you can also see the **Print Calibration Details**, for every ink in the printing condition's ink set:

- the ink **Name** and **Ink Book**,
- the **Screen Name** (the screen code and full screen name of the screen to use for that ink),
- the **Curve**'s short name (excluding the advanced parameters) for each ruling that is defined.

Note: You can open the *Printing* parameters from here: click **See more calibration details**.

Standard Post Print Corrugated Printing Conditions

For *Standard Post Print Corrugated* printing conditions you can also see:

- the **Print Production Method**,
- which press you made the printing condition for (**Press Brand**),
- which **Board Liner** material you made the printing condition for,
- your **Imager Type**,
- the **Exposure Type** you are using,
- the **Plate Type** you are using.

Note: You can open the *Plate Making* parameters from here: click **Open Plate Making**.

If you have already determined a screen for your printing condition, you can also see a table that shows, for every ink defined in the printing condition:

- the ink **Name** and **Ink Book**,
- the **Screen Name** (the screen code and full screen name of the screen to use for that ink).

Note: You can open the *Press and Inks* parameters from here: click **Open Press and Inks**.

High Quality Post Print Corrugated Printing Conditions

For *High Quality Post Print Corrugated* printing conditions you can also see:

- the **Print Production Method**,
- which press you made the printing condition for (**Press Brand**),
- which **Board Liner** material you made the printing condition for,

- the **Printing Standard** you are printing towards,
- your **Imager Type**,
- the **Exposure Type** you are using,
- the **Plate Type** you are using.

Note: You can open the *Plate Making* parameters from here: click **Open Plate Making**.

If you have already determined screens and curves for your printing condition, you can also see the **Print Calibration Details**, for every ink in the printing condition's ink set:

- the ink **Name** and **Ink Book**,
- the **Screen Name** (the screen code and full screen name of the screen to use for that ink),
- the **Curve**'s short name (excluding the advanced parameters) for each ruling that is defined.

Note: You can open the *Printing* parameters from here: click **See more calibration details**.

Unfinished printing conditions ( ) will only show details from the parts that already have been completed.

Tip: You can leave the details pane open when you navigate through the printing conditions. The details pane can be closed by clicking the **X** icon in the top right corner.

4.4.2. Selected Item Pane

When you select a printing condition in the *Printing Conditions explorer*, you can see some basic information about it in the **Selected Item** pane, in the application's lower left corner:

- the printing condition's **name**,
- the date (and time) it was **created on**, and **modified**,
- any **keywords** you have associated with this printing condition,
- any **description** you have entered for this printing condition.

5. Creating and Managing Printing Conditions

5.1. Types of Printing Conditions

Depending on your license(s), you can create up to four types of printing conditions, corresponding to three different flexo printing workflow **applications** (the type of jobs and substrates that you usually work on):

- Printing conditions for **Flexibles**, if you are printing on flexible packaging material (for example for plastic bags or pouches). See *Creating a Printing Condition for Flexibles* on page 43.
- Printing conditions for **Labels**, if you are printing labels (on a narrow web substrate). See *Creating a Printing Condition for Labels* on page 113.
- Printing conditions for **Corrugated**, if you are printing on corrugated material (for example packaging cardboard). In this case, you can create either a printing condition for either:
  - **Standard Post Print** Corrugated, if you only print solids, in one or more spot colors, but no screened images. See *Creating a Printing Condition for Standard Post Print Corrugated* on page 171.
  - **High Quality Post Print** Corrugated, if you print in multi color (CMYK or more), and with high quality images on your corrugated material. See *Creating a Printing Condition for High Quality Post Print Corrugated* on page 189.

Note:

If you already had a previous version of the Print Control Wizard (18.1.1 or earlier), you may also still have legacy printing conditions (for flexibles and/or for labels).

You can still use these printing conditions in production, but you will not be able to edit them anymore.

You can see all of these printing conditions in the *Printing Conditions Explorer*.

5.2. Creating a Printing Condition for Flexibles

If you are printing on flexible packaging material (for example for plastic bags or pouches), you should create a printing condition for **flexibles**.

If you are printing labels (on a narrow web substrate), you should create a printing condition for **labels**.

Note: To create a printing condition for flexibles and/or labels, you need to have the respective corresponding licenses.

1. In the **Printing Conditions** library, click the **New Printing Condition** button in the bottom toolbar.
2. In the **New Printing Condition** dialog:

a) Enter the **Printing Condition Name** you want to use.

We recommend you use a descriptive name, that includes some of your workflow's key settings, for example `Press Type - Plate Type - Substrate`.

b) Select the **Application** of your flexo printing workflow (the type of jobs and substrates that you usually work on).

Note: Depending on your license, you may see one or more options here.

- Select **Flexibles** if you are printing on flexible packaging.
- Select **Labels** if you are printing labels (on a narrow web substrate).

Note: The selection of the **Application** is not just informative, it influences some of the steps during calibration: different choices in drop down menu's, charts will be adapted in size and design, ...

c) Select the **Substrate**. See *Substrate* on page 48

d) Select the **Ink Set**. See *Ink Set and Printing Standard* on page 49

Note: It is still possible to change the substrate and ink set after this dialog is closed.

e) Click **OK**. A new printing condition is created, and the configuration steps are shown.

Note: The printing condition is immediately saved into the database.

3. Complete all configuration steps: see *Printing Condition Configuration Steps* on page 44
4. After finishing the last configuration step **Screens and Curves**, you can:
   - Have a final look at the results and parameters of the printing condition: see *Reviewing the Printing Condition*
   - Create a detailed report of the printing condition: see *Saving a Report* on page 287

Over time, as your equipment ages and your production fluctuates, you may need to adapt your printing condition, see *Editing Flexibles or Labels Printing Conditions* on page 232.

5.2.1. Printing Condition Configuration Steps

At the top, a banner displays the status of the printing condition and a brief description of the selected configuration step.

Below the banner you see an overview of all configuration steps:

Under PROPERTIES	Under CALIBRATE
• *General* on page 46 • *Plate Making* on page 46 • *Substrate* on page 48 • *Ink Set and Printing Standard* on page 49	• *Plate and Press Calibration* on page 51 • *White* on page 62 • *Printing* on page 65

Under PROPERTIES	Under CALIBRATE
• *Press* on page 50	

To navigate between the configuration steps, you have two options:

- Select a **configuration step**
- Click the **navigation arrows** on the left and right of the pane: < >

Unfinished printing conditions have an indicator next to each step:

- ✔ : all mandatory parameters are filled in,
- ✱ : you still need to fill in some or all mandatory parameters,
- ⊖ : this configuration step is not available until some mandatory parameters in previous steps are filled in.

Note:

- Mandatory parameters in the configuration steps are marked with an orange star ✱. After filling them in they get a green check mark ✔. They need to all be green before the configuration step is marked as completed.
- The progress of some steps (selection options, charts...) depend on the mandatory parameters from previous steps. Changing a parameter will require to redo the step.

Note:

It is not possible to edit any of the selection lists in the printing condition (substrate type, plate type...). Only parameters that have been tested and approved can be selected.

The selection a step can limit the selection possibilities in one of the next steps.

The activated licenses can also influence the selection possibilities.

At any point in the process you can stop working on your printing condition and continue later. Use the buttons **Close** and **Quit Now and Continue Later**. Don't forget to **Save** when asked.

When you are ready to continue, open the printing condition by right-clicking it and selecting **Open**, or by double-clicking on it. The first step that is incomplete will automatically be selected, to remind you where to continue.

Note: When you open a finished printing condition, the interface is a little different. See *Reviewing the Printing Condition*.

If you want to remove your latest modifications in the printing condition, click the **Revert** button in the bottom tool bar. Be aware that **all** modifications since the last time you saved will be removed.

We recommend to regularly save changes (for example after every step) to make better use of **Revert** and avoid unnecessary loss of time and data.

General

The first configuration step in the list shows the **Application** that has been chosen in the **New Printing Condition** dialog. It can no longer be changed.

See *Creating a Printing Condition for Flexibles* on page 43.

You have the opportunity to enter a **Description** and add/remove **Keywords**, but this is not mandatory.

Note:

Keywords added via the Printing Conditions Explorer will also be visible here.

See the **Keywords** chapter in the Color Pilot user guide: *https://www.esko.com/en/support/product?id=Color%20Pilot*.

Plate Making

Specify in this configuration step what Flexo plates will be used and the way the plates are made (image, expose, develop).

1. Select your **Imager Type**:
   - **CDI Crystal**: the new generation of Esko imager, using the Crystal technology
   - **CDI Spark**: an older generation of Esko imager

   For more information about Esko's different CDI models: *https://www.esko.com/en/products/digital-flexo-platemaking/cdi-spark/models*
2. Select your **Optics**:
   - For **CDI Crystal**:
     - Optics40 V2
     - Optics80 V2
     - Optics40 V3
     - Optics80 V3
     - Optics40 V3+
     - Optics80 V3+
   - For **CDI Spark**:
     - Optics15
     - Optics25
     - Optics40
     - Optics80
     - Optics40 V2
     - Optics80 V2
     - Optics40 V3
     - Optics80 V3
     - Optics40 V3+
     - Optics80 V3+

Tip: If you don't know your CDI's optics technology, you can find it in the tables below (it is linked to its maximum imaging speed).

Table: CDI Spark (Models 2530, 4835, 4260 and 5080)

Maximum Imaging Speed	Optics Technology
1.5 m^2/hr	**Optics 15**
2.5 m^2/hr	**Optics 25**
4 m^2/hr	**Optics 40**, **Optics 40 v2**, **Optics 40 v3** or **Optics 40 v3+** (depending on the model)
8 m^2/hr	**Optics 80**, **Optics 80 v2**, **Optics 80 v3** or **Optics 80 v3+** (depending on the model)

Table: CDI Crystal (Models 4835 and 5080)

Maximum Imaging Speed	Optics Technology
4 m^2/hr	**Optics 40 v2**, **Optics 40 v3** or **Optics 40 v3+**
8 m^2/hr	**Optics 80 v2**, **Optics 80 v3** or **Optics 80 v3+**

3. **Resolution**:

   The resolution that is used to image the plates on CDI, is fixed at 4000ppi. The screen technologies in the Print Control Wizard (Pixel+, FM in highlights, ...) require this resolution.

4. Select your **Exposure Type**:

   - **Inline-UV**: Esko device that exposes inline the front of the plate directly after imaging,
   - **XPS** Crystal: Esko device that simultaneously exposes the front and back of the plate, using UV LEDs.
   - **Bank**: non-Esko exposure device, can be an analog or digital device.

   Note: To be able to guarantee a minimum quality, you can only select **XPS** for labels.

5. In **Description**, you can add information about your exposure devices, for example exposing times, what device (if you own several exposing devices of the same type) ...

   You can also add all other information that could not be specified in the default fields, information that is important to identify how the plates are created.

6. Select your **Plate Type**.

   A wide range of plate types from different manufacturers is available. All plates in the list are suitable for *your chosen application* (Flexibles or Labels), and tested and approved by Esko, to be able to guarantee a minimum quality.

   In the future more plate types could be added. Contact Esko support if your plate type is not in the list.

Some plate types are listed twice, each with a different developer. Make the selection of your developer type from this list.

7. Select your plate's **Thickness** if desired.

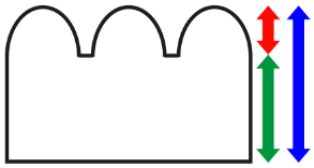
   Depending the plate type you selected, you will have a fixed list of plate thicknesses. Only plate thicknesses that are tested and approved by Esko will be available.

   In the future more thicknesses could be added. Contact Esko support if your thickness is not in the list.

8. Enter your **Relief Depth** if desired.

   This is the depth of the dots on your plate (or the difference in height between the printing surface and the floor of the plate).

   You can calculate your plate relief depth (in red below) by measuring your plate's thickness (in blue) and subtracting the plate floor's thickness (in green).



Note: To change the units, see *Preferred Units* on page 35.

9. **Developer**: The type of developer is automatically defined when you select the plate type. It can be:

   - **Solvent**
   - **Thermal**
   - **Water**

   For some plate types we support more than 1 developer type.

   Select your developer type in **Plate Type**.

Substrate

Define the substrate you are using for your printing condition.

1. Select your **Substrate Type**:

   - **Acrylic**: a substrate made of acrylate, polyacrylate or methyl methacrylate components, sold for example under the Perspex, Plexiglas, Lucite or Acrylite trade names
   - **PE**: a polyethylene, polyester, PET, PETG or HPDE substrate, sold for example under the Mylar, Melinex, Hostaphan or BoPET trade names
   - **Spun PE**: spun and bonded polyethylene, sold for example under the Tyvek trade name
   - **PP**: a polypropylene, PVC or vinyl substrate
   - **PS**: polystyrene
   - **Paper**

Note: Substrate type is already filled in from the **New Printing Condition** dialog, but can still be changed. See *Creating a Printing Condition for Flexibles* on page 43

2. Select your substrate's **Opacity**:
   - **Transparent**
   - **White Underprint**: where a white ink is printed under the other inks
   - **White Overprint**: where a white ink is printed on top of the other inks, for example for reverse printing
   - **Opaque**
3. Enter your substrate's **Thickness** in microns or mil, not mandatory.

   Note: To change the units, see *Preferred Units* on page 35
4. Add a more detailed **Description** of your substrate. Not mandatory, but highly recommended to add all data that identifies the substrate.

Ink Set and Printing Standard

Define what inks you are using on press, and what targets you want the printed result to match.

1. Select the **Ink Set** you are printing with.

   This can be **CMYK** or an expanded gamut printing ink set (for example **CMYK Orange Green Violet**), where the expanded gamut inks are part of the **ClassicColors** ink book.

   For more information about expanded gamut printing, please see *Equinox and Expanded Gamut Printing* in the Color Pilot documentation.

   Note:
   - The **Ink Set** is already filled in from the **New Printing Condition** dialog, but can still be changed. See *Creating a Printing Condition for Flexibles* on page 43
   - Compared to the previous versions of the Print Control Wizard software, it is not possible anymore to only use one ink. The minimum is CMYK.
2. Select the **Printing Standard** you want to match.

   The printing standard defines:
   - the expected color of the substrate and inks,
   - the target dot gain curves for each printing ink,
   - how to measure tone values.

   This target data will be used in the *Printing* configuration step .

   Tip: See *What is a Printing Standard* for more information about the different printing standards.
3. In the **Details** table you can see an overview of the inks in your selected ink set.

   For each ink, you can see more information about the target data in your selected standard:
   - the **Desired Curve**,

- the desired density or tone of the **50%** level,
- the target **LabCh** values for the **solid** inks.

Press

Adding information about your press setup is not mandatory, but highly advised.

For every setup it is important to gather as much information as possible, to better understand the setup conditions at a later time.

Note: As this configuration step is optional, the indicator will always be green ✔.

1. Enter the manufacturer name of your press (**Press Brand**).
2. Select your **Press Type**. It can be either:
   - **Central Impression** press: containing a single large-diameter common impression cylinder that supports the substrate as it enters in contact with a series of adjacent plate cylinders.
   - **Stack Press**: in which the substrate passes through multiple color stations which are aligned in one or two vertical stacks).
   - **In-line Press**: in which the substrate passes through multiple color stations which are aligned in a straight horizontal line).
3. Select your **Press Size** (**Wide Web** or **Narrow Web**).

   It is not possible to select a cylinder width.
4. Enter your press' **Printing Speed** in meters or feet per minute.

   Note: To change the units, see *Preferred Units* on page 35.
5. In **Press Inks** you see an overview of the inks in your printing condition, set up in *Ink Set and Printing Standard* and *White*.

   Note: For white, the name of the ink you selected as white will be shown in the list.

   Per ink you can add extra information about the ink, anilox and tape you will use on press:

   a) Select the ink and click the **Modify** button, or double-click the ink.
   b) Specify the **Ink Properties**:

      1. Enter the manufacturer of the ink (**Brand**).
      2. Select the **Type**: **Solvent**, **Water-based** or **UV curable**.
      3. Enter the **Viscosity** in seconds.

      You can measure an ink's viscosity using an efflux cup. The viscosity is the number of seconds it needs to flow through the hole at the bottom of the cup until the cup is completely empty (very viscous inks need longer). Some newer press models can measure this automatically (electronically).

      Note: The ink's viscosity affects how well it transfers onto your substrate, and can change depending on ambient temperature and time (for example when the solvent in a solvent based ink starts evaporating).

c) Specify the **Anilox Properties**:

1. Enter the manufacturer of the anilox (**Brand**).
2. Enter the **Type**.
3. Enter the anilox' **Line Screen** in lines per inch (this is the number of cells per linear inch).

   A higher line screen is used for finer detail, while a lower one will transfer a heavier layer of ink.
4. Enter the **Angle** of engraving (relative to the anilox axis) in degrees. This is typically 30°, 45° or 60°.
5. Enter the anilox' **Cell Volume** (the ink capacity of each engraved cell) in billion cubic microns (BCM).

Note:

The cell volume of an anilox roll can change over time, due to wear, damage and "plugging" (dried ink residues at the bottom of the cells).

Plugging can happen when Solvent or Water-based ink is not cleaned immediately after using the anilox and dries in (UV curable ink will not dry on its own).

d) Specify the **Tape Properties** by entering the manufacturer of the tape (**Brand**).

Note: We recommend to also add the tape hardness in the same field.

e) Specify any additional information that might be required under **Other Properties**.

f) If all your inks have the same properties, you can select **Apply properties to all inks**. This option is enabled when no parameters have been set for any inks.

g) Click **OK**.

All parameters per ink are visible in the overview table.

Note:

At any time, you can modify individual ink's properties.

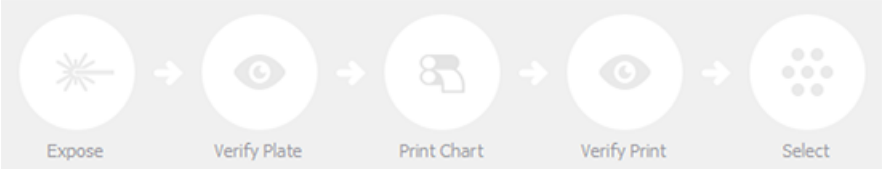
You can also first add the data that most inks have in common (by using **Apply properties to all inks**), then edit the inks individually.

Plate and Press Calibration

In this configuration step you will verify the quality of your plate making, and determine the best possible screening dot shape and solid surface screening for your printing condition.

Note: Screen characteristics for the highlights will be determined in the last configuration step (*Printing*).

The plate and press calibration consists of 5 steps, displayed in this way:



To start the calibration, click **Click here to start calibrating your plate making and press.**

In the **Calibrate Plate and Press** wizard that opens, you have 3 options:

1. *Start a guided setup*.

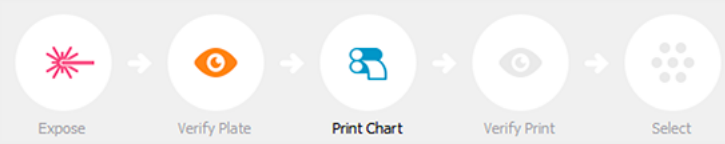
   Select this option if you want to be guided step by step through the calibration. In most cases, we recommend you use this option.
2. *Copy the setup from another printing condition*.

   Select this option if you know that the settings from an existing printing condition can also be used for your new printing condition.
3. *Manual setup*.

   Select this option if you know what settings to select without using the wizard (for example based on knowledge and tests from outside the Print Control Wizard, or settings received from an external partner, etc.).

Note:

If you press **Quit Now and Continue Later** in the wizard, the wizard closes and the completed calibration steps are colored. The step where you need to continue from is also colored, and its text is darkened:



To continue the calibration, click **Click here to continue calibrating your plate making and press**.

Start a Guided Setup

Select this option if you want to be guided step by step through the calibration. In most cases, we recommend you use this option.

1. Select **Start a guided setup** in the *Calibrate Plate and Press wizard*.
2. Save the test charts that you will use to calibrate your printing process.

   See *Save the Test Charts* on page 53.
3. Use these test charts to make a plate, and check that plate's quality.

   See *Prepare and Verify the Plate* on page 54.
4. Make a print and check that print's quality.

See *Make a Print and Verify the Quality* on page 58.

5. Inspect the screening and select the best screen parameters.

   See *Choose the Best Screening* on page 58.

6. When you are done, click **Finish** in the lower right corner.

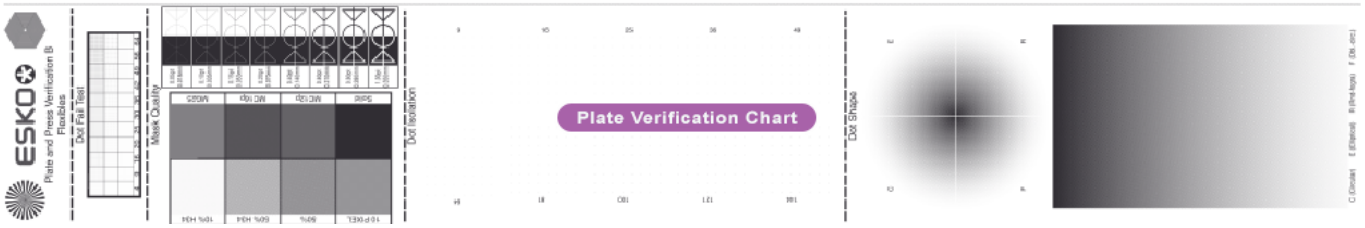
You can now see your settings (**Pixel Boost**, **Screen Type**, **Surface Screening**, **Solid Density**, **Screen Dot Shape** and **Description**) on the **Plate and Press Calibration** page.

Note: You can later edit the Plate and Press Calibration settings: see *Change Plate and Press Calibration Settings* on page 232.

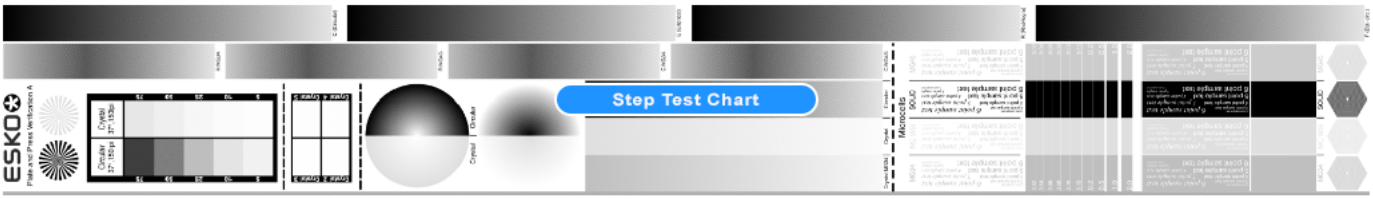
Save the Test Charts

On the **Save Charts** screen, you can see two test charts: a **Plate Verification Chart** and a **Step Test Chart**.

The **Plate Verification Chart** will be used to verify the plate quality and to determine the dot shape.



The **Step Test Chart** will be used to determine the dot shape, surface screening and pixel boost factor.



1. Click **Save Charts...**
2. Browse to your desired location and click **Select Folder**.

   This saves the following files to selected folder:

   - `PlateVerificationChart.len` for the **Plate Verification Chart**,
   - a **Step Test Chart** per supported ruling: `StepTestChart_110lpi.lenx`, `StepTestChart_125lpi.lenx`, `StepTestChart_135lpi.lenx`, `StepTestChart_150lpi.lenx`, and `StepTestChart_175lpi.lenx`.

     Note: You only need to use the step test chart corresponding to the ruling you use most in production.

Note:

- The charts are always saved as LEN or LENX files, it is not possible to save them as a different format.
- The wizard creates different charts for Labels and for Flexibles. You can re-use the chart files for other Plate and Press calibrations, but make sure that you use the correct chart type (either for Labels or for Flexibles).

3. Use these test charts to make a plate, and check that plate's quality.

   See *Prepare and Verify the Plate* on page 54.

Prepare and Verify the Plate

Still in the *Calibrate Plate and Press wizard*'s *guided setup*, you need to image your plate, verify it, expose it, and verify specific elements. You will verify it using the *Plate Verification Chart*.

1. **Image the plate** on the CDI according to your company's Standard Operating Procedures, using the two *LEN test charts*:

   - For the **Step Test Chart**: image it several times, using different boost factors.

     Note:

     - To automatically create a series, use the step test option in the Grapholas Exposer software from the CDI.

       For more information about setting up a step test on a CDI Crystal, click *Learn more about setting up a Step Test*.

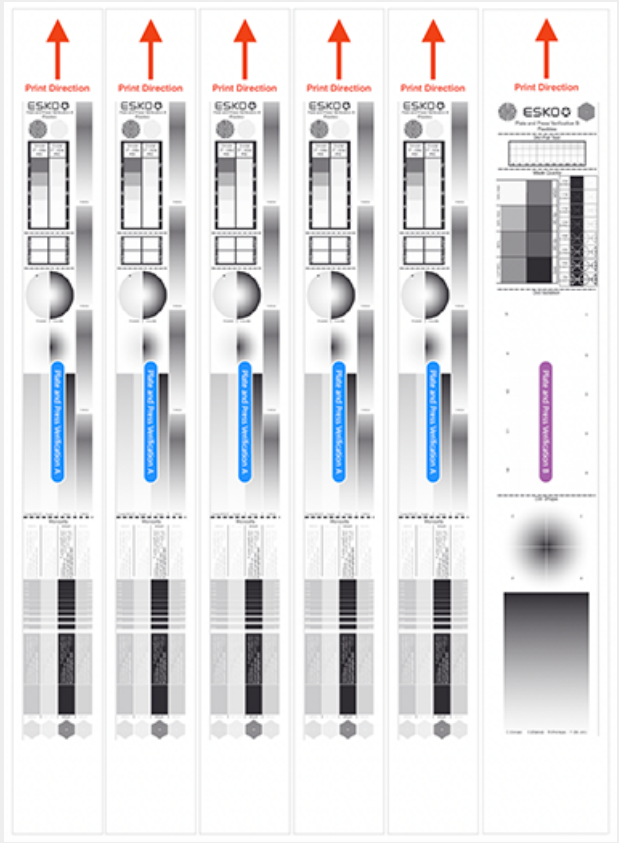
       For more information about setting up a step test on a CDI Spark, contact Esko Support.

     - Create as many copies as your plate size can contain.

   - For the **Plate Verification Chart**: image the chart once.

Note:

- Make sure that the **Step Test Chart** and the **Plate Verification Chart** are on the same plate, so they will be printed together.
- Position the charts in the print direction of the plate (with the Esko logo printed first).



2. Check the **Mask quality** of your imaged but unexposed plate.

a) Make sure you have a mask densitometer (such as the Techkon DENS or the Techkon T120).
b) Put the unexposed plate on a light table and locate the **Plate Verification Chart**.
c) On the **Verify the Imaged Plate** wizard screen, click *Learn more about evaluating this area*, to open the Standard Operating Procedure about verifying the plate quality.
d) Evaluate your plate according to the guidelines in that document.
e) Compare your result to the value that was found as good quality during the CDI's installation.
f) **Accept** ✓ if the result matches the reference, or **Reject** ✗ if the result doesn't match.

If your plate quality is good and you accepted the mask quality, you can continue to the next step.

If you rejected it, you cannot continue to the next step.

Troubleshoot your plate making process and repeat the test. Once the new test is positive, change the state from **Reject** to **Accept**.

3. **Expose and process the plate** according to your company's Standard Operating Procedures.
4. Check the **Dot Fail Test** as follows:
   a) Use a simple magnifying glass.
   b) Check the center and lower rows of the **Plate Verification Chart**'s **Dot Fail Test** element.

The smallest number where all dots are in position gives the resulting value. You can find more information in the Standard Operating Procedure document (you can download it again from the **Verify the Exposed Plate** screen if needed by clicking *Learn more about evaluating this area*).

   c) Compare your result to the value that was found as good quality during the CDI's installation.

For newer software versions, this is being recorded within the software.

   d) On the **Verify the Exposed Plate** screen, select the **Dot Fail** area in the preview image of the chart, and either **Accept** if the result matches the reference, or **Reject** if the result doesn't match.
5. Check the **Plate Relief**.

   a) Use a micrometer.
   b) Measure the plate height on an area that was intensively exposed (solid, MC16p, MG25, 50%).
   c) Measure the floor height in the area marked **Relief**.
   d) Calculate the plate relief (this is plate height minus floor height).

You can find more information in the Standard Operating Procedure document.

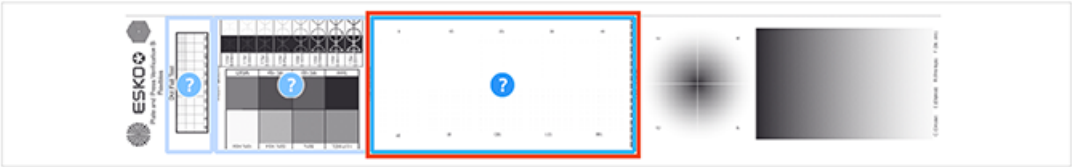
   e) Compare your result to the value that was found as good quality for your production.

Note:

- If the relief is too high (low floor), the highlight dots will print unstably.
- If the relief is too low (high floor), the floor will start to print in some areas (dirty print).

f) Select the **Check Plate Relief and Masked Image** area in the preview image of the chart, and either **Accept** if the relief is not too low or too high, or **Reject** if the result doesn't match.

6. Check the **Dot Isolation** (single dot test).

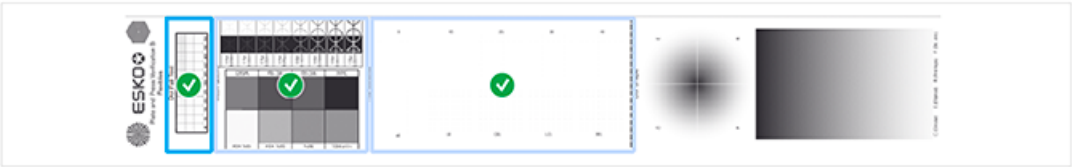


a) Use a magnifying glass.
b) Verify the 10 squares: each square contains 100 dots of a certain size, and is marked by a number (the number indicates the size of the dots in the square, for example 16 = 4x4 pixels).
c) The smallest number where all dots of one square are equal in shape and size, gives the resulting value.

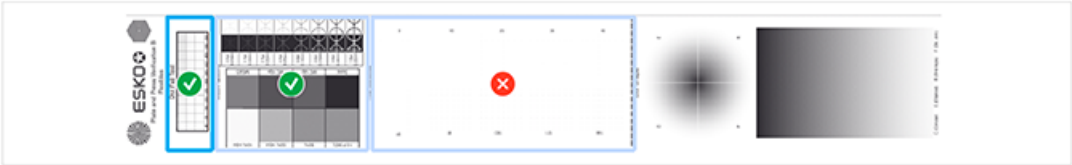
   You can find more information in the Standard Operating Procedure document.
d) Compare your result to the value that was found as good quality during the CDI's installation.

   For newer software versions, this is being recorded within the software.
e) Select the **Check Dot Isolation** area in the preview image of the chart, and either **Accept** if the result matches the reference, or **Reject** if the result doesn't match.

If your plate quality is good and you accepted the three areas, you can continue to the next step.



If you rejected one or more checks, you cannot continue to the next step.



Troubleshoot your plate making process and repeat the test. Once the new test is positive, change the state from **Reject** to **Accept** for that area.

7. You can now move on to making a print and checking that print's quality.

See *Make a Print and Verify the Quality* on page 58.

Make a Print and Verify the Quality

1. **Make a Print** using *your plate*, using the *printing condition settings* you entered, and your company's Standard Operating Procedures.

   We recommend to print with cyan or magenta ink.

   Note: For this step, you can image and print only the *step test chart* instead if desired.

2. **Select several copies** in your print run, as follows:

   - After the first good sheet, print 50 to 100 meters (this is to make sure that the screens are stable).
   - In these 50 to 100 meters, select 3 to 5 copies (3 is the minimum, but we advise to take 5 for better results) that represent the complete print run: begin, middle and end.

3. **Verify** the print quality.

   a) Check the **Slur** and **Impression** (pressure) marks on the print.

   - Use a magnifying glass.
   - On the **Verify Print Quality** wizard screen, click *Learn more about evaluating and verifying print quality* to open the Standard Operating Procedure document.
   - Using these guidelines, check that **all** marks on the print are OK (to avoid left/right or top/bottom differences).
   - Verify the other copies in the same way.

   Note:

   If one or more copies are not OK, they should be replaced by a copy from that same strip (preferably from within 30m of the original copy).

   If only 1 copy is OK, troubleshoot with the press operator and reprint.

   b) Select **Accept** or **Reject** in the wizard.

If your print quality is OK, you can continue to *the next step*.

Choose the Best Screening

You now need to evaluate the *step test* on *your print*, to find the best pixel boost factor and surface screening for your printing process.

1. Evaluate the printed step tests and find the best pixel boost factor.
   a) On the **Inspect Printed Screening** wizard screen, click *Learn more about how to evaluate a Step Test* to open the Standard Operating Procedure document.
   b) On your printed pixel boost step tests, check the trailing edge, ink lay down and solid ink density according to the guidelines in that document, and find the best pixel boost value.
   c) Enter that value in the **Optimal boost factor** field in the wizard.

      If no pixel boost value gave satisfactory results, select **I did not find an optimal boost factor** instead.
   d) Enter the best pixel boost value (if any) in your CDI, as explained in the document.
2. Go to the **Select Optimal Screening** wizard screen and enter the screening parameters that give the best results on your printed step tests:
   a) The **Imaging with Pixel+** parameter is filled in automatically.

      Your imaging technology will use *Pixel+* if you found a good boost factor, and will not use Pixel+ otherwise.
   b) The **Screen Type** also depends on whether you found a good boost factor.

      - If you did, the **Screen Type** is **Crystal** by default (which gives the best result), but you can change it to **Crystal NP** (non-Pixel+) if you want to use a more traditional screen.
      - If you didn't, the **Screen Type** is always **Crystal NP** (non-Pixel+).
   c) The **Screen Dot Shape** is always **Circular** when you use **Crystal** screens.

      If you use **Crystal NP** screens, you can choose between **Round**, **Circular**, **Double Circular** or **Elliptical**.

      Choose based on what screening dot is printing the smoothest gradients, improves overall printing quality, and is showing the best stability throughout the print run. Check for:

      - tonal jumps
      - dot stability: random missing dots, deformed dots...
      - dot gain: what screen produces a dot gain closest to the printing standard (less compensation needed)
      - color saturation of tints and solids
      - etc.

      Check on the other copies you selected from your print run, if your selection shows similar results, without issues!
   d) Choose the **Surface Screening** to apply to your solid areas.

      Note: Different surface screening types are available, depending on your *Screen Type* and *Screen Dot Shape*.

      Check if your selection is not causing any issues in:

      - Text, negative text and negative lines.

- Smoothness of the transition into the solid (no tonal jumps).

Note:

- MG34 and MG45 have several gradients in the step test. It is not necessary that all gradients have a smooth transition.
- The gradient named "Crystal" is using MCWSI.

For more information, read the **Surface Screening** part of the Standard Operating Procedure document (if needed, you can download it again by clicking *Learn more about selecting the boost factor and screen technology*).

e) Enter the **Solid Density** and select the density standard you use on your measurement device (ANSI A, DIN, ...). This is not mandatory.

f) You can also enter a **Description** if desired.

g) Don't forget to enter the results in the CDI.

Note: For more information about setting up on a CDI Crystal , click *Learn more about selecting the boost factor and screen technology*. For more information about setup on a CDI Spark, contact Esko Support.

3. Click **Next** and then **Finish** when you are done.

Copy the Setup from Another Printing Condition

Select this option if you know that the settings from an existing printing condition can also be used for your new printing condition.

1. Select **Copy the setup from another printing condition** in the *Calibrate Plate and Press wizard*.
2. **Select** the printing condition you want to copy the parameters from.
   a) Click the **Select** link in the **Printing Condition** field.
   b) Select a printing condition from the list.

Note:

- By default, you can only select printing conditions using the same application (labels, flexibles, ...). To be able to select any printing condition from the list, Click **Allow printing conditions with a different application.**
- It is also possible to select an unfinished printing condition ( ), but only if the **Plate and Press Calibration** configuration step is completed.

   c) Click **Select**.
3. Choose whether to **Copy all hardware settings** (this setting is selected by default).

   This copies settings related to plate making, press, printing standard... , but not:

- the settings specified when creating the printing condition: ink set, substrate and application,
- the settings from the *Printing* configuration step.

4. Check the plate and press calibration settings that you are going to copy into your new printing condition: they are listed on screen.
5. If desired, you can enter a **Description**.
6. Click **Finish** to copy the settings.

You can now see your settings (**Pixel Boost**, **Screen Type**, **Surface Screening**, **Solid Density**, **Screen Dot Shape** and **Description**) on the **Plate and Press Calibration** page.

Note: It is possible to edit the Plate and Press Calibration settings: see *Change Plate and Press Calibration Settings* on page 232.

Manual Setup

Select this option if you know what settings to select without using the wizard (for example based on knowledge and tests from outside the Print Control Wizard, or settings received from an external partner, etc.).

1. Select **Manual setup** in the *Calibrate Plate and Press wizard*.
2. On the **Define Plate Screening Settings Manually** wizard screen, fill in your imaging and screening settings:
   a) In **Imaging with Pixel+**, select **Yes** if you want to use *Pixel+*, or **No** to use more traditional imaging and screening technology.
   b) Enter the **Boost Factor** you are using (only when using Pixel+).
   c) The **Screen Type** also depends on whether you are using Pixel+ or not.
      - If you are using Pixel+, you can choose between **Crystal** or **Crystal NP** (non-Pixel+, if you want to use a more traditional screen).
      - Otherwise, it is always **Crystal NP** (non-Pixel+).
   d) The **Screen Dot Shape** is always **Circular** when you use **Crystal** screens.

      If you use **Crystal NP** screens, you can choose between **Round**, **Circular**, **Double Circular** or **Elliptical**.
   e) Choose the **Surface Screening** to apply to your solid areas.

      Note: Different surface screening types are available, depending on your *Screen Type* and *Screen Dot Shape*.
   f) Enter the **Solid Density** and select the density standard you use on your measurement device (ANSI A, DIN, ...). This is not mandatory.
   g) You can also enter a **Description** if desired.
   h) Don't forget to enter the results in the CDI.
3. Click **Finish** when you are done.

You can now see your settings (**Pixel Boost**, **Screen Type**, **Surface Screening**, **Solid Density**, **Screen Dot Shape** and **Description**) on the **Plate and Press Calibration** page.

Note: It is possible to edit the Plate and Press Calibration settings: see *Change Plate and Press Calibration Settings* on page 232.

White

The goal of this configuration step is to improve the evenness of the ink film and the opacity for solid white, by applying a surface screening.

There are different types of surface screening and depending the printing conditions, some will give better results than others. By printing a test chart on press, you will be able to select the most optimal surface screening for your printing condition.

This step is not mandatory and becomes available when the step **Plate and Press Calibration** is completed.

Note:

- As this configuration step is optional, the indicator will always be green ✔, with or without performing the White calibration.
- The White calibration is only available when you have license for an XPS exposer. The screen technology for white ink (very fine surface screening pattern) requires the very consistent exposing of a LED UV system (= XPS).
- We recommend to only use the White calibration for solvent inks, as other inks are not tested yet.

1. To start the wizard, click **Click here to choose the screen for white**.
2. **Create** the white chart
   a) click **Save Chart...**
   b) specify the folder where you want to save, click **Select Folder**

   A file named `PCW_White.LEN` is created in the selected folder

   Example of the white chart:

- This wizard always creates the same chart, independently of the parameters in the previous steps. It is possible to re-use the same **PCW_White.LEN** file for other White calibrations.
- The chart will always be saved as a LEN file, no other formats possible.
- You can edit the LEN file in an Esko editor, to adapt for your production (plate size, bearer bars, ...). However, it is important that **you don't change** any of the technical elements related to the white screening.

3. **Make a plate** according to your company's Standard Operating Procedures using this LEN test chart.

   Note: It is not necessary to adjust the Pixel boost for the white, use the value from the process colors.

4. **Make a Print** using this plate, according to the printing condition and your company's Standard Operating Procedures.
5. **Select the ink** that you will use for white in your production files.
   a) In step 1, click **Select**
   b) In the top part of the dialog, **select the ink book** that contains your white
   c) **Select the ink** in the list below
   d) Click **Select**

   Note: Typically, **White** from the Ink Book **ClassicColors** is used

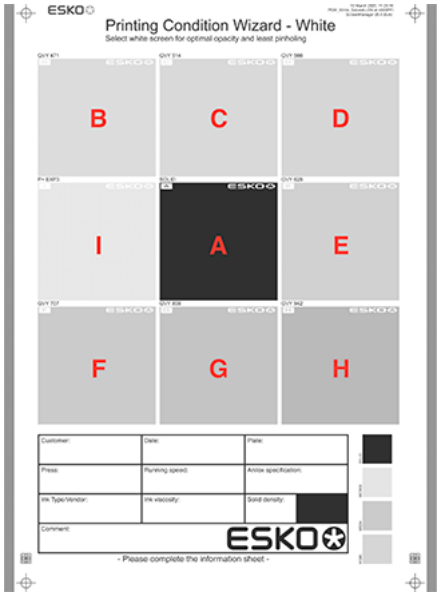
   It is possible to use any ink (the name does not need to contain white) from any ink book, as long as the production files contain an ink using the exact same name and ink book as you select here.

   You can also use the remapping functionality in Automation Engine for this.

   To create a new ink, see the chapter **Adding an Ink to in Ink Book** in the Color Pilot user guide: *https://www.esko.com/en/support/product?id=Color%20Pilot*

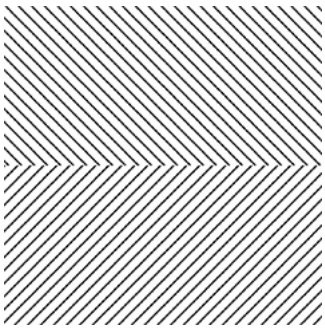
   Note: Click ⊗ to remove the ink, or repeat the selection procedure

6. **Evaluate** the printed chart



a) Check if the overall quality of the printed result matches your current daily production.
b) The patch in the center (A) is a pure solid, without surface screening. The printed result of this patch should be very similar to your current daily production.
c) The pure solid patch (A) is surrounded by 8 patches, each with a different surface screening and labeled from B to I. Each patch is also horizontally divided in two sections with different orientation of the MicroCells. In order to verify if the orientation will influence the quality of the white.

Zoom on the center of a patch:



Choose the patch that shows the best printed result, by considering:

- What patch has the best opacity and evenness of the ink film?
- What patch doesn't show a difference between the upper and lower part?

Note: It is possible that the pure solid (A) is showing the best result.

Note: For more information, click *Learn more about choosing surface screening for white.*

7. In Step 2, **select the patch** from the pull-down menu: A (Solid) to I

8. You also have the opportunity to enter a **Description**, not mandatory.
9. Click **Finish** in the lower right corner

- In case you selected B to I, a screen will be created with the name CRYSTAL WHITE X (where X stands for the letter you selected: B to I).
- In case you selected A (Solid), no screen will be generated.

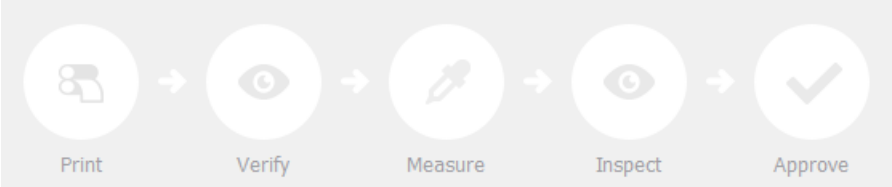
The selected ink, the calculated screen (or A (Solid)) and description are now shown on the White page.

Note: It is possible to edit the White setup: see *Edit White* on page 233

Printing

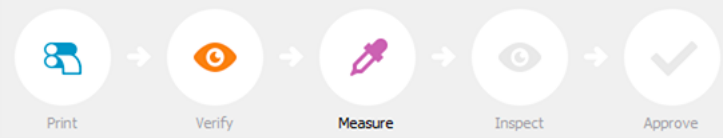
In the final configuration step, you will generate the dot gain compensation curves, and finish the setup of your custom screen, by choosing the highlights ("mindot", or minimum dot) that are best for your production.

The printing calibration consists of 5 steps, displayed in this way:



Note:

When you **Quit to Continue Later**, the completed steps will be colored. The step where you will continue from, is also colored and the text is darkened (**Measure** in the example below):



To continue the configuration, click **Click here to continue calibrating your printing.**

To start the calibration, click **Click here to start calibrating your printing**.

Depending on your license, you will either see a dialog to choose one of the three calibration methods below, or you will only be able to perform the legacy calibration.

- **Full calibration (recommended)**: this is a 4 color calibration method available from Print Control Wizard 22.07 onwards.

  It uses an improved chart (compared to previous versions), and produces custom screens that use the **Crystal V** screening technology, giving finer highlights without graininess.

  Because it's a 4 color calibration, it also calibrates overprints and gray balance towards *your chosen printing standard*.

  We recommend you use this for best results.

See *Full Calibration* on page 66.

- **Quick calibration**: this is a single color calibration method available from Print Control Wizard 22.07 onwards. It also produces **Crystal V** screens, but being single color, it doesn't calibrate overprints or gray balance.

  Note that after doing a quick calibration, you can calibrate additional colors if needed.

  See *Quick Calibration* on page 82.

- **Legacy calibration**: this is the calibration method used in previous versions (up to 22.03 included). It uses older Crystal screening technology (Crystal and Crystal NP, but not Crystal V).

  See *Legacy Calibration* on page 93.

Full Calibration

This is a 4 color calibration method available from Print Control Wizard 22.07 onwards.

It uses an improved chart (compared to previous versions), and produces custom screens that use the **Crystal V** screening technology, giving finer highlights without graininess.

Because it's a 4 color calibration, it also calibrates overprints and gray balance towards *your chosen printing standard*.

We recommend you use this calibration method for best results.

1. In the **Choose Angle and Ruling** wizard step, select the **Screen Ruling** you use in production.

   A fixed list of rulings is available from 90 lpi to 245 lpi. If your ruling is not in the list, choose the closest available ruling.

   If you are using several rulings, you can add additional rulings after you finished the printing condition. See *Add a Ruling* on page 241.

2. Select the **Angle Set** used in your production.

   You have the same 3 options that are available in the Imaging Engine tickets: **Offset**, **Flexo-7.5**, **Flexo+7.5**.

   Below the **Angle Set** selection, you find a list of all inks used in your printing condition. You defined this in *Ink Set and Printing Standard*.

   Note: If you have completed the setup for **White**, the ink you selected as white will also be visible in the list. See *White* on page 62.

   The angles, defined by the **Angle Set**, are shown next to each ink.

   It is possible to change the angle of an ink:

   a) Click the angle.
   b) Select another angle from the list.
   c) The **Angle Set** will be set to **<Custom>**.

   Note:

   Some angles are bigger than 90°, this is due to the screening technology used in the Print Control Wizard.

   The corresponding value in "the 90° zone" is mentioned between brackets, make your selection based on this value.

3. Choose either:
   - **Full ink-set print-run and measurements (recommended)**: select this option to print and measure charts. The wizard will guide you step by step.

     Note:

     Dot gain and highlights are very specific to individual certain press/ink/substrate combinations.

     Even if your printing condition is very similar (for example the same inks and substrate, but a different press), we highly recommend to print and measure the charts.

     If the results are very similar to another printing condition, you can still decide to use the same settings for both printing conditions.

     See *Full Ink Set Print Run and Measurements* on page 67.
   - **Manually select screens and use default adjustment curves**: select this option if you know what settings to select for the highlights in your screen. The software will select default dot gain compensation curves for all inks.

     See *Manually Select Screens and Use Default Adjustment Curves* on page 80.

     Note: You can still edit the curves later: see *Update Curves* on page 234.

Full Ink Set Print Run and Measurements

Select the **Full ink-set print-run and measurements (recommended)** option to print and measure charts. The wizard will guide you step by step.

Note:

Dot gain and highlights are very specific to individual certain press-ink-substrate combinations.

Even if your printing condition is very similar (for example the same inks and substrate, but a different press), we highly recommend to print and measure the charts.

If the results are very similar to another printing condition, you can still decide to use the same settings for both printing conditions.

1. Customize your test chart as desired, then save it and print it.

   See *Creating the Test Chart* on page 68.
2. Evaluate the quality of your plate.

   See *Checking the Plate Quality* on page 70.
3. Evaluate the quality of your printed chart.

   See *Checking the Print Quality* on page 70.
4. Measure the chart to find the best screen and curve.

   See *Measuring the Chart* on page 72.
5. Evaluate the highlights on your chart to find the best highlights settings.

   See *Evaluating the Highlights* on page 75.

6. When you are done, the wizard will generate your custom screens and curves, based on your production settings.
7. Select the screen and curve to use for non-calibrated colors.

   See *Choosing the Spot Colors' Printing Settings* on page 78.
8. Compare your results to your *printing standard*.

   See *Checking the Solids and Overprints* on page 78.

Creating the Test Chart

In the **Save Test Chart** step, customize your test chart as desired and save it.

The application shows a preview of the test chart for Flexibles or Labels in *your chosen ink set*. When you customize the chart, the preview is updated automatically to reflect your changes.

Use the various **Chart Options** to customize your test chart to fit your press needs.

1. Customize the dimensions of the chart using the **Chart Size** option.
   a) Unlock the **Chart Size** option by clicking on the
   b) Set your preferred **Width** and **Repeat Length**.

   If the preferred dimensions are higher than what is needed to print all the parts in a single chart, and the layout is set as:

   - **Complete Calibration Chart** then the parts will be placed in a single chart with blank space at the top or sides.
   - **Split Calibration chart parts** then the layout will be changed to **Complete Calibration Chart** and all the parts will be placed on a single chart.

   If the preferred dimensions are lower than what is needed to print all the parts in a single chart, and the layout is set as **Complete Calibration Chart** then the layout will be changed to **Split Calibration chart parts** and all the split charts will be of the preferred size.

   Note: If the preferred size is lower than the dimensions needed to print the split charts, then the size will be automatically set to the minimun size required to print the split charts.

   Tip: You can see the dimensions of the layout at the bottom of the preview.
2. Customize the layout of the chart using the various **Layout** options.
   - **Complete Calibration Chart** will place all different parts that need to be printed in a single chart. The chart size will be minimum width and length required to fit all the parts in a single chart.
   - **Split Calibration chart parts** will automatically split the layout into several smaller parts. All elements that need to be printed together will be placed on the same layout. Some parts may be rotated to fit the chart. When splitting using this method, each small chart will be of a different size. If you want to make all the charts to be of the same size, you can set the preferred dimensions using the **Chart Size** option.

   Note: This is the behaviour only when the **Chart Size** options are locked. If the chart size is manually changed, the layout might get affected. Check the **Chart Size** section to know more about how the chart layout changes when chart size is modified.

Tip: You can see the dimensions of the layout at the bottom of the preview.

3. **Mirror Image**: select this for reverse printing.
4. **Add default bearer bars and slur marks**: the bearer bars help with the print stability, and the slur marks help you check the print quality.
5. **Add a custom element**: if you want to add an image or a technical element to the chart, for example to check the quality with something you use frequently.
   a) Click **Browse...**
   b) Browse to the location of the file.
   c) Click **Open**.

   Note:
   - The element needs to be a `.ct` file (Esko native image file format).
   - Use the free CT/LP plug-in from Esko in Adobe® Photoshop® to create `.ct` files from your element(To download the free plug-in, search for 'CT/LP plug-in' on *esko.com*).

     If you are using Full Calibration, save the Photoshop document with CMYK or Multichannel imaging modes. Spot-channels will only be included if Multichannel mode is used. So to write a CMYK file with an extra spot channel, convert it to multichannel mode before saving it as a `.ct` file.
   - The `.ct` files cannot contain multiple layers. When the Photoshop document has multiple layers, merge all layers into a single layer before saving it as `.ct`.
   - You can only add one element. If you want to add several elements, you first need to group them in Adobe® Photoshop®.
6. Save the chart:
   a) Click **Save Chart**.
   b) Browse to your desired folder.
   c) Specify a **File name** for your chart.
   d) Select the **File Type** you want to save: **LEN** or **Tiff**.

      Note:

      In most cases, we recommend you save the file as a **LEN** file, and use it directly on the CDI.

      However, if you want to edit it to add extra elements specific to your production (different bearer bars for example), you should save it as **Tiff**, but make sure **you don't change** any of the technical elements! Please see *this knowledge base article* to know more about editing charts.
   e) Click **Save**.

   For each ink in your printing condition, a file will be created in your selected folder. For example if your ink set is CMYK and you completed the White setup, you will get 5 files: **File name_C**, **File name_M**, **File name_Y**, **File name_K**, **File name_White**.

   It could take several minutes to create the file.

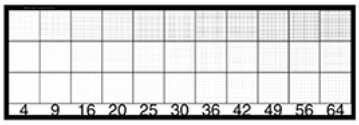
Note: If you change any parameter in your printing condition, **always** create a new chart, to make sure you have the correct elements for your printing condition in your chart (as the chart is based on numerous parameters from the previous steps like application, dot shape, surface screening...).

7. **Image the plates** on your CDI according to your company's Standard Operating Procedures, AND using the settings specified in the previous steps.
8. On the imaged, exposed and processed plate, you can *check the plate quality*.

Checking the Plate Quality

In the **Check Plates** step, you need to check the dot fail test.

Click **Learn more about evaluating this area** to open documents with guidelines on how to evaluate these elements. You can find evaluation guidelines for the dot fail test in the *Standard Operating Procedure for verifying plate quality*.



Check the **Dot Fail** test on the plate as follows:

a) Use a magnifying glass.
b) Check the center and lower row.
c) The smallest number where all dots are in position gives the resulting value.
d) Verify all elements on the plate.
e) Compare your result to the value that was found as good quality during the CDI's installation. This should be the same value you used during the *plate and press calibration*.
f) **Accept** if the result matches the reference, or **Reject** if the result doesn't match.

   If the result doesn't match, you need to troubleshoot the problem that is causing the low quality dots, remake the plate and evaluate the dots again.

Once you are satisfied with the plate quality, print a few copies of your chart and *check the print quality*

Note: The **Next** button will be disabled if you reject the plate quality.

Checking the Print Quality

Make a Print using the plates, according to the settings you entered in the printing condition and your company's Standard Operating Procedures.

Note:

To make sure the screens and curves that will be created are accurate for your production process, your measurement data needs to be representative of your complete print run.

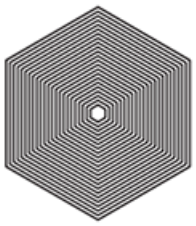
We therefore recommend that:

- you print another 50 to 100 meters (or more if this better reflects your production) after the press has reached your regular quality,
- you select 5 (or at least 3) copies in that "regular quality" print run: from the beginning, the middle and the end.

Once you've printed a few copies of your chart, check the slur marks, and the registration marks in the **Verify Print Quality** step.

Click **Learn more about evaluating this area** to open documents with guidelines on how to evaluate these elements. You can find evaluation guidelines for slur marks and registration marks in the *Standard Operating Procedure for verifying print quality*.

1. Check the **Slur Marks** on your prints in the following way:



   a) Use a magnifying glass.
   b) Follow the guidelines in the Standard Operating Procedure (click *Learn more about evaluating this area* to access it).
   c) Make sure that all relevant marks on the print are good.
   d) Verify all copies.
   e) Back in the wizard, Accept or Reject the quality of the slur marks:

      - click **Accept** if you are satisfied with the quality of the slur marks,
      - click **Reject** if you aren't.

        If the marks on one or more copies are not satisfactory, find other copies of the test chart to evaluate (for example from around 30 m on the same run).

        If only one copy (or none) is good, troubleshoot with the press operator and reprint.

2. Checking the **Registration marks** on the print:

   a) Check the registration marks on the print using the same guidelines as for the slur marks.

b) **Accept** or **Reject** the quality of the registration marks.

Once you are satisfied with the plate quality, click **Next** and move on to *measuring the chart* to find the best screen and curve.

Note: The **Next** button will be disabled if you reject the quality of the slur marks or registration marks.

Measuring the Chart

1. **Measure** the **Mindot Chart**.

   This will be used to determine the screen for the highlights.

   The Magenta printed part will be used for CMY, the Black printed part for K.

   If your selected ink set contains one or more extra inks (for example OGV), the first ink will be added to the chart, and will be used for these extra inks. For example if the ink set is CMYKOG, Orange will be added to the chart.

   a) Cut out the chart from your first copy.

   b) The chart can be read in patch or scan mode by an X-Rite i1 Pro or X-Rite i1iO. No other measurement devices are supported.

   To measure with the i1 Pro, it is advised to cut off the text before each row.

   c) With the cogwheel ( ) on the bottom right, you can stop, calibrate and reconnect your measurement device, change the measurement mode and the measurement condition.

   See the **Using a Spectrophotometer** chapter in the *Color Pilot user guide*.

   d) To know how to measure the chart with your measurement device, follow the instructions on the bottom left above the icons .

   The preview will show the instructions and the measurement progress.

   Tip:

   After you are done measuring a page, you can save the measurement data as a measurement file if desired (in the CGATS - Committee for Graphic Arts Technologies Standards - color measurement format):

   - Go back to the page you have just measured using the back arrow.
   - Click the cogwheel ( ) at the bottom right and select **Save measurement...**
   - Choose a location to save your measurements file (with the `.txt` extension).

   Tip:

   Alternatively, if you had already measured your chart and saved the measurement, you can load your measurement file instead of re-measuring it here.

   1. Make sure that your measurement file is a CGATS (Committee for Graphic Arts Technologies Standards color measurement format) file, with the `.it8`, `.txt` or `.cgats` extension.
   2. Click the cogwheel ( ) at the bottom right and select **Load Measurement...**

2. Check the **Measurement Results**.
   a) Check the preview: the upper and lower part of the patches should have approximately the same color.

   Note:

   The comparison of measurements (upper part) and the standard (lower part) is a rough approximation. Only look for clear differences:

   - completely different color: for example wrong row measured, chart upside down.
   - the same color, but a very big difference in lightness: for example not printed correctly, issue with the measurement device.

   b) **Accept** or **Reject** .

   If your measurement is ok, you can continue to the next step.

   If you rejected the measurement result, you will be guided to measure again, following this same procedure.

