

Ink Tools for Adobe Photoshop

22.11

User Guide

11 - 2022

Contents

- 1. Copyright Notice..... 4**
 - 1.1. Third party license information.....5
- 2. Installation and Setup..... 29**
 - 2.1. Installing the Ink Tools..... 29
 - 2.2. Esko Setup..... 29
 - 2.2.1. Plug-in Overview..... 30
 - 2.2.2. Network License..... 31
 - 2.2.3. Color Settings.....32
 - 2.2.4. Ink Tools..... 32
- 3. Where to find the Ink Tools..... 34**
- 4. About the Ink Tools..... 35**
- 5. About Photoshop..... 36**
 - 5.1. Image Modes..... 36
 - 5.2. Layers..... 36
 - 5.3. Channels..... 37
 - 5.4. Photoshop Color Management..... 37
- 6. Display Inks..... 39**
 - 6.1. What are Display Inks?..... 39
 - 6.1.1. Display Inks and CMYK Color mode.....40
 - 6.1.2. Need more than four inks?..... 41
 - 6.1.3. Need Less than four inks? Invisible channels..... 41
 - 6.2. Setting and removing Display Inks..... 41
 - 6.2.1. The Display Inks Dialog..... 41
 - 6.2.2. How to see what display inks are currently set..... 42
 - 6.2.3. Removing the display inks..... 43
 - 6.3. Importing and Exporting Files..... 43
 - 6.3.1. Display Inks outside of Photoshop..... 43
 - 6.3.2. Flatten to Spot Channels..... 43
 - 6.3.3. Move Spot Channels to CMYK..... 44
 - 6.4. Color Engine and Color Accuracy..... 45
 - 6.4.1. Color Engine Inks..... 45
 - 6.4.2. Overprint Sequence..... 47
- 7. The InkSwitch Filter..... 48**
 - 7.1. The InkSwitch Dialog..... 48
 - 7.1.1. InkSwitch Settings..... 48
 - 7.1.2. Preview Area..... 50

7.1.3. Set Display Inks.....	51
7.2. How to InkSwitch a Layered image.....	51
7.3. Some applications of InkSwitch.....	52
7.3.1. Reducing the number of inks.....	52
7.3.2. Cleaning separations for conventional flexography.....	52
7.3.3. Reducing overprints.....	53
8. Viewer.....	54
8.1. About Viewer.....	54
8.2. The Viewer window.....	54
8.2.1. Navigating in the Preview.....	54
8.2.2. Separations.....	55
8.2.3. Measure Ink Densities.....	56
8.2.4. Quality Control.....	57

1. Copyright Notice

© Copyright 2022 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 Sun Microsystems 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 patented technology.

This product and use of this product is under license from Markzware under U.S. Patent No. 5,963,641.

 This product includes pugixml.

MIT License

Copyright (c) 2006-2022 Arseny Kapoulkine

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 curl.

COPYRIGHT AND PERMISSION NOTICE

Copyright (c) 1996 - 2020, 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 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 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 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 Verschuere
 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 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 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 svgio.

Copyright Oleg Maximenko 2014.
Distributed under the Boost Software License, Version 1.0.

This product includes QtSvg.

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

This product includes ZXing C++ Library.

NOTICES FOR TextCodec

Part of this software uses code source from Qt under LGPL license.
Copyright (C) 2015 The Qt Company Ltd.

NOTICES FOR ZXing

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

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 appleseed.
 The MIT License (MIT)

Copyright (c) 2010-2013 Francois Beaune, Jupiter Jazz Limited
 Copyright (c) 2014-2019 The appleseedhq Organization

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 bcd.

Copyright (c) 2017 Malik Boughida and Tamy Boubekeur. 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.

You are under no obligation whatsoever to provide any bug fixes, patches, or upgrades to the features, functionality or performance of the source code ("Enhancements") to anyone; however, if you choose to make your Enhancements available either publicly, or directly to the authors of this software, without imposing a separate written license agreement for such Enhancements, then you hereby grant the following license: a non-exclusive, royalty-free perpetual license to install, use, modify, prepare derivative works, incorporate into

other computer software, distribute, and sublicense such enhancements or derivative works thereof, in binary and source code form.

 This product includes glad.

The MIT License (MIT)

Copyright (c) 2013-2018 David Herberth

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 murmurhash3.

MurmurHash3 was written by Austin Appleby, and is placed in the public domain. The author hereby disclaims copyright to this source code.

 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 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 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 Botan.

Copyright (C) 1999-2020 The Botan 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:

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 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 GLEW: The OpenGL Extension Wrangler Library.

The OpenGL Extension Wrangler Library
 Copyright (C) 2002-2007, Milan Ikits <milan ikits[at]ieee org>
 Copyright (C) 2002-2007, Marcelo E. Magallon <mmagallo[at]debian org>
 Copyright (C) 2002, Lev Povalahev
 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.
- * The name of the author 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.

Mesa 3-D graphics library
 Version: 7.0

Copyright (C) 1999-2007 Brian Paul 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 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 BRIAN PAUL 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.

Copyright (c) 2007 The Khronos Group Inc.

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

THE MATERIALS 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. 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 MATERIALS OR THE USE OR OTHER DEALINGS IN THE MATERIALS.

 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 tesseract.
 Copyright (C) 2016 Google, Inc. Licensed under the Apache License, Version 2.0

 This product includes robin-map.
 MIT License
 Copyright (c) 2017 Tessil
 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 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 cereal.

Copyright (c) 2013-2022, Randolph Voorhies, Shane Grant
 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 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 gSOAP.

EXHIBIT B.

Part of the software embedded in this product is gSOAP software.
 Portions created by gSOAP are Copyright (C) 2001-2007 Robert A. van Engelen, Genivia inc. All Rights Reserved.

THE SOFTWARE IN THIS PRODUCT WAS IN PART PROVIDED BY GENIVIA INC 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 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 llvm.

University of Illinois/NCSA

Open Source License

Copyright (c) 2003-2019 University of Illinois at Urbana-Champaign.
All rights reserved.

Developed by:

LLVM Team

University of Illinois at Urbana-Champaign

<http://llvm.org>

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal with 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:

- * Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimers.
- * Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimers in the documentation and/or other materials provided with the distribution.
- * Neither the names of the LLVM Team, University of Illinois at Urbana-Champaign, nor the names of its contributors may be used to endorse or promote products derived from this Software without specific prior written permission.

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 CONTRIBUTORS 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 WITH THE SOFTWARE.

This product includes OpenSSL.

Copyright (c) 1998-2017 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 routines 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 OpenImageIO.

Copyright (c) 2008-present by Contributors to the OpenImageIO 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. 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 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 xxHash.

xxHash Library
 Copyright (c) 2012-2014, Yann Collet
 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.

 This product includes lz4.

Copyright (C) 2011-present, Yann Collet.

BSD 2-Clause License (<http://www.opensource.org/licenses/bsd-license.php>)

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 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 ICU.

Copyright (c) 1995-2014 International Business Machines Corporation and others
 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, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, provided that the above copyright notice(s) and this permission notice appear in all copies of the Software and that both the above copyright notice(s) and this permission notice appear in supporting documentation.

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 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 THIS SOFTWARE.

 This product includes XByak.

Copyright (c) 2007 MITSUNARI Shigeo
 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 copyright owner 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.

 #####
 #####

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 PCRE.

Copyright (c) 1997-2016 University of Cambridge
All rights reserved.

Copyright(c) 2010-2016 Zoltan Herczeg
All rights reserved.

Copyright(c) 2009-2016 Zoltan Herczeg
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 University of Cambridge nor the names of any 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 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 OpenShadingLanguage.

BSD 3-Clause License

Copyright (c) 2009-2019 Sony Pictures Imageworks Inc., et al.
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 leptonica.

- Copyright (C) 2001-2016 Leptonica. 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 ANY
- 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 FCollada.

Copyright 2006 Feeling Software. All rights reserved.

Copyright 2005-2006 Feeling Software and
 Copyright 2005-2006 Autodesk Media Entertainment.

Copyright (C) 1998-2003 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 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 OpenJDK.

The GNU General Public License (GPL)

Version 2, June 1991

Copyright (C) 1989, 1991 Free Software Foundation, Inc.
 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change free software--to make sure the software is free for all its users. This General Public License applies to most of the Free Software Foundation's software and to any other program whose authors commit to using it. (Some other Free Software Foundation software is covered by the GNU Library General Public License instead.) You can apply it to your programs, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights. These restrictions translate to certain responsibilities for you if you distribute copies of the software, or if you modify it.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must give the recipients all the rights that you have. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

We protect your rights with two steps: (1) copyright the software, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the software.

Also, for each author's protection and ours, we want to make certain that everyone understands that there is no warranty for this free software. If the software is modified by someone else and passed on, we want its recipients to know that what they have is not the original, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that redistributors of a free program will individually obtain patent licenses, in effect making the program proprietary. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

The precise terms and conditions for copying, distribution and modification follow.

TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

0. This License applies to any program or other work which contains a notice placed by the copyright holder saying it may be distributed under the terms of this General Public License. The "Program", below, refers to any such program or work, and a "work based on the Program" means either the Program or any derivative work under copyright law: that is to say, a work containing the Program or a portion of it, either verbatim or with modifications and/or translated into another language. (Hereinafter, translation is included without limitation in the term "modification".) Each licensee is addressed as "you".

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running the Program is not restricted, and the output from the Program is covered only if its contents constitute a work based on the Program (independent of having been made by

running the Program). Whether that is true depends on what the Program does.

