

# User Manual

for

## Kongsberg XP systems

### Note

We remind you that only the Esko staff, or persons having received appropriate training, are allowed to handle, manipulate or do repairs on the system.

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# 1. Welcome

---

Welcome to a long-lasting co-operation with Esko.

The intention of this User Manual is to provide information sufficient to:

- Understand the main principles of the XP system.
- Learn how to operate the XP table in order to produce the expected result.
- Learn about the XP safety rules in order to operate the system in a safe way.

The manual is divided into the following main sections:

- Safety regulations    The main safety issues are described.
- System description    A short-form description of the system. This section is divided into two chapters:
  - System description.
  - Graphical User Interface (GUI). This part is available as context sensitive help from the XP-Guide program. In addition, it is available as Appendix A in this manual.
- How to's..            Typical tasks are described in detail.
- Preparing for a job    What do I have to prepare before the start of a job. This is a part of the 'How to' chapter.
- Work with ARS        The Automatic Registration System is covered by a separate chapter.
- System setup         A description of all parameters to be set and how to set them.
- Tooling system        A complete description of the XP tooling system.
- Maintenance         What maintenance is required in a short and long term.
- Appendices

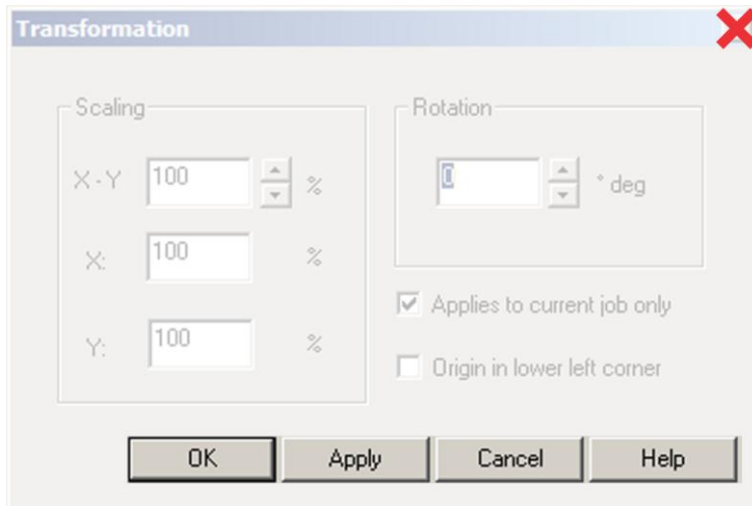
Some definitions used in this document:

<b>Name or style</b>	<b>Description</b>
Pop-up dialog	This is the dialog that appears when you click the Right mouse button.
<i>Start button</i>	The italic style indicates this is a button on the Operator panel.
<b>OK</b>	The bold style indicates this is a button or function in the XP-Guide user interface.
<b>Options-&gt;System Option</b>	Menu selection: From the Options menu, select System Option
(123)	123 is the page number where the actual function is described. It is also a hyperlink; a mouse-click on the number will bring you directly to the issue.

## 1.1 Local languages

This manual is available in a wide range of local languages. When the document is translated into a local language, the screen pictures, some illustrations and the content in the Appendices remains in English language.

## 1.2 About XP-Guide dialogs



To exit from any XP-Guide dialog, use the control buttons available. Using the cross in upper right corner is not recommended and the consequence is unpredictable.

## 2. Safety regulations

---

### 2.1 Introduction

The Kongsberg table is designed to conform to safety regulation standards.

Nevertheless, operating the table can involve hazards if the operator does not follow the operating instructions or uses the table for non-intended purposes.

The safety regulations described below are supplemented with safety warnings in the respective topics.

### 2.2 Responsibilities

#### 2.2.1 The manufacturer

The manufacturer is responsible for delivering the system according to safety regulation standards.

#### 2.2.2 The customer

The customer is responsible for:

- Ensuring that the system is used for its intended use only
- Allowing that only authorized and trained personnel operate the system
- Preventive maintenance as described in the Maintenance manual.
- The local regulations regarding installation and operation are fulfilled.

#### 2.2.3 The operators

The operators are responsible for:

- Operating the system only when it is in a flawless state.
- Ensuring that no unauthorized persons come close to the system.

### 2.3 Requirements to be met by operators

The personnel operating the system must:

- Be adequately trained.
- Have read and understood the instructions described in "Safety regulation" as well as any other safety warnings.

### 2.4 Definition of use

The intended use is described in the 'How to..' chapter. Any other use is considered non-intended use.

Examples of non-intended use:

- Operation by operators not meeting the requirements as described above.
- Unauthorized modifications (bridging safety devices, removing covers etc.)
- Utilizing accessories other than those specified by Esko.



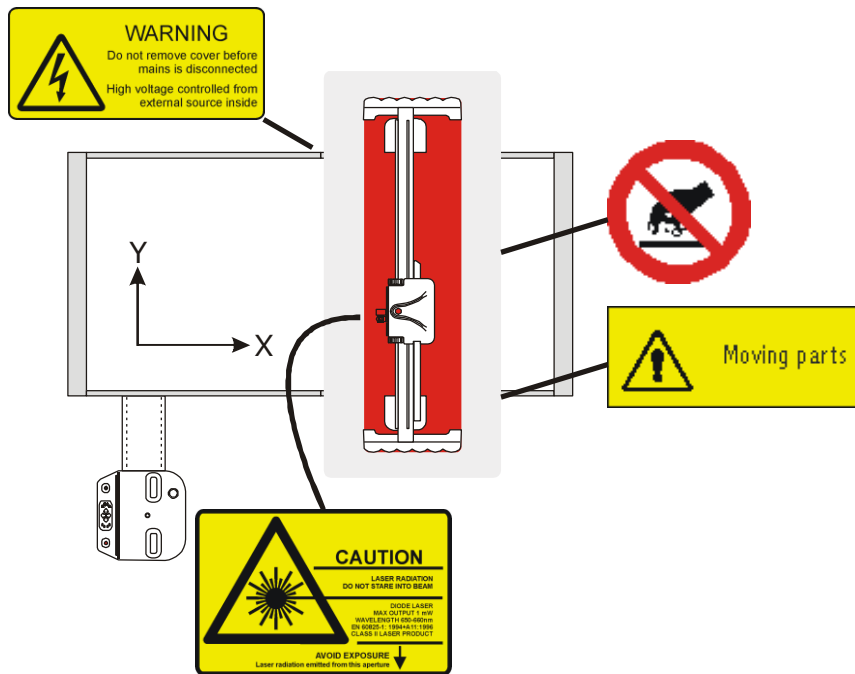
Non-intended use may cause:

- Health hazards and injuries.
- Damage to the system.
- Incorrect functionality.
- Damage to work materials.

Esko is not liable for any damage resulting from such non-intended use.

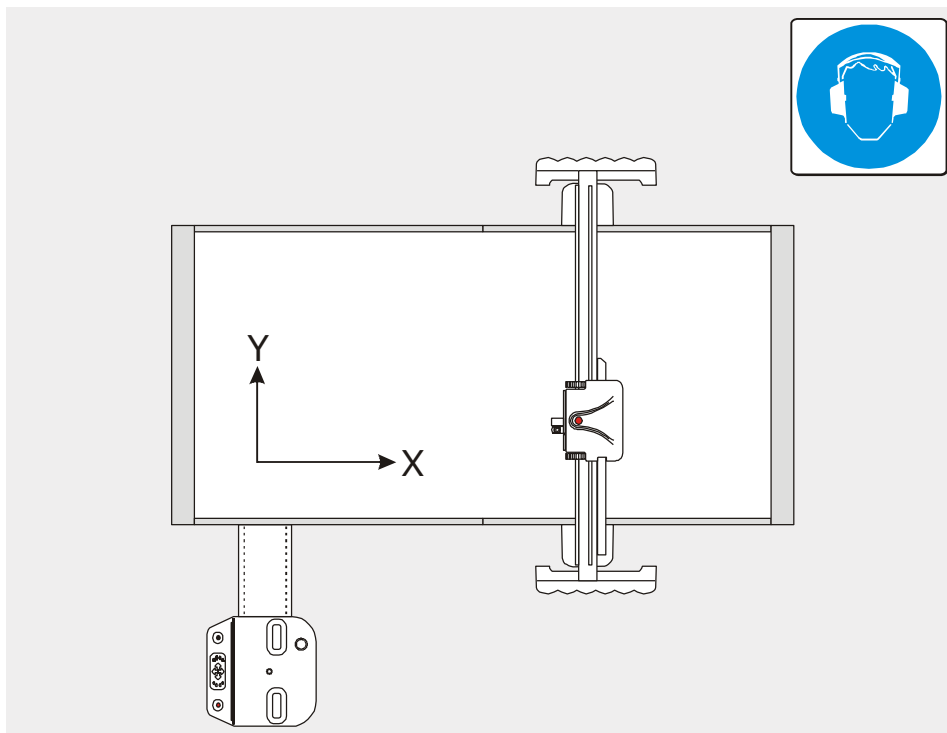
## 2.5 Danger zones

### 2.5.1 Moving parts, laser radiation and high voltage



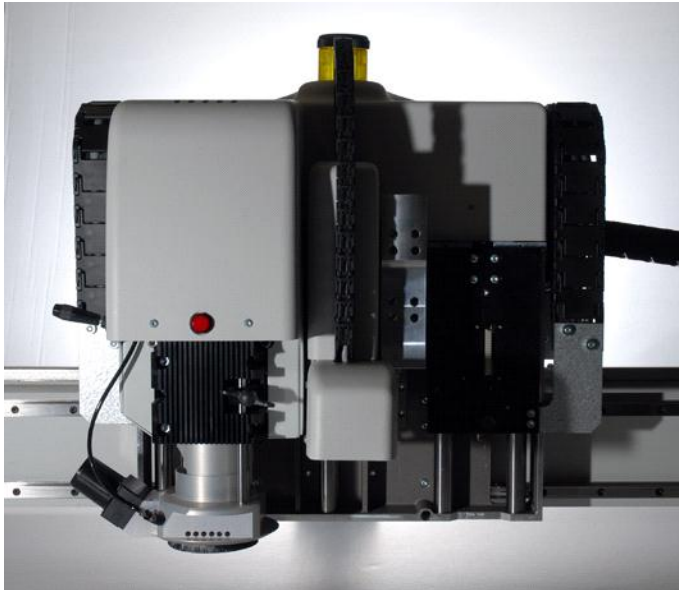
The area around the moving parts should be considered to be a danger zone.

### 2.5.2 Noise level



Hearing protection should be used by any personnel exposed to the noise from the XP table.

### 2.5.3 Ejection of parts






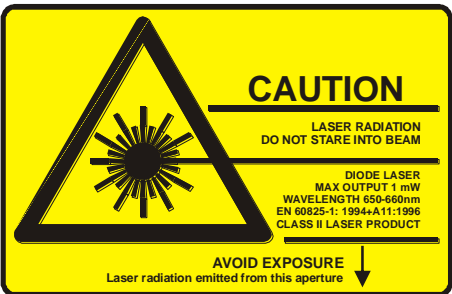
Potential risk when running the HSMU/HPMU:

Personnel hit by breaking milling bit or small pieces of processed material.

Eye protection should be used by any personnel working with HSMU/HPMU on XP.

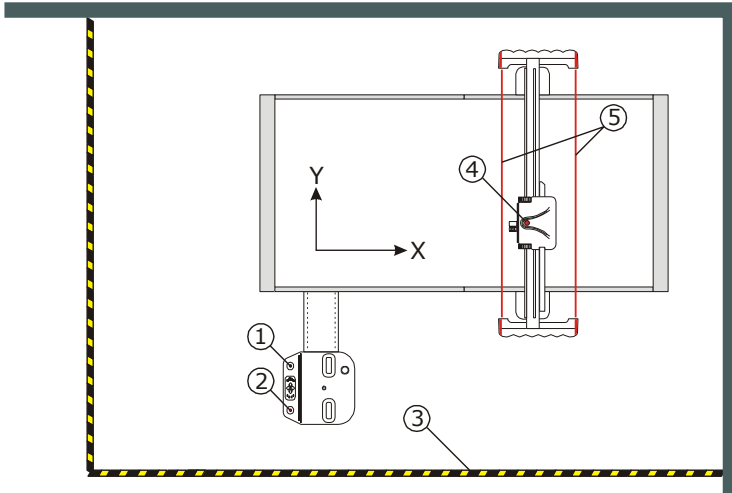
### 2.6 Warning sign explanation

	<p>Knife blades are extremely sharp. Used in this documentation to indicate operations with knife blades and milling bits.</p>
	<p>Potential areas with a risk of being squeezed are marked with the 'do not touch' sign. These areas are:</p> <ul style="list-style-type: none"> <li>• Between Y carriage and rack</li> <li>• When the Y carriage moves towards traverse ends.</li> <li>• Between the table top and the moving traverse.</li> <li>• Underneath the tool head.</li> </ul>
	<p>The Hearing Protection symbol indicates areas where the use of hearing protection is compulsory.</p>

	<p>The Eye Protection symbol indicates areas where the use of eye protection is compulsory.</p>
	<p>Potential areas with a risk of being hit by moving parts are marked with the 'Moving Parts' sign. These areas are:</p> <ul style="list-style-type: none"> <li>• Both traverse ends.</li> <li>• Y carriage.</li> <li>• Tool head(s).</li> </ul>
	<p>The main power unit contains main voltage and may only be opened by authorized personnel. The main power unit is marked with the 'voltage' warning sign.</p>
	<p>Laser radiation. The tool head is equipped with a class II laser pointer. Avoid laser light into your eyes.</p>

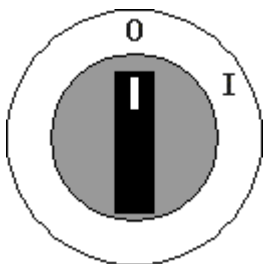
## 2.7 Safety devices

### 2.7.1 Overview



1	The Main power switch
2	Emergency stop
3	Yellow / black tape on the floor to indicate attention area
4	Warning lamp
5	Dynaguard

### 2.7.2 The Main power switch



The Main power switch turns power to the table on/off.

### 2.7.3 Emergency stop button



When hit, the Emergency stop button switches off all power to the table.

Note: Activating the emergency stop button does not provide a guarantee against injury!

Due to the high kinetic energy of moving parts do not underestimate stopping distances of traverse, Y carriage and tool head.

### 2.7.4 Yellow / black tape

The yellow / black tape indicates the warning area. This area is restricted to operators and other trained personnel.

### 2.7.5 Warning lamp on top of Y carriage

Light is	Description
Off	Servo power is off
On	Servo power is on, Safety system is enabled, table is in operation
Blinking	Safety system is activated. Reset Safety system to continue operation

### 2.7.6 DynaGuard Safety System

The Photocell safety system consists of two light beams in front of the traverse and two behind. In addition, there is a stop mechanism mounted on each end of the traverse.

Machine movement will stop and servo power will be switched off if:

- One of the light beams is broken.
- The stop mechanism is activated, for instance when a person is standing too near the table.

To continue operation after the Safety system has been activated, do:

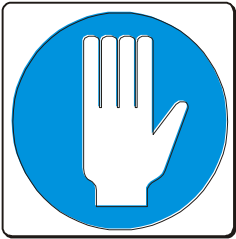
- Reset the Safety system by pressing Stop on Operators panel
- Press Start to continue operation

## 2.8 Protective equipment

For the operator(s), Esko recommends the following protective equipment:



- Close-fitting clothes to avoid being caught by the beam or the tool head which can cause injuries.



- Gloves to protect against cuts from materials with sharp edges



- Eye protection should be used by any personnel working with HSMU/HPMU on XP.



- Always use hearing protection when working with the machine for a longer period of time.  
The acoustic noise level will vary with the type of operation and tooling, but a typical average level is 78.5 – 83.5 dBA and a maximum level of 98.5 dBA.

## 2.9 Procedures in case of malfunctions

Trouble-shooting and repair shall only be executed by authorized personnel.  
Contact the Esko Service Organization.

## 3. System description

---

### 3.1 Application programs available

After installation of XP-Guide, the following application programs are available:

XP-Guide	Control program for the XP - table
SysLoad	Program for download of updates to CU – modules.
HWT900XP	Hardware test program, see separate HWT900XP User Manual.
FaceMill	A program for face milling. Prepared for HSMU/HPMU (145).
FaceCut	A program for simple cut out of squares. Prepared for knife or milling (145).



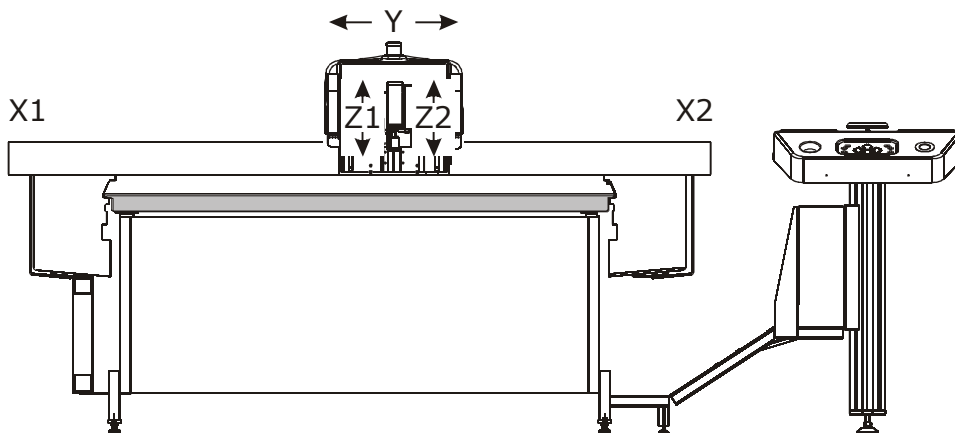
## 3.2 Naming conventions

### 3.2.1 Table

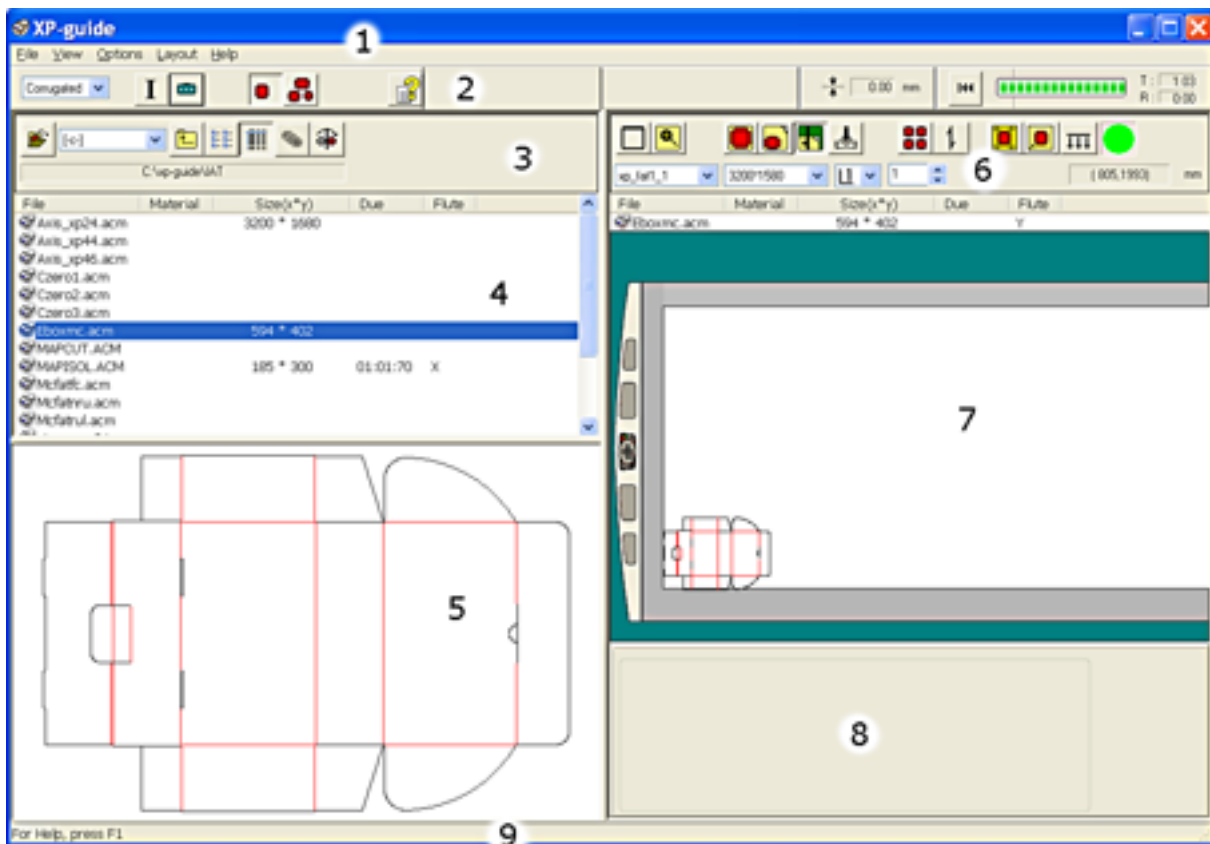


- |                         |                                 |
|-------------------------|---------------------------------|
| 1 Cutting table         | 6 Emergency stop button         |
| 2 Traverse              | 7 Operator panel                |
| 3 Y carriage            | 8 Main power on/off switch      |
| 4 Tools                 | 9 Traverse safety stop switches |
| 5 Main Power Unit (MPU) |                                 |

### 3.2.2 Axes



### 3.2.3 The Graphical User Interface



The XP Graphical User Interface (GUI) contains these main elements:

- |                     |                    |
|---------------------|--------------------|
| 1 Main Menu         | 5 Preview          |
| 2 Main Toolbar      | 6 Job View Toolbar |
| 3 File View Toolbar | 7 Job View         |
| 4 File View         | 8 ARS Toolbar      |
|                     | 9 Status Bar       |

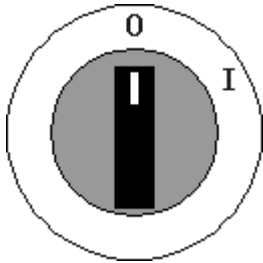
## 3.3 Operating elements

The table is equipped with the following operating elements:

- Main power switch
- Emergency stop switch
- Operators Panel

### 3.3.1 Main power switch

On XP, the Main power switch is located on the Front Panel or Revolving Work Station.



**Switch positions:**

0 - the main power to the machine is switched OFF.

I - the main power to the machine is switched ON.

### 3.3.2 Emergency stop switch

On XP, the Emergency stop switch is located on the Front Panel or Revolving Work Station.