   This could be the same chart (wrong row, chart upside down), or a different chart from the print run.
3. On the next wizard screen, measure the **Tone Value Chart**.
   - This will be used to create the dot gain compensation curves.
   - The chart will contain all inks from your selected ink set.

     For example if the ink set is CMYKOGV, the chart will contain CMYKOGV patches.
   - Cut out the chart from the same copy as your mindot chart in the previous steps.
   - The chart can be read in patch or scan mode by an X-Rite i1 Pro or X-Rite i1iO. No other measurement devices are supported.
   - With the cogwheel ( ) on the bottom right, you can stop, calibrate and reconnect your measurement device, change the measurement mode and the measurement condition.

     See the **Using a Spectrophotometer** chapter in the *Color Pilot user guide*.
   - To know how to measure the chart with your measurement device, follow the instructions on the bottom left, above the icons .

     The preview will visualize the instructions and the measurement progress.
4. Check the **Measurements Results**.
   a) Check the preview, the upper and lower part of the patches should have approximately the same color.

   After the first measurement you can compare your measurement to the standard. After the measurement of your 2nd, 3rd... copy, you can also compare to the average and to the other measurements.

   Select what you want to **Compare with** on top of the preview.

Note:

- In this step we mainly want to detect if the charts were measured correctly (not upside down, mirrored...)

  If the color in the patch is the same, but there is a big difference in lightness, this is probably not an issue. The dot gain compensation curve created from these measurements will correct for this.

- Comparing charts among each other could be useful, to detect if some charts are printed very differently. If a chart is an exception, you may not want to include it in your average.

b) In the **Solid Info** area, to the right of the preview:

1. Check the measured density of your inks: for each ink, the **Measured Density** should be within tolerance of the **Desired Density**.

   Use the same tolerance as your company uses on press (typically + or - 0,05).

   Select the density standard you use on your measurement device (ANSI A, DIN, ...) from the **Density Formula** list below.

   Note:

   The **Desired Density** is derived from the printing standard you selected in **Ink Set and Printing Standard**.

   We don't show desired density for CMYK inks for standards that use an ICC profile as a standard profile. This is because density calculation requires spectral data, which is not available in ICC profiles.

2. Check the measured color difference (**ΔE**): for each ink, the ΔE should be within tolerance of the printing standard you selected in **Ink Set and Printing Standard**.

   Select the Delta E formula used in your selected printing standard, from the **ΔE Formula** list below.

3. Check your inks' color values: select an ink to see its **Desired** and **Measured** LabCh values, with a split patch showing the measured and desired color for this ink.

Note: We don't show desired density, Lab and ΔE for the OGV inks. There are no standards for these inks, so there is nothing to match.

c) If everything is OK, click **Accept** and continue.

Otherwise click **Reject** and measure again.

Note:

In this case, you need to measure both the mindot chart and the tone value chart again. This is because:

- different samples may be printed somewhat differently, so you shouldn't mix print samples,
- if you detect a printing issue on the tone value chart, then it is likely that the complete print sample is not representative, and that your mindot measurement is not that reliable.

5. Select **Measure another sample** if needed.

   To have an accurate and reliable screens and curves creation, it is important that the measurements are an average of a complete print run. Measure minimum 3 charts of good print quality (we advise to use 5).

   You will be guided to measure again, following this same procedure.

   The wizard will indicate how many charts you already measured: sample 1, sample 2...

6. Once you have measured enough charts of good quality, you can select **Stop measuring and inspect the resulting screens**.
7. In the next step, you will need to evaluate the highlights and select the best highlights screening settings.

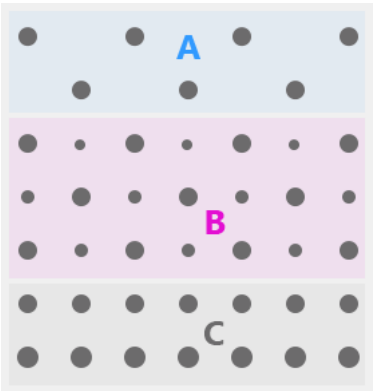
   See *Evaluating the Highlights* on page 75.

Evaluating the Highlights

In the **Select Highlights** wizard step, you need to evaluate and choose the highlight settings that are best for your production, to finish setting up your custom screen and curve.

These settings are:

- The **Mindot** (or minimum dot): the minimum size that a dot can have in the highlights, while printing in a stable and clear way.
- The **Mindot distance**: the maximum distance between these minimum dots, to ensure highlights that print well.
- The **Transitional mindot**: even smaller dots that support the mindots in the transitional areas (between FM screening in the highlights and AM screening in the midtones).



- **A)** In the lightest highlights, there are only **Mindots** (separated by a distance no larger than the **Mindot distance**).
- **B)** As highlights get darker, increasingly smaller dots are added to the spaces between the regular dots.

  Once the screen grid is completely filled, the screen reaches the transition point. The last and smallest dot size added before the transition point is the **Transitional mindot**.
- **C)** In the midtones, the **Transitional mindots** reach the size of the regular **Mindots**, and the screen becomes a standard screen.

You need to define these settings for each ink group used in your print run: CMY, Black and expanded gamut inks.

1. In the **Screen and Curve** table, you can see the details of the screening and curve settings that the wizard created for each ink group, based on your measurements:
   - The **Ink (Group)** that the screening and curve settings are for.
   - The **Screen Name** (generated based on the screening settings).
   - The screen **Code** (you can change this if desired: click **Select** and choose another free screen code from the list shown).
   - The diameter of the **Mindot** in microns or milli-inches.
   - The **Curve Bump**, the smallest input percentage you can print with this screen.

     All smaller percentages are "bumped up" to this value. This data will be included in the curve generated by the wizard.
   - The **Estimated Lightest Tone Value**, the percentage that the smallest input percentage from the **Curve Bump** gives on print.

     This will also be included in the curve.
   - The **Mindot Δ** (mindot distance), the distance between dots at the lightest tone value (the dots with the diameter shown under **Mindot**).
   - The **FM Highlights**, the highlight tones where FM (stochastic screening) is used.

     For example, if the **Curve Bump** is 0.20% and the **FM Highlights** show 2%, this means that:
     - between 0% and 0.20% nothing is printed,
     - between 0.20% and 2% the highlights are printed with FM,
     - tones above 2% are printed with AM.
2. Select an **Ink** or ink group in the table: CMY, Black or expanded gamut inks (the inks here depend on your ink set, for example it can be OGV).
3. You can see an analysis of the mindot chart measurements for this ink (group).

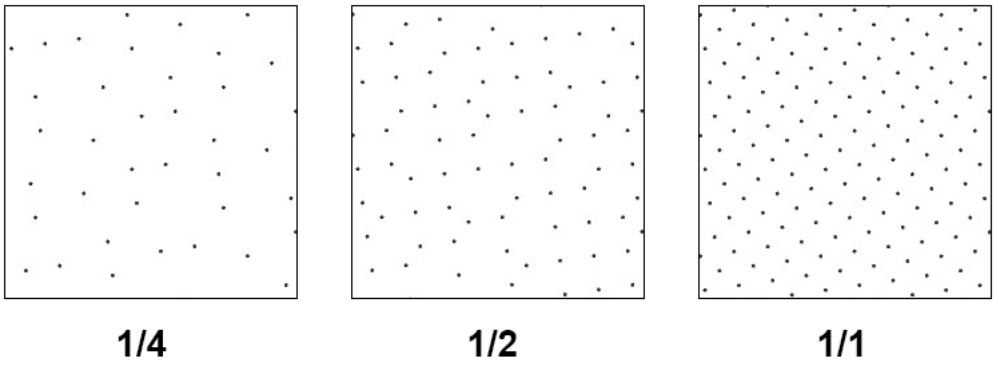
Dot Size (px)	0	6	9	12	16	19	22	25	31	36	42	47	54	60	Solid
Mindot Distance 0.17 mm (1/1)		4,9 ✗	7,1 ✓	9,8	14,2	17,8	21,4	24,8	31,8	37,6	43,8	48,7	56,2	62,3	
0.24 mm (1/2)		2,2 ✗	3,1 ✓	4,9	6,7	7,1	8,9	9,8	13,4	17,0	20,0	22,4	27,1	30,6	
0.34 mm (1/4)		0,4 ✗	1,3 ✗	2,2 ✓	3,1	3,1	4,0	4,9	5,8	7,1	8,0	8,9	11,0	13,4	

For the three **Mindot Distances** on the chart, the wizard shows which **Dot Size** is optimal. This is the smallest mindot size that gives a good print quality.

Note:

The fraction next to the distance indicates the amount of dots used to print the highlights.

- **1/1** means that means that all the dots are kept (the screen doesn't use FM screening).
- **1/2** means that half of the dots are kept (resulting in FM screening).
- **1/4** means that a quarter of the dots are kept (resulting in FM screening). This gives lighter highlights, but may increase graininess.



4. Examine these highlights on the print to decide if you agree with these results.
5. Under **Set Highlight Settings**, choose the best highlight settings for your production process based on what you found.
   a) Select the **Mindot Distance** you typically use for your production.

      If you choose one of the measured distances, you will see **(Measured)** next to it.

      Note:

      The first time you make a printing condition for this *application*, the biggest distance measured from the chart is filled in by default.

      After that, the wizard remembers the **Mindot Distance** you filled in for the previous printing condition for this application and fills it in by default.

   b) Select the **Mindot** that you found to be the best for your mindot distance.

      By default, the mindot size that the wizard found the best for that mindot distance is selected. This can either be a **Measured** mindot size, or a size calculated based on the other measurements (**Estimated**).

      If you choose a different size, you will still see an indication of what the wizard recommends next to **Measured** or **Estimated**.

      Note: The bigger the **Mindot Distance** is, the bigger your **Mindot** needs to be, to give you a stable print.

   c) Select the **Transitional Mindot** based on your visual inspection of the **1/1** row.

By default, the **Transitional Mindot** with a green check mark on the **1/1** line in the wizard is selected.

d) You can see your changes reflected in the **Screen and Curve** table below (for your selected ink or ink group).

6. Repeat these steps for the other ink groups.

Choosing the Spot Colors' Printing Settings

1. On the **Spot Colors** screen, select which separation from your printing condition should be used to set the default screen and curve for your spot colors (= all separations that are not in the ink set).

   The default is **Black**, but you can select any of the inks from the printing condition. Or **<None>**, if your spot colors don't need to use the screen and curve from your printing condition.

2. Click **Next** to generate your custom screens and curves, based on your production settings.

   This can take some time.

Checking the Solids and Overprints

Note: You will only see the **Check Color Differences of Solids and Overprints** wizard screen if you have the corresponding license.

On the **Check Color Differences of Solids and Overprints** wizard screen, you can compare the solids and overprints achieved by your printing condition with the solids and overprints expected by *your printing standard*. This shows you how close you are to your standard in terms of color.

After calibrating your printing setup (with the *plate and press calibration* and the *printing calibration*), you will be able to print **much closer** to your printing standard (when using the settings from your printing condition).

However, in some cases you will not be able to print **exactly** like the printing standard definition, as the printing setup used to create the printing standard may be somewhat different from your own printing setup (for example, the inks may have a slightly different hue, or the substrate may be different...).

If this is the case, you need to decide whether you want to:

- Keep using the printing standard, and accept that there will always be some amount of deviation from the standard when verifying your prints against it.

- Make a profile based on your calibrated printing setup (calibrated to print as close as possible to the standard), and use this profile as printing target instead of the printing standard.

  This way, when verifying future prints, you will check against "the closest your printing setup can get to the standard", and not against a standard that you know you can never match perfectly.

  This also allows you to keep track of how much your printing setup drifts from its best state (the state calibrated by the printing condition). If it drifts too much, you can:

  - check whether your printing settings are still exactly as described in the printing condition,
  - troubleshoot your printing process,
  - recalibrate your printing setup using this profile (the **printing condition profile**) as target. See *the Color Pilot documentation* to know more about recalibration.

1. In the preview, you can see a visual comparison of the solids and overprints achieved by your printing condition with the solids and overprints from your printing standard.

   The solids and overprints achieved by your printing condition are the solids and overprints taken from your tone value chart measurements and corrected by your newly created adjustment curves and screen highlight bumps.

The preview shows split patches, with the color measured on print at the top left of the patches, and the corresponding color from your standard at the bottom right.

You can zoom in, zoom out, or fit the zoom to the view.

2. On the right, you can see **Statistics** about how well your printed solids and overprints match those defined in your chosen printing standard.
   a) By default the **ΔE Formula** set in Color Pilot's Preferences is used to calculate the color differences, but you can change it to one of the following:
      - **CIELAB Delta E (Classic)**,
      - **Delta E 94**,
      - **Delta E 2000**,
      - **CMC (1:1)**,
      - **CMC (2:1)**,
      - **Delta E 2000 (2:1:1)**.
   b) You can see the following statistics (the **Delta E** statistics are updated when you change the formula above, and **Delta H** is the difference in hue):
      - **Average ΔE**: the average of the color differences of all patches,
      - **Maximum ΔE**: the worst color difference found in all the patches,
      - **Maximum ΔE best 90%**: the worst color difference found in the best 90 % of the patches (so excluding the worst 10%),
      - **Primaries ΔE**: the average color difference of the patches that only have one ink (except black), whether it's a solid or a tint,
      - **Primaries ΔH**: the average difference in hue of the same primary patches,
      - **Grey ΔE**: the average color difference of all solids and gradations of black, as well as all patches with equal amounts of C, M and Y,
      - **Substrate ΔE**: the color difference between the measured substrate in your prints and the one in your standard.
3. You can **Highlight** specific patches, to perform a visual check on those parts of your measurements:
   - the **Patches with above average ΔE** (with a color difference above the average difference between your measurements and the standard),
   - the **Worst 10 percent** (the 10% of the patches that have the highest Delta E values),
   - the **Substrate** (if there are several substrate measurements they will all be highlighted),
   - the **Primaries** (patches that only have one ink -except black-, whether a solid or a tint),

- the **Greys** (all solids and gradations of black, as well as all patches with equal amounts of C, M and Y),
- the patch with the **Maximum ΔE**.

4. To inspect a single patch more in detail, select it in the preview to show more data in the **Patch Details** on the right.

   You can see:

   - the patch's ink composition in your ink set,
   - a bigger split patch,
   - its Lab/LCh values,
   - the ΔE between your measured print and your standard for this patch.

5. If you find significant color differences between your measured solids and overprints and the ones from the standard, choose whether you want to:

   - Keep using the printing standard, and accept that there will always be some amount of deviation from the standard when verifying your prints against it.

     In this case, deselect **Save Press Profile**.

   - Make a profile based on your calibrated printing setup (calibrated to print as close as possible to the standard), and use this profile as printing target instead of the printing standard.

     This way, when verifying future prints, you will check against "the closest your printing setup can get to the standard", and not against a standard that you know you can never match perfectly.

     In this case, leave **Save Press Profile** selected (and change the profile name if desired).

6. If you chose to make a press profile (or "printing condition profile"), choose whether to **Use this press profile as target for future recalibrations**.

   This allows you to keep track of how much your printing setup drifts from its best state (the state calibrated by the printing condition), and recalibrate your printing setup using this profile as target.

   See *the Color Pilot documentation* to know more about recalibration.

7. When you are done, click **Finish** to save your completed printing calibration.

   You can see your final screen and adjustment curve for each ink on the **Printing** page. See *Printing Calibration Results* on page 228.

   You can also view additional details (color **Gamut**, **Gray balance**, **Solid densities**).

8. Click **Save and Close** in the printing condition.

You can now *review your printing condition parameters* and *save a report* if desired.

You can find your new printing condition in the *Printing Conditions Explorer*, your new screen in the *Screens Explorer*, and your new curves in the *Curves Explorer*.

Manually Select Screens and Use Default Adjustment Curves

Select the screens manually if you know what settings to select for the highlights in your screen. The software will select default dot gain compensation curves for all inks.

These highlights settings are:

- The **Mindot** (or minimum dot): the minimum size that a dot can have in the highlights, while printing in a stable and clear way.
- The **Mindot distance**: the maximum distance between these minimum dots, to ensure highlights that print well.
- The **Transitional mindot**: even smaller dots that support the mindots in the transitional areas (between FM screening in the highlights and AM screening in the midtones).

You need to define these settings for each ink group used in your print run: CMY, Black and expanded gamut inks.

1. In the overview table, you can see default screening settings for each ink/ink group:
   - The **Ink (Group)** that the screening settings are for.
   - The **Screen Name** (generated based on the screening settings).
   - The screen **Code** (you can change this if desired: click **Select** and choose another free screen code from the list shown).
   - The diameter of the **Largest Mindot** in microns or milli-inches (the largest mindot is the dot used at the lightest tone value).
   - The **Curve Bump**, the smallest input percentage you can print with this screen.

     All smaller percentages are "bumped up" to this value. This data will be included in the curve generated by the wizard.
   - The **Estimated Lightest Tone Value**, the percentage that the smallest input percentage from the **Curve Bump** gives on print.

     This information is not included when manually selecting screening settings, as it needs to be calculated from measurements.
   - The **Mindot Δ** (mindot distance), the distance between dots at the lightest tone value (the dots with the diameter shown under **Largest Mindot**).
   - The **FM Highlights**, the highlight tones where FM (stochastic screening) is used.

     This information is not included when manually selecting screening settings, as it needs to be calculated from measurements.
2. Select an **Ink** or ink group in the table: CMY, Black or expanded gamut inks (the inks here depend on your ink set, for example it can be OGV).
3. Based on your production process knowledge, select the best highlights settings for that ink or ink group.
   a) Select the **Mindot Distance** you typically use for your production.

   Note:

   The first time you make a printing condition for this *application*, the biggest distance measured from the chart is filled in by default.

   After that, the wizard remembers the **Mindot Distance** you filled in for the previous printing condition for this application and fills it in by default.

   b) Select the **Mindot** that you found to be the best for your mindot distance.

Note: The bigger the **Mindot Distance** is, the bigger your **Mindot** needs to be, to give you a stable print.

c) Select the **Transitional Mindot** that you found to be the best in your production process.

d) You can see your changes reflected in the overview table above (for your selected ink or ink group).

4. Repeat these steps for the other ink groups.
5. On the **Spot Colors** screen, select which separation from your printing condition should be used to set the default screen and curve for your spot colors (= all separations that are not in the ink set).

   The default is **Black**, but you can select any of the inks from the printing condition. Or **<None>**, if your spot colors don't need to use the screen and curve from your printing condition.
6. Click **Finish**.

   The screens and curves are created (this could take some time).

Note:

The curves used are flexible *PressSync Curves*.

For Flexibles, the base curve is always F40, and for Labels, it is always E50. The curve bump (indicated between brackets) is calculated from your selected screening parameters.

The curve bump value is in the metric defined for that ink/ink group in *your chosen standard*. This means that different ink/ink group's curve bumps may use different metrics (for example CMY and Black may use density, while OGV may use SCTV), and cannot be compared.

All information about the selected screens, curves and measurement results is now shown on the **Printing** page. See *Printing Calibration Results* on page 228.

You can now *review your printing condition parameters* and *save a report* if desired.

You can find your new printing condition in the *Printing Conditions Explorer*, your new screen in the *Screens Explorer*, and your new curves in the *Curves Explorer*.

Quick Calibration

This is a single color calibration method available from Print Control Wizard 22.07 onwards. It produces **Crystal V** screens (giving finer highlights without graininess), but being single color, it doesn't calibrate overprints or gray balance.

Note that after doing a quick calibration, you can calibrate additional colors if needed.

1. In the **Choose Angle and Ruling** step:

   a) Select the **Screen Ruling** used in your production.

   A fixed list of rulings is available (from 90 lpi to 245 lpi). If your ruling is not in the list, choose the closest ruling available.

   If you are using several rulings, you can add additional rulings after you finished the printing condition. See *Add a Ruling* on page 268.

   b) Select the **Angle Set** used in your production.

   You can choose either **Offset**, **Flexo -7.5** or **Flexo +7.5** (these are the same options as the ones available in the Imaging Engine tickets).

c) In the table below, you can see the angles for your individual inks (taken from the **Angle Set**). You can still change them if desired:

1. Click the angle you want to change.
2. Select another angle from the list.

> **Note:** Some angles are bigger than 90°, this is due to the screening technology used in the Print Control Wizard. The corresponding value in "the 90° zone" is mentioned between brackets, you can make your selection based on this value.

3. The **Angle Set** is now set to **<Custom>**.

2. In the **Choose Separation** step, choose which ink of *your ink set* you want to calibrate.

   We recommend you use Cyan or Magenta.

3. In the **Print Chart** step, customize your test chart as desired, then save it and print it.

   See *Creating the Test Chart* on page 83.

4. Evaluate the quality of your plate.

   See *Checking the Plate Quality* on page 85.

5. Evaluate the quality of your printed chart.

   See *Checking the Print Quality* on page 86.

6. Measure the chart to find the best screen and curve.

   See *Measuring the Chart* on page 87.

7. Evaluate the highlights on your chart to find the best highlights settings.

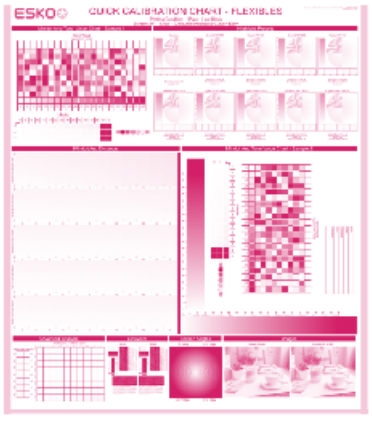
   See *Evaluating the Highlights* on page 91.

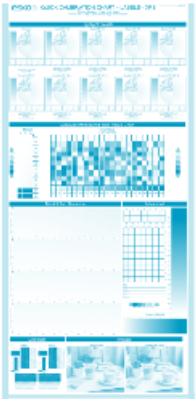
8. When you are done, the wizard will generate your custom screen and curve, based on your production settings.

Creating the Test Chart

In the **Save Test Chart** step, customize your test chart as desired and save it.

The application shows a preview of the test chart for Flexibles or Labels in your chosen ink. When you customize the chart, the preview is updated automatically to reflect your changes.





Quick calibration chart for Flexibles	Quick calibration chart for Labels

Use the various **Chart Options** to customize your test chart to fit your press needs.

1. Customize the dimensions of the chart using the **Chart Size** option.
   a) Unlock the **Chart Size** option by clicking on the
   b) Set your preferred **Width** and **Repeat Length**.

   If the preferred dimensions are higher than what is needed to print all the parts in a single chart, and the layout is set as:

   - **Complete Calibration Chart** then the parts will be placed in a single chart with blank space at the top or sides.
   - **Split Calibration chart parts** then the layout will be changed to **Complete Calibration Chart** and all the parts will be placed on a single chart.

   If the preferred dimensions are lower than what is needed to print all the parts in a single chart, and the layout is set as **Complete Calibration Chart** then the layout will be changed to **Split Calibration chart parts** and all the split charts will be of the preferred size.

   Note: If the preferred size is lower than the dimensions needed to print the split charts, then the size will be automatically set to the minimun size required to print the split charts.

   Tip: You can see the dimensions of the layout at the bottom of the preview.

2. Customize the layout of the chart using the various **Layout** options.
   - **Complete Calibration Chart** will place all different parts that need to be printed in a single chart. The chart size will be minimum width and length required to fit all the parts in a single chart.
   - **Split Calibration chart parts** will automatically split the layout into several smaller parts. All elements that need to be printed together will be placed on the same layout. Some parts may be rotated to fit the chart. When splitting using this method, each small chart will be of a different size. If you want to make all the charts to be of the same size, you can set the preferred dimensions using the **Chart Size** option.

   Note: This is the behaviour only when the **Chart Size** options are locked. If the chart size is manually changed, the layout might get affected. Check the **Chart Size** section to know more about how the chart layout changes when chart size is modified.

   Tip: You can see the dimensions of the layout at the bottom of the preview.

3. **Mirror Image**: select this for reverse printing.
4. **Add default bearer bars and slur marks**: the bearer bars help with the print stability, and the slur marks help you check the print quality.
5. **Add a custom element**: if you want to add an image or a technical element to the chart, for example to check the quality with something you use frequently.
   a) Click **Browse...**

b) Browse to the location of the file.
c) Click **Open**.

Note:

- The element needs to be a `.ct` file (Esko native image file format).
- Use the free CT/LP plug-in from Esko in Adobe® Photoshop® to create `.ct` files from your element(To download the free plug-in, search for 'CT/LP plug-in' on *esko.com*). Save the Photoshop document with Grayscale image mode to use in Quick Calibration.
- The `.ct` files cannot contain multiple layers. When the Photoshop document has multiple layers, merge all layers into a single layer before saving it as `.ct`.
- You can only add one element. If you want to add several elements, you first need to group them in Adobe® Photoshop®.

6. Save the chart:
   a) Click **Save Chart**.
   b) Browse to your desired folder.
   c) Specify a **File name** for your chart.
   d) Select the **File Type** you want to save: **LEN** or **Tiff**.

Note:

In most cases, we recommend you save the file as a **LEN** file, and use it directly on the CDI.

However, if you want to edit it to add extra elements specific to your production (different bearer bars for example), you should save it as **Tiff**, but make sure **you don't change** any of the technical elements! Please see *this knowledge base article* to know more about editing charts.

   e) Click **Save**.

It could take several minutes to create the file.

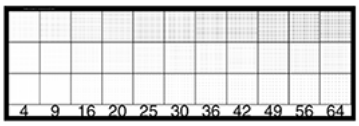
Note: If you change any parameter in your printing condition, **always** create a new chart, to make sure you have the correct elements for your printing condition in your chart (as the chart is based on numerous parameters from the previous steps like application, dot shape, surface screening...).

7. **Image the plates** on your CDI according to your company's Standard Operating Procedures, AND using the settings specified in the previous steps.
8. Once the imaged, exposed and processed plate, you can *check the plate quality*.

Checking the Plate Quality

The **Check Plates** step, you need to check the dot fail test

Click **Learn more about evaluating this area** to open documents with guidelines on how to evaluate these elements. You can find: evaluation guidelines for the dot fail test in the *Standard Operating Procedure for verifying plate quality*.



1. Check the **Dot Fail** test on the plate as follows:
   - Use a magnifying glass.
   - Check the center and lower row.
   - The smallest number where all dots are in position gives the resulting value.
   - Verify all elements on the plate.
   - Compare your result to the value that was found as good quality during the CDI's installation. This should be the same value you used during the *plate and press calibration*.
2. **Accept** if the result matches the reference, or **Reject** if the result doesn't match.

   If the result doesn't match, you need to troubleshoot the problem that is causing the low quality dots, remake the plate and evaluate the dots again.

Once you are satisfied with the plate quality, print a few copies of your chart and move on to *check the print quality*

Note: The **Next** button will be disabled if you reject the plate quality.

Checking the Print Quality

Make a Print using the plates, according to the settings you entered in the printing condition and your company's Standard Operating Procedures.

Note:

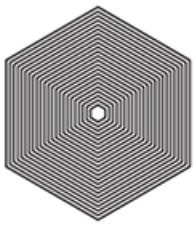
To make sure the screens and curves that will be created are accurate for your production process, your measurement data needs to be representative of your complete print run.

We therefore recommend that:

- you print another 50 to 100 meters (or more if this better reflects your production) after the press has reached your regular quality,
- you select 5 (or at least 3) copies in that "regular quality" print run: from the beginning, the middle and the end.

Once you've printed a few copies of your chart, check the slur marks in the **Verify Print Quality** step.

Click **Learn more about evaluating this area** to open documents with guidelines on how to evaluate these elements. You can find evaluation guidelines for slur marks and registration marks in the *Standard Operating Procedure for verifying print quality*.



Check the **Slur Marks** on your prints the following way:

a) Use a magnifying glass.
b) Follow the guidelines in the Standard Operating Procedure (click *Learn more about evaluating this area* to access it).
c) Make sure that all relevant marks on the print are good.
d) Verify all copies.
e) Accept or Reject the quality of the slur marks:

- click **Accept** if you are satisfied with the quality of the slur marks,
- click **Reject** if you aren't.

  If the marks on one or more copies are not satisfactory, find other copies of the test chart to evaluate (for example from around 30 m on the same run).

  If only one copy (or none) is good, troubleshoot with the press operator and reprint.

Once you are satisfied with the print quality, click **Next** and move on to *measuring the chart* to find the best screen and curve.

Note: The **Next** button will be disabled if you reject the quality of the slur marks.

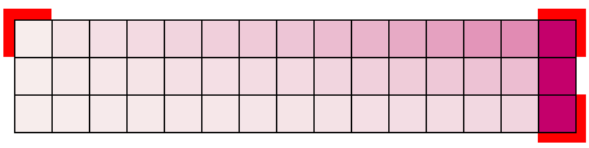
Measuring the Chart

You should now measure the chart to find the best screen and curve.

1. **Measure** the **Mindot Chart**.

   "Mindot" stands for "minimum dot". This chart will be used to determine the best screen for the highlights.

   You can use either an X-Rite i1 Pro or X-Rite i1iO spectrophotometer, in patch or scan mode. No other measurement devices are supported.



   a) Get ready to measure your print sample:

      1. Cut out the mindot chart from your first copy. To measure with the i1 Pro, we recommend you cut off the text before each row.

2. Place your sample on your spectrophotometer table or on the backing you typically use for measuring prints.
3. Make sure your spectrophotometer is connected to your computer.

Note:

With the cogwheel ( ) at the bottom right, you can stop, calibrate and reconnect your spectrophotometer, change the measurement mode and the measurement condition.

See the **Using a Spectrophotometer** chapter in the *Color Pilot user guide*.

b) Measure your chart following the instructions on screen (above the pause and play icons).

The preview will show the instructions and the measurement progress.

Tip:

After you are done measuring a page, you can save the measurement data as a measurement file if desired (in the CGATS - Committee for Graphic Arts Technologies Standards - color measurement format):

- Go back to the page you have just measured using the back arrow.
- Click the cogwheel ( ) at the bottom right and select **Save measurement...**
- Choose a location to save your measurements file (with the `.txt` extension).

Tip:

Alternatively, if you had already measured your chart and saved the measurement, you can load your measurement file instead of re-measuring it here.

1. Make sure that your measurement file is a CGATS (Committee for Graphic Arts Technologies Standards color measurement format) file, with the `.it8`, `.txt` or `.cgats` extension.
2. Click the cogwheel ( ) at the bottom right and select **Load Measurement...**

2. After you are done measuring, check the **Measurement results** on the next page.

a) Check the preview.

The patches are split diagonally , with the measured color at the top left, and the expected color (from your *printing standard*) at the bottom right. They should have approximately the same color.

Note:

The comparison of the measurements and the expected color is an approximation. Only look for clear differences:

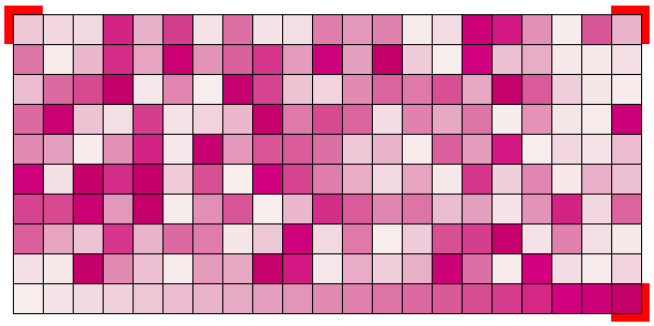
- if the color is completely different, you may have measured the wrong row, or your chart may be upside down;
- if they are the same color, but there is a very big difference in lightness: the chart may not be printed correctly, or there may be an issue with the measurement device.

b) If your measurement is good, click **Accept** and continue to the next step, otherwise click **Reject** and measure again (either the same chart if for example you measured it incorrectly, or another chart from the print run).

3. Measure the **Tone Value Chart**.

   This will be used to create the dot gain compensation curves.

   You can use either an X-Rite i1 Pro or X-Rite i1iO spectrophotometer, in patch or scan mode. No other measurement devices are supported.



   a) Get ready to measure your print sample:

      1. Cut out the tone value chart from the same copy as the mindot chart you measured.
      2. Use the same spectrophotometer as the one you used to measure the mindot chart.

   b) Measure your chart following the instructions on screen (above the pause and play icons).

   The preview will show the instructions and the measurement progress.

4. Check the measurements results.

   a) Check the preview.

      The patches' measured color at the top left should have approximately the same color as the expected color at the bottom right.

Note:

In this step we mainly want to detect if the charts were measured correctly (not upside down, mirrored...).

If the color in the patch is the same, but there is a big difference in lightness, this is probably not an issue. The dot gain compensation curve created from these measurements will correct for this.

b) Select which data you want to compare your measurements with, in the list above the preview.

After the first measurement you can only compare your measured data to the **Standard** (*your chosen printing standard*).

After you measure more copies, you can also compare to the **Average** of all measurements (including the current one), and to previous measurements individually.

Note: When comparing different measurement samples, if one of the samples is printed very differently, it could be an exception. In this case you shouldn't include it in your average.

c) Check the **solid density** (under **Solid Info**, to the right of the preview).

The **Measured Density** should be within tolerance of your **Desired Density** (taken from your *printing standard*). Use the same density tolerance as your company uses on press (typically + or - 0,05).

Select the density standard you use on your measurement device (ANSI A, DIN...), from the **Density Formula** list at the bottom.

Note: If you chose a standard that uses an ICC profile, you will not see a **Desired Density** for your ink, because the density calculation requires spectral data, which is not available in ICC profiles.

d) Check the **color difference** between the measured and expected solid color.

You can see **LabCh** values for both colors next to a bigger split patch, and a **ΔE** (color difference) value. Check whether this ΔE value is within the ΔE tolerance that your company uses.

By default, the wizard uses the ΔE formula you set in Color Pilot's preferences, but you can choose a different one in the **ΔE Formula** list below.

e) If everything is OK, click **Accept** and continue.

Otherwise click **Reject** and measure again.

Note:

In this case, you need to measure both the mindot chart and the tone value chart again. This is because:

- different samples may be printed somewhat differently, so you shouldn't mix print samples,
- if you detect a printing issue on the tone value chart, then it is likely that the complete print sample is not representative, and that your mindot measurement is not that reliable.

5. In the next screen, select **Measure another sample** if needed.

> **Note:** To make sure your final screen and curve are accurate and reliable, the measurements need to be an average of a complete print run. Measure a minimum of 3 charts of a good print quality (we advise to use 5).

You will be guided to measure the next sample, following the same procedure. The wizard will indicate how many charts you already measured: sample 1, sample 2...

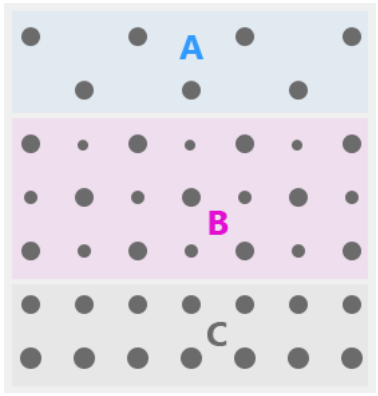
6. After you measured enough charts of good quality, you can select **Stop measuring and inspect the resulting screens**.

Evaluating the Highlights

In the final configuration step, you need to evaluate and choose the highlight settings that are best for your production, to finish setting up your custom screen and curve.

These settings are:

- The **Mindot** (or minimum dot): the minimum size that a dot can have in the highlights, while printing in a stable and clear way.
- The **Mindot distance**: the maximum distance between these minimum dots, to ensure highlights that print well.
- The **Transitional mindot**: even smaller dots that support the mindots in the transitional areas (between FM screening in the highlights and AM screening in the midtones).



- **A)** In the lightest highlights, there are only **Mindots** (separated by a distance no larger than the **Mindot distance**).
- **B)** As highlights get darker, increasingly smaller dots are added to the spaces between the regular dots.

  Once the screen grid is completely filled, the screen reaches the transition point. The last and smallest dot size added before the transition point is the **Transitional mindot**.
- **C)** In the midtones, the **Transitional mindots** reach the size of the regular **Mindots**, and the screen becomes a standard screen.

1. You can see an analysis of the mindot chart measurements.

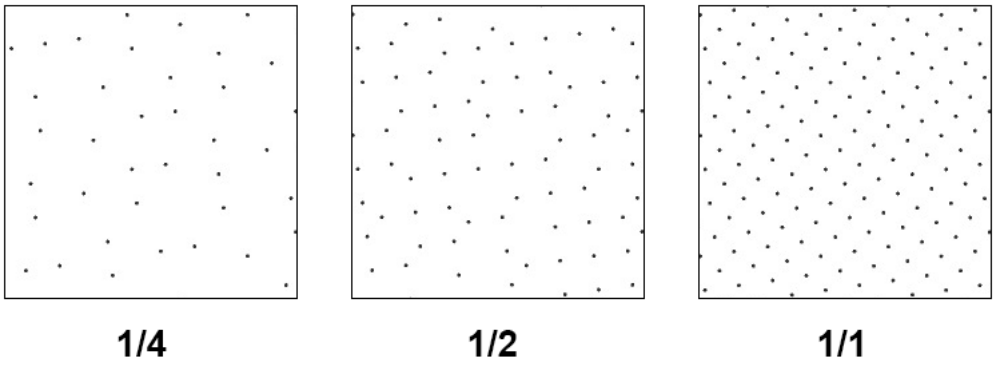
Dot Size (px)	0	6	9	12	16	19	22	25	31	36	42	47	54	60	Solid
Mindot Distance 0.17 mm (1/1)		4,9 ✗	7,1 ✓	9,8	14,2	17,8	21,4	24,8	31,8	37,6	43,8	48,7	56,2	62,3	
0.24 mm (1/2)		2,2 ✗	3,1 ✓	4,9	6,7	7,1	8,9	9,8	13,4	17,0	20,0	22,4	27,1	30,6	
0.34 mm (1/4)		0,4 ✗	1,3 ✗	2,2 ✓	3,1	3,1	4,0	4,9	5,8	7,1	8,0	8,9	11,0	13,4	

For the three **Mindot Distances** on the chart, the wizard shows which **Dot Size** is optimal. This is the smallest mindot size that gives a good print quality.

Note:

The fraction next to the distance indicates the amount of dots used to print the highlights.

- **1/1** means that means that all the dots are kept (the screen doesn't use FM screening).
- **1/2** means that half of the dots are kept (resulting in FM screening).
- **1/4** means that a quarter of the dots are kept (resulting in FM screening). This gives lighter highlights, but may increase graininess.



2. Examine these highlights on the print to decide if you agree with these results.
3. Under **Set Highlight Settings**, choose the best highlight settings for your production process based on what you found.
   a) Select the **Mindot Distance** you typically use for your production.

      If you choose one of the measured distances, you will see **(Measured)** next to it.

      Note:

      The first time you make a printing condition for this *application*, the biggest distance measured from the chart is filled in by default.

      After that, the wizard remembers the **Mindot Distance** you filled in for the previous printing condition for this application and fills it in by default.

   b) Select the **Mindot** that you found to be the best for your mindot distance.

      By default, the mindot size that the wizard found the best for that mindot distance is selected. This can either be a **Measured** mindot size, or a size calculated based on the other measurements (**Estimated**).

      If you choose a different size, you will still see an indication of what the wizard recommends next to **Measured** or **Estimated**.

Note: The bigger the **Mindot Distance** is, the bigger your **Mindot** needs to be, to give you a stable print.

c) Select the **Transitional Mindot** based on your visual inspection of the **1/1** row.

By default, the **Transitional Mindot** with a green check mark on the **1/1** line in the wizard is selected.

4. In the **Screen and Curve** table, you can see the details of screen that the wizard created based on your chosen settings:
   - the **Ink** that this screen is for,
   - the **Screen Name** (this is generated based on the settings used),
   - the screen **Code** (you can change this if desired: click **Select** and choose another free screen code from the list shown),
   - the **Mindot** size in microns or milli-inches (corresponding to the mindot you chose above),
   - the **Curve Bump** (this is the smallest input percentage you can print with this screen, all smaller percentages are "bumped up" to this value; this data will be included in the curve generated by the wizard),
   - the **Estimated Lightest Tone Value** (the percentage that the smallest input percentage from the **Curve Bump** gives on print).
5. Click **Finish** to generate your custom screen and curve, based on your production settings.

   This may take a moment.

   You can see your final screens and adjustment curves on the **Printing** page. See *Printing Calibration Results* on page 228.

You can now *review your printing condition parameters* and *save a report* if desired.

You can find your new printing condition in the *Printing Conditions Explorer*, your new screen in the *Screens Explorer*, and your new curves in the *Curves Explorer*.

Legacy Calibration

This is the calibration method that was available in previous versions of the application(22.03 or older). It uses older Crystal screening technology (Crystal and Crystal NP, but not Crystal V). It is only available when **Legacy Calibration** is enabled in **Edit** > **Preferences** > **Printing Conditions**.

1. In the **Choose Angle and Ruling** wizard step, select the **Screen Ruling** you use in production.

   A fixed list of rulings is available from 100 lpi to 250 lpi. If your ruling is not in the list, choose the closest available ruling.

   If you are using several rulings, you can add additional rulings after you finished the printing condition. See *Add a Ruling* on page 241.
2. Select the **Angle Set** used in your production.

   You have the same 3 options that are available in the Imaging Engine tickets: Offset, Flexo-7.5, Flexo+7.5.

Below the **Angle Set** selection, you find a list of all inks used in your printing condition. You defined this in *Ink Set and Printing Standard* on page 49.

Note: If you have completed the setup for **White**, the ink you selected as white will also be visible in the list. See *White* on page 62.

The angles, defined by the **Angle Set**, are shown next to each ink.

It is possible to change the angle of an ink:

a) Click the angle.
b) Select another angle from the list.
c) The **Angle Set** will be set to **<Custom>**.

Note:

Some angles are bigger than 90°, this is due to the screening technology used in the Print Control Wizard.

The corresponding value in "the 90° zone" is mentioned between brackets, make your selection based on this value.

3. Choose either:

- **Full ink-set print-run and measurements (recommended)**: select this option to print and measure charts. The wizard will guide you step by step.

  Note:

  Dot gain and highlights are very specific to individual certain press-ink-substrate combinations.

  Even if your printing condition is very similar (for example the same inks and substrate, but a different press), we highly recommend to print and measure the charts.

  If the results are very similar to another printing condition, you can still decide to use the same settings for both printing conditions.

  See *Full Ink Set Print Run and Measurements* on page 94.

- **Manually select screens and use default adjustment curves**: select this option if you know what settings to select for the highlights in your screen. The software will select default dot gain compensation curves for all inks.

  See *Manually select screens and use default adjustment curves* on page 112.

  Note: You can still edit the curves later: see *Update Curves* on page 234.

Full Ink Set Print Run and Measurements

Select the **Full ink-set print-run and measurements (recommended)** option to print and measure charts. The wizard will guide you step by step.

Note:

Dot gain and highlights are very specific to individual certain press/ink/substrate combinations.

Even if your printing condition is very similar (for example the same inks and substrate, but a different press), we highly recommend to print and measure the charts.

If the results are very similar to another printing condition, you can still decide to use the same settings for both printing conditions.

1. In the **Print Chart** step, customize your test chart as desired, then save it and print it.

   See *Creating the test chart* on page 95.
2. Evaluate the quality of your plate.

   See *Checking the Plate Quality* on page 98.
3. Evaluate the quality of your printed chart.

   See *Checking the printed chart* on page 98.
4. Measure the chart to find the best screen and curve.

   See *Measuring the chart* on page 100.
5. Evaluate the highlights on your chart to find the best highlights settings.

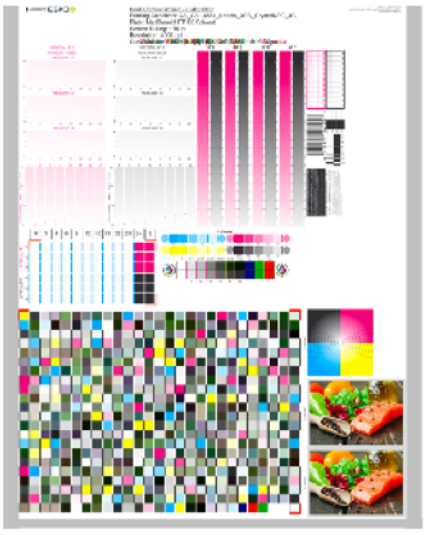
   See *Overview of the selected screen and highlights* on page 104 and *Inspect the screen results* on page 107.
6. Choose which of the settings found should be used for non calibrated inks (spot colors).

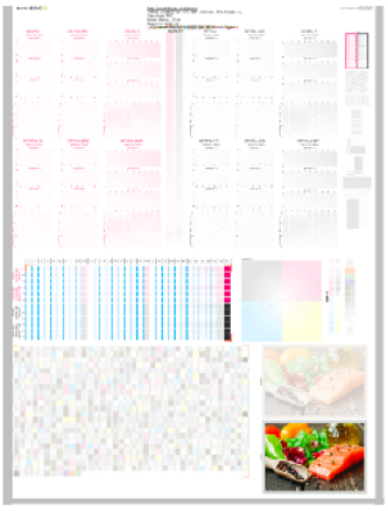
   See *Choosing the Spot Colors' Printing Settings* on page 78.
7. When you are done, the wizard will generate your custom screen and curve, based on your production settings.

Creating the test chart

1. **Create** the test chart:

   a) A preview of the default layout is shown for labels (left) and for flexibles (right)





Note: The illustrations of the charts in this manual are just one example, out of many possible versions. Your chart could look slightly different from the sample in this user guide.

b) Add **chart options** to customize the layout:

Note: All changes will be visualized in the preview.

- Unlock the **Chart Size** option by clicking on the and set your preferred **Width** and **Repeat Length**.

  If the preferred dimensions are higher than what is needed to print all the parts in a single chart, and the layout is set as:

  - **Complete Calibration Chart** then the parts will be placed in a single chart with blank space at the top or sides.
  - **Split Calibration chart parts** then the layout will be changed to **Complete Calibration Chart** and all the parts will be placed on a single chart.

  If the preferred dimensions are lower than what is needed to print all the parts in a single chart, and the layout is set as **Complete Calibration Chart** then the layout will be changed to **Split Calibration chart parts** and all the split charts will be of the preferred size.

  Note: If the preferred size is lower than the dimensions needed to print the split charts, then the size will be automatically set to the minimun size required to print the split charts.

  Tip: You can see the dimensions of the layout at the bottom of the preview.

- Customize the layout of the chart using the various **Layout** options:
  - **Complete Calibration Chart** will place all different parts that need to be printed in a single chart. The chart size will be minimum width and length required to fit all the parts in a single chart.
  - **Split Calibration chart parts** will automatically split the layout into several smaller parts. All elements that need to be printed together will be placed on the same layout. Some parts may be rotated to fit the chart. When splitting using this method, each small chart will be of a different size. If you want to make all the charts to be of the same size, you can set the preferred dimensions using the **Chart Size** option.
- **Mirror Image**: to be used for reverse printing.

  This option is on by default when using **White Overprint** in *Substrate* on page 48.
- **Add default bearer bars, slur marks and registration marks**:

  This option is always on by default.

- **Add a custom element**:

  If you want to add an image or technical element to the chart, to quality control the print.

  1. Click **Browse**.
  2. Browse to the location of the file.
  3. Click **Open**.

  Note:

  - The element needs to be a `.ct` file (Esko native image file format).
  - Use the free CT/LP plug-in from Esko in Adobe® Photoshop® to create `.ct` files from your element (To download the free plug-in, search for 'CT/LP plug-in' on *esko.com*).

    If you are using:

    - Quick Calibration: save the Photoshop document with Grayscale image mode

      .

    - Full Calibration: save the Photoshop document with CMYK or Multichannel imaging modes.

      Spot-channels will only be included if Multichannel mode is used. So to write a CMYK file with an extra spot channel, convert it to multichannel mode before saving it as a `.ct` file.
  - The `.ct` files cannot contain multiple layers. When the Photoshop document has multiple layers, merge all layers into a single layer before saving it as `.ct`.
  - You can only add one element. If you want to add several elements, you first need to group them in Adobe® Photoshop®.

c) Click **Save Chart**
d) Specify the folder where you want to save, click **Select Folder**
e) Specify a **File name**
f) Select the **File Type** you want to save: **LEN** or **Tiff**.

Note:

In most cases, we recommend you save the file as a **LEN** file, and use it directly on the CDI.

However, if you want to edit it to add extra elements specific to your production (different bearer bars for example), you should save it as **Tiff**, but make sure **you don't change** any of the technical elements! Please see *this knowledge base article* to know more about editing charts.

g) Click **Save**

For each ink in your printing condition, a file will be created in the selected folder. For example if your inkset is CMYK and you completed the White setup, you will get 5 files: **File name_C**, **File name_M**, **File name_Y**, **File name_K**, **File name_White**

Note: It could take several minutes to create the file.

Note: The created chart is based on numerous parameters from the previous steps (application, dot shape, surface screening, ...). **Always** create a new chart, to assure that you have the correct elements in your chart for your printing condition.

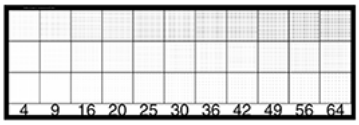
2. **Image the plates** on CDI according to your company's Standard Operating Procedures, AND using the settings specified in the previous steps.
3. Click **Next** in the lower right corner to continue to *check the plate quality*

Checking the Plate Quality

In the **Check Plates** step, you need to check the dot fail test.

Click *Learn more about evaluating this area* to open documents with guidelines for the dot fail test.

Check **Dot Fail** on the plate.



a) use a magnifying glass
b) check the center and lower row
c) the smallest number where all dots are in position gives the resulting value.
d) Verify all elements on the plate.
e) compare to the value that was found as good quality during installation of the CDI, same value as used during *Plate and Press Calibration* on page 51
f) **Accept** if the result matches the reference, or **Reject** if the result doesn't match.

   If the result doesn't match, you need to troubleshoot the problem that is causing the low quality dots, remake the plate and evaluate the dots again.

Once you are satisfied with the plate quality, print a few copies of your chart and move on to *check the print quality*

Note: The **Next** button will be disabled if you reject the plate quality.

Checking the printed chart

Make a Print using the plates, according to the settings you entered in the printing condition and your company's Standard Operating Procedures.

Note:

To make sure the screens and curves that will be created are accurate for your production process, your measurement data needs to be representative of your complete print run.

We therefore recommend that:

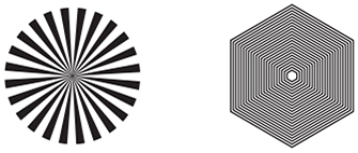
- you print another 50 to 100 meters (or more if this better reflects your production) after the press has reached your regular quality,
- you select 5 (or at least 3) copies in that "regular quality" print run: from the beginning, the middle and the end.

Once you've printed a few copies of your chart, check the slur marks, and the registration marks in the **Verify Print Quality** step.

After accepting or rejecting each element, the next one is shown automatically.

Click *Learn more about evaluating this area* to open documents with guidelines on how to evaluate these elements.

1. Check **Slur and Impression marks** on the print



   a) Use a magnifying glass
   b) **ALL** marks (= all inks) on the print should be ok
   c) verify all copies. If 1 or more copies are not ok, they should be replaced by a copy from that same strip (for example from around 30m). If only 1 copy is ok, troubleshoot with the press operator and reprint.
   d) In the wizard, **Accept** or **Reject**.

2. Check **Registration marks** on the print.

   a) use a magnifying glass
   b) **ALL** marks on the print should be ok
   c) verify all copies. If 1 or more copies are not ok, they should be replaced by a copy from that same strip (for example from around 30m). If only 1 copy is ok, troubleshoot with the press operator and reprint.
   d) **Accept** or **Reject**.

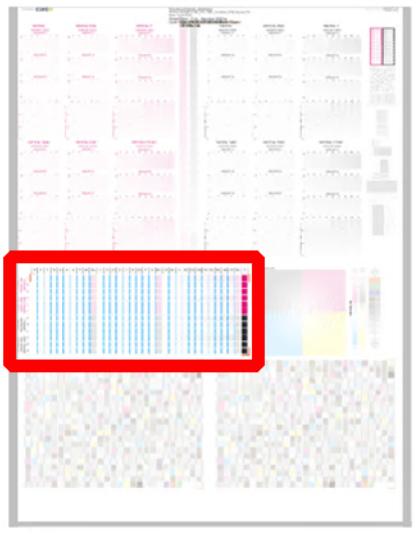
3. Click **Next** in the lower right corner to continue to measuring the charts. See *Measuring the chart* on page 100.

Note: The **Next** button will be disabled if you reject the quality of the slur marks or registration marks.

Measuring the chart

1. **Measure** the **Mindot Chart**.

   You can see the mindot chart for **Labels** (left) and for **Flexibles** (right) below.



   This will be used to determine the screen for the highlights.

   The magenta printed part will be used for CMY, the black printed part for K. If your selected ink set contains 1 or more extra inks (OGV), the first ink will be added to the chart, to be used for OGV.

   For example if the ink set is CMYKOG, orange will be added to the chart.

   a) Cut out the chart from your first copy.
   b) The chart can be read in patch or scan mode by an X-Rite i1 Pro or X-Rite i1iO. No other measurement devices are supported.

      To measure with the i1 Pro, it is advised to cut off the text before each row.
   c) With the cogwheel ( ) on the bottom right, you can stop, calibrate and reconnect your measurement device, change the measurement mode and the measurement condition.

      See the **Using a Spectrophotometer** chapter in the *Color Pilot user guide*.
   d) To know how to measure the chart with your measurement device, follow the instructions on the bottom left above the icons .

      The preview will show the instructions and the measurement progress.

Tip:

After you are done measuring a page, you can save the measurement data as a measurement file if desired (in the CGATS - Committee for Graphic Arts Technologies Standards - color measurement format):

- Go back to the page you have just measured using the back arrow.
- Click the cogwheel ( ) at the bottom right and select **Save measurement...**
- Choose a location to save your measurements file (with the `.txt` extension).

Tip:

Alternatively, if you had already measured your chart and saved the measurement, you can load your measurement file instead of re-measuring it here.

1. Make sure that your measurement file is a CGATS (Committee for Graphic Arts Technologies Standards color measurement format) file, with the `.it8`, `.txt` or `.cgats` extension.
2. Click the cogwheel ( ) at the bottom right and select **Load Measurement...**

2. Check the **Measurement results**.
   a) Check the preview: the upper and lower part of the patches should approximately have the same color.

Note:

The comparison of measurements (upper part) and the standard (lower part) is a rough approximation. Only look for clear differences:

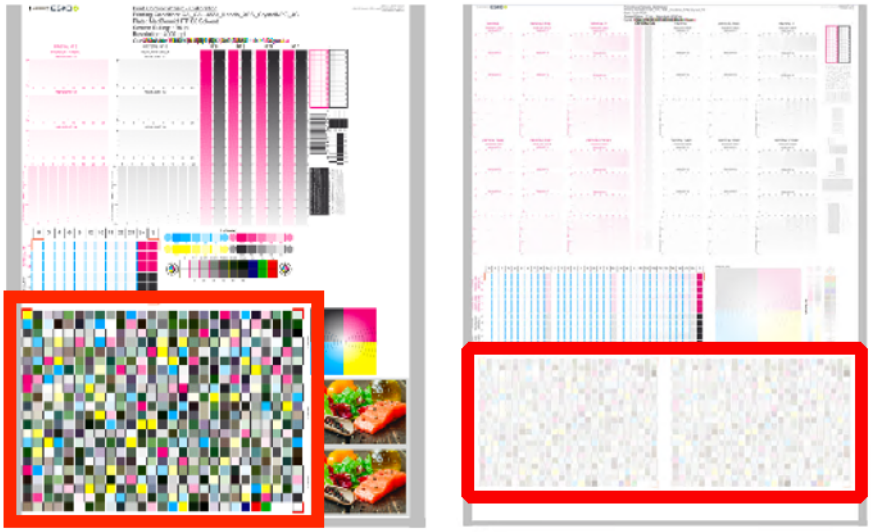
- completely different color: for example wrong row measured, chart upside down
- the same color, but a very big difference in lightness: for example not printed correctly, issue with the measurement device.

   b) **Accept** or **Reject**

   When your measurement is ok, it is possible to continue to the next step.

   If you rejected the measurement result, you will be guided to measure again, following this same procedure.

   This could be the same chart (wrong row, chart upside down) or a different chart from the print run.
3. Measure the **Tone Value Chart** for Labels (left) or Flexibles (right).



- This will be used to create the dot gain compensation curves.
- The chart will contain all inks from your selected ink set.

  For example if the ink set is CMYKOGV, the chart will contain CMYKOGV patches.
- Cut out the chart from the same copy as your mindot chart in the previous steps.
- The chart can be read in patch or scan mode by an X-Rite i1 Pro or X-Rite i1iO. No other measurement devices are supported.
- With the cogwheel ( ) on the bottom right, you can stop, calibrate and reconnect your measurement device, change the measurement mode and the measurement condition.

  See the chapter **Using a Spectrophotometer** in the Color Pilot user guide: *https://www.esko.com/en/support/product?id=Color%20Pilot*.
- To know how to measure the chart with your measurement device, follow the instructions on the bottom left, above the icons .

  The preview will visualize the instructions and the measurement progress.

4. **Check** the **measurements results**.
   a) Check the preview, the upper and lower part of the patches should approximately have the same color.

   After the first measurement you can compare your measurement to the standard. After the measurement of your 2nd, 3rd... copy, you can also compare to the average and to the other measurements.

   Select what you want to compare with, from the pull-down menu, on top of the preview.

Note:

- In this step we mainly want to detect if the charts were measured correct (not upside down, mirrored...)

  If the color in the patch is the same, but there is a big difference in lightness, this is probably not an issue. The dot gain compensation curve created from these measurements will correct for this.

- Comparing charts among each other could be useful, to detect if some charts are printed very different. That chart could be an exception and we don't want to include this in our average.

b) Check the **solid info**, to the right of the preview.

1. Density: for each ink, the measured density should be within tolerance of the desired density.

   Use the same tolerance as your company uses on press (typically + or - 0,05).

   Select the Density standard you use on your measurement device (ANSI A, DIN, ...), from the pull-down menu below the Solid Info.

   Note:

   The desired density is derived from the printing standard you selected in Ink Set and Printing Standard

   We don't show desired density for CMYK inks for standards that use an ICC profile as a standard profile. This is because density calculation requires spectral data, which is not available in ICC profiles.