1. You may copy and distribute verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and give any other recipients of the Program a copy of this License along with the Program.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Program or any portion of it, thus forming a work based on the Program, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

- a) You must cause the modified files to carry prominent notices stating that you changed the files and the date of any change.
- b) You must cause any work that you distribute or publish, that in whole or in part contains or is derived from the Program or any part thereof, to be licensed as a whole at no charge to all third parties under the terms of this License.
- c) If the modified program normally reads commands interactively when run, you must cause it, when started running for such interactive use in the most ordinary way, to print or display an announcement including an appropriate copyright notice and a notice that there is no warranty (or else, saying that you provide a warranty) and that users may redistribute the program under these conditions, and telling the user how to view a copy of this License. (Exception: if the Program itself is interactive but does not normally print such an announcement, your work based on the Program is not required to print an announcement.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Program, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Program, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Program.

In addition, mere aggregation of another work not based on the Program with the Program (or with a work based on the Program) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may copy and distribute the Program (or a work based on it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you also do one of the following:

- a) Accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,
- b) Accompany it with a written offer, valid for at least three years, to give any third party, for a charge no more than your cost of physically performing source distribution, a complete machine-readable copy of the corresponding source code, to be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,
- c) Accompany it with the information you received as to the offer to distribute corresponding source code. (This alternative is allowed only for noncommercial distribution and only if you received the program in object code or executable form with such an offer, in accord with Subsection b above.)

The source code for a work means the preferred form of the work for making modifications to it. For an executable work, complete source code means all the source code for all modules it contains, plus any associated interface

definition files, plus the scripts used to control compilation and installation of the executable. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

If distribution of executable or object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place counts as distribution of the source code, even though third parties are not compelled to copy the source along with the object code.

4. You may not copy, modify, sublicense, or distribute the Program except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense or distribute the Program is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

5. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Program or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Program (or any work based on the Program), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Program or works based on it.

6. Each time you redistribute the Program (or any work based on the Program), the recipient automatically receives a license from the original licensor to copy, distribute or modify the Program subject to these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties to this License.

7. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Program at all. For example, if a patent license would not permit royalty-free redistribution of the Program by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Program.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system, which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

8. If the distribution and/or use of the Program is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Program under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

9. The Free Software Foundation may publish revised and/or new versions of the General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Program

specifies a version number of this License which applies to it and "any later version", you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Program does not specify a version number of this License, you may choose any version ever published by the Free Software Foundation.

10. If you wish to incorporate parts of the Program into other free programs whose distribution conditions are different, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

NO WARRANTY

11. BECAUSE THE PROGRAM IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM "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 PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

12. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

END OF TERMS AND CONDITIONS

How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest possible use to the public, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

One line to give the program's name and a brief idea of what it does.

Copyright (C) <year> <name of author>

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., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA.

Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

Gnomovision version 69, Copyright (C) year name of author Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type 'show w'. This is free software, and you are welcome to redistribute it under certain conditions; type 'show c' for details.

The hypothetical commands 'show w' and 'show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be

called something other than 'show w' and 'show c'; they could even be mouse-clicks or menu items--whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the program, if necessary. Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the program 'Gnomovision' (which makes passes at compilers) written by James Hacker.

signature of Ty Coon, 1 April 1989

Ty Coon, President of Vice

This General Public License does not permit incorporating your program into proprietary programs. If your program is a subroutine library, you may consider it more useful to permit linking proprietary applications with the library. If this is what you want to do, use the GNU Library General Public License instead of this License.

"CLASSPATH" EXCEPTION TO THE GPL

Certain source files distributed by Oracle America and/or its affiliates are subject to the following clarification and special exception to the GPL, but only where Oracle has expressly included in the particular source file's header the words "Oracle designates this particular file as subject to the "Classpath" exception as provided by Oracle in the LICENSE file that accompanied this code."

Linking this library statically or dynamically with other modules is making a combined work based on this library. Thus, the terms and conditions of the GNU General Public License cover the whole combination.

As a special exception, the copyright holders of this library give you permission to link this library with independent modules to produce an executable, regardless of the license terms of these independent modules, and to copy and distribute the resulting executable under terms of your choice, provided that you also meet, for each linked independent module, the terms and conditions of the license of that module. An independent module is a module which is not derived from or based on this library. If you modify this library, you may extend this exception to your version of the library, but you are not obligated to do so. If you do not wish to do so, delete this exception statement from your version.

This product includes tessdata.

Inc. Licensed under the Apache License, Version 2.0

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 openexr.

Copyright Contributors to the OpenEXR 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:

- * 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 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 Bonjour SDK.

Copyright (c) 2003-2004, Apple Computer, 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:

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 Apple Computer, Inc. ("Apple") 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 APPLE AND ITS 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 APPLE 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 Qt.

The software uses Qt, licensed under LGPL v3. The Qt Toolkit is Copyright (C) 2020 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.

2. Installation and Setup

2.1. Installing the Ink Tools

- Open the `Photoshop.mpkg` package on the installation disk and follow the instructions on screen.



This will install the **Ink Tools** in your Adobe Photoshop® Plug-Ins folder and the **License Manager** in your Applications folder.

2.2. Esko Setup

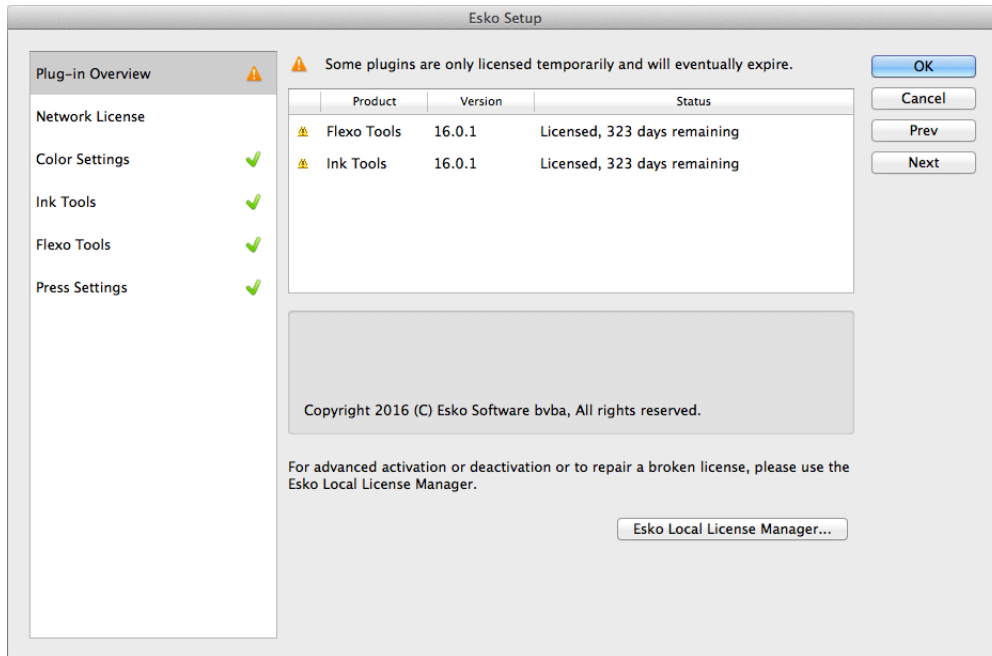
You can open the Esko Setup dialog by choosing **File > Automate > Esko Setup**

The Esko Setup contains multiple tabs:

- [Plug-in Overview](#) on page 30
- [Network License](#) on page 31
- [Color Settings](#) on page 32
- [Ink Tools](#) on page 32

You can change the tab by clicking it on the left, or by using the **Prev** and **Next** buttons.

2.2.1. Plug-in Overview

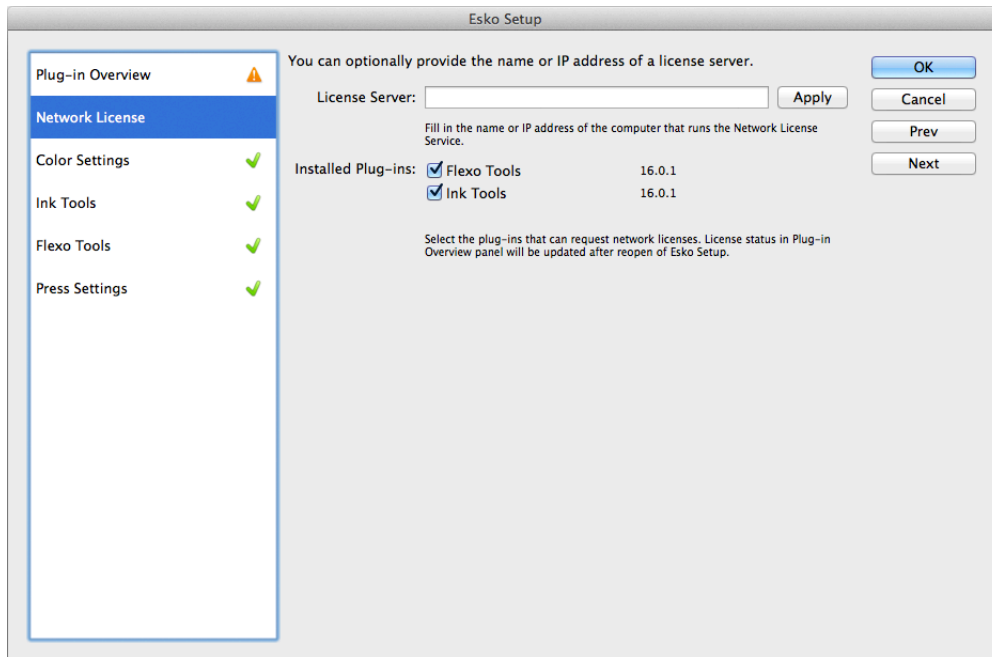


The Plug-in Overview gives an overview of the currently installed Esko Plug-ins, their version and their license status.