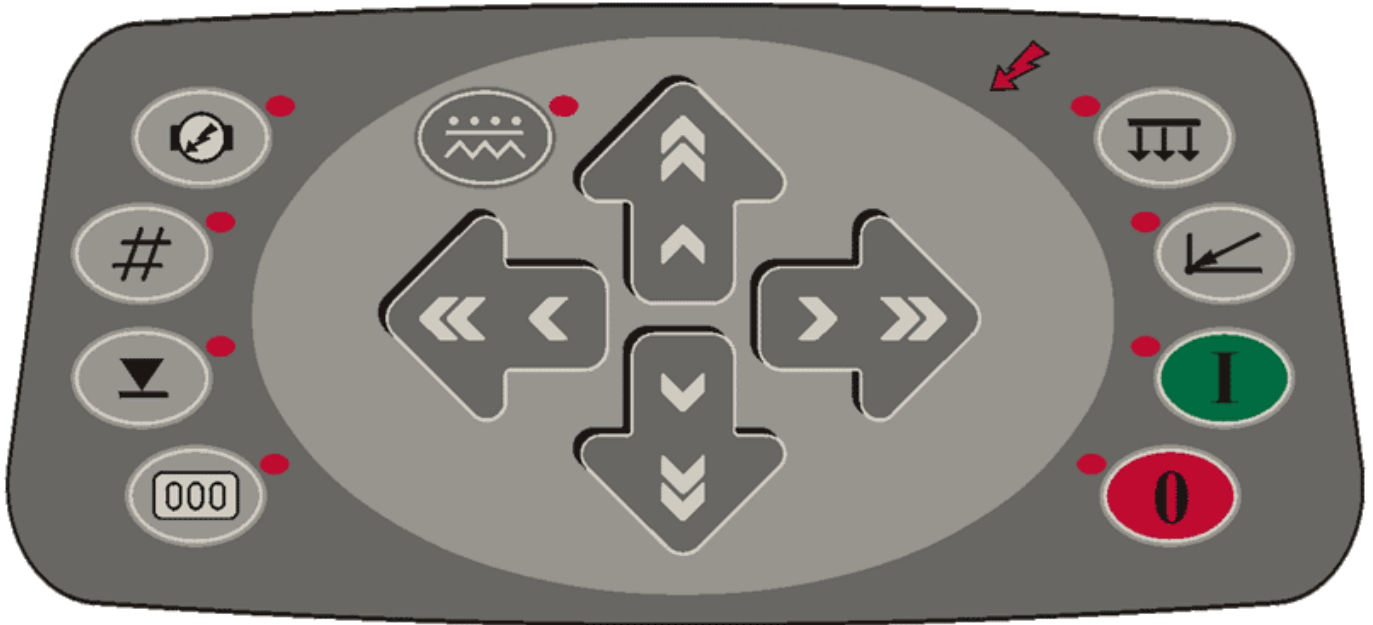


**Switch positions:**

UP - the main power to the machine is switched ON.

DOWN - the main power to the machine is switched OFF.

### 3.4 Operators panel



#### 3.4.1 Power on



Lit when Main power is on

#### 3.4.2 Start button



Press this button to start operation.

#### 3.4.3 Stop button



Press this button to stop operation.

### 3.4.4 Vacuum On/Off button



Press this button to switch Vacuum On/Off.

### 3.4.5 Init Button



Press this button to:

- Initialize the system, i.e. give variables pre-set values.
- Set Panel Reference Point.

If Fixed Reference Point is disabled, the current position of the Laser Pointer is set as the new Reference Point.

### 3.4.6 Table Zero / Forced tool height measure



Press this button, then the Start button, to move the tool head to Zero Reference Point, which corresponds to origin in the Coordinate System. The Table Zero Mode is automatically selected at Start-Up. The button remains lit until the Zero Position is reached.

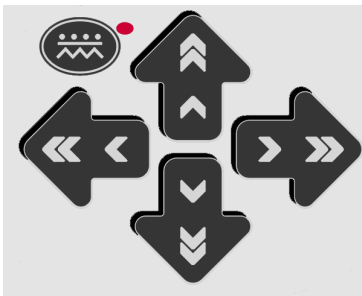
If **Forced tool height measuring mode** is enabled, this button will start a **Tool height measuring** sequence. For more information, see (38).

### 3.4.7 Servo On/Off



Press this button to switch the Servo on/off. The servo power is on when the lamp is lit.

### 3.4.8 Jog buttons



Press the Jog buttons to move the tool head in the desired direction. The system must be in Stop mode, i.e. the Stop button must be lit, for these buttons to be operative.

Note: It is possible to configure the jog direction, see Option, System setup.

### 3.4.9 Continuous Jog



Press a Jog button to manually move the tool head with constant speed. The X and Y Jog buttons can be operated both individually and simultaneously.

Press the single arrow for low jog speed.  
Press both symbols for medium jog speed.

### 3.4.10 Incremental Jog / Forced tool height measure



Press this button to select the **Incremental jog / Forced tool height measuring** mode.

Press the button a second time to disable the **Incremental jog / Forced tool height measuring** mode.

For information about **Forced tool height measure**, see (38).



Press the two arrows to move the tool head a large step.  
Press the single arrow to move the tool head a small step.

The size of the incremental movement can be changed from Option-> System setup.

### 3.4.11 Tool Down



Press this Tool Down button to manually operate the machine with a tool in the down position.

Cancel by pressing Tool Down a second time.

### 3.4.12 Vacuum release mode



For details about this function, see separate chapter 'Vacuum control' (100).

### 3.4.13 Manual belt clamp

In order to manually drag material onto the cutting table using the conveyor belt, the Manual Belt clamp function is available.

The Manual Belt Clamp function is enabled after the Vacuum release button has been kept down for more than 2 secs.



The Manual Belt Clamp function is active as long as the Vacuum release button is kept down.

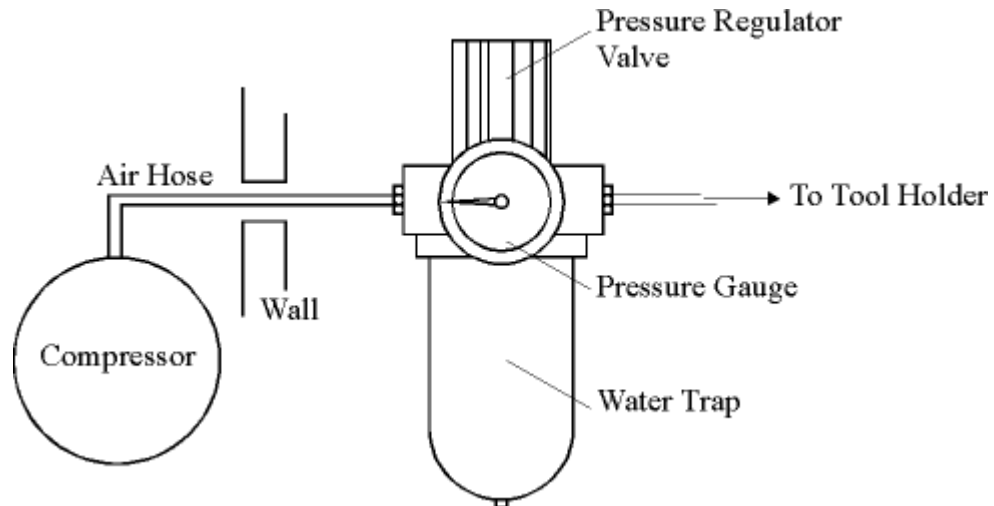
As long as the Manual Belt Clamp function is active, the following actions are carried out:

- The belt clamps are activated.
- The feeder paws are activated.
- The operator panel jog buttons are available for manual movement of the traverse / conveyor belt. All other possible actions on the machine are inhibited.
- Acceleration is reduced during belt movement.

## 3.5 High pressure air system

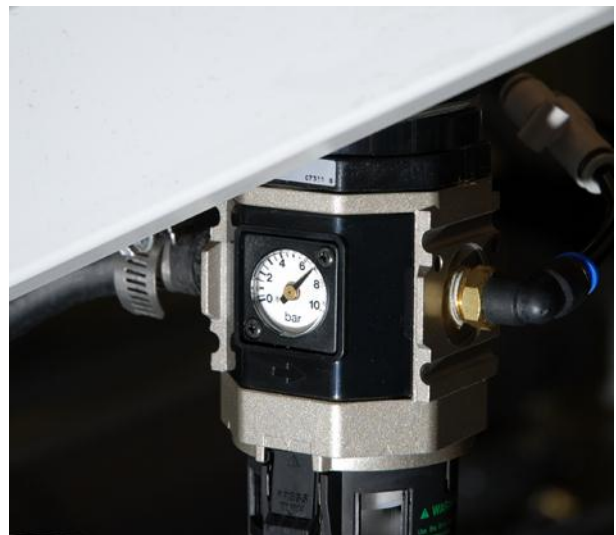
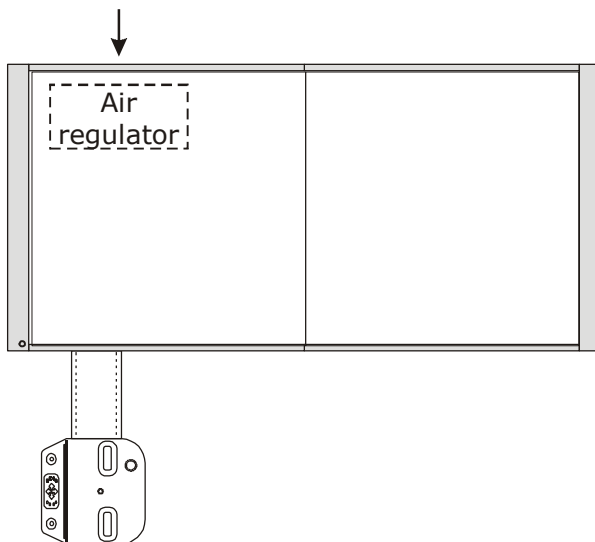
### 3.5.1 General

The High Pressure Air System supplies the valves and tooling with compressed air.



For details regarding air supply requirements, see 'Site Preparation manual'.

### 3.5.2 Air regulator settings



The compressed air is connected to a combined pressure regulator valve/water trap. The air pressure should be adjusted to minimum 6 bar (6 kg/cm<sup>2</sup>, 6\*10<sup>5</sup> Pa). Recommended pressure level is 7 bar (7 kg/cm<sup>2</sup>, 7\*10<sup>5</sup> Pa).



## 4. How to procedures

---

### 4.1 Introduction

*Keep away from moving parts during operation.*



*Do not lean on racks, guide ways or traverse during operation as this may cause personal injury.*

*Before starting operation, make sure that:  
the table is free from obstructions  
no unauthorized personnel come close to the table*

All procedures for how to run the machine, except 'Power on' is based upon the following assumptions:

- The user interface is up and running.
- The actual tools are properly mounted and adjusted.

### 4.2 Power on sequence

Follow these steps to power up the system and get ready to work:

#### 4.2.1 Front End PC

Switch on the PC and the monitor.

#### 4.2.2 Table Power

Switch the table on using the *Main Power switch*.

**Note:** After power off, wait minimum 5 sec. before the system is switched on again.

#### 4.2.3 XP-Guide

Use the mouse, double-click the icon for XP-Guide. Check that no error message indicates faulty conditions.

#### 4.2.4 Safety system

Reset the Safety system by pressing the *Stop* pushbutton.

#### 4.2.5 Servo Power

Press the *Servo on* pushbutton. The Warning lamp on top of the Y carriage should be on without flashing.

## 4.2.6 Table zero sequence

Press *Start* pushbutton to complete the table zero sequence. The machine will move to current selected reference point.

The table is now ready for operation.

## 4.3 Continue after safety break

If the Safety system is activated, all movements on the table are stopped and the Warning lamp on top of the Y carriage starts flashing.

To continue operation, proceed as follows:

1. Ensure the table is free from obstructions and ready for operation.
2. Reset the **Safety system** by pressing the *Stop* pushbutton.

## 4.4 Power Off sequence

When power off, follow this sequence:

### 4.4.1.1 Servo power off

Press the *Servo on* pushbutton to switch servo power off.

### 4.4.1.2 Table Power

Switch Table power off using the *Main Power* switch.

### 4.4.1.3 Front End PC

To switch off the PC, use the Operating system shutdown procedure.

## 4.5 Preparing for a job

**Keep away from moving parts during operation.**



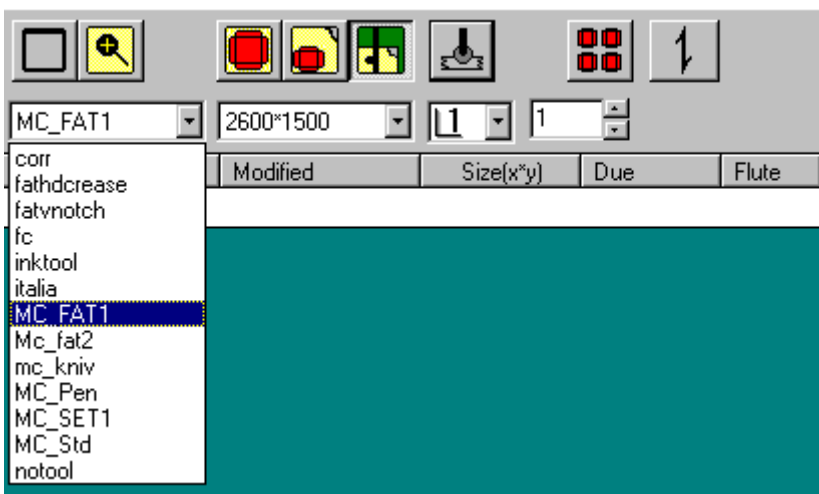
**Do not lean on racks, guide ways or traverse during operation as this may cause personal injury.**

**Before starting operation, make sure that:**

- **the table is free from obstructions**
- **no personnel come close to the table**

Use this chapter as a check – list when changing from one job to another.

### 4.5.1 Job Setup

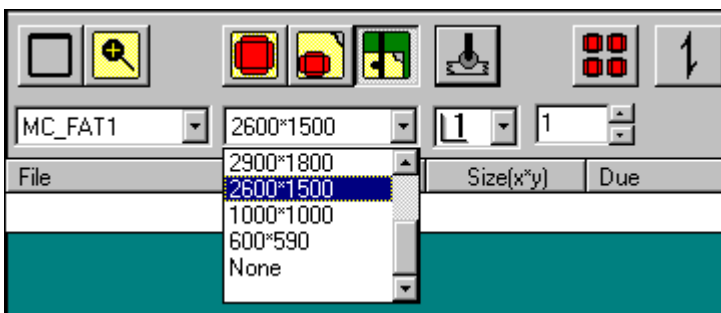


**Job Setup** is a table that links Logical tool numbers (P - numbers) in the **Input File** to physical tools on the machine and describes their behavior (78).

The **Job Setup** information is stored as a file on the front end PC.

Select **Job Setup** file from the **Job Setup** drop down list.

### 4.5.2 Board Setup





Position the material for the job on the table.

Select **Board Size** from the **Board Size** drop down list.

**Note:** Board size information is used for calculating **Step & Repeat**. If Step & Repeat is not used, this setup is optional.

### 4.5.3 Open an input file

From File View, open files in one of following ways:

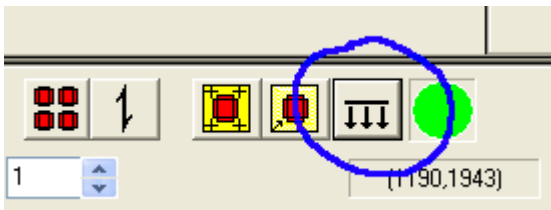
	Double click on a file.
	Select a file and click the <b>Open</b> button.
	Click on a file, hold the left mouse button down, drag the file into <b>Job View</b> and release it.
	When <b>Auto Open</b> is enabled and activated the files will be opened automatically.

### 4.5.4 Set flute direction



Use the **Toggle Flute Direction** button to set correct direction for the actual job.

### 4.5.5 Vacuum Section Setup



From the **Vacuum Section** setup – dialog, configure a suitable vacuum area for the job.

### 4.5.6 Select proper speed

The machine speed during execution will have important impact on the final result.

For some combinations of tools and materials, you can run with full speed, for other combinations, the speed and/or the acceleration has to be reduced.

For this purpose, the following alternatives are available:

- Select between **High Quality, Normal** or **High Speed** mode (75).
- Reduce the overall acceleration (69).
- Reduce the speed and acceleration for the **Job setup** line (80)

## 4.5.7 Run the job

Verify that the display of the job in **Job View** is reasonable.





Ensure that all settings are proper.

Press *Vacuum on* to start the vacuum pump (If you are running with Automatic vacuum control enabled, the pump will start automatically when *Start* is pressed).

Press *Start* to execute the job.

## 4.6 Open an Input File

From **File View**, open **Input Files** in one of following ways:

	Double click on a file.
	Select a file and click the <b>Open</b> button.
	Click on a file, hold the left mouse button down, drag the file into <b>Job View</b> and release it.
	When <b>Auto Open</b> is enabled and activated the files will be opened automatically (183).

The formats available are:

File extension	Description
.acm	Kongsberg acm – format. This is the default input format for Kongsberg XP. Described in the Technical Reference manual for XP.
.plt	HPGL. Described in the Technical Reference manual for XP.
.dxf	DXF. See Appendix about DXF input tuning (193).
.ard	ArtiosCAD. See Appendix about the ArtiosCAD module CAD-X (193).
.cf2	CF2. See Appendix about the ArtiosCAD module CAD-X (193).
.ddes	DDES. See Appendix about the ArtiosCAD module CAD-X (193).

The format is selected from the System Setup dialog (74).  
Standard file extensions will be automatically recognized.

## 4.7 Corrugated Production



### Take care:

- Knife blades are extremely sharp.
- Keep away from all moving parts.
- Ensure all other personnel stays in a safe distance from all moving parts.
- Use hearing protectors.

1. Ensure that the tool configuration is correct for the job and corresponds with the **Job Setup** information.
2. Ensure that the knife blade is sharp and proper.
3. Ensure that the **Job Setup** information is correct for the material. If not, select **Job Setup** file.
4. From **File View**, select the **Input File**.
5. Retrieve information about required sheet size from **Job View**.
6. Position a sheet of material against the left ruler. Retrieve information about the flute direction from the **Job View** window and position the material accordingly.
7. Configure vacuum zones according to the material size.
8. Switch *Vacuum on*.
9. Ensure that you run with a suitable **Program Reference point**.
10. Execute the job by pressing *Start*.
11. To repeat the job, press *Init* and repeat this procedure from point 5.

## 4.8 Milling Production



### Take care:

- Milling bits are extremely sharp.  
 Keep away from all moving parts.  
 Ensure all other personnel stays in a safe distance from all moving parts.  
 Use hearing protectors.

Milling jobs should be executed in High Quality mode (75).

1. Ensure that the tool configuration is correct for the job and corresponds with the **Job Setup** information.
2. Ensure that the router bit is sharp and proper for the job.
3. Ensure that the **Job Setup** information is correct for the material. If not, select **Job Setup** file.
4. From **File View**, select the **Input File**.
5. Retrieve information about required sheet size from **Job View**.
6. Position a sheet of material against the left ruler.
7. Configure vacuum zones according to the material size.
8. Switch *Vacuum on*.
9. Ensure that you run with a suitable **Program Reference point**.
10. Execute the job by pressing *Start*.
11. To repeat the job, press *Init* and repeat this procedure from point 6.

## 4.9 Hard board production



### Take care:

- Milling bits are extremely sharp.
- Keep away from all moving parts.
- Ensure all other personnel stays in a safe distance from all moving parts.
- Use hearing protectors.



To prepare hard board materials, the procedure is as follows:

1. Mill through the top layer using HSMU/HPMU.
2. Cut through the mid-section using the HF VibraCut knife tool.
3. Mill through the bottom layer using HSMU/HPMU.

1. Ensure that the tool configuration is correct for the job and corresponds with the **Job Setup** information.
2. Ensure that the router bit is sharp and proper for the job.
3. Ensure that the knife blade is sharp and proper for the job.
4. Ensure that the **Job Setup** information is correct for the material. If not, select **Job Setup** file.
5. From **File View**, select the **Input File**.
6. Retrieve information about required sheet size from **Job View**.
7. Position a sheet of material against the left ruler.
8. Configure vacuum zones according to the material size.
9. Switch *Vacuum on*.
10. Ensure that you run with a suitable **Program Reference point**.
11. Execute the job by pressing *Start*.
12. To repeat the job, press *Init* and repeat this procedure from point 6.

## 4.10 Cutting thick materials



### Take care:

- Keep away from all moving parts.
- Ensure all other personnel stays in a safe distance from all moving parts.
- Use hearing protectors.

When preparing materials with thickness between 45 – 50 mm (1¾ - 2 in.), the following rules apply:

- No camera operations are available.
- Disable Measure material thickness.
- In Job setup, use T-function to specify the cutting depth.
- This function is for knife tools only.

More job setup

Knife overcut

Enable knife overcut

Start                      End

Material measurement

Disable material thickness measurement

OK      Cancel      Help

Job setup

Board size

Current job setup: b\_knife      Depth unit: MM      Speed unit: %

Line #:	Tool	T	T	100	100	100	Extended..
1	FoamKnife 1	T-20.00	T-20.00	100	100	100	
2	FoamKnife 1	T	T	100	100	100	
	No tool						
	No tool						
	No tool						

More...      Test line 1

No tool = Ignore      Circle adjustment 1

Knife before crease

OK      Cancel      Apply      Help

Disable Material thickness measurement:  
**Job setup->More**

Cutting depth using T-function:

Note: This function is useful for all materials with an un-even surface.

## 4.11 Make a pen plot



### Take care:

- Keep away from all moving parts.
- Ensure all other personnel stays in a safe distance from all moving parts.
- Use hearing protectors.

1. Ensure that the tool configuration is correct for the job and corresponds with the **Job Setup** information.
2. Ensure that the Ball point pen is proper for the job.
3. Ensure that the **Job Setup** information is correct for the material. If not, select **Job Setup** file.
4. From **File View**, select the **Input File**.
5. Retrieve information about required sheet size from **Job View**.
6. Position a sheet of material against the left ruler.



7. Configure vacuum zones according to the material size.
8. Switch *Vacuum on*.
9. Ensure that you run with a suitable **Program Reference point**.
10. Execute the job by pressing *Start*.
11. To repeat the job, press *Init* and repeat this procedure from point 6.

## 4.12 Set the table up for multi pass creasing or milling



### Take care:

- Knife blades are extremely sharp.
- Keep away from all moving parts.
- Ensure all other personnel stays in a safe distance from all moving parts.
- Use hearing protectors.

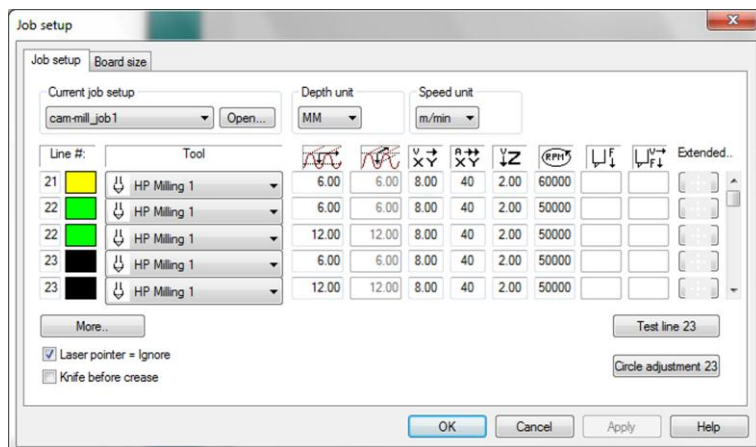
Multi pass creasing is beneficial if you want a deeper crease pattern. This is achieved by running one pass with for example 50% depth and a second pass with 70% dept.