2. Color difference (ΔE): for each ink, the ΔE should be within tolerance of the printing standard you selected in Ink Set and Printing Standard. See *Ink Set and Printing Standard* on page 49.

   Select the ΔE Formula that is requested by the printing standard, from the pull-down menu below the Solid Info.

   Note: Select an ink if you want to see the LabCh details, below the **Solid Info** window.

Note: We don't show desired density, Lab and ΔE for the OGV inks. There are no standards for these inks, so there's nothing to match.

c) If everything is OK, click **Accept** and continue.

Otherwise click **Reject** and measure again.

Note:

In this case, you need to measure both the mindot chart and the tone value chart again. This is because:

- different samples may be printed somewhat differently, so you shouldn't mix print samples,
- if you detect a printing issue on the tone value chart, then it is likely that the complete print sample is not representative, and that your mindot measurement is not that reliable.

5. Select **Measure another sample** if needed.

   To have an accurate and reliable screens and curves creation, it is important that the measurements are an average of a complete print run. Measure minimum 3 charts of good print quality (we advise to use 5).

   a) You will be guided to measure again. Following this same procedure from the top.

   Note: The wizard will indicate how many charts you already measured: sample 1, sample 2...

6. If you measured enough charts of good quality, you can select **Stop measuring and inspect the resulting screens**.

   See *Overview of the selected screen and highlights* on page 104.

Overview of the selected screen and highlights

View at the top, an overview of the screen technology and highlights selected from the measurements.

One selection is made for CMY (based on magenta part in mindot chart), another for K and another for OGV (if present, based on the part in mindot chart printed in the fifth separation).

You see per ink group (CMY, K and OGV) what is the selected:

Screen Name:

1. The first part of the screen name is the screening dot (dot shape) you selected in Plate and Press Calibration: Crystal, Crystal C or Crystal NP. See *Plate and Press Calibration* on page 51
2. The surface screening selected in Plate and Press Calibration will be mentioned after the screening dot: MG34, MG45 or SOL (=solid). See *Plate and Press Calibration* on page 51

   Exceptions for Crystal NP:

   - the dot shape (R, C, F or E) will be mentioned after the surface screening, for example Crystal NP MG34 R9
   - SOL will not be mentioned if surface screening Solid is used, for example Crystal NP R6

   Exceptions for Crystal and Crystal C:

   - when MCWSI is selected, nothing will be mentioned in the name, for example Crystal 6 or Crystal C12
   - for Crystal C, the 'C' will be mentioned after the surface screening, for example Crystal MG34 C3
3. The number at the end indicates the size (in pixels) of the minimum dot, used in the screen.

Note:

- For Crystal C and Crystal NP: it indicates the number of pixels that will form the printing dot
- For Crystal: it indicates the number of boosted pixels. As each pixel will be boosted (Pixel +) on the CDI, the size of the printing dot will be bigger than the amount of pixels.

4. If a support dot is selected, the support dot characteristics will be mentioned at the end of the screen name, for example Crystal 4 **S4R1**
   - The size of the support dot: **S3** = 3 pixels
   - The type of ruling used: **R1** = single ruling, **R2** = double ruling)
5. For more information, see:
   - *Types of Screens* on page 30
   - *How to evaluate highlights*

Code

When the screen is created, a code needs be assigned to the screen. So the screen can be easily used, communicated and traced back by Esko software and operators. Comparable to other Esko screens: Circular dot = C; an HD screen = HDxx; ...

This code is unique and will automatically be selected, based on 'next available in the list'.

It is possible to change the code BEFORE creation:

1. Click **Select**, next to the code
2. Select a screen code from the list
3. Click **OK**

Note: If the screen already exists, because it was already created in another printing condition, the code will be greyed out and labeled **(already exists)**. It is not possible to change the code.

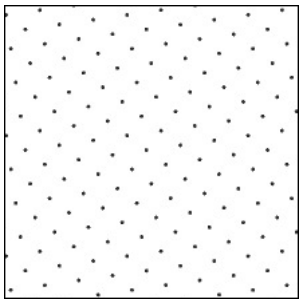
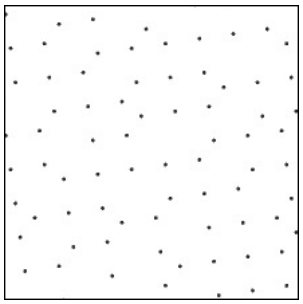
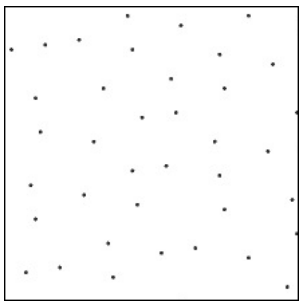
Minimum Dot on Plate

The size (diameter) of the selected minimum dot is mentioned in microns (µm).

Note: As boosted pixels on CDI gets bigger then 'regular' pixels, the diameter of 4 boosted pixels (Crystal 4) will be bigger than the diameter of 12 regular pixels (Crystal C12 or Crystal NP C12).

FM Dot Population

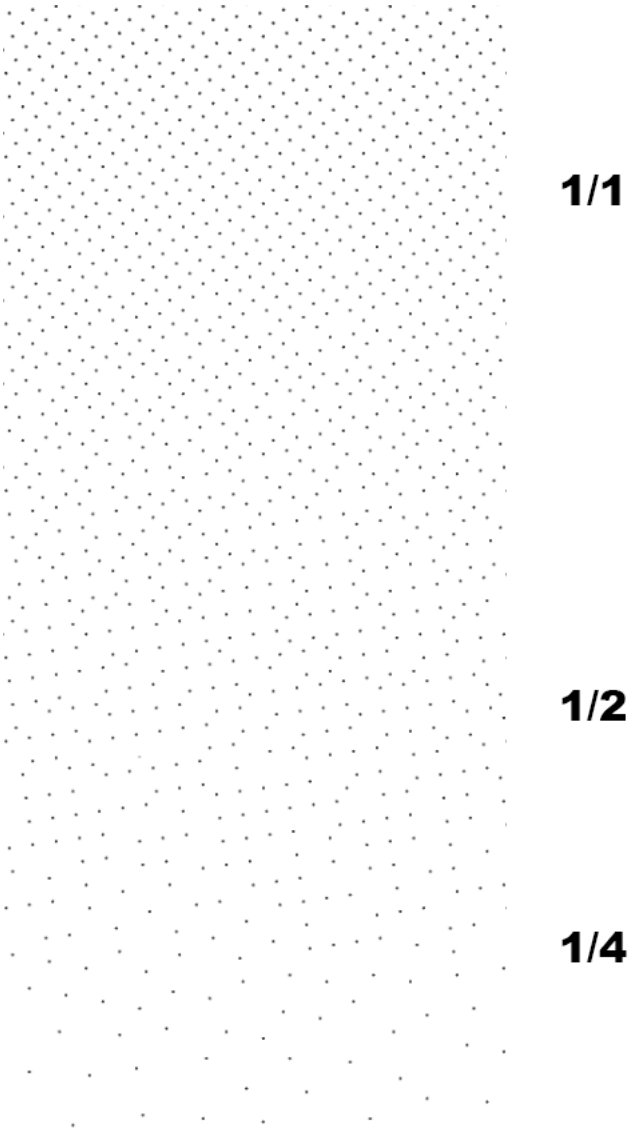
The FM dot population indicates the amount of dots used to print the highlights.

	**1/1** means that all the dots are kept (the screen doesn't use FM screening)
	**1/2** means that half of the dots are kept (resulting in FM screening)
	**1/4** means that a quarter of the dots are kept (resulting in FM screening) A lower FM dot population gives lighter highlights, but may increase graininess.

Transition point:

- If 1/1 (no FM): there is no transition point, the minimum dot will be the bump.
- If 1/2 or 1/4 (FM): the transition point, where the AM screen starts changing into an FM screen, will be determined by the minimum dot.

If you see **1/4**, it means that the screen gradually transitions from 1/1 (no FM) to 1/2, then to 1/4 in the highlights, as you can see below.



Lightest Tone Value

The lightest tone that can be printed, will be displayed.

The value is the result of the selected **minimum dot** and **FM dot population**. The combination that gives in print a stable dot and the lightest highlight, will be automatically selected from the measurements.

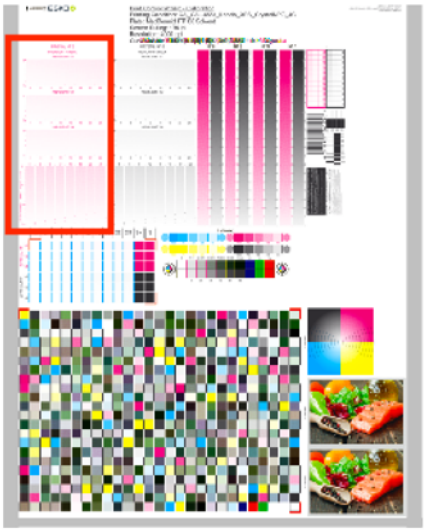
Continue to inspect the screen results

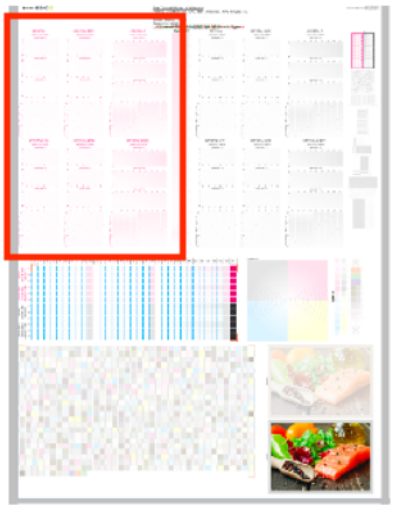
See *Inspect the screen results* on page 107.

Inspect the screen results

1. **Locate** on your print sample, the **highlight check** areas.

   In the example below, the CMY area is marked, for Labels (left) and for Flexibles (right)





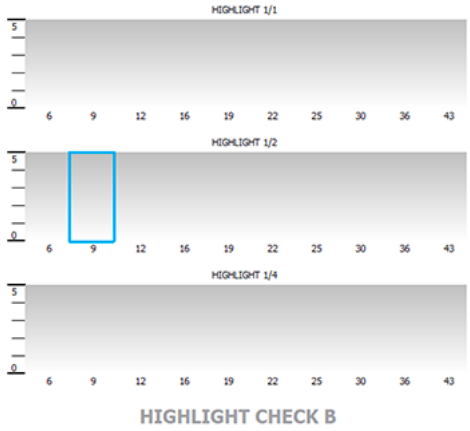
- Per available Ink Group (CMY, K and OGV) you will have a set of HIGHLIGHT CHECK's. The set is the same for each ink group.
- The number of HIGHLIGHT CHECK's depends on the **Screening Dot** you selected in *Plate and Press Calibration* (could be different number than the examples above).
- For every available screen technology there will be a HIGHLIGHT CHECK.

It shows the screens highlights (from 0 to 5%) for:

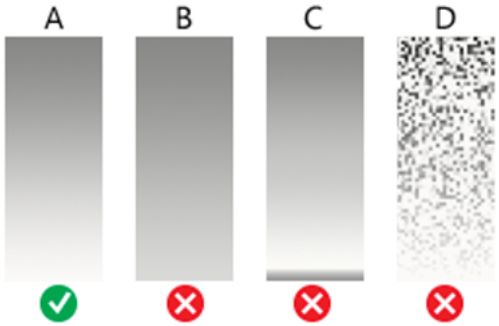
- different **FM Dot Population**: 1/1, 1/2 and 1/4
- different **Minimum Dot** (in pixels)

2. In the overview, select the **Ink Group** you want to inspect: CMY, Black or OGV

   You will see your selected highlight in the preview, the area will be marked with a blue rectangle.



3. Locate the same area on your print sample, and inspect it on a light booth using a magnifier



a) **Skip the next step** and continue with the inspection of the other ink groups, if the highlights gradient fade smoothly (as in the gradient A)

b) **Continue to the next step**, if the highlights quality is not good enough and you encounter any of the issues below:

- B: the screen prints too dark, giving a hard edge in the highlights
- C: there is tone reversal in the highlights
- D: the print is too grainy

> **Note:**
>
> Inspect the screen results on ALL print samples were you measured the charts! The selected highlight should fade smoothly on all samples. If not, try to find a better highlight. To avoid that you will see the same unstable print behavior in your daily production.

For more information, click *Learn more about inspecting highlights*.

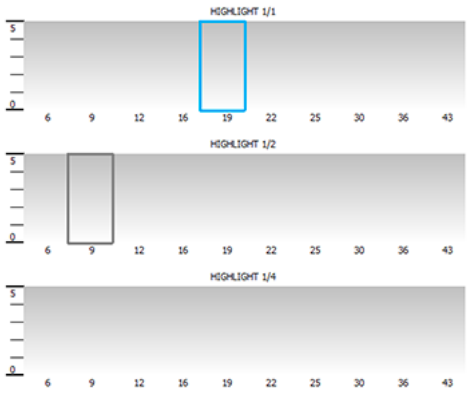
4. Select a highlight that you consider better

a) Inspect the neighboring highlight gradients (within the same or another FM Dot Population) to try and find better quality highlights.

If you don't find any satisfactory highlights for your selected screen technology, inspect the highlights of another screen technology (for example Crystal C instead of Crystal).

b) To select the better highlight, click the area in the preview.

- The blue rectangle will be placed in the new selected area.
- The selection from the measurements will be marked with a grey rectangle.
- The Ink Group will be marked with and the new settings will be applied.



HIGHLIGHT CHECK B

Note:

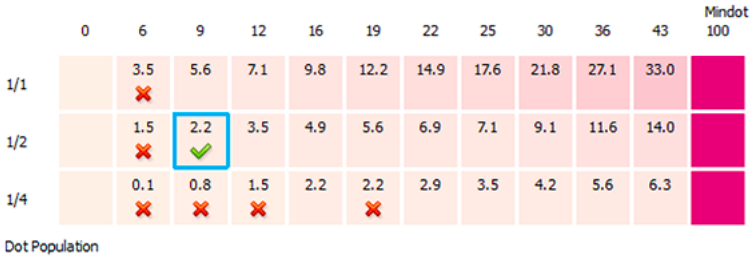
If you found the better highlight in another screen technology, first select the **screen technology** from the pull-down menu (on top of the preview).

Only screens that are related to the screening dot you selected in *Plate and Press Calibration* will be available.

Note: Click **Reset** (top right of the preview), to remove your change.

c) Enable **Show mindot strip with densities** (on top of the preview), if you need additional information to help you make your choice.

Next to the highlight check preview, the mindot strip of the selected Ink Group is displayed, with the detailed result of your measurements.



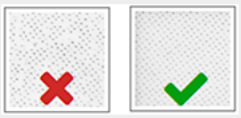
The patches on screen are arranged as in your print sample, by **minimum dot** size (horizontally) and **FM dot population** (vertically).

For each patch, you can see the tone value produced by the screen in this patch, and the wizards' evaluation:

- The patch with a green check is the one the wizard considers optimal: it prints in a stable way and produces the lightest highlights of all the stable patches
- Patches with no specific markings also print in a stable way
- Patches with a red cross do not guarantee a stable print
- Hover on a specific patch, to see more information below the strip

Tip:

A stable print gives a smooth result without any clumping or missing dots.



Note: In the mindot preview, you can also select the better highlight. The Highlight preview will be automatically adapted.

5. Inspect the screen result of another ink group, using the same procedure as the previous steps.

   When all ink groups are inspected and the correct settings are applied, continue to the next step.

6. Select which separation from your printing condition will be used to set the default screen and curve for your **spot colors** (= all separations that are not in the ink set).

   The default is Black, but you can select any of the inks from the printing condition. Or <none>, if your spot colors don't need to use the screen and curve from your printing condition.

7. Click **Finish**

   The screens and curves will be created (this could take some time) and the wizard will be closed.

Note:

To better understand how the Print Control Wizard calculates the minimum gray value (H38 (**min2.7%**,h100000,s79)) of the curve, see the example below:

For Crystal C screen at a specific tone in the highlights, P+ dots are mixed with solid dots. Because solid dots print larger, these solid dots need to be reduced. This is done with a reducing factor, internally called as 'AM2WSI' parameter. This factor is around 5/8 = 0.625, so when the 'minimum' in the PressSync curve is set to 2.7%, the real gray level in the LEN file will be: 2.7% x 0.625 = 1.69%.

When 1/1 population is selected in PCW, the required bump to have no FM is setting the 'minimum' PressSync parameter equal to the transition point (point where AM goes to FM). Also here the AM2WSI parameter is used.

Note also that in 20.0 a 'keep0%' is added to the curve and set to 0.39% Result is that the 1st 8-bit CT tint (=0.39%) will have a gray value of : 'minimum' * 'AM2WS'I

In previous version of Print Control Wizard (18.1.1), 'keep0%' was set to 0%, so the gray value of the 1st 8-bit tint was about 0.3% higher than 'minimum' * 'AM2WSI'

All information about the selected screens, curves and measurement results are now shown on the **Printing** page. See *Printing Calibration Results* on page 228.

Choosing the Spot Colors' Printing Settings

1. On the **Spot Colors** screen, select which separation from your printing condition should be used to set the default screen and curve for your spot colors (= all separations that are not in the ink set).

   The default is **Black**, but you can select any of the inks from the printing condition. Or **<None>**, if your spot colors don't need to use the screen and curve from your printing condition.
2. Click **Next** to generate your custom screens and curves, based on your production settings.

   This can take some time.

Manually select screens and use default adjustment curves

Select the screens manually if you know what settings to select for the highlights in your screen. The software will select default dot gain compensation curves for all inks.

1. On the **Set Manually** wizard screen, you can see an overview of the selected screen technology and highlights.

   For more information, see *Overview of the selected screen and highlights* on page 104.
2. Set the screening parameters for each ink group.
   a) In the overview table, select the **Ink Group**: CMY, Black or additional inks (this depends on your ink set, for example OGV).
   b) Underneath the table, select the **Screen Technology** to use for this ink group.

      Only screens related to the screening dot you selected in *Plate and Press Calibration* are available.
   c) Select the **Mindot** for this ink group.

      The mindots available in the list are related to the screen technology you selected.
   d) Select the **FM Dot Population**: 1/1, 1/2 or 1/4.
   e) Repeat the steps for the other ink groups.

      When all ink groups are inspected and the correct settings are applied, continue to the next step.
3. On the **Spot Colors** screen, select which separation from your printing condition should be used to set the default screen and curve for your spot colors (= all separations that are not in the ink set).

   The default is **Black**, but you can select any of the inks from the printing condition. Or **<None>**, if your spot colors don't need to use the screen and curve from your printing condition.
4. Click **Finish**.

   The screens and curves are created (this could take some time).

Note:

When you manually set up your printing calibration, the selected curves are always F40 for Flexibles and E50 for Labels.

Only the flexible curve options (value shown between brackets) are calculated, based on the selected screening parameters. See *PressSync Curves* on page 26.

All information about the selected screens, curves and measurement results are now shown on the **Printing** page. See *Printing Calibration Results* on page 228.

5.3. Creating a Printing Condition for Labels

If you are printing on flexible packaging material (for example for plastic bags or pouches), you should create a printing condition for **flexibles**.

If you are printing labels (on a narrow web substrate), you should create a printing condition for **labels**.

Note: To create a printing condition for flexibles and/or labels, you need to have the respective corresponding licenses.

1. In the **Printing Conditions** library, click the **New Printing Condition** button in the bottom toolbar.
2. In the **New Printing Condition** dialog:
   a) Enter the **Printing Condition Name** you want to use.
   We recommend you use a descriptive name, that includes some of your workflow's key settings, for example `Press Type - Plate Type - Substrate`.
   b) Select the **Application** of your flexo printing workflow (the type of jobs and substrates that you usually work on).

   Note: Depending on your license, you may see one or more options here.

   - Select **Flexibles** if you are printing on flexible packaging.
   - Select **Labels** if you are printing labels (on a narrow web substrate).

   Note: The selection of the **Application** is not just informative, it influences some of the steps during calibration: different choices in drop down menu's, charts will be adapted in size and design, ...

   c) Select the **Substrate**. See *Substrate* on page 48
   d) Select the **Ink Set**. See *Ink Set and Printing Standard* on page 49

   Note: It is still possible to change the substrate and ink set after this dialog is closed.

   e) Click **OK**. A new printing condition is created, and the configuration steps are shown.

   Note: The printing condition is immediately saved into the database.
3. Complete all configuration steps: see *Printing Condition Configuration Steps* on page 44
4. After finishing the last configuration step **Screens and Curves**, you can:
   - Have a final look at the results and parameters of the printing condition: see *Reviewing the Printing Condition*
   - Create a detailed report of the printing condition: see *Saving a Report* on page 287

Over time, as your equipment ages and your production fluctuates, you may need to adapt your printing condition, see *Editing Flexibles or Labels Printing Conditions* on page 232.

5.3.1. Printing Condition Configuration Steps

At the top, a banner displays the status of the printing condition and a brief description of the selected configuration step.

Below the banner you see an overview of all configuration steps:

Under PROPERTIES	Under CALIBRATE
• *General* on page 46 • *Plate Making* on page 46 • *Substrate* on page 48 • *Ink Set and Printing Standard* on page 49 • *Press* on page 50	• *Plate and Press Calibration* on page 51 • *White* on page 62 • *Printing* on page 65

To navigate between the configuration steps, you have two options:

- Select a **configuration step**
- Click the **navigation arrows** on the left and right of the pane: < >

Unfinished printing conditions have an indicator next to each step:

- ✔ : all mandatory parameters are filled in,
- ✱ : you still need to fill in some or all mandatory parameters,
- ⊖ : this configuration step is not available until some mandatory parameters in previous steps are filled in.

Note:

- Mandatory parameters in the configuration steps are marked with an orange star ✱. After filling them in they get a green check mark ✔. They need to all be green before the configuration step is marked as completed.
- The progress of some steps (selection options, charts...) depend on the mandatory parameters from previous steps. Changing a parameter will require to redo the step.

Note:

It is not possible to edit any of the selection lists in the printing condition (substrate type, plate type...). Only parameters that have been tested and approved can be selected.

The selection a step can limit the selection possibilities in one of the next steps.

The activated licenses can also influence the selection possibilities.

At any point in the process you can stop working on your printing condition and continue later. Use the buttons **Close** and **Quit Now and Continue Later**. Don't forget to **Save** when asked.

When you are ready to continue, open the printing condition by right-clicking it and selecting **Open**, or by double-clicking on it. The first step that is incomplete will automatically be selected, to remind you where to continue.

Note: When you open a finished printing condition, the interface is a little different. See *Reviewing the Printing Condition*.

If you want to remove your latest modifications in the printing condition, click the **Revert** button in the bottom tool bar. Be aware that **all** modifications since the last time you saved will be removed.

We recommend to regularly save changes (for example after every step) to make better use of **Revert** and avoid unnecessary loss of time and data.

General

The first configuration step in the list shows the **Application** that has been chosen in the **New Printing Condition** dialog. It can no longer be changed.

See *Creating a Printing Condition for Flexibles* on page 43.

You have the opportunity to enter a **Description** and add/remove **Keywords**, but this is not mandatory.

Note:

Keywords added via the Printing Conditions Explorer will also be visible here.

See the **Keywords** chapter in the Color Pilot user guide: *https://www.esko.com/en/support/product?id=Color%20Pilot*.

Plate Making

Specify in this configuration step what Flexo plates will be used and the way the plates are made (image, expose, develop).

1. Select your **Imager Type**:
   - **CDI Crystal**: the new generation of Esko imager, using the Crystal technology
   - **CDI Spark**: an older generation of Esko imager

   For more information about Esko's different CDI models: *https://www.esko.com/en/products/digital-flexo-platemaking/cdi-spark/models*
2. Select your **Optics**:
   - For **CDI Crystal**:

- Optics40 V2
- Optics80 V2
- Optics40 V3
- Optics80 V3
- Optics40 V3+
- Optics80 V3+

- For **CDI Spark**:
  - Optics15
  - Optics25
  - Optics40
  - Optics80
  - Optics40 V2
  - Optics80 V2
  - Optics40 V3
  - Optics80 V3
  - Optics40 V3+
  - Optics80 V3+

Tip: If you don't know your CDI's optics technology, you can find it in the tables below (it is linked to its maximum imaging speed).

Table: CDI Spark (Models 2530, 4835, 4260 and 5080)

Maximum Imaging Speed	Optics Technology
1.5 m^2/hr	**Optics 15**
2.5 m^2/hr	**Optics 25**
4 m^2/hr	**Optics 40**, **Optics 40 v2**, **Optics 40 v3** or **Optics 40 v3+** (depending on the model)
8 m^2/hr	**Optics 80**, **Optics 80 v2**, **Optics 80 v3** or **Optics 80 v3+** (depending on the model)

Table: CDI Crystal (Models 4835 and 5080)

Maximum Imaging Speed	Optics Technology
4 m^2/hr	**Optics 40 v2**, **Optics 40 v3** or **Optics 40 v3+**
8 m^2/hr	**Optics 80 v2**, **Optics 80 v3** or **Optics 80 v3+**

3. **Resolution**:

   The resolution that is used to image the plates on CDI, is fixed at 4000ppi. The screen technologies in the Print Control Wizard (Pixel+, FM in highlights, ...) require this resolution.

4. Select your **Exposure Type**:
   - **Inline-UV**: Esko device that exposes inline the front of the plate directly after imaging,
   - **XPS** Crystal: Esko device that simultaneously exposes the front and back of the plate, using UV LEDs.
   - **Bank**: non-Esko exposure device, can be an analog or digital device.

   Note: To be able to guarantee a minimum quality, you can only select **XPS** for labels.

5. In **Description**, you can add information about your exposure devices, for example exposing times, what device (if you own several exposing devices of the same type) ...

   You can also add all other information that could not be specified in the default fields, information that is important to identify how the plates are created.

6. Select your **Plate Type**.

   A wide range of plate types from different manufacturers is available. All plates in the list are suitable for *your chosen application* (Flexibles or Labels), and tested and approved by Esko, to be able to guarantee a minimum quality.

   In the future more plate types could be added. Contact Esko support if your plate type is not in the list.

   Some plate types are listed twice, each with a different developer. Make the selection of your developer type from this list.

7. Select your plate's **Thickness** if desired.

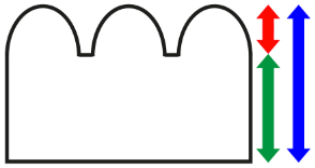
   Depending the plate type you selected, you will have a fixed list of plate thicknesses. Only plate thicknesses that are tested and approved by Esko will be available.

   In the future more thicknesses could be added. Contact Esko support if your thickness is not in the list.

8. Enter your **Relief Depth** if desired.

   This is the depth of the dots on your plate (or the difference in height between the printing surface and the floor of the plate).

   You can calculate your plate relief depth (in red below) by measuring your plate's thickness (in blue) and subtracting the plate floor's thickness (in green).



   Note: To change the units, see *Preferred Units* on page 35.

9. **Developer**: The type of developer is automatically defined when you select the plate type. It can be:
   - **Solvent**
   - **Thermal**
   - **Water**

For some plate types we support more than 1 developer type.

Select your developer type in **Plate Type**.

Substrate

Define the substrate you are using for your printing condition.

1. Select your **Substrate Type**:
   - **Acrylic**: a substrate made of acrylate, polyacrylate or methyl methacrylate components, sold for example under the Perspex, Plexiglas, Lucite or Acrylite trade names
   - **PE**: a polyethylene, polyester, PET, PETG or HPDE substrate, sold for example under the Mylar, Melinex, Hostaphan or BoPET trade names
   - **Spun PE**: spun and bonded polyethylene, sold for example under the Tyvek trade name
   - **PP**: a polypropylene, PVC or vinyl substrate
   - **PS**: polystyrene
   - **Paper**

   Note: Substrate type is already filled in from the **New Printing Condition** dialog, but can still be changed. See *Creating a Printing Condition for Flexibles* on page 43
2. Select your substrate's **Opacity**:
   - **Transparent**
   - **White Underprint**: where a white ink is printed under the other inks
   - **White Overprint**: where a white ink is printed on top of the other inks, for example for reverse printing
   - **Opaque**
3. Enter your substrate's **Thickness** in microns or mil, not mandatory.

   Note: To change the units, see *Preferred Units* on page 35
4. Add a more detailed **Description** of your substrate. Not mandatory, but highly recommended to add all data that identifies the substrate.

Ink Set and Printing Standard

Define what inks you are using on press, and what targets you want the printed result to match.

1. Select the **Ink Set** you are printing with.

   This can be **CMYK** or an expanded gamut printing ink set (for example **CMYK Orange Green Violet**), where the expanded gamut inks are part of the **ClassicColors** ink book.

   For more information about expanded gamut printing, please see *Equinox and Expanded Gamut Printing* in the Color Pilot documentation.

Note:

- The **Ink Set** is already filled in from the **New Printing Condition** dialog, but can still be changed. See *Creating a Printing Condition for Flexibles* on page 43
- Compared to the previous versions of the Print Control Wizard software, it is not possible anymore to only use one ink. The minimum is CMYK.

2. Select the **Printing Standard** you want to match.

   The printing standard defines:

   - the expected color of the substrate and inks,
   - the target dot gain curves for each printing ink,
   - how to measure tone values.

   This target data will be used in the *Printing* configuration step .

   Tip: See *What is a Printing Standard* for more information about the different printing standards.

3. In the **Details** table you can see an overview of the inks in your selected ink set.

   For each ink, you can see more information about the target data in your selected standard:

   - the **Desired Curve**,
   - the desired density or tone of the **50%** level,
   - the target **LabCh** values for the **solid** inks.

Press

Adding information about your press setup is not mandatory, but highly advised.

For every setup it is important to gather as much information as possible, to better understand the setup conditions at a later time.

Note: As this configuration step is optional, the indicator will always be green ✔.

1. Enter the manufacturer name of your press (**Press Brand**).
2. Select your **Press Type**. It can be either:
   - **Central Impression** press: containing a single large-diameter common impression cylinder that supports the substrate as it enters in contact with a series of adjacent plate cylinders.
   - **Stack Press**: in which the substrate passes through multiple color stations which are aligned in one or two vertical stacks).
   - **In-line Press**: in which the substrate passes through multiple color stations which are aligned in a straight horizontal line).
3. Select your **Press Size** (**Wide Web** or **Narrow Web**).

   It is not possible to select a cylinder width.
4. Enter your press' **Printing Speed** in meters or feet per minute.

Note: To change the units, see *Preferred Units* on page 35.

5. In **Press Inks** you see an overview of the inks in your printing condition, set up in *Ink Set and Printing Standard* and *White*.

   Note: For white, the name of the ink you selected as white will be shown in the list.

   Per ink you can add extra information about the ink, anilox and tape you will use on press:

   a) Select the ink and click the **Modify** button, or double-click the ink.
   b) Specify the **Ink Properties**:

      1. Enter the manufacturer of the ink (**Brand**).
      2. Select the **Type**: **Solvent**, **Water-based** or **UV curable**.
      3. Enter the **Viscosity** in seconds.

      You can measure an ink's viscosity using an efflux cup. The viscosity is the number of seconds it needs to flow through the hole at the bottom of the cup until the cup is completely empty (very viscous inks need longer). Some newer press models can measure this automatically (electronically).

      Note: The ink's viscosity affects how well it transfers onto your substrate, and can change depending on ambient temperature and time (for example when the solvent in a solvent based ink starts evaporating).

   c) Specify the **Anilox Properties**:

      1. Enter the manufacturer of the anilox (**Brand**).
      2. Enter the **Type**.
      3. Enter the anilox' **Line Screen** in lines per inch (this is the number of cells per linear inch).

         A higher line screen is used for finer detail, while a lower one will transfer a heavier layer of ink.
      4. Enter the **Angle** of engraving (relative to the anilox axis) in degrees. This is typically 30°, 45° or 60°.
      5. Enter the anilox' **Cell Volume** (the ink capacity of each engraved cell) in billion cubic microns (BCM).

         Note:

         The cell volume of an anilox roll can change over time, due to wear, damage and "plugging" (dried ink residues at the bottom of the cells).

         Plugging can happen when Solvent or Water-based ink is not cleaned immediately after using the anilox and dries in (UV curable ink will not dry on its own).

   d) Specify the **Tape Properties** by entering the manufacturer of the tape (**Brand**).

      Note: We recommend to also add the tape hardness in the same field.

   e) Specify any additional information that might be required under **Other Properties**.
   f) If all your inks have the same properties, you can select **Apply properties to all inks**. This option is enabled when no parameters have been set for any inks.

g) Click **OK**.

All parameters per ink are visible in the overview table.

Note:

At any time, you can modify individual ink's properties.

You can also first add the data that most inks have in common (by using **Apply properties to all inks**), then edit the inks individually.

Plate and Press Calibration

For labels, default plate and press calibration settings are filled in automatically. Tests have shown that these settings give the best results in about 90% of the cases.

However, you can still calibrate your plate and printing process if you want: click the **Calibrate Plate and Press Again...** button in the top right corner to get started, and follow the explanations in *Change Plate and Press Calibration Settings* on page 232.

The default plate and press calibration settings for labels are:

- no **Pixel Boost**,
- **Crystal NP** (non-Pixel+) as **Screen Type**,
- no **Surface Screening** (**Solid**),
- a **Circular Screen Dot Shape**.

If desired, you can add a **Description** with additional information.

White

The goal of this configuration step is to improve the evenness of the ink film and the opacity for solid white, by applying a surface screening.

There are different types of surface screening and depending the printing conditions, some will give better results than others. By printing a test chart on press, you will be able to select the most optimal surface screening for your printing condition.

This step is not mandatory and becomes available when the step **Plate and Press Calibration** is completed.

Note:

- As this configuration step is optional, the indicator will always be green ✔, with or without performing the White calibration.
- The White calibration is only available when you have license for an XPS exposer. The screen technology for white ink (very fine surface screening pattern) requires the very consistent exposing of a LED UV system (= XPS).
- We recommend to only use the White calibration for solvent inks, as other inks are not tested yet.

1. To start the wizard, click **Click here to choose the screen for white**.
2. **Create** the white chart
   a) click **Save Chart...**

b) specify the folder where you want to save, click **Select Folder**

A file named `PCW_White.LEN` is created in the selected folder

Example of the white chart:

- This wizard always creates the same chart, independently of the parameters in the previous steps. It is possible to re-use the same **PCW_White.LEN** file for other White calibrations.
- The chart will always be saved as a LEN file, no other formats possible.
- You can edit the LEN file in an Esko editor, to adapt for your production (plate size, bearer bars, ...). However, it is important that **you don't change** any of the technical elements related to the white screening.

3. **Make a plate** according to your company's Standard Operating Procedures using this LEN test chart.

   Note: It is not necessary to adjust the Pixel boost for the white, use the value from the process colors.

4. **Make a Print** using this plate, according to the printing condition and your company's Standard Operating Procedures.
5. **Select the ink** that you will use for white in your production files.
   a) In step 1, click **Select**
   b) In the top part of the dialog, **select the ink book** that contains your white
   c) **Select the ink** in the list below
   d) Click **Select**

   Note: Typically, **White** from the Ink Book **ClassicColors** is used

It is possible to use any ink (the name does not need to contain white) from any ink book, as long as the production files contain an ink using the exact same name and ink book as you select here.

You can also use the remapping functionality in Automation Engine for this.

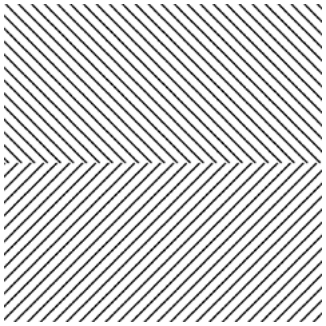
To create a new ink, see the chapter **Adding an Ink to in Ink Book** in the Color Pilot user guide: *https://www.esko.com/en/support/product?id=Color%20Pilot*

Note: Click ⊗ to remove the ink, or repeat the selection procedure

6. **Evaluate** the printed chart

a) Check if the overall quality of the printed result matches your current daily production.
b) The patch in the center (A) is a pure solid, without surface screening. The printed result of this patch should be very similar to your current daily production.
c) The pure solid patch (A) is surrounded by 8 patches, each with a different surface screening and labeled from B to I. Each patch is also horizontally divided in two sections with different orientation of the MicroCells. In order to verify if the orientation will influence the quality of the white.

Zoom on the center of a patch:



Choose the patch that shows the best printed result, by considering:

- What patch has the best opacity and evenness of the ink film?
- What patch doesn't show a difference between the upper and lower part?

Note: It is possible that the pure solid (A) is showing the best result.

Note: For more information, click *Learn more about choosing surface screening for white.*

7. In Step 2, **select the patch** from the pull-down menu: A (Solid) to I
8. You also have the opportunity to enter a **Description**, not mandatory.
9. Click **Finish** in the lower right corner

- In case you selected B to I, a screen will be created with the name CRYSTAL WHITE X (where X stands for the letter you selected: B to I).
- In case you selected A (Solid), no screen will be generated.

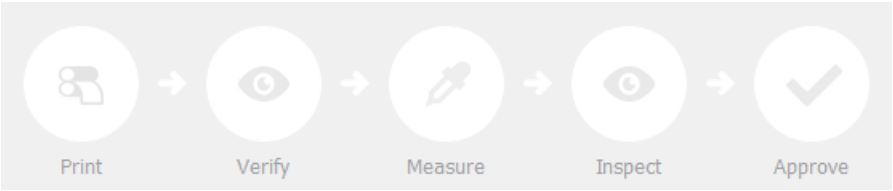
The selected ink, the calculated screen (or A (Solid)) and description are now shown on the White page.

Note: It is possible to edit the White setup: see *Edit White* on page 233

Printing

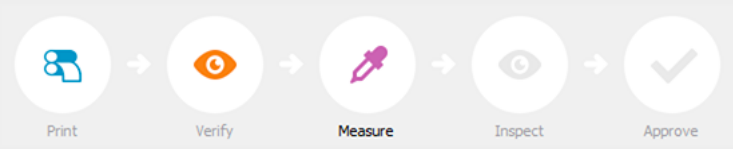
In the final configuration step, you will generate the dot gain compensation curves, and finish the setup of your custom screen, by choosing the highlights ("mindot", or minimum dot) that are best for your production.

The printing calibration consists of 5 steps, displayed in this way:



Note:

When you **Quit to Continue Later**, the completed steps will be colored. The step where you will continue from, is also colored and the text is darkened (**Measure** in the example below):



To continue the configuration, click **Click here to continue calibrating your printing.**

To start the calibration, click **Click here to start calibrating your printing**.

Depending on your license, you will either see a dialog to choose one of the three calibration methods below, or you will only be able to perform the legacy calibration.

- **Full calibration (recommended)**: this is a 4 color calibration method available from Print Control Wizard 22.07 onwards.

  It uses an improved chart (compared to previous versions), and produces custom screens that use the **Crystal V** screening technology, giving finer highlights without graininess.

  Because it's a 4 color calibration, it also calibrates overprints and gray balance towards *your chosen printing standard*.

  We recommend you use this for best results.

  See *Full Calibration* on page 66.

- **Quick calibration**: this is a single color calibration method available from Print Control Wizard 22.07 onwards. It also produces **Crystal V** screens, but being single color, it doesn't calibrate overprints or gray balance.

  Note that after doing a quick calibration, you can calibrate additional colors if needed.

  See *Quick Calibration* on page 82.

- **Legacy calibration**: this is the calibration method used in previous versions (up to 22.03 included). It uses older Crystal screening technology (Crystal and Crystal NP, but not Crystal V).

  See *Legacy Calibration* on page 93.

Full Calibration

This is a 4 color calibration method available from Print Control Wizard 22.07 onwards.

It uses an improved chart (compared to previous versions), and produces custom screens that use the **Crystal V** screening technology, giving finer highlights without graininess.

Because it's a 4 color calibration, it also calibrates overprints and gray balance towards *your chosen printing standard*.

We recommend you use this calibration method for best results.

1. In the **Choose Angle and Ruling** wizard step, select the **Screen Ruling** you use in production.

   A fixed list of rulings is available from 90 lpi to 245 lpi. If your ruling is not in the list, choose the closest available ruling.

If you are using several rulings, you can add additional rulings after you finished the printing condition. See *Add a Ruling* on page 241.

2. Select the **Angle Set** used in your production.

   You have the same 3 options that are available in the Imaging Engine tickets: **Offset**, **Flexo-7.5**, **Flexo+7.5**.

   Below the **Angle Set** selection, you find a list of all inks used in your printing condition. You defined this in *Ink Set and Printing Standard*.

   Note: If you have completed the setup for **White**, the ink you selected as white will also be visible in the list. See *White* on page 62.

   The angles, defined by the **Angle Set**, are shown next to each ink.

   It is possible to change the angle of an ink:

   a) Click the angle.
   b) Select another angle from the list.
   c) The **Angle Set** will be set to **<Custom>**.

   Note:

   Some angles are bigger than 90°, this is due to the screening technology used in the Print Control Wizard.

   The corresponding value in "the 90° zone" is mentioned between brackets, make your selection based on this value.

3. Choose either:

   - **Full ink-set print-run and measurements (recommended)**: select this option to print and measure charts. The wizard will guide you step by step.

     Note:

     Dot gain and highlights are very specific to individual certain press/ink/substrate combinations.

     Even if your printing condition is very similar (for example the same inks and substrate, but a different press), we highly recommend to print and measure the charts.

     If the results are very similar to another printing condition, you can still decide to use the same settings for both printing conditions.

     See *Full Ink Set Print Run and Measurements* on page 67.

   - **Manually select screens and use default adjustment curves**: select this option if you know what settings to select for the highlights in your screen. The software will select default dot gain compensation curves for all inks.

     See *Manually Select Screens and Use Default Adjustment Curves* on page 80.

     Note: You can still edit the curves later: see *Update Curves* on page 234.

Full Ink Set Print Run and Measurements

Select the **Full ink-set print-run and measurements (recommended)** option to print and measure charts. The wizard will guide you step by step.

Note:

Dot gain and highlights are very specific to individual certain press-ink-substrate combinations.

Even if your printing condition is very similar (for example the same inks and substrate, but a different press), we highly recommend to print and measure the charts.

If the results are very similar to another printing condition, you can still decide to use the same settings for both printing conditions.

1. Customize your test chart as desired, then save it and print it.

   See *Creating the Test Chart* on page 68.
2. Evaluate the quality of your plate.

   See *Checking the Plate Quality* on page 70.
3. Evaluate the quality of your printed chart.

   See *Checking the Print Quality* on page 70.
4. Measure the chart to find the best screen and curve.

   See *Measuring the Chart* on page 72.
5. Evaluate the highlights on your chart to find the best highlights settings.

   See *Evaluating the Highlights* on page 75.
6. When you are done, the wizard will generate your custom screens and curves, based on your production settings.
7. Select the screen and curve to use for non-calibrated colors.

   See *Choosing the Spot Colors' Printing Settings* on page 78.
8. Compare your results to your *printing standard*.

   See *Checking the Solids and Overprints* on page 78.

Creating the Test Chart

In the **Save Test Chart** step, customize your test chart as desired and save it.

The application shows a preview of the test chart for Flexibles or Labels in *your chosen ink set*. When you customize the chart, the preview is updated automatically to reflect your changes.

Use the various **Chart Options** to customize your test chart to fit your press needs.

1. Customize the dimensions of the chart using the **Chart Size** option.
   a) Unlock the **Chart Size** option by clicking on the
   b) Set your preferred **Width** and **Repeat Length**.

      If the preferred dimensions are higher than what is needed to print all the parts in a single chart, and the layout is set as:

- **Complete Calibration Chart** then the parts will be placed in a single chart with blank space at the top or sides.
- **Split Calibration chart parts** then the layout will be changed to **Complete Calibration Chart** and all the parts will be placed on a single chart.

If the preferred dimensions are lower than what is needed to print all the parts in a single chart, and the layout is set as **Complete Calibration Chart** then the layout will be changed to **Split Calibration chart parts** and all the split charts will be of the preferred size.

Note: If the preferred size is lower than the dimensions needed to print the split charts, then the size will be automatically set to the minimun size required to print the split charts.

Tip: You can see the dimensions of the layout at the bottom of the preview.

2. Customize the layout of the chart using the various **Layout** options.
   - **Complete Calibration Chart** will place all different parts that need to be printed in a single chart. The chart size will be minimum width and length required to fit all the parts in a single chart.
   - **Split Calibration chart parts** will automatically split the layout into several smaller parts. All elements that need to be printed together will be placed on the same layout. Some parts may be rotated to fit the chart. When splitting using this method, each small chart will be of a different size. If you want to make all the charts to be of the same size, you can set the preferred dimensions using the **Chart Size** option.

   Note: This is the behaviour only when the **Chart Size** options are locked. If the chart size is manually changed, the layout might get affected. Check the **Chart Size** section to know more about how the chart layout changes when chart size is modified.

   Tip: You can see the dimensions of the layout at the bottom of the preview.
3. **Mirror Image**: select this for reverse printing.
4. **Add default bearer bars and slur marks**: the bearer bars help with the print stability, and the slur marks help you check the print quality.
5. **Add a custom element**: if you want to add an image or a technical element to the chart, for example to check the quality with something you use frequently.
   a) Click **Browse...**
   b) Browse to the location of the file.
   c) Click **Open**.

Note:

- The element needs to be a `.ct` file (Esko native image file format).
- Use the free CT/LP plug-in from Esko in Adobe® Photoshop® to create `.ct` files from your element(To download the free plug-in, search for 'CT/LP plug-in' on *esko.com*).

  If you are using Full Calibration, save the Photoshop document with CMYK or Multichannel imaging modes. Spot-channels will only be included if Multichannel mode is used. So to write a CMYK file with an extra spot channel, convert it to multichannel mode before saving it as a `.ct` file.
- The `.ct` files cannot contain multiple layers. When the Photoshop document has multiple layers, merge all layers into a single layer before saving it as `.ct`.
- You can only add one element. If you want to add several elements, you first need to group them in Adobe® Photoshop®.

6. Save the chart:
   a) Click **Save Chart**.
   b) Browse to your desired folder.
   c) Specify a **File name** for your chart.
   d) Select the **File Type** you want to save: **LEN** or **Tiff**.

   Note:

   In most cases, we recommend you save the file as a **LEN** file, and use it directly on the CDI.

   However, if you want to edit it to add extra elements specific to your production (different bearer bars for example), you should save it as **Tiff**, but make sure **you don't change** any of the technical elements! Please see *this knowledge base article* to know more about editing charts.

   e) Click **Save**.

   For each ink in your printing condition, a file will be created in your selected folder. For example if your ink set is CMYK and you completed the White setup, you will get 5 files: **File name_C**, **File name_M**, **File name_Y**, **File name_K**, **File name_White**.

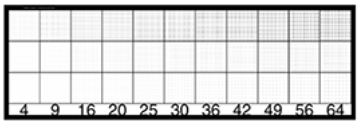
   It could take several minutes to create the file.

   Note: If you change any parameter in your printing condition, **always** create a new chart, to make sure you have the correct elements for your printing condition in your chart (as the chart is based on numerous parameters from the previous steps like application, dot shape, surface screening...).
7. **Image the plates** on your CDI according to your company's Standard Operating Procedures, AND using the settings specified in the previous steps.
8. On the imaged, exposed and processed plate, you can *check the plate quality*.

Checking the Plate Quality

In the **Check Plates** step, you need to check the dot fail test.

Click **Learn more about evaluating this area** to open documents with guidelines on how to evaluate these elements. You can find evaluation guidelines for the dot fail test in the *Standard Operating Procedure for verifying plate quality*.



Check the **Dot Fail** test on the plate as follows:

a) Use a magnifying glass.
b) Check the center and lower row.
c) The smallest number where all dots are in position gives the resulting value.
d) Verify all elements on the plate.
e) Compare your result to the value that was found as good quality during the CDI's installation. This should be the same value you used during the *plate and press calibration*.
f) **Accept** if the result matches the reference, or **Reject** if the result doesn't match.

   If the result doesn't match, you need to troubleshoot the problem that is causing the low quality dots, remake the plate and evaluate the dots again.

Once you are satisfied with the plate quality, print a few copies of your chart and *check the print quality*

Note: The **Next** button will be disabled if you reject the plate quality.

Checking the Print Quality

Make a Print using the plates, according to the settings you entered in the printing condition and your company's Standard Operating Procedures.

Note:

To make sure the screens and curves that will be created are accurate for your production process, your measurement data needs to be representative of your complete print run.

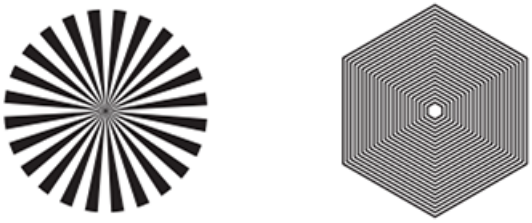
We therefore recommend that:

- you print another 50 to 100 meters (or more if this better reflects your production) after the press has reached your regular quality,
- you select 5 (or at least 3) copies in that "regular quality" print run: from the beginning, the middle and the end.

Once you've printed a few copies of your chart, check the slur marks, and the registration marks in the **Verify Print Quality** step.

Click **Learn more about evaluating this area** to open documents with guidelines on how to evaluate these elements. You can find evaluation guidelines for slur marks and registration marks in the *Standard Operating Procedure for verifying print quality*.

1. Check the **Slur Marks** on your prints in the following way:



a) Use a magnifying glass.
b) Follow the guidelines in the Standard Operating Procedure (click *Learn more about evaluating this area* to access it).
c) Make sure that all relevant marks on the print are good.
d) Verify all copies.
e) Back in the wizard, Accept or Reject the quality of the slur marks:

- click **Accept** if you are satisfied with the quality of the slur marks,
- click **Reject** if you aren't.

  If the marks on one or more copies are not satisfactory, find other copies of the test chart to evaluate (for example from around 30 m on the same run).

  If only one copy (or none) is good, troubleshoot with the press operator and reprint.

2. Checking the **Registration marks** on the print:

a) Check the registration marks on the print using the same guidelines as for the slur marks.
b) **Accept** or **Reject** the quality of the registration marks.

Once you are satisfied with the plate quality, click **Next** and move on to *measuring the chart* to find the best screen and curve.

Note: The **Next** button will be disabled if you reject the quality of the slur marks or registration marks.

Measuring the Chart

1. **Measure** the **Mindot Chart**.

   This will be used to determine the screen for the highlights.

   The Magenta printed part will be used for CMY, the Black printed part for K.

   If your selected ink set contains one or more extra inks (for example OGV), the first ink will be added to the chart, and will be used for these extra inks. For example if the ink set is CMYKOG, Orange will be added to the chart.

   a) Cut out the chart from your first copy.

b) The chart can be read in patch or scan mode by an X-Rite i1 Pro or X-Rite i1iO. No other measurement devices are supported.

To measure with the i1 Pro, it is advised to cut off the text before each row.

c) With the cogwheel ( ) on the bottom right, you can stop, calibrate and reconnect your measurement device, change the measurement mode and the measurement condition.

See the **Using a Spectrophotometer** chapter in the *Color Pilot user guide*.

d) To know how to measure the chart with your measurement device, follow the instructions on the bottom left above the icons .

The preview will show the instructions and the measurement progress.

Tip:

After you are done measuring a page, you can save the measurement data as a measurement file if desired (in the CGATS - Committee for Graphic Arts Technologies Standards - color measurement format):

- Go back to the page you have just measured using the back arrow.
- Click the cogwheel ( ) at the bottom right and select **Save measurement...**
- Choose a location to save your measurements file (with the `.txt` extension).

Tip:

Alternatively, if you had already measured your chart and saved the measurement, you can load your measurement file instead of re-measuring it here.

1. Make sure that your measurement file is a CGATS (Committee for Graphic Arts Technologies Standards color measurement format) file, with the `.it8`, `.txt` or `.cgats` extension.
2. Click the cogwheel ( ) at the bottom right and select **Load Measurement...**

2. Check the **Measurement Results**.

a) Check the preview: the upper and lower part of the patches should have approximately the same color.

Note:

The comparison of measurements (upper part) and the standard (lower part) is a rough approximation. Only look for clear differences:

- completely different color: for example wrong row measured, chart upside down.
- the same color, but a very big difference in lightness: for example not printed correctly, issue with the measurement device.

b) **Accept** or **Reject** .

If your measurement is ok, you can continue to the next step.

If you rejected the measurement result, you will be guided to measure again, following this same procedure.

This could be the same chart (wrong row, chart upside down), or a different chart from the print run.

3. On the next wizard screen, measure the **Tone Value Chart**.
   - This will be used to create the dot gain compensation curves.
   - The chart will contain all inks from your selected ink set.

     For example if the ink set is CMYKOGV, the chart will contain CMYKOGV patches.
   - Cut out the chart from the same copy as your mindot chart in the previous steps.
   - The chart can be read in patch or scan mode by an X-Rite i1 Pro or X-Rite i1iO. No other measurement devices are supported.
   - With the cogwheel ( ) on the bottom right, you can stop, calibrate and reconnect your measurement device, change the measurement mode and the measurement condition.

     See the **Using a Spectrophotometer** chapter in the *Color Pilot user guide*.
   - To know how to measure the chart with your measurement device, follow the instructions on the bottom left, above the icons .

     The preview will visualize the instructions and the measurement progress.
4. Check the **Measurements Results**.
   a) Check the preview, the upper and lower part of the patches should have approximately the same color.

      After the first measurement you can compare your measurement to the standard. After the measurement of your 2nd, 3rd... copy, you can also compare to the average and to the other measurements.

      Select what you want to **Compare with** on top of the preview.

      Note:
      - In this step we mainly want to detect if the charts were measured correctly (not upside down, mirrored...)

        If the color in the patch is the same, but there is a big difference in lightness, this is probably not an issue. The dot gain compensation curve created from these measurements will correct for this.
      - Comparing charts among each other could be useful, to detect if some charts are printed very differently. If a chart is an exception, you may not want to include it in your average.

   b) In the **Solid Info** area, to the right of the preview:
      1. Check the measured density of your inks: for each ink, the **Measured Density** should be within tolerance of the **Desired Density**.

         Use the same tolerance as your company uses on press (typically + or - 0,05).

         Select the density standard you use on your measurement device (ANSI A, DIN, ...) from the **Density Formula** list below.

Note:

The **Desired Density** is derived from the printing standard you selected in **Ink Set and Printing Standard**.

We don't show desired density for CMYK inks for standards that use an ICC profile as a standard profile. This is because density calculation requires spectral data, which is not available in ICC profiles.

2. Check the measured color difference (**ΔE**): for each ink, the ΔE should be within tolerance of the printing standard you selected in **Ink Set and Printing Standard**.

   Select the Delta E formula used in your selected printing standard, from the **ΔE Formula** list below.
3. Check your inks' color values: select an ink to see its **Desired** and **Measured** LabCh values, with a split patch showing the measured and desired color for this ink.

Note: We don't show desired density, Lab and ΔE for the OGV inks. There are no standards for these inks, so there is nothing to match.

c) If everything is OK, click **Accept** and continue.

Otherwise click **Reject** and measure again.

Note:

In this case, you need to measure both the mindot chart and the tone value chart again. This is because:

- different samples may be printed somewhat differently, so you shouldn't mix print samples,
- if you detect a printing issue on the tone value chart, then it is likely that the complete print sample is not representative, and that your mindot measurement is not that reliable.

5. Select **Measure another sample** if needed.

   To have an accurate and reliable screens and curves creation, it is important that the measurements are an average of a complete print run. Measure minimum 3 charts of good print quality (we advise to use 5).

   You will be guided to measure again, following this same procedure.

   The wizard will indicate how many charts you already measured: sample 1, sample 2...
6. Once you have measured enough charts of good quality, you can select **Stop measuring and inspect the resulting screens**.
7. In the next step, you will need to evaluate the highlights and select the best highlights screening settings.

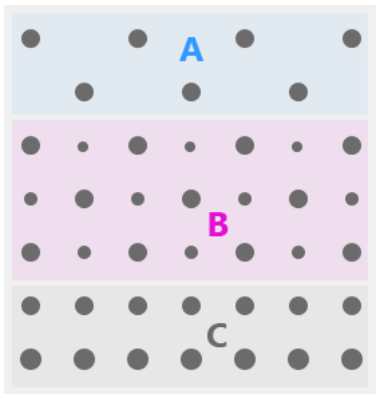
   See *Evaluating the Highlights* on page 75.

Evaluating the Highlights

In the **Select Highlights** wizard step, you need to evaluate and choose the highlight settings that are best for your production, to finish setting up your custom screen and curve.

These settings are:

- The **Mindot** (or minimum dot): the minimum size that a dot can have in the highlights, while printing in a stable and clear way.
- The **Mindot distance**: the maximum distance between these minimum dots, to ensure highlights that print well.
- The **Transitional mindot**: even smaller dots that support the mindots in the transitional areas (between FM screening in the highlights and AM screening in the midtones).

	• **A)** In the lightest highlights, there are only **Mindots** (separated by a distance no larger than the **Mindot distance**). • **B)** As highlights get darker, increasingly smaller dots are added to the spaces between the regular dots. Once the screen grid is completely filled, the screen reaches the transition point. The last and smallest dot size added before the transition point is the **Transitional mindot**. • **C)** In the midtones, the **Transitional mindots** reach the size of the regular **Mindots**, and the screen becomes a standard screen.

You need to define these settings for each ink group used in your print run: CMY, Black and expanded gamut inks.

1. In the **Screen and Curve** table, you can see the details of the screening and curve settings that the wizard created for each ink group, based on your measurements:
   - The **Ink (Group)** that the screening and curve settings are for.
   - The **Screen Name** (generated based on the screening settings).
   - The screen **Code** (you can change this if desired: click **Select** and choose another free screen code from the list shown).
   - The diameter of the **Mindot** in microns or milli-inches.
   - The **Curve Bump**, the smallest input percentage you can print with this screen.

     All smaller percentages are "bumped up" to this value. This data will be included in the curve generated by the wizard.
   - The **Estimated Lightest Tone Value**, the percentage that the smallest input percentage from the **Curve Bump** gives on print.

     This will also be included in the curve.
   - The **Mindot Δ** (mindot distance), the distance between dots at the lightest tone value (the dots with the diameter shown under **Mindot**).
   - The **FM Highlights**, the highlight tones where FM (stochastic screening) is used.