You can use the **Activate** button to activate a single product key online.

For more activation, deactivation and repair options, you can click the **Esko Local License Manager...** button to open the Esko Local License Manager. For more information, we refer to the Local License Manager documentation.

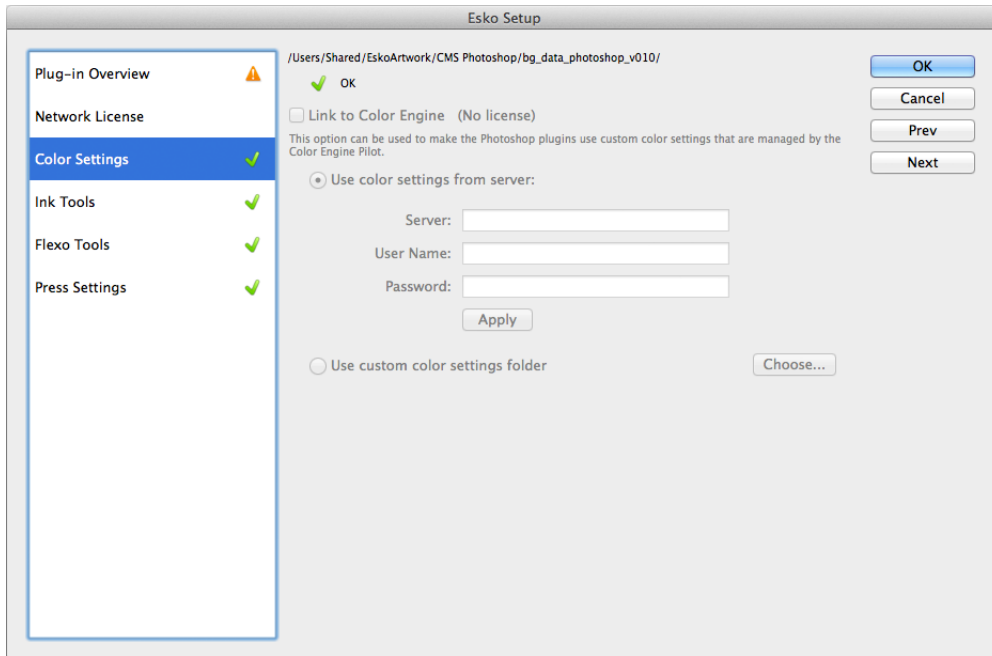
2.2.2. Network License



In the Network License tab, you can define the name or the IP address of the computer that runs the Network License Service, and the plug-ins that should use a Network License.

For more information, we refer to the Network License Manager documentation.

2.2.3. Color Settings

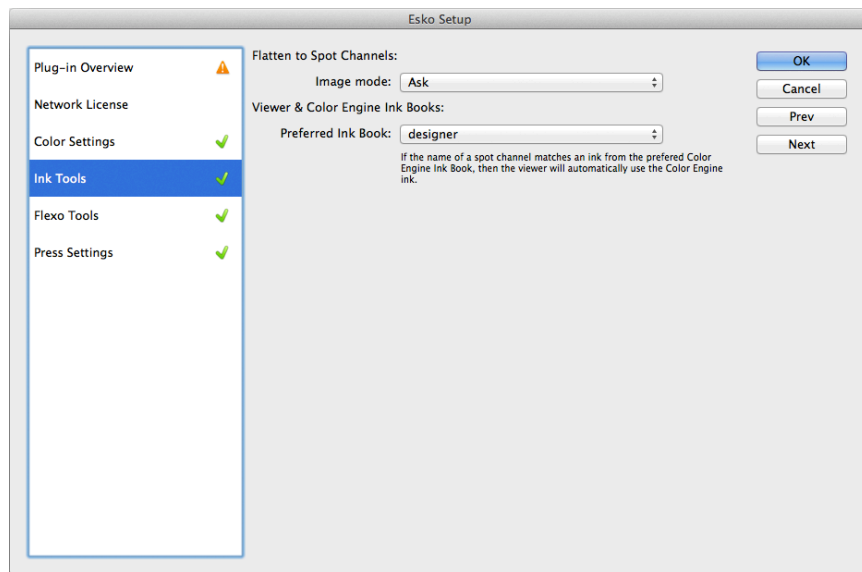


The Color Settings tab shows the current color setting folder path. Enable **Link to Color Engine** to use custom color settings that are managed by Color Engine Pilot.

You can either use the color settings from the server, or use a custom color settings folder, managed by Color Engine Pilot.

In the first case, you need to provide the server name and credentials, in the second you need to define the color settings folder location.

2.2.4. Ink Tools



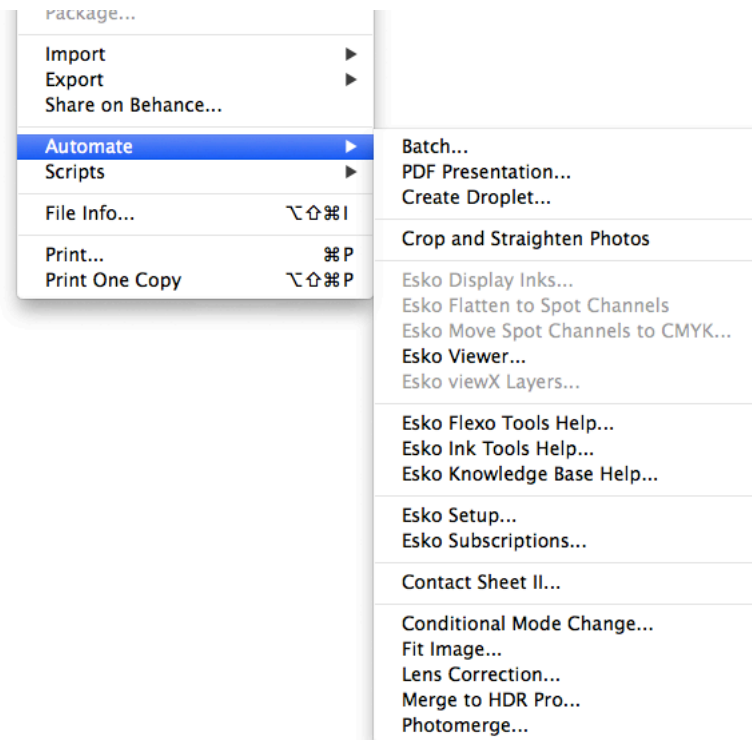
1. Choose the **Image mode** to use with the **Flatten to Spot Channels** tool. See [Choosing an Image Mode](#) on page 33.
2. Choose the **Preferred Ink Book**. If the name of a spot channel matches an ink from the preferred Color Engine Ink Book, then the viewer will automatically use the Color Engine ink.

Choosing an Image Mode

- Choose the **Image mode** to use in the **Flatten to Spot Channels** tool:
 - **Always to Multichannel:** **Flatten to Spot Channels** will always create a multichannel file.
 - **Always to CMYK Color:** **Flatten to Spot Channels** will always create a (flattened) CMYK file with extra spot channels.
 - **Ask:** Every time you use **Flatten to Spot Channels**, you will be asked to choose the Image mode to use.

3. Where to find the Ink Tools

1. Open a **CMYK** image in Photoshop.
2. Go to **File > Automate**, and you will see the Ink Tools:



Use **Display Inks...** to set “display inks” used to render the display color-accurate for your images.

Use **Flatten to Spot Channels** to move CMYK channels with display inks into regular Photoshop spot channels (to save the document as a regular file).

Use **Move Spot Channels to CMYK...** to move Spot channels into CMYK channels with display inks (to benefit from the display inks).

Use the **Viewer** to get a very accurate separation viewer. See [Viewer](#) on page 54

See [Display Inks](#) on page 39, [Flatten to Spot Channels](#) on page 43 and [Move Spot Channels to CMYK](#) on page 44 for more information.



Note:

You can find another Ink Tool in the **Filter > DeskPack** menu.

Use the **InkSwitch...** filter to automatically re-separate CMYK images into any set of two, three or four special inks.

For more information, see [The InkSwitch Filter](#) on page 48.

4. About the Ink Tools

The Ink Tools are a set of plug-ins on Adobe Photoshop for working with images with special inks. With the Ink Tools, creating and retouching images with special ink separations has become a lot easier on your favorite image editor.

With **Display Inks** you can show your special ink separations in full color overprint. The colors will match a lot closer to the printed result as when using the standard Photoshop spot channels. And unlike spot channels, with Display Inks you don't have to give up any Photoshop feature like layering.

The **Inkswitch filter** can automatically calculate special ink separations to match the appearance of a CMYK target. Patented Esko-Graphics technology is used to create totally new separations for any combination of two, three or four spot-colors. The result is displayed with Display Inks so you can further enhance the image with a very accurate display of the overprint colors.

Viewer is a very accurate separation viewer with a lot of extra production tools. It eliminates the need for separated proofs and will help you to avoid bad plate-making.

5. About Photoshop

Before we introduce the Ink Tools, it is important to have a good understanding of Photoshop itself. First we will explain some Photoshop terminology that is relevant to the Ink Tools: [Image Modes](#) on page 36, [Layers](#) on page 36, [Channels](#) on page 37.

The last chapter focuses on Photoshop's color management (**Color Profiles, Working CMYK Profile, Document CMYK Profile**).