Multi pass milling is beneficial if you want to mill through a material where the thickness is bigger than the router bit diameter.

Multi pass creasing or milling is available by modifications in the Job Setup file. Proceed as follows:

1. Open the **Job Setup** file for editing.
2. Identify the crease or milling line where multi pass is wanted.
3. Add one or more new lines with the same logical tool number and specify the same tool and desired depth.
4. When executing the job with this **Job Setup** file selected, the multi pass function will be carried out for the specified logical tool(s).
5. The multi pass lines will be executed in the same sequence as they appear in the **Job setup** dialog.

This picture shows a **Job Setup** with double pass creasing with logical tool no 22:



## 4.13 Jobs including reverse score



### Take care:

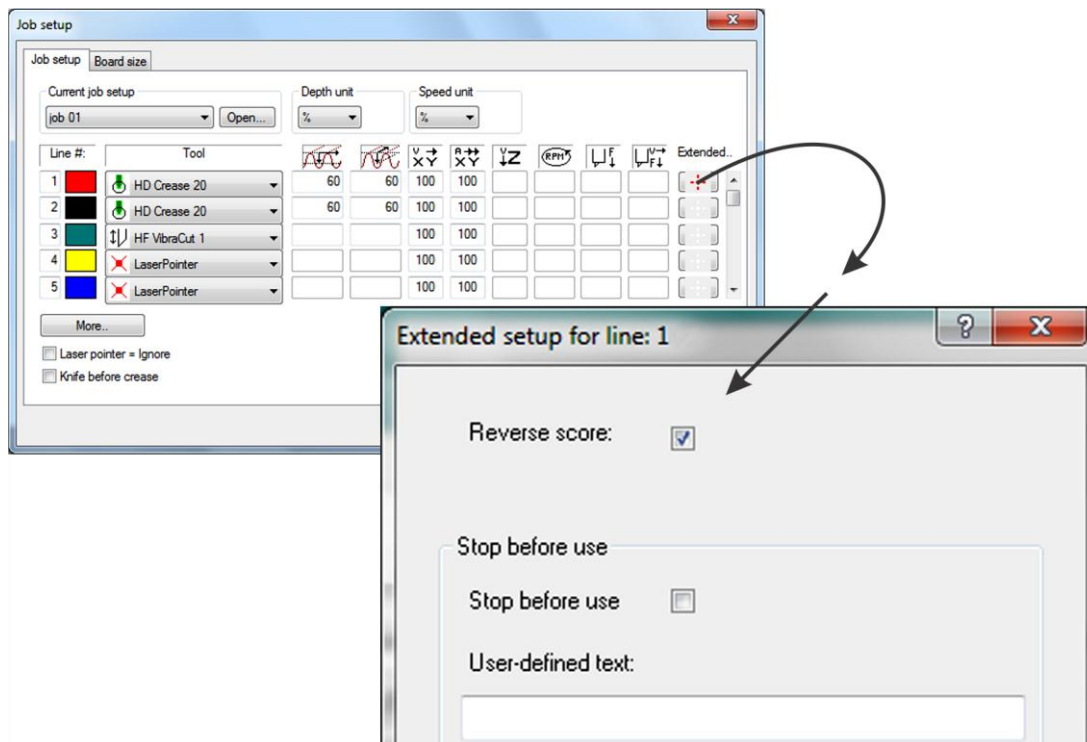
- Knife blades are extremely sharp.
- Keep away from all moving parts.
- Ensure all other personnel stays in a safe distance from all moving parts.
- Use hearing protectors.

A typical use of reverse score is when you want to add a crease line on the front side of a material that you normally prepare from the rear side.

Reverse score is available by modifications in the Job Setup file. This function requires that the table is equipped with left and right rulers. Proceed as follows:

1. Open the **Job Setup** file for editing.
2. Identify line for reverse score or add a line for this function.
3. Open the More dialog for this line, enable **Reverse score**.
4. When executing the job with this Job Setup selected, the **Reverse score** function will be carried out for the specified logical tool(s).
5. Follow the instructions displayed when executing the job.

The picture shows a Job Setup with reverse creasing using logical tool no 1:

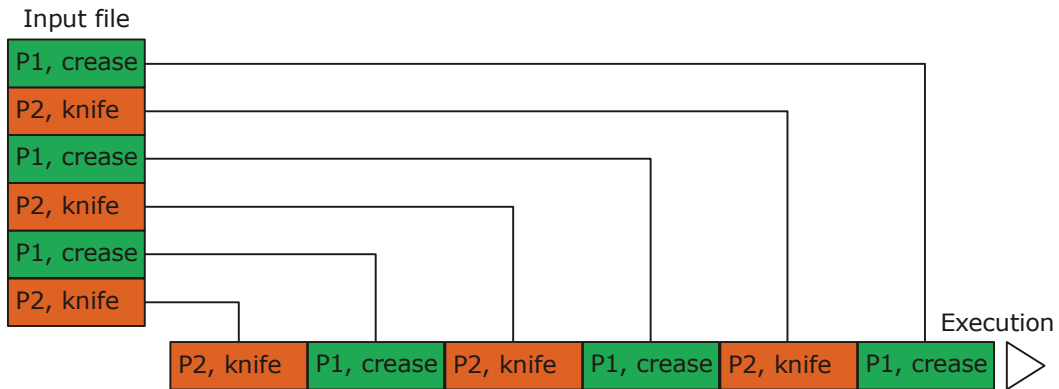


## 4.14 Work with different reference point settings

To define or modify reference point settings, go to the **Set Reference point** wizard (72). Reference points are selected from the **Job View Toolbar** (185).

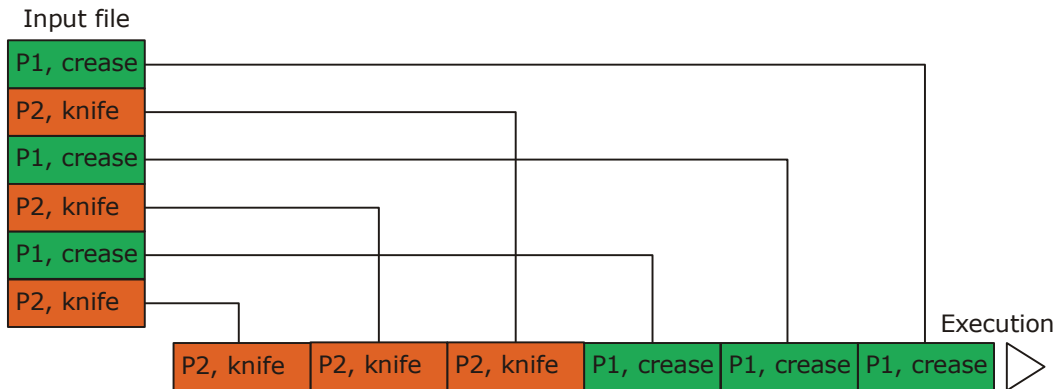
## 4.15 Work with Sequencing and Optimization

### 4.15.1 Sequencing disabled



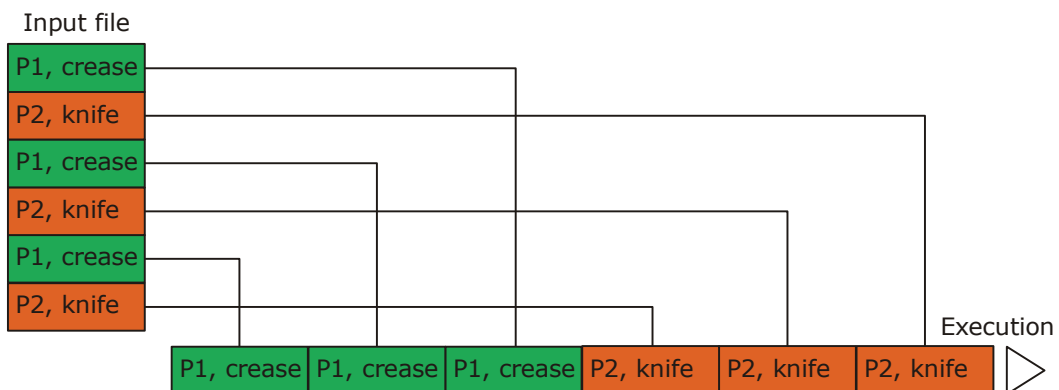
The input file is executed as is.

### 4.15.2 Sequencing enabled



All crease lines are executed before knife cuts. The sequence is: pen, crease, v-notch knife, milling, knife, drill.

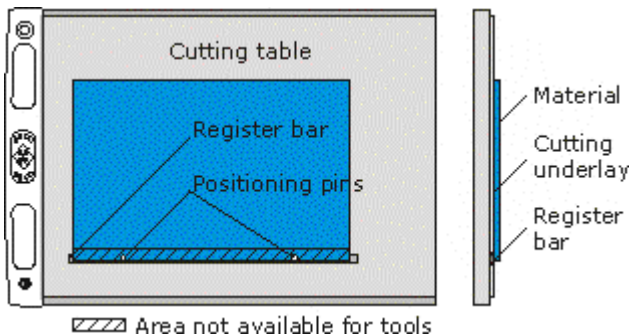
### 4.15.3 Sequencing and knife before crease enabled



All knife cuts are executed before crease lines. The sequence is: pen, milling, knife, crease, V-notch knife, drill.

## 4.16 Work with Register bar

The Register bar is an aid when the material needs registrations that fits the requirements of a specific printing press or die cutter.



On XP, the register bar is mounted along the X - axis as illustrated at left.

**Register bar** - Register bar fixed to the table.

**Material** - Sheet of material with pre-punched holes that fit the Positioning pins on the Register bar.

**Positioning pins**. Use these pins to fix the sheet of material in a correct position on the table. When the sheet is fixed and vacuum is switched on, you must remove the pins.

**Cutting underlay** - Cutting underlay.

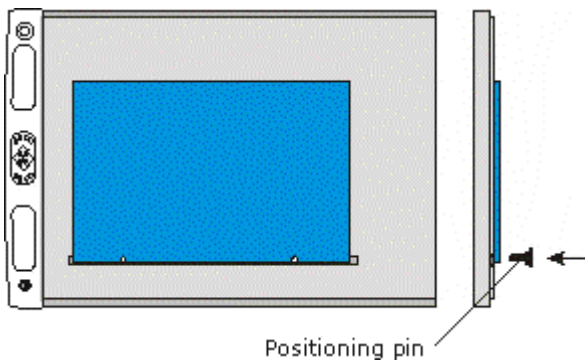
**Area not available for tools** - This area is outside the working area of the machine.

### 4.16.1 Work flow



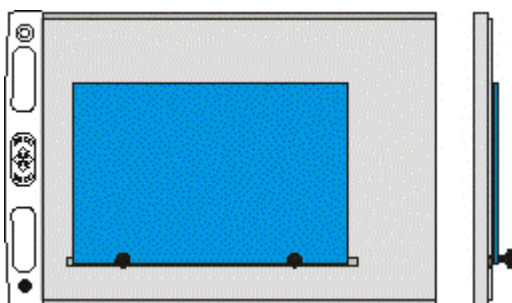
#### Take care:

- Knife blades are extremely sharp.
- Keep away from all moving parts.
- Ensure all other personnel stays in a safe distance from all moving parts.
- Use hearing protectors.

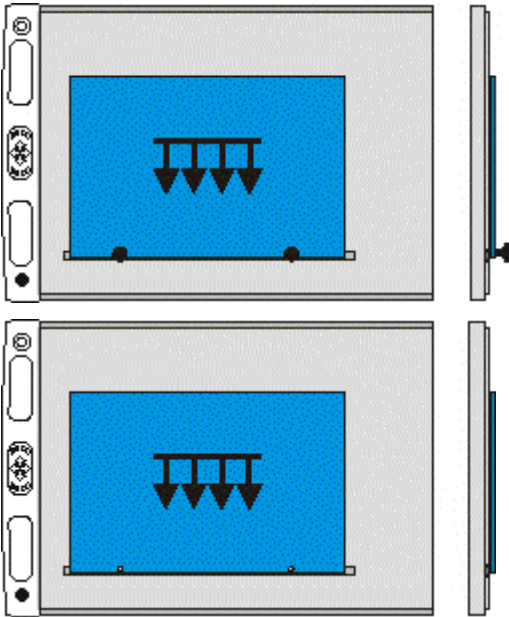


Place the sheet of material onto the cutting table and align the holes in the material with the positioning pin holes.

Insert the positioning pins.



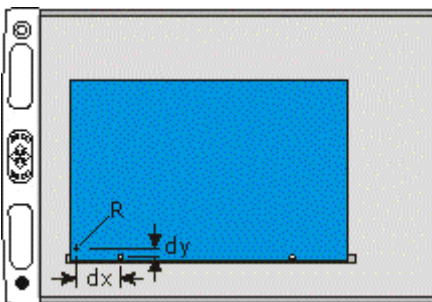
When both positioning pins are in place, the sheet is correctly positioned.



Switch vacuum on.

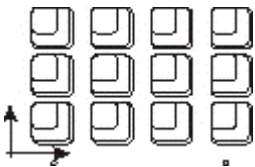
**IMPORTANT:** Remove the Positioning pins.  
Now, the machine is ready for operation.

#### 4.16.2 Reference point setting

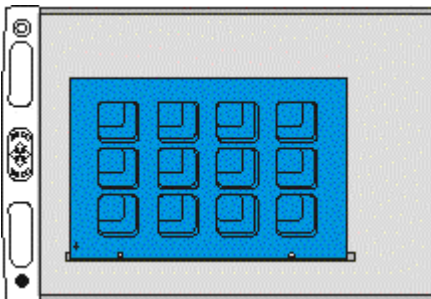


When working with register bar, select one of the available Reference points ( Option->Table options ) and set a reference point in a fixed position relative to one of the Positioning pins (R in the illustration).

This position should be used as origin during geometry design and cam file generation.



When preparing the job in the CAD - system, use the same Reference point as origin.



This work flow ensures exact positioning of the geometry relative to the Positioning pins.

### 4.16.3 Forced tool height measurement

Follow these steps to start a tool height measuring sequence:



1) Enable *Incremental Jog*.



2) Select the *Table Zero* sequence.



3) Press *Start* to execute the height measuring sequence (as part of the Table zero sequence).

## 5. Work with ARS

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### 5.1 Introduction

XP offers different levels of automation for Registration mark reading:

<b>ARS</b>	<b>1 -</b>	Manual reading of 2 registration marks by use of laser pointer (standard).
	<b>2 -</b>	Manual reading of 2 registration marks by use of camera as pointing device (option).
	<b>3 -</b>	Automatic reading of up to 4 registration marks. Linear transformation (option).

This chapter will cover all ARS – related issues.

The camera solution used in ARS is based upon a Scorpion software package.



Thus, it is a pre-requisite that Scorpion is properly installed and configured together with XP-Guide in order to make ARS work.

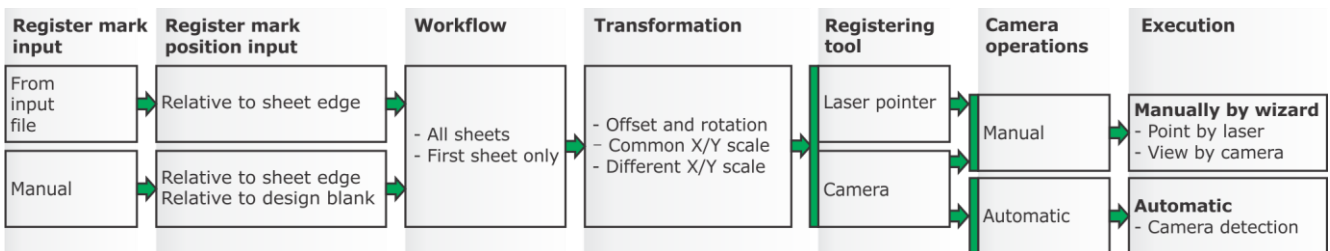
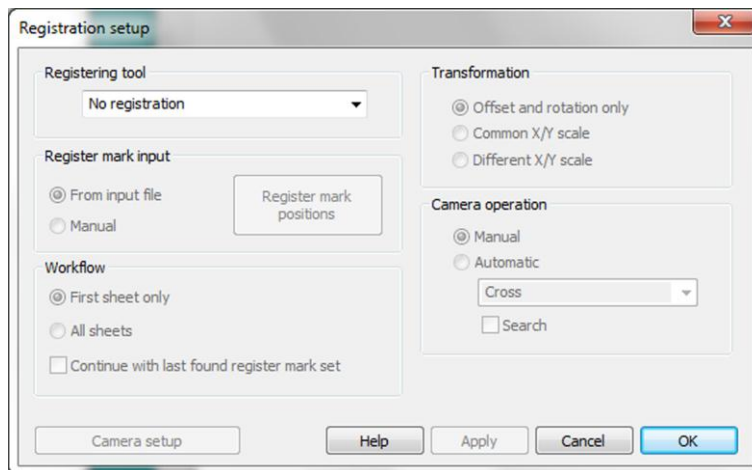
Note: The **Job layout** function is not available when running ARS.

## 5.2 ARS - modes of operation

### 5.2.1 Introduction

All settings described in this chapter are available from the Registration setup dialog, available from:

	<b>XP-Guide-&gt;Option-&gt;Registration setup</b>
	<b>Job view toolbar -&gt; Enter ARS registration setup dialog</b> The button change face depending upon if ARS is running or not. XP-Guide is running with ARS enabled.
	<b>Job view toolbar -&gt; Enter ARS registration setup dialog</b> No ARS functions are enabled.

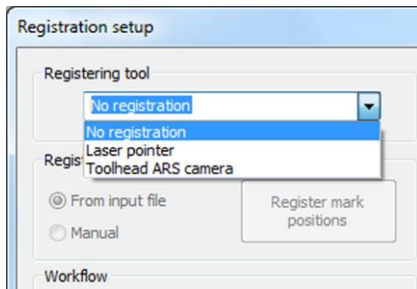


The mode of operation is specified by 3 (4) parameters as illustrated above:

- Register mark input / position input
- Work flow
- Transformation
- Registering tool
- Camera operations



## 5.2.2 Registering tool



From the drop down menu, select the tool to use for registration or No registration.

## 5.2.3 Register mark input

Specify how the location of the register marks is specified to the system:

### 5.2.3.1 From input file

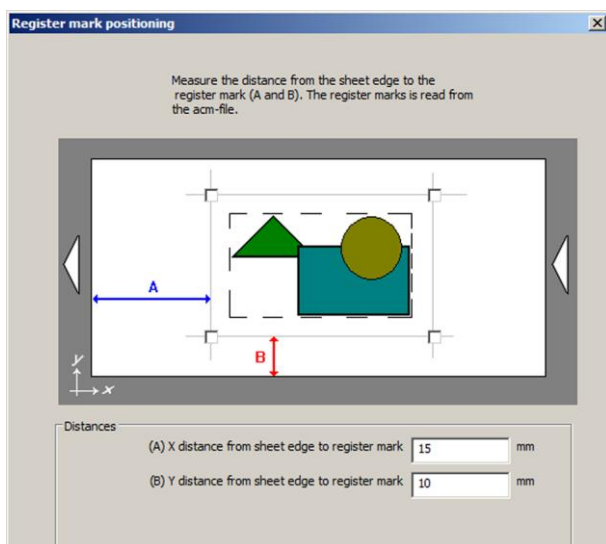
The location of the register marks is specified in the input file, provided by the CAD – system.

### 5.2.3.2 Manual

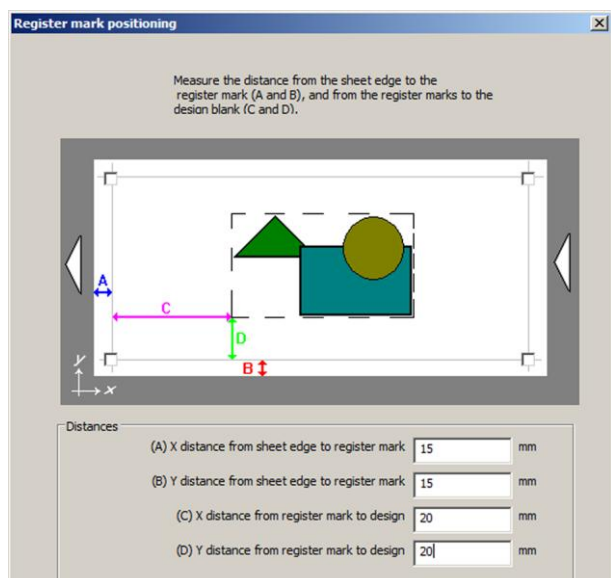
The location of the register marks is entered manually.

### 5.2.3.3 Register mark position

Press the Register mark position button to enter the dialog:



If your Register mark input is from input file, enter A/B values.



If your Register mark input is Manual, enter A/B/C/D values.

## 5.2.4 Camera operation

Use this setting to select between a manual or automatic mode of operation:

### 5.2.4.1 Manual detection of register marks

#### Pointing with laser

A wizard will guide you from one register mark to the next.

Place the laser pointer in the center of the register mark and press *Start*.

#### Viewing with camera

This is a manual, visual detection of register marks.

A wizard will guide you from one register mark to the next.

Place the camera (cross in the view) in the center of the register mark and press *Start*.

### 5.2.4.2 Automatic detection of register marks

#### Automatic detection

The system will, by means of a camera picture, automatically detect the position of the register mark.

#### Circle or cross as register mark

Specify if the register mark is a cross or a circle.

The geometry requirements are:

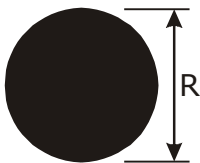


$$2 \text{ mm} < L < 12 \text{ mm}$$

$$1 \text{ mm} < T < 0.5 * L$$

$$0.08 \text{ in.} < L < 0.47 \text{ in.}$$

$$0.04 \text{ in.} < T < 0.5 * L$$



$$2 \text{ mm} < R < 12 \text{ mm}$$

$$0.08 \text{ in.} < R < 0.47 \text{ in.}$$

#### Search

If no register mark is detected inside the camera picture, the system will try to search for a register mark around the expected location (twice the size of the camera picture).

## 5.2.5 Workflow

### 5.2.5.1 Register on – First sheet only

Reading register marks will be carried out on the first sheet in a job. For the subsequent sheets, no register mark reading will take place.

The compensations calculated for the first sheet will be used for all sheets in the job, that is, until a new file is opened.

### 5.2.5.2 Register on – All sheets

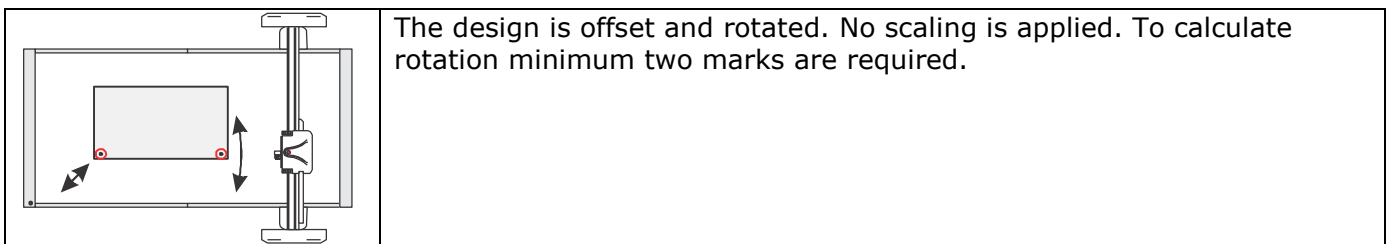
Reading register marks will be carried out for every sheet of material in a job.