     For example, if the **Curve Bump** is 0.20% and the **FM Highlights** show 2%, this means that:

- between 0% and 0.20% nothing is printed,
- between 0.20% and 2% the highlights are printed with FM,
- tones above 2% are printed with AM.

2. Select an **Ink** or ink group in the table: CMY, Black or expanded gamut inks (the inks here depend on your ink set, for example it can be OGV).
3. You can see an analysis of the mindot chart measurements for this ink (group).

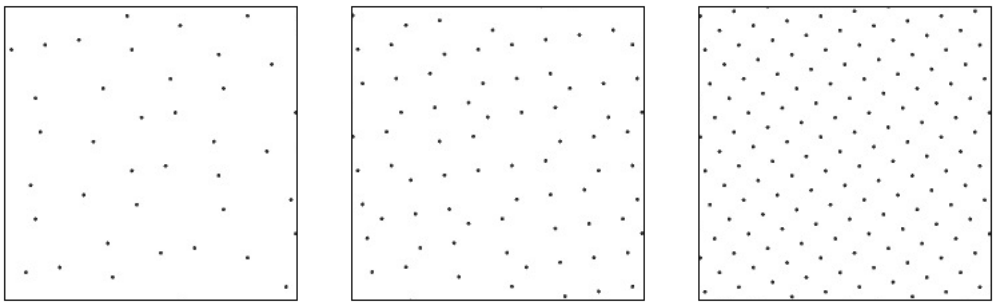
Dot Size (px)	0	6	9	12	16	19	22	25	31	36	42	47	54	60	Solid
Mindot Distance 0.17 mm (1/1)		4,9 ✗	7,1 ✓	9,8	14,2	17,8	21,4	24,8	31,8	37,6	43,8	48,7	56,2	62,3	
0.24 mm (1/2)		2,2 ✗	3,1 ✓	4,9	6,7	7,1	8,9	9,8	13,4	17,0	20,0	22,4	27,1	30,6	
0.34 mm (1/4)		0,4 ✗	1,3 ✗	2,2 ✓	3,1	3,1	4,0	4,9	5,8	7,1	8,0	8,9	11,0	13,4	

For the three **Mindot Distances** on the chart, the wizard shows which **Dot Size** is optimal. This is the smallest mindot size that gives a good print quality.

Note:

The fraction next to the distance indicates the amount of dots used to print the highlights.

- **1/1** means that means that all the dots are kept (the screen doesn't use FM screening).
- **1/2** means that half of the dots are kept (resulting in FM screening).
- **1/4** means that a quarter of the dots are kept (resulting in FM screening). This gives lighter highlights, but may increase graininess.



4. Examine these highlights on the print to decide if you agree with these results.
5. Under **Set Highlight Settings**, choose the best highlight settings for your production process based on what you found.
   a) Select the **Mindot Distance** you typically use for your production.

If you choose one of the measured distances, you will see **(Measured)** next to it.

Note:

The first time you make a printing condition for this *application*, the biggest distance measured from the chart is filled in by default.

After that, the wizard remembers the **Mindot Distance** you filled in for the previous printing condition for this application and fills it in by default.

b) Select the **Mindot** that you found to be the best for your mindot distance.

By default, the mindot size that the wizard found the best for that mindot distance is selected. This can either be a **Measured** mindot size, or a size calculated based on the other measurements (**Estimated**).

If you choose a different size, you will still see an indication of what the wizard recommends next to **Measured** or **Estimated**.

Note: The bigger the **Mindot Distance** is, the bigger your **Mindot** needs to be, to give you a stable print.

c) Select the **Transitional Mindot** based on your visual inspection of the **1/1** row.

By default, the **Transitional Mindot** with a green check mark on the **1/1** line in the wizard is selected.

d) You can see your changes reflected in the **Screen and Curve** table below (for your selected ink or ink group).

6. Repeat these steps for the other ink groups.

Choosing the Spot Colors' Printing Settings

1. On the **Spot Colors** screen, select which separation from your printing condition should be used to set the default screen and curve for your spot colors (= all separations that are not in the ink set).

   The default is **Black**, but you can select any of the inks from the printing condition. Or **<None>**, if your spot colors don't need to use the screen and curve from your printing condition.

2. Click **Next** to generate your custom screens and curves, based on your production settings.

   This can take some time.

Checking the Solids and Overprints

Note: You will only see the **Check Color Differences of Solids and Overprints** wizard screen if you have the corresponding license.

On the **Check Color Differences of Solids and Overprints** wizard screen, you can compare the solids and overprints achieved by your printing condition with the solids and overprints expected by *your printing standard*. This shows you how close you are to your standard in terms of color.

After calibrating your printing setup (with the *plate and press calibration* and the *printing calibration*), you will be able to print **much closer** to your printing standard (when using the settings from your printing condition).

However, in some cases you will not be able to print **exactly** like the printing standard definition, as the printing setup used to create the printing standard may be somewhat different from your own printing setup (for example, the inks may have a slightly different hue, or the substrate may be different...).

If this is the case, you need to decide whether you want to:

- Keep using the printing standard, and accept that there will always be some amount of deviation from the standard when verifying your prints against it.
- Make a profile based on your calibrated printing setup (calibrated to print as close as possible to the standard), and use this profile as printing target instead of the printing standard.

  This way, when verifying future prints, you will check against "the closest your printing setup can get to the standard", and not against a standard that you know you can never match perfectly.

  This also allows you to keep track of how much your printing setup drifts from its best state (the state calibrated by the printing condition). If it drifts too much, you can:

  - check whether your printing settings are still exactly as described in the printing condition,
  - troubleshoot your printing process,
  - recalibrate your printing setup using this profile (the **printing condition profile**) as target. See *the Color Pilot documentation* to know more about recalibration.

1. In the preview, you can see a visual comparison of the solids and overprints achieved by your printing condition with the solids and overprints from your printing standard.

   The solids and overprints achieved by your printing condition are the solids and overprints taken from your tone value chart measurements and corrected by your newly created adjustment curves and screen highlight bumps.

   The preview shows split patches, with the color measured on print at the top left of the patches , and the corresponding color from your standard at the bottom right .

   You can zoom in , zoom out , or fit the zoom to the view .
2. On the right, you can see **Statistics** about how well your printed solids and overprints match those defined in your chosen printing standard.
   a) By default the **ΔE Formula** set in Color Pilot's Preferences is used to calculate the color differences, but you can change it to one of the following:

      - **CIELAB Delta E (Classic)**,
      - **Delta E 94**,
      - **Delta E 2000**,
      - **CMC (1:1)**,
      - **CMC (2:1)**,
      - **Delta E 2000 (2:1:1)**.

   b) You can see the following statistics (the **Delta E** statistics are updated when you change the formula above, and **Delta H** is the difference in hue):

      - **Average ΔE**: the average of the color differences of all patches,
      - **Maximum ΔE**: the worst color difference found in all the patches,
      - **Maximum ΔE best 90%**: the worst color difference found in the best 90 % of the patches (so excluding the worst 10%),
      - **Primaries ΔE**: the average color difference of the patches that only have one ink (except black), whether it's a solid or a tint,

- **Primaries ΔH**: the average difference in hue of the same primary patches,
- **Grey ΔE**: the average color difference of all solids and gradations of black, as well as all patches with equal amounts of C, M and Y,
- **Substrate ΔE**: the color difference between the measured substrate in your prints and the one in your standard.

3. You can **Highlight** specific patches, to perform a visual check on those parts of your measurements:
   - the **Patches with above average ΔE** (with a color difference above the average difference between your measurements and the standard),
   - the **Worst 10 percent** (the 10% of the patches that have the highest Delta E values),
   - the **Substrate** (if there are several substrate measurements they will all be highlighted),
   - the **Primaries** (patches that only have one ink -except black-, whether a solid or a tint),
   - the **Greys** (all solids and gradations of black, as well as all patches with equal amounts of C, M and Y),
   - the patch with the **Maximum ΔE**.
4. To inspect a single patch more in detail, select it in the preview to show more data in the **Patch Details** on the right.

   You can see:
   - the patch's ink composition in your ink set,
   - a bigger split patch,
   - its Lab/LCh values,
   - the ΔE between your measured print and your standard for this patch.
5. If you find significant color differences between your measured solids and overprints and the ones from the standard, choose whether you want to:
   - Keep using the printing standard, and accept that there will always be some amount of deviation from the standard when verifying your prints against it.

     In this case, deselect **Save Press Profile**.
   - Make a profile based on your calibrated printing setup (calibrated to print as close as possible to the standard), and use this profile as printing target instead of the printing standard.

     This way, when verifying future prints, you will check against "the closest your printing setup can get to the standard", and not against a standard that you know you can never match perfectly.

     In this case, leave **Save Press Profile** selected (and change the profile name if desired).
6. If you chose to make a press profile (or "printing condition profile"), choose whether to **Use this press profile as target for future recalibrations**.

   This allows you to keep track of how much your printing setup drifts from its best state (the state calibrated by the printing condition), and recalibrate your printing setup using this profile as target.

See *the Color Pilot documentation* to know more about recalibration.

7. When you are done, click **Finish** to save your completed printing calibration.

   You can see your final screen and adjustment curve for each ink on the **Printing** page. See *Printing Calibration Results* on page 228.

   You can also view additional details (color **Gamut**, **Gray balance**, **Solid densities**).

8. Click **Save and Close** in the printing condition.

You can now *review your printing condition parameters* and *save a report* if desired.

You can find your new printing condition in the *Printing Conditions Explorer*, your new screen in the *Screens Explorer*, and your new curves in the *Curves Explorer*.

Manually Select Screens and Use Default Adjustment Curves

Select the screens manually if you know what settings to select for the highlights in your screen. The software will select default dot gain compensation curves for all inks.

These highlights settings are:

- The **Mindot** (or minimum dot): the minimum size that a dot can have in the highlights, while printing in a stable and clear way.
- The **Mindot distance**: the maximum distance between these minimum dots, to ensure highlights that print well.
- The **Transitional mindot**: even smaller dots that support the mindots in the transitional areas (between FM screening in the highlights and AM screening in the midtones).

You need to define these settings for each ink group used in your print run: CMY, Black and expanded gamut inks.

1. In the overview table, you can see default screening settings for each ink/ink group:
   - The **Ink (Group)** that the screening settings are for.
   - The **Screen Name** (generated based on the screening settings).
   - The screen **Code** (you can change this if desired: click **Select** and choose another free screen code from the list shown).
   - The diameter of the **Largest Mindot** in microns or milli-inches (the largest mindot is the dot used at the lightest tone value).
   - The **Curve Bump**, the smallest input percentage you can print with this screen.

     All smaller percentages are "bumped up" to this value. This data will be included in the curve generated by the wizard.
   - The **Estimated Lightest Tone Value**, the percentage that the smallest input percentage from the **Curve Bump** gives on print.

     This information is not included when manually selecting screening settings, as it needs to be calculated from measurements.
   - The **Mindot Δ** (mindot distance), the distance between dots at the lightest tone value (the dots with the diameter shown under **Largest Mindot**).

- The **FM Highlights**, the highlight tones where FM (stochastic screening) is used.

  This information is not included when manually selecting screening settings, as it needs to be calculated from measurements.

2. Select an **Ink** or ink group in the table: CMY, Black or expanded gamut inks (the inks here depend on your ink set, for example it can be OGV).
3. Based on your production process knowledge, select the best highlights settings for that ink or ink group.
   a) Select the **Mindot Distance** you typically use for your production.

   Note:

   The first time you make a printing condition for this *application*, the biggest distance measured from the chart is filled in by default.

   After that, the wizard remembers the **Mindot Distance** you filled in for the previous printing condition for this application and fills it in by default.

   b) Select the **Mindot** that you found to be the best for your mindot distance.

   Note: The bigger the **Mindot Distance** is, the bigger your **Mindot** needs to be, to give you a stable print.

   c) Select the **Transitional Mindot** that you found to be the best in your production process.
   d) You can see your changes reflected in the overview table above (for your selected ink or ink group).
4. Repeat these steps for the other ink groups.
5. On the **Spot Colors** screen, select which separation from your printing condition should be used to set the default screen and curve for your spot colors (= all separations that are not in the ink set).

   The default is **Black**, but you can select any of the inks from the printing condition. Or **<None>**, if your spot colors don't need to use the screen and curve from your printing condition.
6. Click **Finish**.

   The screens and curves are created (this could take some time).

   Note:

   The curves used are flexible *PressSync Curves*.

   For Flexibles, the base curve is always F40, and for Labels, it is always E50. The curve bump (indicated between brackets) is calculated from your selected screening parameters.

   The curve bump value is in the metric defined for that ink/ink group in *your chosen standard*. This means that different ink/ink group's curve bumps may use different metrics (for example CMY and Black may use density, while OGV may use SCTV), and cannot be compared.

All information about the selected screens, curves and measurement results is now shown on the **Printing** page. See *Printing Calibration Results* on page 228.

You can now *review your printing condition parameters* and *save a report* if desired.

You can find your new printing condition in the *Printing Conditions Explorer*, your new screen in the *Screens Explorer*, and your new curves in the *Curves Explorer*.

Quick Calibration

This is a single color calibration method available from Print Control Wizard 22.07 onwards. It produces **Crystal V** screens (giving finer highlights without graininess), but being single color, it doesn't calibrate overprints or gray balance.

Note that after doing a quick calibration, you can calibrate additional colors if needed.

1. In the **Choose Angle and Ruling** step:
   a) Select the **Screen Ruling** used in your production.

      A fixed list of rulings is available (from 90 lpi to 245 lpi). If your ruling is not in the list, choose the closest ruling available.

      If you are using several rulings, you can add additional rulings after you finished the printing condition. See *Add a Ruling* on page 268.
   b) Select the **Angle Set** used in your production.

      You can choose either **Offset**, **Flexo -7.5** or **Flexo +7.5** (these are the same options as the ones available in the Imaging Engine tickets).
   c) In the table below, you can see the angles for your individual inks (taken from the **Angle Set**). You can still change them if desired:

      1. Click the angle you want to change.
      2. Select another angle from the list.

      Note: Some angles are bigger than 90°, this is due to the screening technology used in the Print Control Wizard. The corresponding value in "the 90° zone" is mentioned between brackets, you can make your selection based on this value.

      3. The **Angle Set** is now set to **<Custom>**.
2. In the **Choose Separation** step, choose which ink of *your ink set* you want to calibrate.

   We recommend you use Cyan or Magenta.
3. In the **Print Chart** step, customize your test chart as desired, then save it and print it.

   See *Creating the Test Chart* on page 83.
4. Evaluate the quality of your plate.

   See *Checking the Plate Quality* on page 85.
5. Evaluate the quality of your printed chart.

   See *Checking the Print Quality* on page 86.
6. Measure the chart to find the best screen and curve.

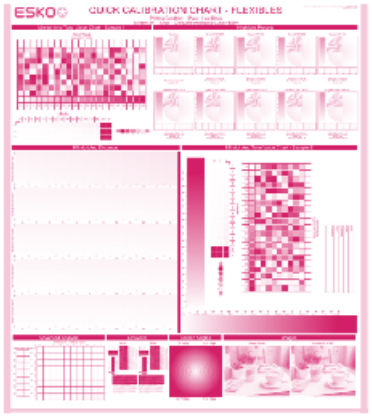
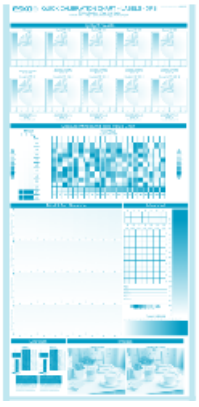
   See *Measuring the Chart* on page 87.
7. Evaluate the highlights on your chart to find the best highlights settings.

   See *Evaluating the Highlights* on page 91.
8. When you are done, the wizard will generate your custom screen and curve, based on your production settings.

Creating the Test Chart

In the **Save Test Chart** step, customize your test chart as desired and save it.

The application shows a preview of the test chart for Flexibles or Labels in your chosen ink. When you customize the chart, the preview is updated automatically to reflect your changes.

	
Quick calibration chart for Flexibles	Quick calibration chart for Labels

Use the various **Chart Options** to customize your test chart to fit your press needs.

1. Customize the dimensions of the chart using the **Chart Size** option.
   a) Unlock the **Chart Size** option by clicking on the
   b) Set your preferred **Width** and **Repeat Length**.

   If the preferred dimensions are higher than what is needed to print all the parts in a single chart, and the layout is set as:

   - **Complete Calibration Chart** then the parts will be placed in a single chart with blank space at the top or sides.
   - **Split Calibration chart parts** then the layout will be changed to **Complete Calibration Chart** and all the parts will be placed on a single chart.

   If the preferred dimensions are lower than what is needed to print all the parts in a single chart, and the layout is set as **Complete Calibration Chart** then the layout will be changed to **Split Calibration chart parts** and all the split charts will be of the preferred size.

   Note: If the preferred size is lower than the dimensions needed to print the split charts, then the size will be automatically set to the minimun size required to print the split charts.

   Tip: You can see the dimensions of the layout at the bottom of the preview.

2. Customize the layout of the chart using the various **Layout** options.

- **Complete Calibration Chart** will place all different parts that need to be printed in a single chart. The chart size will be minimum width and length required to fit all the parts in a single chart.
- **Split Calibration chart parts** will automatically split the layout into several smaller parts. All elements that need to be printed together will be placed on the same layout. Some parts may be rotated to fit the chart. When splitting using this method, each small chart will be of a different size. If you want to make all the charts to be of the same size, you can set the preferred dimensions using the **Chart Size** option.

Note: This is the behaviour only when the **Chart Size** options are locked. If the chart size is manually changed, the layout might get affected. Check the **Chart Size** section to know more about how the chart layout changes when chart size is modified.

Tip: You can see the dimensions of the layout at the bottom of the preview.

3. **Mirror Image**: select this for reverse printing.
4. **Add default bearer bars and slur marks**: the bearer bars help with the print stability, and the slur marks help you check the print quality.
5. **Add a custom element**: if you want to add an image or a technical element to the chart, for example to check the quality with something you use frequently.
   a) Click **Browse...**
   b) Browse to the location of the file.
   c) Click **Open**.

Note:

- The element needs to be a `.ct` file (Esko native image file format).
- Use the free CT/LP plug-in from Esko in Adobe® Photoshop® to create `.ct` files from your element(To download the free plug-in, search for 'CT/LP plug-in' on *esko.com*). Save the Photoshop document with Grayscale image mode to use in Quick Calibration.
- The `.ct` files cannot contain multiple layers. When the Photoshop document has multiple layers, merge all layers into a single layer before saving it as `.ct`.
- You can only add one element. If you want to add several elements, you first need to group them in Adobe® Photoshop®.

6. Save the chart:
   a) Click **Save Chart**.
   b) Browse to your desired folder.
   c) Specify a **File name** for your chart.
   d) Select the **File Type** you want to save: **LEN** or **Tiff**.

Note:

In most cases, we recommend you save the file as a **LEN** file, and use it directly on the CDI.

However, if you want to edit it to add extra elements specific to your production (different bearer bars for example), you should save it as **Tiff**, but make sure **you don't change** any of the technical elements! Please see *this knowledge base article* to know more about editing charts.

e) Click **Save**.

It could take several minutes to create the file.

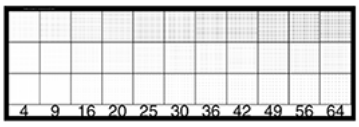
Note: If you change any parameter in your printing condition, **always** create a new chart, to make sure you have the correct elements for your printing condition in your chart (as the chart is based on numerous parameters from the previous steps like application, dot shape, surface screening...).

7. **Image the plates** on your CDI according to your company's Standard Operating Procedures, AND using the settings specified in the previous steps.
8. Once the imaged, exposed and processed plate, you can *check the plate quality*.

Checking the Plate Quality

The **Check Plates** step, you need to check the dot fail test

Click **Learn more about evaluating this area** to open documents with guidelines on how to evaluate these elements. You can find: evaluation guidelines for the dot fail test in the *Standard Operating Procedure for verifying plate quality*.



1. Check the **Dot Fail** test on the plate as follows:
   - Use a magnifying glass.
   - Check the center and lower row.
   - The smallest number where all dots are in position gives the resulting value.
   - Verify all elements on the plate.
   - Compare your result to the value that was found as good quality during the CDI's installation. This should be the same value you used during the *plate and press calibration*.
2. **Accept** if the result matches the reference, or **Reject** if the result doesn't match.

   If the result doesn't match, you need to troubleshoot the problem that is causing the low quality dots, remake the plate and evaluate the dots again.

Once you are satisfied with the plate quality, print a few copies of your chart and move on to *check the print quality*

Note: The **Next** button will be disabled if you reject the plate quality.

Checking the Print Quality

Make a Print using the plates, according to the settings you entered in the printing condition and your company's Standard Operating Procedures.

Note:

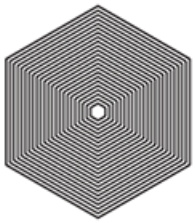
To make sure the screens and curves that will be created are accurate for your production process, your measurement data needs to be representative of your complete print run.

We therefore recommend that:

- you print another 50 to 100 meters (or more if this better reflects your production) after the press has reached your regular quality,
- you select 5 (or at least 3) copies in that "regular quality" print run: from the beginning, the middle and the end.

Once you've printed a few copies of your chart, check the slur marks in the **Verify Print Quality** step.

Click **Learn more about evaluating this area** to open documents with guidelines on how to evaluate these elements. You can find evaluation guidelines for slur marks and registration marks in the *Standard Operating Procedure for verifying print quality*.



Check the **Slur Marks** on your prints the following way:

a) Use a magnifying glass.
b) Follow the guidelines in the Standard Operating Procedure (click *Learn more about evaluating this area* to access it).
c) Make sure that all relevant marks on the print are good.
d) Verify all copies.
e) Accept or Reject the quality of the slur marks:

- click **Accept** if you are satisfied with the quality of the slur marks,
- click **Reject** if you aren't.

  If the marks on one or more copies are not satisfactory, find other copies of the test chart to evaluate (for example from around 30 m on the same run).

  If only one copy (or none) is good, troubleshoot with the press operator and reprint.

Once you are satisfied with the print quality, click **Next** and move on to *measuring the chart* to find the best screen and curve.

Note: The **Next** button will be disabled if you reject the quality of the slur marks.

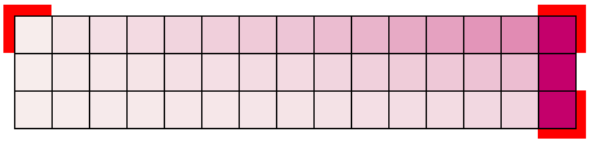
Measuring the Chart

You should now measure the chart to find the best screen and curve.

1. **Measure** the **Mindot Chart**.

   "Mindot" stands for "minimum dot". This chart will be used to determine the best screen for the highlights.

   You can use either an X-Rite i1 Pro or X-Rite i1iO spectrophotometer, in patch or scan mode. No other measurement devices are supported.



   a) Get ready to measure your print sample:

      1. Cut out the mindot chart from your first copy. To measure with the i1 Pro, we recommend you cut off the text before each row.
      2. Place your sample on your spectrophotometer table or on the backing you typically use for measuring prints.
      3. Make sure your spectrophotometer is connected to your computer.

      Note:

      With the cogwheel ( ) at the bottom right, you can stop, calibrate and reconnect your spectrophotometer, change the measurement mode and the measurement condition.

      See the **Using a Spectrophotometer** chapter in the *Color Pilot user guide*.

   b) Measure your chart following the instructions on screen (above the pause and play icons).

      The preview will show the instructions and the measurement progress.

      Tip:

      After you are done measuring a page, you can save the measurement data as a measurement file if desired (in the CGATS - Committee for Graphic Arts Technologies Standards - color measurement format):

      - Go back to the page you have just measured using the back arrow.
      - Click the cogwheel ( ) at the bottom right and select **Save measurement...**
      - Choose a location to save your measurements file (with the `.txt` extension).

Tip:

Alternatively, if you had already measured your chart and saved the measurement, you can load your measurement file instead of re-measuring it here.

1. Make sure that your measurement file is a CGATS (Committee for Graphic Arts Technologies Standards color measurement format) file, with the `.it8`, `.txt` or `.cgats` extension.
2. Click the cogwheel ( ) at the bottom right and select **Load Measurement...**

2. After you are done measuring, check the **Measurement results** on the next page.
   a) Check the preview.

   The patches are split diagonally , with the measured color at the top left, and the expected color (from your *printing standard*) at the bottom right. They should have approximately the same color.

   Note:

   The comparison of the measurements and the expected color is an approximation. Only look for clear differences:

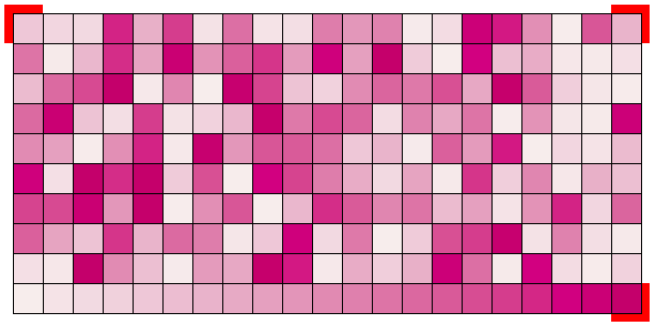
   - if the color is completely different, you may have measured the wrong row, or your chart may be upside down;
   - if they are the same color, but there is a very big difference in lightness: the chart may not be printed correctly, or there may be an issue with the measurement device.

   b) If your measurement is good, click **Accept** and continue to the next step, otherwise click **Reject** and measure again (either the same chart if for example you measured it incorrectly, or another chart from the print run).

3. Measure the **Tone Value Chart**.

   This will be used to create the dot gain compensation curves.

   You can use either an X-Rite i1 Pro or X-Rite i1iO spectrophotometer, in patch or scan mode. No other measurement devices are supported.



   a) Get ready to measure your print sample:

      1. Cut out the tone value chart from the same copy as the mindot chart you measured.

2. Use the same spectrophotometer as the one you used to measure the mindot chart.

b) Measure your chart following the instructions on screen (above the pause and play icons).

The preview will show the instructions and the measurement progress.

4. Check the measurements results.

a) Check the preview.

The patches' measured color at the top left should have approximately the same color as the expected color at the bottom right.

Note:

In this step we mainly want to detect if the charts were measured correctly (not upside down, mirrored...).

If the color in the patch is the same, but there is a big difference in lightness, this is probably not an issue. The dot gain compensation curve created from these measurements will correct for this.

b) Select which data you want to compare your measurements with, in the list above the preview.

After the first measurement you can only compare your measured data to the **Standard** (*your chosen printing standard*).

After you measure more copies, you can also compare to the **Average** of all measurements (including the current one), and to previous measurements individually.

Note: When comparing different measurement samples, if one of the samples is printed very differently, it could be an exception. In this case you shouldn't include it in your average.

c) Check the **solid density** (under **Solid Info**, to the right of the preview).

The **Measured Density** should be within tolerance of your **Desired Density** (taken from your *printing standard*). Use the same density tolerance as your company uses on press (typically + or - 0,05).

Select the density standard you use on your measurement device (ANSI A, DIN...), from the **Density Formula** list at the bottom.

Note: If you chose a standard that uses an ICC profile, you will not see a **Desired Density** for your ink, because the density calculation requires spectral data, which is not available in ICC profiles.

d) Check the **color difference** between the measured and expected solid color.

You can see **LabCh** values for both colors next to a bigger split patch, and a **ΔE** (color difference) value. Check whether this ΔE value is within the ΔE tolerance that your company uses.

By default, the wizard uses the ΔE formula you set in Color Pilot's preferences, but you can choose a different one in the **ΔE Formula** list below.

e) If everything is OK, click **Accept** and continue.

Otherwise click **Reject** and measure again.

Note:

In this case, you need to measure both the mindot chart and the tone value chart again. This is because:

- different samples may be printed somewhat differently, so you shouldn't mix print samples,
- if you detect a printing issue on the tone value chart, then it is likely that the complete print sample is not representative, and that your mindot measurement is not that reliable.

5. In the next screen, select **Measure another sample** if needed.

Note: To make sure your final screen and curve are accurate and reliable, the measurements need to be an average of a complete print run. Measure a minimum of 3 charts of a good print quality (we advise to use 5).

You will be guided to measure the next sample, following the same procedure. The wizard will indicate how many charts you already measured: sample 1, sample 2...

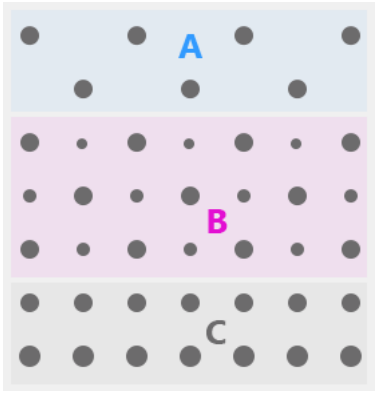
6. After you measured enough charts of good quality, you can select **Stop measuring and inspect the resulting screens**.

Evaluating the Highlights

In the final configuration step, you need to evaluate and choose the highlight settings that are best for your production, to finish setting up your custom screen and curve.

These settings are:

- The **Mindot** (or minimum dot): the minimum size that a dot can have in the highlights, while printing in a stable and clear way.
- The **Mindot distance**: the maximum distance between these minimum dots, to ensure highlights that print well.
- The **Transitional mindot**: even smaller dots that support the mindots in the transitional areas (between FM screening in the highlights and AM screening in the midtones).



- **A)** In the lightest highlights, there are only **Mindots** (separated by a distance no larger than the **Mindot distance**).
- **B)** As highlights get darker, increasingly smaller dots are added to the spaces between the regular dots.

  Once the screen grid is completely filled, the screen reaches the transition point. The last and smallest dot size added before the transition point is the **Transitional mindot**.
- **C)** In the midtones, the **Transitional mindots** reach the size of the regular **Mindots**, and the screen becomes a standard screen.

1. You can see an analysis of the mindot chart measurements.

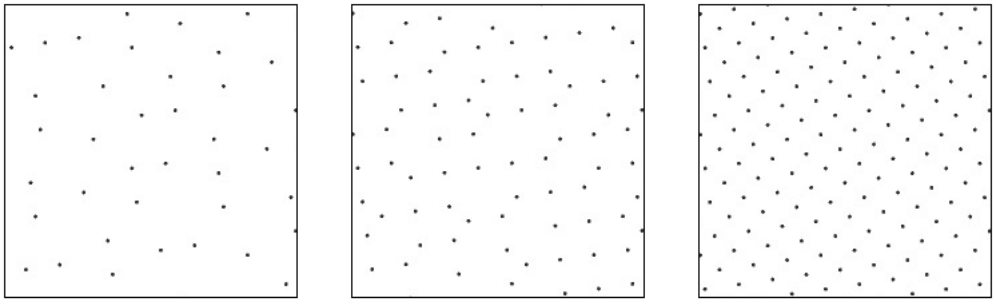
Dot Size (px)	0	6	9	12	16	19	22	25	31	36	42	47	54	60	Solid
Mindot Distance 0.17 mm (1/1)		4,9 ✗	7,1 ✓	9,8	14,2	17,8	21,4	24,8	31,8	37,6	43,8	48,7	56,2	62,3	
0.24 mm (1/2)		2,2 ✗	3,1 ✓	4,9	6,7	7,1	8,9	9,8	13,4	17,0	20,0	22,4	27,1	30,6	
0.34 mm (1/4)		0,4 ✗	1,3 ✗	2,2 ✓	3,1	3,1	4,0	4,9	5,8	7,1	8,0	8,9	11,0	13,4	

For the three **Mindot Distances** on the chart, the wizard shows which **Dot Size** is optimal. This is the smallest mindot size that gives a good print quality.

Note:

The fraction next to the distance indicates the amount of dots used to print the highlights.

- **1/1** means that means that all the dots are kept (the screen doesn't use FM screening).
- **1/2** means that half of the dots are kept (resulting in FM screening).
- **1/4** means that a quarter of the dots are kept (resulting in FM screening). This gives lighter highlights, but may increase graininess.



2. Examine these highlights on the print to decide if you agree with these results.
3. Under **Set Highlight Settings**, choose the best highlight settings for your production process based on what you found.
   a) Select the **Mindot Distance** you typically use for your production.

      If you choose one of the measured distances, you will see **(Measured)** next to it.

Note:

The first time you make a printing condition for this *application*, the biggest distance measured from the chart is filled in by default.

After that, the wizard remembers the **Mindot Distance** you filled in for the previous printing condition for this application and fills it in by default.

b) Select the **Mindot** that you found to be the best for your mindot distance.

By default, the mindot size that the wizard found the best for that mindot distance is selected. This can either be a **Measured** mindot size, or a size calculated based on the other measurements (**Estimated**).

If you choose a different size, you will still see an indication of what the wizard recommends next to **Measured** or **Estimated**.

Note: The bigger the **Mindot Distance** is, the bigger your **Mindot** needs to be, to give you a stable print.

c) Select the **Transitional Mindot** based on your visual inspection of the **1/1** row.

By default, the **Transitional Mindot** with a green check mark on the **1/1** line in the wizard is selected.

4. In the **Screen and Curve** table, you can see the details of screen that the wizard created based on your chosen settings:
   - the **Ink** that this screen is for,
   - the **Screen Name** (this is generated based on the settings used),
   - the screen **Code** (you can change this if desired: click **Select** and choose another free screen code from the list shown),
   - the **Mindot** size in microns or milli-inches (corresponding to the mindot you chose above),
   - the **Curve Bump** (this is the smallest input percentage you can print with this screen, all smaller percentages are "bumped up" to this value; this data will be included in the curve generated by the wizard),
   - the **Estimated Lightest Tone Value** (the percentage that the smallest input percentage from the **Curve Bump** gives on print).
5. Click **Finish** to generate your custom screen and curve, based on your production settings.

   This may take a moment.

   You can see your final screens and adjustment curves on the **Printing** page. See *Printing Calibration Results* on page 228.

You can now *review your printing condition parameters* and *save a report* if desired.

You can find your new printing condition in the *Printing Conditions Explorer*, your new screen in the *Screens Explorer*, and your new curves in the *Curves Explorer*.

Legacy Calibration

This is the calibration method that was available in previous versions of the application(22.03 or older). It uses older Crystal screening technology (Crystal and Crystal NP, but not Crystal V). It is only available when **Legacy Calibration** is enabled in **Edit** > **Preferences** > **Printing Conditions**.

1. In the **Choose Angle and Ruling** wizard step, select the **Screen Ruling** you use in production.

   A fixed list of rulings is available from 100 lpi to 250 lpi. If your ruling is not in the list, choose the closest available ruling.

   If you are using several rulings, you can add additional rulings after you finished the printing condition. See *Add a Ruling* on page 241.

2. Select the **Angle Set** used in your production.

   You have the same 3 options that are available in the Imaging Engine tickets: Offset, Flexo-7.5, Flexo+7.5.

   Below the **Angle Set** selection, you find a list of all inks used in your printing condition. You defined this in *Ink Set and Printing Standard* on page 49.

   Note: If you have completed the setup for **White**, the ink you selected as white will also be visible in the list. See *White* on page 62.

   The angles, defined by the **Angle Set**, are shown next to each ink.

   It is possible to change the angle of an ink:

   a) Click the angle.
   b) Select another angle from the list.
   c) The **Angle Set** will be set to **<Custom>**.

   Note:

   Some angles are bigger than 90°, this is due to the screening technology used in the Print Control Wizard.

   The corresponding value in "the 90° zone" is mentioned between brackets, make your selection based on this value.

3. Choose either:

   - **Full ink-set print-run and measurements (recommended)**: select this option to print and measure charts. The wizard will guide you step by step.

     Note:

     Dot gain and highlights are very specific to individual certain press-ink-substrate combinations.

     Even if your printing condition is very similar (for example the same inks and substrate, but a different press), we highly recommend to print and measure the charts.

     If the results are very similar to another printing condition, you can still decide to use the same settings for both printing conditions.

See *Full Ink Set Print Run and Measurements* on page 94.

- **Manually select screens and use default adjustment curves**: select this option if you know what settings to select for the highlights in your screen. The software will select default dot gain compensation curves for all inks.

  See *Manually select screens and use default adjustment curves* on page 112.

  Note: You can still edit the curves later: see *Update Curves* on page 234.

Full Ink Set Print Run and Measurements

Select the **Full ink-set print-run and measurements (recommended)** option to print and measure charts. The wizard will guide you step by step.

Note:

Dot gain and highlights are very specific to individual certain press/ink/substrate combinations.

Even if your printing condition is very similar (for example the same inks and substrate, but a different press), we highly recommend to print and measure the charts.

If the results are very similar to another printing condition, you can still decide to use the same settings for both printing conditions.

1. In the **Print Chart** step, customize your test chart as desired, then save it and print it.

   See *Creating the test chart* on page 95.
2. Evaluate the quality of your plate.

   See *Checking the Plate Quality* on page 98.
3. Evaluate the quality of your printed chart.

   See *Checking the printed chart* on page 98.
4. Measure the chart to find the best screen and curve.

   See *Measuring the chart* on page 100.
5. Evaluate the highlights on your chart to find the best highlights settings.

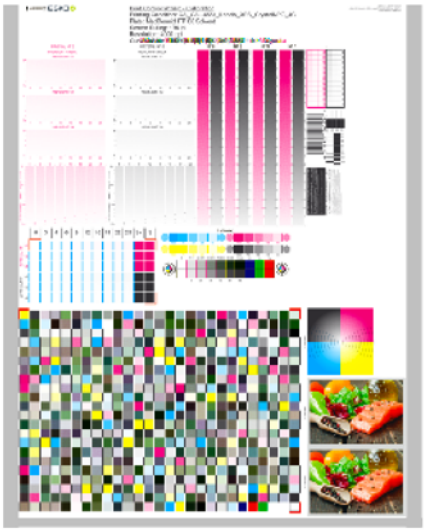
   See *Overview of the selected screen and highlights* on page 104 and *Inspect the screen results* on page 107.
6. Choose which of the settings found should be used for non calibrated inks (spot colors).

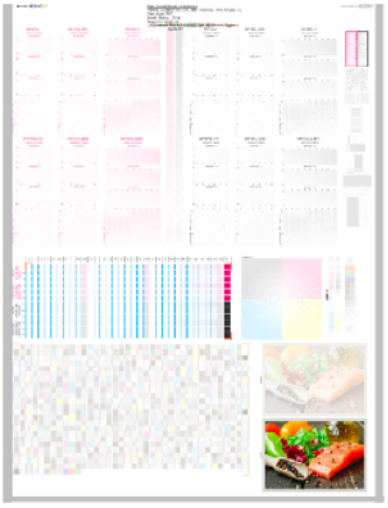
   See *Choosing the Spot Colors' Printing Settings* on page 78.
7. When you are done, the wizard will generate your custom screen and curve, based on your production settings.

Creating the test chart

1. **Create** the test chart:

   a) A preview of the default layout is shown for labels (left) and for flexibles (right)





Note: The illustrations of the charts in this manual are just one example, out of many possible versions. Your chart could look slightly different from the sample in this user guide.

b) Add **chart options** to customize the layout:

Note: All changes will be visualized in the preview.

- Unlock the **Chart Size** option by clicking on the and set your preferred **Width** and **Repeat Length**.

  If the preferred dimensions are higher than what is needed to print all the parts in a single chart, and the layout is set as:

  - **Complete Calibration Chart** then the parts will be placed in a single chart with blank space at the top or sides.
  - **Split Calibration chart parts** then the layout will be changed to **Complete Calibration Chart** and all the parts will be placed on a single chart.

  If the preferred dimensions are lower than what is needed to print all the parts in a single chart, and the layout is set as **Complete Calibration Chart** then the layout will be changed to **Split Calibration chart parts** and all the split charts will be of the preferred size.

  Note: If the preferred size is lower than the dimensions needed to print the split charts, then the size will be automatically set to the minimun size required to print the split charts.

  Tip: You can see the dimensions of the layout at the bottom of the preview.

- Customize the layout of the chart using the various **Layout** options:

- **Complete Calibration Chart** will place all different parts that need to be printed in a single chart. The chart size will be minimum width and length required to fit all the parts in a single chart.
- **Split Calibration chart parts** will automatically split the layout into several smaller parts. All elements that need to be printed together will be placed on the same layout. Some parts may be rotated to fit the chart. When splitting using this method, each small chart will be of a different size. If you want to make all the charts to be of the same size, you can set the preferred dimensions using the **Chart Size** option.

- **Mirror Image**: to be used for reverse printing.

  This option is on by default when using **White Overprint** in *Substrate* on page 48.

- **Add default bearer bars, slur marks and registration marks**:

  This option is always on by default.

- **Add a custom element**:

  If you want to add an image or technical element to the chart, to quality control the print.

  1. Click **Browse**.
  2. Browse to the location of the file.
  3. Click **Open**.

  Note:

  - The element needs to be a `.ct` file (Esko native image file format).
  - Use the free CT/LP plug-in from Esko in Adobe® Photoshop® to create `.ct` files from your element (To download the free plug-in, search for 'CT/LP plug-in' on *esko.com*).

    If you are using:

    - Quick Calibration: save the Photoshop document with Grayscale image mode

      .

    - Full Calibration: save the Photoshop document with CMYK or Multichannel imaging modes.

      Spot-channels will only be included if Multichannel mode is used. So to write a CMYK file with an extra spot channel, convert it to multichannel mode before saving it as a `.ct` file.

  - The `.ct` files cannot contain multiple layers. When the Photoshop document has multiple layers, merge all layers into a single layer before saving it as `.ct`.
  - You can only add one element. If you want to add several elements, you first need to group them in Adobe® Photoshop®.

c) Click **Save Chart**

d) Specify the folder where you want to save, click **Select Folder**

e) Specify a **File name**

f) Select the **File Type** you want to save: **LEN** or **Tiff**.

> **Note:**
>
> In most cases, we recommend you save the file as a **LEN** file, and use it directly on the CDI.
>
> However, if you want to edit it to add extra elements specific to your production (different bearer bars for example), you should save it as **Tiff**, but make sure **you don't change** any of the technical elements! Please see *this knowledge base article* to know more about editing charts.

g) Click **Save**

For each ink in your printing condition, a file will be created in the selected folder. For example if your inkset is CMYK and you completed the White setup, you will get 5 files: **File name_C**, **File name_M**, **File name_Y**, **File name_K**, **File name_White**

> **Note:** It could take several minutes to create the file.

> **Note:** The created chart is based on numerous parameters from the previous steps (application, dot shape, surface screening, ...). **Always** create a new chart, to assure that you have the correct elements in your chart for your printing condition.

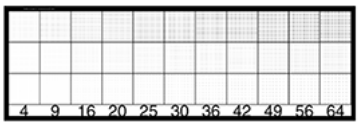
2. **Image the plates** on CDI according to your company's Standard Operating Procedures, AND using the settings specified in the previous steps.
3. Click **Next** in the lower right corner to continue to *check the plate quality*

Checking the Plate Quality

In the **Check Plates** step, you need to check the dot fail test.

Click *Learn more about evaluating this area* to open documents with guidelines for the dot fail test.

Check **Dot Fail** on the plate.



a) use a magnifying glass

b) check the center and lower row

c) the smallest number where all dots are in position gives the resulting value.

d) Verify all elements on the plate.

e) compare to the value that was found as good quality during installation of the CDI, same value as used during *Plate and Press Calibration* on page 51

f) **Accept** if the result matches the reference, or **Reject** if the result doesn't match.

If the result doesn't match, you need to troubleshoot the problem that is causing the low quality dots, remake the plate and evaluate the dots again.

Once you are satisfied with the plate quality, print a few copies of your chart and move on to *check the print quality*

Note: The **Next** button will be disabled if you reject the plate quality.

Checking the printed chart

Make a Print using the plates, according to the settings you entered in the printing condition and your company's Standard Operating Procedures.

Note:

To make sure the screens and curves that will be created are accurate for your production process, your measurement data needs to be representative of your complete print run.

We therefore recommend that:

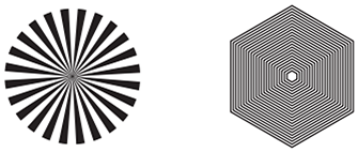
- you print another 50 to 100 meters (or more if this better reflects your production) after the press has reached your regular quality,
- you select 5 (or at least 3) copies in that "regular quality" print run: from the beginning, the middle and the end.

Once you've printed a few copies of your chart, check the slur marks, and the registration marks in the **Verify Print Quality** step.

After accepting or rejecting each element, the next one is shown automatically.

Click *Learn more about evaluating this area* to open documents with guidelines on how to evaluate these elements.

1. Check **Slur and Impression marks** on the print



   a) Use a magnifying glass
   b) **ALL** marks (= all inks) on the print should be ok
   c) verify all copies. If 1 or more copies are not ok, they should be replaced by a copy from that same strip (for example from around 30m). If only 1 copy is ok, troubleshoot with the press operator and reprint.
   d) In the wizard, **Accept** or **Reject**.

2. Check **Registration marks** on the print.

   a) use a magnifying glass
   b) **ALL** marks on the print should be ok

c) verify all copies. If 1 or more copies are not ok, they should be replaced by a copy from that same strip (for example from around 30m). If only 1 copy is ok, troubleshoot with the press operator and reprint.

d) **Accept** or **Reject** .

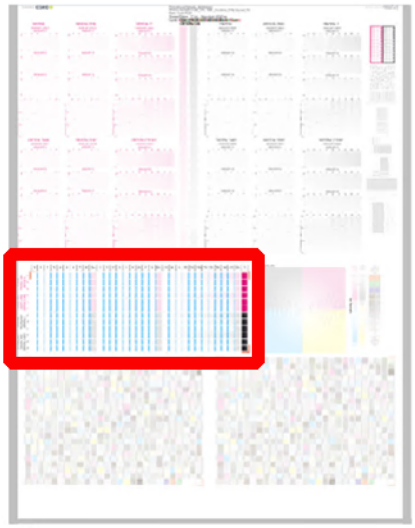
3. Click **Next** in the lower right corner to continue to measuring the charts. See *Measuring the chart* on page 100.

Note: The **Next** button will be disabled if you reject the quality of the slur marks or registration marks.

Measuring the chart

1. **Measure** the **Mindot Chart**.

   You can see the mindot chart for **Labels** (left) and for **Flexibles** (right) below.



   This will be used to determine the screen for the highlights.

   The magenta printed part will be used for CMY, the black printed part for K. If your selected ink set contains 1 or more extra inks (OGV), the first ink will be added to the chart, to be used for OGV.

   For example if the ink set is CMYKOG, orange will be added to the chart.

   a) Cut out the chart from your first copy.

   b) The chart can be read in patch or scan mode by an X-Rite i1 Pro or X-Rite i1iO. No other measurement devices are supported.

      To measure with the i1 Pro, it is advised to cut off the text before each row.

   c) With the cogwheel ( ) on the bottom right, you can stop, calibrate and reconnect your measurement device, change the measurement mode and the measurement condition.

      See the **Using a Spectrophotometer** chapter in the *Color Pilot user guide*.

   d) To know how to measure the chart with your measurement device, follow the instructions on the bottom left above the icons .

The preview will show the instructions and the measurement progress.

Tip:

After you are done measuring a page, you can save the measurement data as a measurement file if desired (in the CGATS - Committee for Graphic Arts Technologies Standards - color measurement format):

- Go back to the page you have just measured using the back arrow.
- Click the cogwheel ( ) at the bottom right and select **Save measurement...**
- Choose a location to save your measurements file (with the `.txt` extension).

Tip:

Alternatively, if you had already measured your chart and saved the measurement, you can load your measurement file instead of re-measuring it here.

1. Make sure that your measurement file is a CGATS (Committee for Graphic Arts Technologies Standards color measurement format) file, with the `.it8`, `.txt` or `.cgats` extension.
2. Click the cogwheel ( ) at the bottom right and select **Load Measurement...**

2. Check the **Measurement results**.
   a) Check the preview: the upper and lower part of the patches should approximately have the same color.

Note:

The comparison of measurements (upper part) and the standard (lower part) is a rough approximation. Only look for clear differences:

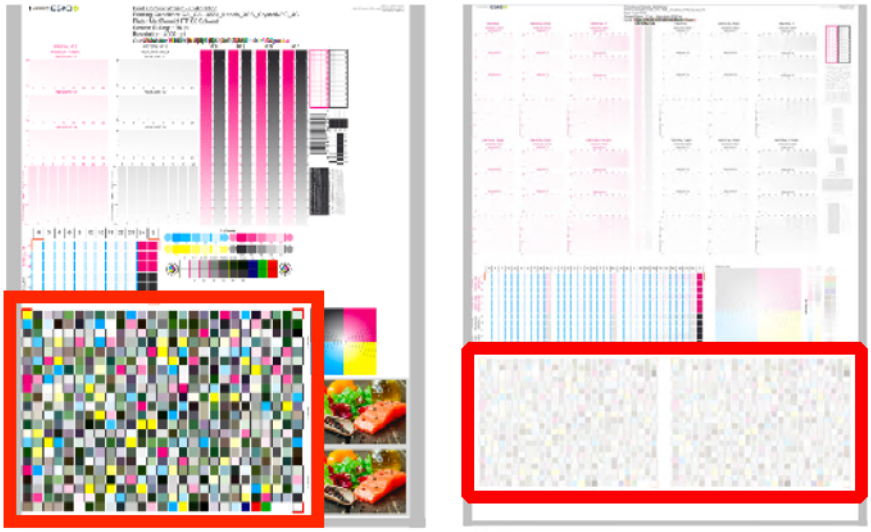
- completely different color: for example wrong row measured, chart upside down
- the same color, but a very big difference in lightness: for example not printed correctly, issue with the measurement device.

   b) **Accept** or **Reject**

   When your measurement is ok, it is possible to continue to the next step.

   If you rejected the measurement result, you will be guided to measure again, following this same procedure.

   This could be the same chart (wrong row, chart upside down) or a different chart from the print run.
3. Measure the **Tone Value Chart** for Labels (left) or Flexibles (right).



- This will be used to create the dot gain compensation curves.
- The chart will contain all inks from your selected ink set.

  For example if the ink set is CMYKOGV, the chart will contain CMYKOGV patches.
- Cut out the chart from the same copy as your mindot chart in the previous steps.
- The chart can be read in patch or scan mode by an X-Rite i1 Pro or X-Rite i1iO. No other measurement devices are supported.
- With the cogwheel ( ) on the bottom right, you can stop, calibrate and reconnect your measurement device, change the measurement mode and the measurement condition.

  See the chapter **Using a Spectrophotometer** in the Color Pilot user guide: *https://www.esko.com/en/support/product?id=Color%20Pilot*.
- To know how to measure the chart with your measurement device, follow the instructions on the bottom left, above the icons .

  The preview will visualize the instructions and the measurement progress.

4. **Check** the **measurements results**.
   a) Check the preview, the upper and lower part of the patches should approximately have the same color.

   After the first measurement you can compare your measurement to the standard. After the measurement of your 2nd, 3rd... copy, you can also compare to the average and to the other measurements.

   Select what you want to compare with, from the pull-down menu, on top of the preview.

Note:

- In this step we mainly want to detect if the charts were measured correct (not upside down, mirrored...)

  If the color in the patch is the same, but there is a big difference in lightness, this is probably not an issue. The dot gain compensation curve created from these measurements will correct for this.

- Comparing charts among each other could be useful, to detect if some charts are printed very different. That chart could be an exception and we don't want to include this in our average.

b) Check the **solid info**, to the right of the preview.

1. Density: for each ink, the measured density should be within tolerance of the desired density.

   Use the same tolerance as your company uses on press (typically + or - 0,05).

   Select the Density standard you use on your measurement device (ANSI A, DIN, ...), from the pull-down menu below the Solid Info.

   Note:

   The desired density is derived from the printing standard you selected in Ink Set and Printing Standard

   We don't show desired density for CMYK inks for standards that use an ICC profile as a standard profile. This is because density calculation requires spectral data, which is not available in ICC profiles.

2. Color difference (ΔE): for each ink, the ΔE should be within tolerance of the printing standard you selected in Ink Set and Printing Standard. See *Ink Set and Printing Standard* on page 49.

   Select the ΔE Formula that is requested by the printing standard, from the pull-down menu below the Solid Info.

   Note: Select an ink if you want to see the LabCh details, below the **Solid Info** window.

Note: We don't show desired density, Lab and ΔE for the OGV inks. There are no standards for these inks, so there's nothing to match.

c) If everything is OK, click **Accept** and continue.

Otherwise click **Reject** and measure again.

Note:

In this case, you need to measure both the mindot chart and the tone value chart again. This is because:

- different samples may be printed somewhat differently, so you shouldn't mix print samples,
- if you detect a printing issue on the tone value chart, then it is likely that the complete print sample is not representative, and that your mindot measurement is not that reliable.

5. Select **Measure another sample** if needed.

   To have an accurate and reliable screens and curves creation, it is important that the measurements are an average of a complete print run. Measure minimum 3 charts of good print quality (we advise to use 5).

   a) You will be guided to measure again. Following this same procedure from the top.

   Note: The wizard will indicate how many charts you already measured: sample 1, sample 2...

6. If you measured enough charts of good quality, you can select **Stop measuring and inspect the resulting screens**.

   See *Overview of the selected screen and highlights* on page 104.

Overview of the selected screen and highlights

View at the top, an overview of the screen technology and highlights selected from the measurements.

One selection is made for CMY (based on magenta part in mindot chart), another for K and another for OGV (if present, based on the part in mindot chart printed in the fifth separation).

You see per ink group (CMY, K and OGV) what is the selected:

Screen Name:

1. The first part of the screen name is the screening dot (dot shape) you selected in Plate and Press Calibration: Crystal, Crystal C or Crystal NP. See *Plate and Press Calibration* on page 51
2. The surface screening selected in Plate and Press Calibration will be mentioned after the screening dot: MG34, MG45 or SOL (=solid). See *Plate and Press Calibration* on page 51

   Exceptions for Crystal NP:

   - the dot shape (R, C, F or E) will be mentioned after the surface screening, for example Crystal NP MG34 R9
   - SOL will not be mentioned if surface screening Solid is used, for example Crystal NP R6

   Exceptions for Crystal and Crystal C:

   - when MCWSI is selected, nothing will be mentioned in the name, for example Crystal 6 or Crystal C12
   - for Crystal C, the 'C' will be mentioned after the surface screening, for example Crystal MG34 C3
3. The number at the end indicates the size (in pixels) of the minimum dot, used in the screen.

Note:

- For Crystal C and Crystal NP: it indicates the number of pixels that will form the printing dot
- For Crystal: it indicates the number of boosted pixels. As each pixel will be boosted (Pixel +) on the CDI, the size of the printing dot will be bigger than the amount of pixels.

4. If a support dot is selected, the support dot characteristics will be mentioned at the end of the screen name, for example Crystal 4 **S4R1**
   - The size of the support dot: **S3** = 3 pixels
   - The type of ruling used: **R1** = single ruling, **R2** = double ruling)
5. For more information, see:
   - *Types of Screens* on page 30
   - *How to evaluate highlights*

Code

When the screen is created, a code needs be assigned to the screen. So the screen can be easily used, communicated and traced back by Esko software and operators. Comparable to other Esko screens: Circular dot = C; an HD screen = HDxx; ...

This code is unique and will automatically be selected, based on 'next available in the list'.

It is possible to change the code BEFORE creation:

1. Click **Select**, next to the code
2. Select a screen code from the list
3. Click **OK**

Note: If the screen already exists, because it was already created in another printing condition, the code will be greyed out and labeled **(already exists)**. It is not possible to change the code.

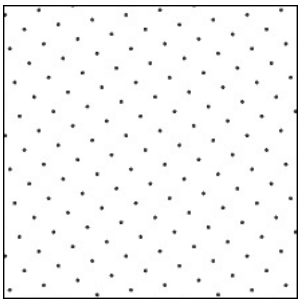
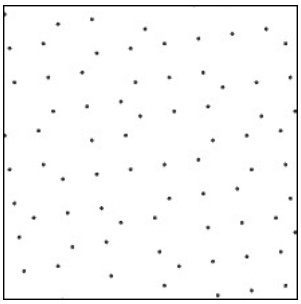
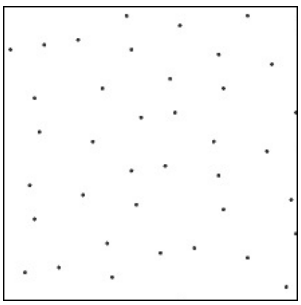
Minimum Dot on Plate

The size (diameter) of the selected minimum dot is mentioned in microns (µm).

Note: As boosted pixels on CDI gets bigger then 'regular' pixels, the diameter of 4 boosted pixels (Crystal 4) will be bigger than the diameter of 12 regular pixels (Crystal C12 or Crystal NP C12).

FM Dot Population

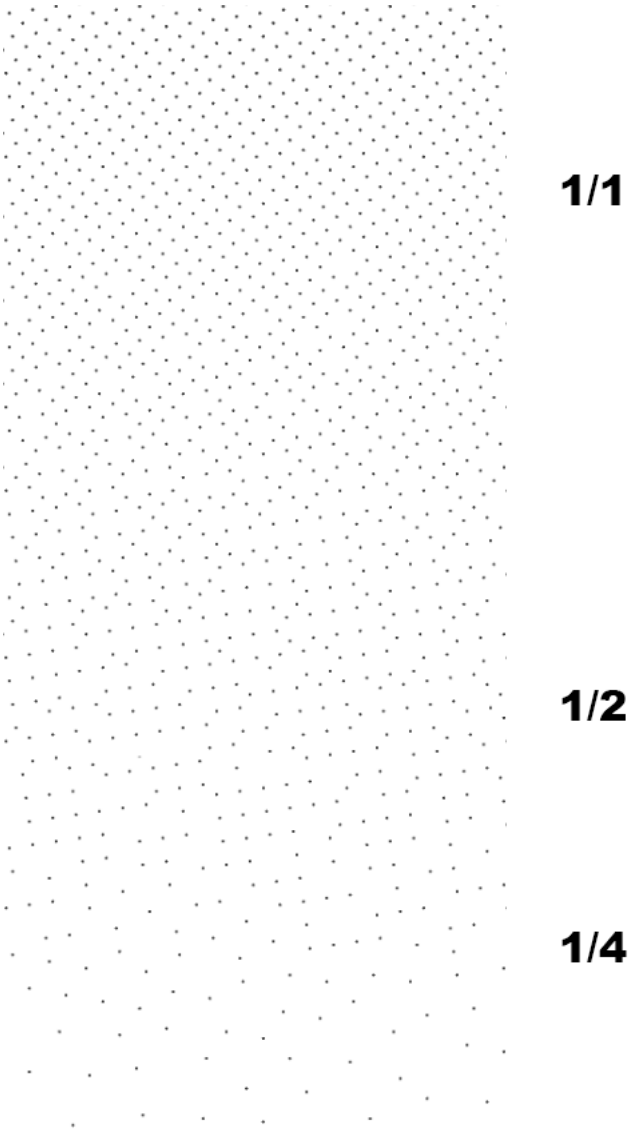
The FM dot population indicates the amount of dots used to print the highlights.