5.1. Image Modes

Photoshop makes a distinction between a number of different image modes (CMYK Color, Multichannel, RGB Color...). A Photoshop document is always in one of these modes. This mode not only dictates the behavior of the colors, but also the behavior and limitations of the **channels** and the **layers**. Some filters, adjustments and file formats are disabled in some image modes. The most common image modes for pre-press are CMYK Color and Multichannel:

CMYK Color mode In this image mode the colors are made up in CMYK. The document has four fixed channels (Cyan, Magenta, Yellow and Black). These channels cannot be moved or deleted without leaving the CMYK Color mode. The CMYK Color mode supports the use of transparency and multiple layers. Any number of Spot Channels or Alpha Channels can be added (see also [Layers](#) on page 36, [Channels](#) on page 37).

Multichannel mode In this image mode there are no fixed channels, the document can have any number of spot channels and alpha channels (see also [Layers](#) on page 36, [Channels](#) on page 37). The Multichannel mode does not support the use of transparency or multiple layers.

5.2. Layers

A document in CMYK Color mode can have multiple layers. Each layer contains both color and transparency pixel-information and an optional layer mask. With multiple layers, designs can be made with moveable objects that automatically knock-out other objects that are in the background.

Note that a layer doesn't necessarily have to knock out the underlying layers. If desired a layer can also be blended in a dozen other ways with its background.

There are also **Adjustment Layers**. Instead of pixel information these layers hold a color adjustment which is automatically applied on the underlying layers whenever the adjustment layer is visible.

Spot channels are not part of the layers nor the transparency. As a result, the **Multichannel mode** does not support multiple layers or transparency.

5.3. Channels

CMYK Channels A Photoshop document in CMYK Color mode has four fixed channels (Cyan, Magenta, Yellow and Black).

Spot Channels A Photoshop document can have any number of spot channels. A spot channel is a single separation with an ink-color attached to it. Spot channels are displayed on the screen as if they are printed on top of the CMYK-separations (if any). Unlike layers, spot channels don't hold any transparency information.

Note that Spot Channels do have a solidity percentage. However, this value is only used for display. The solidity of a spot channel does not affect the way the image will be flattened and RIPped.

A knock-out effect between a spot channel and another spot channel or between a spot channel and a CMYK layer has to be edited manually by the retoucher.

Alpha Channels A document can also have any number of alpha channels. Alpha channels behave very similar to spot channels but typically they store temporary information like pixel selections. Alpha channels are not intended as separations to be printed.

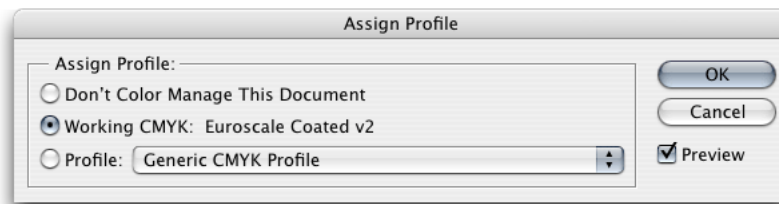
5.4. Photoshop Color Management

Color management is all about color consistency over different devices: When retouching a CMYK-image, the colors that are displayed on the screen should match the colors on the press. When making an inkjet proof, the colors printed by the proofer should match the colors on the press. When printing an RGB digital photograph on an inkjet printer, the colors on the inkjet printer should match the RGB colors on the screen.

Device Profiles To match colors on two devices, the color management software requires a device profile for both devices. A device profile for a device contains information about the color behavior of that device. A device profile of a CMYK press or proofer typically contains colorimetric measurements of thousands of different combinations of CMYK-percentages.

Photoshop's Color Management on CMYK Colors When Photoshop displays a CMYK image or any other CMYK color on the screen it will use a CMYK profile and match that to the RGB Display Profile (as configured in the Mac OS X System Preferences). If available, Photoshop will use the Document Profile. That is a CMYK profile that is embedded (tagged) in the CMYK document. If the document doesn't have an embedded profile Photoshop will use the Working CMYK profile to display CMYK colors. The Working CMYK Profile is a default profile that can be set in Photoshop's **Color Settings**.

To see if a document has a document profile, choose **Image > Mode > Assign Profile...** from the menu.

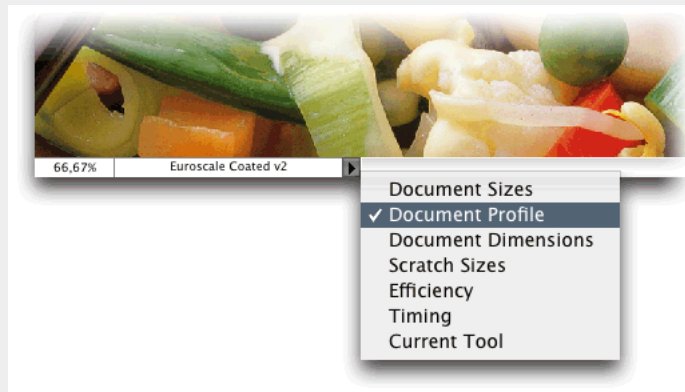


- Don't color manage this document: The document has no embedded document profile
- Working CMYK: The working CMYK profile has been explicitly embedded in the document. In this case the document profile and the working profile are the same.
- Profile: Another profile is embedded in the document.



Tip:

The embedded color profile can also be shown at the bottom of the document window.



Photoshop's Color Management on Spot Channels Spot channels are displayed in a different way. Each Spot-channel has an ink color and a solidity percentage. This color is used to display the solid (100%). To display the other percentages, the spot dot gain curve (which is set in Photoshop's Color Settings) is used. The solidity percentage of the spot channel is used to simulate the ink's overprint behavior on top of the CMYK colors or other spot channels. Since Photoshop is not using a color profile or any other type of overprint information, the display of overprinting spot colors is not as accurate as the display of composite CMYK colors can be.

6. Display Inks

6.1. What are Display Inks?

Spot channels are Photoshop's standard way of handling special ink separations. But they have a few drawbacks:

- Inaccurate rendering of overprints (see [Photoshop Color Management](#) on page 37).
- No support for transparency and layering.
- Creating spot color separations manually is time consuming.

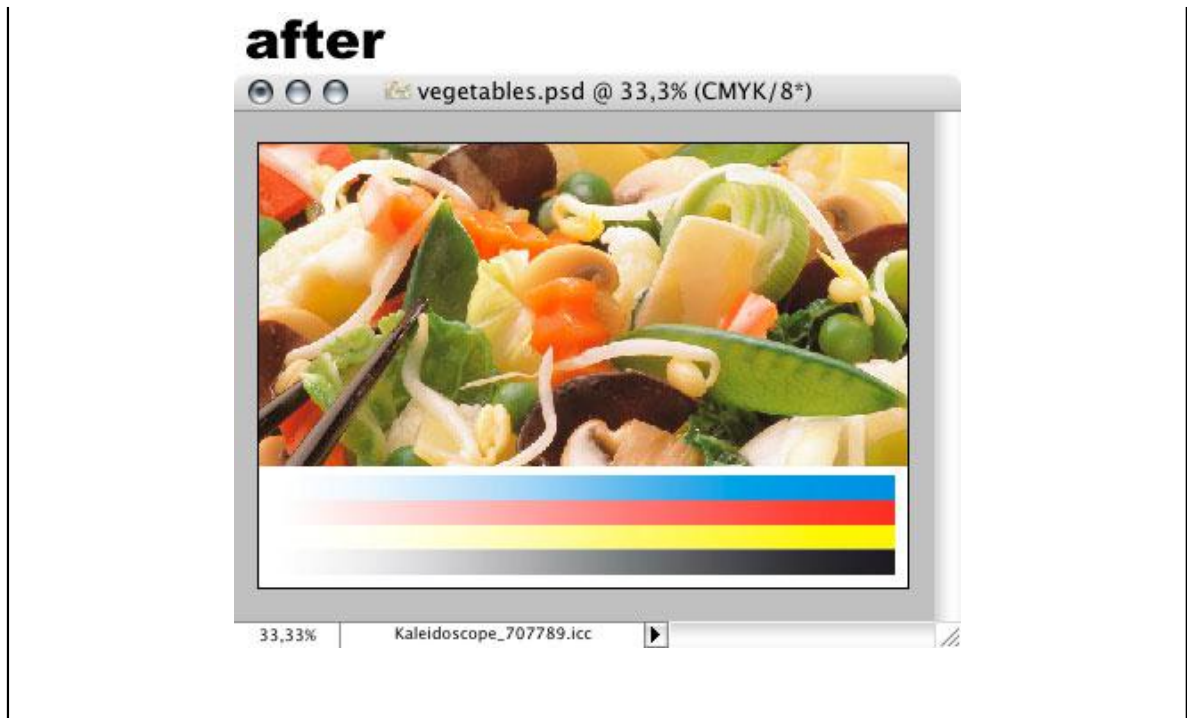
The Ink Tools offer an alternative for Spot Channels: Display Inks.

With the Ink Tools, a CMYK Color document can be tagged with four Display Inks. These display inks replace the **Document Profile** and they will dictate the color display on screen: The CMYK channels will be displayed as if they are printed with these special inks. The separations (the percentages) are not changed.

In this example we set the display ink of the magenta channel to PANTONE Warm Red. The separations don't change, they're just displayed in other colors.

before





Display Inks allow you to retouch special ink images but keep the separations in the CMYK channels. Only the visualization is changed.

6.1.1. Display Inks and CMYK Color mode

When using Display Inks, the image mode is CMYK Color and not Multichannel. The special ink separations are stored in the CMYK channels and not in Spot Channels.

Four available channels There are only four channels available for display inks, so only four display inks can be set on an image. If you require more than four or less than four separations, see [Need more than four inks?](#) on page 41 and [Need Less than four inks? Invisible channels](#) on page 41 for more information.