### 5.2.5.3 Continue with last found register mark set

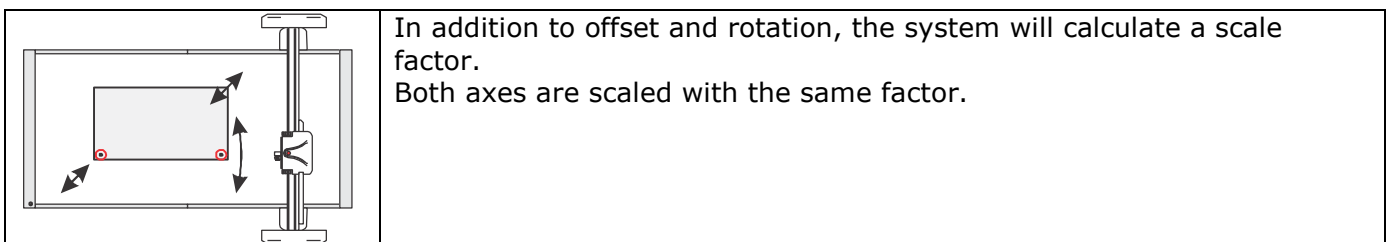
If, for any reason, reading register marks fails, the job will continue, using the last register mark information available.

## 5.2.6 Transformation

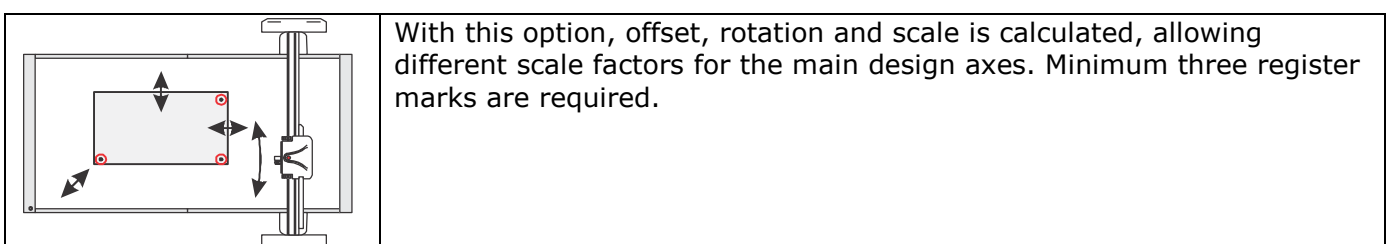
### 5.2.6.1 Offset and rotation only



### 5.2.6.2 Common X/Y scale (Uniform)



### 5.2.6.3 Different X/Y scale (non-uniform)



## 5.3 Work with ARS (Automatic Registration System)

### 5.3.1 The camera window

This window is available from:

- **Registration setup->Camera setup**
- It pops up each time a register mark is searched for / detected.



### 5.3.2 Camera control

Three different camera control views are available from the tabs on top of window:

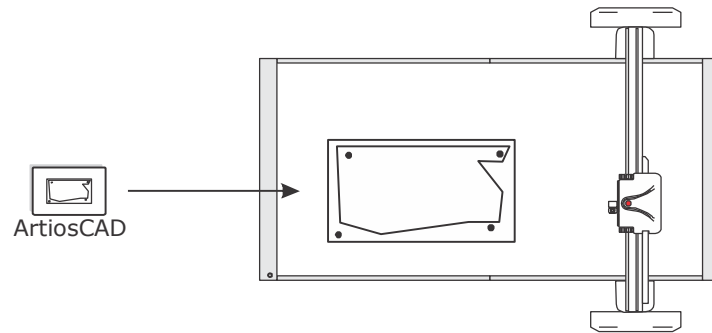
<b>Image</b>	This is the default view where the camera picture is shown. In the picture there is a red marker to indicate the centre of the picture. The green circle indicates that high accuracy area. If a register mark is detected outside this area the machine moves the camera centre over the register mark and takes a second picture.
<b>Camera</b>	This tab defines which camera to be used and also which camera that creates the Image. The only time the operator needs to use this tab is when a new camera is installed (1).
<b>Misc</b>	This tab is used when entering the license code (1).

(1) For more information, see Installation Guide for XP available on the XP-Guide CD.

### 5.3.3 Other camera controls

Camera info	Informational messages from the camera control.
Live Video	Press this button to enable live video. The camera picture will be continuously updated.
Snapshot	One single picture will be taken. If a register mark is available in the picture, it will be detected.
Adjust offset	Run wizard in order to adjust the offset of the camera.
Calibrate Camera	Run wizard to calibrate the camera.

### 5.3.4 Pre-defined register marks



When the position of the register marks is included in the Input file to XP-Guide, we call it pre-defined register marks.

From ArtiosCAD, a maximum of 4 pre-defined register marks can be added to the design. A description on how to generate register marks in ArtiosCAD is available from the document *ServiceGuide\_ArtiosCAD - Kongsberg* on the XP-Guide CD.

### 5.3.5 Reading pre-defined register marks automatically



**Take care:**

- Knife blades are extremely sharp.
- Keep away from all moving parts.
- Ensure all other personnel stays in a safe distance from all moving parts.
- Use ear protection.

Select this alternative if:

- An ARS – camera is available.
- Standard register marks are available on the upward face of the material on the cutting table, visible to the camera.
- Coordinates for the registration marks are defined in the input file. ArtiosCAD and Digital Flexo Suite are able to do so.

#### 5.3.5.1 Procedure

- Prepare for the job as described in the User manual for XP.
- Select Automatic operation and options as described in chapter 'ARS – modes of operation' (40).
- During execution, the register marks are examined one by one and compensations are calculated before the job is completed.
- If, for any reason, the register mark is not detected, the execution will stop and a picture is displayed in the GUI. The following alternatives are available:
  1. If the register mark is visible inside the picture frame, position the mouse pointer in the center of the register mark and click the mouse.
  2. If the register mark is not visible, move the machine by manual jog until the register mark is inside the picture and press *Start*.
  3. Select **Ignore this mark** (this register mark) and press *Start*.

### 5.3.6 Reading pre-defined register marks manually



**Take care:**

- Knife blades are extremely sharp.
- Keep away from all moving parts.
- Ensure all other personnel stays in a safe distance from all moving parts.
- Use ear protection.

Select this alternative if:

- Register marks are available, but the marks can not be recognized by the camera due to shape or lack of contrast.
- Automatic register mark detection is not available.
- Coordinates for the registration marks are defined in the input file. ArtiosCAD and Digital Flexo Suite are able to do so.

#### 5.3.6.1 Procedure using camera

- Prepare for the job as described in the User manual for XP.
- After *Start*, the execution will stop for each register mark and the camera picture is displayed in the GUI. Two alternatives are available:
  1. Use the register mark by mouse click
    - By manual jog, move the camera to a position where the register mark is inside the picture.
    - In the picture, move the cursor over the center of the register mark and press the left mouse button.
    - If the mouse-click was inside the green circle, the machine will move to the next register mark and the procedure is repeated.  
If the mouse-click was outside the green circle, the machine will move until the "click-position" is close to the center of the green circle. Now, move the cursor over the center of the register mark and press the left mouse button once more.
  2. Use the register mark by jog
    - By manual jog, move the camera until the centre cross is exactly on top of the register mark.
    - Press *Start* to continue execution.
- After the last register mark is found, the compensation parameters are calculated and the job is completed.



### 5.3.6.2 Procedure using laser pointer

- Prepare for the job as described in the User manual for XP.
- After *Start*, the execution will stop for each register mark.
- By manual jog, move the laser pointer into the center of the register mark.
- Press *Start* to move to the next register mark and repeat the procedure.
- After the last register mark is found, the compensation parameters are calculated and the job is completed.

### 5.3.7 Reading manually defined register marks



#### Take care:

- Knife blades are extremely sharp.
- Keep away from all moving parts.
- Ensure all other personnel stays in a safe distance from all moving parts.
- Use ear protection.

Select this alternative if:

- No pre-defined register marks are available in the input file.

#### 5.3.7.1 Procedure

- Specify **Manual Register mark input** and other Registration setup parameters as described in chapter ARS – modes of operation (41).
- Enter the X/Y distance from the register mark to design blank, see (41).
- Depending upon the selected mode of operation, follow one of the procedures for reading pre-defined register marks as found in chapter 'Work with ARS' (44).

### 5.3.7.2 Manually defined register marks - key parameters

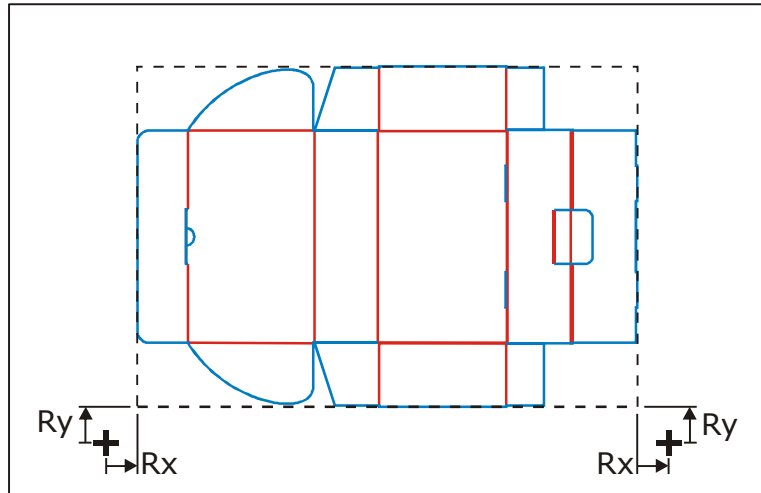
This chapter describes the work flow from Structural design through Graphical design and print and finally to Corrugated production and how the register marks are treated in the different steps:

#### Structural design

The structural design is prepared using a design software tool, as ArtiosCAD.

The two register marks are positioned symmetric and in a known position relative to the design (Rx and Ry).

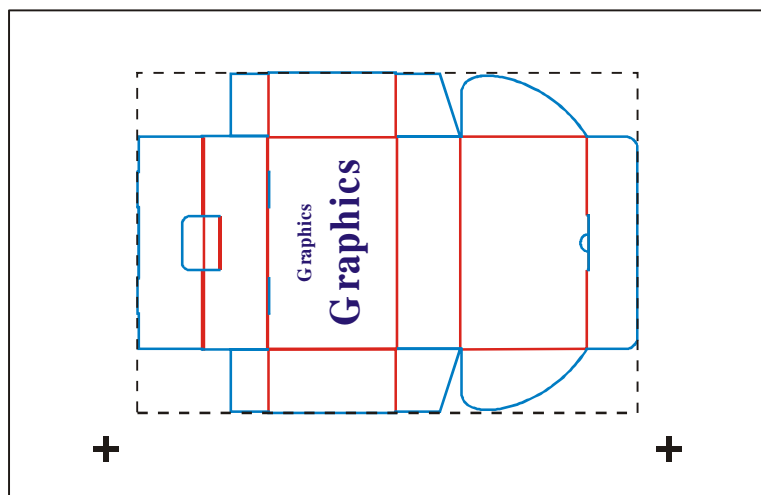
In a company working with this system, one should standardize these values and use the same offset (Rx and Ry) in all designs.



#### Graphical design and print

The graphical design is prepared using a graphical design software tool.

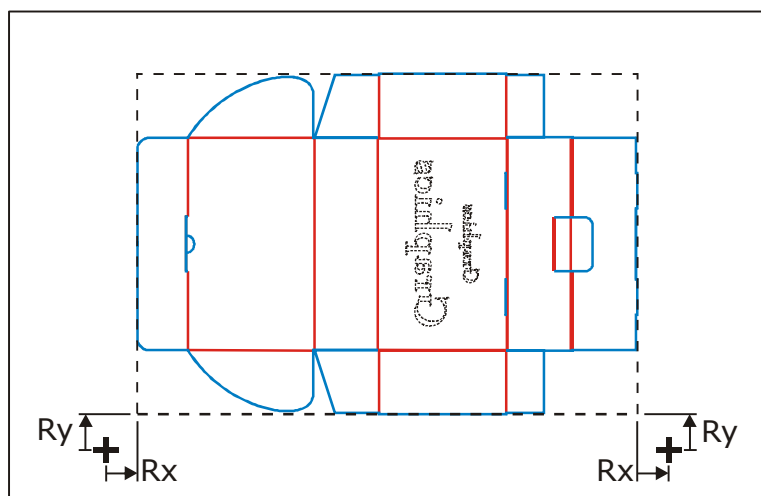
The structural design template (output from the CAD system) is used to correctly position the graphics and the register marks relative to the structural design.



#### Corrugated production

On the Cutting table, the offset values Rx and Ry must be entered into the system.

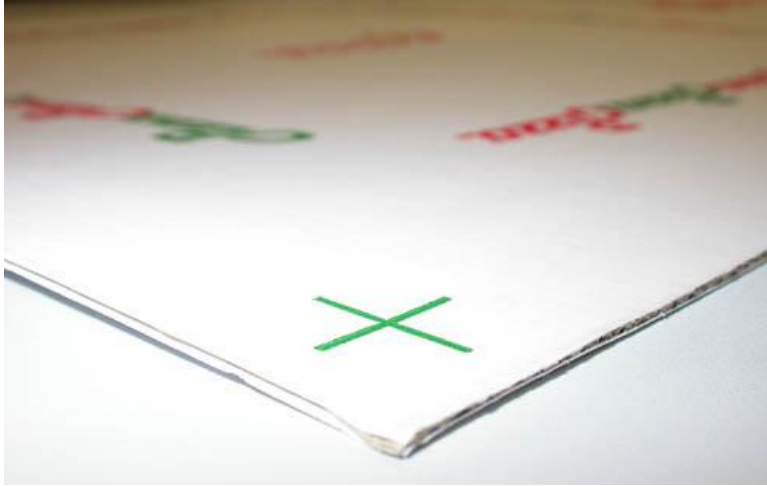
When the position of the register marks is obtained, offset Rx, Ry is used to position the structural design relative to the register marks.



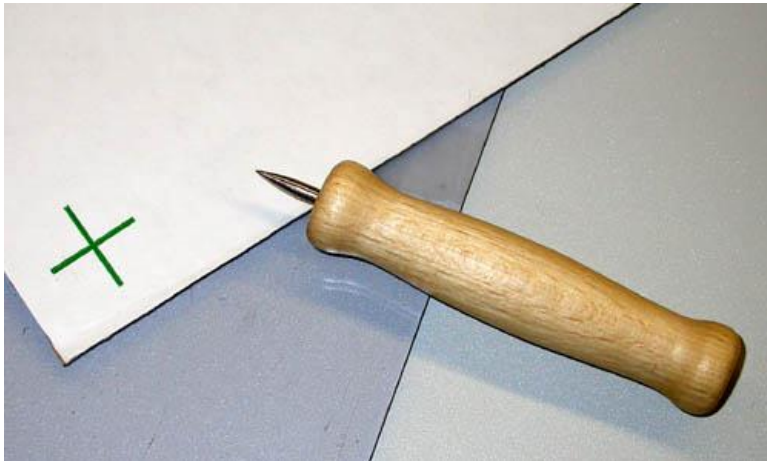
Rx, Ry - distance from **Register mark to design blank**

### 5.3.8 How to make the register mark visible on the up-ward side of the material

- A typical use of this alternative is when the register mark is on the down-ward side of the material.
- Use this procedure to make the register mark visible on the up-ward side of the material:



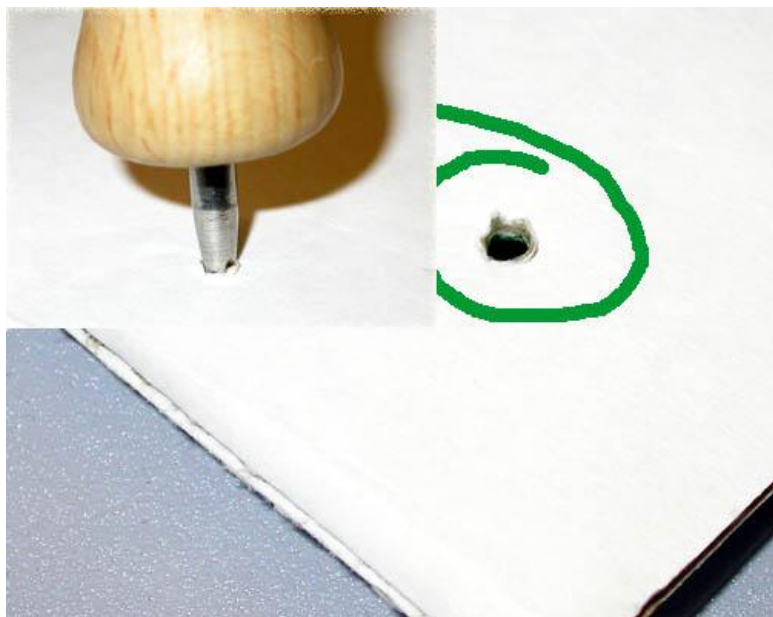
This is the Register mark, which in this case will be on the down-ward side of the sheet when cutting and creasing is carried out.



Place the sheet on a soft surface, and use an awl to make a hole through the material.



Keep the awl vertical as you apply pressure.



On the rear side, use the awl to round the hole.

Now, you have transferred the Register mark to the opposite side of the sheet.

Repeat the procedure for the second Register mark.

## 5.4 Camera calibration



### Take care:

- Knife blades are extremely sharp.
- Keep away from all moving parts.
- Ensure all other personnel stays in a safe distance from all moving parts.
- Use ear protection.

### 5.4.1 Introduction

To achieve maximum accuracy when using ARS, the camera should be calibrated relative to the laser pointer.

Camera calibration is a three-step process:

<p>Knife tool used for calibration</p> <p>Camera to be calibrated</p> <p>Laser pointer</p>	<ol style="list-style-type: none"> <li>1) The knife tool to be used for camera calibration is calibrated relative to the laser pointer.</li> <li>2) The camera is calibrated relative to the knife tool.</li> <li>3) The camera position relative to the laser pointer is calculated based upon the previous two calibrations.</li> </ol>
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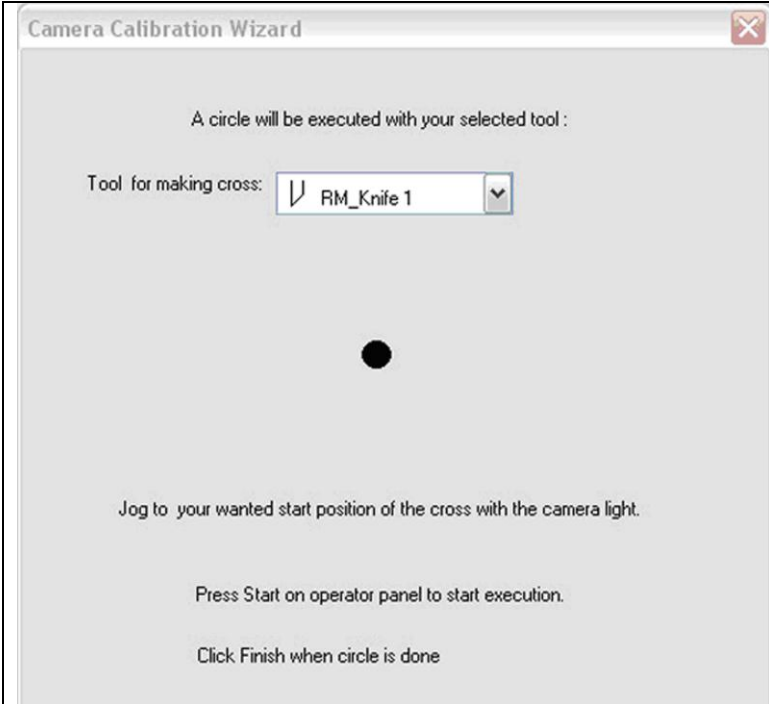
Knife tool calibration is not included in this procedure; it is available in the Tool section.

It is important that the knife tool calibration procedure is completed before this procedure is carried out:

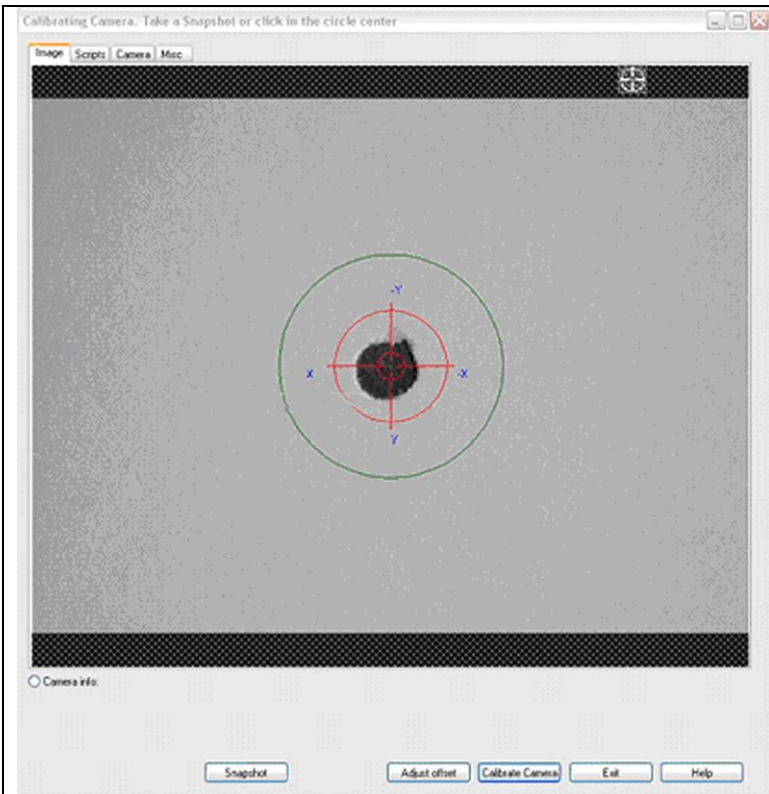
## 5.4.2 Procedure

Select the camera calibration wizard:

**Option->Registration setup (Alt+R)->Camera setup->Calibrate camera.**

	<ol style="list-style-type: none"> <li>1. Select the tool to be used when making a circle. Use a knife tool.</li> <li>2. Press <i>Start</i> to make the circle.</li> <li>3. Press <b>Finish</b>.</li> <li>4. Press <b>Close</b> to continue.</li> <li>5. Remove the material from inside the circle.</li> </ol>
---	---

The camera dialog will be shown with the circle inside the picture:

	<ol style="list-style-type: none"> <li>1. If camera focus has to be adjusted, do it now by turning the camera lens in or out.</li> <li>2. Click the <b>Snapshot</b> – button and the machine will move to the next point.</li> <li>3. Continue to click <b>Snapshot</b> until all points are completed and the dialog disappears.</li> <li>4. The camera is now calibrated.</li> </ol>
--	--

## 5.5 Adjust camera offset

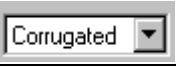



### Take care:

- Knife blades are extremely sharp.
- Keep away from all moving parts.
- Ensure all other personnel stays in a safe distance from all moving parts.
- Use ear protection.