	**1/1** means that all the dots are kept (the screen doesn't use FM screening)
	**1/2** means that half of the dots are kept (resulting in FM screening)
	**1/4** means that a quarter of the dots are kept (resulting in FM screening) A lower FM dot population gives lighter highlights, but may increase graininess.

Transition point:

- If 1/1 (no FM): there is no transition point, the minimum dot will be the bump.
- If 1/2 or 1/4 (FM): the transition point, where the AM screen starts changing into an FM screen, will be determined by the minimum dot.

If you see **1/4**, it means that the screen gradually transitions from 1/1 (no FM) to 1/2, then to 1/4 in the highlights, as you can see below.



Lightest Tone Value

The lightest tone that can be printed, will be displayed.

The value is the result of the selected **minimum dot** and **FM dot population**. The combination that gives in print a stable dot and the lightest highlight, will be automatically selected from the measurements.

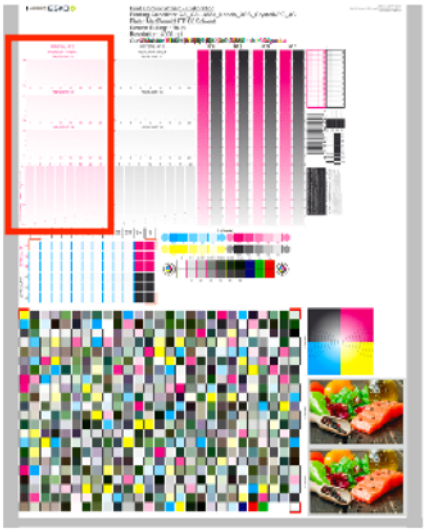
Continue to inspect the screen results

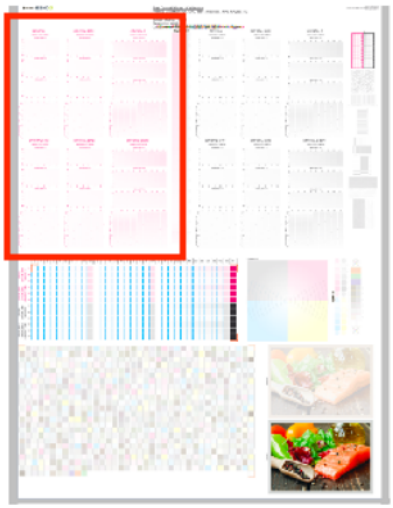
See *Inspect the screen results* on page 107.

Inspect the screen results

1. **Locate** on your print sample, the **highlight check** areas.

   In the example below, the CMY area is marked, for Labels (left) and for Flexibles (right)





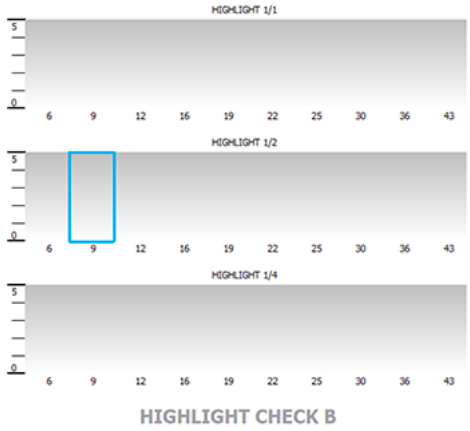
- Per available Ink Group (CMY, K and OGV) you will have a set of HIGHLIGHT CHECK's. The set is the same for each ink group.
- The number of HIGHLIGHT CHECK's depends on the **Screening Dot** you selected in *Plate and Press Calibration* (could be different number than the examples above).
- For every available screen technology there will be a HIGHLIGHT CHECK.

It shows the screens highlights (from 0 to 5%) for:

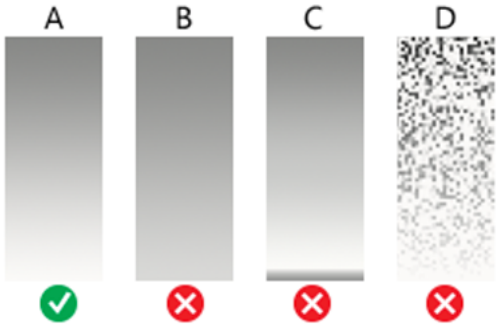
- different **FM Dot Population**: 1/1, 1/2 and 1/4
- different **Minimum Dot** (in pixels)

2. In the overview, select the **Ink Group** you want to inspect: CMY, Black or OGV

   You will see your selected highlight in the preview, the area will be marked with a blue rectangle.



3. Locate the same area on your print sample, and inspect it on a light booth using a magnifier



a) **Skip the next step** and continue with the inspection of the other ink groups, if the highlights gradient fade smoothly (as in the gradient A)

b) **Continue to the next step**, if the highlights quality is not good enough and you encounter any of the issues below:

- B: the screen prints too dark, giving a hard edge in the highlights
- C: there is tone reversal in the highlights
- D: the print is too grainy

> **Note:**
>
> Inspect the screen results on ALL print samples were you measured the charts! The selected highlight should fade smoothly on all samples. If not, try to find a better highlight. To avoid that you will see the same unstable print behavior in your daily production.

For more information, click *Learn more about inspecting highlights*.

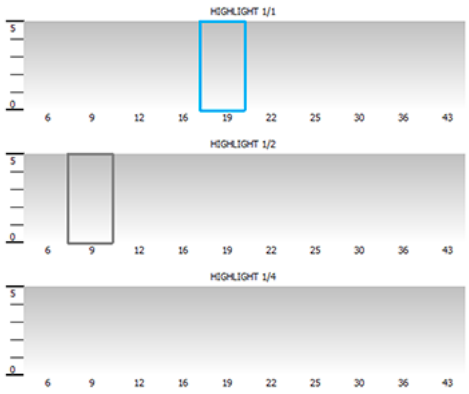
4. Select a highlight that you consider better

a) Inspect the neighboring highlight gradients (within the same or another FM Dot Population) to try and find better quality highlights.

If you don't find any satisfactory highlights for your selected screen technology, inspect the highlights of another screen technology (for example Crystal C instead of Crystal).

b) To select the better highlight, click the area in the preview.

- The blue rectangle will be placed in the new selected area.
- The selection from the measurements will be marked with a grey rectangle.
- The Ink Group will be marked with and the new settings will be applied.



HIGHLIGHT CHECK B

Note:

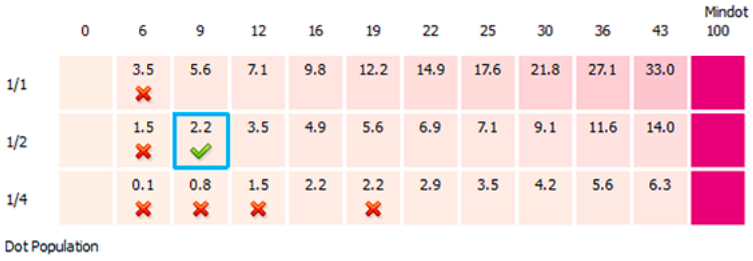
If you found the better highlight in another screen technology, first select the **screen technology** from the pull-down menu (on top of the preview).

Only screens that are related to the screening dot you selected in *Plate and Press Calibration* will be available.

Note: Click **Reset** (top right of the preview), to remove your change.

c) Enable **Show mindot strip with densities** (on top of the preview), if you need additional information to help you make your choice.

Next to the highlight check preview, the mindot strip of the selected Ink Group is displayed, with the detailed result of your measurements.



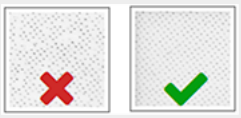
The patches on screen are arranged as in your print sample, by **minimum dot** size (horizontally) and **FM dot population** (vertically).

For each patch, you can see the tone value produced by the screen in this patch, and the wizards' evaluation:

- The patch with a green check is the one the wizard considers optimal: it prints in a stable way and produces the lightest highlights of all the stable patches
- Patches with no specific markings also print in a stable way
- Patches with a red cross do not guarantee a stable print
- Hover on a specific patch, to see more information below the strip

Tip:

A stable print gives a smooth result without any clumping or missing dots.



Note: In the mindot preview, you can also select the better highlight. The Highlight preview will be automatically adapted.

5. Inspect the screen result of another ink group, using the same procedure as the previous steps.

   When all ink groups are inspected and the correct settings are applied, continue to the next step.

6. Select which separation from your printing condition will be used to set the default screen and curve for your **spot colors** (= all separations that are not in the ink set).

   The default is Black, but you can select any of the inks from the printing condition. Or <none>, if your spot colors don't need to use the screen and curve from your printing condition.

7. Click **Finish**

   The screens and curves will be created (this could take some time) and the wizard will be closed.

Note:

To better understand how the Print Control Wizard calculates the minimum gray value (H38 (**min2.7%**,h100000,s79)) of the curve, see the example below:

For Crystal C screen at a specific tone in the highlights, P+ dots are mixed with solid dots. Because solid dots print larger, these solid dots need to be reduced. This is done with a reducing factor, internally called as 'AM2WSI' parameter. This factor is around 5/8 = 0.625, so when the 'minimum' in the PressSync curve is set to 2.7%, the real gray level in the LEN file will be: 2.7% x 0.625 = 1.69%.

When 1/1 population is selected in PCW, the required bump to have no FM is setting the 'minimum' PressSync parameter equal to the transition point (point where AM goes to FM). Also here the AM2WSI parameter is used.

Note also that in 20.0 a 'keep0%' is added to the curve and set to 0.39% Result is that the 1st 8-bit CT tint (=0.39%) will have a gray value of : 'minimum' * 'AM2WS'I

In previous version of Print Control Wizard (18.1.1), 'keep0%' was set to 0%, so the gray value of the 1st 8-bit tint was about 0.3% higher than 'minimum' * 'AM2WSI'

All information about the selected screens, curves and measurement results are now shown on the **Printing** page. See *Printing Calibration Results* on page 228.

Manually select screens and use default adjustment curves

Select the screens manually if you know what settings to select for the highlights in your screen. The software will select default dot gain compensation curves for all inks.

1. On the **Set Manually** wizard screen, you can see an overview of the selected screen technology and highlights.

   For more information, see *Overview of the selected screen and highlights* on page 104.
2. Set the screening parameters for each ink group.
   a) In the overview table, select the **Ink Group**: CMY, Black or additional inks (this depends on your ink set, for example OGV).
   b) Underneath the table, select the **Screen Technology** to use for this ink group.

      Only screens related to the screening dot you selected in *Plate and Press Calibration* are available.
   c) Select the **Mindot** for this ink group.

      The mindots available in the list are related to the screen technology you selected.
   d) Select the **FM Dot Population**: 1/1, 1/2 or 1/4.
   e) Repeat the steps for the other ink groups.

      When all ink groups are inspected and the correct settings are applied, continue to the next step.
3. On the **Spot Colors** screen, select which separation from your printing condition should be used to set the default screen and curve for your spot colors (= all separations that are not in the ink set).

   The default is **Black**, but you can select any of the inks from the printing condition. Or **<None>**, if your spot colors don't need to use the screen and curve from your printing condition.
4. Click **Finish**.

   The screens and curves are created (this could take some time).

   Note:

   When you manually set up your printing calibration, the selected curves are always F40 for Flexibles and E50 for Labels.

   Only the flexible curve options (value shown between brackets) are calculated, based on the selected screening parameters. See *PressSync Curves* on page 26.

All information about the selected screens, curves and measurement results are now shown on the **Printing** page. See *Printing Calibration Results* on page 228.

5.4. Creating a Printing Condition for Standard Post Print Corrugated

If you are printing on corrugated material (for example packaging cardboard), you should create a printing condition for **Corrugated**.

Note: You need to have the corresponding license to create a printing condition for Corrugated.

1. In the **Printing Conditions** library, click the **New Printing Condition** button in the bottom toolbar.
2. In the **New Printing Condition** dialog:
   a) Enter the **Printing Condition Name** you want to use.
   We recommend you use a descriptive name, that includes some of your workflow's key settings, for example `Press Type - Plate Type - Substrate`.
   b) In **Application** (the application of your flexo printing workflow, so the type of jobs and substrates that you usually work on), select **Corrugated**.
   This is meant for **post-print** production, where you print directly onto the final corrugated material (as opposed to **pre-print**, where you print onto a substrate which is then laminated to the final product).
   c) In **Board Liner**, select the type of corrugated material you are printing on.
   The application supports:
   Brown Kraftliner
   White Top Kraftliner
   White Coated Kraftliner
   Brown Test Liner
   Brown Kraft Top Liner
   White Top Test Liner Uncoated
   Mottled Test Liner
   White Top Test Liner Coated
   d) Select the **Print Production Method** you are using.
   - If you only print solids, in one or more spot colors, but no screened images, select **Standard Post Print (solids only)**. This is typically used with:
     recycled board liners
     higher fluting profiles
     softer plates
     higher volume aniloxes
   - If you print in multi color (CMYK or more), and with high quality images on your corrugated material, select **High Quality Post Print (solids & halftone)** instead. This is typically used with:
     primary packaging
     low fluting board grades
     lower volume aniloxes

   See *Creating a Printing Condition for High Quality Post Print Corrugated* on page 189.
   e) Click **OK**.
   This creates your printing condition and saves it to the printing conditions database.
3. The printing condition editor opens, showing your printing condition's configuration steps.

Complete all configuration steps as explained in *Configuration Steps for Standard Post Print* on page 173.

4. After finishing the last configuration step, you can:
   - Have a final look at the parameters and screen(s) of the printing condition: see *Reviewing the Printing Condition* on page 227.
   - Create a detailed report of the printing condition: see *Saving a Report* on page 287.

Over time, as your equipment ages and your production fluctuates, you may need to adapt your printing condition, see *Editing a Standard Post Print Corrugated Printing Condition* on page 260.

5.4.1. Configuration Steps for Standard Post Print

The Printing Condition Editor

When you open a printing condition for editing, a banner at the top displays the status of the printing condition and a brief description of the selected configuration step.

Below the banner you see an overview of all configuration steps for *Standard Post Print (solids only)*.

- *General*
- *Plate Making*
- *Board*
- *Press and Inks*

To navigate between the configuration steps, you can either:

- select a configuration step,
- click the navigation arrows on the left and right of the pane: < >

Unfinished printing conditions have an indicator next to each step:

- ✔ : all mandatory parameters are filled in,
- ✱ : you still need to fill in some or all mandatory parameters,
- ⊖ : this configuration step is not available until some mandatory parameters in previous steps are filled in.

Filling in Parameters

- Mandatory parameters in the configuration steps are marked with an orange star ✱. After filling them in they get a green check mark ✔. They need to all be green before the configuration step is marked as completed.
- Some of the steps depend on mandatory parameters from previous steps. If you change a mandatory parameter, you will need to redo any step depending on it.

Note:

You cannot edit any of the selection lists in the printing condition (for example substrate type, plate type...). Only parameters that have been tested and approved can be selected.

For some parameters, what you can select depends on:

- your license,
- what you have selected in previous steps (for example, you can only select between types of optics that are available on the model of CDI you have entered).

Pausing and Resuming Your Work

At any point in the process you can stop working on your printing condition and continue later. Use the **Save and Close** or **Quit Now and Continue Later** buttons (depending on where you are in the configuration).

If you are asked to confirm whether to save your work and close, don't forget to click **Yes**.

When you are ready to continue, open the printing condition by right-clicking it and selecting **Open**, or by double-clicking on it. The first step that is incomplete will automatically be selected, to remind you where to continue.

If you want to remove your latest modifications in the printing condition, click the **Revert** button in the bottom tool bar. Be aware that **all modifications** until the latest save action will be removed.

We recommend to regularly save changes (for example after every step) to make better use of **Revert** and avoid unnecessary loss of time and data.

After You Are Done

When you open a finished printing condition, the interface will be a little different. See *Reviewing the Printing Condition*.

General

The required **General** parameters are pre-filled in, but you can still add information if desired.

1. The **Application** is the one you chose in the *New Printing Condition dialog*. It can no longer be changed.
2. The **Print Production Method** is also the one *you selected*.
3. If desired, you can add a **Description** (to help you tell this printing condition apart from other similar ones you might be using).
4. You can also add (or remove) **Keywords**.

Note: Keywords added via the Printing Conditions Explorer will also be visible here. See the **Keywords** chapter in *the Color Pilot user guide*.

Plate Making

In this configuration step, you need to specify what Flexo plates you use, and the way the plates are made (imaged, exposed, and developed).

1. Select your **Imager Type**:
   - **CDI Crystal**: the new generation of Esko imager, using the Crystal technology

- **CDI Spark**: an older generation of Esko imager

See *CDI Imagers* for information about Esko's different CDI models.

2. Select your **Optics**:

- For **CDI Crystal**:
  - Optics40 V2
  - Optics80 V2
  - Optics100 V2
  - Optics40 V3
  - Optics80 V3
  - Optics100 V3
  - Optics40 V3+
  - Optics80 V3+
  - Optics100 V3+
- For **CDI Spark**:
  - Optics15
  - Optics25
  - Optics40
  - Optics80
  - Optics40 V2
  - Optics80 V2
  - Optics100 V2
  - Optics40 V3
  - Optics80 V3
  - Optics100 V3
  - Optics40 V3+
  - Optics80 V3+
  - Optics100 V3+

Tip: If you don't know your CDI's optics technology, you can find it in the tables below (it is linked to its maximum imaging speed).

Table: CDI Spark (Models 2530, 4835, 4260, 5080, and 5080-C)

Maximum Imaging Speed	Optics Technology
1.5 m^2/hr	**Optics 15**
2.5 m^2/hr	**Optics 25**
4 m^2/hr	**Optics 40**, **Optics 40**, **Optics 40 v3** or **Optics 40 v3+**
8 m^2/hr	**Optics 80**, **Optics 80 v2**, **Optics 80 v3** or **Optics 80 v3+**(depending on the model)

Maximum Imaging Speed	Optics Technology
10 m^2/hr	**Optics 100 v2**, **Optics 100 v3** or **Optics 100 v3+**

Table: CDI Crystal (Models 4835 and 5080)

Maximum Imaging Speed	Optics Technology
4 m^2/hr	**Optics 40 v2**, **Optics 40 v3** or **Optics 40 v3+**
8 m^2/hr	**Optics 80 v2**, **Optics 80 v3** or **Optics 80 v3+**
10 m^2/hr	**Optics 100 v2**, **Optics 100 v3** or **Optics 100 v3+**

3. Choose a **Resolution** of either **2400** or **2540** ppi.

   The **Resolution** you can use depends on your *Print Production Method*, **Imager Type** and **Optics**:

Standard Post Print	High Quality Post Print
• When working with a **CDI Crystal** with **Optics 100 v2**, you can only use the higher resolution, **2540** ppi. • When working with a **CDI Crystal** with lower optics, you can select either **2400** or **2540** ppi. • When working with a **CDI Spark**, you can select either **2400** or **2540** ppi.	You can only use the higher resolution, **2540** ppi (for both imager types and all optics).

4. Select your **Exposure Type**:
   - **XPS** Crystal: an Esko device that simultaneously exposes the front and back of the plate, using UV LEDs.
   - **Bank**: a non-Esko exposure device, that can be an analog or a digital device.

   Note: The exposure types available here depend on your license.

5. In **Description**, you can add information about your exposure devices, for example exposing times, what device (if you own several exposing devices of the same type) ...

   You can also add all other information that could not be specified in the default fields, and that is important to identify how the plates are created.

6. Select your **Plate Type**.

   A wide range of plate types from different manufacturers is available. All plates in the list are suitable for corrugated printing, and tested and approved by Esko, to be able to guarantee a minimum quality.

   In the future more plate types could be added. Contact Esko support if your plate type is not in the list.

7. Select your plate's **Thickness** if desired.

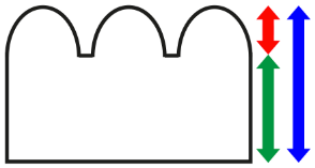
Depending the plate type you selected, you will have a fixed list of plate thicknesses. Only plate thicknesses that are tested and approved by Esko will be available.

In the future more plate thicknesses could be added. Contact Esko support if your plate thickness is not in the list.

8. Enter your **Relief Depth** if desired.

   This is the depth of the dots on your plate (or the difference in height between the printing surface and the floor of the plate).

   You can calculate your plate relief depth (in red below) by measuring your plate's thickness (in blue) and subtracting the plate floor's thickness (in green).



Note: To change the units, see *Preferred Units* on page 35.

9. The **Developer** is always set to **Solvent** for plates made for printing on corrugated material.

Board

Define the characteristics of the board material you are printing on.

1. The **Board Liner** is the one you *already selected*.

   However, you can still change it if needed. You can choose one of the following:

   Brown Kraftliner
   White Top Kraftliner
   White Coated Kraftliner
   Brown Test Liner
   Brown Kraft Top Liner
   White Top Test Liner Uncoated
   Mottled Test Liner
   White Top Test Liner Coated

2. Select the type of **Board Fluting** in the material you are using (**A**, **B**, **C**, **E** or **F**).
3. Select the **Board Style**.

   This can be **Single Face**, **Single Wall**, **Double Wall** or **Triple Wall**.

4. If desired, you can add a **Description** (to help you tell this board apart from other similar boards you might be using).

Press and Inks

The **Press and Inks** configuration step is available once you filled in all mandatory parameters in the previous configuration steps (*General*, *Board*, and *Plate Making*).

In this configuration step, you need to add information about your press setup.

For every setup it is important to gather as much information as possible, to better understand the conditions of the setup at a later time.

1. Enter the manufacturer name of your press (**Press Brand**).
2. Select your **Press Type**. It can be either:
   - **Central Impression** press: containing a single large-diameter common impression cylinder that supports the substrate as it enters in contact with a series of adjacent plate cylinders.
   - **Stack Press**: in which the substrate passes through multiple color stations which are aligned in one or two vertical stacks).
   - **In-line Press**: in which the substrate passes through multiple color stations which are aligned in a straight horizontal line).
3. Select your **Press Size**: **Wide Web** or **Narrow Web**.
4. Enter your press' **Printing Speed**, in sheets per minute.
5. In the **Press Inks** table, you can:
   - Add the properties of the inks that you typically use, and choose a screen for these inks.

     See *Adding Inks* on page 178.
   - Modify the properties of one or more of the inks you have added.

     See *Modifying Inks* on page 184.
   - Remove one or more of the inks you added: select the ink in the table, click **Remove Inks...** and confirm your choice.

   Once you have added inks, you can see the properties of each ink, and the screen found for it, in the **Press Inks** table.

Adding Inks

In the *Press and Inks* section of the corrugated printing condition editor, you need to add the properties of the inks that you typically use (including what anilox and tape you use for printing with them), and choose a screen for these inks.

You can set "default" properties that represent most or all of your inks, but you can also set properties for specific inks, for example if you are having trouble getting the ink coverage you want with a particular ink, or if a customer has specific requirements for some spot colors.

For default inks, and for each specific ink that you want to add:

1. Click **Add Ink...** under the **Press Inks** table.
   This opens the **Add Ink** wizard.
2. On the **Choose Ink and Workflow** screen:
   a) Choose for which ink you want to set properties and choose a screen:
      - To set "default" properties that represent most or all of your inks, leave **Other Inks** selected in the **Ink** field.
      - To set properties for a specific ink, click the **Select** link and browse to your desired ink in the pop-up that open (first select the right ink book, then your ink).

        Note: You can use inks from cloud ink books. Please see *the Color Pilot documentation* to learn more about cloud ink books.

b) Choose a method of entering properties and choosing a screen:

- In most cases, we recommend that you follow the guided procedure that will help you analyze a printed test chart to find the best screen: select **Analyse a print to find the best screen**.
- If you have already used the guided procedure for another ink and you want to set properties and choose a screen for a new, but similar ink (that uses the same anilox and tape), you can select **Copy screen and printing condition properties from another ink**.

  In this case, click **Select** in the **Reference Ink** field, and select the ink which properties and screen you want to copy.
- If you already know the best screen to use for the ink you are working with (for example if you received screening settings from an external plate maker), you can select **Define screen and printing condition properties manually**.

3. On the **Define Printing Condition Properties** screen, enter the properties of your ink(s).

   See *Defining Ink Properties* on page 180.

   Note: If you have chosen the **Copy screen and printing condition properties from another ink**, the properties will already be filled in, but you can still change them if needed.

   Tip:

   From this point onwards, you can use the **Quit Now and Continue Later** button if you need to stop, save your progress, and resume the wizard later. Make sure you click **Yes** in the pop-up asking whether you want to save your work and close the wizard.

   When you are ready to resume your work, you will see an unfinished task icon on the **Add Inks...** button. When clicking **Add Inks...**, you will be asked whether you want to continue your unfinished wizard session. Click **Yes**.

   You can also choose to start a new wizard session instead, but you will not be able to save two unfinished wizard sessions (the second one will overwrite the first one).

4. If you are following the guided procedure (you selected **Analyse a print to find the best screen** on the *Choose Ink and Workflow* screen), you now need to print a test chart, and evaluate it.

   See *Printing and Evaluating a Test Chart* on page 181.

5. On the **Choose Screen** step, you need to choose the best screen to use for your ink(s).

   Note:

   - If you are following the guided procedure, you need to evaluate the screens on your printed test chart.
   - If you are copying another ink's properties and screen, it will be already filled in, but you can change it if desired.
   - If you already know the screen to use (for example you received it from an external plate maker), you can just fill it in.

   See *Choosing a Screen* on page 183.

6. Click **Finish**, and your screen will be created (in *your screens database*).

You can now see your ink's properties and screen summarized in the **Press Inks** table.

The **Description for selected ink** at the bottom shows the description you're entered when choosing your screen.

Defining Ink Properties

On the **Define Printing Condition Properties** screen, enter the properties of your ink(s).

Note: If you have chosen the **Copy screen and printing condition properties from another ink**, the properties will already be filled in, but you can still change them if needed.

1. Under **Ink Properties**:
   - Enter the manufacturer of the ink (**Brand**).
   - Select the **Type**: **Solvent**, **Water-based** or **UV curable**.
   - Enter the **Viscosity** in seconds.

   You can measure an ink's viscosity using an efflux cup. The viscosity is the number of seconds it needs to flow through the hole at the bottom of the cup until the cup is completely empty (very viscous inks need longer). Some newer press models can measure this automatically (electronically).

   Note: The ink's viscosity affects how well it transfers onto your substrate, and can change depending on ambient temperature and time (for example when the solvent in a solvent based ink starts evaporating).
2. Under **Anilox Properties**:
   - Enter the manufacturer of the anilox (**Brand**).
   - Enter the anilox **Type**.
   - Enter the anilox' **Line Screen** in lines per inch (this is the number of cells per linear inch).

     A higher line screen is used for finer detail, while a lower one will transfer a heavier layer of ink.
   - Enter the **Angle** of engraving (relative to the anilox axis) in degrees. This is typically 30°, 45° or 60°.
   - Enter the anilox' **Cell Volume** (the ink capacity of each engraved cell) in billion cubic microns (BCM).

     Note:

     The cell volume of an anilox roll can change over time, due to wear, damage and "plugging" (dried ink residues at the bottom of the cells).

     Plugging can happen when solvent or water-based ink is not cleaned immediately after using the anilox and dries in (UV curable ink will not dry on its own).
3. Specify the **Tape Properties** by entering the manufacturer of the tape (**Brand**).

   Note: We recommend to also add the tape hardness in the same field.

Printing and Evaluating a Test Chart

After *entering your ink properties*, you now need to print and evaluate a test chart to find the best screen for your selected ink.

Note: This is only applicable if you are following the guided procedure (you selected **Analyse a print to find the best screen** at the start of the wizard).

1. On the **Save Test Chart** screen, save the LEN file that you will use to print your test chart.

   This LEN file will have the resolution you entered in the *Plate Making parameters*.

   a) Customize the dimensions of the chart using the **Chart Size** option.

   Unlock the **Chart Size** option by clicking on the and set your preferred **Width** and **Repeat Length**.

   If the preferred dimensions are higher than what is needed to print all the parts in a single chart, and the layout is set as:

   - **Complete Calibration Chart** then the parts will be placed in a single chart with blank space at the top or sides.
   - **Split Calibration chart parts** then the layout will be changed to **Complete Calibration Chart** and all the parts will be placed on a single chart.

   If the preferred dimensions are lower than what is needed to print all the parts in a single chart, and the layout is set as **Complete Calibration Chart** then the layout will be changed to **Split Calibration chart parts** and all the split charts will be of the preferred size.

   Note: If the preferred size is lower than the dimensions needed to print the split charts, then the size will be automatically set to the minimun size required to print the split charts.

   Tip: You can see the dimensions of the layout at the bottom of the preview.

   b) Customize the layout of the chart using the various **Layout** options.

   - **Complete Calibration Chart** will place all different parts that need to be printed in a single chart. The chart size will be minimum width and length required to fit all the parts in a single chart.
   - **Split Calibration chart parts** will automatically split the layout into several smaller parts. All elements that need to be printed together will be placed on the same layout. Some parts may be rotated to fit the chart. When splitting using this method, each small chart will be of a different size. If you want to make all the charts to be of the same size, you can set the preferred dimensions using the **Chart Size** option.

   Note: This is the behaviour only when the **Chart Size** options are locked. If the chart size is manually changed, the layout might get affected. Check the **Chart Size** section to know more about how the chart layout changes when chart size is modified.

Tip: You can see the dimensions of the layout at the bottom of the preview.

c) If you want your test chart to be mirrored, select **Mirror Image**.

The chart preview is adjusted to reflect your selection.

d) If desired, you can also choose to **Add default bearer bars and slur marks**.

The bearer bars will support the plate while printing, and the slur marks are a small pressure sensitive pattern that will help you check if the amount of pressure applied is correct.

Note: Adding these makes the chart slightly bigger. You can see the **Chart Size** above the chart preview.

e) Click **Save Chart**, and browse to your desired location.

2. On the **Check Plates** screen, verify the plate quality by testing the **Dot Fail**

To **Check Dot Fail**, you need to check the quality of the individual dots.

Tip: For each step, click the *Learn more about evaluating this area* link to open a document with more information and guidelines.

If the quality is good, click the green check mark and continue to the next step.

If it isn't, click the red cross. In this case you need to troubleshoot the problem that is causing the low quality dots and evaluate the dots again.

Note: The **Next** button will be disabled if you reject the plate quality.

3. Once you're satisfied with the plate quality, print the test chart using the setup that you described.

Note:

To make sure the screens and curves that will be created are accurate for your production process, your measurement data needs to be representative of your complete print run.

We therefore recommend that:

- you print another 50 to 100 meters (or more if this better reflects your production) after the press has reached your regular quality,
- you select 5 (or at least 3) copies in that "regular quality" print run: from the beginning, the middle and the end.

4. The **Verify Print Quality** screen guides you in checking the print quality of your test chart's key areas.

You need to evaluate each area of the chart that is marked with a blue question mark on screen.

Tip: For each step, click the *Learn more about evaluating this area* link to open a document with more information and guidelines.

a) In the **Check Slur Marks** step, you need to check whether the slur marks printed correctly.

The slur marks are pressure sensitive, and the pattern will not look correct if there is either too little or too much pressure applied during printing. For example, you may have missing lines if there is too little pressure, or missing white space between the lines if there is too much pressure. The lines may also look wavy instead of straight, or smudged.

If the slur marks look good, click the green check mark and continue to the next step.

If they don't, click the red cross. In this case you need to troubleshoot the pressure problem, print a new test chart, and evaluate the slur marks again.

b) In the **Check Lines** step, you need to check whether the different line thicknesses printed correctly.

This is to make sure that any barcodes in your print jobs will be printed correctly.

If the lines look good, click the green check mark and continue to the next step.

If they don't, click the red cross. In this case you need to troubleshoot the problem, print a new test chart, and evaluate the lines again.

c) In the **Check Fluting** step, check whether you can see the fluting pattern coming through the printed image.

If this is the case, there is too much pressure applied during printing.

If the image looks good (you cannot see the fluting pattern through it), click the green check mark.

If you can see the fluting pattern, click the red cross. In this case you need to troubleshoot the pressure problem, print a new test chart, and evaluate again.

d) When you have found that all areas are satisfactory, click **Next**.

Choosing a Screen

On the **Choose Screen** step, you need to choose the best screen to use for your ink(s), and the best surface screening for your solids. The right surface screening pattern will give you a good ink coverage while optimizing your ink usage. Some inks may not need a surface screening pattern.

1. Choose the best surface screening.

Note:

- If you are following the guided procedure, you need to evaluate the screens on your printed test chart.

  Click the **Learn more about choosing surface screening for corrugated** link to open a document with more information and guidelines.

- If you are copying another ink's properties and screen, it will be already filled in, but you can change it if desired.

- If you already know the screen to use (for example you received it from an external plate maker), you can just fill it in.

a) In the **Surface Screening** list, select the option that gives you the best result for your printed solids.

All options are surface screening patterns, except **(A) Solid**, which prints the solid as it is, without surface screening.

b) Enter the **Solid Density** for your chosen surface screening pattern.

By default, the density unit is set to **ANSI A**, but you can change it as desired.

2. Choose the best screening dot.
   a) Compare the dots used in the 4 series of patches at the bottom of your chart, and choose the one giving the best result (this can be **Round**, **Circular**, **Double Circular** or **Elliptical**).
   b) If desired, you can also enter a **Description** (for example, of the result obtained with your chosen dot versus other ones).
3. Click **Finish**, and your screen will be created (in *your screens database*).

You can now see your ink's properties and screen summarized in the **Press Inks** table.

Modifying Inks

Once you *added some inks* (you defined ink properties and chose a screen for either all "default" inks, or certain specific inks), you can change those properties later if needed.

1. In the **Press Inks** table, select the ink you want to modify and click **Modify Ink...** (you can also double-click the ink).
   This opens the **Modify Ink** wizard.
2. On the **Choose Workflow** screen, choose a method of entering properties and choosing a screen:
   - In most cases, we recommend that you follow the guided procedure that will help you analyze a printed test chart to find the best screen: select **Analyse a print to find the best screen**.
   - If you have already used the guided procedure for another ink and you want to set properties and choose a screen for a new, but similar ink, you can select **Copy screen and printing condition properties from another ink**.

     In this case, click **Select** in the **Reference Ink** field, and select the ink which properties and screen you want to copy.
   - If you already know the best screen to use for the ink you are working with (for example if you received screening settings from an external plate maker), you can select **Define screen and printing condition properties manually**.
3. On the **Define Printing Condition Properties** screen, the properties of your ink(s) are filled in. Modify them as desired.

   See *Defining Ink Properties* on page 180 for more information.

Tip:

From this point onwards, you can use the **Quit Now and Continue Later** button if you need to stop, save your progress, and resume the wizard later. Make sure you click **Yes** in the pop-up asking whether you want to save your work and close the wizard.

When you are ready to resume your work, you will see an unfinished task icon on the **Add Inks...** button. When clicking either **Add Inks...** or **Modify Inks...**, you will be asked whether you want to continue your unfinished wizard session. Click **Yes**.

You can also choose to start a new wizard session instead, but you will not be able to save two unfinished wizard sessions (the second one will overwrite the first one).

4. If you are following the guided procedure (you selected **Analyse a print to find the best screen** on the *Choose Workflow* screen), you now need to print a test chart, and evaluate it.

   See *Printing and Evaluating a Test Chart* on page 181.

5. On the **Choose Screen** screen, you can select a different surface screening pattern if desired, and fill in/edit the **Description**.

   See *Choosing a Screen* on page 183 for more information.

6. Click **Finish** when you are done editing your ink.

You can now see your ink's updated properties and screen summarized in the **Press Inks** table.

The **Description for selected ink** at the bottom shows the description you're entered when choosing your screen.

Defining Ink Properties

On the **Define Printing Condition Properties** screen, enter the properties of your ink(s).

Note: If you have chosen the **Copy screen and printing condition properties from another ink**, the properties will already be filled in, but you can still change them if needed.

1. Under **Ink Properties**:

   - Enter the manufacturer of the ink (**Brand**).
   - Select the **Type**: **Solvent**, **Water-based** or **UV curable**.
   - Enter the **Viscosity** in seconds.

   You can measure an ink's viscosity using an efflux cup. The viscosity is the number of seconds it needs to flow through the hole at the bottom of the cup until the cup is completely empty (very viscous inks need longer). Some newer press models can measure this automatically (electronically).

   Note: The ink's viscosity affects how well it transfers onto your substrate, and can change depending on ambient temperature and time (for example when the solvent in a solvent based ink starts evaporating).

2. Under **Anilox Properties**:

   - Enter the manufacturer of the anilox (**Brand**).

- Enter the anilox **Type**.
- Enter the anilox' **Line Screen** in lines per inch (this is the number of cells per linear inch).

  A higher line screen is used for finer detail, while a lower one will transfer a heavier layer of ink.
- Enter the **Angle** of engraving (relative to the anilox axis) in degrees. This is typically 30°, 45° or 60°.
- Enter the anilox' **Cell Volume** (the ink capacity of each engraved cell) in billion cubic microns (BCM).

  Note:

  The cell volume of an anilox roll can change over time, due to wear, damage and "plugging" (dried ink residues at the bottom of the cells).

  Plugging can happen when solvent or water-based ink is not cleaned immediately after using the anilox and dries in (UV curable ink will not dry on its own).

3. Specify the **Tape Properties** by entering the manufacturer of the tape (**Brand**).

   Note: We recommend to also add the tape hardness in the same field.

Printing and Evaluating a Test Chart

After *entering your ink properties*, you now need to print and evaluate a test chart to find the best screen for your selected ink.

Note: This is only applicable if you are following the guided procedure (you selected **Analyse a print to find the best screen** at the start of the wizard).

1. On the **Save Test Chart** screen, save the LEN file that you will use to print your test chart.

   This LEN file will have the resolution you entered in the *Plate Making parameters*.

   a) Customize the dimensions of the chart using the **Chart Size** option.

   Unlock the **Chart Size** option by clicking on the and set your preferred **Width** and **Repeat Length**.

   If the preferred dimensions are higher than what is needed to print all the parts in a single chart, and the layout is set as:

   - **Complete Calibration Chart** then the parts will be placed in a single chart with blank space at the top or sides.
   - **Split Calibration chart parts** then the layout will be changed to **Complete Calibration Chart** and all the parts will be placed on a single chart.

   If the preferred dimensions are lower than what is needed to print all the parts in a single chart, and the layout is set as **Complete Calibration Chart** then the layout will be changed to **Split Calibration chart parts** and all the split charts will be of the preferred size.

Note: If the preferred size is lower than the dimensions needed to print the split charts, then the size will be automatically set to the minimun size required to print the split charts.

Tip: You can see the dimensions of the layout at the bottom of the preview.

b) Customize the layout of the chart using the various **Layout** options.

- **Complete Calibration Chart** will place all different parts that need to be printed in a single chart. The chart size will be minimum width and length required to fit all the parts in a single chart.
- **Split Calibration chart parts** will automatically split the layout into several smaller parts. All elements that need to be printed together will be placed on the same layout. Some parts may be rotated to fit the chart. When splitting using this method, each small chart will be of a different size. If you want to make all the charts to be of the same size, you can set the preferred dimensions using the **Chart Size** option.

Note: This is the behaviour only when the **Chart Size** options are locked. If the chart size is manually changed, the layout might get affected. Check the **Chart Size** section to know more about how the chart layout changes when chart size is modified.

Tip: You can see the dimensions of the layout at the bottom of the preview.

c) If you want your test chart to be mirrored, select **Mirror Image**.

The chart preview is adjusted to reflect your selection.

d) If desired, you can also choose to **Add default bearer bars and slur marks**.

The bearer bars will support the plate while printing, and the slur marks are a small pressure sensitive pattern that will help you check if the amount of pressure applied is correct.

Note: Adding these makes the chart slightly bigger. You can see the **Chart Size** above the chart preview.

e) Click **Save Chart**, and browse to your desired location.

2. On the **Check Plates** screen, verify the plate quality by testing the **Dot Fail**

To **Check Dot Fail**, you need to check the quality of the individual dots.

Tip: For each step, click the *Learn more about evaluating this area* link to open a document with more information and guidelines.

If the quality is good, click the green check mark and continue to the next step.

If it isn't, click the red cross. In this case you need to troubleshoot the problem that is causing the low quality dots and evaluate the dots again.

Note: The **Next** button will be disabled if you reject the plate quality.

3. Once you're satisfied with the plate quality, print the test chart using the setup that you described.

Note:

To make sure the screens and curves that will be created are accurate for your production process, your measurement data needs to be representative of your complete print run.

We therefore recommend that:

- you print another 50 to 100 meters (or more if this better reflects your production) after the press has reached your regular quality,
- you select 5 (or at least 3) copies in that "regular quality" print run: from the beginning, the middle and the end.

4. The **Verify Print Quality** screen guides you in checking the print quality of your test chart's key areas.

   You need to evaluate each area of the chart that is marked with a blue question mark on screen.

   Tip: For each step, click the *Learn more about evaluating this area* link to open a document with more information and guidelines.

   a) In the **Check Slur Marks** step, you need to check whether the slur marks printed correctly.

      The slur marks are pressure sensitive, and the pattern will not look correct if there is either too little or too much pressure applied during printing. For example, you may have missing lines if there is too little pressure, or missing white space between the lines if there is too much pressure. The lines may also look wavy instead of straight, or smudged.

      If the slur marks look good, click the green check mark and continue to the next step.

      If they don't, click the red cross. In this case you need to troubleshoot the pressure problem, print a new test chart, and evaluate the slur marks again.

   b) In the **Check Lines** step, you need to check whether the different line thicknesses printed correctly.

      This is to make sure that any barcodes in your print jobs will be printed correctly.

      If the lines look good, click the green check mark and continue to the next step.

      If they don't, click the red cross. In this case you need to troubleshoot the problem, print a new test chart, and evaluate the lines again.

   c) In the **Check Fluting** step, check whether you can see the fluting pattern coming through the printed image.

      If this is the case, there is too much pressure applied during printing.

      If the image looks good (you cannot see the fluting pattern through it), click the green check mark.

      If you can see the fluting pattern, click the red cross. In this case you need to troubleshoot the pressure problem, print a new test chart, and evaluate again.

   d) When you have found that all areas are satisfactory, click **Next**.

Choosing a Screen

On the **Choose Screen** step, you need to choose the best screen to use for your ink(s), and the best surface screening for your solids. The right surface screening pattern will give you a good ink coverage while optimizing your ink usage. Some inks may not need a surface screening pattern.

1. Choose the best surface screening.

   Note:

   - If you are following the guided procedure, you need to evaluate the screens on your printed test chart.

     Click the **Learn more about choosing surface screening for corrugated** link to open a document with more information and guidelines.

   - If you are copying another ink's properties and screen, it will be already filled in, but you can change it if desired.

   - If you already know the screen to use (for example you received it from an external plate maker), you can just fill it in.

   a) In the **Surface Screening** list, select the option that gives you the best result for your printed solids.

      All options are surface screening patterns, except **(A) Solid**, which prints the solid as it is, without surface screening.

   b) Enter the **Solid Density** for your chosen surface screening pattern.

      By default, the density unit is set to **ANSI A**, but you can change it as desired.

2. Choose the best screening dot.

   a) Compare the dots used in the 4 series of patches at the bottom of your chart, and choose the one giving the best result (this can be **Round**, **Circular**, **Double Circular** or **Elliptical**).

   b) If desired, you can also enter a **Description** (for example, of the result obtained with your chosen dot versus other ones).

3. Click **Finish**, and your screen will be created (in *your screens database*).

You can now see your ink's properties and screen summarized in the **Press Inks** table.

5.5. Creating a Printing Condition for High Quality Post Print Corrugated

If you are printing on corrugated material (for example packaging cardboard), you should create a printing condition for **Corrugated**.

Note: To create a printing condition for High Quality Post Print Corrugated, you need to have the corresponding license.

1. In the **Printing Conditions** library, click the **New Printing Condition** button in the bottom toolbar.

2. In the **New Printing Condition** dialog:
   a) Enter the **Printing Condition Name** you want to use.

      We recommend you use a descriptive name, that includes some of your workflow's key settings, for example `Press Type - Plate Type - Substrate`.
   b) In **Application** (the application of your flexo printing workflow, so the type of jobs and substrates that you usually work on), select **Corrugated**.

      This is meant for **post-print** production, where you print directly onto the final corrugated material (as opposed to **pre-print**, where you print onto a substrate which is then laminated to the final product).
   c) In **Board Liner**, select the type of corrugated material you are printing on.

      The application supports:

      Brown Kraftliner
      White Top Kraftliner
      White Coated Kraftliner
      Brown Test Liner
      Brown Kraft Top Liner
      White Top Test Liner Uncoated
      Mottled Test Liner
      White Top Test Liner Coated
   d) Select the **Print Production Method** you are using.

      - If you print in multi color (CMYK or more), and with high quality images on your corrugated material, select **High Quality Post Print (solids & halftone)**. This is typically used with:

        primary packaging
        low fluting board grades
        lower volume aniloxes

      - If you only print solids, in one or more spot colors, but no screened images, select **Standard Post Print (solids only)** instead. This is typically used with:

        recycled board liners
        higher fluting profiles
        softer plates
        higher volume aniloxes

        See *Creating a Printing Condition for Standard Post Print Corrugated* on page 171.
   e) When using the **High Quality Post Print (solids & halftone) Print Production Method**, select your **Ink Set**.

      You can choose **CMYK**, or CMYK plus 1, 2 or 3 inks (to choose from **Red**, **Orange**, **Green**, **Blue** and **Violet**).
   f) Click **OK**.

      This creates your printing condition and saves it to the printing conditions database.
3. The printing condition editor opens, showing your printing condition's configuration steps.

   Complete all configuration steps as explained in *Configuration Steps for High Quality Post Print* on page 191.
4. After finishing the last configuration step, you can:

- Have a final look at the parameters and screen(s) of the printing condition: see *Reviewing the Printing Condition* on page 227.
- Create a detailed report of the printing condition: see *Saving a Report* on page 287.

Over time, as your equipment ages and your production fluctuates, you may need to adapt your printing condition, see *Editing a High Quality Corrugated Printing Condition* on page 260.

5.5.1. Configuration Steps for High Quality Post Print

The Printing Condition Editor

When you open a printing condition for editing, a banner at the top displays the status of the printing condition and a brief description of the selected configuration step.

Below the banner you see an overview of all configuration steps for *High Quality Post Print (solids & halftone)*.

Under PROPERTIES	Under CALIBRATE
• *General* • *Plate Making* • *Board* • *Ink Set and Printing Standard* • *Press*	*Printing*

To navigate between the configuration steps, you can either:

- select a configuration step,
- click the navigation arrows on the left and right of the pane: < >

Unfinished printing conditions have an indicator next to each step:

- ✔ : all mandatory parameters are filled in,
- ✱ : you still need to fill in some or all mandatory parameters,
- ⊖ : this configuration step is not available until some mandatory parameters in previous steps are filled in.

Filling in Parameters

- Mandatory parameters in the configuration steps are marked with an orange star ✱. After filling them in they get a green check mark ✔. They need to all be green before the configuration step is marked as completed.
- Some of the steps depend on mandatory parameters from previous steps. If you change a mandatory parameter, you will need to redo any step depending on it.

Note:

You cannot edit any of the selection lists in the printing condition (for example substrate type, plate type...). Only parameters that have been tested and approved can be selected.

For some parameters, what you can select depends on:

- your license,
- what you have selected in previous steps (for example, you can only select between types of optics that are available on the model of CDI you have entered).

Pausing and Resuming Your Work

At any point in the process you can stop working on your printing condition and continue later. Use the **Save and Close** or **Quit Now and Continue Later** buttons (depending on where you are in the configuration).

If you are asked to confirm whether to save your work and close, don't forget to click **Yes**.

When you are ready to continue, open the printing condition by right-clicking it and selecting **Open**, or by double-clicking on it. The first step that is incomplete will automatically be selected, to remind you where to continue.

If you want to remove your latest modifications in the printing condition, click the **Revert** button in the bottom tool bar. Be aware that **all modifications** until the latest save action will be removed.

We recommend to regularly save changes (for example after every step) to make better use of **Revert** and avoid unnecessary loss of time and data.

After You Are Done

When you open a finished printing condition, the interface will be a little different. See *Reviewing the Printing Condition*.

General

The required **General** parameters are pre-filled in, but you can still add information if desired.

1. The **Application** is the one you chose in the *New Printing Condition dialog*. It can no longer be changed.
2. The **Print Production Method** is also the one *you selected*.
3. If desired, you can add a **Description** (to help you tell this printing condition apart from other similar ones you might be using).
4. You can also add (or remove) **Keywords**.

Note: Keywords added via the Printing Conditions Explorer will also be visible here. See the **Keywords** chapter in *the Color Pilot user guide*.

Plate Making

In this configuration step, you need to specify what Flexo plates you use, and the way the plates are made (imaged, exposed, and developed).

1. Select your **Imager Type**:
   - **CDI Crystal**: the new generation of Esko imager, using the Crystal technology

- **CDI Spark**: an older generation of Esko imager

See *CDI Imagers* for information about Esko's different CDI models.

2. Select your **Optics**:

- For **CDI Crystal**:
  - Optics40 V2
  - Optics80 V2
  - Optics100 V2
  - Optics40 V3
  - Optics80 V3
  - Optics100 V3
  - Optics40 V3+
  - Optics80 V3+
  - Optics100 V3+
- For **CDI Spark**:
  - Optics15
  - Optics25
  - Optics40
  - Optics80
  - Optics40 V2
  - Optics80 V2
  - Optics100 V2
  - Optics40 V3
  - Optics80 V3
  - Optics100 V3
  - Optics40 V3+
  - Optics80 V3+
  - Optics100 V3+

Tip: If you don't know your CDI's optics technology, you can find it in the tables below (it is linked to its maximum imaging speed).

Table: CDI Spark (Models 2530, 4835, 4260, 5080, and 5080-C)

Maximum Imaging Speed	Optics Technology
1.5 m^2/hr	**Optics 15**
2.5 m^2/hr	**Optics 25**
4 m^2/hr	**Optics 40**, **Optics 40**, **Optics 40 v3** or **Optics 40 v3+**
8 m^2/hr	**Optics 80**, **Optics 80 v2**, **Optics 80 v3** or **Optics 80 v3+**(depending on the model)

Maximum Imaging Speed	Optics Technology
10 m^2/hr	**Optics 100 v2**, **Optics 100 v3** or **Optics 100 v3+**

Table: CDI Crystal (Models 4835 and 5080)

Maximum Imaging Speed	Optics Technology
4 m^2/hr	**Optics 40 v2**, **Optics 40 v3** or **Optics 40 v3+**
8 m^2/hr	**Optics 80 v2**, **Optics 80 v3** or **Optics 80 v3+**
10 m^2/hr	**Optics 100 v2**, **Optics 100 v3** or **Optics 100 v3+**

3. Choose a **Resolution** of either **2400** or **2540** ppi.

   The **Resolution** you can use depends on your *Print Production Method*, **Imager Type** and **Optics**:

Standard Post Print	High Quality Post Print
• When working with a **CDI Crystal** with **Optics 100 v2**, you can only use the higher resolution, **2540** ppi. • When working with a **CDI Crystal** with lower optics, you can select either **2400** or **2540** ppi. • When working with a **CDI Spark**, you can select either **2400** or **2540** ppi.	You can only use the higher resolution, **2540** ppi (for both imager types and all optics).

4. Select your **Exposure Type**:
   - **XPS** Crystal: an Esko device that simultaneously exposes the front and back of the plate, using UV LEDs.
   - **Bank**: a non-Esko exposure device, that can be an analog or a digital device.

   Note: The exposure types available here depend on your license.

5. In **Description**, you can add information about your exposure devices, for example exposing times, what device (if you own several exposing devices of the same type) ...

   You can also add all other information that could not be specified in the default fields, and that is important to identify how the plates are created.

6. Select your **Plate Type**.

   A wide range of plate types from different manufacturers is available. All plates in the list are suitable for corrugated printing, and tested and approved by Esko, to be able to guarantee a minimum quality.

   In the future more plate types could be added. Contact Esko support if your plate type is not in the list.

7. Select your plate's **Thickness** if desired.

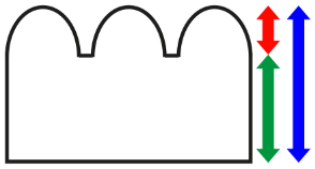
Depending the plate type you selected, you will have a fixed list of plate thicknesses. Only plate thicknesses that are tested and approved by Esko will be available.

In the future more plate thicknesses could be added. Contact Esko support if your plate thickness is not in the list.

8. Enter your **Relief Depth** if desired.

   This is the depth of the dots on your plate (or the difference in height between the printing surface and the floor of the plate).

   You can calculate your plate relief depth (in red below) by measuring your plate's thickness (in blue) and subtracting the plate floor's thickness (in green).



Note: To change the units, see *Preferred Units* on page 35.

9. The **Developer** is always set to **Solvent** for plates made for printing on corrugated material.

Board

Define the characteristics of the board material you are printing on.

1. The **Board Liner** is the one you *already selected*.

   However, you can still change it if needed. You can choose one of the following:

   Brown Kraftliner
   White Top Kraftliner
   White Coated Kraftliner
   Brown Test Liner
   Brown Kraft Top Liner
   White Top Test Liner Uncoated
   Mottled Test Liner
   White Top Test Liner Coated

2. Select the type of **Board Fluting** in the material you are using (**A**, **B**, **C**, **E** or **F**).
3. Select the **Board Style**.

   This can be **Single Face**, **Single Wall**, **Double Wall** or **Triple Wall**.

4. If desired, you can add a **Description** (to help you tell this board apart from other similar boards you might be using).

Ink Set and Printing Standard

Define what inks you are using on press, and what targets you want the printed result to match.

1. Select the **Ink Set** you are printing with.

   This can be **CMYK** or an expanded gamut printing ink set (for example **CMYK Orange Green Violet**), where the expanded gamut inks are part of the **ClassicColors** ink book.

   For more information about expanded gamut printing, please see *Equinox and Expanded Gamut Printing* in the Color Pilot documentation.

   Note: The **Ink Set** is already filled in from what you chose in the *New Printing Condition dialog*, but you can still change it here.

2. Select the **Printing Standard** you want to match.

   The printing standard defines:

   - the expected color of the substrate and inks,
   - the target dot gain curves for each printing ink,
   - how to measure tone values.

   By default, this is set to **cmyk_Linear_color** (a linear curve that typically gives good results for corrugated printing), but you can change it as desired. This target data will be used in the *Printing* configuration step .

   Tip: See *What is a Printing Standard* for more information about the different printing standards.

3. In the **Details** table you can see an overview of the inks in your selected ink set.

   For each ink, you can see more information about the target data in your selected standard:

   - the **Desired Curve**,
   - the desired density or tone of the **50%** level,
   - the target **LabCh** values for the **solid** CMYK inks.

Press

Adding information about your press setup is not mandatory, but highly advised.

For every setup it is important to gather as much information as possible, to better understand the conditions of the setup later.

Note: As this configuration step is optional, the indicator is always green ✔

1. Enter the manufacturer name of your press (**Press Brand**).
2. Select your **Press Type**. It can be either:
   - **Central Impression** press: containing a single large-diameter common impression cylinder that supports the substrate as it enters in contact with a series of adjacent plate cylinders.
   - **Stack Press**: in which the substrate passes through multiple color stations which are aligned in one or two vertical stacks).
   - **In-line Press**: in which the substrate passes through multiple color stations which are aligned in a straight horizontal line).
3. Select your **Press Size**.

It is not possible to select a cylinder width, just the category **Wide Web** or **Narrow Web**.

4. Enter your press' **Printing Speed** in sheets per minute.
5. In **Press Inks** you see an overview of the inks in your printing condition, set up in *Ink Set and Printing Standard*.

   For each ink, you can add extra information about the **Ink**, **Anilox** and **Tape** you will use on press:

   a) Select the ink and click the **Modify** button, or double-click the ink.
   b) Specify the **Ink Properties**:

      1. Enter the manufacturer of the ink (**Brand**).
      2. Select the **Type**: **Solvent**, **Water-based** or **UV curable**.
      3. Enter the **Viscosity** in seconds.

      You can measure an ink's viscosity using an efflux cup. The viscosity is the number of seconds it needs to flow through the hole at the bottom of the cup until the cup is completely empty (very viscous inks need longer). Some newer press models can measure this automatically (electronically).

      Note: The ink's viscosity affects how well it transfers onto your substrate, and can change depending on ambient temperature and time (for example when the solvent in a solvent based ink starts evaporating).

   c) Specify the **Anilox Properties**:

      1. Enter the manufacturer of the anilox (**Brand**).
      2. Enter the **Type**.
      3. Enter the anilox' **Line Screen** in lines per inch (this is the number of cells per linear inch).

         A higher line screen is used for finer detail, while a lower one will transfer a heavier layer of ink.
      4. Enter the **Angle** of engraving (relative to the anilox axis) in degrees. This is typically 30°, 45° or 60°.
      5. Enter the anilox' **Cell Volume** (the ink capacity of each engraved cell) in billion cubic microns (BCM).

         Note:

         The cell volume of an anilox roll can change over time, due to wear, damage and "plugging" (dried ink residues at the bottom of the cells). Plugging can happen when solvent or water-based ink is not cleaned immediately after using the anilox and dries in (UV curable ink will not dry on its own).

   d) Specify the **Tape Properties** by entering the manufacturer of the tape (**Brand**).

      Note: We recommend to also add the tape hardness in the same field.

   e) Specify any additional information that might be required under **Other Properties**.
   f) If all your inks have the same properties, you can select **Apply properties to all inks**.
   g) Click **OK**.