Channel Names After display inks have been set, the channels are still called "Cyan", "Magenta", "Yellow" and "Black". This might be a bit confusing at first (for hints see: [How to see what display inks are currently set](#) on page 42). But on the other hand the CMYK channels have a lot of advantages over Spot Channels:

Layering The CMYK channels can be combined with transparency and can be put into multiple layers. So Display Inks allow you to create foregrounds and backgrounds in composite spot colors. The layers will create the background knock-outs automatically.

Create Mix colors The color palette can be used to mix special inks and apply it on all four channels at the same time.

Adjustment Layers can be used to make color adjustments to spot color objects without losing the original separations.

Layer effects can be used for automatic drop shadows and glows. The object that throws the shadow can be made up of spot colors. The drop shadow itself can be one or more spot colors.

Use the **layer blending modes** for creative effects, or for easier manual trapping.

6.1.2. Need more than four inks?

Display inks are always set on the CMYK channels. Only four display inks can be set on an image because there are only four channels available to hold the different separations.

If your image requires more than four inks then you won't be able to use all of them as display inks. A subset of four inks can be assigned to the different CMYK channels using display inks. The remaining separations can be put in standard Photoshop spot channels. To benefit the most from the advantages of display inks, choose four separations that require most color accuracy and layering. Use display inks for these separations, use spot channels for the other separations.

When creating an image with all four process inks and one or more special inks, you might also want to consider eliminating one or more of the process inks using the **InkSwitch Filter**. Then use **Move Spot Channels to CMYK** to put the special color separation in the vacant CMYK channel.

InkSwitch is not able to generate separations for more than four inks.



Note: The **Viewer** can accurately display more than 4 inks. See [Viewer](#) on page 54 for more information on Viewer.

6.1.3. Need Less than four inks? Invisible channels

Display inks are always set on the CMYK channels, so there are always four channels available to hold the different separations.

If your image requires less than four inks, you can use display inks to deactivate one or more of the CMYK channels. The deactivated channel(s) will become invisible, as if it was printed with an invisible ink. Although invisible, the pixel data is still there. Later on, when your special ink image is exported to a file (see [Flatten to Spot Channels](#) on page 43), the invisible channel(s) will automatically be discarded.

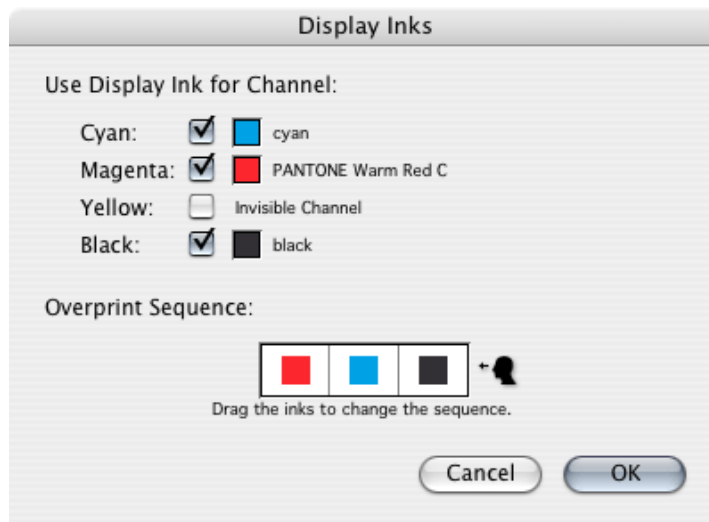
See [The Display Inks Dialog](#) on page 41 on how to create invisible channels.

6.2. Setting and removing Display Inks

6.2.1. The Display Inks Dialog

This chapter describes how to set the display inks on a CMYK document. If you already have spot channels, and you would like to use display inks instead of the spot channels, go to [Move Spot Channels to CMYK](#) on page 44.

To set the display inks on a CMYK document, choose **File > Automation > Display Inks...** in the menu. The Display Inks dialog appears:



Use Display Ink for Channel: For each CMYK channel, you can specify the display ink to be used. Click on the ink patch to change the inks. It will pop up an ink selector where you can choose from the list of available [Color Engine Inks](#) on page 45.

Uncheck the checkboxes to turn one or more CMYK channels invisible (see [Need Less than four inks? Invisible channels](#) on page 41). You cannot uncheck all four channels.

Overprint Sequence: Click and drag the ink patches to change their sequence (see [Overprint Sequence](#) on page 47).

When you press the OK button, the Ink Tools will calculate a new color profile and assign it to the document.

6.2.2. How to see what display inks are currently set

There are several ways to see if and what Display Inks are set on the current CMYK document:

1. Display Inks Dialog

Choose **File > Automate > Esko Display Inks** from the menu and see if any display inks are currently set.

2. Channels Palette

The channel names remain Cyan, Magenta, Yellow and Black, even after the display inks have been set. However, the channel thumbnails might already give a hint of the display inks that are currently used. This will only work if **Show Channels in Color** has been enabled in the Photoshop Preferences.

3. Document Profile

If the document has display inks, then the name of the document profile will be "Color_Engine_" followed by a number (see also [Photoshop Color Management](#)).

4. Window Title

The title of the document window can tell you if a CMYK document is tagged with a color profile or not:

- "(CMYK/8)" The document is tagged with the working CMYK profile. No display inks are set.

- "(CMYK/8#)" The document is not tagged. No display inks are set.
- "(CMYK/8*)" The document is tagged with another CMYK profile. The document might have display inks.

Viewer

You can open the Viewer and look at the separation list in the Viewer window. See [Viewer](#) on page 54

6.2.3. Removing the display inks

To remove the display inks from the CMYK channels, go to **Image > Mode > Assign Profile** and choose **Don't Color Manage this Document**. The display of the image is then restored to the Working CMYK profile without changing the separations.

6.3. Importing and Exporting Files

6.3.1. Display Inks outside of Photoshop

Loading and Saving Display Inks CMYK color documents with display inks can be saved (for example as a layered Photoshop Document file). This file can be opened again in Photoshop for further retouching. But other applications (like Adobe Illustrator) will not support the Display ink information and treat the separations as process inks. This image will be displayed incorrectly and the output will also be incorrect. **Display Inks only work inside Photoshop.**

To enable you to work with CMYK channels and display inks inside Photoshop and with spot channels outside of Photoshop, the ink tools have two plug-ins to convert separations from one type into the other:

Flatten to Spot Channels This tool will move the CMYK channels with display inks into regular Photoshop spot channels. After applying this plug-ins you can save the image as a normal TIFF or DCS2 file.

Move Spot Channels to CMYK This tool enables you to move regular Spot Channels to a CMYK-channel with the corresponding Display ink. Apply this tool on a document with spot channels to benefit from the **advantages of Display Inks**. Use this plug-in right after opening a TIFF or DCS2 file with spot colors.

6.3.2. Flatten to Spot Channels

Flatten to Spot Channels is a tool to move CMYK channels with display inks into regular Photoshop spot channels so you can save the document as a regular file (See also [Display Inks outside of Photoshop](#)).

This tool only works on a CMYK image with display inks.

Choose **File > Automate > Esko Flatten to Spot Channels**. A dialog will pop up:



You can choose the resulting image mode:

Multichannel: All CMYK channels are replaced by Spot Channels with a color that corresponds to the display ink of the CMYK channel. The CMYK channels that were set invisible are discarded. The result is a flat Multichannel document. This option is best suited when you want to write a DCS2 file.

CMYK Color + Spot Channels: The CMYK channels are kept, but their content is moved to new Spot Channels with a color that corresponds to the display ink of the CMYK channel. The CMYK channels that had a process ink as display ink are not changed. The CMYK channels that were set invisible are cleared. This option is best suited when you want to write a TIFF file.



Tip:

To skip this question in the future, see [Ink Tools](#) on page 32.



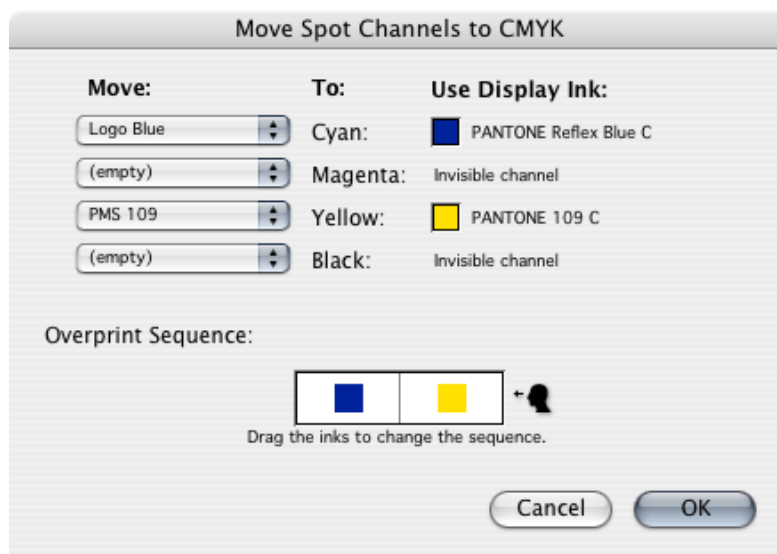
Note:

The image will be flattened. So if it contains multiple layers or transparency, we advise you to save a local copy of the Photoshop document before using this tool. If the image would need to be retouched again, you can open the layered version. Note that you cannot use this layered file in other applications.

6.3.3. Move Spot Channels to CMYK

Move spot channels to CMYK is a tool that can move Spot channels into CMYK channels with display inks. This tool allows you to open a file with regular spot channels, move the spot channels to CMYK channels and benefit from the display inks.

Choose **File > Automate > Esko Move Spot Channels to CMYK...** and a dialog pops up:



Move to: The dialog shows a table where you can specify the spot channels that have to be moved to the CMYK channels. In the column on the left (Move:) you can choose which spot channel you would like to move. The second column shows the CMYK-channel that the spot channel will be moved into.