Follow this procedure to calibrate the camera position relative to the other tools in the tool holder:

### 5.5.1 General

	<ul style="list-style-type: none"> <li>• As the camera is mounted outside the tool head cover, it is important that this test is carried out with the cover mounted.</li> </ul>
	<ul style="list-style-type: none"> <li>• All test files to be used are available from the folder: c:\xp-guide\iat</li> </ul>
	<ul style="list-style-type: none"> <li>• From <b>Options-&gt;Table options</b>, select <b>Manual Vacuum control</b> to ensure vacuum stays on during the complete procedure.</li> </ul>
	<ul style="list-style-type: none"> <li>• From <b>Main Toolbar-&gt;Application selection</b>, select Corrugated.</li> </ul>
	<ul style="list-style-type: none"> <li>• From <b>Job View Toolbar-&gt; Select Reference point</b>, select <b>Panel Ref. point</b>.</li> </ul>
	<ul style="list-style-type: none"> <li>• For this procedure, use a thin sheet of carton (500 x 600 mm) as test material.</li> </ul>
	<ul style="list-style-type: none"> <li>• To continue in next chapter</li> </ul>

## 5.5.2 Procedure

Select **Options->Registration setup->Camera setup->Adjust camera offset:**



The wizard will create a circle, which will be used for offset adjustment.

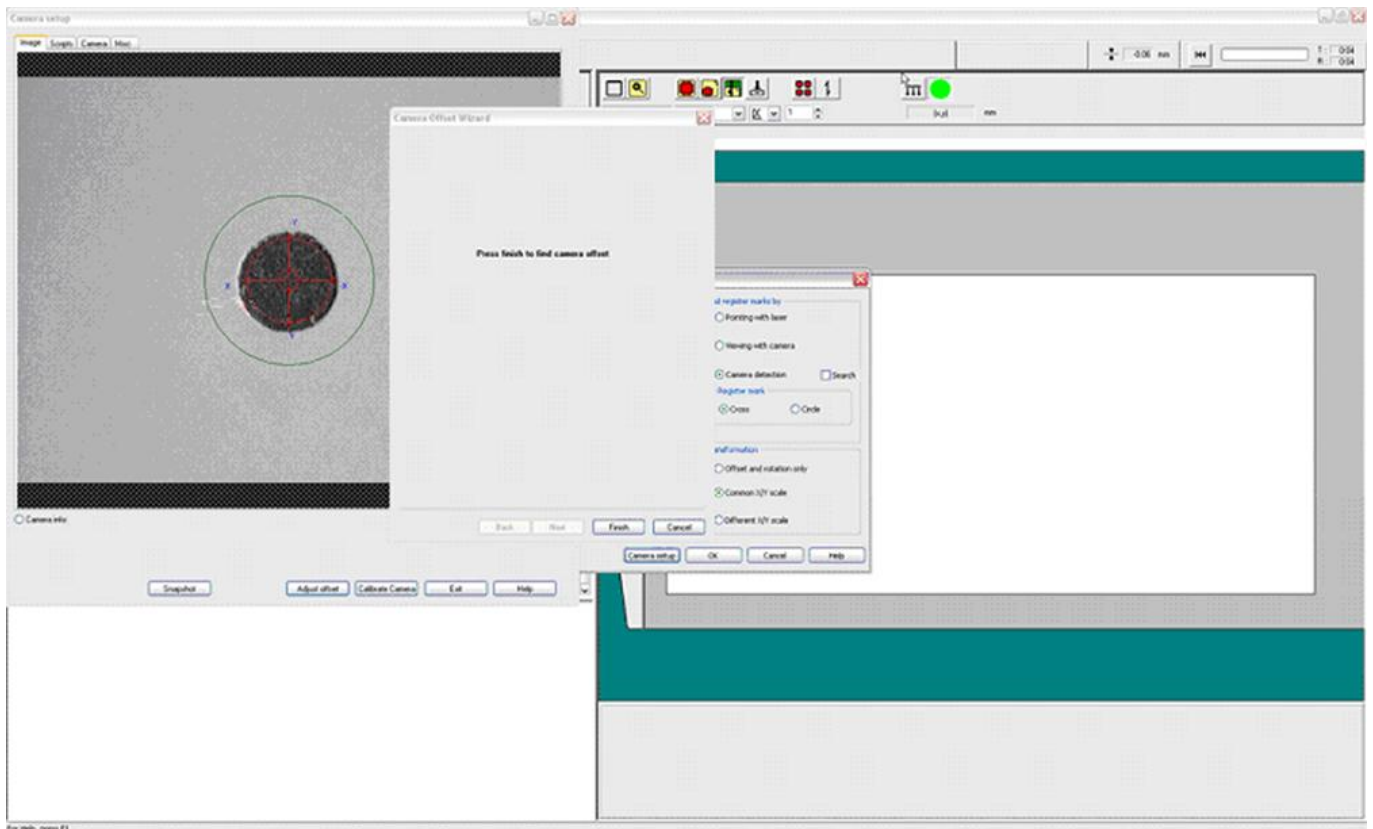
From the drop-down menu in the dialog, select the tool to be used, preferably a knife.

With a sheet of material on the table, switch *Vacuum on*.

Jog to a proper position on the sheet and press *Start*. Note: In this case, the position is the position of the camera.

The cross is made and the camera is positioned above the cross. The following dialog appears:





By *Jog* and *Incremental jog*, move the camera until the red marker is exactly in the center of the circle.

In the dialog, press **Finish**.

In the **Continue Adjustment** dialog, press **Close**.

Switch *Vacuum* off.

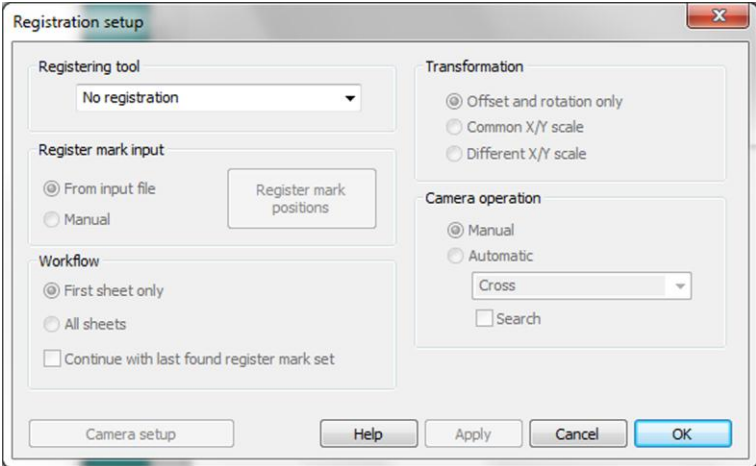
Now, the camera offset is properly adjusted.

## 5.6 Verify correct offset adjustment

### 5.6.1 Draw the test figure

1	Select <b>No registration</b> : <b>Option-&gt;Registration setup (Alt+R)-&gt;No registration.</b>
2	Open the file regtestd.acm
3	Place a sheet of carton, 400 x 400 mm, on the table.
4	Switch <i>Vacuum on</i> to keep the sheet in a stable position.
5	Configure <b>Job setup</b> to have a pen tool for line 1, 2 and 5.
6	Jog to a start position (laser pointer) in the -X, -Y corner of the sheet.
7	Press <i>Init</i> .
8	Press <i>Start</i> to draw the file.

### 5.6.2 Draw the test figure using registration marks

1	Select <b>Register mark input from input file</b> and <b>Camera detection</b> : <b>Option-&gt;Registration setup (Alt+R)-&gt;From input file.</b> <b>Option-&gt;Registration setup (Alt+R)-&gt;Camera detection.</b>
	
2	Open the file regtest.acm using the same <b>Job setup</b> (pen tool for line 1, 2 and 5).
3	Move the machine to approximate the same position as used when the test figure was prepared and press <i>Init</i> .
4	Press <i>Start</i> .
5	The program will automatically read 4 registration marks and execute the file.
6	Inspect the final result. Requirement: The angles prepared by this file should be positioned exactly on the two registration marks prepared by the first file.

## 6. Work with 123Box

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### 6.1 Introduction

123Box is an add-on to the XP-Guide control software for Kongsberg cutting tables.

The purpose of the program is to offer a simple work flow for preparation and production of standard corrugated and folding carton boxes.

The solution is based upon a CAD-X implementation using ArtiosCAD functions to select a design from a library, enter dimensions and generate a cut-file.

The cut-file is automatically opened in XP-Guide, ready to be cut on the Kongsberg cutting table (for description of ArtiosCAD and CAD-X, see separate chapters).

It is a pre-requisite for this function that ArtiosCAD is installed and configured for CAD-X on the front end PC.

In Service Guide for 123Box, chapter 3 and 4, you will find a description of how to install and configure the ArtiosCAD software.

A license key is required for ArtiosCAD to run properly.

### 6.2 ArtiosCAD, short introduction

#### **Design, Manufacturing and Communication for Packaging.**

- ArtiosCAD is the world's most popular structural design software for packaging design.
- With dedicated tools specifically designed for packaging professionals for structural design, product development, virtual prototyping and manufacturing, ArtiosCAD increases productivity throughout your company.
- ArtiosCAD is the ideal product for all corrugated, folding carton and POP display designers. Artios CAD's Design Modules are the best there are today.
- The design and drafting tools of ArtiosCAD include functions that structural designers need to get their job done accurately and efficiently.
- The tool alignment and snapping features provide graphical feedback, helping both experienced and new users immediately become more productive.
- Complete 3D integration allows for quick prototyping of designs and presentations, eliminating communication errors and reducing design review cycles.
- ArtiosCAD's layout and tooling design features can be used to create plate layouts and die tooling – optimized for the production equipment that will be used in manufacturing.
- The integrated database and reporting features enhance communication within your company as well as with external suppliers. ArtiosCAD's Adobe® Illustrator® plug-ins truly creates the first round-trip workflow for structural and graphic designers.

#### **Key benefits**

- Superior drafting tools increase packaging designer productivity
- Smart Standards save time and reduce errors
- 3D modeling and design provide fast prototyping and presentations
- Powerful and efficient layout and tooling design reduce production costs
- Relational database offers flexible library searches and reports

## 6.3 CAD-X, short introduction

- CAD-X is a software module that makes it possible for other programs to use functions from within ArtiosCAD.
- The CAD-X software is installed as part of XP-Guide.
- It is a pre-requisite for CAD-X to run properly that ArtiosCAD is installed on the PC before installing XP-Guide.

## 6.4 Work with 123Box

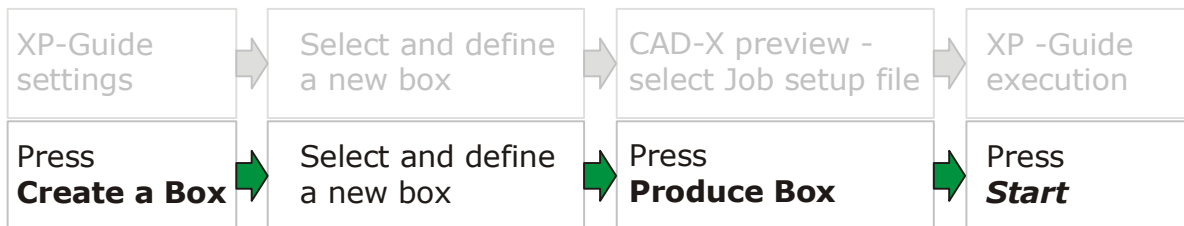
### 6.4.1 Introduction

The 123Box workflow can be illustrated as follows:

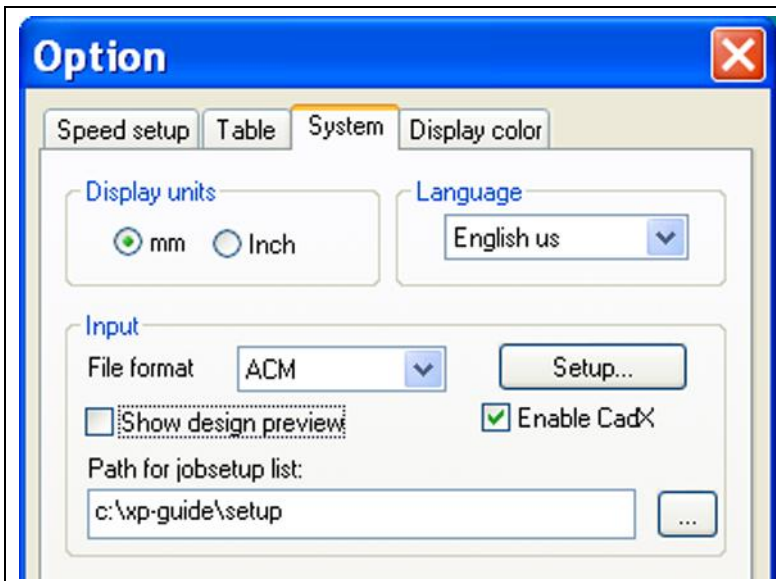
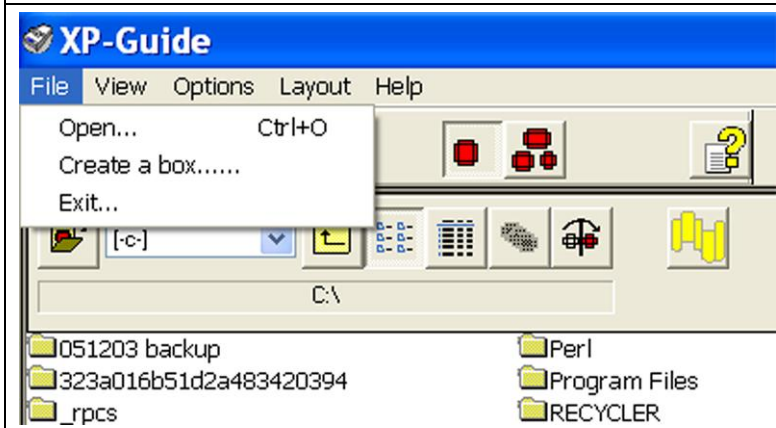
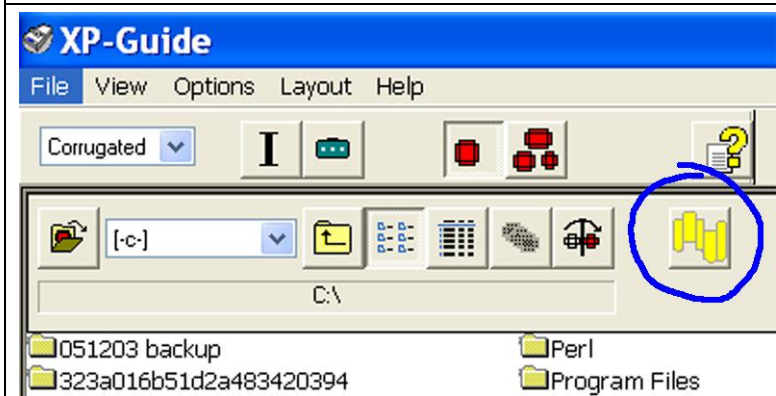


This chapter will describe each step in detail.

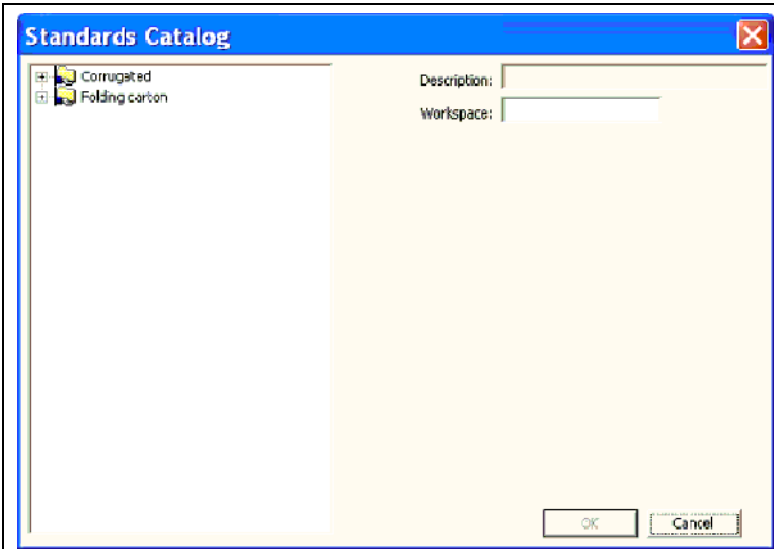
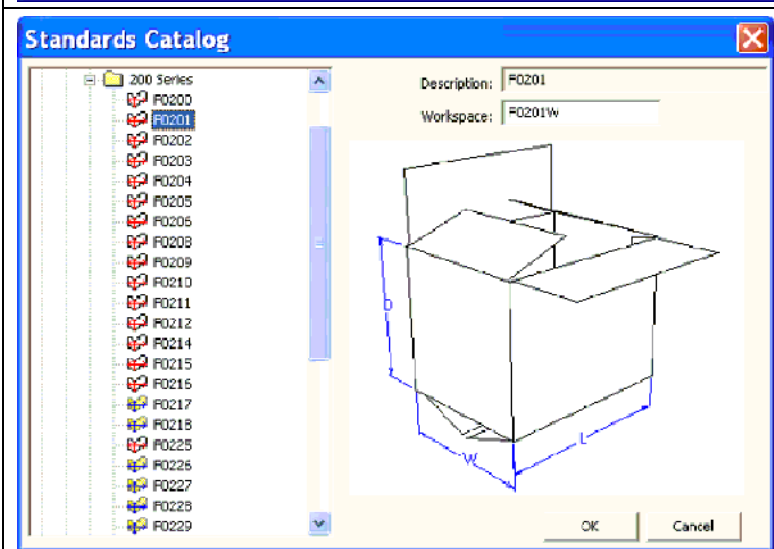
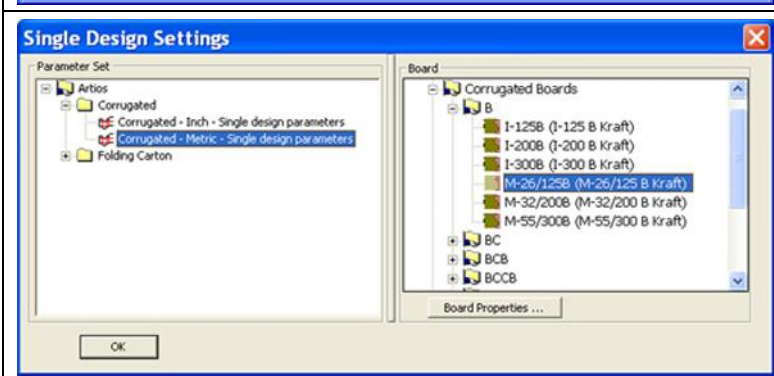
When all default settings are correct, the complete workflow is just a few steps illustrated as:

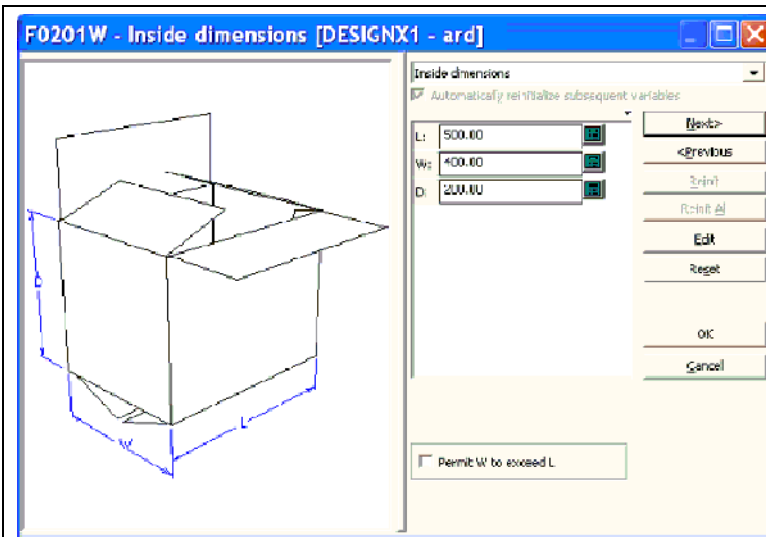


### 6.4.2 XP-Guide settings

	<p>For 123Box, the following XP-Guide settings are necessary:</p> <p>From <b>Option-&gt;System setup</b>:</p> <ul style="list-style-type: none"> <li>• <b>Enable CAD-X</b>: must be enabled.</li> </ul>
	<p>From <b>Main menu-&gt;File</b>, select <b>Create a box...</b> or..</p>
	<p>..press the <b>Fileview toolbar-&gt;Create a box</b> button.</p>

### 6.4.3 Select and define a new box

	<p>From the <b>Create a box</b> – function, the Standards catalogue dialog is displayed. Select Corrugated or Folding Carton.</p>
	<p>From the list of standard boxes, select the wanted standard (template) and press OK.</p>
	<p>Select the board to use and press OK.  For setting of default parameters, see ServiceGuide_123Box, Chapter 3, Boards.</p>



Enter the dimensions to use.

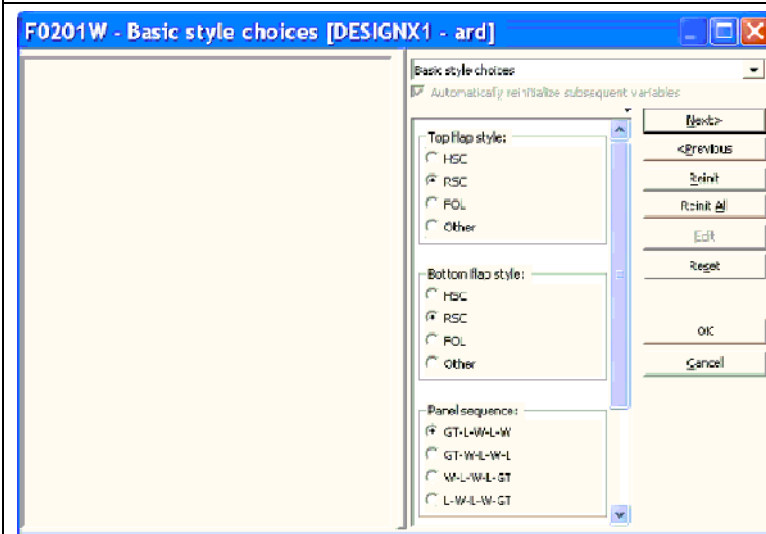
Press Next to enter the next setup menu.

Note:

The number of menus and parameters depends upon the actual standard selected.

Pressing OK will bring you directly to the CAD-X preview dialog.