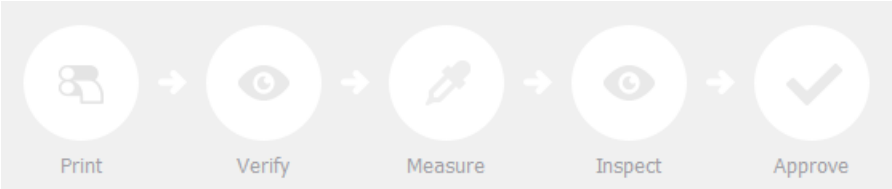
   You can see each ink's parameters in the overview table. You can edit these parameters at any time.

Tip: First, add all data that most inks have in common, by using **Apply properties to all inks**. Then edit the inks individually.

Printing

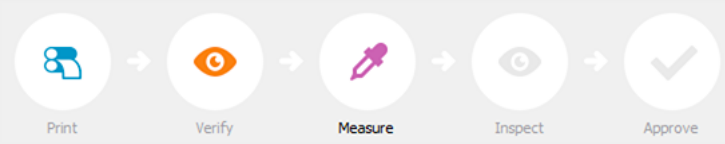
The final configuration step will guide you through the calibration process. You will print and measure a test chart, to determine the best screen and curve to use when printing, so you can get the highest possible quality in production.

The printing calibration consists of 5 steps, displayed in this way:



Note:

When you **Quit to Continue Later**, the completed steps will be colored. The step where you will continue from, is also colored and the text is darkened (**Measure** in the example below):



To continue the configuration, click **Click here to continue calibrating your printing.**

To start the calibration, click **Click here to start calibrating your printing**.

You will see a dialog to choose one of the two calibration methods below.

- **Full calibration (recommended)**: this is a 4 color calibration method available from Print Control Wizard 22.11 onwards.

  It produces custom screens that use the **Crystal V** screening technology, giving finer highlights without graininess.

  Because it's a 4 color calibration, it also calibrates overprints and gray balance towards *your chosen printing standard*.

  We recommend you use this for best results.

  See *Full Calibration* on page 199.

- **Quick calibration**: this is a single color calibration method (this is the method that was available in versions older than 22.11). It also produces **Crystal V** screens, but being single color, it doesn't calibrate overprints or gray balance.

  Note that after doing a quick calibration, you can calibrate additional colors if needed.

See *Quick Calibration* on page 215.

Full Calibration

This is a 4 color calibration method available from Print Control Wizard 22.11 onwards.

It uses produces custom screens that use the **Crystal V** screening technology, giving finer highlights without graininess.

Because it's a 4 color calibration, it also calibrates overprints and gray balance towards *your chosen printing standard*.

We recommend you use this calibration method for best results.

1. In the **Choose Angle and Ruling** step:
   a) Select the **Screen Ruling** used in your production.

      A fixed list of rulings is available (from 85 lpi to 155 lpi). If your ruling is not in the list, choose the closest ruling available.

      If you are using several rulings, you can add additional rulings after you finished the printing condition. See *Add a Ruling* on page 268.
   b) Select the **Angle Set** used in your production.

      You can choose either **Offset**, **Flexo -7.5** or **Flexo +7.5** (these are the same options as the ones available in the Imaging Engine tickets).
   c) In the table below, you can see the angles for your individual inks (taken from the **Angle Set**). You can still change them if desired:

      1. Click the angle you want to change.
      2. Select another angle from the list.

      Note: Some angles are bigger than 90°, this is due to the screening technology used in the Print Control Wizard. The corresponding value in "the 90° zone" is mentioned between brackets, you can make your selection based on this value.

      3. The **Angle Set** is now set to **<Custom>**.
2. Choose either:

   - **Full ink-set print-run and measurements (recommended)**: select this option to print and measure charts. The wizard will guide you step by step.

     Note:

     Dot gain and highlights are very specific to individual certain press/ink/substrate combinations.

     Even if your printing condition is very similar (for example the same inks and substrate, but a different press), we highly recommend to print and measure the charts.

     If the results are very similar to another printing condition, you can still decide to use the same settings for both printing conditions.

See *Full Ink Set Print Run and Measurements* on page 200.

- **Manually select screens and use default adjustment curves**: select this option if you know what settings to select for the highlights in your screen. The software will select default dot gain compensation curves for all inks.

  See *Manually Select Screens and Use Default Adjustment Curves* on page 213.

  Note: You can still edit the curves later: see *Update the Curves* on page 260.

After finishing your calibration, you can *review your printing condition parameters* and *save a report* if desired.

You can find your new printing condition for High Quality Post Print corrugated is in the *Printing Conditions Explorer*, your new screen in the *Screens Explorer*, and your new curves in the *Curves Explorer*.

Full Ink Set Print Run and Measurements

Select the **Full ink-set print-run and measurements (recommended)** option to print and measure charts. The wizard will guide you step by step.

Note:

Dot gain and highlights are very specific to individual certain press-ink-substrate combinations.

Even if your printing condition is very similar (for example the same inks and substrate, but a different press), we highly recommend to print and measure the charts.

If the results are very similar to another printing condition, you can still decide to use the same settings for both printing conditions.

1. In the **Select Screen Defaults** step, choose the **Surface Screening** and **Screen Dot Shape** to use in the test chart.

   Some widely used values are pre-selected (**Solid** as **Surface Screening** and a **Round Screen Dot Shape**), but you can change them as desired.
2. In the **Print Chart** step, customize your test chart as desired, then save it and pint it.

   See *Creating Test Chart* on page 201.
3. Evaluate the quality of your plate.

   See *Checking the Plate Quality* on page 203.
4. Evaluate the quality of your printed chart.

   See *Checking the Print Quality* on page 204.
5. Measure the chart to find the best screen and curve.

   See *Measuring the Chart* on page 72.
6. Evaluate the highlights on your chart to find the best highlights settings.

   See *Evaluating the Highlights* on page 75.
7. Select the screen and curve to use for non-calibrated colors.

   See *Choosing the Spot Colors' Printing Settings* on page 78.
8. Compare your results to your *printing standard*.

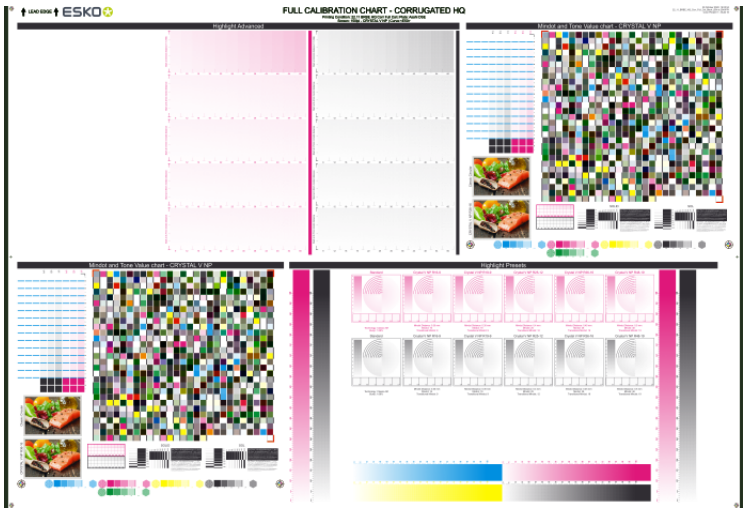
See *Checking the Solids and Overprints* on page 211.

9. When you are done, the wizard will generate your custom screens and curves, based on your production settings.

Creating Test Chart

In the **Save Test Chart** step, customize your test chart as desired and save it.

The application shows a preview of the Corrugated High Quality test chart in your chosen ink set. When you customize the chart, the preview is updated automatically to reflect your changes.



Use the various **Chart Options** to customize your test chart to fit your press needs.

1. Customize the dimensions of the chart using the **Chart Size** option.
   a) Unlock the **Chart Size** option by clicking on the
   b) Set your preferred **Width** and **Repeat Length**.

   If the preferred dimensions are higher than what is needed to print all the parts in a single chart, and the layout is set as:

   - **Complete Calibration Chart** then the parts will be placed in a single chart with blank space at the top or sides.
   - **Split Calibration chart parts** then the layout will be changed to **Complete Calibration Chart** and all the parts will be placed on a single chart.

   If the preferred dimensions are lower than what is needed to print all the parts in a single chart, and the layout is set as **Complete Calibration Chart** then the layout will be changed to **Split Calibration chart parts** and all the split charts will be of the preferred size.

   Note: If the preferred size is lower than the dimensions needed to print the split charts, then the size will be automatically set to the minimun size required to print the split charts.

Tip: You can see the dimensions of the layout at the bottom of the preview.

2. Customize the layout of the chart using the various **Layout** options.
   - **Complete Calibration Chart**will place all different parts that need to be printed in a single chart. The chart size will be minimum width and length required to fit all the parts in a single chart.
   - **Split Calibration chart parts**, the layout will automatically be split in several smaller parts. All elements that need to be printed together will be placed on the same layout. Some parts may be rotated to fit the chart. When splitting using this method, each small chart will be of a different size. If you want to make all the charts to be of the same size, you can set the preferred dimensions using the **Chart Size** option.

   Note: This is the behaviour only when the **Chart Size** options are locked. If the chart size is manually changed, the layout might get affected. Check the **Chart Size** section to know more about how the chart layout changes when chart size is modified.

   Tip: You can see the dimensions of the layout at the bottom of the preview.

3. **Mirror Image**: select this for reverse printing.
4. **Add default bearer bars, slur marks and registration marks**: the bearer bars help with the print stability, the slur marks help you check the print quality, and the registration marks help you check the registration of the different separations.
5. **Add a custom element**: if you want to add an image or a technical element to the chart, for example to check the quality with something you use frequently.
   a) Click **Browse...**
   b) Browse to the location of the file.
   c) Click **Open**.

   Note:
   - The element needs to be a `.ct` file (Esko native image file format).
   - Use the free CT/LP plug-in from Esko in Adobe® Photoshop® to create `.ct` files from your element(To download the free plug-in, search for 'CT/LP plug-in' on *esko.com*).

     If you are using Full Calibration, save the Photoshop document with CMYK or Multichannel imaging modes. Spot-channels will only be included if Multichannel mode is used. So to write a CMYK file with an extra spot channel, convert it to multichannel mode before saving it as a `.ct` file.
   - The `.ct` files cannot contain multiple layers. When the Photoshop document has multiple layers, merge all layers into a single layer before saving it as `.ct`.
   - You can only add one element. If you want to add several elements, you first need to group them in Adobe® Photoshop®.

6. Save the chart:
   a) Click **Save Chart**.
   b) Browse to your desired folder.
   c) Specify a **File name** for your chart.

d) Select the **File Type** you want to save: **LEN** or **Tiff**.

> **Note:**
>
> In most cases, we recommend you save the file as a **LEN** file, and use it directly on the CDI.
>
> However, if you want to edit it to add extra elements specific to your production (different bearer bars for example), you should save it as **Tiff**, but make sure **you don't change** any of the technical elements! Please see *this knowledge base article* to know more about editing charts.

e) Click **Save**.

It could take several minutes to create the file.

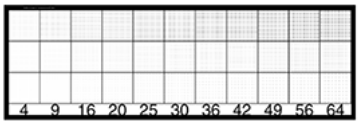
> **Note:** If you change any parameter in your printing condition, **always** create a new chart, to make sure you have the correct elements for your printing condition in your chart (as the chart is based on numerous parameters from the previous steps like application, dot shape, surface screening...).

7. **Image the plates** on your CDI according to your company's Standard Operating Procedures, AND using the settings specified in the previous steps.
8. On the imaged, exposed and processed plate, you can *check the plate quality*.

Checking the Plate Quality

In the **Check Plates** step, you need to check the dot fail test

Click **Learn more about evaluating this area** to open documents with guidelines on how to evaluate these elements. You can find: evaluation guidelines for the dot fail test in the *Standard Operating Procedure for verifying plate quality*.



Check the **Dot Fail** test on the plate as follows:

a) Use a magnifying glass.
b) Check the center and lower row.
c) The smallest number where all dots are in position gives the resulting value.
d) Verify all elements on the plate.
e) Compare your result to the value that was found as good quality during the CDI's installation. This should be the same value you used during the *plate and press calibration*.
f) **Accept** ✓ if the result matches the reference, or **Reject** ✗ if the result doesn't match.

   If the result doesn't match, you need to troubleshoot the problem that is causing the low quality dots, remake the plate and evaluate the dots again.

Once you are satisfied with the plate quality, print a few copies of the chart and move on to *check the print quality*.

Note: The **Next** button will be disabled if you reject the plate quality.

Checking the Print Quality

Make a Print using the plates, according to the settings you entered in the printing condition and your company's Standard Operating Procedures.

Note:

To make sure the screens and curves that will be created are accurate for your production process, your measurement data needs to be representative of your complete print run.

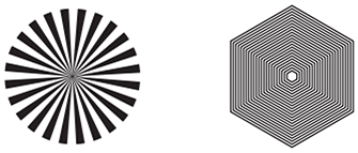
We therefore recommend that:

- you print another 50 to 100 meters (or more if this better reflects your production) after the press has reached your regular quality,
- you select 5 (or at least 3) copies in that "regular quality" print run: from the beginning, the middle and the end.

Once you've printed a few copies of your chart, check the slur marks, and the registration marks in the **Verify Print Quality** step.

Click **Learn more about evaluating this area** to open a *document with guidelines* on how to evaluate these elements.

1. Check the slur marks.



   a) Use a magnifying glass.
   b) Follow the guidelines in the Standard Operating Procedure (click *Learn more about evaluating this area* to access it).
   c) Make sure that all relevant marks on the print are good.
   d) Verify all copies.
   e) Back in the wizard, Accept or Reject the quality of the slur marks:

      - click **Accept** if you are satisfied with the quality of the slur marks,
      - click **Reject** if you aren't.

        If the marks on one or more copies are not satisfactory, find other copies of the test chart to evaluate (for example from around 30 m on the same run).

        If only one copy (or none) is good, troubleshoot with the press operator and reprint.

2. Check the **Registration marks** on the print:

a) Check the registration marks on the print using the same guidelines as for the slur marks.

b) **Accept** or **Reject** the quality of the registration marks.

Once you are satisfied with the print quality, you can move on to *measuring the chart* to find the best screen and curve.

Note: The **Next** button will be disabled if you reject the quality of the slur marks or registration marks.

Measuring the Chart

1. **Measure** the **Mindot Chart**.

   This will be used to determine the screen for the highlights.

   The Magenta printed part will be used for CMY, the Black printed part for K.

   If your selected ink set contains one or more extra inks (for example OGV), the first ink will be added to the chart, and will be used for these extra inks. For example if the ink set is CMYKOG, Orange will be added to the chart.

   a) Cut out the chart from your first copy.

   b) The chart can be read in patch or scan mode by an X-Rite i1 Pro or X-Rite i1iO. No other measurement devices are supported.

   To measure with the i1 Pro, it is advised to cut off the text before each row.

   c) With the cogwheel ( ) on the bottom right, you can stop, calibrate and reconnect your measurement device, change the measurement mode and the measurement condition.

   See the **Using a Spectrophotometer** chapter in the *Color Pilot user guide*.

   d) To know how to measure the chart with your measurement device, follow the instructions on the bottom left above the icons .

   The preview will show the instructions and the measurement progress.

   Tip:

   After you are done measuring a page, you can save the measurement data as a measurement file if desired (in the CGATS - Committee for Graphic Arts Technologies Standards - color measurement format):

   - Go back to the page you have just measured using the back arrow.
   - Click the cogwheel ( ) at the bottom right and select **Save measurement...**
   - Choose a location to save your measurements file (with the `.txt` extension).

Tip:

Alternatively, if you had already measured your chart and saved the measurement, you can load your measurement file instead of re-measuring it here.

1. Make sure that your measurement file is a CGATS (Committee for Graphic Arts Technologies Standards color measurement format) file, with the `.it8`, `.txt` or `.cgats` extension.
2. Click the cogwheel ( ) at the bottom right and select **Load Measurement...**

2. Check the **Measurement Results**.
   a) Check the preview: the upper and lower part of the patches should have approximately the same color.

Note:

The comparison of measurements (upper part) and the standard (lower part) is a rough approximation. Only look for clear differences:

- completely different color: for example wrong row measured, chart upside down.
- the same color, but a very big difference in lightness: for example not printed correctly, issue with the measurement device.

   b) **Accept** or **Reject** .

   If your measurement is ok, you can continue to the next step.

   If you rejected the measurement result, you will be guided to measure again, following this same procedure.

   This could be the same chart (wrong row, chart upside down), or a different chart from the print run.
3. On the next wizard screen, measure the **Tone Value Chart**.
   - This will be used to create the dot gain compensation curves.
   - The chart will contain all inks from your selected ink set.

     For example if the ink set is CMYKOGV, the chart will contain CMYKOGV patches.
   - Cut out the chart from the same copy as your mindot chart in the previous steps.
   - The chart can be read in patch or scan mode by an X-Rite i1 Pro or X-Rite i1iO. No other measurement devices are supported.
   - With the cogwheel ( ) on the bottom right, you can stop, calibrate and reconnect your measurement device, change the measurement mode and the measurement condition.

     See the **Using a Spectrophotometer** chapter in the *Color Pilot user guide*.
   - To know how to measure the chart with your measurement device, follow the instructions on the bottom left, above the icons .

     The preview will visualize the instructions and the measurement progress.

4. Check the **Measurements Results**.
   a) Check the preview, the upper and lower part of the patches should have approximately the same color.

      After the first measurement you can compare your measurement to the standard. After the measurement of your 2nd, 3rd... copy, you can also compare to the average and to the other measurements.

      Select what you want to **Compare with** on top of the preview.

      Note:
      - In this step we mainly want to detect if the charts were measured correctly (not upside down, mirrored...)

        If the color in the patch is the same, but there is a big difference in lightness, this is probably not an issue. The dot gain compensation curve created from these measurements will correct for this.

      - Comparing charts among each other could be useful, to detect if some charts are printed very differently. If a chart is an exception, you may not want to include it in your average.

   b) In the **Solid Info** area, to the right of the preview:

      1. Check the measured density of your inks: for each ink, the **Measured Density** should be within tolerance of the **Desired Density**.

         Use the same tolerance as your company uses on press (typically + or - 0,05).

         Select the density standard you use on your measurement device (ANSI A, DIN, ...) from the **Density Formula** list below.

         Note:

         The **Desired Density** is derived from the printing standard you selected in **Ink Set and Printing Standard**.

         We don't show desired density for CMYK inks for standards that use an ICC profile as a standard profile. This is because density calculation requires spectral data, which is not available in ICC profiles.

      2. Check the measured color difference (**ΔE**): for each ink, the ΔE should be within tolerance of the printing standard you selected in **Ink Set and Printing Standard**.

         Select the Delta E formula used in your selected printing standard, from the **ΔE Formula** list below.

      3. Check your inks' color values: select an ink to see its **Desired** and **Measured** LabCh values, with a split patch showing the measured and desired color for this ink.

      Note: We don't show desired density, Lab and ΔE for the OGV inks. There are no standards for these inks, so there is nothing to match.

   c) If everything is OK, click **Accept** and continue.

      Otherwise click **Reject** and measure again.

Note:

In this case, you need to measure both the mindot chart and the tone value chart again. This is because:

- different samples may be printed somewhat differently, so you shouldn't mix print samples,
- if you detect a printing issue on the tone value chart, then it is likely that the complete print sample is not representative, and that your mindot measurement is not that reliable.

5. Select **Measure another sample** if needed.

   To have an accurate and reliable screens and curves creation, it is important that the measurements are an average of a complete print run. Measure minimum 3 charts of good print quality (we advise to use 5).

   You will be guided to measure again, following this same procedure.

   The wizard will indicate how many charts you already measured: sample 1, sample 2...

6. Once you have measured enough charts of good quality, you can select **Stop measuring and inspect the resulting screens**.
7. In the next step, you will need to evaluate the highlights and select the best highlights screening settings.

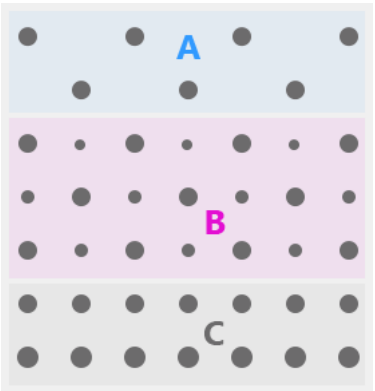
   See *Evaluating the Highlights* on page 75.

Evaluating the Highlights

In the **Select Highlights** wizard step, you need to evaluate and choose the highlight settings that are best for your production, to finish setting up your custom screen and curve.

These settings are:

- The **Mindot** (or minimum dot): the minimum size that a dot can have in the highlights, while printing in a stable and clear way.
- The **Mindot distance**: the maximum distance between these minimum dots, to ensure highlights that print well.
- The **Transitional mindot**: even smaller dots that support the mindots in the transitional areas (between FM screening in the highlights and AM screening in the midtones).



- **A)** In the lightest highlights, there are only **Mindots** (separated by a distance no larger than the **Mindot distance**).
- **B)** As highlights get darker, increasingly smaller dots are added to the spaces between the regular dots.

  Once the screen grid is completely filled, the screen reaches the transition point. The last and smallest dot size added before the transition point is the **Transitional mindot**.
- **C)** In the midtones, the **Transitional mindots** reach the size of the regular **Mindots**, and the screen becomes a standard screen.

You need to define these settings for each ink group used in your print run: CMY, Black and expanded gamut inks.

1. In the **Screen and Curve** table, you can see the details of the screening and curve settings that the wizard created for each ink group, based on your measurements:
   - The **Ink (Group)** that the screening and curve settings are for.
   - The **Screen Name** (generated based on the screening settings).
   - The screen **Code** (you can change this if desired: click **Select** and choose another free screen code from the list shown).
   - The diameter of the **Mindot** in microns or milli-inches.
   - The **Curve Bump**, the smallest input percentage you can print with this screen.

     All smaller percentages are "bumped up" to this value. This data will be included in the curve generated by the wizard.
   - The **Estimated Lightest Tone Value**, the percentage that the smallest input percentage from the **Curve Bump** gives on print.

     This will also be included in the curve.
   - The **Mindot Δ** (mindot distance), the distance between dots at the lightest tone value (the dots with the diameter shown under **Mindot**).
   - The **FM Highlights**, the highlight tones where FM (stochastic screening) is used.

     For example, if the **Curve Bump** is 0.20% and the **FM Highlights** show 2%, this means that:
     - between 0% and 0.20% nothing is printed,
     - between 0.20% and 2% the highlights are printed with FM,
     - tones above 2% are printed with AM.
2. Select an **Ink** or ink group in the table: CMY, Black or expanded gamut inks (the inks here depend on your ink set, for example it can be OGV).
3. You can see an analysis of the mindot chart measurements for this ink (group).

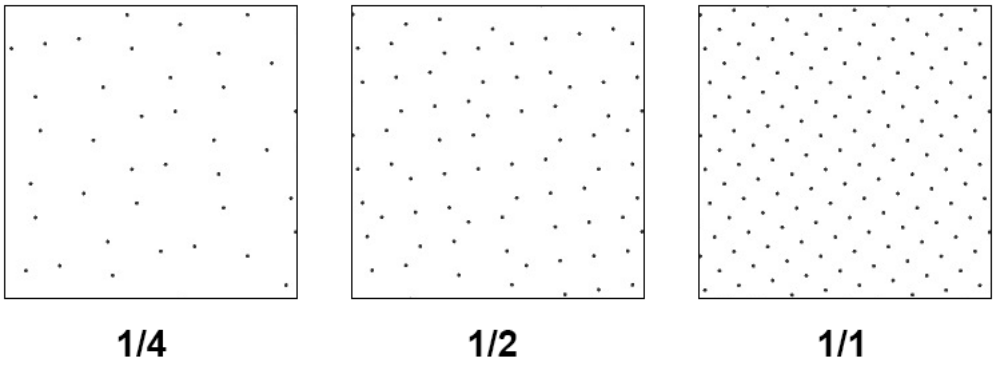
Dot Size (px)	0	6	9	12	16	19	22	25	31	36	42	47	54	60	Solid
Mindot Distance 0.17 mm (1/1)		4,9 ✗	7,1 ✓	9,8	14,2	17,8	21,4	24,8	31,8	37,6	43,8	48,7	56,2	62,3	
0.24 mm (1/2)		2,2 ✗	3,1 ✓	4,9	6,7	7,1	8,9	9,8	13,4	17,0	20,0	22,4	27,1	30,6	
0.34 mm (1/4)		0,4 ✗	1,3 ✗	2,2 ✓	3,1	3,1	4,0	4,9	5,8	7,1	8,0	8,9	11,0	13,4	

For the three **Mindot Distances** on the chart, the wizard shows which **Dot Size** is optimal. This is the smallest mindot size that gives a good print quality.

Note:

The fraction next to the distance indicates the amount of dots used to print the highlights.

- **1/1** means that means that all the dots are kept (the screen doesn't use FM screening).
- **1/2** means that half of the dots are kept (resulting in FM screening).
- **1/4** means that a quarter of the dots are kept (resulting in FM screening). This gives lighter highlights, but may increase graininess.



4. Examine these highlights on the print to decide if you agree with these results.
5. Under **Set Highlight Settings**, choose the best highlight settings for your production process based on what you found.
   a) Select the **Mindot Distance** you typically use for your production.

      If you choose one of the measured distances, you will see **(Measured)** next to it.

      Note:

      The first time you make a printing condition for this *application*, the biggest distance measured from the chart is filled in by default.

      After that, the wizard remembers the **Mindot Distance** you filled in for the previous printing condition for this application and fills it in by default.

   b) Select the **Mindot** that you found to be the best for your mindot distance.

      By default, the mindot size that the wizard found the best for that mindot distance is selected. This can either be a **Measured** mindot size, or a size calculated based on the other measurements (**Estimated**).

      If you choose a different size, you will still see an indication of what the wizard recommends next to **Measured** or **Estimated**.

      Note: The bigger the **Mindot Distance** is, the bigger your **Mindot** needs to be, to give you a stable print.

   c) Select the **Transitional Mindot** based on your visual inspection of the **1/1** row.

By default, the **Transitional Mindot** with a green check mark on the **1/1** line in the wizard is selected.

d) You can see your changes reflected in the **Screen and Curve** table below (for your selected ink or ink group).

6. Repeat these steps for the other ink groups.

Choosing the Spot Colors' Printing Settings

1. On the **Spot Colors** screen, select which separation from your printing condition should be used to set the default screen and curve for your spot colors (= all separations that are not in the ink set).

   The default is **Black**, but you can select any of the inks from the printing condition. Or **<None>**, if your spot colors don't need to use the screen and curve from your printing condition.

2. Click **Next** to generate your custom screens and curves, based on your production settings.

   This can take some time.

Checking the Solids and Overprints

Note: You will only see the **Check Color Differences of Solids and Overprints** wizard screen if you have the corresponding license.

On the **Check Color Differences of Solids and Overprints** wizard screen, you can compare the solids and overprints achieved by your printing condition with the solids and overprints expected by *your printing standard*. This shows you how close you are to your standard in terms of color.

After calibrating your printing setup, you will be able to print **much closer** to your printing standard (when using the settings from your printing condition).

However, in some cases you will not be able to print **exactly** like the printing standard definition, as the printing setup used to create the printing standard may be somewhat different from your own printing setup (for example, the inks may have a slightly different hue, or the substrate may be different...).

If this is the case, you need to decide whether you want to:

- Keep using the printing standard, and accept that there will always be some amount of deviation from the standard when verifying your prints against it.
- Make a profile based on your calibrated printing setup (calibrated to print as close as possible to the standard), and use this profile as printing target instead of the printing standard.

  This way, when verifying future prints, you will check against "the closest your printing setup can get to the standard", and not against a standard that you know you can never match perfectly.

  This also allows you to keep track of how much your printing setup drifts from its best state (the state calibrated by the printing condition). If it drifts too much, you can:

  - check whether your printing settings are still exactly as described in the printing condition,
  - troubleshoot your printing process,
  - recalibrate your printing setup using this profile (the **printing condition profile**) as target. See *the Color Pilot documentation* to know more about recalibration.

1. In the preview, you can see a visual comparison of the solids and overprints achieved by your printing condition with the solids and overprints from your printing standard.

   The solids and overprints achieved by your printing condition are the solids and overprints taken from your tone value chart measurements and corrected by your newly created adjustment curves and screen highlight bumps.

The preview shows split patches, with the color measured on print at the top left of the patches, and the corresponding color from your standard at the bottom right.

You can zoom in, zoom out, or fit the zoom to the view.

2. On the right, you can see **Statistics** about how well your printed solids and overprints match those defined in your chosen printing standard.
   a) By default the **ΔE Formula** set in Color Pilot's Preferences is used to calculate the color differences, but you can change it to one of the following:
      - **CIELAB Delta E (Classic)**,
      - **Delta E 94**,
      - **Delta E 2000**,
      - **CMC (1:1)**,
      - **CMC (2:1)**,
      - **Delta E 2000 (2:1:1)**.
   b) You can see the following statistics (the **Delta E** statistics are updated when you change the formula above, and **Delta H** is the difference in hue):
      - **Average ΔE**: the average of the color differences of all patches,
      - **Maximum ΔE**: the worst color difference found in all the patches,
      - **Maximum ΔE best 90%**: the worst color difference found in the best 90 % of the patches (so excluding the worst 10%),
      - **Primaries ΔE**: the average color difference of the patches that only have one ink (except black), whether it's a solid or a tint,
      - **Primaries ΔH**: the average difference in hue of the same primary patches,
      - **Grey ΔE**: the average color difference of all solids and gradations of black, as well as all patches with equal amounts of C, M and Y,
      - **Substrate ΔE**: the color difference between the measured substrate in your prints and the one in your standard.
3. You can **Highlight** specific patches, to perform a visual check on those parts of your measurements:
   - the **Patches with above average ΔE** (with a color difference above the average difference between your measurements and the standard),
   - the **Worst 10 percent** (the 10% of the patches that have the highest Delta E values),
   - the **Substrate** (if there are several substrate measurements they will all be highlighted),
   - the **Primaries** (patches that only have one ink -except black-, whether a solid or a tint),

- the **Greys** (all solids and gradations of black, as well as all patches with equal amounts of C, M and Y),
- the patch with the **Maximum ΔE**.

4. To inspect a single patch more in detail, select it in the preview to show more data in the **Patch Details** on the right.

   You can see:

   - the patch's ink composition in your ink set,
   - a bigger split patch,
   - its Lab/LCh values,
   - the ΔE between your measured print and your standard for this patch.

5. If you find significant color differences between your measured solids and overprints and the ones from the standard, choose whether you want to:

   - Keep using the printing standard, and accept that there will always be some amount of deviation from the standard when verifying your prints against it.

     In this case, deselect **Save Press Profile**.

   - Make a profile based on your calibrated printing setup (calibrated to print as close as possible to the standard), and use this profile as printing target instead of the printing standard.

     This way, when verifying future prints, you will check against "the closest your printing setup can get to the standard", and not against a standard that you know you can never match perfectly.

     In this case, leave **Save Press Profile** selected (and change the profile name if desired).

6. If you chose to make a press profile (or "printing condition profile"), choose whether to **Use this press profile as target for future recalibrations**.

   This allows you to keep track of how much your printing setup drifts from its best state (the state calibrated by the printing condition), and recalibrate your printing setup using this profile as target.

   See *the Color Pilot documentation* to know more about recalibration.

7. When you are done, click **Finish** to save your completed printing calibration.

   You can see your final screen and adjustment curve for each ink on the **Printing** page. See *Printing Calibration Results* on page 228.

   You can also view additional details (**Solid densities**, color **Gamut** and **Gray Balance**). See *Verification* on page 229.

8. Click **Save and Close** in the printing condition.

You can now *review your printing condition parameters* and *save a report* if desired.

You can find your new printing condition in the *Printing Conditions Explorer*, your new screen in the *Screens Explorer*, and your new curves in the *Curves Explorer*.

Manually Select Screens and Use Default Adjustment Curves

Select the screens manually if you know what settings to select for the highlights in your screen. The software will select default dot gain compensation curves for all inks.

These highlights settings are:

- The **Mindot** (or minimum dot): the minimum size that a dot can have in the highlights, while printing in a stable and clear way.
- The **Mindot distance**: the maximum distance between these minimum dots, to ensure highlights that print well.
- The **Transitional mindot**: even smaller dots that support the mindots in the transitional areas (between FM screening in the highlights and AM screening in the midtones).

You need to define these settings for each ink group used in your print run: CMY, Black and expanded gamut inks.

1. In the overview table, you can see default screening settings for each ink/ink group:
   - The **Ink (Group)** that the screening settings are for.
   - The **Screen Name** (generated based on the screening settings).
   - The screen **Code** (you can change this if desired: click **Select** and choose another free screen code from the list shown).
   - The diameter of the **Largest Mindot** in microns or milli-inches (the largest mindot is the dot used at the lightest tone value).
   - The **Curve Bump**, the smallest input percentage you can print with this screen.

     All smaller percentages are "bumped up" to this value. This data will be included in the curve generated by the wizard.
   - The **Estimated Lightest Tone Value**, the percentage that the smallest input percentage from the **Curve Bump** gives on print.

     This information is not included when manually selecting screening settings, as it needs to be calculated from measurements.
   - The **Mindot Δ** (mindot distance), the distance between dots at the lightest tone value (the dots with the diameter shown under **Largest Mindot**).
   - The **FM Highlights**, the highlight tones where FM (stochastic screening) is used.

     This information is not included when manually selecting screening settings, as it needs to be calculated from measurements.
2. Select an **Ink** or ink group in the table: CMY, Black or expanded gamut inks (the inks here depend on your ink set, for example it can be OGV).
3. Based on your production process knowledge, select the best highlights settings for that ink or ink group.
   a) Select the **Mindot Distance** you typically use for your production.

   Note:

   The first time you make a printing condition for this *application*, the biggest distance measured from the chart is filled in by default.

   After that, the wizard remembers the **Mindot Distance** you filled in for the previous printing condition for this application and fills it in by default.

   b) Select the **Mindot** that you found to be the best for your mindot distance.

Note: The bigger the **Mindot Distance** is, the bigger your **Mindot** needs to be, to give you a stable print.

c) Select the **Transitional Mindot** that you found to be the best in your production process.

d) You can see your changes reflected in the overview table above (for your selected ink or ink group).

4. Repeat these steps for the other ink groups.
5. On the **Spot Colors** screen, select which separation from your printing condition should be used to set the default screen and curve for your spot colors (= all separations that are not in the ink set).

   The default is **Black**, but you can select any of the inks from the printing condition. Or **<None>**, if your spot colors don't need to use the screen and curve from your printing condition.
6. Click **Finish**.

   The screens and curves are created (this could take some time).

Note:

The curves used are flexible *PressSync Curves*.

For High Quality Post Print Corrugated, the base curve is always E50, and the curve bump (indicated between brackets) is calculated from your selected screening parameters.

The curve bump value is in the metric defined for that ink/ink group in *your chosen standard*. This means that different ink/ink group's curve bumps may use different metrics (for example CMY and Black may use density, while OGV may use SCTV), and cannot be compared.

You can see all information about the selected screens, curves and measurement results on the **Printing** page. See *Printing Calibration Results* on page 228.

You can now *review your printing condition parameters* and *save a report* if desired.

You can find your new printing condition in the *Printing Conditions Explorer*, your new screen in the *Screens Explorer*, and your new curves in the *Curves Explorer*.

Quick Calibration

This is a single color calibration method available from Print Control Wizard 22.11 onwards. It produces **Crystal V** screens (giving finer highlights without graininess), but being single color, it doesn't calibrate overprints or gray balance.

Note that after doing a quick calibration, you can calibrate additional colors if needed.

1. In the **Choose Angle and Ruling** step:

   a) Select the **Screen Ruling** used in your production.

   A fixed list of rulings is available (from 85 lpi to 155 lpi). If your ruling is not in the list, choose the closest ruling available.

   If you are using several rulings, you can add additional rulings after you finished the printing condition. See *Add a Ruling* on page 268.

   b) Select the **Angle Set** used in your production.

   You can choose either **Offset**, **Flexo -7.5** or **Flexo +7.5** (these are the same options as the ones available in the Imaging Engine tickets).

c) In the table below, you can see the angles for your individual inks (taken from the **Angle Set**). You can still change them if desired:

1. Click the angle you want to change.
2. Select another angle from the list.

Note: Some angles are bigger than 90°, this is due to the screening technology used in the Print Control Wizard. The corresponding value in "the 90° zone" is mentioned between brackets, you can make your selection based on this value.

3. The **Angle Set** is now set to **<Custom>**.

2. In the **Choose Separation** step, choose which ink of *your ink set* you want to calibrate.
3. In the **Select Screen Defaults** step, choose the **Surface Screening** and **Screening Dot** to use in the test chart.

   Some widely used values are pre-selected (**Solid** as **Surface Screening** and a **Round Screening Dot**), but you can change them as desired.

Note: If you find that the values you chose here don't give you good enough results when evaluating the chart, you can change them later (before creating the final screen). See *Checking Your Screen Defaults* on page 224.

4. In the **Print Chart** step, customize your test chart as desired, then save it and print it.

   See *Creating the Test Chart* on page 216.
5. Evaluate the quality of your plate.

   See *Checking the Plate Quality* on page 219.
6. Evaluate the quality of your printed chart.

   See *Checking the Print Quality* on page 219.
7. Measure the chart to find the best screen and curve.

   See *Measuring the Chart* on page 220.
8. Check how well *your screen defaults* printed.

   See *Checking Your Screen Defaults* on page 224.
9. Evaluate the highlights on your chart to find the best highlights settings.

   See *Evaluating the Highlights* on page 91.
10. When you are done, the wizard will generate your custom screen and curve, based on your production settings.

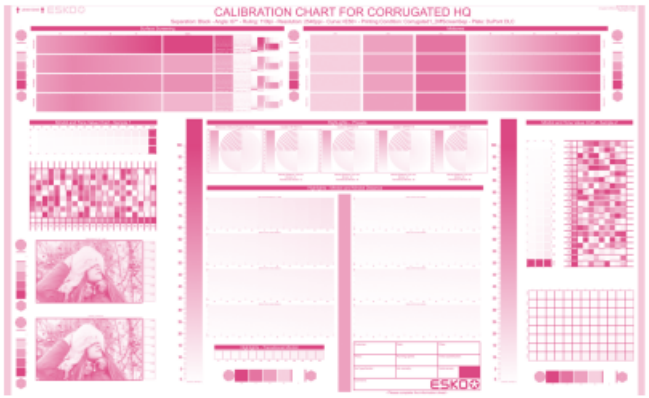
After finishing your calibration, you can*review your printing condition parameters* and *save a report* if desired.

You can find your new printing condition for High Quality Post Print corrugated is in the *Printing Conditions Explorer*, your new screen in the *Screens Explorer*, and your new curves in the *Curves Explorer*.

Creating the Test Chart

In the **Save Test Chart** step, customize your test chart as desired and save it.

The application shows a preview of the Corrugated High Quality test chart in your chosen ink. When you customize the chart, the preview is updated automatically to reflect your changes.



Use the various **Chart Options** to customize your test chart to fit your press needs.

1. Customize the dimensions of the chart using the **Chart Size** option.
   a) Unlock the **Chart Size** option by clicking on the
   b) Set your preferred **Width** and **Repeat Length**.

   If the preferred dimensions are higher than what is needed to print all the parts in a single chart, and the layout is set as:

   - **Complete Calibration Chart** then the parts will be placed in a single chart with blank space at the top or sides.
   - **Split Calibration chart parts** then the layout will be changed to **Complete Calibration Chart** and all the parts will be placed on a single chart.

   If the preferred dimensions are lower than what is needed to print all the parts in a single chart, and the layout is set as **Complete Calibration Chart** then the layout will be changed to **Split Calibration chart parts** and all the split charts will be of the preferred size.

   Note: If the preferred size is lower than the dimensions needed to print the split charts, then the size will be automatically set to the minimun size required to print the split charts.

   Tip: You can see the dimensions of the layout at the bottom of the preview.

2. Customize the layout of the chart using the various **Layout** options.
   - **Complete Calibration Chart**will place all different parts that need to be printed in a single chart. The chart size will be minimum width and length required to fit all the parts in a single chart.
   - **Split Calibration chart parts**, the layout will automatically be split in several smaller parts. All elements that need to be printed together will be placed on the same layout. Some parts may be rotated to fit the chart. When splitting using this method, each small chart will be of a different size. If you want to make all the charts to be of the same size, you can set the preferred dimensions using the **Chart Size** option.

Note: This is the behaviour only when the **Chart Size** options are locked. If the chart size is manually changed, the layout might get affected. Check the **Chart Size** section to know more about how the chart layout changes when chart size is modified.

Tip: You can see the dimensions of the layout at the bottom of the preview.

3. **Mirror Image**: select this for reverse printing.
4. **Add default bearer bars and slur marks**: the bearer bars help with the print stability, and the slur marks help you check the print quality.
5. **Add a custom element**: if you want to add an image or a technical element to the chart, for example to check the quality with something you use frequently.
   a) Click **Browse...**
   b) Browse to the location of the file.
   c) Click **Open**.

   Note:
   - The element needs to be a `.ct` file (Esko native image file format).
   - Use the free CT/LP plug-in from Esko in Adobe® Photoshop® to create `.ct` files from your element (To download the free plug-in, search for 'CT/LP plug-in' on *esko.com*). Save the Photoshop document with Grayscale image mode to use in Quick Calibration.
   - The `.ct` files cannot contain multiple layers. When the Photoshop document has multiple layers, merge all layers into a single layer before saving it as `.ct`.
   - You can only add one element. If you want to add several elements, you first need to group them in Adobe® Photoshop®.
6. Save the chart:
   a) Click **Save Chart**.
   b) Browse to your desired folder.
   c) Specify a **File name** for your chart.
   d) Select the **File Type** you want to save: **LEN** or **Tiff**.

   Note:

   In most cases, we recommend you save the file as a **LEN** file, and use it directly on the CDI.

   However, if you want to edit it to add extra elements specific to your production (different bearer bars for example), you should save it as **Tiff**, but make sure **you don't change** any of the technical elements! Please see *this knowledge base article* to know more about editing charts.

   e) Click **Save**.

   It could take several minutes to create the file.

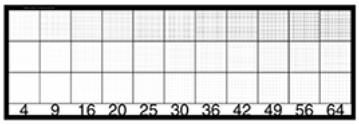
Note: If you change any parameter in your printing condition, **always** create a new chart, to make sure you have the correct elements for your printing condition in your chart (as the chart is based on numerous parameters from the previous steps like application, dot shape, surface screening...).

7. **Image the plates** on your CDI according to your company's Standard Operating Procedures, AND using the settings specified in the previous steps.
8. On the imaged, exposed and processed plate, you can *check the plate quality*.

Checking the Plate Quality

In the **Check Plates** step, you need to check the dot fail test.

Click **Learn more about evaluating this area** to open documents with guidelines on how to evaluate these elements. You can find: evaluation guidelines for the dot fail test in the *Standard Operating Procedure for verifying plate quality*.



Check the **Dot Fail** test on the plate as follows:

a) Use a magnifying glass.
b) Check the center and lower row.
c) The smallest number where all dots are in position gives the resulting value.
d) Verify all elements on the plate.
e) Compare your result to the value that was found as good quality during the CDI's installation. This should be the same value you used during the *plate and press calibration*.
f) **Accept** if the result matches the reference, or **Reject** if the result doesn't match.

   If the result doesn't match, you need to troubleshoot the problem that is causing the low quality dots, remake the plate and evaluate the dots again.

Once you are satisfied with the plate quality, print a few copies of your chart and move on to *check the print quality*.

Note: The **Next** button will be disabled if you reject the plate quality.

Checking the Print Quality

Make a Print using the plates, according to the settings you entered in the printing condition and your company's Standard Operating Procedures.

Note:

To make sure the screens and curves that will be created are accurate for your production process, your measurement data needs to be representative of your complete print run.

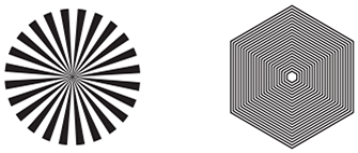
We therefore recommend that:

- you print another 50 to 100 meters (or more if this better reflects your production) after the press has reached your regular quality,
- you select 5 (or at least 3) copies in that "regular quality" print run: from the beginning, the middle and the end.

Once you've printed a few copies of your chart, check the slur marks in the **Verify Print Quality** step.

Click **Learn more about evaluating this area** to open documents with guidelines on how to evaluate these elements. You can find evaluation guidelines for the slur marks in the *Standard Operating Procedure for verifying print quality*.

1. Check the slur marks.



   a) Use a magnifying glass.
   b) Follow the guidelines in the Standard Operating Procedure (click *Learn more about evaluating this area* to access it).
   c) Make sure that all relevant marks on the print are good.
   d) Verify all copies.
   e) Back in the wizard, Accept or Reject the quality of the slur marks:

      - click **Accept** if you are satisfied with the quality of the slur marks,
      - click **Reject** if you aren't.

        If the marks on one or more copies are not satisfactory, find other copies of the test chart to evaluate (for example from around 30 m on the same run).

        If only one copy (or none) is good, troubleshoot with the press operator and reprint.

2. Once you are satisfied with the print quality, you can move on to *measuring the chart* to find the best screen and curve.

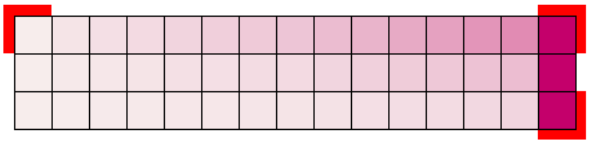
Measuring the Chart

You should now measure the chart to find the best screen and curve.

1. **Measure** the **Mindot Chart**.

   "Mindot" stands for "minimum dot". This chart will be used to determine the best screen for the highlights.

   You can use either an X-Rite i1 Pro or X-Rite i1i0 spectrophotometer, in patch or scan mode. No other measurement devices are supported.



a) Get ready to measure your print sample:

1. Cut out the mindot chart from your first copy. To measure with the i1 Pro, we recommend you cut off the text before each row.
2. Place your sample on your spectrophotometer table or on the backing you typically use for measuring prints.
3. Make sure your spectrophotometer is connected to your computer.

Note:

With the cogwheel ( ) at the bottom right, you can stop, calibrate and reconnect your spectrophotometer, change the measurement mode and the measurement condition.

See the **Using a Spectrophotometer** chapter in the *Color Pilot user guide*.

b) Measure your chart following the instructions on screen (above the pause and play icons).

The preview will show the instructions and the measurement progress.

Tip:

After you are done measuring a page, you can save the measurement data as a measurement file if desired (in the CGATS - Committee for Graphic Arts Technologies Standards - color measurement format):

- Go back to the page you have just measured using the back arrow.
- Click the cogwheel ( ) at the bottom right and select **Save measurement...**
- Choose a location to save your measurements file (with the `.txt` extension).

Tip:

Alternatively, if you had already measured your chart and saved the measurement, you can load your measurement file instead of re-measuring it here.

1. Make sure that your measurement file is a CGATS (Committee for Graphic Arts Technologies Standards color measurement format) file, with the `.it8`, `.txt` or `.cgats` extension.
2. Click the cogwheel ( ) at the bottom right and select **Load Measurement...**

2. After you are done measuring, check the **Measurement results** on the next page.

a) Check the preview.

The patches are split diagonally , with the measured color at the top left, and the expected color (from your *printing standard*) at the bottom right. They should have approximately the same color.

Note:

The comparison of the measurements and the expected color is an approximation. Only look for clear differences:

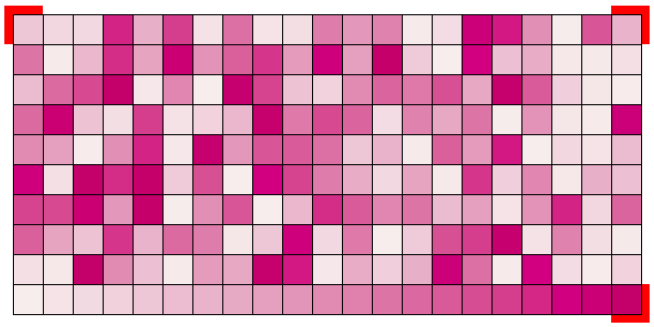
- if the color is completely different, you may have measured the wrong row, or your chart may be upside down;
- if they are the same color, but there is a very big difference in lightness: the chart may not be printed correctly, or there may be an issue with the measurement device.

b) If your measurement is good, click **Accept** and continue to the next step, otherwise click **Reject** and measure again (either the same chart if for example you measured it incorrectly, or another chart from the print run).

3. Measure the **Tone Value Chart**.

This will be used to create the dot gain compensation curves.

You can use either an X-Rite i1 Pro or X-Rite i1iO spectrophotometer, in patch or scan mode. No other measurement devices are supported.



a) Get ready to measure your print sample:

1. Cut out the tone value chart from the same copy as the mindot chart you measured.
2. Use the same spectrophotometer as the one you used to measure the mindot chart.

b) Measure your chart following the instructions on screen (above the pause and play icons).

The preview will show the instructions and the measurement progress.

4. Check the measurements results.

a) Check the preview.

The patches' measured color at the top left should have approximately the same color as the expected color at the bottom right.

Note:

In this step we mainly want to detect if the charts were measured correctly (not upside down, mirrored...).

If the color in the patch is the same, but there is a big difference in lightness, this is probably not an issue. The dot gain compensation curve created from these measurements will correct for this.

b) Select which data you want to compare your measurements with, in the list above the preview.

After the first measurement you can only compare your measured data to the **Standard** (*your chosen printing standard*).

After you measure more copies, you can also compare to the **Average** of all measurements (including the current one), and to previous measurements individually.

Note: When comparing different measurement samples, if one of the samples is printed very differently, it could be an exception. In this case you shouldn't include it in your average.

c) Check the **solid density** (under **Solid Info**, to the right of the preview).

The **Measured Density** should be within tolerance of your **Desired Density** (taken from your *printing standard*). Use the same density tolerance as your company uses on press (typically + or - 0,05).

Select the density standard you use on your measurement device (ANSI A, DIN...), from the **Density Formula** list at the bottom.

Note: If you chose a standard that uses an ICC profile, you will not see a **Desired Density** for your ink, because the density calculation requires spectral data, which is not available in ICC profiles.

d) Check the **color difference** between the measured and expected solid color.

You can see **LabCh** values for both colors next to a bigger split patch, and a **ΔE** (color difference) value. Check whether this ΔE value is within the ΔE tolerance that your company uses.

By default, the wizard uses the ΔE formula you set in Color Pilot's preferences, but you can choose a different one in the **ΔE Formula** list below.

e) If everything is OK, click **Accept** and continue.

Otherwise click **Reject** and measure again.

Note:

In this case, you need to measure both the mindot chart and the tone value chart again. This is because:

- different samples may be printed somewhat differently, so you shouldn't mix print samples,
- if you detect a printing issue on the tone value chart, then it is likely that the complete print sample is not representative, and that your mindot measurement is not that reliable.

5. In the next screen, select **Measure another sample** if needed.

   Note: To make sure your final screen and curve are accurate and reliable, the measurements need to be an average of a complete print run. Measure a minimum of 3 charts of a good print quality (we advise to use 5).

   You will be guided to measure the next sample, following the same procedure. The wizard will indicate how many charts you already measured: sample 1, sample 2...

6. After you measured enough charts of good quality, you can select **Stop measuring and inspect the resulting screens**.

Checking Your Screen Defaults

In the **Verify Surface Screening and Midtones** step, you need to check how well the *screen defaults that you chose* printed.

To do this, follow the guidelines in this *Standard Operating Procedure* when evaluating the elements for surface screening and dot on your chart.

Note:

If you find that the defaults you chose don't give you a satisfactory result, you can still change them before creating the final screen.

However, as most of the chart was printed with these defaults, your curve will not be accurate anymore. To remedy this, use the *Update Curves* wizard on your finished printing condition.

1. Select the best **Surface Screening** from the chart (if it's not the one you chose previously).
2. Enter the **Solid Density** for that surface screening.
3. Select the best **Screening Dot** from the chart (if it's not the one you chose previously).

Once you have entered the best screening settings from your chart, you can move on to *evaluating the highlights*.

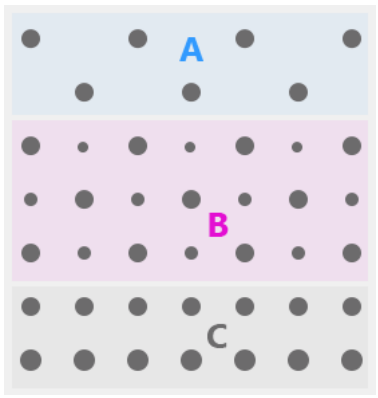
Evaluating the Highlights

In the final configuration step, you need to evaluate and choose the highlight settings that are best for your production, to finish setting up your custom screen and curve.

These settings are:

- The **Mindot** (or minimum dot): the minimum size that a dot can have in the highlights, while printing in a stable and clear way.
- The **Mindot distance**: the maximum distance between these minimum dots, to ensure highlights that print well.
- The **Transitional mindot**: even smaller dots that support the mindots in the transitional areas (between FM screening in the highlights and AM screening in the midtones).

	• **A)** In the lightest highlights, there are only **Mindots** (separated by a distance no larger than the **Mindot distance**). • **B)** As highlights get darker, increasingly smaller dots are added to the spaces between the regular dots.



Once the screen grid is completely filled, the screen reaches the transition point. The last and smallest dot size added before the transition point is the **Transitional mindot**.

- **C)** In the midtones, the **Transitional mindots** reach the size of the regular **Mindots**, and the screen becomes a standard screen.

1. You can see an analysis of the mindot chart measurements.

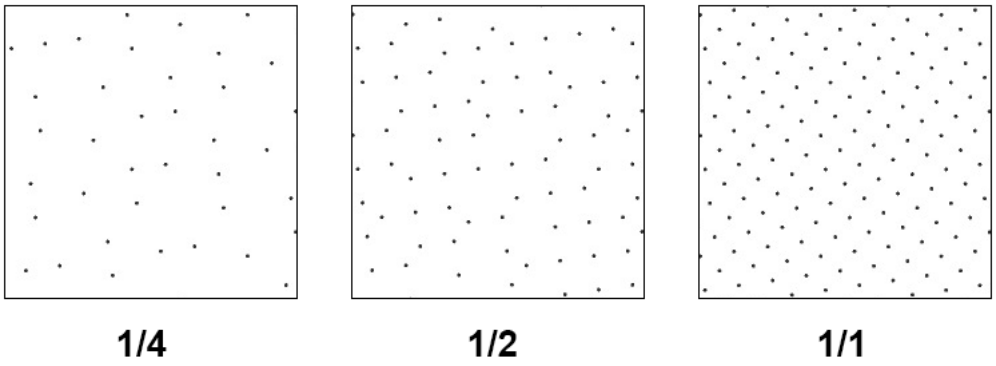
Dot Size (px)	0	6	9	12	16	19	22	25	31	36	42	47	54	60	Solid
Mindot Distance 0.17 mm (1/1)		4,9 ✗	7,1 ✓	9,8	14,2	17,8	21,4	24,8	31,8	37,6	43,8	48,7	56,2	62,3	
0.24 mm (1/2)		2,2 ✗	3,1 ✓	4,9	6,7	7,1	8,9	9,8	13,4	17,0	20,0	22,4	27,1	30,6	
0.34 mm (1/4)		0,4 ✗	1,3 ✗	2,2 ✓	3,1	3,1	4,0	4,9	5,8	7,1	8,0	8,9	11,0	13,4	

For the three **Mindot Distances** on the chart, the wizard shows which **Dot Size** is optimal. This is the smallest mindot size that gives a good print quality.

Note:

The fraction next to the distance indicates the amount of dots used to print the highlights.

- **1/1** means that means that all the dots are kept (the screen doesn't use FM screening).
- **1/2** means that half of the dots are kept (resulting in FM screening).
- **1/4** means that a quarter of the dots are kept (resulting in FM screening). This gives lighter highlights, but may increase graininess.



2. Examine these highlights on the print to decide if you agree with these results.
3. Under **Set Highlight Settings**, choose the best highlight settings for your production process based on what you found.
   a) Select the **Mindot Distance** you typically use for your production.

      If you choose one of the measured distances, you will see **(Measured)** next to it.

      Note:

      The first time you make a printing condition for this *application*, the biggest distance measured from the chart is filled in by default.

      After that, the wizard remembers the **Mindot Distance** you filled in for the previous printing condition for this application and fills it in by default.

   b) Select the **Mindot** that you found to be the best for your mindot distance.

      By default, the mindot size that the wizard found the best for that mindot distance is selected. This can either be a **Measured** mindot size, or a size calculated based on the other measurements (**Estimated**).

      If you choose a different size, you will still see an indication of what the wizard recommends next to **Measured** or **Estimated**.

      Note: The bigger the **Mindot Distance** is, the bigger your **Mindot** needs to be, to give you a stable print.

   c) Select the **Transitional Mindot** based on your visual inspection of the **1/1** row.

By default, the **Transitional Mindot** with a green check mark on the **1/1** line in the wizard is selected.

4. In the **Screen and Curve** table, you can see the details of screen that the wizard created based on your chosen settings:
   - the **Ink** that this screen is for,
   - the **Screen Name** (this is generated based on the settings used),
   - the screen **Code** (you can change this if desired: click **Select** and choose another free screen code from the list shown),
   - the **Mindot** size in microns or milli-inches (corresponding to the mindot you chose above),
   - the **Curve Bump** (this is the smallest input percentage you can print with this screen, all smaller percentages are "bumped up" to this value; this data will be included in the curve generated by the wizard),
   - the **Estimated Lightest Tone Value** (the percentage that the smallest input percentage from the **Curve Bump** gives on print).
5. Click **Finish** to generate your custom screen and curve, based on your production settings.

   This may take a moment.

   You can see your final screens and adjustment curves on the **Printing** page. See *Printing Calibration Results* on page 228.

You can now *review your printing condition parameters* and *save a report* if desired.

You can find your new printing condition in the *Printing Conditions Explorer*, your new screen in the *Screens Explorer*, and your new curves in the *Curves Explorer*.

5.6. Reviewing the Printing Condition

After finishing the last configuration step, you can see **This printing condition is ready to be used!** in the banner on top, and a green check mark ✔ on the right.

The configuration steps no longer have an indicator (✔, ✱, ⊖) next to their name.

1. Navigate between the configuration steps and check if all parameters are correct.
2. You can see your resulting curves and screens parameters on the **Printing** page.