Use Display Ink: The last column of the table shows the display ink that will be used to display the moved separation. Based on the spot channel name, the tool will try to find a suitable Color Engine Ink automatically. If this fails or if you want to override it, you can click on the ink-patch and select a Color Engine Ink yourself.

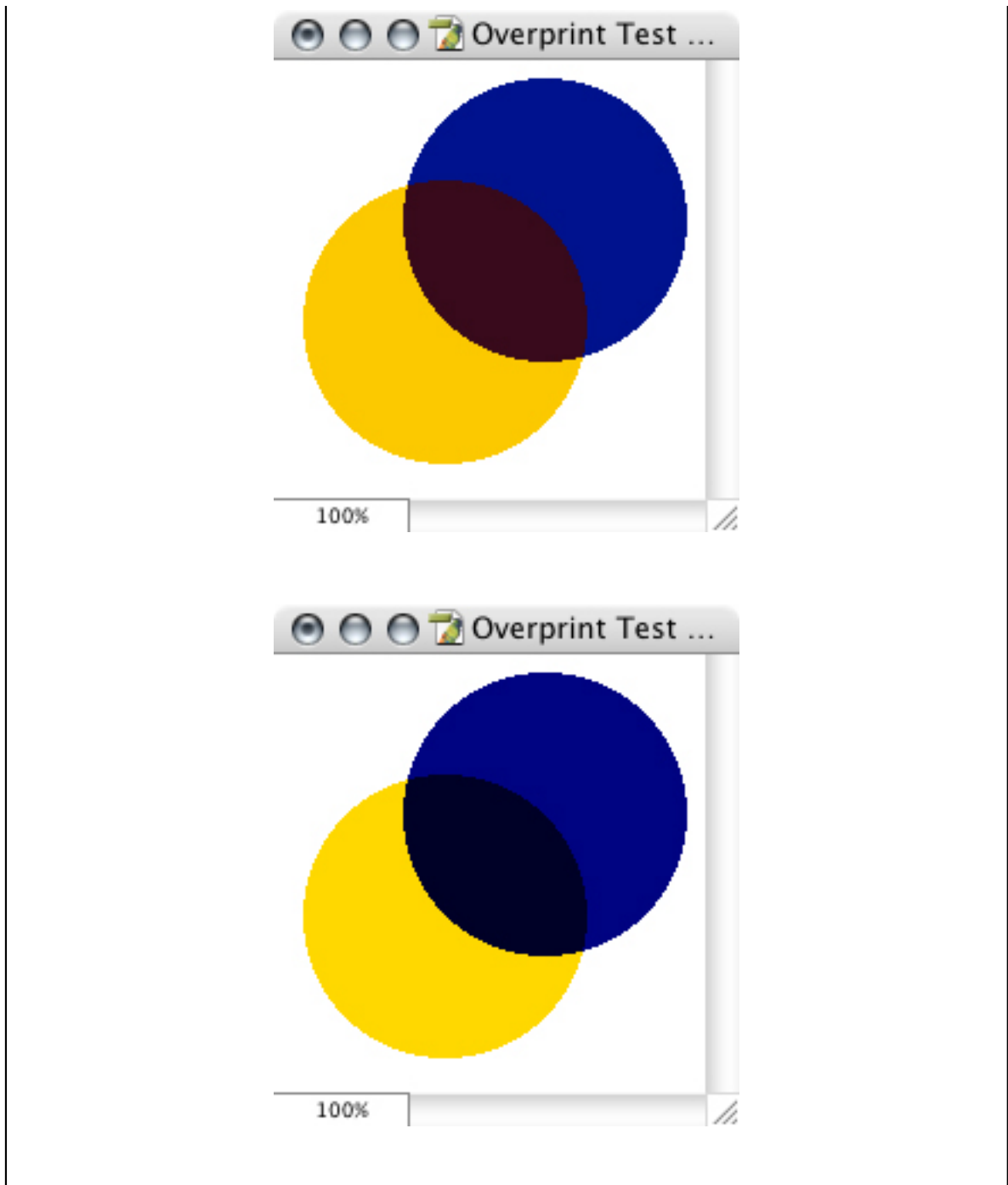
Overprint Sequence: Click and drag the ink patches to change their sequence (read more about [overprint sequence](#)).

6.4. Color Engine and Color Accuracy

6.4.1. Color Engine Inks

The color rendering of a document with Display Inks is far more accurate than the color rendering of spot channels.

PANTONE 109 C on top of PANTONE Reflex Blue. The top image uses spot channels, the bottom image uses display inks. Notice how the spot channels show an uncharacteristic red colorcast in the overprinting area.



To display the overprinting spot channels, the Ink Tools use the Esko-Graphics Kaleidoscope color engine, containing patented technology to predict the appearance of any overprint combination of special inks.

Color Engine Ink Profiles To do this accurately, the Color Engine engine requires an ink profile for every special ink that is involved. Such a **Color Engine ink profile** contains data of spectral measurements of an ink in several overprint situations.

The Ink Tools for Adobe Photoshop are shipped with two Color Engine Ink Books:

1. Process. Containing Color Engine Ink Profiles for Cyan, Magenta, Yellow and Black.

2. PANTONE Solid Coated. Containing Color Engine Ink Profiles for the of all inks from the PANTONE Solid Coated guide (edition 2000).

Custom Ink Profiles If you want to use other inks (custom inks), you have to create extra ink profiles. You can do this with the Esko-Graphics application **Color Engine** which runs on Windows. Color Engine keeps all its ink profiles and other data in a special folder called BG_DATA_CMS_V010 on the Windows computer. To use the extra ink profiles that you created in Color Engine:

1. On the windows computer, make sure the BG_DATA_CMS_V010 folder is shared.
2. On your mac, connect to the Windows computer using Windows file sharing(SMB) and activate the BG_DATA_CMS_V010 folder.
3. Go to the [Ink Tools](#) on page 32 and specify the connected folder as **Custom Color Engine Data Folder**.

6.4.2. Overprint Sequence

The appearance of a composite color on a press depends on the order in which the separations are printed on top of each other. 50% warm red, printed on top of 100% black looks different than 100% black printed on top of 50% warm red.

For the most accurate color rendering of the Display Inks, the Color Engine (see also [Color Engine Inks](#)) needs to know in which order the inks will overprint. That's why you can specify the overprint sequence when setting the display inks:



With surface printing put the ink that is printed first to the left and put the ink that is printed last to the right. With reverse printing (printing at the backside of a transparent stock) put the ink that is printed first to the right and put the ink that is printed last to the left.

When setting Display Inks, the overprint sequence will affect the displayed color wherever two or more inks overprint.

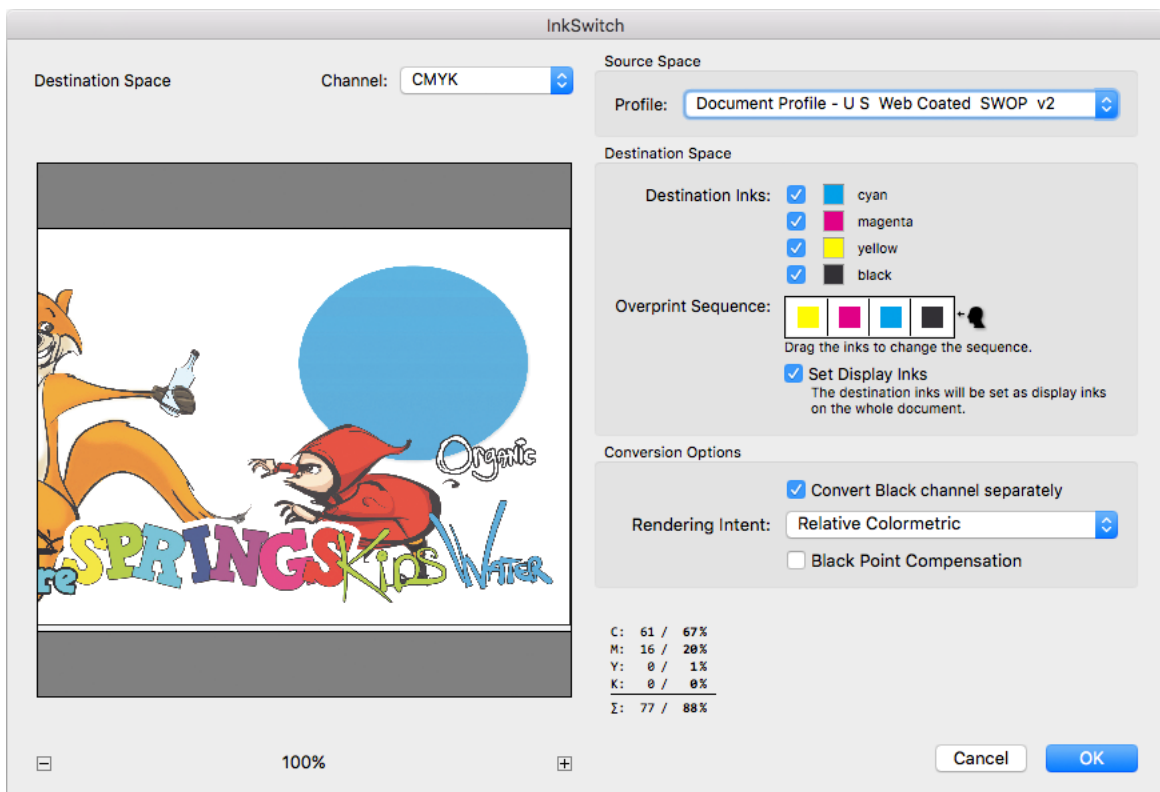
You can also set an overprint sequence in the InkSwitch filter. In this case the overprint sequence will affect the separations that are generated by the InkSwitch filter. When changing the overprint sequence, InkSwitch will generate slightly different separations to compensate for the slightly different appearance of the inks when they overprint.