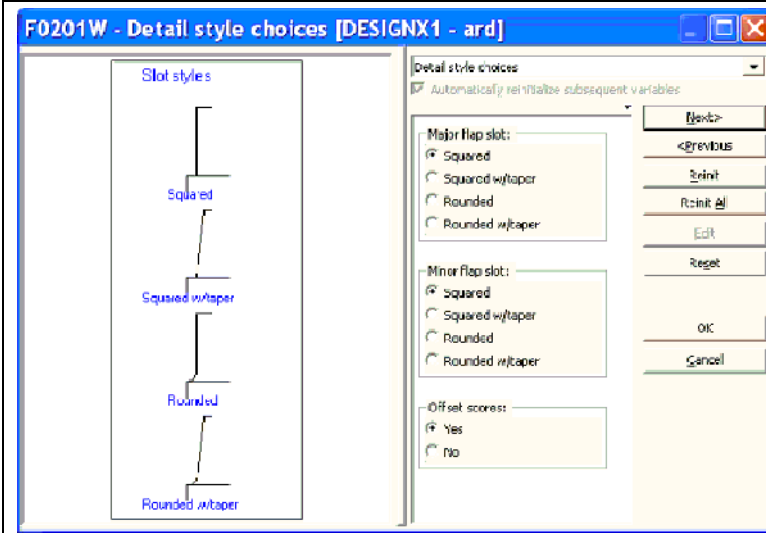
This is the recommended choice if you know that the default settings are correct for the rest of the parameters.



Accept or select your preferences in the Style Choice menus and press Next.

Pressing OK will bring you directly to the CAD-X preview dialog.

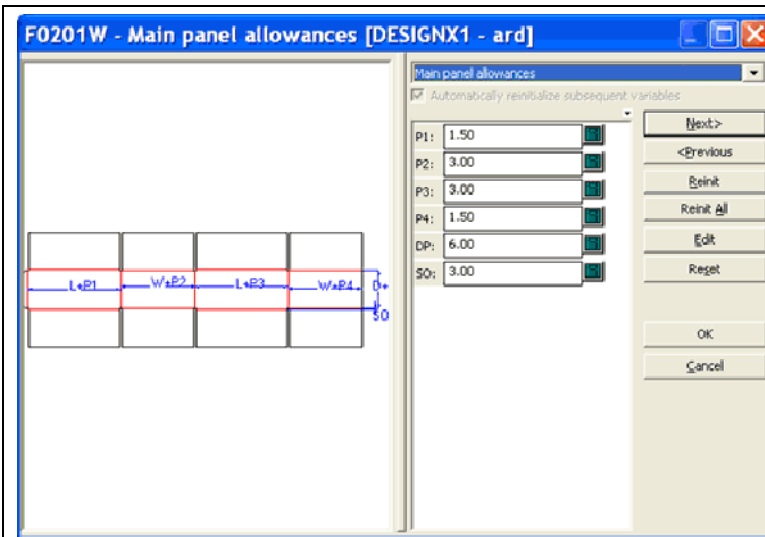
This is the recommended choice if you know that the default settings are correct for the rest of the parameters.



Check for correct settings and press Next.

Pressing OK will bring you directly to the CAD-X preview dialog.

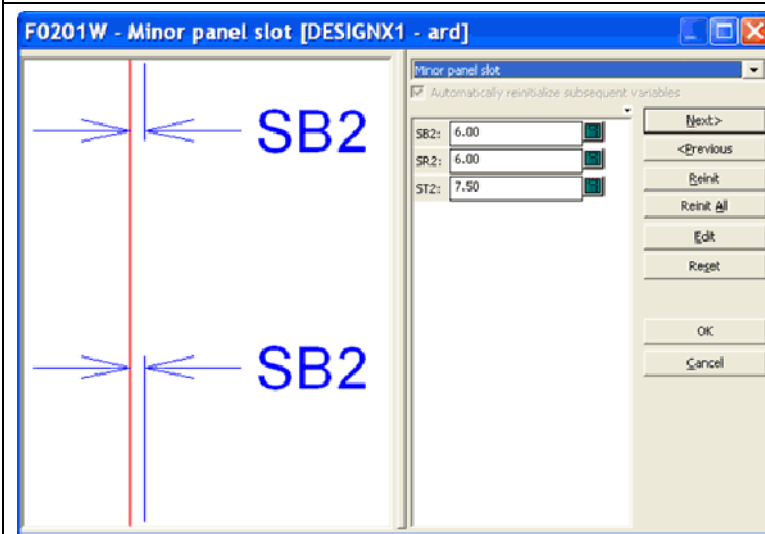
This is the recommended choice if you know that the default settings are correct for the rest of the parameters.



Check for correct settings and press Next.

Pressing OK will bring you directly to the CAD-X preview dialog.

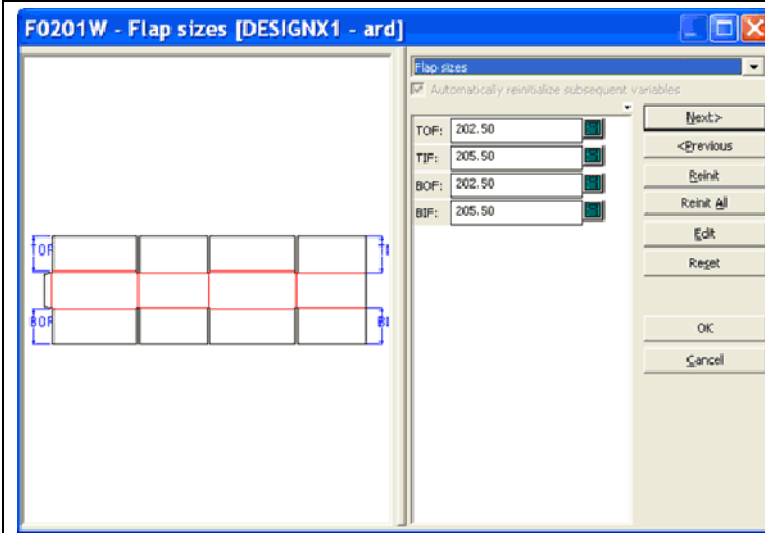
This is the recommended choice if you know that the default settings are correct for the rest of the parameters.



Check for correct settings and press Next.

Pressing OK will bring you directly to the CAD-X preview dialog.

This is the recommended choice if you know that the default settings are correct for the rest of the parameters.

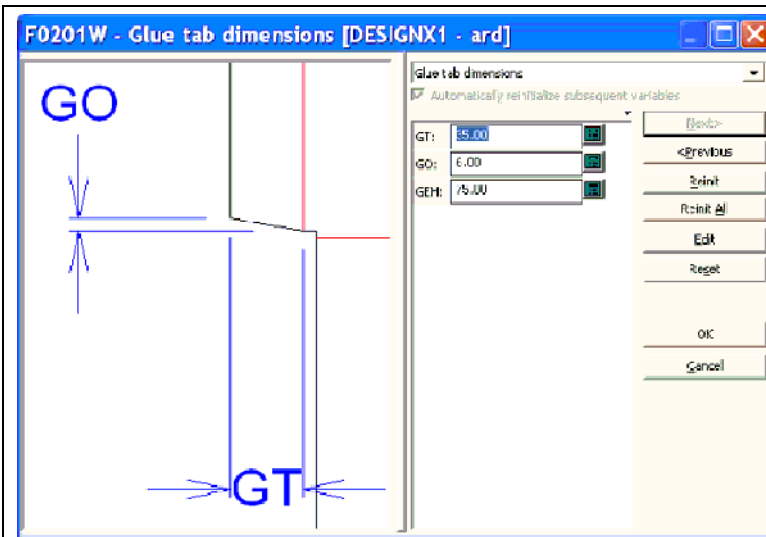


Check for correct settings and press Next.

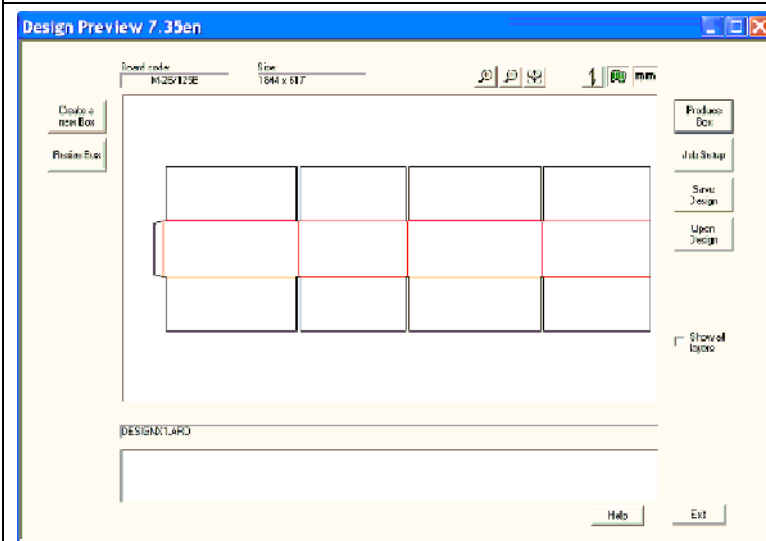
Pressing OK will bring you directly to the CAD-X preview dialog.

This is the recommended choice if you know that the default settings are correct for the rest of the parameters.





Check for correct settings and press OK.



This is the CAD-X preview dialog.

Press Job Setup if you want to verify or edit Tooling parameters here. (Could be done either here or in XP-Guide later in the process).

When all settings are correct, press Produce Box.

XP-Guide will be displayed with the design selected and displayed in Job view.

If you want to look more at options available, see chapter CAD-X preview dialog.

## 7. System setup

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### 7.1 Introduction

This chapter will explain all functions and parameters that are important for the XP system to run properly.

## 7.2 Reference Points and Coordinate System

All X and Y coordinates in the **Input File** uses the selected **Reference Point** as origin.

Two modes of operation are available:

### 1) Fixed reference point



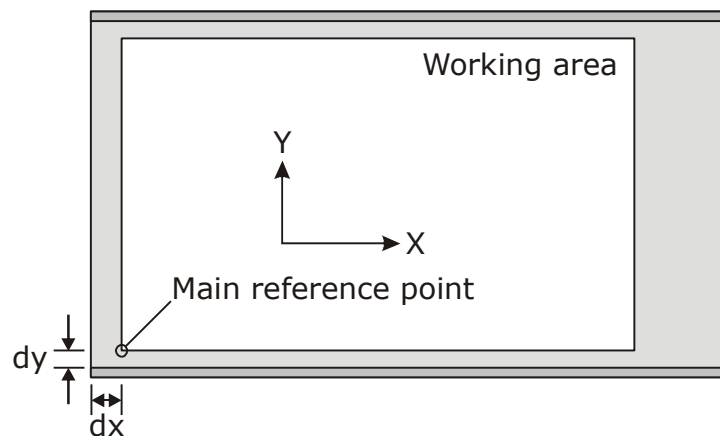
Select a **Reference Point** from the **Select Reference point** drop down list.

### 2) Panel reference point



- From the **Select Reference point** drop down list, select **Panel Ref Point**.
- Position the Laser pointer at the desired reference point.
- Press **Init**.

### 7.2.1 The Main Reference point position



The fixed reference point number 1 is defined as the Main Reference point.

The other fixed reference points (2 – 10) are all specified relative to the Main reference point. Thus, moving the Main reference point will move these reference points as well. The Main reference point has to be correctly positioned in order to obtain:

- A full working area.
- Correct sheet feed operation.
- Correct handling of long jobs

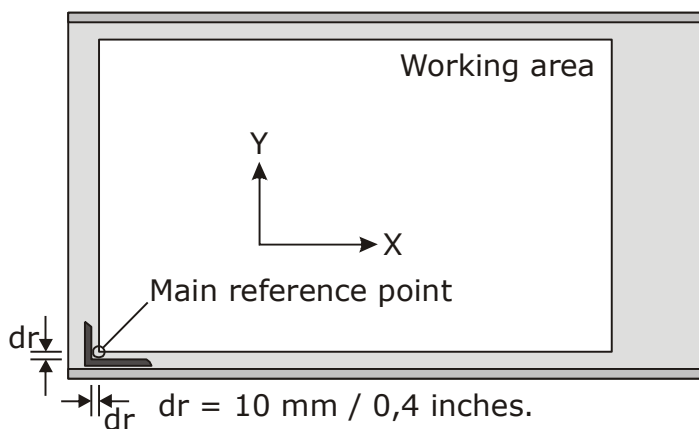
Using the Main reference point during program execution ensures correct operation.

## 7.2.2 The Main Reference point for i-cut

For i-cut to run properly, the Main Reference point should be set in a specific position on the table, using i-cut reference point setting wizard (72).  
 After i-cut reference point setting, do not modify the position of the Main Reference point.  
 If you need a reference point in another position on the table, use one of the other reference points available (2 – 10).

## 7.2.3 Rulers and reference points

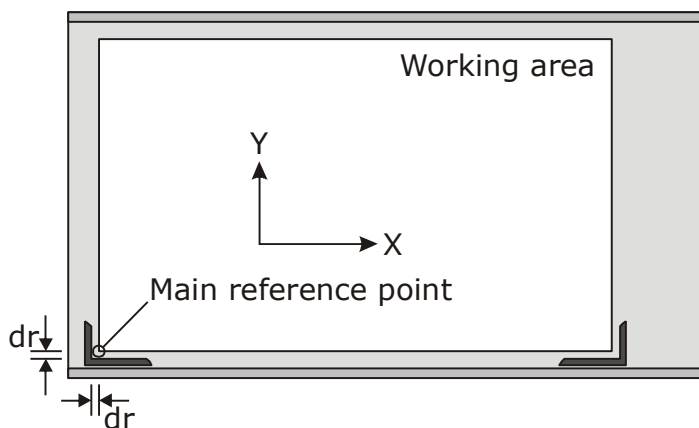
The ruler system ensures an easy and correct positioning of the material on the table.



The Main Reference point shall be defined 10 mm inside the ruler.

When you use the lower right ruler, the Reference Point will automatically be moved to an identical distance from the right ruler, as it is defined from the left ruler. The lower right ruler is normally used for reverse score operations.

At the same time the direction of the X axis is reversed.



## 7.3 Speed Setup

The Speed setup dialog is available from:

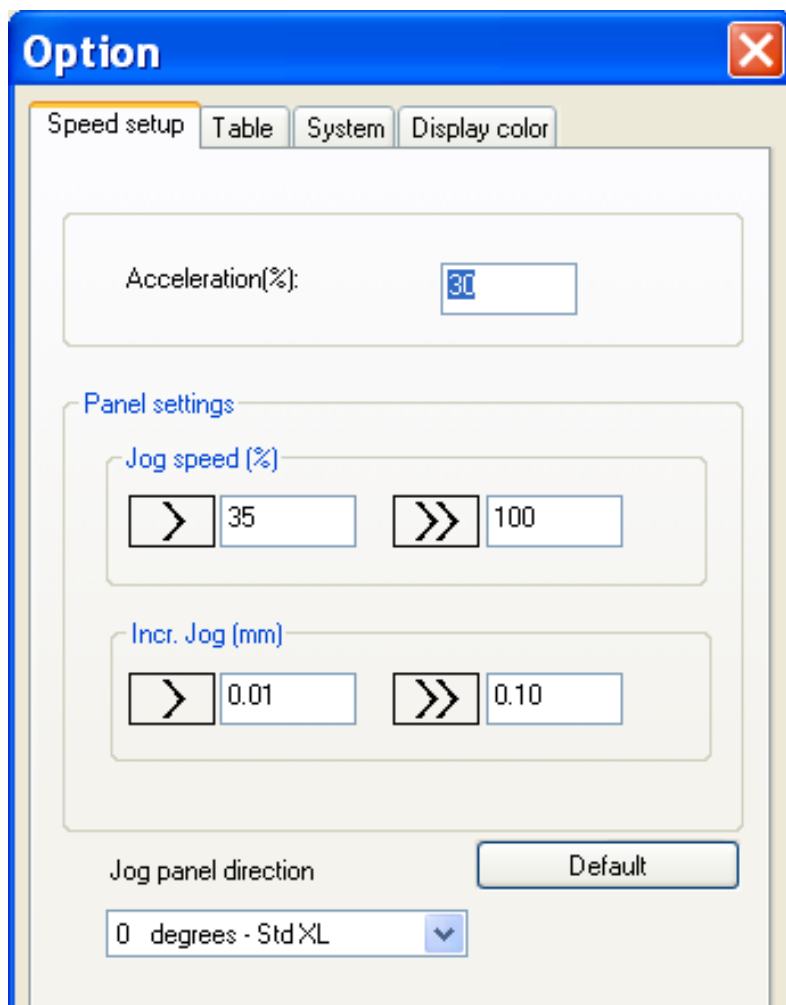
- **Main Menu->Options->System Option**
- **CTRL+Alt+O**

Select the **Speed Setup** tab.

### 7.3.1 Table Acceleration

The Table Acceleration can be reduced to a % value of the maximum acceleration.

Enter the wanted value in the **Acceleration** edit box.



### 7.3.2 Continuous Jog speed

The *Continuous Jog* speed can be reduced to a % value of the maximum jog speed.



Enter the wanted value in the low **Jog Speed** edit box.



Enter the wanted value in the high **Jog Speed** edit box.

### 7.3.3 Incremental Jog

The size of the *Incremental Jog* movements can be customized.

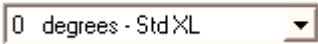


Enter the wanted value in the short **Jog Increment** edit box.



Enter the wanted value in the long **Jog Increment** edit box.

### 7.3.4 Jog directions



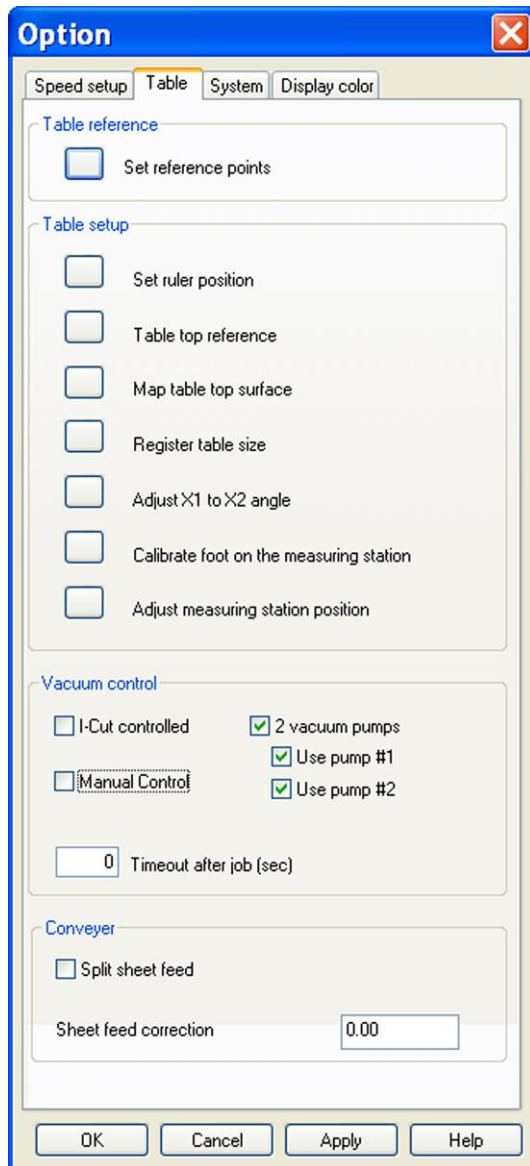
Specify jog direction for the *Manual Jog* buttons on the Operator panel.

## 7.4 Table setup

The Table setup dialog is available from:

- **Main Menu->Options->Table Option**
- **CTRL+R**

The following selections are available:



### 7.4.1 Set Reference point

The Set Reference point wizard is an aid for adding or changing the table reference points.

Procedure:

Press the **Set Reference Points** button to set up any fixed reference points. Follow the instructions given by the wizard and define the number of fixed references you want.

As many as 10 points can be defined.

Click the **OK** button.

#### 7.4.1.1 i-cut Main reference

Press this button to establish the correct Main reference point for i-cut operations.

### 7.4.2 Set Ruler Position

If your table is equipped with rulers, please follow the procedure below. If not, enable the "Do not use rulers" - checkbox in the **Set Ruler Position** dialog.

For the table to operate properly an exact registration of the ruler positions is necessary. This is a one time job, but it can be necessary to repeat the procedure if mechanical maintenance has been carried out on the table or traverse.

Correct registration of the right ruler is required when reverse operations are carried out.

Procedure:

Press the **Set Ruler Position** button. Follow the instruction given by the wizard and define the left ruler position.

Repeat the procedure for the right ruler.

**Note!** When the right ruler is registered, use a position 100 mm out from the corner (marked on the ruler).

### 7.4.3 Table top reference

Use this function to complete a tool height reference calibration.

The tool height is measured in current position and the reference to the table top surface is updated. The Table top reference function should be carried out:

- After mechanical adjustments of traverse or tool head.
- When cutting through material is not working properly.
- After any change of cutting / milling underlay, for instance, after adding or removing the milling underlay.

Procedure:

Remove all materials from the table surface. The cutting underlay remains in place. If the table is equipped with a conveyor belt, avoid measuring directly on the belt junction. Press the **Table top reference** button. In the wizard, press **OK** to start measurement.

### 7.4.4 Map Table Top surface

To assure correct cutting depth the surface of the table top is measured in order to create a map. It is recommended to execute this function if the cutting mat is worn out and after the cutting mat has been replaced.

Procedure:

If the table is equipped with a conveyor belt, move the belt junction away from the table surface. Press the **Map Table Top Surface** button. Follow the instructions given by the wizard.

### 7.4.5 Register Table size

This wizard moves the tool head from edge to edge of the table in order to measure the table size. This registration is normally done just once.

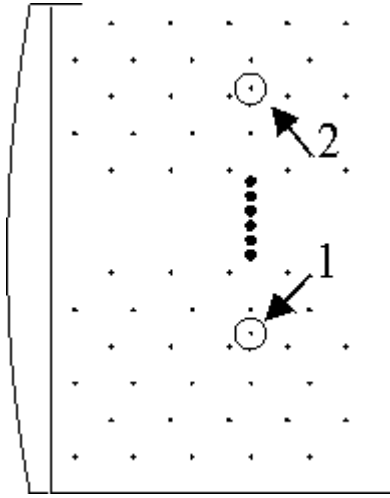
Procedure:

Press the **Register Table Size** button. Follow the instruction given by the wizard.



### 7.4.6 Adjust X1 to X2 angle

Use this wizard to obtain correct angle between X axis and Y axis.



Procedure:

Press the **Adjust X1 to X2 angle** button. Follow the instructions exactly as given by the wizard.

Note: Use drilled holes in table as reference (see picture).

### 7.4.7 Calibrate foot on the measuring station

Use this wizard to calibrate the height level of the measuring station.

Procedure:

Press the **Calibrate foot** button. Follow the instruction given by the wizard.

Repeat this procedure after maintenance on the traverse, carriage or measuring station.

### 7.4.8 Adjust measuring station position

Use this wizard to calibrate the position of the measuring station to the system.

Procedure:

Press the **Adjust measuring station position** button. Follow the instruction given by the wizard.

Repeat this procedure after maintenance on the measuring station.

### 7.4.9 Vacuum control

For details about this function, see separate chapter 'Vacuum control' (100).

### 7.4.10 Conveyor belt control

#### **Split sheet feed**

The sheet feed movement is divided into two sequences.