   See *Printing Calibration Results* on page 228.

   Note: These details are available for printing conditions for Flexibles, Labels, and High Quality Post Print Corrugated, but not for Standard Post Print Corrugated as these printing conditions only use screening parameters for solids.
3. You can also view detailed information about how you will print when using your printing condition.

   See *Verification* on page 229.
4. You can edit some parameters if needed.

See *Editing Flexibles or Labels Printing Conditions* on page 232 or *Editing Corrugated Printing Conditions* on page 259.

Note: Be careful, as editing mandatory parameters will reset some configuration steps down the line, and you will have to repeat these steps. If this is the case you will see a warning.

5. Save a report if needed.

   See *Saving a Report* on page 287.

6. Click **Close** to return to the **Printing Conditions Explorer**.

   See *Printing Conditions Explorer* on page 39.

5.6.1. Printing Calibration Results

Once you have completed your printing calibration, you can see the resulting screens and curves (as well as your measurement results) on the **Printing** page.

Note: These details are available for printing conditions for Flexibles, Labels, and High Quality Post Print Corrugated, but not for Standard Post Print Corrugated as these printing conditions only use screening parameters for solids.

1. In the **Print Calibration Details** table, you can see an overview of all inks in the printing condition.

   If you *chose settings for your spot colors*, they are shown as **Other Inks**.

   For each ink, you can see:

   - the ink **Name**,
   - the **Ink Book**,
   - the printing **Angle**,
   - the **Screen name**: the screen code and screen technology,
   - the **Adjustment curve**: the *Flexible PressSync curve* used as dot gain compensation curve,
   - The mindot distance (**Mindot Δ**), the distance between dots at the lightest tone value,
   - The **Estimated Lightest Tone Value**: the percentage that the smallest input percentage gives on print,
   - The transition point (**TP**): the tone in the input file at which the screening changes from FM to AM.

2. At the bottom of the page, you can see detailed information about the curves. This shows both the **Measured Curves** and the **Adjustment Curves**.

   a) By default, all of your inks' curves are displayed, but you can select one or more inks in the **Print Calibration Details** table to only display those inks' curves.

      Hold the **Ctrl** or **Shift** key to select several inks.

b) If you made your printing condition for more than one ruling, select for which **Ruling** you want to see the curves.

c) By default, you can see the reference values from your printing standard as a continuous line on the **Measured Curves** graph (while the measured data is shown as dots).

Deselect **Show printing standard** if you want to hide that line.

3. If desired, you can open the *curve strategy* (containing your curves) in Curve Pilot: click the **Curve Strategy** name (`*.icpro`) underneath the **Print Calibration Details** table.

Note: You will not be able to use Color Pilot while opening and using Curve Pilot. Color Pilot becomes available again after closing Curve Pilot.

From this page you can also:

- Define new screens and curves: see *Calibrate Printing Again* on page 233.
- Update the current curves: see *Update Curves* on page 234.
- Add an extra ruling: see *Add a Ruling* on page 241.
- Calibrate or recalibrate one of your separations: see *Calibrating One Separation* on page 248 (for Flexibles or Labels printing conditions), or *Calibrating One Separation* on page 276 (for High Quality Post Print Corrugated printing conditions).

  You can use this to (re)calibrate a separation that is not printing as well anymore, to make sure you keep getting good results when using your printing condition.

5.6.2. Verification

Under **Verification**, You can view detailed information about how you will print when using your (finished) printing condition:

- you can compare your measured *solids* to the target values for your printing condition,
- you can view your printing condition's *gamut*, and how it compares to your target gamut,
- you can check the *gray balance* across the tone range for your printing setup.

Note: This information is available for printing conditions for Flexibles, Labels, and High Quality Post Print Corrugated, but not for Standard Post Print Corrugated.

Solids

On the **Solids** page, you can compare your measured results to the target values for your printing condition. These target values come from either:

- the *printing standard you selected* when making your printing condition,
- your printing condition profile (if you have *created a profile* that describes the closest that you can realistically print to your standard, when using your printing condition).

You can see the name of your printing standard and (if applicable) of your profile at the top of the window, under **This printing condition is ready for production!**

You can find the target value of your standard or profile in the **Printing Standard** part of the table.

You can compare:

- the **Substrate** (the 0% patch),
- the single ink solids (**cyan**, **magenta**...),

- secondary colors (for example **red (magenta + yellow)**),
- neutral gray (**CMY Composed**, which is 100% of each C, M and Y).

You can compare their LabCh values, color patches, and **Density** values.

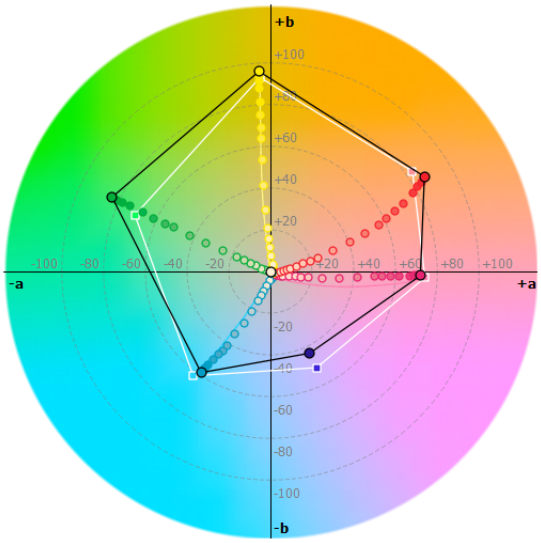
You can view the color difference in **ΔE** (calculated using the ΔE formula from the printing standard by default, but you can select another **ΔE Formula** below), and the density difference in **ΔDensity**.

If the printing standard selected has tolerances set up for color and density deviations, you can see them in the **Tolerance** columns. If a **ΔE** or **ΔDensity** value is higher than the tolerance for that ink or ink combination, it is shown in red with a warning sign .

You can find more information about tolerances in printing standards in the *Curve Pilot documentation*.

Gamut

On the **Gamut** page, you can see your printing condition's gamut. This is the totality of the colors that you can reproduce when using your printing condition. You can see it drawn in black lines on a color wheel.



The colored dots represent your measurements for the printing condition's inks (the colored dots on the black line are the inks' solids). You can hide the measurements other than the solids by deselecting **Show color tone scale**.

By default, you can also see your target gamut, drawn in white lines. This is either:

- the gamut of the *printing standard you selected* when making your printing condition,
- the gamut of your printing condition profile (if you have *created a profile* that describes the closest that you can realistically print to your standard, when using your printing condition).

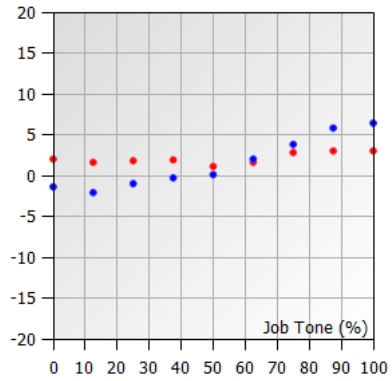
You can hide the target gamut by deselecting **Show printing standard**.

If you have both **Show printing standard** and **Show color tone scale** selected, you can also see lines representing the target measurements across the color tones, in the color of the corresponding ink.

If your printing condition has several rulings, by default the gamut and measurements information is shown for the first ruling you measured. You can display it for another ruling using the **Ruling** list on the left.

Gray Balance

The **Gray Balance** page contains a graph showing the results of your "gray finder patches" measurements. These are patches with varying percentages of C, M and Y, to find the perfect neutral grays across the tone range for your printing setup.

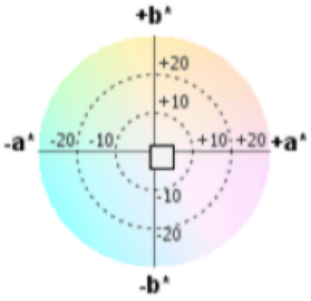


There are 2 series of dots:

- the red dots are **CMY a**, which indicate the potential color cast of your gray patches on the green-red axis,
- the blue dots are **CMY b**, which indicate the potential color cast of your gray patches on the blue-yellow axis.

As you can see on the color wheel below:

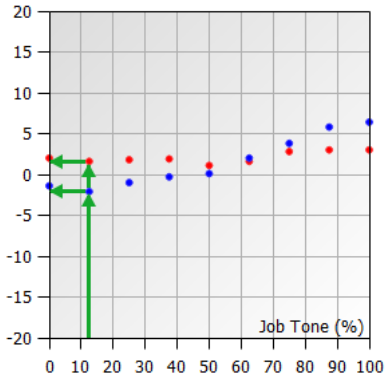
- on the **a axis**, negative values go towards green, 0 is neutral gray, and positive values go towards red,
- on the **b axis**, negative values go towards blue, 0 is neutral gray, and positive values go towards yellow.



This means that you should interpret this graph as in this example:

- we are assessing the gray balance of the 12% gray tone,
- it has a very slight blueish cast (the corresponding blue dot is at -2%),
- it also has a very slight reddish cast (the corresponding red dot is at +2%),

- since the color casts are very slight, this measured point is a good neutral gray.



You can choose to hide the **CMY a** or **CMY b** points by deselecting the corresponding option on the right.

If your printing condition has several rulings, by default the gray balance information is shown for the first ruling you measured. You can display it for another ruling using the **Ruling** list on the left.

5.7. Editing Flexibles or Labels Printing Conditions

5.7.1. Change Plate and Press Calibration Settings

If the current screening dot and surface screening are not delivering the same quality anymore, it could be necessary to review the settings.

We recommend to only redo this step if all other possibilities to maintain the quality (adapt machine settings for CDI and press, check printing tools...) failed.

1. Open a printing condition: right-click it and select **Open**, or double-click it.
2. Select **Plate and Press Calibration**.
3. Click **Calibrate Plate and Press Again...** at the top right.
   - If you had completed the **Plate and Press Calibration** but not later steps, you will get a warning that this will reset your plate and press calibration settings. Click **Yes** to continue.
   - If you had also completed later steps (*White* on page 62 and *Printing* on page 65), you will get a warning that this will reset all these settings, and **you won't be able to use your printing condition in production until you complete all the steps again**.

     Important: We recommend you make a copy of your printing condition before changing these settings, so that you can continue production in the meantime.
4. Complete all steps described in *Plate and Press Calibration* on page 51.

5. Click **Finish** when you are done.

5.7.2. Edit White

To edit the White settings:

1. Open a printing condition: Right-click it and select **Open**, or double-click on a printing condition.
2. Select **White**
3. Click **Change White setting...**

> **Note:**
>
> If you already completed the **Printing** configuration step, a warning will appear that changing the White settings will reset the screens and curves and the printing condition becomes unavailable for production.
>
> - If you click **Yes**, you will need to create new screens and curves by going through all the steps again.
> - If you click **No**, you cannot edit your white

4. Complete all steps as described in *White* on page 62

5.7.3. Calibrate Printing Again

If the current settings are not delivering the same quality anymore, it could be necessary to reset the settings and test on press what parameters are optimal for the new circumstances.

> **Note:** It is not possible to adapt individual settings, you need to complete all steps. If only the curves need to be adapted, use the **Update Curves** function. See *Update Curves* on page 234.

We recommend to only redo this step if all other possibilities failed to maintain the quality (adapting machine settings for CDI and Press, checking printing tools...).

1. Open a printing condition: right-click it and select **Open**, or double-click it.
2. Select **Printing**.
3. Click **Calibrate Printing Again...** at the top right.

> **Note:**
>
> A warning will appear that changing the screens and curves settings will reset the screens and curves and the printing condition becomes unavailable for production.
>
> - If you click **Yes**, you will need to create new screens and curves by going through all the printing calibration steps again.
> - If you click **No**, you cannot edit your screens and curves.

4. Complete all steps described in *Printing* on page 65.

At the end, when clicking **Finish**, you will get a warning that the previous curve strategy and curves will be deleted from the Esko resources. This includes curves for all rulings.

5.7.4. Update Curves

As small changes, aging of printing equipment and/or fluctuations in production over time are perfectly normal, some curves will need to be slightly modified (updated) at certain times.

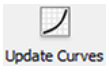
At any point in the process you can stop working on your printing condition and continue later. Use the buttons **Close** and **Quit Now and Continue Later**. Don't forget to **Save** when asked.

In the **Printing Conditions** library, the printing condition will get the mark in front of the name.

When you are ready to continue, start the wizard. You will be asked to **Resume** or to **Start a new session**. Click **Resume** to continue editing your printing condition.

Note:

- You can continue to use the printing condition, when you didn't finish editing.
- Only one unfinished session can be available per printing condition. You need to finish first the current session if you want to add a new ruling or Update curves. The new session will overwrite the unfinished session.
- It is possible to remove an unfinished task, right-click on your printing condition and select remove unfinished task.

1. Start updating the curves:
   - In the **Printing Conditions** library, select the printing condition and click the **Update Curves** button 

in the bottom toolbar
   - In the **Printing Conditions** library, right-click the printing condition and select **Update Curves...**
   - Open the printing condition and click the **Update Curves...** in the **Printing** overview.
2. Select the **Screen Ruling** you want to update the curves for.

   Note: You can only select a ruling that was already added to the printing condition. On top, you see an overview of the curves for every ink and ruling.
3. **Create** the test chart:
   a) A preview of the layout is shown.

b) Add **chart options** to customize the layout.

Note: All changes will be visualized in the preview.

- Unlock the **Chart Size** option by clicking on the and set your preferred **Width** and **Repeat Length**.

  If the preferred dimensions are higher than what is needed to print all the parts in a single chart, and the layout is set as:

  - **Complete Calibration Chart** then the parts will be placed in a single chart with blank space at the top or sides.
  - **Split Calibration chart parts** then the layout will be changed to **Complete Calibration Chart** and all the parts will be placed on a single chart.

  If the preferred dimensions are lower than what is needed to print all the parts in a single chart, and the layout is set as **Complete Calibration Chart** then the layout will be changed to **Split Calibration chart parts** and all the split charts will be of the preferred size.

  Note: If the preferred size is lower than the dimensions needed to print the split charts, then the size will be automatically set to the minimun size required to print the split charts.

  Tip: You can see the dimensions of the layout at the bottom of the preview.

- Customize the layout of the chart using the various **Layout** options:
  - **Complete Calibration Chart** will place all different parts that need to be printed in a single chart. The chart size will be minimum width and length required to fit all the parts in a single chart.
  - **Split Calibration chart parts** will automatically split the layout into several smaller parts. All elements that need to be printed together will be placed on the same layout. Some

parts may be rotated to fit the chart. When splitting using this method, each small chart will be of a different size. If you want to make all the charts to be of the same size, you can set the preferred dimensions using the **Chart Size** option.

- **Mirror Image**: to be used for reverse printing.

  This option is on by default when using **White Overprint** in *Substrate* on page 48.

- **Add default bearer bars, slur marks and registration marks**:

  This option is always on by default.

- **Add a custom element**:

  If you want to add an image or technical element to the chart, to quality control the print.

  1. Click **Browse**.
  2. Browse to the location of the file.
  3. Click **Open**.

  Note:

  - The element needs to be a `.ct` file (Esko native image file format).
  - Use the free CT/LP plug-in from Esko in Adobe® Photoshop® to create `.ct` files from your element.(To download the free plug-in, search for 'CT/LP plug-in' on *esko.com*)

    Save the Photoshop document with CMYK or Multichannel imaging modes. Spot-channels will only be included if Multichannel mode is used. So to write a CMYK file with an extra spot channel, convert it to multichannel mode before saving it as a `.ct` file.
  - The `.ct` files cannot contain multiple layers. When the Photoshop document has multiple layers, merge all layers into a single layer before saving it as `.ct`.
  - You can only add one element. If you want to add several elements, you first need to group them in Adobe® Photoshop®.

c) Click **Save Chart**.
d) Specify the folder where you want to save, click **Select Folder**.
e) Specify a **File name**.
f) Select the **File Type** you want to save: **LEN** or **Tiff**.

Note:

In most cases, we recommend you save the file as a **LEN** file, and use it directly on the CDI.

However, if you want to edit it to add extra elements specific to your production (different bearer bars for example), you should save it as **Tiff**, but make sure **you don't change** any of the technical elements! Please see *this knowledge base article* to know more about editing charts.

g) Click **Save**.

For each ink in your printing condition, a file will be created in the selected folder. For example if your inkset is CMYK and you completed the White setup, you will get 5 files: **File name_C**, **File name_M**, **File name_Y**, **File name_K**, **File name_White**.

Note: It could take several minutes to create the file.

Note: The created chart is based on numerous parameters from the previous steps (application, dot shape, surface screening, ...). **Always** create a new chart, to assure that you have the correct elements in your chart for your printing condition.

4. **Image the plates** on CDI according to your company's Standard Operating Procedures, and using the settings specified in the printing condition.
5. **Make a Print** using these plates, according to the settings you entered in the printing condition and your company's Standard Operating Procedures.

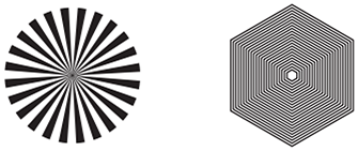
Note:

To have an accurate and reliable curves creation, it is important that the measurements are an average of a complete print run.

We therefore recommend:

- after reaching printing conditions (= first ok sheet), print 50 to 100 meters (or more if this better reflects your production).
- starting from the first ok sheet, select min 3 copies (advise = 5) that represent the complete print run: begin – middle – end.

6. Check the slur marks.



a) Check your prints the following way:

- Use a magnifying glass.
- Follow the guidelines in the Standard Operating Procedure (click *Learn more about evaluating this area* to access it).
- Make sure that all relevant marks on the print are good.
- Verify all copies.

b) Back in the wizard:

- click **Accept** if you are satisfied with the quality of the slur marks,
- click **Reject** if you aren't.

7. Check the **Gradient**.

a) Check the gradient on print:

The gradient should be smooth from the highlights to the solid.

b) **Accept** or **Reject** the gradient quality.

8. Check the **Registration marks**.

a) Check the registration marks on the print using the same guidelines as for the slur marks.

b) In the wizard, **Accept** or **Reject** the quality of the registration marks.

9. If you are satisfied with the quality of all three areas, you can move on to *measuring the chart*.

However, if you rejected or more checks, you need to either:

- find other copies of the test chart to evaluate (for example from around 30 m on the same run),
- troubleshoot with the press operator and reprint.

If the new tests are positive, you can change the status from **Reject** to **Accept** for that area.

Alternatively, you can create a new printing condition for this ruling. To decide whether to do this, compare this test chart to the test chart that you used to set up your screens and curves.

10. Measure the **Tone Value Chart**

- The chart will contain all inks from your selected ink set.

  For example ink set is CMYKOGV: chart will contain CMYKOGV patches

- The chart can be read in patch or scan mode by an X-Rite i1 Pro or X-Rite i1iO. No other measurement devices are supported.

- With the cogwheel ( ) on the bottom right, you can stop, calibrate and reconnect your measurement device, change the measurement mode and the measurement condition.

  See the chapter **Using a Spectrophotometer** in the Color Pilot user guide: *https://www.esko.com/en/support/product?id=Color%20Pilot*

- To know how to measure the chart with your measurement device, follow the instructions on the bottom left, above the icons

  The preview will visualize the instructions and the measurement progress.

11. **Check** the **measurements results**.

    a) Check the preview, the upper and lower part of the patches should approximately have the same color.

    After the first measurement you can compare your measurement to the standard. After the measurement of your 2nd, 3rd ... copy, you can also compare to the average and to the other measurements.

    Select what you want to compare with, from the pull-down menu, on top of the preview.

    Note:

    - In this step we mainly want to detect if the charts were measured correct (not upside down, mirrored, ...)

      If the color in the patch is the same, but there is a big difference in lightness, this is probably not an issue. The dot gain compensation curve created from these measurements will correct for this.

    - Comparing charts among each other could be usefull, to detect if some charts are printed very different. That chart could be an exception and we don't want to include this in our average.

    b) Check the **solid info**, to the right of the preview.

    1. Density: for each ink, the measured density should be within tolerance of the desired density

       Use the same tolerance as your company uses on press (typically + or - 0,05)

       Select the Density standard you use on your measurement device (ANSI A, DIN, ...), from the pull-down menu below the Solid Info.

       Note:

       The desired density is derived from the printing standard you selected in Ink Set and Printing Standard

       We don't show desired density for CMYK inks for standards that use an ICC profile as a standard profile. This is because density calculation requires spectral data, which is not available in ICC profiles.

2. Color difference (ΔE): for each ink, the ΔE should be within tolerance of the printing standard you selected in Ink Set and Printing Standard. See *Ink Set and Printing Standard* on page 49

   Select the ΔE Formula that is requested by the printing standard, from the pull-down menu below the Solid Info

   Note: Select an ink if you want to see the LabCh details, below the **Solid Info** window.

   Note: We don't show desired density, Lab and dE for the OGV inks. There are no standards for these inks, so there's nothing to match.

c) **Accept** or **Reject**

When your measurement is ok, it is possible to continue to the next step.

Note:

If you rejected the measurement result, you will be guided to measure again.

12. Select **Measure another sample** if needed.

    To have an accurate and reliable curves creation, it is important that the measurements are an average of a complete print run. Measure minimum 3 charts of good print quality (advise = 5)

    You will be guided to measure again, following the same procedure.

    Note: The wizard will indicate how many charts you already measured: sample 1, sample 2, ...

13. If you measured enough charts of good quality, you can select **Stop measuring and inspect the resulting curves**
14. **Inspect** the curve results
    a) View at the top left an overview per ink of the original and the new curve created from the measurements.
    b) View on the right a graph of the curves.
       - Colored curve: new curve created form the measurements
       - Grey curve: curve from the ruling created during first setup of the printing condition
    c) Select **Use new adjustment curves** if the new curves deviate too much from the original curves.
    d) Select **Use adjustment curves for xxx lpi** if there is little to no difference between the new and original curves.

       Note: Below the selection, a recommendation is shown made by analyzing the difference between the curves.
15. Click **Finish**.

Note:

We **strongly advise against** editing curves and curve strategies created via the Print Control Wizard in Curve Pilot.

Curve Pilot is an expert tool with a lot of functionality that is not needed and therefore not supported by the Print Control Wizard. Wrong usage of the tools could generate issues in your printing condition.

We only recommend to open the Curve strategy and PressSync curves in Curve Pilot to have a more detailed view of the curves and to see the Curve history (for example how many times were the curves updated + what were the previous settings).

For more information, see the Curve Pilot user guide: *https://www.esko.com/en/support/product?id=Curve%20Pilot*

5.7.5. Add a Ruling

When you created your printing condition *for flexibles* or *for labels*, you typically selected the main ruling used in your production. If you are also using other rulings for this printing condition, you can add them one by one.

All rulings will use the same screening setting, only the curves will be different. A wizard will guide you through the steps to print and measure a test chart.

Important: The chart is **different** from the chart used for *printing calibration*, it only contains the tone value part. **Don't** re-use the plates made for printing calibration!

Note:

You can only add the two rulings closest (one lower, one higher) to the ruling that was used during setup of the printing condition. This is because when deviating too much from the original ruling, the screening parameters are no longer valid.

Once you have added all available rulings to the printing condition, you will see an error message if you try adding more rulings.

At any point in the process you can stop working on your printing condition and continue later. Use the buttons **Close** and **Quit Now and Continue Later**. Don't forget to **Save** when asked.

In the **Printing Conditions** library, the printing condition will get the mark in front of the name.

When you are ready to continue, start the wizard. You will be asked to **Resume** or to **Start a new session**. Click **Resume** to continue editing your printing condition.

Note:

- You can continue to use the printing condition, even if you didn't finish editing it.
- You can only have one unfinished session per printing condition. If you want to add a new ruling or update the curves, you need to first finish the current session, otherwise the new session will overwrite the unfinished session.
- It is possible to remove an unfinished task: right-click your printing condition and select **Remove Unfinished Task**.

1. Start adding a new ruling:

- In the **Printing Conditions** library, select the printing condition and click the **Add Ruling** button

in the bottom toolbar
- In the **Printing Conditions** library, right-click the printing condition and select **Add Ruling...**
- Open the printing condition and click the **Add Ruling...** button on the printing calibration page.

This opens the **Add Ruling** wizard.

2. In the **Choose Ruling** step, you see an overview of the inks in your printing condition, with their screens and curves for the current ruling.

   Underneath, choose the **ruling to add to your printing condition**.

3. **Create** the test chart:

   a) A preview of the layout is shown.

   b) Add **chart options** to customize the layout.

Note: All changes will be visualized in the preview.

- Unlock the **Chart Size** option by clicking on the and set your preferred **Width** and **Repeat Length**.

  If the preferred dimensions are higher than what is needed to print all the parts in a single chart, and the layout is set as:

  - **Complete Calibration Chart** then the parts will be placed in a single chart with blank space at the top or sides.
  - **Split Calibration chart parts** then the layout will be changed to **Complete Calibration Chart** and all the parts will be placed on a single chart.

  If the preferred dimensions are lower than what is needed to print all the parts in a single chart, and the layout is set as **Complete Calibration Chart** then the layout will be changed to **Split Calibration chart parts** and all the split charts will be of the preferred size.

Note: If the preferred size is lower than the dimensions needed to print the split charts, then the size will be automatically set to the minimun size required to print the split charts.

Tip: You can see the dimensions of the layout at the bottom of the preview.

- Customize the layout of the chart using the various **Layout** options:
  - **Complete Calibration Chart** will place all different parts that need to be printed in a single chart. The chart size will be minimum width and length required to fit all the parts in a single chart.
  - **Split Calibration chart parts** will automatically split the layout into several smaller parts. All elements that need to be printed together will be placed on the same layout. Some parts may be rotated to fit the chart. When splitting using this method, each small chart will be of a different size. If you want to make all the charts to be of the same size, you can set the preferred dimensions using the **Chart Size** option.
- **Mirror Image**: to be used for reverse printing.

  This option is on by default when using **White Overprint** in *Substrate* on page 48.
- **Add default bearer bars, slur marks and registration marks**:

  This option is always on by default.
- **Add a custom element**:

  If you want to add an image or technical element to the chart, to quality control the print.

  1. Click **Browse**.
  2. Browse to the location of the file.
  3. Click **Open**.

  Note:
  - The element needs to be a `.ct` file (Esko native image file format).
  - Use the free CT/LP plug-in from Esko in Adobe® Photoshop® to create `.ct` files from your element.(To download the free plug-in, search for 'CT/LP plug-in' on *esko.com*)

    Save the Photoshop document with CMYK or Multichannel imaging modes. Spot-channels will only be included if Multichannel mode is used. So to write a CMYK file with an extra spot channel, convert it to multichannel mode before saving it as a `.ct` file.
  - The `.ct` files cannot contain multiple layers. When the Photoshop document has multiple layers, merge all layers into a single layer before saving it as `.ct`.
  - You can only add one element. If you want to add several elements, you first need to group them in Adobe® Photoshop®.

c) Click **Save Chart**.
d) Specify the folder where you want to save, click **Select Folder**.
e) Specify a **File name**.
f) Select the **File Type** you want to save: **LEN** or **Tiff**.

> **Note:**
>
> In most cases, we recommend you save the file as a **LEN** file, and use it directly on the CDI.
>
> However, if you want to edit it to add extra elements specific to your production (different bearer bars for example), you should save it as **Tiff**, but make sure **you don't change** any of the technical elements! Please see *this knowledge base article* to know more about editing charts.

g) Click **Save**.

For each ink in your printing condition, a file will be created in the selected folder. For example if your inkset is CMYK and you completed the White setup, you will get 5 files: **File name_C**, **File name_M**, **File name_Y**, **File name_K**, **File name_White**.

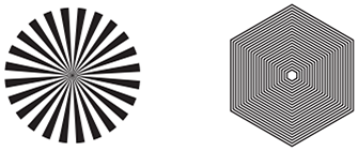
> **Note:** It could take several minutes to create the file.

> **Note:** The created chart is based on numerous parameters from the previous steps (application, dot shape, surface screening, ...). **Always** create a new chart, to assure that you have the correct elements in your chart for your printing condition.

4. **Image the plates** on CDI according to your company's Standard Operating Procedures, and using the settings specified in the printing condition.
5. **Make a Print** using these plates, according to the settings you entered in the printing condition and your company's Standard Operating Procedures.

> **Note:**
>
> To have an accurate and reliable curves creation, it is important that the measurements are an average of a complete print run.
>
> We therefore recommend:
>
> - after reaching printing conditions (= first ok sheet), print 50 to 100 meters (or more if this better reflects your production).
> - starting from the first ok sheet, select min 3 copies (advise = 5) that represent the complete print run: begin – middle – end.

6. Check the slur marks.



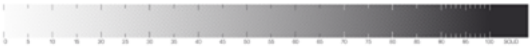
a) Check your prints the following way:

- Use a magnifying glass.
- Follow the guidelines in the Standard Operating Procedure (click *Learn more about evaluating this area* to access it).
- Make sure that all relevant marks on the print are good.
- Verify all copies.

b) Back in the wizard:

- click **Accept** if you are satisfied with the quality of the slur marks,
- click **Reject** if you aren't.

7. Check the **Gradient**.



a) Check the gradient on print:

The gradient should be smooth from the highlights to the solid.

b) **Accept** or **Reject** the gradient quality.

8. Check the **Registration marks**.

a) Check the registration marks on the print using the same guidelines as for the slur marks.

b) In the wizard, **Accept** or **Reject** the quality of the registration marks.

9. If you are satisfied with the quality of all three areas, you can move on to *measuring the chart*.

However, if you rejected or more checks, you need to either:

- find other copies of the test chart to evaluate (for example from around 30 m on the same run),
- troubleshoot with the press operator and reprint.

If the new tests are positive, you can change the status from **Reject** to **Accept** for that area.

Alternatively, you can create a new printing condition for this ruling. To decide whether to do this, compare this test chart to the test chart that you used to set up your screens and curves.

10. Measure the **Tone Value Chart**

- The chart will contain all inks from your selected ink set.

  For example ink set is CMYKOGV: chart will contain CMYKOGV patches

- The chart can be read in patch or scan mode by an X-Rite i1 Pro or X-Rite i1iO. No other measurement devices are supported.

- With the cogwheel ( ) on the bottom right, you can stop, calibrate and reconnect your measurement device, change the measurement mode and the measurement condition.

  See the chapter **Using a Spectrophotometer** in the Color Pilot user guide: *https://www.esko.com/en/support/product?id=Color%20Pilot*

- To know how to measure the chart with your measurement device, follow the instructions on the bottom left, above the icons

  The preview will visualize the instructions and the measurement progress.

11. **Check** the **measurements results**.

    a) Check the preview, the upper and lower part of the patches should approximately have the same color.

    After the first measurement you can compare your measurement to the standard. After the measurement of your 2nd, 3rd ... copy, you can also compare to the average and to the other measurements.

    Select what you want to compare with, from the pull-down menu, on top of the preview.

Note:

- In this step we mainly want to detect if the charts were measured correct (not upside down, mirrored, ...)

  If the color in the patch is the same, but there is a big difference in lightness, this is probably not an issue. The dot gain compensation curve created from these measurements will correct for this.

- Comparing charts among each other could be usefull, to detect if some charts are printed very different. That chart could be an exception and we don't want to include this in our average.

b) Check the **solid info**, to the right of the preview.

1. Density: for each ink, the measured density should be within tolerance of the desired density

   Use the same tolerance as your company uses on press (typically + or - 0,05)

   Select the Density standard you use on your measurement device (ANSI A, DIN, ...), from the pull-down menu below the Solid Info.

   Note:

   The desired density is derived from the printing standard you selected in Ink Set and Printing Standard

   We don't show desired density for CMYK inks for standards that use an ICC profile as a standard profile. This is because density calculation requires spectral data, which is not available in ICC profiles.

2. Color difference (ΔE): for each ink, the ΔE should be within tolerance of the printing standard you selected in Ink Set and Printing Standard. See *Ink Set and Printing Standard* on page 49

   Select the ΔE Formula that is requested by the printing standard, from the pull-down menu below the Solid Info

   Note: Select an ink if you want to see the LabCh details, below the **Solid Info** window.

Note: We don't show desired density, Lab and dE for the OGV inks. There are no standards for these inks, so there's nothing to match.

c) **Accept** or **Reject**

When your measurement is ok, it is possible to continue to the next step.

Note:

If you rejected the measurement result, you will be guided to measure again.

12. Select **Measure another sample** if needed.

    To have an accurate and reliable curves creation, it is important that the measurements are an average of a complete print run. Measure minimum 3 charts of good print quality (advise = 5)

    You will be guided to measure again, following the same procedure.

Note: The wizard will indicate how many charts you already measured: sample 1, sample 2, ...

13. If you measured enough charts of good quality, you can select **Stop measuring and inspect the resulting curves**
14. **Inspect** the curve results
    a) View at the top left an overview per ink of the original and the new curve created from the measurements.
    b) View on the right a graph of the curves.
    - Colored curve: new curve created form the measurements
    - Grey curve: curve from the ruling created during first setup of the printing condition

    c) Select **Use new adjustment curves** if the new curves deviate too much from the original curves.
    d) Select **Use adjustment curves for xxx lpi** if there is little to no difference between the new and original curves.

    Note: Below the selection, a recommendation is shown made by analyzing the difference between the curves.
15. Click **Finish**.

You can see your printing condition's new curve information in the *Details pane* of the *Printing Conditions explorer*.

You can also see it in the printing condition itself, on the *Printing* page.

5.7.6. Calibrating One Separation

If, after using your printing condition for some time, one of your separations is not printing as well anymore, you can recalibrate it to maintain good printing results.

If you only calibrated one separation (with a *Quick Calibration*), you can also use this to calibrate another one.

Note: You need to have the corresponding license to be able to do this.

1. Open your completed printing condition: in the **Printing Conditions** explorer, double-click it or right-click it and select **Open**.
2. Go to the **Printing** page.
3. Select the separation you want to re(calibrate) in the **Print Calibration Details** table, and click the **Calibrate Separation...** button.
4. In the **Print Chart** step, customize your test chart as desired, then save it and print it.

   Note: This is the same chart as the *Quick Calibration* chart.

   See *Creating the Test Chart* on page 83.
5. Evaluate the quality of your plate.

   See *Checking the Plate Quality* on page 85.
6. Evaluate the quality of your printed chart.

See *Checking the Print Quality* on page 86.

7. Measure the chart to find the best screen and curve.

   See *Measuring the Chart* on page 87.

8. Evaluate the highlights on your chart to find the best highlights settings.

   See *Evaluating the Highlights* on page 91.

9. Choose whether to copy your chosen separation's new screen and curve to other separations in your ink set.

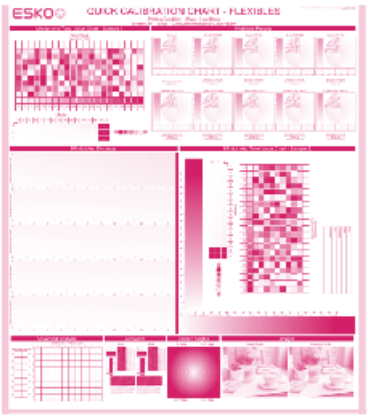
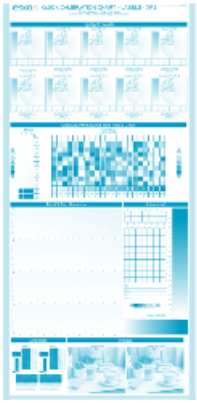
   See *Copy Calibration* on page 259.

10. After clicking **Finish**, then **Save and Close**, your printing condition is updated and ready to be used in production again.

Creating the Test Chart

In the **Save Test Chart** step, customize your test chart as desired and save it.

The application shows a preview of the test chart for Flexibles or Labels in your chosen ink. When you customize the chart, the preview is updated automatically to reflect your changes.

	
Quick calibration chart for Flexibles	Quick calibration chart for Labels

Use the various **Chart Options** to customize your test chart to fit your press needs.

1. Customize the dimensions of the chart using the **Chart Size** option.

   a) Unlock the **Chart Size** option by clicking on the

   b) Set your preferred **Width** and **Repeat Length**.

      If the preferred dimensions are higher than what is needed to print all the parts in a single chart, and the layout is set as:

      - **Complete Calibration Chart** then the parts will be placed in a single chart with blank space at the top or sides.

- **Split Calibration chart parts** then the layout will be changed to **Complete Calibration Chart** and all the parts will be placed on a single chart.

If the preferred dimensions are lower than what is needed to print all the parts in a single chart, and the layout is set as **Complete Calibration Chart** then the layout will be changed to **Split Calibration chart parts** and all the split charts will be of the preferred size.

Note: If the preferred size is lower than the dimensions needed to print the split charts, then the size will be automatically set to the minimun size required to print the split charts.

Tip: You can see the dimensions of the layout at the bottom of the preview.

2. Customize the layout of the chart using the various **Layout** options.
   - **Complete Calibration Chart** will place all different parts that need to be printed in a single chart. The chart size will be minimum width and length required to fit all the parts in a single chart.
   - **Split Calibration chart parts** will automatically split the layout into several smaller parts. All elements that need to be printed together will be placed on the same layout. Some parts may be rotated to fit the chart. When splitting using this method, each small chart will be of a different size. If you want to make all the charts to be of the same size, you can set the preferred dimensions using the **Chart Size** option.

Note: This is the behaviour only when the **Chart Size** options are locked. If the chart size is manually changed, the layout might get affected. Check the **Chart Size** section to know more about how the chart layout changes when chart size is modified.

Tip: You can see the dimensions of the layout at the bottom of the preview.

3. **Mirror Image**: select this for reverse printing.
4. **Add default bearer bars and slur marks**: the bearer bars help with the print stability, and the slur marks help you check the print quality.
5. **Add a custom element**: if you want to add an image or a technical element to the chart, for example to check the quality with something you use frequently.
   a) Click **Browse...**
   b) Browse to the location of the file.
   c) Click **Open**.

Note:

- The element needs to be a `.ct` file (Esko native image file format).
- Use the free CT/LP plug-in from Esko in Adobe® Photoshop® to create `.ct` files from your element(To download the free plug-in, search for 'CT/LP plug-in' on *esko.com*). Save the Photoshop document with Grayscale image mode to use in Quick Calibration.
- The `.ct` files cannot contain multiple layers. When the Photoshop document has multiple layers, merge all layers into a single layer before saving it as `.ct`.
- You can only add one element. If you want to add several elements, you first need to group them in Adobe® Photoshop®.

6. Save the chart:
   a) Click **Save Chart**.
   b) Browse to your desired folder.
   c) Specify a **File name** for your chart.
   d) Select the **File Type** you want to save: **LEN** or **Tiff**.

Note:

In most cases, we recommend you save the file as a **LEN** file, and use it directly on the CDI.

However, if you want to edit it to add extra elements specific to your production (different bearer bars for example), you should save it as **Tiff**, but make sure **you don't change** any of the technical elements! Please see *this knowledge base article* to know more about editing charts.

   e) Click **Save**.

   It could take several minutes to create the file.

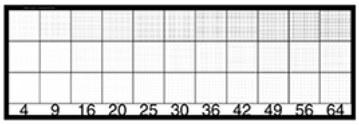
Note: If you change any parameter in your printing condition, **always** create a new chart, to make sure you have the correct elements for your printing condition in your chart (as the chart is based on numerous parameters from the previous steps like application, dot shape, surface screening...).

7. **Image the plates** on your CDI according to your company's Standard Operating Procedures, AND using the settings specified in the previous steps.
8. Once the imaged, exposed and processed plate, you can *check the plate quality*.

Checking the Plate Quality

The **Check Plates** step, you need to check the dot fail test

Click **Learn more about evaluating this area** to open documents with guidelines on how to evaluate these elements. You can find: evaluation guidelines for the dot fail test in the *Standard Operating Procedure for verifying plate quality*.



1. Check the **Dot Fail** test on the plate as follows:
   - Use a magnifying glass.
   - Check the center and lower row.
   - The smallest number where all dots are in position gives the resulting value.
   - Verify all elements on the plate.
   - Compare your result to the value that was found as good quality during the CDI's installation. This should be the same value you used during the *plate and press calibration*.
2. **Accept** if the result matches the reference, or **Reject** if the result doesn't match.

   If the result doesn't match, you need to troubleshoot the problem that is causing the low quality dots, remake the plate and evaluate the dots again.

Once you are satisfied with the plate quality, print a few copies of your chart and move on to *check the print quality*

Note: The **Next** button will be disabled if you reject the plate quality.

Checking the Print Quality

Make a Print using the plates, according to the settings you entered in the printing condition and your company's Standard Operating Procedures.

Note:

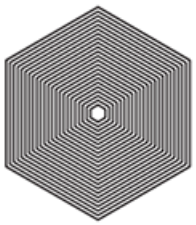
To make sure the screens and curves that will be created are accurate for your production process, your measurement data needs to be representative of your complete print run.

We therefore recommend that:

- you print another 50 to 100 meters (or more if this better reflects your production) after the press has reached your regular quality,
- you select 5 (or at least 3) copies in that "regular quality" print run: from the beginning, the middle and the end.

Once you've printed a few copies of your chart, check the slur marks in the **Verify Print Quality** step.

Click **Learn more about evaluating this area** to open documents with guidelines on how to evaluate these elements. You can find evaluation guidelines for slur marks and registration marks in the *Standard Operating Procedure for verifying print quality*.



Check the **Slur Marks** on your prints the following way:

a) Use a magnifying glass.
b) Follow the guidelines in the Standard Operating Procedure (click *Learn more about evaluating this area* to access it).
c) Make sure that all relevant marks on the print are good.
d) Verify all copies.
e) Accept or Reject the quality of the slur marks:

- click **Accept** if you are satisfied with the quality of the slur marks,
- click **Reject** if you aren't.

  If the marks on one or more copies are not satisfactory, find other copies of the test chart to evaluate (for example from around 30 m on the same run).

  If only one copy (or none) is good, troubleshoot with the press operator and reprint.

Once you are satisfied with the print quality, click **Next** and move on to *measuring the chart* to find the best screen and curve.

Note: The **Next** button will be disabled if you reject the quality of the slur marks.

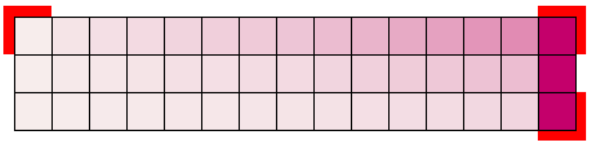
Measuring the Chart

You should now measure the chart to find the best screen and curve.

1. **Measure** the **Mindot Chart**.

   "Mindot" stands for "minimum dot". This chart will be used to determine the best screen for the highlights.

   You can use either an X-Rite i1 Pro or X-Rite i1iO spectrophotometer, in patch or scan mode. No other measurement devices are supported.



   a) Get ready to measure your print sample:

      1. Cut out the mindot chart from your first copy. To measure with the i1 Pro, we recommend you cut off the text before each row.

2. Place your sample on your spectrophotometer table or on the backing you typically use for measuring prints.
3. Make sure your spectrophotometer is connected to your computer.

Note:

With the cogwheel ( ) at the bottom right, you can stop, calibrate and reconnect your spectrophotometer, change the measurement mode and the measurement condition.

See the **Using a Spectrophotometer** chapter in the *Color Pilot user guide*.

b) Measure your chart following the instructions on screen (above the pause and play icons).

The preview will show the instructions and the measurement progress.

Tip:

After you are done measuring a page, you can save the measurement data as a measurement file if desired (in the CGATS - Committee for Graphic Arts Technologies Standards - color measurement format):

- Go back to the page you have just measured using the back arrow.
- Click the cogwheel ( ) at the bottom right and select **Save measurement...**
- Choose a location to save your measurements file (with the `.txt` extension).

Tip:

Alternatively, if you had already measured your chart and saved the measurement, you can load your measurement file instead of re-measuring it here.

1. Make sure that your measurement file is a CGATS (Committee for Graphic Arts Technologies Standards color measurement format) file, with the `.it8`, `.txt` or `.cgats` extension.
2. Click the cogwheel ( ) at the bottom right and select **Load Measurement...**

2. After you are done measuring, check the **Measurement results** on the next page.

a) Check the preview.

The patches are split diagonally , with the measured color at the top left, and the expected color (from your *printing standard*) at the bottom right. They should have approximately the same color.

Note:

The comparison of the measurements and the expected color is an approximation. Only look for clear differences:

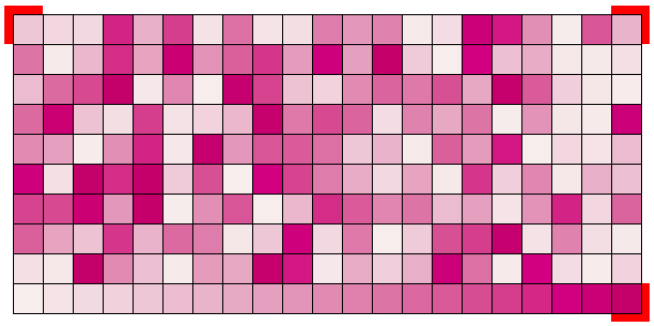
- if the color is completely different, you may have measured the wrong row, or your chart may be upside down;
- if they are the same color, but there is a very big difference in lightness: the chart may not be printed correctly, or there may be an issue with the measurement device.

b) If your measurement is good, click **Accept** and continue to the next step, otherwise click **Reject** and measure again (either the same chart if for example you measured it incorrectly, or another chart from the print run).

3. Measure the **Tone Value Chart**.

   This will be used to create the dot gain compensation curves.

   You can use either an X-Rite i1 Pro or X-Rite i1iO spectrophotometer, in patch or scan mode. No other measurement devices are supported.



   a) Get ready to measure your print sample:

      1. Cut out the tone value chart from the same copy as the mindot chart you measured.
      2. Use the same spectrophotometer as the one you used to measure the mindot chart.

   b) Measure your chart following the instructions on screen (above the pause and play icons).

   The preview will show the instructions and the measurement progress.

4. Check the measurements results.

   a) Check the preview.

      The patches' measured color at the top left should have approximately the same color as the expected color at the bottom right.

Note:

In this step we mainly want to detect if the charts were measured correctly (not upside down, mirrored...).

If the color in the patch is the same, but there is a big difference in lightness, this is probably not an issue. The dot gain compensation curve created from these measurements will correct for this.

b) Select which data you want to compare your measurements with, in the list above the preview.

After the first measurement you can only compare your measured data to the **Standard** (*your chosen printing standard*).

After you measure more copies, you can also compare to the **Average** of all measurements (including the current one), and to previous measurements individually.

Note: When comparing different measurement samples, if one of the samples is printed very differently, it could be an exception. In this case you shouldn't include it in your average.

c) Check the **solid density** (under **Solid Info**, to the right of the preview).

The **Measured Density** should be within tolerance of your **Desired Density** (taken from your *printing standard*). Use the same density tolerance as your company uses on press (typically + or - 0,05).

Select the density standard you use on your measurement device (ANSI A, DIN...), from the **Density Formula** list at the bottom.

Note: If you chose a standard that uses an ICC profile, you will not see a **Desired Density** for your ink, because the density calculation requires spectral data, which is not available in ICC profiles.

d) Check the **color difference** between the measured and expected solid color.

You can see **LabCh** values for both colors next to a bigger split patch, and a **ΔE** (color difference) value. Check whether this ΔE value is within the ΔE tolerance that your company uses.

By default, the wizard uses the ΔE formula you set in Color Pilot's preferences, but you can choose a different one in the **ΔE Formula** list below.

e) If everything is OK, click **Accept** and continue.

Otherwise click **Reject** and measure again.

Note:

In this case, you need to measure both the mindot chart and the tone value chart again. This is because:

- different samples may be printed somewhat differently, so you shouldn't mix print samples,
- if you detect a printing issue on the tone value chart, then it is likely that the complete print sample is not representative, and that your mindot measurement is not that reliable.

5. In the next screen, select **Measure another sample** if needed.

> **Note:** To make sure your final screen and curve are accurate and reliable, the measurements need to be an average of a complete print run. Measure a minimum of 3 charts of a good print quality (we advise to use 5).

You will be guided to measure the next sample, following the same procedure. The wizard will indicate how many charts you already measured: sample 1, sample 2...

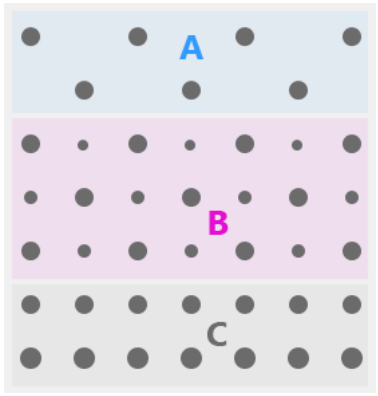
6. After you measured enough charts of good quality, you can select **Stop measuring and inspect the resulting screens**.

Evaluating the Highlights

You now need to evaluate and choose the highlight settings that are best for your production, to finish setting up your custom screen and curve.

These settings are:

- The **Mindot** (or minimum dot): the minimum size that a dot can have in the highlights, while printing in a stable and clear way.
- The **Mindot distance**: the maximum distance between these minimum dots, to ensure highlights that print well.
- The **Transitional mindot**: even smaller dots that support the mindots in the transitional areas (between FM screening in the highlights and AM screening in the midtones).



- **A)** In the lightest highlights, there are only **Mindots** (separated by a distance no larger than the **Mindot distance**).
- **B)** As highlights get darker, increasingly smaller dots are added to the spaces between the regular dots.

  Once the screen grid is completely filled, the screen reaches the transition point. The last and smallest dot size added before the transition point is the **Transitional mindot**.
- **C)** In the midtones, the **Transitional mindots** reach the size of the regular **Mindots**, and the screen becomes a standard screen.

1. You can see an analysis of the mindot chart measurements.

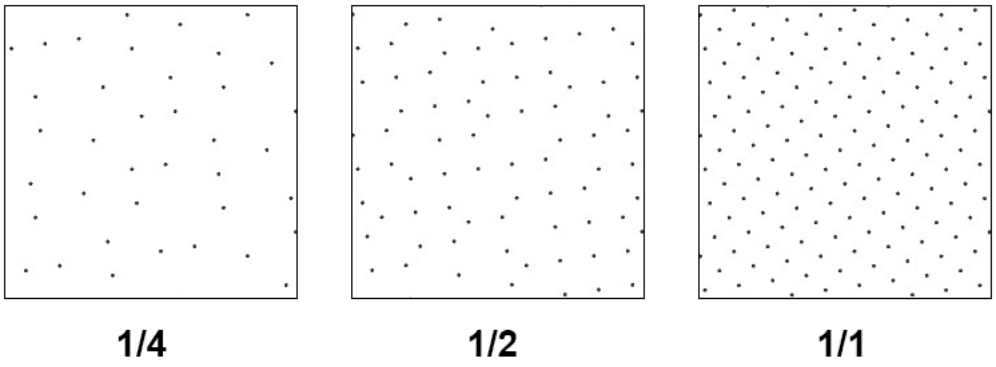
Dot Size (px)	0	6	9	12	16	19	22	25	31	36	42	47	54	60	Solid
Mindot Distance 0.17 mm (1/1)		4,9 ✗	7,1 ✓	9,8	14,2	17,8	21,4	24,8	31,8	37,6	43,8	48,7	56,2	62,3	
0.24 mm (1/2)		2,2 ✗	3,1 ✓	4,9	6,7	7,1	8,9	9,8	13,4	17,0	20,0	22,4	27,1	30,6	
0.34 mm (1/4)		0,4 ✗	1,3 ✗	2,2 ✓	3,1	3,1	4,0	4,9	5,8	7,1	8,0	8,9	11,0	13,4	

For the three **Mindot Distances** on the chart, the wizard shows which **Dot Size** is optimal. This is the smallest mindot size that gives a good print quality.

Note:

The fraction next to the distance indicates the amount of dots used to print the highlights.

- **1/1** means that means that all the dots are kept (the screen doesn't use FM screening).
- **1/2** means that half of the dots are kept (resulting in FM screening).
- **1/4** means that a quarter of the dots are kept (resulting in FM screening). This gives lighter highlights, but may increase graininess.



2. Examine these highlights on the print to decide if you agree with these results.
3. Under **Set Highlight Settings**, choose the best highlight settings for your production process based on what you found.
   a) Select the **Mindot Distance** you typically use for your production.

      By default, the biggest distance measured from the chart is filled in. If you choose one of the measured distances, you will see **(Measured)** next to it.
   b) Select the **Mindot** that you found to be the best for your mindot distance.

      By default, the mindot size that the wizard found the best for that mindot distance is selected. This can either be a **Measured** mindot size, or a size calculated based on the other measurements (**Estimated**).

      If you choose a different size, you will still see an indication of what the wizard recommends next to **Measured** or **Estimated**.

      Note: The bigger the **Mindot Distance** is, the bigger your **Mindot** needs to be, to give you a stable print.
   c) Select the **Transitional Mindot** based on your visual inspection of the **1/1** row.

      By default, the **Transitional Mindot** with a green check mark on the **1/1** line in the wizard is selected.
4. Under **Selected Screen and Curve**, you can see the details of screen that the wizard created based on your chosen settings:

- the **Ink** that this screen is for,
- the **Screen Name** (this is generated based on the settings used),
- the screen **Code** (you can change this if desired: click **Select** and choose another free screen code from the list shown),
- the **Largest Mindot** size in microns or milli-inches (corresponding to the mindot you chose above),
- the **Curve Bump** (this is the smallest input percentage you can print with this screen, all smaller percentages are "bumped up" to this value; this data will be included in the curve generated by the wizard),
- the **Estimated Lightest Tone Value** (the percentage that the smallest input percentage from the **Curve Bump** gives on print).

5. Click **Next** to generate your custom screen and curve, based on your separation's measurements.

   This may take some time.

Copy Calibration

Once the wizard calculated the best curve and screen for your chosen separation, you need to decide what to do for the remaining separations.

In the **Copy Calibration of (Separation Name) to Other Separations** step, you can see the **New Screen** and **New Adjustment Curve** that the wizard calculated for your chosen separation.

You can also see the existing screens and curves used until now for the other separations.

- If you want to copy the screen and curve you just found for your chosen separation to (some of) the remaining separations, do the following:
  a) Under **Copy Calibration to Other Separations**, select the separations you want to copy your new screen and curve to.
  b) Click **Finish**.
- If you want to keep the existing screens and curves for the other separations, just click **Finish**.

Note: The settings for **Other Inks** are used for spot colors.

5.8. Editing Corrugated Printing Conditions

As small changes, aging of printing equipment and/or fluctuations in production over time are perfectly normal, you may need to make some small changes to your printing condition in the future.

For example, if the current surface screening is not delivering the same quality anymore, it could be necessary to review the settings.

We recommend to only do this if all other possibilities (adapting CDI and press machine settings, checking printing tools...) failed to maintain the quality.

Depending on the type of corrugated printing condition you want to edit, see:

- *Editing a Standard Post Print Corrugated Printing Condition* on page 260
- *Editing a High Quality Corrugated Printing Condition* on page 260

5.8.1. Editing a Standard Post Print Corrugated Printing Condition

1. Open the printing condition: right-click it and select **Open**, or double-click it.
2. In the *General* step, you can edit the **Description** and **Keywords**.
3. In the *Board* step:
   - You can change the **Board Fluting**, **Board Style** and **Description** as you wish.
   - If you want to change the **Board Liner**, you will need to redo the step about *choosing a screen* for your inks.
4. In the *Plate Making* step, changing any of the essential parameters (marked with a green check ✔) means that you will need to redo the step about *choosing a screen* for your inks.
5. In the *Press and Inks* step, you can *add* or *modify* inks (and choose screens for these inks).

5.8.2. Editing a High Quality Corrugated Printing Condition

Note: To work with printing conditions for High Quality Post Print Corrugated, you need to have the corresponding license.

Update the Curves

As small changes, aging of printing equipment and/or fluctuations in production over time are perfectly normal, some curves will need to be slightly modified (updated) at certain times.

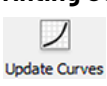
At any point in the process you can stop working on your printing condition and continue later. Use the buttons **Close** and **Quit Now and Continue Later**. Don't forget to **Save** when asked.

In the **Printing Conditions** library, the printing condition will get the mark in front of the name.

When you are ready to continue, start the wizard. You will be asked to **Resume** or to **Start a new session**. Click **Resume** to continue editing your printing condition.

Note:

- You can continue to use the printing condition, even if you didn't finish editing it.
- You can only have one unfinished session per printing condition. If you want to *add a new ruling* or update the curves, you need to first finish the current session, otherwise the new session will overwrite the unfinished session.
- It is possible to remove an unfinished task: right-click your printing condition and select **Remove Unfinished Task**.

1. Start updating the curves:
   - In the **Printing Conditions** library, select a finished printing condition and click the **Update Curves** 

button in the bottom toolbar.

- In the **Printing Conditions** library, right-click the printing condition and select **Update Curves...**
- Open the printing condition and click the **Update Curves...** link in the **Screens and Curves** overview.

2. In the **Choose Ruling** step, you see an overview of the inks in your printing condition, with their screens and curves.

   If you have *added several rulings* to your printing condition, you can see the **Adjustment Curves** for each ruling.

   Underneath, choose the **ruling to update adjustment curves for** (you can only select one of the rulings in your printing condition).
3. From this point on, the wizard is identical to *Add a Ruling* on page 241. Follow steps 4 to 19 of this procedure.
4. In the **Print Test Chart** step, customize your test chart as desired, then save it and print it.

   See *Creating and Printing the Test Chart* on page 261.
5. Verify the print quality.

   See *Checking the Print Quality* on page 264.
6. Measure the tone value chart on your print.

   See *Measuring the Chart* on page 265.
7. Inspect the resulting adjustment curves for your new ruling.

   See *Inspecting the Curves* on page 267.
8. When you are done, click **Finish**.

You can see your printing condition's new curve information in the *Details pane* of the *Printing Conditions explorer*.

You can also see it in the printing condition itself, on the **Screens and Curves** page.

Creating and Printing the Test Chart

In the **Print Test Chart** step, customize your test chart as desired, then save it and print it.

Note: We recommend you print this test chart several times (at least 3, but preferably 5) to make sure your measurements are representative of your printing output.

The application shows a preview of the chart layout. When your customize the chart, the preview is updated automatically to reflect your changes.

1. Customize the dimensions of the chart using the **Chart Size** option.
   a) Unlock the **Chart Size** option by clicking on the
   b) Set your preferred **Width** and **Repeat Length**.