7. The InkSwitch Filter

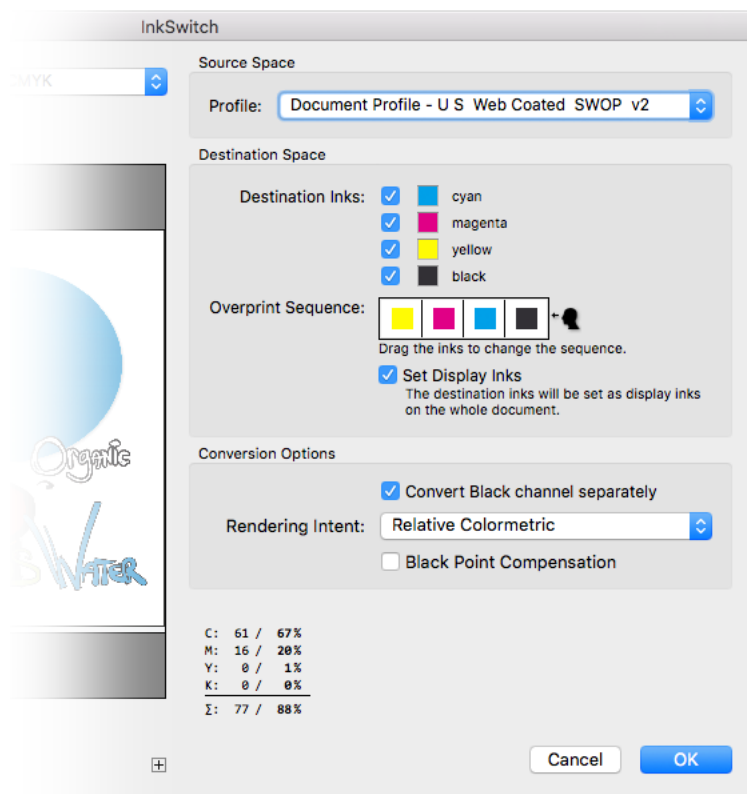
InkSwitch is a filter that automatically re-separates a CMYK image into any set of two, three or four special inks. The separations are automatically adjusted to keep the appearance of the original CMYK image as much as possible.

7.1. The InkSwitch Dialog

To open the InkSwitch filter dialog, choose **Filter > DeskPack > InkSwitch** from the menu.



7.1.1. InkSwitch Settings



The InkSwitch settings are on the right side of the **InkSwitch dialog**. You can reset them to the default settings by holding **Option** and clicking on the Cancel button.

Source Space, Profile: Here you can choose the color space that the original separations were intended for. The original image separations and this profile make up the appearance of the original image. This is the target that has to be matched by InkSwitch.

There are three options:

1. Document Profile: Use the color profile that is tagged in the document as source color space. This option is the default but it is only available if the document has an embedded profile and no display inks.
2. Working CMYK Profile: Use the working CMYK profile, as configured in the Photoshop Color Settings.
3. Color Engine CMYK: Instead of using a profile, use the four Color Engine process inks to make up the appearance of the original image. By choosing this option you can avoid that InkSwitch compensates the separations for unintended differences in the source and destination inks.

If there are already display inks set, option 2 is automatically selected, allowing you to InkSwitch from CMYK to special inks even after those special inks have already been set as display inks.

Destination Space

Inks: Choose the inks that you want to generate separations for. Click on the ink-patches to select another [Color Engine Ink](#).

If you want to generate an image of less than 4 inks, you can deactivate some of the output channels in the InkSwitch dialog. The deactivated channel will become empty and invisible and InkSwitch will match the original image with the remaining inks as good as possible.

Overprint Sequence: Here you have to specify in which order the inks will be printed. The overprint sequence will affect the visualization of the result, but it will also affect the separations that are calculated.

Convert Black Channel Separately: When this option is toggled on, InkSwitch will convert the black channel independent from the other three channels. Use this option to avoid detail from the black channel to be transferred to the other channels or vice-versa. This option can generate a colorcast in the shadows if the 4th destination ink is not a neutral black or dark gray.

Rendering Intent and Black Point Compensation: You can set the Rendering Intent and Black Point Compensation to be used for the conversion of images. By default, Rendering Intent is set to "Relative Colormetric" with Black Point Compensation disabled, which is best for most flexography jobs.

Set Display Inks When this is toggled on, the destination inks, used by InkSwitch to create the new separations, will also be used to display the result. The destination inks will be set as Display Inks. For more information see [InkSwitch: Set Display Inks](#).

7.1.2. Preview Area

The left side of the InkSwitch dialog shows a preview.



In the preview area you can see a preview of InkSwitch. If you click and hold the mouse-button in the Preview Area, the original image is displayed. By clicking and releasing the mouse, you can compare the original image and the filter-result. The original image is displayed using the Source profile (see [InkSwitch Settings](#) on page 48) and the destination image is displayed using the Destination Inks. If both images are almost identical, InkSwitch did a fine job!

Channel: Use the channel-selector to view a single channel or all channels.

**Tip:**

To show a single channel in color or in grayscale see Photoshop's Preferences "Show Channel in Color".

Zooming and Panning: With the zoom buttons you can zoom in and out on the image. When zoomed in on a part of the image, click and drag in the preview area to pan to another part of the image.

Color Values (densitometer): At the bottom of the InkSwitch Dialog, a little table shows the color percentages and the Total Area Coverage of the pixel that the mouse is currently pointing at. The column to the left shows the original values, the column to the right shows the converted values.

7.1.3. Set Display Inks

When the InkSwitch filter is applied on an image (to adjust the image's separations for a different set of inks) the destination inks can also be set as Display Inks on the image. That way the new separations are displayed in the inks that they were meant for.

**Note:**

When InkSwitch is applied with less than four destination inks, the CMYK-channels that were deactivated in the InkSwitch dialog (see [InkSwitch Settings](#)) will be set invisible.

When InkSwitch is applied on a part of the image (only one layer, or on a selection of pixels), the separations will only be recalculated in the selected part. But the Display Inks cannot be set on just a part of the image. Display Inks affect the display of all the CMYK-information in your image. In this case you might want to uncheck "Set Display Inks" for the time being, to keep the original document profile as the Source Space when performing InkSwitch on other parts of the image. The inkswitched parts will be displayed in the wrong colors until the display inks are set.

7.2. How to InkSwitch a Layered image

InkSwitching a layered image

Since Photoshop does not allow selecting multiple layers at once, it is not possible to InkSwitch a layered image in one go without flattening the layers. Luckily Photoshop has a quick and easy way to repeat the last filter.

To InkSwitch a layered image completely to a new set of inks:

1. Select the first layer.
2. Go to the InkSwitch dialog and set the desired destination inks. Make sure that "Set Display Inks" is disabled. Click OK.
3. Select the next layer.
4. Press **Control+Command+F** or select **Filter > InkSwitch** in the menu.
5. Repeat 3. and 4. until all the layers are InkSwitched except the last one.
6. Select the last layer to be inkswitched.
7. Select **Filter > DeskPack > InkSwitch**.

8. In the InkSwitch dialog, enable "Set Display Inks" and click **OK**.



Note:

After a layer has been InkSwitched, its separations are recalculated but still displayed in plain CMYK. This may look strange since the new separations were not intended for standard process inks. However, after the last layer is InkSwitched, the Display Inks will be set on the whole document and the colors will be displayed correctly.

7.3. Some applications of InkSwitch

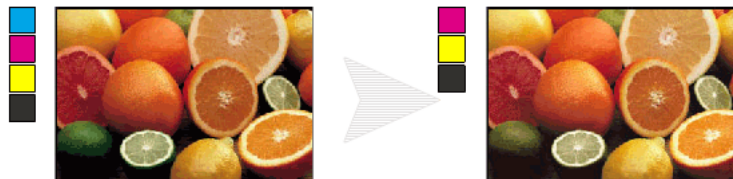
In this chapter we give some applications for InkSwitch in your pre-press situation.

7.3.1. Reducing the number of inks

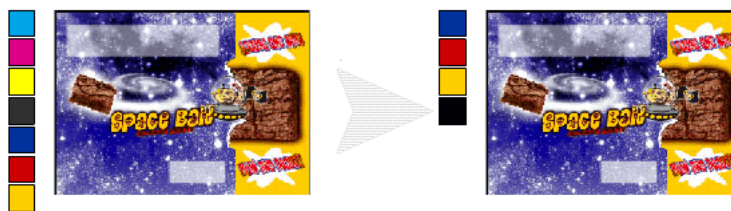
A lot of money can be saved by printing a job with fewer inks.

Use InkSwitch to eliminate one or more inks from an image:

- Eliminate a process color, InkSwitch will compensate for the lost separation in the other separations.



- Replace a process color by one of the Spot Colors that are used already in the linework.



7.3.2. Cleaning separations for conventional flexography

Conventional flexographic plates are typically not very good at printing stable highlights. Some highlights print dirty, others print too dark (especially later in the press-run when the plates start wearing). Unstable highlights can ruin composite colors and the overall appearance of an image. To

prevent this, flexo retouchers often remove the third color component out of the different objects. They will remove all cyan out of "red" objects like tomatos, oranges and sometimes fleshtones. And they will remove all magenta out of the green objects like leaves and green apples. To keep the correct appearance of the object and the whole image, the cleaned separation has to be compensated for in the other separations. InkSwitch is very good at this.