#### **Sheet feed correction**

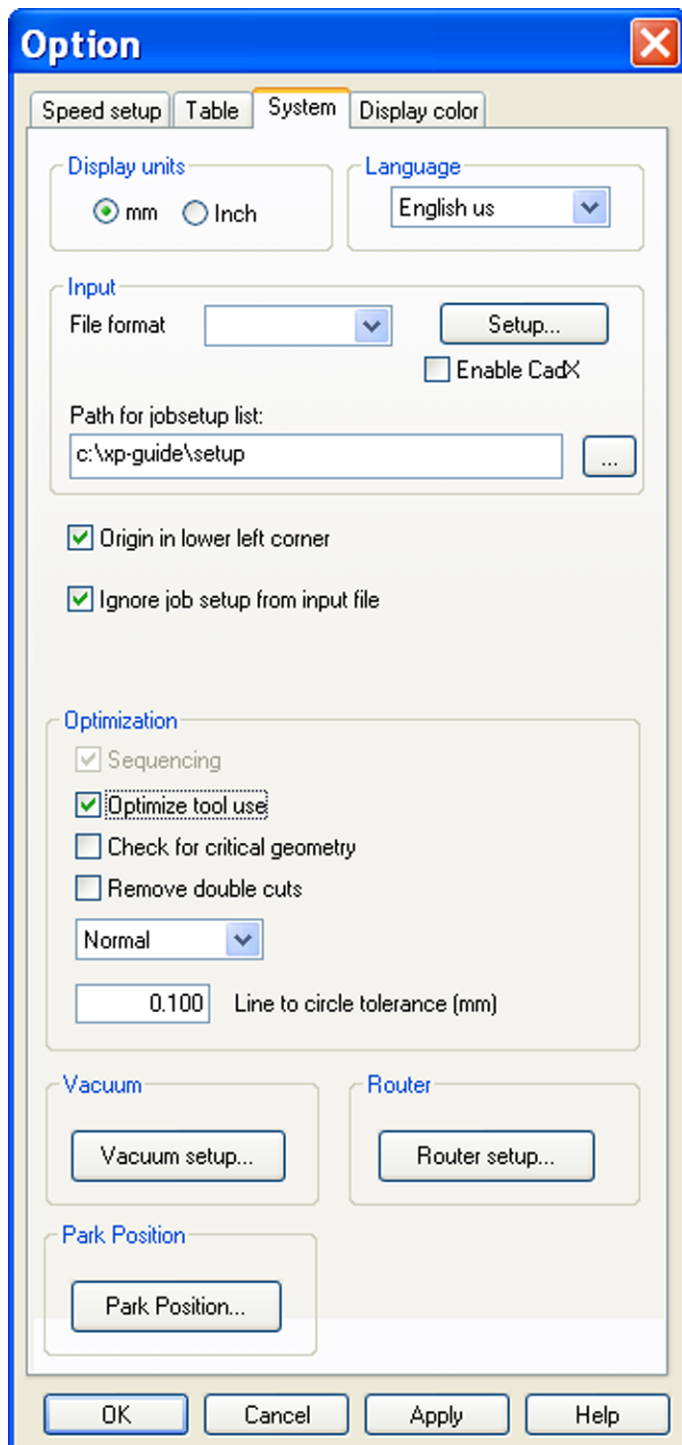
Adjust the movement of the conveyor belt to be shorter or longer.

## 7.5 System Options

The System option dialog is available from:

- **Main Menu->Options->System Option**
- **CTRL+Alt+O**

Select the System tab. The following selections are available:



### 7.5.1 Display units

Select unit to be used for the GUI.

### 7.5.2 Language

Select language for the GUI.

### 7.5.3 Input File Format

Select one of the available ACM or HPGL formats in the drop down list. ACM is the standard CAM format.

### 7.5.4 Setup

Enter this dialog for advanced input file format setting.

For ACM and HPGL, use the setup dialog to specify the programming increment for the input file.

For DXF, CF2, DDES, ARD, see ArtiosCAD User manual for more information.

### 7.5.5 Enable CAD-X

CAD-X enabled allows for the following input formats in addition to the formats mentioned above: DXF, CF2, DDES, ARD. If none of these formats are used, leave the function disabled.

### 7.5.6 Origin in lower left corner

Causes the entire input file coordinates to be offset, using the lower left corner of the job as reference.

The lower left corner of the job will now always be in the selected **Reference Point**.

**Note! i-cut and ArtiosCAD users should leave this function OFF.**

### 7.5.7 Ignore Job Setup from Input file

Inside an **Input File**, it is possible to specify a **Job Setup** file to be used during program execution. Enable this function to ignore the specified **Job Setup** file.

Note: Most CAD systems do not add **Job Setup** file information to the Input File.

### 7.5.8 Sequencing

This function will sort the input file in order to minimize tool changes. The execution order will be determined by the tool type, so that pen is executed before crease which is executed before knife.

Some functions depend upon sequencing being active, as reverse score.

**Note! i-cut and ArtiosCAD users should leave this function OFF.**

### 7.5.9 Optimize tool use

This function will reduce the movement with tool up to a minimum, making the execution on the table as fast as possible.

**Note! i-cut and ArtiosCAD users should leave this function OFF.**

### 7.5.10 Check for critical geometry

Optimizes cut directions for reduced paper tear hazards.

**Note! i-cut and ArtiosCAD users should leave this function OFF.**

### 7.5.11 Remove double cuts

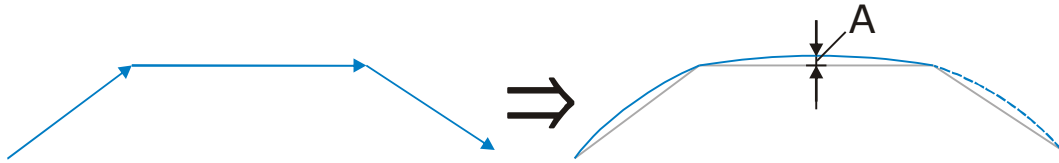
This function will remove any double cuts. Used together with the layout function.

### 7.5.12 High Quality, Normal, High Speed

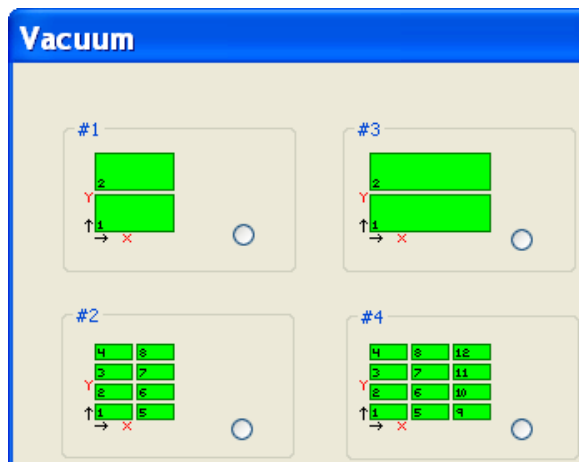
Select mode of operation.

### 7.5.13 Line to circle tolerance

Specifies the maximum allowed arrow height A when straight lines are converted to circles. Maximum allowed arrow height value is 0.2 mm / 0.08 inch.



### 7.5.14 Vacuum setup

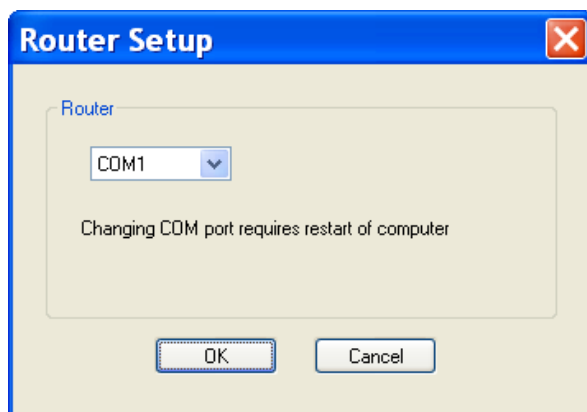


Pressing the **Vacuum Setup** - button opens up a new dialog where the vacuum section configuration for the actual machine is specified.

This setup is a one-time job as long as the vacuum section solution on the machine remains un-changed. The setup should correspond to the actual hardware.

The selected setup will determine which vacuum section configuration that will be available in the user interface.

### 7.5.15 Router setup




From the **Router Setup** dialog, the physical COM-port used for communication with the Milling Unit (HSMU/HPMU) is specified.

**Note**

The inverter needs to be connected to a genuine COM port. If connected to a USB-to-COM adapter, the communication will fail.

## 7.5.16 Park position

Pressing the Park Position - button opens the Set Park Position dialog offering the following functions:

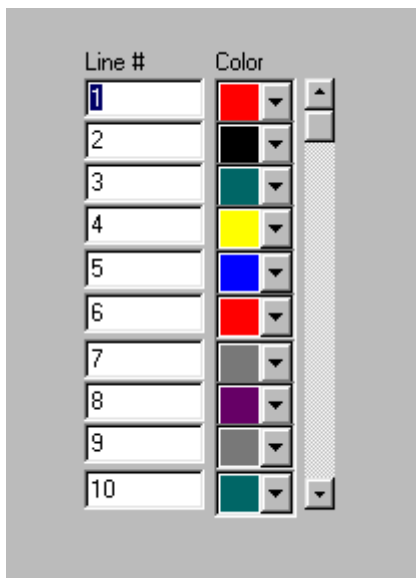
<b>Park position from file</b>	The park position is specified in the CAD system and transferred to XL via the input file.
<b>Go to reference point after job</b>	Move to the selected reference point after job finished.
<b>Selectable park position</b>	Enter co-ordinates (X,Y) for the park position. The co-ordinates are relative to the selected reference point.
	Set park position in current position. Press this button to established a park position in current laser pointer position.
<b>Park position at end of job</b>	The park position is in the lower right corner of the rectangle enclosing the job.

## 7.6 Display colors

The Display colors dialog is available from:

- **Main Menu->Options->System Option**
- **CTRL+Alt+O**

Select the Display Color tab.



This dialog defines what colors to be used for each line in **Job Setup** when a job is displayed in **Job View**.

Colors are changed by clicking on any of the combo boxes and selecting the wanted color. Additional lines can be added at the bottom of the list.

## 7.7 Job Setup

### 7.7.1 Introduction

**Job Setup** is a table that links Logical tool numbers (P - numbers) in the **Input File** to tools on the machine and describes their behavior.

The **Job Setup** information is stored as a file on the front end PC.

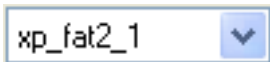
#### Notes

- All **Job Setup** files must have extension *.mat*
- All **Job Setup** files have the identifier *FMT 2000* as the first line in the Job Setup file.

Typically, the **Job Setup** is different for the different materials used. Therefore, it is recommended to have one **Job Setup** file for each material type used.

### 7.7.2 Select Job Setup files

Selection of **Job Setup** files is available from:



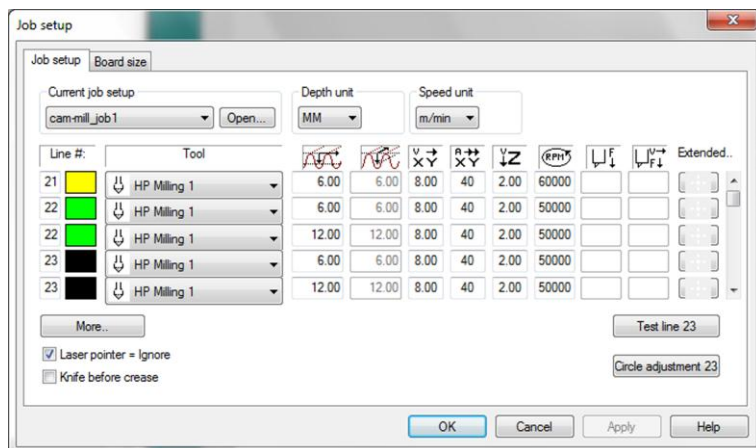
- Select a **Job Setup** file from the drop down list in **Job View**.
- Invoke the **Job Setup** dialogue and select a **Job Setup** file from the drop down list in the dialogue.

## 7.7.3 Create and edit Job Setup files

Job Setup is maintained from the **Job Setup** dialogue.

The **Job Setup** dialogue is available from:

- **Main Menu->Options->Job Setup**
- The **Job View** tool bar button.
- Pop up menu in Job View
- **Ctrl + J**



1. Job Setup is edited line by line. The parameters are described below.
2. When finished editing, use the Apply function to save to current or to a new file name.
3. Each line in Job Setup can be tested using the Test Line function. Follow the instructions in the dialog.

## 7.7.4 Job Setup Parameters

### 7.7.4.1 Depth unit

Specify if the depth unit is mm / inch or percentage (%).

### 7.7.4.2 Speed unit

Specify if the speed unit is mm/min / ips or percentage (%).

### 7.7.4.3 Line #

Logical tools can be numbered from 1 to 99. A maximum of 30 logical tools are available.

Line #.	
1	
2	
3	
4	
5	

The color defined for each logical tool is displayed in **Job View** as shown.

The color for each logical tool number is specified in **Options->System Option**.

### 7.7.5 Tool

Select the tool to be used for this line from the drop down list.

### 7.7.6 Depth

Depth can be set either in mm/inch or in % of material thickness. Different values can be entered for With and Across the Flute.



With the flute



Across the flute

Entering a positive value specifies a depth measured from the top of the material, but:

- For knife cutting, a value = 0 specifies through-cut.
- For pen, crease, drill and router, a value = 0 specifies the top of the material.

If you specify a T+/- value, the value specifies a distance from the cutting underlay. T0 specifies cutting or milling through the material down to the cutting underlay.

A positive T-value will increase the cutting / creasing depth.

Note: The T - function is available only when mm/inch is selected as depth unit.

### 7.7.7 X/Y speed



The speed can be reduced to an absolute value or to a percentage (%) of maximum speed, depending upon the 'Speed unit' setting.

This value affects tool down movements only.

### 7.7.8 X/Y acceleration



The acceleration can be reduced to a percentage (%) of the maximum acceleration.

This value affects tool down movements only.



## 7.7.9 Z-axis Speed



The speed can be reduced to an absolute value or to a percentage (%) of maximum speed, depending upon the 'Speed unit' setting.

## 7.7.10 RPM



Specify RPM for the HSMU/HPMU spindle.

## 7.7.11 Laser pointer = Ignore

This function specifies the behavior of lines with tool type 'No-tool':

Function disabled - the line is executed using laser pointer (verify mode).

Function enabled - the line is ignored during program execution (ignore mode).

## 7.7.12 Knife before crease

Use this function to force all knife movement to be executed before the crease movements.

Normally this option should be turned off. It is recommended to use this option if the crease lines are done with a V-Notch tool.

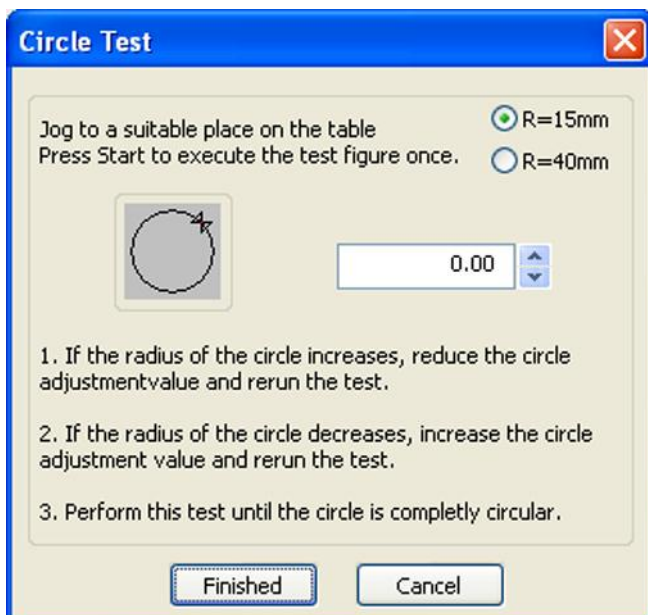
## 7.7.13 Test line n

Select this function to execute a test figure with the selected tool n.

The figure executed is a square 40 x 40 mm (1.6 x 1.6 inches).

Use this function as a quick way to verify correct adjustments for the different tools.

## 7.7.14 Circle adjustment line n



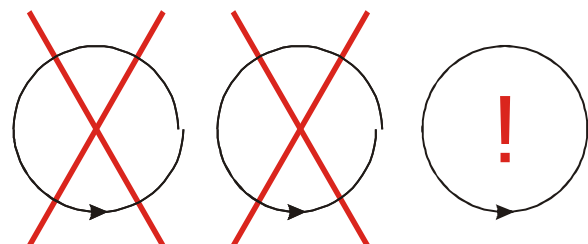
The **Circle lag** parameter determines the quality of circles when cutting with knife.

The value will be different for different materials.

Complete this wizard to obtain a proper adjustment of the **Circle lag** parameter.

Select between two different circle sizes, R=15 and R=40 mm.

Note: We recommend that the **Circle lag** value is set to 0 before the first figure is executed.



## 7.7.15 Extended..

For each line in Job Setup, an extended setup is available:



- This button face indicates that some of the extended parameters are set.



- This button face indicates that none of the extended parameters are set.

The extended parameters are:

### 7.7.15.1 Reverse score

Enable this check box to specify that the tool shall work on the front side of the material.

### 7.7.15.2 Stop before use

When this function is enabled, the execution will stop at the beginning of this line and an operator message is displayed.

The text to be displayed is entered into the **User-defined text:** – field.

Note: Enable **Sequencing** if **Stop before use** is used in combination with **Multi-pass (33)**.

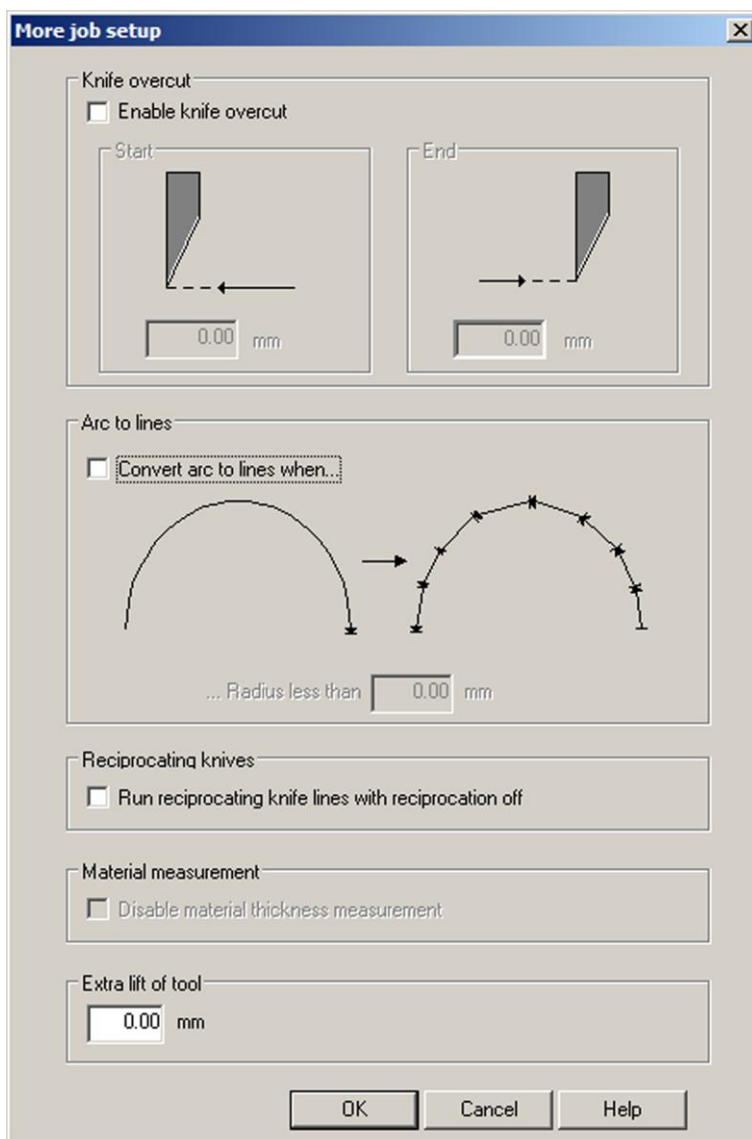
### 7.7.15.3 Knife lift angle

If the change in direction is above this value (in degrees), the tool is lifted.  
If the knife tool has a lag, the knife lift angle is 14 degrees.

### 7.7.15.4 Perf pattern

Specify a perforating pattern in the two edit boxes. The first specifies a tool up length and the second a tool down length.

## 7.7.16 More



The following functions are available through the **More** button:

#### 7.7.16.1 OverCut

Check this box to enable or disable the Knife Over-cut function. Applies to knife tools only.

Specify the size of the over-cut at start and end of consecutive cut lines.

When the direction change between two consecutive lines is bigger than 13.5 degrees, an over-cut corner action is performed.

#### 7.7.16.2 Arc to Line

Arc to Line will apply to knife tools only. The radius is the maximum radius where the Arc to Line function will be executed.

In order to make a more correct cut this function will minimize angular and sideways forces onto the cutting knife. This is achieved by splitting circles into straight line segments and turn the cut direction for each segment. Thus, the knife is lowered into the material where there is no cut before.

### 7.7.16.3 Reciprocating knife with motor off

Enable the function: 'Run reciprocating knife lines with reciprocation off' to run the Reciprocating knife with motor switched off.

#### 7.7.16.4 Disable material thickness measurement

When this function is enabled, no material thickness measurement is carried out.

The following rules apply:

- In Job setup, the **T** – function must be used for depth settings.
- In Job setup, the **Depths unit** must be set to mm/inches (Percent not allowed).
- During tool up movements, the knife is lifted to its top position.

Note: This function is for knife tools only.

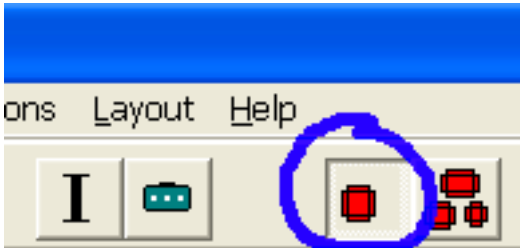
#### 7.7.16.5 Extra lift of tool

Add extra lift height to tools when moved in up position. Useful for warped boards or uneven surfaces.

## 7.8 Job Layout

XP-Guide can operate in either Single Design Layout mode or Multi Design Layout mode

### 7.8.1 Single Design Layout



Press the Single Design Button to select **Single Design** layout mode.

When a design is opened in this mode it is always located relative the selected reference point. Only one design can be placed on the table. It can be further manipulated with **Rotation**, **Scaling** or with **Step and repeat**.

### 7.8.2 Multi Design Layout



Press the Multi Design Button to select **Multi Design** layout mode.

When a design is opened from File view, the first design will be located relative to the reference point as in single design layout. The following designs will be placed according to the settings of the Job Layout Snap function. If a design is opened using drag and drop, it can be dropped anywhere inside **Job View**.

The bar on top of **Job View** is showing the name of the selected design.

#### Note:

- By using the Multi Design functions, you can locate your design anywhere inside the **Job View** area. The red and green "traffic light" will show if the work is inside the work area boundaries or not.
- A combination of Multi Design and ARS is not supported.

### 7.8.3 Multi design layout functions

Note: All functions described here are available from **Main Menu->Layout** and from the Pop-up menu in Job view.