   If the preferred dimensions are higher than what is needed to print all the parts in a single chart, and the layout is set as:

   - **Complete Calibration Chart** then the parts will be placed in a single chart with blank space at the top or sides.
   - **Split Calibration chart parts** then the layout will be changed to **Complete Calibration Chart** and all the parts will be placed on a single chart.

   If the preferred dimensions are lower than what is needed to print all the parts in a single chart, and the layout is set as **Complete Calibration Chart** then the layout will be changed to **Split Calibration chart parts** and all the split charts will be of the preferred size.

   Note: If the preferred size is lower than the dimensions needed to print the split charts, then the size will be automatically set to the minimun size required to print the split charts.

   Tip: You can see the dimensions of the layout at the bottom of the preview.

2. Customize the layout of the chart using the various **Layout** options.
   - **Complete Calibration Chart** will place all different parts that need to be printed in a single chart. The chart size will be minimum width and length required to fit all the parts in a single chart.
   - **Split Calibration chart parts** will automatically split the layout into several smaller parts. All elements that need to be printed together will be placed on the same layout. Some parts may be rotated to fit the chart. When splitting using this method, each small chart will be of a different size. If you want to make all the charts to be of the same size, you can set the preferred dimensions using the **Chart Size** option.

Note: This is the behaviour only when the **Chart Size** options are locked. If the chart size is manually changed, the layout might get affected. Check the **Chart Size** section to know more about how the chart layout changes when chart size is modified.

Tip: You can see the dimensions of the layout at the bottom of the preview.

3. **Mirror Image**: select this for reverse printing.
4. **Add default bearer bars and slur marks**: the bearer bars help with the print stability, and the slur marks help you check the print quality.
5. **Add a custom element**: if you want to add an image or a technical element to the chart, for example to check the quality with something you use frequently.
   a) Click **Browse...**
   b) Browse to the location of the file.
   c) Click **Open**.

   Note:
   - The element needs to be a `.ct` file (Esko native image file format).
   - Use the free CT/LP plug-in from Esko in Adobe® Photoshop® to create `.ct` files from your element.(To download the free plug-in, search for 'CT/LP plug-in' on *esko.com*)

     Save the Photoshop document with CMYK or Multichannel imaging modes. Spot-channels will only be included if Multichannel mode is used. So to write a CMYK file with an extra spot channel, convert it to multichannel mode before saving it as a `.ct` file.
   - The `.ct` files cannot contain multiple layers. When the Photoshop document has multiple layers, merge all layers into a single layer before saving it as `.ct`.
   - You can only add one element. If you want to add several elements, you first need to group them in Adobe® Photoshop®.
6. Save the chart:
   a) Click **Save Chart**.
   b) Browse to your desired folder.
   c) Specify a **File name** for your chart.
   d) Select the **File Type** you want to save: **LEN** or **Tiff**.

   Note:

   In most cases, we recommend you save the file as a **LEN** file, and use it directly on the CDI.

   However, if you want to edit it to add extra elements specific to your production (different bearer bars for example), you should save it as **Tiff**, but make sure **you don't change** any of the technical elements! Please see *this knowledge base article* to know more about editing charts.

   e) Click **Save**.

   It could take several minutes to create the file.

Note: If you change any parameter in your printing condition, **always** create a new chart, to make sure you have the correct elements for your printing condition in your chart (as the chart is based on numerous parameters from the previous steps like application, dot shape, surface screening...).

7. **Image the plates** on your CDI according to your company's Standard Operating Procedures, AND using the settings specified in the printing condition.
8. **Make a Print** using these plates, according to the settings you entered in the printing condition and your company's Standard Operating Procedures.

Note:

To make sure the screens and curves that will be created are accurate for your production process, your measurement data needs to be representative of your complete print run.

We therefore recommend that:

- you print another 50 to 100 meters (or more if this better reflects your production) after the press has reached your regular quality,
- you select 5 (or at least 3) copies in that "regular quality" print run: from the beginning, the middle and the end.

9. Once you have printed your chart, you can *check the print quality*.

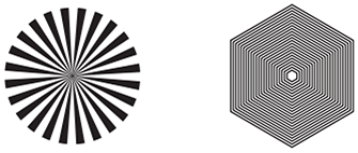
Checking the Print Quality

Once you have *printed a few copies* of your chart, you need to verify the print quality (in **Verify Print Quality** step).

The **Verify Print Quality** step, you need to check 3 elements: the slur marks, the gradient, and the registration marks.

Click **Learn more about evaluating this area** to open documents with guidelines on how to evaluate these elements. You can find evaluation guidelines for the slur marks and registration marks in the *Standard Operating Procedure for verifying print quality*, and evaluation guidelines for the gradient in the *Standard Operating Procedure for evaluating highlights*.

1. Check the slur marks.



a) Check your prints the following way:

- Use a magnifying glass.
- Follow the guidelines in the Standard Operating Procedure (click *Learn more about evaluating this area* to access it).
- Make sure that all relevant marks on the print are good.
- Verify all copies.

b) Back in the wizard:

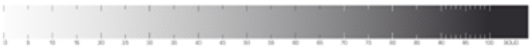
- click **Accept** if you are satisfied with the quality of the slur marks,
- click **Reject** if you aren't.

2. Check the **Registration marks**.

a) Check the registration marks on the print using the same guidelines as for the slur marks.

b) In the wizard, **Accept** or **Reject** the quality of the registration marks.

3. Check the **Gradient**.



a) Check the gradient on print:

The gradient should be smooth from the highlights to the solid.

b) **Accept** or **Reject** the gradient quality.

4. If you are satisfied with the quality of all three areas, you can move on to *measuring the chart*.

However, if you rejected or more checks, you need to either:

- find other copies of the test chart to evaluate (for example from around 30 m on the same run),
- troubleshoot with the press operator and reprint.

If the new tests are positive, you can change the status from **Reject** to **Accept** for that area.

Alternatively, you can create a new printing condition for this ruling. To decide whether to do this, compare this test chart to the test chart that you used to set up your screens and curves.

Measuring the Chart

1. Measure the **Tone Value Chart** of the first sample.

You can use either an X-Rite i1 Pro or X-Rite i1iO spectrophotometer, in patch or scan mode. No other measurement devices are supported.

a) Get ready to measure your print sample:

1. Cut out the tone value chart from your first copy.
2. Place your sample on your spectrophotometer table or on the backing you typically use for measuring prints.
3. Make sure your spectrophotometer is connected to your computer.

Note: With the cogwheel ( ) at the bottom right, you can stop, calibrate and reconnect your spectrophotometer, change the measurement mode and the measurement condition. See the chapter **Using a Spectrophotometer** in the Color Pilot user guide: *https://www.esko.com/en/support/product?id=Color%20Pilot*.

b) Measure your chart following the instructions on screen (above the pause and play icons).

The preview will show the instructions and the measurement progress.

2. After you are done measuring, check the **Measurement results** on the next page.

a) Check the preview.

The patches are split diagonally , with the measured color at the top left, and the expected color (from your *printing standard*) at the bottom right. They should have approximately the same color.

Note: If the color in the patch is the same, but there is a big difference in lightness, this is probably not an issue. The dot gain compensation curve created from these measurements will correct for this.

b) Select which data you want to compare your measurements with, in the list above the preview.

After the first measurement you can only compare your measured data to the **Standard** (*your chosen printing standard*).

After you measure more copies, you can also compare to the **Average** of all measurements (including the current one), and to previous measurements individually.

Note: When comparing different measurement samples, if one of the samples is printed very differently, it could be an exception. In this case you shouldn't include it in your average.

c) Check the **solid density** (under **Solid Info**, to the right of the preview).

The **Measured Density** should be within tolerance of your **Desired Density** (taken from your *printing standard*). Use the same density tolerance as your company uses on press (typically + or - 0,05).

Select the density standard you use on your measurement device (ANSI A, DIN...), from the **Density Formula** list at the bottom.

Note: If you chose a standard that uses an ICC profile, you will not see a **Desired Density** for your ink, because the density calculation requires spectral data, which is not available in ICC profiles.

d) Check the **color difference** between the measured and expected solid color.

You can see **LabCh** values for both colors next to a bigger split patch, and a **ΔE** (color difference) value. Check whether this ΔE value is within the ΔE tolerance that your company uses.

By default, the wizard uses the ΔE formula you set in Color Pilot's preferences, but you can choose a different one in the **ΔE Formula** list below.

Note: If your ink set contains OGV inks, you will see that there is no **Desired Density**, **Desired LabCh** values and **ΔE** for these inks. This is because there are no standards for these inks, so there is nothing to match.

e) If everything is OK, click **Accept** and continue.

Otherwise click **Reject** and measure again.

3. In the next screen, select **Measure another sample** if needed.

Note: To make sure your measurements are an average of a complete print run, you should measure a minimum of 3 charts of a good print quality (we advise to use 5).

You will be guided to measure the next sample, following the same procedure. The wizard will indicate how many charts you already measured: sample 1, sample 2...

4. After you measured enough charts of good quality, you can select **Stop measuring and inspect the resulting curves**.

After that you can *inspect the adjustment curves* for your new ruling.

Inspecting the Curves

In the **Inspect Results** step, inspect the resulting adjustment curves calculated from your measurements.

1. For each ink, you can see the original curve and the new curve for your chosen ruling.
2. You can also see a graph comparing the two curves for each ink.

The colored curve is the new adjustment curve, and the gray curve is the original adjustment curve.

If your ink set has expanded gamut inks, you can see the CMYK inks and the expanded gamut inks in different tabs.

3. Select which curves you want to use for your inks:
   - Select **Use new adjustment curves** if the new curves deviate too much from the original curves.
   - Select **Keep used adjustment curves** if there is little to no difference between the new and the original curves.

   Note: The wizard recommends the best option based on the difference between the curves.

4. Click **Finish** when you are done.

You can see your printing condition's new curve information in the *Details pane* of the *Printing Conditions explorer*.

You can also see it in the printing condition itself, on the **Screens and Curves** page.

Add a Ruling

When you created your printing condition *for high quality post print corrugated*, you typically selected the main ruling used in your production. If you are also using other rulings for this printing condition, you can add them one by one to your finished printing condition.

All rulings will use the same screening setting, only the curves will be different. A wizard will guide you through the steps to print and measure a test chart.

Important: The chart is **different** from the chart used in *printing calibration*, it only contains the tone value part. **Don't** re-use the plates made for printing calibration!

Note:

You can only add the two rulings closest (one lower, one higher) to the ruling that was used during setup of the printing condition. This is because when deviating too much from the original ruling, the screening parameters are no longer valid.

Once you have added all available rulings to the printing condition, you will see an error message if you try adding more rulings.

At any point in the process you can stop working on your printing condition and continue later. Use the buttons **Close** and **Quit Now and Continue Later**. Don't forget to **Save** when asked.

In the **Printing Conditions** library, the printing condition will get the mark in front of the name.

When you are ready to continue, start the wizard. You will be asked to **Resume** or to **Start a new session**. Click **Resume** to continue editing your printing condition.

Note:

- You can continue to use the printing condition, even if you didn't finish editing it.
- You can only have one unfinished session per printing condition. If you want to add a new ruling or *update the curves*, you need to first finish the current session, otherwise the new session will overwrite the unfinished session.
- It is possible to remove an unfinished task: right-click your printing condition and select **Remove Unfinished Task**.

1. Start adding a new ruling:
   - In the **Printing Conditions** library, select a finished printing condition and click the **Add Ruling**

button in the bottom toolbar.
   - In the **Printing Conditions** library, right-click the printing condition and select **Add Ruling...**
   - Open the printing condition and click the **Add Ruling...** button on the printing calibration page.

   This opens the **Add Ruling** wizard.
2. In the **Choose Ruling** step, you see an overview of the inks in your printing condition, with their screens and curves for the current ruling.

   Underneath, choose the **ruling to add to your printing condition**.
3. In the **Print Test Chart** step, customize your test chart as desired, then save it and print it.

   See *Creating and Printing the Test Chart* on page 261.
4. Verify the print quality.

   See *Checking the Print Quality* on page 264.
5. Measure the tone value chart on your print.

   See *Measuring the Chart* on page 265.
6. Inspect the resulting adjustment curves for your new ruling.

   See *Inspecting the Curves* on page 275.
7. When you are done, click **Finish**.

You can see your printing condition's new curve information in the *Details pane* of the *Printing Conditions explorer*.

You can also see it in the printing condition itself, on the *Printing* page.

Creating and Printing the Test Chart

In the **Print Test Chart** step, customize your test chart as desired, then save it and print it.

Note: We recommend you print this test chart several times (at least 3, but preferably 5) to make sure your measurements are representative of your printing output.

The application shows a preview of the chart layout. When your customize the chart, the preview is updated automatically to reflect your changes.

1. Customize the dimensions of the chart using the **Chart Size** option.
   a) Unlock the **Chart Size** option by clicking on the
   b) Set your preferred **Width** and **Repeat Length**.

   If the preferred dimensions are higher than what is needed to print all the parts in a single chart, and the layout is set as:

   - **Complete Calibration Chart** then the parts will be placed in a single chart with blank space at the top or sides.
   - **Split Calibration chart parts** then the layout will be changed to **Complete Calibration Chart** and all the parts will be placed on a single chart.

   If the preferred dimensions are lower than what is needed to print all the parts in a single chart, and the layout is set as **Complete Calibration Chart** then the layout will be changed to **Split Calibration chart parts** and all the split charts will be of the preferred size.

   Note: If the preferred size is lower than the dimensions needed to print the split charts, then the size will be automatically set to the minimun size required to print the split charts.

   Tip: You can see the dimensions of the layout at the bottom of the preview.

2. Customize the layout of the chart using the various **Layout** options.
   - **Complete Calibration Chart** will place all different parts that need to be printed in a single chart. The chart size will be minimum width and length required to fit all the parts in a single chart.
   - **Split Calibration chart parts** will automatically split the layout into several smaller parts. All elements that need to be printed together will be placed on the same layout. Some parts may be rotated to fit the chart. When splitting using this method, each small chart will be of a different size. If you want to make all the charts to be of the same size, you can set the preferred dimensions using the **Chart Size** option.

Note: This is the behaviour only when the **Chart Size** options are locked. If the chart size is manually changed, the layout might get affected. Check the **Chart Size** section to know more about how the chart layout changes when chart size is modified.

Tip: You can see the dimensions of the layout at the bottom of the preview.

3. **Mirror Image**: select this for reverse printing.
4. **Add default bearer bars and slur marks**: the bearer bars help with the print stability, and the slur marks help you check the print quality.
5. **Add a custom element**: if you want to add an image or a technical element to the chart, for example to check the quality with something you use frequently.
   a) Click **Browse...**
   b) Browse to the location of the file.
   c) Click **Open**.

   Note:
   - The element needs to be a `.ct` file (Esko native image file format).
   - Use the free CT/LP plug-in from Esko in Adobe® Photoshop® to create `.ct` files from your element.(To download the free plug-in, search for 'CT/LP plug-in' on *esko.com*)

     Save the Photoshop document with CMYK or Multichannel imaging modes. Spot-channels will only be included if Multichannel mode is used. So to write a CMYK file with an extra spot channel, convert it to multichannel mode before saving it as a `.ct` file.
   - The `.ct` files cannot contain multiple layers. When the Photoshop document has multiple layers, merge all layers into a single layer before saving it as `.ct`.
   - You can only add one element. If you want to add several elements, you first need to group them in Adobe® Photoshop®.
6. Save the chart:
   a) Click **Save Chart**.
   b) Browse to your desired folder.
   c) Specify a **File name** for your chart.
   d) Select the **File Type** you want to save: **LEN** or **Tiff**.

   Note:

   In most cases, we recommend you save the file as a **LEN** file, and use it directly on the CDI.

   However, if you want to edit it to add extra elements specific to your production (different bearer bars for example), you should save it as **Tiff**, but make sure **you don't change** any of the technical elements! Please see *this knowledge base article* to know more about editing charts.

   e) Click **Save**.

   It could take several minutes to create the file.

Note: If you change any parameter in your printing condition, **always** create a new chart, to make sure you have the correct elements for your printing condition in your chart (as the chart is based on numerous parameters from the previous steps like application, dot shape, surface screening...).

7. **Image the plates** on your CDI according to your company's Standard Operating Procedures, AND using the settings specified in the printing condition.
8. **Make a Print** using these plates, according to the settings you entered in the printing condition and your company's Standard Operating Procedures.

Note:

To make sure the screens and curves that will be created are accurate for your production process, your measurement data needs to be representative of your complete print run.

We therefore recommend that:

- you print another 50 to 100 meters (or more if this better reflects your production) after the press has reached your regular quality,
- you select 5 (or at least 3) copies in that "regular quality" print run: from the beginning, the middle and the end.

9. Once you have printed your chart, you can *check the print quality*.

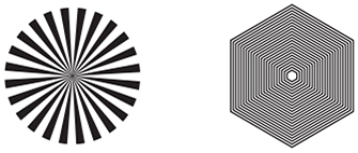
Checking the Print Quality

Once you have *printed a few copies* of your chart, you need to verify the print quality (in **Verify Print Quality** step).

The **Verify Print Quality** step, you need to check 3 elements: the slur marks, the gradient, and the registration marks.

Click **Learn more about evaluating this area** to open documents with guidelines on how to evaluate these elements. You can find evaluation guidelines for the slur marks and registration marks in the *Standard Operating Procedure for verifying print quality*, and evaluation guidelines for the gradient in the *Standard Operating Procedure for evaluating highlights*.

1. Check the slur marks.



a) Check your prints the following way:

- Use a magnifying glass.
- Follow the guidelines in the Standard Operating Procedure (click *Learn more about evaluating this area* to access it).
- Make sure that all relevant marks on the print are good.
- Verify all copies.

b) Back in the wizard:

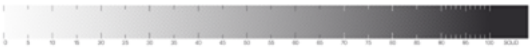
- click **Accept** if you are satisfied with the quality of the slur marks,
- click **Reject** if you aren't.

2. Check the **Registration marks**.

a) Check the registration marks on the print using the same guidelines as for the slur marks.

b) In the wizard, **Accept** or **Reject** the quality of the registration marks.

3. Check the **Gradient**.



a) Check the gradient on print:

The gradient should be smooth from the highlights to the solid.

b) **Accept** or **Reject** the gradient quality.

4. If you are satisfied with the quality of all three areas, you can move on to *measuring the chart*.

However, if you rejected or more checks, you need to either:

- find other copies of the test chart to evaluate (for example from around 30 m on the same run),
- troubleshoot with the press operator and reprint.

If the new tests are positive, you can change the status from **Reject** to **Accept** for that area.

Alternatively, you can create a new printing condition for this ruling. To decide whether to do this, compare this test chart to the test chart that you used to set up your screens and curves.

Measuring the Chart

1. Measure the **Tone Value Chart** of the first sample.

You can use either an X-Rite i1 Pro or X-Rite i1iO spectrophotometer, in patch or scan mode. No other measurement devices are supported.

a) Get ready to measure your print sample:

1. Cut out the tone value chart from your first copy.
2. Place your sample on your spectrophotometer table or on the backing you typically use for measuring prints.
3. Make sure your spectrophotometer is connected to your computer.

Note: With the cogwheel ( ) at the bottom right, you can stop, calibrate and reconnect your spectrophotometer, change the measurement mode and the measurement condition. See the chapter **Using a Spectrophotometer** in the Color Pilot user guide: *https://www.esko.com/en/support/product?id=Color%20Pilot*.

b) Measure your chart following the instructions on screen (above the pause and play icons).

The preview will show the instructions and the measurement progress.

2. After you are done measuring, check the **Measurement results** on the next page.

a) Check the preview.

The patches are split diagonally , with the measured color at the top left, and the expected color (from your *printing standard*) at the bottom right. They should have approximately the same color.

Note: If the color in the patch is the same, but there is a big difference in lightness, this is probably not an issue. The dot gain compensation curve created from these measurements will correct for this.

b) Select which data you want to compare your measurements with, in the list above the preview.

After the first measurement you can only compare your measured data to the **Standard** (*your chosen printing standard*).

After you measure more copies, you can also compare to the **Average** of all measurements (including the current one), and to previous measurements individually.

Note: When comparing different measurement samples, if one of the samples is printed very differently, it could be an exception. In this case you shouldn't include it in your average.

c) Check the **solid density** (under **Solid Info**, to the right of the preview).

The **Measured Density** should be within tolerance of your **Desired Density** (taken from your *printing standard*). Use the same density tolerance as your company uses on press (typically + or - 0,05).

Select the density standard you use on your measurement device (ANSI A, DIN...), from the **Density Formula** list at the bottom.

Note: If you chose a standard that uses an ICC profile, you will not see a **Desired Density** for your ink, because the density calculation requires spectral data, which is not available in ICC profiles.

d) Check the **color difference** between the measured and expected solid color.

You can see **LabCh** values for both colors next to a bigger split patch, and a **ΔE** (color difference) value. Check whether this ΔE value is within the ΔE tolerance that your company uses.

By default, the wizard uses the ΔE formula you set in Color Pilot's preferences, but you can choose a different one in the **ΔE Formula** list below.

Note: If your ink set contains OGV inks, you will see that there is no **Desired Density**, **Desired LabCh** values and **ΔE** for these inks. This is because there are no standards for these inks, so there is nothing to match.

e) If everything is OK, click **Accept** and continue.

Otherwise click **Reject** and measure again.

3. In the next screen, select **Measure another sample** if needed.

Note: To make sure your measurements are an average of a complete print run, you should measure a minimum of 3 charts of a good print quality (we advise to use 5).

You will be guided to measure the next sample, following the same procedure. The wizard will indicate how many charts you already measured: sample 1, sample 2...

4. After you measured enough charts of good quality, you can select **Stop measuring and inspect the resulting curves**.

After that you can *inspect the adjustment curves* for your new ruling.

Inspecting the Curves

In the **Inspect Results** step, inspect the resulting adjustment curves for your new ruling.

1. For each ink, you can see the curve for the original ruling, and the curve calculated for your new ruling from your measurements.
2. You can also see a graph comparing the two curves for each ink.

The colored curve is the curve calculated for the new ruling, and the gray curve is the original ruling's curve.

If your ink set has expanded gamut inks, you can see the CMYK inks and the expanded gamut inks in different tabs.

3. Select which curves you want to use for your inks:
   - Select **Use new adjustment curves** if the new curves deviate too much from the original curves.
   - Select **Use adjustment curves for xxx lpi** (where **xxx** is the original ruling) if there is little to no difference between the new and the original curves.

   Note: The wizard recommends the best option based on the difference between the curves.

4. Click **Finish** when you are done.

You can see your printing condition's new curve information in the *Details pane* of the *Printing Conditions explorer*.

You can also see it in the printing condition itself, on the **Screens and Curves** page.

Calibrating One Separation

If, after using your printing condition for some time, one of your separations is not printing as well anymore, you can recalibrate it to maintain good printing results.

Note: To work with printing conditions for High Quality Post Print Corrugated, you need to have the corresponding license.

1. Open your completed printing condition: in the **Printing Conditions** explorer, double-click it or right-click it and select **Open**.
2. Go to the **Printing** page.
3. Select the separation you want to re(calibrate) in the **Print Calibration Details** table, and click the **Calibrate Separation...** button.
4. In the **Select Screen Defaults** step, choose the **Surface Screening** and **Screen Dot Shape** to use in the test chart.

   Some widely used values are pre-selected, but you can change them as desired.

   Note: If you find that the values you chose here don't give you good enough results when evaluating the chart, you can change them later (before creating the final screen). See *Checking Your Screen Defaults* on page 284.

5. In the **Print Chart** step, customize your test chart as desired, then save it and print it.

   Note: If you initially did a *Quick Calibration*, this is the same Corrugated High Quality test chart as you used for that initial calibration.

   See *Creating the Test Chart* on page 216.

6. Evaluate the quality of your printed chart.

   See *Checking the Print Quality* on page 219.

7. Measure the chart to find the best screen and curve.

See *Measuring the Chart* on page 220.

8. Check how well *your screen defaults* printed.

   See *Checking Your Screen Defaults* on page 284.

9. Evaluate the highlights on your chart to find the best highlights settings.

   See *Evaluating the Highlights* on page 257.

10. Choose whether to copy your chosen separation's new screen and curve to other separations in your ink set.

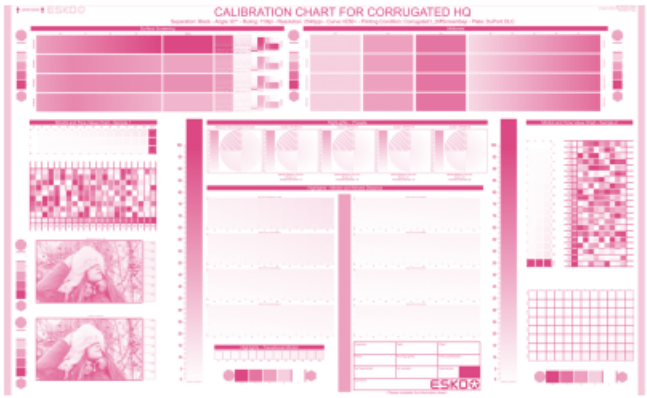
    See *Copy Calibration* on page 259.

11. After clicking **Finish**, then **Save and Close**, your printing condition is updated and ready to be used in production again.

Creating the Test Chart

In the **Save Test Chart** step, customize your test chart as desired and save it.

The application shows a preview of the Corrugated High Quality test chart in your chosen ink. When you customize the chart, the preview is updated automatically to reflect your changes.



Use the various **Chart Options** to customize your test chart to fit your press needs.

1. Customize the dimensions of the chart using the **Chart Size** option.
   a) Unlock the **Chart Size** option by clicking on the
   b) Set your preferred **Width** and **Repeat Length**.

      If the preferred dimensions are higher than what is needed to print all the parts in a single chart, and the layout is set as:

      - **Complete Calibration Chart** then the parts will be placed in a single chart with blank space at the top or sides.
      - **Split Calibration chart parts** then the layout will be changed to **Complete Calibration Chart** and all the parts will be placed on a single chart.

If the preferred dimensions are lower than what is needed to print all the parts in a single chart, and the layout is set as **Complete Calibration Chart** then the layout will be changed to **Split Calibration chart parts** and all the split charts will be of the preferred size.

Note: If the preferred size is lower than the dimensions needed to print the split charts, then the size will be automatically set to the minimun size required to print the split charts.

Tip: You can see the dimensions of the layout at the bottom of the preview.

2. Customize the layout of the chart using the various **Layout** options.
   - **Complete Calibration Chart**will place all different parts that need to be printed in a single chart. The chart size will be minimum width and length required to fit all the parts in a single chart.
   - **Split Calibration chart parts**, the layout will automatically be split in several smaller parts. All elements that need to be printed together will be placed on the same layout. Some parts may be rotated to fit the chart. When splitting using this method, each small chart will be of a different size. If you want to make all the charts to be of the same size, you can set the preferred dimensions using the **Chart Size** option.

   Note: This is the behaviour only when the **Chart Size** options are locked. If the chart size is manually changed, the layout might get affected. Check the **Chart Size** section to know more about how the chart layout changes when chart size is modified.

   Tip: You can see the dimensions of the layout at the bottom of the preview.
3. **Mirror Image**: select this for reverse printing.
4. **Add default bearer bars and slur marks**: the bearer bars help with the print stability, and the slur marks help you check the print quality.
5. **Add a custom element**: if you want to add an image or a technical element to the chart, for example to check the quality with something you use frequently.
   a) Click **Browse...**
   b) Browse to the location of the file.
   c) Click **Open**.

   Note:
   - The element needs to be a `.ct` file (Esko native image file format).
   - Use the free CT/LP plug-in from Esko in Adobe® Photoshop® to create `.ct` files from your element (To download the free plug-in, search for 'CT/LP plug-in' on *esko.com*). Save the Photoshop document with Grayscale image mode to use in Quick Calibration.
   - The `.ct` files cannot contain multiple layers. When the Photoshop document has multiple layers, merge all layers into a single layer before saving it as `.ct`.
   - You can only add one element. If you want to add several elements, you first need to group them in Adobe® Photoshop®.
6. Save the chart:

a) Click **Save Chart**.
b) Browse to your desired folder.
c) Specify a **File name** for your chart.
d) Select the **File Type** you want to save: **LEN** or **Tiff**.

Note:

In most cases, we recommend you save the file as a **LEN** file, and use it directly on the CDI.

However, if you want to edit it to add extra elements specific to your production (different bearer bars for example), you should save it as **Tiff**, but make sure **you don't change** any of the technical elements! Please see *this knowledge base article* to know more about editing charts.

e) Click **Save**.

It could take several minutes to create the file.

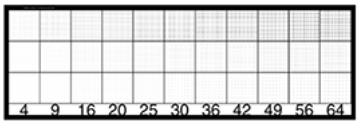
Note: If you change any parameter in your printing condition, **always** create a new chart, to make sure you have the correct elements for your printing condition in your chart (as the chart is based on numerous parameters from the previous steps like application, dot shape, surface screening...).

7. **Image the plates** on your CDI according to your company's Standard Operating Procedures, AND using the settings specified in the previous steps.
8. On the imaged, exposed and processed plate, you can *check the plate quality*.

Checking the Plate Quality

In the **Check Plates** step, you need to check the dot fail test.

Click **Learn more about evaluating this area** to open documents with guidelines on how to evaluate these elements. You can find: evaluation guidelines for the dot fail test in the *Standard Operating Procedure for verifying plate quality*.



Check the **Dot Fail** test on the plate as follows:

a) Use a magnifying glass.
b) Check the center and lower row.
c) The smallest number where all dots are in position gives the resulting value.
d) Verify all elements on the plate.
e) Compare your result to the value that was found as good quality during the CDI's installation. This should be the same value you used during the *plate and press calibration*.
f) **Accept** ✓ if the result matches the reference, or **Reject** ✗ if the result doesn't match.

If the result doesn't match, you need to troubleshoot the problem that is causing the low quality dots, remake the plate and evaluate the dots again.

Once you are satisfied with the plate quality, print a few copies of your chart and move on to *check the print quality*.

Note: The **Next** button will be disabled if you reject the plate quality.

Checking the Print Quality

Make a Print using the plates, according to the settings you entered in the printing condition and your company's Standard Operating Procedures.

Note:

To make sure the screens and curves that will be created are accurate for your production process, your measurement data needs to be representative of your complete print run.

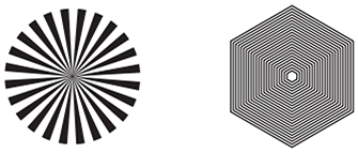
We therefore recommend that:

- you print another 50 to 100 meters (or more if this better reflects your production) after the press has reached your regular quality,
- you select 5 (or at least 3) copies in that "regular quality" print run: from the beginning, the middle and the end.

Once you've printed a few copies of your chart, check the slur marks in the **Verify Print Quality** step.

Click **Learn more about evaluating this area** to open documents with guidelines on how to evaluate these elements. You can find evaluation guidelines for the slur marks in the *Standard Operating Procedure for verifying print quality*.

1. Check the slur marks.



a) Use a magnifying glass.
b) Follow the guidelines in the Standard Operating Procedure (click *Learn more about evaluating this area* to access it).
c) Make sure that all relevant marks on the print are good.
d) Verify all copies.
e) Back in the wizard, Accept or Reject the quality of the slur marks:

- click **Accept** if you are satisfied with the quality of the slur marks,
- click **Reject** if you aren't.

  If the marks on one or more copies are not satisfactory, find other copies of the test chart to evaluate (for example from around 30 m on the same run).

If only one copy (or none) is good, troubleshoot with the press operator and reprint.

2. Once you are satisfied with the print quality, you can move on to *measuring the chart* to find the best screen and curve.

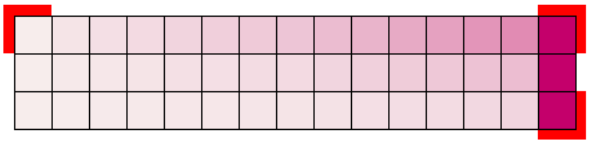
Measuring the Chart

You should now measure the chart to find the best screen and curve.

1. **Measure** the **Mindot Chart**.

   "Mindot" stands for "minimum dot". This chart will be used to determine the best screen for the highlights.

   You can use either an X-Rite i1 Pro or X-Rite i1iO spectrophotometer, in patch or scan mode. No other measurement devices are supported.



   a) Get ready to measure your print sample:

      1. Cut out the mindot chart from your first copy. To measure with the i1 Pro, we recommend you cut off the text before each row.
      2. Place your sample on your spectrophotometer table or on the backing you typically use for measuring prints.
      3. Make sure your spectrophotometer is connected to your computer.

      Note:

      With the cogwheel ( ) at the bottom right, you can stop, calibrate and reconnect your spectrophotometer, change the measurement mode and the measurement condition.

      See the **Using a Spectrophotometer** chapter in the *Color Pilot user guide*.

   b) Measure your chart following the instructions on screen (above the pause and play icons).

      The preview will show the instructions and the measurement progress.

Tip:

After you are done measuring a page, you can save the measurement data as a measurement file if desired (in the CGATS - Committee for Graphic Arts Technologies Standards - color measurement format):

- Go back to the page you have just measured using the back arrow.
- Click the cogwheel ( ) at the bottom right and select **Save measurement...**
- Choose a location to save your measurements file (with the `.txt` extension).

Tip:

Alternatively, if you had already measured your chart and saved the measurement, you can load your measurement file instead of re-measuring it here.

1. Make sure that your measurement file is a CGATS (Committee for Graphic Arts Technologies Standards color measurement format) file, with the `.it8`, `.txt` or `.cgats` extension.
2. Click the cogwheel ( ) at the bottom right and select **Load Measurement...**

2. After you are done measuring, check the **Measurement results** on the next page.
   a) Check the preview.

   The patches are split diagonally , with the measured color at the top left, and the expected color (from your *printing standard*) at the bottom right. They should have approximately the same color.

   Note:

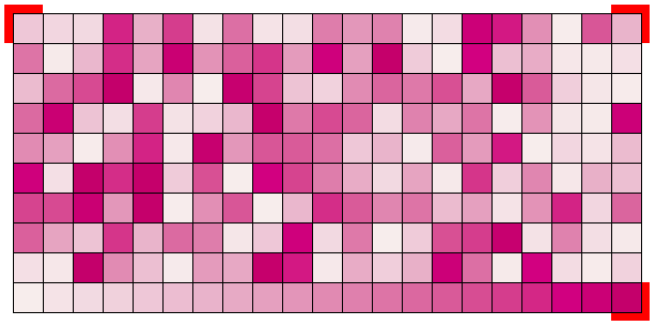
   The comparison of the measurements and the expected color is an approximation. Only look for clear differences:

   - if the color is completely different, you may have measured the wrong row, or your chart may be upside down;
   - if they are the same color, but there is a very big difference in lightness: the chart may not be printed correctly, or there may be an issue with the measurement device.

   b) If your measurement is good, click **Accept** and continue to the next step, otherwise click **Reject** and measure again (either the same chart if for example you measured it incorrectly, or another chart from the print run).
3. Measure the **Tone Value Chart**.

   This will be used to create the dot gain compensation curves.

   You can use either an X-Rite i1 Pro or X-Rite i1iO spectrophotometer, in patch or scan mode. No other measurement devices are supported.



a) Get ready to measure your print sample:

1. Cut out the tone value chart from the same copy as the mindot chart you measured.
2. Use the same spectrophotometer as the one you used to measure the mindot chart.

b) Measure your chart following the instructions on screen (above the pause and play icons).

The preview will show the instructions and the measurement progress.

4. Check the measurements results.

a) Check the preview.

The patches' measured color at the top left should have approximately the same color as the expected color at the bottom right.

Note:

In this step we mainly want to detect if the charts were measured correctly (not upside down, mirrored...).

If the color in the patch is the same, but there is a big difference in lightness, this is probably not an issue. The dot gain compensation curve created from these measurements will correct for this.

b) Select which data you want to compare your measurements with, in the list above the preview.

After the first measurement you can only compare your measured data to the **Standard** (*your chosen printing standard*).

After you measure more copies, you can also compare to the **Average** of all measurements (including the current one), and to previous measurements individually.

Note: When comparing different measurement samples, if one of the samples is printed very differently, it could be an exception. In this case you shouldn't include it in your average.

c) Check the **solid density** (under **Solid Info**, to the right of the preview).

The **Measured Density** should be within tolerance of your **Desired Density** (taken from your *printing standard*). Use the same density tolerance as your company uses on press (typically + or - 0,05).

Select the density standard you use on your measurement device (ANSI A, DIN...), from the **Density Formula** list at the bottom.

Note: If you chose a standard that uses an ICC profile, you will not see a **Desired Density** for your ink, because the density calculation requires spectral data, which is not available in ICC profiles.

d) Check the **color difference** between the measured and expected solid color.

You can see **LabCh** values for both colors next to a bigger split patch, and a **ΔE** (color difference) value. Check whether this ΔE value is within the ΔE tolerance that your company uses.

By default, the wizard uses the ΔE formula you set in Color Pilot's preferences, but you can choose a different one in the **ΔE Formula** list below.

e) If everything is OK, click **Accept** and continue.

Otherwise click **Reject** and measure again.

Note:

In this case, you need to measure both the mindot chart and the tone value chart again. This is because:

- different samples may be printed somewhat differently, so you shouldn't mix print samples,
- if you detect a printing issue on the tone value chart, then it is likely that the complete print sample is not representative, and that your mindot measurement is not that reliable.

5. In the next screen, select **Measure another sample** if needed.

Note: To make sure your final screen and curve are accurate and reliable, the measurements need to be an average of a complete print run. Measure a minimum of 3 charts of a good print quality (we advise to use 5).

You will be guided to measure the next sample, following the same procedure. The wizard will indicate how many charts you already measured: sample 1, sample 2...

6. After you measured enough charts of good quality, you can select **Stop measuring and inspect the resulting screens**.

Checking Your Screen Defaults

In the **Verify Surface Screening and Midtones** step, you need to check how well the *screen defaults that you chose* printed.

To do this, follow the guidelines in this *Standard Operating Procedure* when evaluating the elements for surface screening and dot on your chart.

Note:

If you find that the defaults you chose don't give you a satisfactory result, you can still change them before creating the final screen.

However, as most of the chart was printed with these defaults, your curve will not be accurate anymore. To remedy this, use the *Update Curves* wizard on your finished printing condition.

1. Select the best **Surface Screening** from the chart (if it's not the one you chose previously).

2. Enter the **Solid Density** for that surface screening.
3. Select the best **Screening Dot** from the chart (if it's not the one you chose previously).

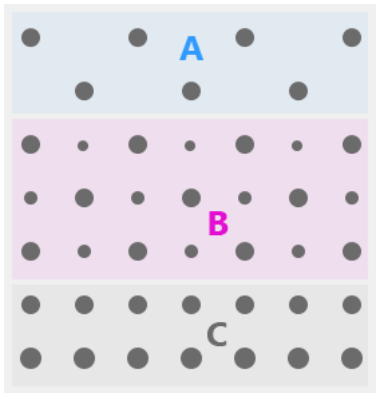
Once you have entered the best screening settings from your chart, you can move on to *evaluating the highlights*.

Evaluating the Highlights

You now need to evaluate and choose the highlight settings that are best for your production, to finish setting up your custom screen and curve.

These settings are:

- The **Mindot** (or minimum dot): the minimum size that a dot can have in the highlights, while printing in a stable and clear way.
- The **Mindot distance**: the maximum distance between these minimum dots, to ensure highlights that print well.
- The **Transitional mindot**: even smaller dots that support the mindots in the transitional areas (between FM screening in the highlights and AM screening in the midtones).



- **A)** In the lightest highlights, there are only **Mindots** (separated by a distance no larger than the **Mindot distance**).
- **B)** As highlights get darker, increasingly smaller dots are added to the spaces between the regular dots.

  Once the screen grid is completely filled, the screen reaches the transition point. The last and smallest dot size added before the transition point is the **Transitional mindot**.
- **C)** In the midtones, the **Transitional mindots** reach the size of the regular **Mindots**, and the screen becomes a standard screen.

1. You can see an analysis of the mindot chart measurements.

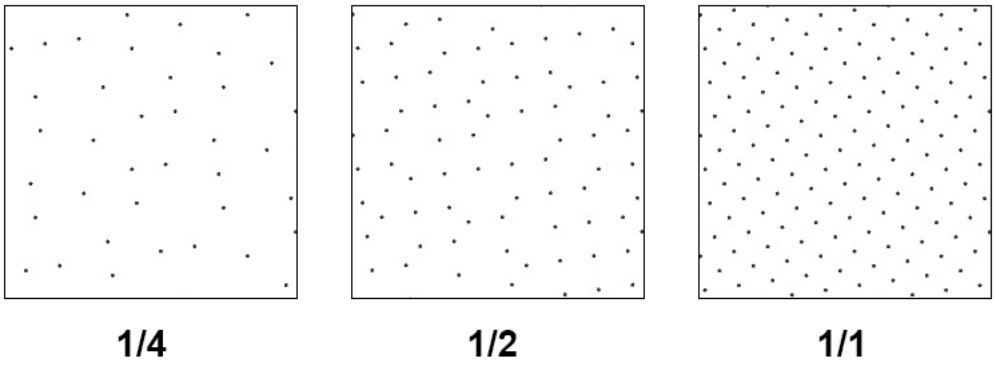
Dot Size (px)	0	6	9	12	16	19	22	25	31	36	42	47	54	60	Solid
Mindot Distance 0.17 mm (1/1)		4,9 ✗	7,1 ✓	9,8	14,2	17,8	21,4	24,8	31,8	37,6	43,8	48,7	56,2	62,3	
0.24 mm (1/2)		2,2 ✗	3,1 ✓	4,9	6,7	7,1	8,9	9,8	13,4	17,0	20,0	22,4	27,1	30,6	
0.34 mm (1/4)		0,4 ✗	1,3 ✗	2,2 ✓	3,1	3,1	4,0	4,9	5,8	7,1	8,0	8,9	11,0	13,4	

For the three **Mindot Distances** on the chart, the wizard shows which **Dot Size** is optimal. This is the smallest mindot size that gives a good print quality.

Note:

The fraction next to the distance indicates the amount of dots used to print the highlights.

- **1/1** means that means that all the dots are kept (the screen doesn't use FM screening).
- **1/2** means that half of the dots are kept (resulting in FM screening).
- **1/4** means that a quarter of the dots are kept (resulting in FM screening). This gives lighter highlights, but may increase graininess.



2. Examine these highlights on the print to decide if you agree with these results.
3. Under **Set Highlight Settings**, choose the best highlight settings for your production process based on what you found.
   a) Select the **Mindot Distance** you typically use for your production.

      By default, the biggest distance measured from the chart is filled in. If you choose one of the measured distances, you will see **(Measured)** next to it.
   b) Select the **Mindot** that you found to be the best for your mindot distance.

      By default, the mindot size that the wizard found the best for that mindot distance is selected. This can either be a **Measured** mindot size, or a size calculated based on the other measurements (**Estimated**).

      If you choose a different size, you will still see an indication of what the wizard recommends next to **Measured** or **Estimated**.

      Note: The bigger the **Mindot Distance** is, the bigger your **Mindot** needs to be, to give you a stable print.
   c) Select the **Transitional Mindot** based on your visual inspection of the **1/1** row.

      By default, the **Transitional Mindot** with a green check mark on the **1/1** line in the wizard is selected.
4. Under **Selected Screen and Curve**, you can see the details of screen that the wizard created based on your chosen settings:
   - the **Ink** that this screen is for,

- the **Screen Name** (this is generated based on the settings used),
- the screen **Code** (you can change this if desired: click **Select** and choose another free screen code from the list shown),
- the **Largest Mindot** size in microns or milli-inches (corresponding to the mindot you chose above),
- the **Curve Bump** (this is the smallest input percentage you can print with this screen, all smaller percentages are "bumped up" to this value; this data will be included in the curve generated by the wizard),
- the **Estimated Lightest Tone Value** (the percentage that the smallest input percentage from the **Curve Bump** gives on print).

5. Click **Next** to generate your custom screen and curve, based on your separation's measurements.
   This may take some time.

Copy Calibration

Once the wizard calculated the best curve and screen for your chosen separation, you need to decide what to do for the remaining separations.

In the **Copy Calibration of (Separation Name) to Other Separations** step, you can see the **New Screen** and **New Adjustment Curve** that the wizard calculated for your chosen separation.

You can also see the existing screens and curves used until now for the other separations.

- If you want to copy the screen and curve you just found for your chosen separation to (some of) the remaining separations, do the following:
  a) Under **Copy Calibration to Other Separations**, select the separations you want to copy your new screen and curve to.
  b) Click **Finish**.
- If you want to keep the existing screens and curves for the other separations, just click **Finish**.

Note: The settings for **Other Inks** are used for spot colors.

5.9. Saving a Report

You can save a PDF report of your printing condition. You can save reports both for finished and unfinished printing conditions (the report will include the printing condition status).

You can use an unfinished printing condition report to give to the press room so they are sure to use the right equipment, or to communicate the press setup between sites/companies.

If desired, you can customize the report by adding your logo.

1. Open the **Save Report** dialog:

- In the **Printing Conditions** library, select a printing condition and click the **Save Report** button in the bottom toolbar.
- In the **Printing Conditions** library, right-click the printing condition and select **Save Report...**
- Open the printing condition and click the **Save Report...** button in the lower right corner.

2. Specify a **File name**. The default name is: `Printing condition name_Report.pdf`.
3. Choose the folder in which you want to save the report:
   a) click **Browse...**
   b) select the folder,
   c) click **Save**.
4. Select a different **Banner** if desired, for example if you want to add your logo on the report.
   a) click **Browse...**
   b) browse to the location and select the file,
   c) click **Open**.

   You will see a preview of your banner. The supported file formats are `.jpeg`, `.png`, `.gif` and `.bmp`. The size of the banner area is 20cm by 2,7cm. Larger or smaller images will be resized.

   Click **Reset** if you want to return to the default Esko banner.
5. Enter a **Description** if you want to add extra information to the report.
6. Select which parameters of your printing condition you want to include in the report.

Hardware settings

This shows the **Properties** you filled in for your printing condition (**General**, **Plate Making**, etc.). The properties categories can be different depending on your *type of printing condition*.

Note:

- When saving a report for an unfinished printing condition, you can only include hardware settings.
- Parameters that are not filled in will not be visible on the report.

Print Calibration Details

This adds a table showing an overview of all inks in the printing condition.

If you chose settings for your spot colors, they are listed as **Other Inks**.

For each ink, you can see:

- the ink **Name**,
- the **Ink Book**,
- the printing **Angle**,
- the **Screen name**: the screen code and screen technology,
- the **Adjustment curve**: the *Flexible PressSync curve* used as dot gain compensation curve,
- The mindot distance (**Mindot Δ**), the distance between dots at the lightest tone value,

- The **Estimated Lightest Tone Value**: the percentage that the smallest input percentage gives on print,
- The transition point (**TP**): the tone in the input file at which the screening changes from FM to AM.

Note: If there are multiple rulings for the selected printing condition, a separate table is added for each ruling.

Curves and gray balance preview:

For each ink and ruling in the printing condition (except **Other** and **White**), two graphs are added: **Measured Curve** and **Adjustment Curve**.

The graphs are grouped by ruling.

An extra graph per ruling is added for the gray balance measurements.

Gamut outline

This adds a basic view of the color gamut (only at 50%) per ruling.

Comparison of gamut outline with printing standard

This adds the reference gamut of the selected printing standard to the gamut outline view (in a white outline).

Note: This option is only available when the **Gamut outline** option is selected.

Solid densities

This adds a table showing the spectral measurement values (in LabCh), and the density measurement values (in the printing standard's metric) of the solids for each ink.

Note: If there are multiple rulings for the selected printing condition, a separate table is added for each ruling.

Comparison of solid densities with printing standard

The printing standard's reference values are added to the **Solid densities** table, and compared to the measured values.

The **ΔE Formula** used for the comparison is listed underneath the table.

Note: This option is only available when the **Solid densities** option is selected.

Note:

- Most of the information is shown as on the page of the printing condition step.
- Some options are not available if the information is not present in the printing condition. For example if screens and curves were manually added (without measuring): the **Gamut outline**, **Solid Densities** and both **Comparison** options will be greyed out.

7. Click **Save**.

The PDF report will be saved in the selected folder and will open automatically in the default application set for your Windows Operating System.

If this is a report for an unfinished printing condition, it will mention **Status: Not ready for production**, and contain the parameters you selected, up to the point you reached while working on your printing condition.

5.10. Exporting and Importing Printing Conditions

Printing conditions can be exported and imported from the *Printing Conditions Explorer*.

The exported file will contain all of the printing condition's data: parameters, screens, Quit Now and Continue Later records...

By default, most data is exported as File Packer (.fp) files. File Packer files are archives that you can use to exchange different types of color management settings (profiles, color strategies, ink books...) between different versions of Color Pilot.

Exception

Legacy printing conditions, created by previous versions of the Print Control Wizard (18.1.1 or lower) cannot be imported or exported via Color Pilot, as they are stored in a different database (Automation Engine's SQL server).

To export or import these, you can use the previous Print Control Wizard software. See the chapter **Importing and Exporting Printing Conditions** in the Print Control Wizard 18.1 user guide: *https://docs.esko.com/docs/en-us/printcontrolwizard/18.1/userguide/home.html#en-us/common/pcw/task/ta_pcw_ImportExportPC.html*.

Screens and Curves

Screens and curves that are not part of a printing condition can also be imported and exported.

However, only custom screens (SCRxx) and HD Flexo screens (HDxx) can be imported/exported. Crystal screens can only be exported via the Printing Condition. Static screens are installed by the Automation Engine installer.

5.10.1. Exporting a Printing Condition

You can export individual printing conditions from the *Printing Conditions Explorer*.

The exported file will contain all of the printing condition's data: parameters, screens, Quit Now and Continue Later records...

Tip: You can also export curves from the *Curves Explorer*, or screens from the *Screens Explorer* in the same way.

1. Right-click the printing condition you want to export, and select **Export...** (or go to **File** > **Export**).
2. Browse to your desired location, change the **File Name** if desired, and click **Save**.

   By default the name of the archive will be `[printing condition name].fp`.

File Packer (.fp) files are archives that you can use to exchange different types of color management settings (profiles, color strategies, ink books...) between different versions of Color Pilot.

Note:

For each ink used in the printing condition, the complete ink book will be included in the printing condition export (unless it is a read-only ink book).

5.10.2. Exporting the Complete Library

When exporting all data from Color Pilot, you have an option to include all screens, curves and printing conditions.

Only use this option if the data will be imported in a Color Pilot that is supporting printing conditions (Color Pilot 20 or later, correct licenses...).

1. Select **Export Library** from the **File** menu.
2. Specify the folder where you want to save the exported archive.
   a) Click **Browse**.
   b) Select the folder.
   c) Click **Save**.
3. Enable the option **Include screens, curves and printing conditions**.
4. Enable **Export as one single archive** (recommended).

   When disabled, all items will be exported as individual single files, which can easily be hundreds of files.
5. It is possible to remove individual items from the export, by selecting one or more items and clicking the **Remove** button.

   A warning will be shown that the removed item could be linked to another item, and this item will not work properly after import in another Color Pilot database.
6. By default, all data (except for ICC profiles) is exported as .fp files, which is only compatible with Esko software.

   Color profiles and ink books can also be exported in another open format, CxF/X-4 and CGATS respectively. Click the triangle (▼) next to the item to change the format.
7. Specify a **File Name**.
8. Click **Export**.

A .fp file will be created in the selected folder. This could take some time.

At the end of the export, you may in some cases see a warning that some items failed to export (shown in a list). The archive is still created, but the items from the list will not be part of the exported file.

5.10.3. Importing a Printing Condition

You can import printing conditions that have been *exported* to the File Packer (.fp) format.

1. Select the exported printing condition(s) to import:

a) Either:

- go to **File** > **Import**,
- press **Ctrl+Alt+E**,
- right-click in the main pane of the **Printing Conditions** explorer and select **Import...**

b) Browse to the printing condition(s) to import.

You can select several printing condition files using the **Shift** key, or select all printing condition files using **Ctrl+A** (if the location you browsed to only contains printing conditions).

Tip: You can also just drag the printing condition to import into your Color Pilot window.

2. In the **Import** dialog that opens, you will see that the printing condition(s) have the state `Ready for import`.

If desired, you can:

a) Change the name of the file(s) in the **Import as** column.

Note: If you have another printing condition with the same name, your printing condition will be imported as `[printing condition name]_2)` by default.

b) Add or remove printing conditions to import using the **+** or **-** buttons.

c) Review any printing condition information shown on the **Details** tab.

3. Import the printing condition(s) by either:

- Selecting the printing condition(s) to import (using **Shift** to select several printing conditions) and clicking **Import Selection** at the bottom right.
- Clicking **Import All** to import all printing conditions in the dialog.

You will see a progress bar, and import details on the **Logging** tab at the bottom of the dialog.

Once the printing conditions are imported, they will have the `Imported` state.

If you select an imported printing condition, you can see its contents on the **Details** tab at the bottom of the **Import** dialog.

4. When you are done, **Close** the **Import** dialog.

Note:

Importing a printing condition will also add the ink book(s) and ink(s) used in this printing condition to your database.

If there is already another ink book with the same name, they will be merged.

5.10.4. Importing a Complete Library

Importing a complete library is typically done when you want to restore a backup of your Color data or share with another Esko configuration.

1. Select **Import** from the **File** menu
2. Navigate to and select the .fp file containing *the library you exported*.

Note: You can also just drag the file onto the Color Pilot shortcut on the desktop or onto the Color Pilot application window to import it.

3. Click **Open**.

   A list of all items in the .fp file are shown in the import dialog.

   In the last column **State** you can see if the item will be imported, merged...

   Note:

   If you import an ink book with the same name as an existing one (for example Designer), the two ink books will be merged.

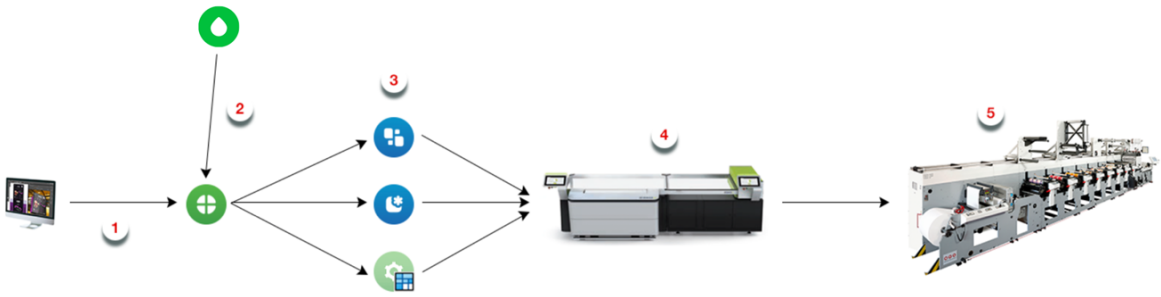
   If you import an ink with the same name as an existing one, the existing ink will be replaced by the imported one.

   Make sure that the data in the .fp file is more recent than the current data in your Color Pilot!

   Select an item in the list to see more details below.

4. Click **Import Selection** if you only want to import one or more items, or click **Import All** if you want to import the complete library.
5. Check if all items were imported successfully, by verifying the **State** of every item.
6. If all is OK, click **Close**.

6. Using a Printing Condition in Your Workflow



1. After prepress, you send your ready-to-RIP files to Imaging Engine.
2. In Imaging Engine, you select the *printing condition* you made with the Print Control Wizard.

   See *Using Your Printing Condition in Imaging Engine* on page 294 for details.
3. After RIP'ing your files, it's time for Flexo Plate Making, using either:
   - automated plate making in Automation Engine,
   - manual plate making using Grapholas or the Digital Flexo Suite.

   Note: When working with version 18.0.1 or later of Imaging Engine and the Print Control Wizard and preparing your plates manually, you need version 18.1 or later of Grapholas or the Digital Flexo Suite software.

   For more information, see the "CDI Workflow" chapter of your Automation Engine manual, or your Grapholas/Digital Flexo Suite documentation.
4. You image and expose your flexo plate using the devices and settings you entered in the Print Control Wizard.

   See *Plate and Press Calibration* on page 51 and *Plate Making* on page 46
5. You print your files on your press using the hardware and consumables you entered in the Print Control Wizard.

   See *Substrate* on page 48, *Ink Set and Printing Standard* on page 49, *Press* on page 50 and *Printing* on page 65

6.1. Using Your Printing Condition in Imaging Engine

Once you created a printing condition containing the optimal screens and curves to use for your production workflow, you can use this printing condition when RIP'ing your files with Imaging Engine.

To do this:

1. In Automation Engine, open the **Image to Screened Separations** ticket.
2. Select your printing condition in the **Printing Condition** field (above the other settings).

For more information, see the **Image to Screened Separations** chapter in the *Imaging Engine user guide*.

Note:

- You can only use a printing condition that you have **completed** (you can see a green check ✔ when you open the printing condition in the Print Control Wizard).

  If you are still working on your printing condition in the Print Control Wizard, you will not be able to select it in Imaging Engine.

- After making a printing condition for your production workflow, you should always use it in Imaging Engine when printing with that production workflow.

  If you make changes to your workflow (for example you print on a different substrate, or you switch to a different ink vendor), we recommend you make a new printing condition in the Print Control Wizard.

Selecting a printing condition automatically fills in some of the **Image to Screened Separations** settings, but not all of them. Settings that are set by the printing condition get the indication **<set by printing condition>**.

It is still possible to overrule a setting manually (ignoring the value from the printing condition).

If all settings of the printing condition are used, the task uses the angles, ruling, screens and curves from the printing condition.

Note:

If you didn't specify settings for spot colors in your printing condition (you selected **<none>** at the end of the *Printing* on page 65 setup), the ticket settings will be automatically applied for spot colors in the job.

If you change a ticket setting (**Dot**, **Angle Set** or **Ruling**), only the spot colors will get the new parameter. The inks that are defined in the printing condition will continue using the settings from the printing condition.

Note:

Legacy printing conditions, created by earlier versions of the Print Control Wizard (18.1.1 or lower) can still be used, but you will notice some different behavior in the **Image to Screened Separations** ticket.

For example as angles are not defined in legacy printing conditions, they will not be set in the ticket. You have to use the angles from the file, or set them in the ticket yourself.