How to remove cyan out of the green objects using InkSwitch:

1. Make a selection of the green objects.
2. Go to InkSwitch Dialog.
3. Reset the inks to plain CMYK by holding **Option** and clicking on the Cancel button.
4. Uncheck the Magenta ink.
5. Uncheck "Set Display Inks" to prevent the Magenta from becoming an invisible channel. (read also [Set Display Inks](#) on page 51).
6. Click OK.

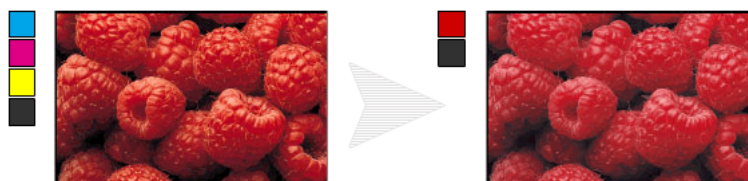
In the selected areas, the separations will be recalculated for Cyan, Yellow, Black. The magenta separation is cleared. InkSwitch will compensate in the other three channels and keep the original appearance.



With a similar routine the cyan can be removed from the red objects or black can be removed from other parts of the image.

7.3.3. Reducing overprints

Some substrates (like metal) are not very good at holding multiple inks on the same place. Therefore colors that are usually printed in composite CMYK are replaced by a single spot color. InkSwitch can be used to reparate the CMYK image to such a set of spot colors, thereby creating an image with less overprinting inks:



8. Viewer

The **Viewer** is available if you have the Flexotools, Ink Tools or Equinox plug-in installed.

8.1. About Viewer

Benefits of using Viewer

Viewer is a very accurate separation viewer with a lot of extra production tools. It eliminates the need for separated proofs and will help you to avoid bad plate-making.

In this preview, you have access to advanced tools such as the Densitometer.

To open the Viewer window, choose **File > Automate > Esko Viewer...**

8.2. The Viewer window

To open the Viewer window, choose **File > Automate > Esko Viewer...**

When opening a document, or changing to a different job, Viewer will (re)calculate the Preview. Viewer will only work when the active document is a CMYK or Multichannel image, at 8 bits per channels. Otherwise the Viewer will show a warning "The current document is not in the CMYK or Multichannel mode".

When changes are made in the Photoshop document, you have to click the **Refresh** button for the changes to become visible in Viewer.



Note: Viewer will take the Photoshop Layer visibility into account, but will disregard Photoshop's Channel visibility settings.

By clicking the **Minimize** button, the Viewer window is minimized, showing only the **Maximize** button. You can maximize the Viewer window by clicking the **Maximize** button. If you choose **File > Automate > Esko Viewer...** the Viewer window will be maximized and refreshed.

Equinox profile

If you have either an Ink Tools or Equinox license, you will get an accurate preview of documents using an Equinox Profile. If you only have Flexotools license, the Equinox document with Equinox Profile will not work. A message at the bottom of the Viewer palette will inform you that color will not be accurate.

8.2.1. Navigating in the Preview

The Viewer window shows the preview of your document in the left pane, and the list of used inks in the right pane of your Viewer palette.

At the bottom of the palette, you will find:



1. a Pan tool (see below), a Zoom tool (see below) and a Densitometer tool (see [Measure Ink Densities](#) on page 56)
2. a zoom-in and zoom-out button and a field showing the current zoom percentage.
3. the Refresh button.
4. the Minimize button.

Zoom in - zoom out

To zoom in the preview pane of the Viewer palette, select the zoom tool and just click, and the view will zoom in using the clicked point as center point.

To zoom out, click while holding the ALT key pressed, and the view will zoom out using the clicked point as center point.

You can also drag a rectangle to zoom in, and the new viewport will be a closest match to the rectangle you dragged.

You can also use the default Photoshop shortcuts: cmd-0 to fit the image in the window, cmd-1 to set the zoom factor to 100%.

To pan the view, select the Pan tool or hold down the spacebar and drag a line in the preview pane. The view will move the direction and the length of the line you drag.

8.2.2. Separations

In the Ink list, you can:

- Click the eye icon in front of a separation/color name to show or hide it.
- Alt-click an eye button to quickly hide all other separations and go in single-separation mode. Alt-click the same eye button again to show all separations.
- You can also use the Photoshop shortcuts: Cmd-2 to show all separations, and Cmd-3 to show only the first separation, Cmd-4 for the second, etc.
- Double-click an ink to open the **Display Inks** window (for CMYK inks) or **Spot Color** dialog for spot colors. See [Display Inks](#) on page 39 or [Spot Colors](#) on page 55

If only one ink is selected, you can choose in the fly-out menu of the Separations section if you want to see the single separation

- in RGB, using the actual color
- in grayscale, as the image might appear on film / plate
- in grayscale but inverted

Spot Colors

Spot colors are accurately shown in Viewer. By default, the color definition of the spot colors is defined by the LAB value of the solid ink, according to Photoshop. However, when possible, the Viewer will use the Color Engine ink information, offering the color accuracy of Color Engine.

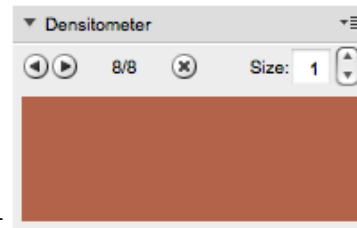
- Colors from the Photoshop Pantone Coated and Pantone Uncoated inks are automatically matched with their Color Engine Ink equivalent
- If a spot color name matches the name of an ink in the **Preferred Ink Book**, that corresponding ink is used. The **Preferred Ink Book** can be set in the Ink Tools tab in **File > Automate > Esko Setup**
- You can manually replace an ink by a Color Engine ink, by double-clicking the color patch in front of the channel name, and selecting an ink book and ink. If you click OK, the name and color of the Photoshop Channel will be changed.

By selecting **Add Spot Channel ...** from the fly-out menu of the separation section in the Viewer, you can immediately add a Color Engine spot color (instead of first adding a channel in Photoshop, and then replace the spot color by the correct Color Engine ink).

8.2.3. Measure Ink Densities

Densitometer

In the middle of the right side of the Viewer window, you can see the Densitometer section. You can



show or hide the section by clicking the triangle in front of it.

- Select the **Densitometer** tool, and click on an area of your document to measure the separation densities in that area.

Every time you click, a new measuring point is set. The densities are shown to the right of each separation, and the color patch in the Densitometer section shows the measured color. The total density of all inks on the point that is being measured (the TAC value) is shown at the bottom of the separation list.



Note: If the TAC value exceeds the TAC limit specified in the currently selected press settings, a warning icon is shown next to the Total Area Coverage

- Use the left and right arrow buttons to browse through the different measuring points. The according densities and color patch will be shown



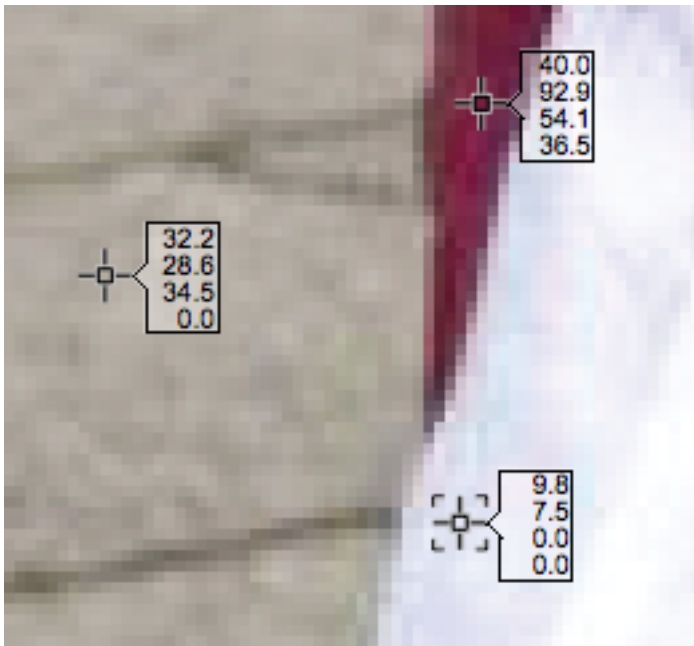
Note: If you are zoomed in and navigate to a measuring point not in the Viewer window, the Preview will pan to show the selected measuring point.

- Click the **Remove** button (X) or use backspace to delete the current measuring point.
- Change the **Size** of the current measuring point by clicking the up and down arrow. If the size is set to e.g. 3, the densitometer will take the average density of a 3 by 3 pixel area.



Note: When creating a new measuring point, the current Size will be used.

- Select **Show bubbles** to show the measured densities next to every measuring point.



When in **Flexo Print** or **Flexo Plate** preview, the bubble will show a black dot next to the density for channels with a percentage equal or higher than the first dot percentage.

When in **Breakout** preview, the bubble will show a red triangle icon next to the density for channels with a percentage below the first dot percentage.

When in **Total Area Coverage** preview, the bubble will show a black dot next to the density for channels with a percentage equal or higher than the first dot percentage, and it will show a yellow triangle icon next to the total area coverage if it exceeds the currently set TAC value.

The densities of separations that are not visible, are shown dimmed in the bubbles.

8.2.4. Quality Control

Registration Error

The Registration Error Preview is a simulation of a design printed with misregistration. It can be very helpful to see if trapping is applied sufficiently and correctly.

Use the slider to set the **Registration Error**, or enter a value in the input field.

The separations are randomly shifted. In fact, all separations are moved exactly the distance of the Registration Error, but all under a random angle.

If you want to see another random registration error simulation, click the **Simulate Again** button.



In the example above, you can see a small area of a job in regular preview (left) and with registration errors (right). In this case, you can clearly see no trapping was applied, so white lines appear at the registration shifts.