#### 7.8.3.1 Select a design

A selected design is always shown in pink. After a design is opened it is always selected. It can also be selected by clicking on a line in the design or holding the left mouse button down and drag a square over the designs to select.

#### 7.8.3.2 Select all designs

All designs are selected with **Ctrl+A** or by selecting **Select All** from the menus.

### 7.8.3.3 Delete selected designs

Selected designs are deleted by pressing the **Del** key or by selecting **Delete** from the menus.

### 7.8.3.4 Delete all designs

All designs are deleted selecting the menu item **Delete All**.

### 7.8.3.5 Rotate selected designs

Selected designs can be rotated with the functions **Rotate 90**, **Rotate 180** or **Rotate**.

### 7.8.3.6 Positioning selected designs with the mouse

Selected designs can be positioned by holding the left mouse button down on a selected element and move the mouse. They can be dropped anywhere or snapped to existing designs depending upon the Snap function settings.

### 7.8.3.7 Positioning selected designs with the arrow keys

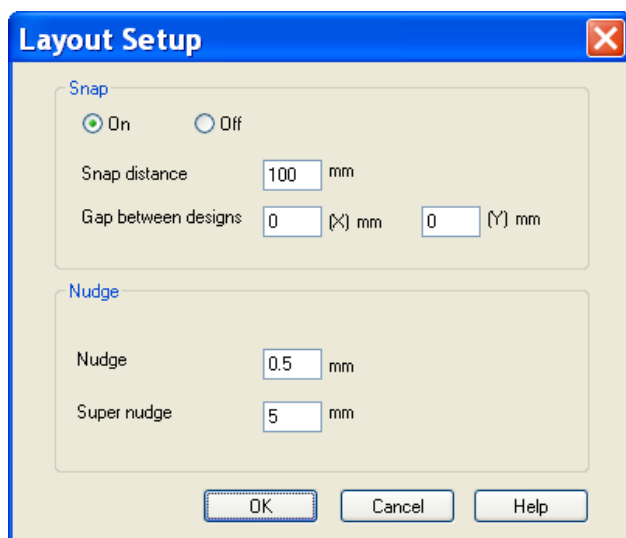
Selected designs can be positioned with keyboard arrows and placed in the JobView depending upon the Snap function settings.

The step size is defined in **Job Layout Setup->Nudge**.

### 7.8.3.8 Step and repeat on selected designs

In **Multi Design** layout, **Step and Repeat** works on selected designs only.

## 7.8.4 Job Layout Setup



Job Layout setup is available from **Main menu->Layout** or **Ctrl+L**.

### 7.8.4.1 Snap

The snap function is turned on and off by ticking the radio buttons on and off.

### 7.8.4.2 Snap distance

When the snap function is on, a design will be snapped to another design if it is positioned closer than the snap distance.

### 7.8.4.3 Gap between designs

This parameter defines the distance between designs after a snap function is completed.

#### 7.8.4.4 Nudge

Fine positioning with the arrow keys on the keyboard.

#### 7.8.4.5 Nudge step

Defines the step the design is moved with when pressing an arrow key.

#### 7.8.4.6 Super nudge step

Defines the step the design is moved with when pressing an arrow key together with the Shift key.

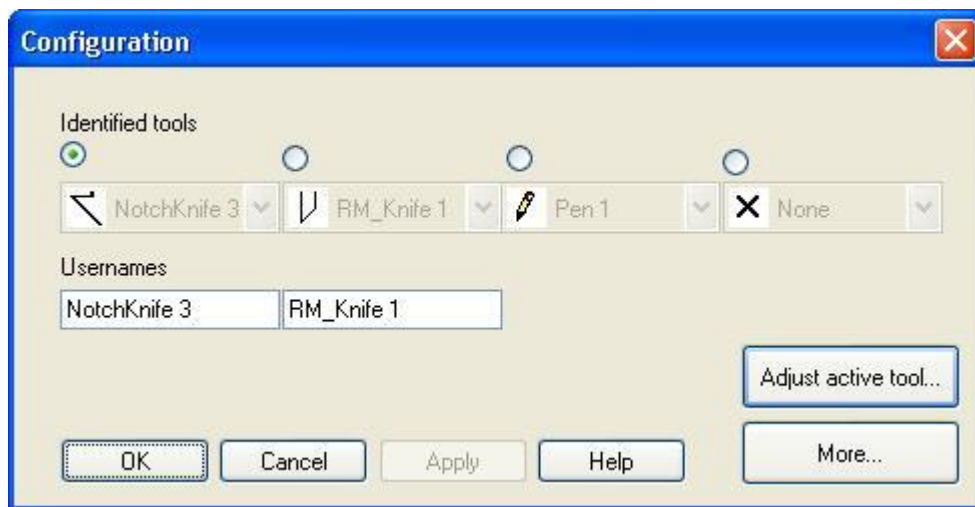
## 7.9 Tool Configuration and Adjustment

The **Tool Configuration** dialog is used for all tool settings and adjustments.

The dialog is available from:



- **Main Toolbar->Tool Configuration**
- **Main menu->Option->Tool Configuration**
- **Ctrl + T**



### 7.9.1 Tool configuration and user names

The tool type mounted is identified by hardware codes in each tool.

Current tool configuration is displayed under **Identified tools**.

When a new tool is inserted, it will be identified to the system automatically.

Use the **Usernames** edit boxes beneath each drop down box to give each tool a nickname you want to associate the tool with.

By default the system creates a username from the tool type and its serial number. F.ex a knife with serial number 3020 will be named **Knife 20**

All tools need to be adjusted in the position they will be used.



## 7.9.2 Adjust Active Tool



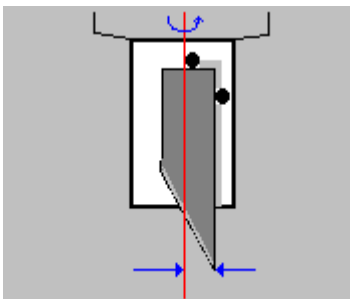
From the **Adjust Active Tool** – dialog, all tool adjustment wizards are executed.

The following procedures are general descriptions of how to adjust the tools. See the description of each tool type for more specific information:

We recommend using a sheet of corrugated material, 5-6 mm / 0.2 inch, when executing the adjustments.

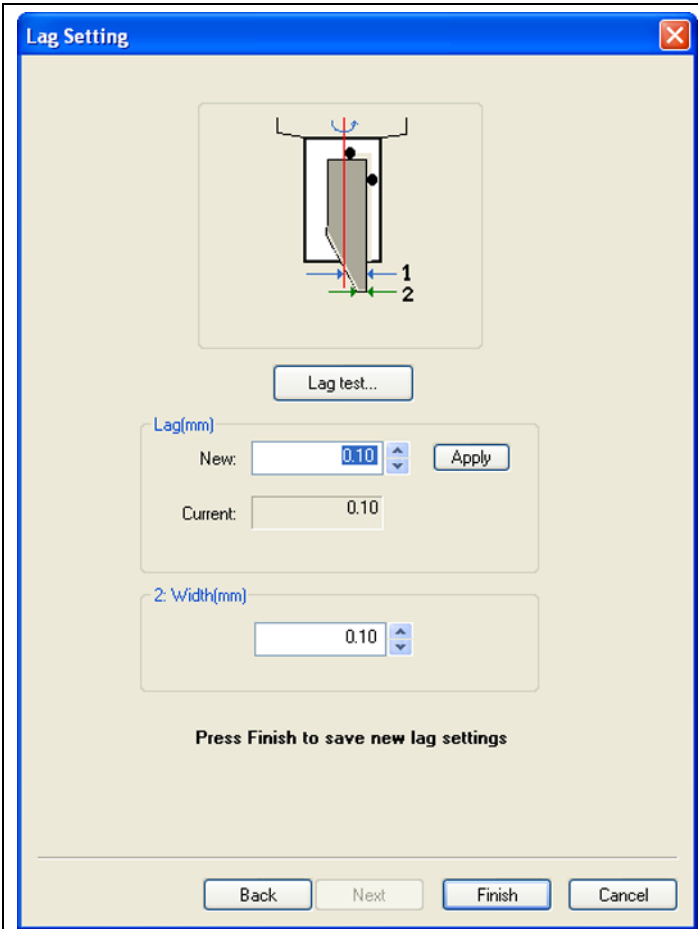
Before any adjustment, complete a **Table Top Reference** function.

### 7.9.2.1 Lag settings (for rotating tools)



1. Select the tool to be adjusted.
2. Press the **Adjust active tool** button to enter the wizard selection dialog.
3. Select **Lag settings**.
4. Follow the instructions given to enter correct values (90).
5. Repeat the procedure for all rotating tools.

**Lag setting dialog**



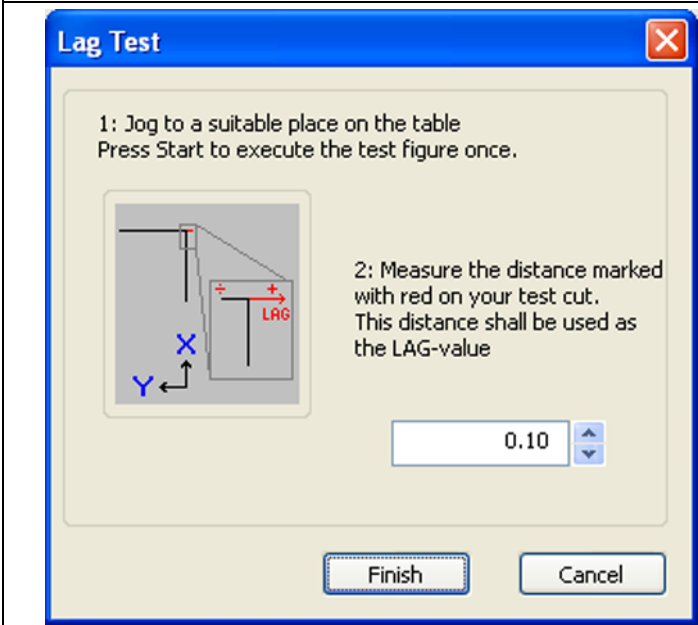
**Lag test** – see next picture

**Lag** – lag value. This is the distance from the rotation center to the back of the knife blade.

Enter the value as measured or as found using the Lag test.

**Width** – knife bottom width

Enter the measured knife bottom width.

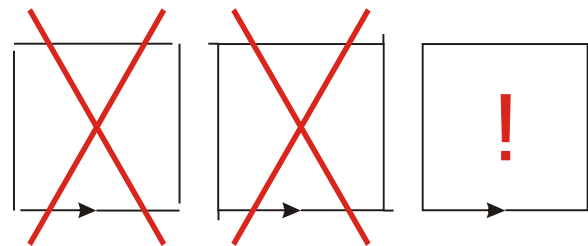


**Lag test**

Run this wizard to obtain correct lag value.

Follow the instructions in the dialog.

Add the measured value to the displayed value.



**Circle lag**

Circle quality is determined by a parameter called **Circle lag**. The parameter value will vary depending upon the actual material. Therefore, the adjustment is located in the Job setup dialog (81).

### 7.9.2.2 Tool height calibration



#### **Knife blades are extremely sharp!**

XP is equipped with an **Automatic tool height calibration** system. Therefore, the system will run without any manual height calibration.

If you, for any reason, would like to add an offset to the measured height, use the **Tool Height Calibration** dialog:

1. Select the tool to be adjusted.
2. Press the **Adjust active tool** button to enter the wizard selection dialog.
3. Select **Tool height calibration**.
4. Follow the instructions given by the wizard, step by step.
5. Repeat the procedure for all tools.

### 7.9.2.3 Rotation adjustment (for rotating tools)



#### **Knife blades are extremely sharp!**

Optimal Angular offset may vary with different material strength and thickness.

The adjustment can be done using the adjustment wizards, or by a manual adjustment procedure:

#### **Wizard adjustment**

1. Select the tool to be adjusted.
2. Press the **Adjust Active tool** button to enter the wizard selection dialog.
3. Select **Rotation adjustment**.
4. Follow the instructions given by the wizard, step by step.
5. Repeat the procedure for all tools in the toolhead.

#### **Manual adjustment**

1. Put an appropriate test material on the table, and switch vacuum on.
2. From the **Tool Configuration dialog**, select one tool.
3. Press the **Adjust Active tool button** to enter the wizard selection dialog.
4. Select **Manual adjustment** of center offset and angle.
5. Enter value for the Angular offset and select **Activate**.
6. Note that the tool will rotate as the new value is activated.
7. Press **Tool override down**, and Jog approximate 10 cm to make a test cut.
8. Press **Tool override down** once more to lift the tool again.
9. Press **Tool override down** once more to lower the tool again.
10. Note how the knife enters into the material.

11. Press **Tool override down** once more to lift the tool again.
12. If knife enters exact into the cut, the angle is correct, select **Finish** to exit.
13. If seen in the cutting direction, the knife enters to the left of the cut, the Angular offset value should be decreased. Repeat from point 5.
14. If seen in the cutting direction, the knife enters to the right of the cut, the Angular offset value should be increased. Repeat from point 5.

#### 7.9.2.4 Center Offset adjustment



#### **Knife blades are extremely sharp!**

The adjustment can be done using the adjustment wizards, or by a manual adjustment procedure:

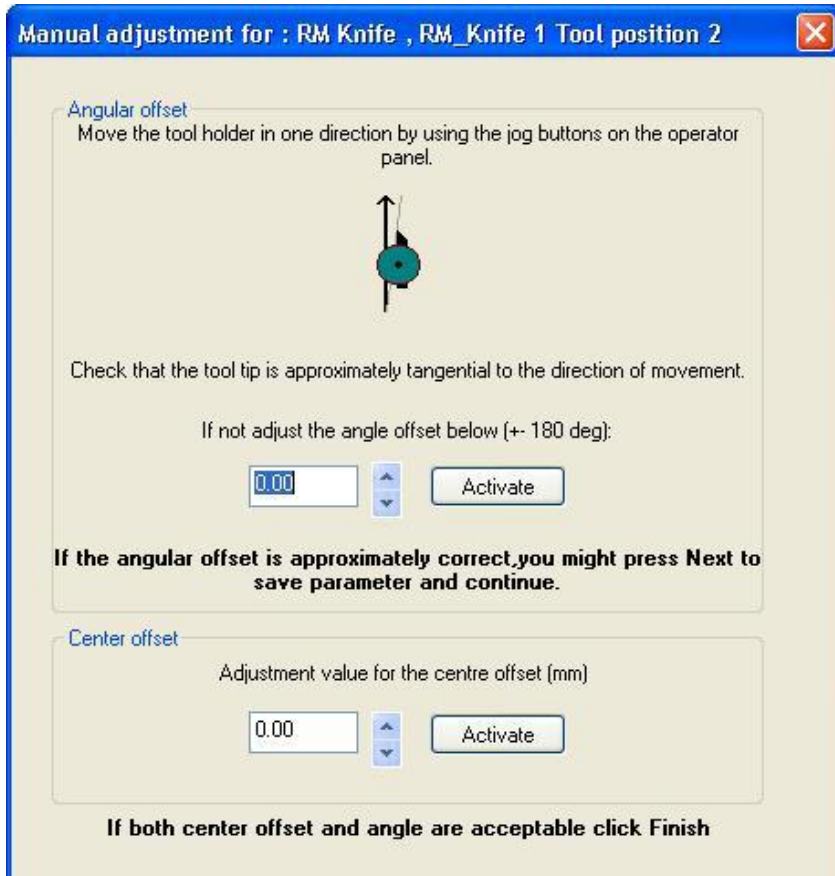
#### **Wizard adjustment**

1. Put an appropriate test material, that means a thin paper on the table (any significant material thickness will create a misleading offset in this wizard), and switch vacuum on.
2. Select the tool to be adjusted.
3. Press the **Adjust Active tool** button to enter the wizard selection dialog.
4. Select **Center Offset Adjustment**.
5. Follow the instructions given by the wizard, step by step.

#### **Manual adjustment**

1. Put an appropriate test material on the table, and switch on the vacuum.
2. From the **Tool Configuration dialog**, select one tool.
3. Press the **Adjust Active tool button** to enter the wizard selection dialog.
4. Select **Manual adjustment** of center offset and angle.
5. Enter value for the **Center offset** and select Activate.
6. Note that the tool will move as the new value is activated.
7. Press **Tool override down**, and Jog approximate 10 cm, to make a test cut.
8. Press **Tool override down** once more to lift the tool again.
9. Press the **Jog button** for the return direction shortly, just to turn the tool.
10. Press **Tool override down** once more to lower the tool again, and Jog the same distance back.
11. Press **Tool override down** once more to lift the tool again.
12. Measure the distance between the two cuts.
13. As a guideline, the distance should be 2 x material thickness.
14. If exact, the Center offset is correct, select Finish to exit.
15. If greater, the Center offset value should be increased. Repeat from point 5.
16. If less, the Center offset value should be decreased. Repeat from point 5.

### 7.9.2.5 Manual adjustment of Center Offset and angle



Sometimes it might be necessary to fine-tune the adjustments obtained using the wizards. Use this dialog to modify the adjustment values for angle and center offset.

1. Select the tool to be adjusted.
2. Press the **Manual adjustment of....** button to enter the adjustment dialog.
3. Key in or use the up/down arrows to specify the wanted offset.
4. Press Activate to enter the value.
5. Test the new settings.

**Note:**

All XP tools should, by default, be close to correct angle when the adjustment value is 0. The **Manual adjustment of....** function is useful if you want to test a tool for correct behavior before program execution.

### 7.9.2.6 Offset adjustment

1. Select the tool to be adjusted.
2. Press the **Adjust Active tool** button to enter the wizard selection dialog.
3. Select **Offset Adjustment**.
4. Follow the instructions given by the wizard, step by step.
5. Repeat the procedure for all tools in the tool head.

## 7.9.3 More...

The More... button opens the More.. dialog, which contains selections to ignore, delete or add to the tool list. The tool list contains tools that you can select for the tool positions.

### 7.9.3.1 Ignore the automatic tool identification

The **Ignore the automatic tool identification** may be used when the automatic tool detection fails, and manually tool selection is necessary. Tick the box to avoid changing the tool setup when zero point sequence is running or tool identification button is selected.

### 7.9.3.2 Delete tools

The selection Delete tools may be selected when a tool is no longer in use. For example when the tool is returned to factory or is malfunctioning. The button Delete the tool remove the tool selected in the Tool dropdown list from the tool list.

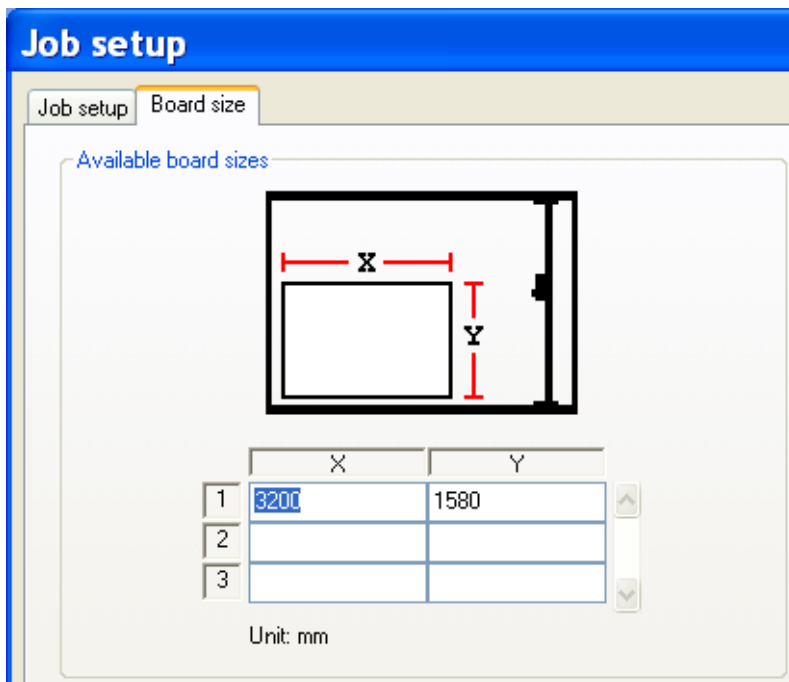
### 7.9.3.3 Add tools

The selection Add tools may be selected to add new tools or tools that fail to be automatically detected. The button Add the tool attaches the tool selected in the Tool dropdown list to the tool list.

## 7.10 Board size

The list of available board sizes is maintained from the Board size dialogue, available from:

- **Main Menu->Options->Board Size setup**
- The **Job View** toolbar button, select the **Board Size** tag
- Pop-up dialog in Job View
- **Ctrl + J**



To edit already defined boards, edit the values directly in the table. To add new boards, go to the last line in the table and add the new material to the empty line. Press the **Apply** button to save the new values.

Select the right board size from the **Job View->Board Size** drop down list. This will ensure a correct size of the displayed board in **Job View**.

## 7.11 Change Flute/grain direction

The flute / grain direction is altered from:

- **Main Menu->Options->Toggle Flute Direction**
- **Job View toolbar-> Toggle Flute Direction**
- Pop-up dialog in Job View
- **Ctrl + F**

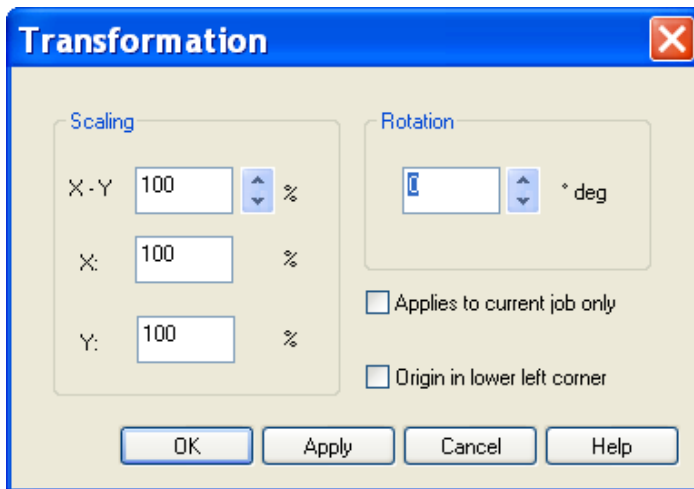


Correct setting of flute / grain direction is important in order to obtain correct cutting/creasing depth.

## 7.12 Transformations

The transformation dialog is available from:

- **Main Menu->Options->Transformation**
- **Ctrl + Alt + T**
- Pop-up dialog in **Job view**



### 7.12.1 Scaling X/Y

Enter a % value in the edit box to scale the design.

A value less than 100 will decrease the size, and a value greater than 100 will increase the size of the design.

Use the Up/down arrows to step the scaling in steps of 10%.

### 7.12.2 Scaling X, Scaling Y

Enter a % value in the edit boxes to perform differential scale of the design.

Note:

Unfortunately, the picture in Job view does not show the design with differential scaling, only common scaling. But the result on the table is according to the input.

### 7.12.3 Rotation

Enter a rotation degree value in the edit box to rotate the design.

See table on next page for simple rotation angle calculation.

Use the Up/down arrows to step the rotation in steps of 90 degrees.

Example:

A value of 90 will rotate the design 90 degrees in counter clock wise direction.

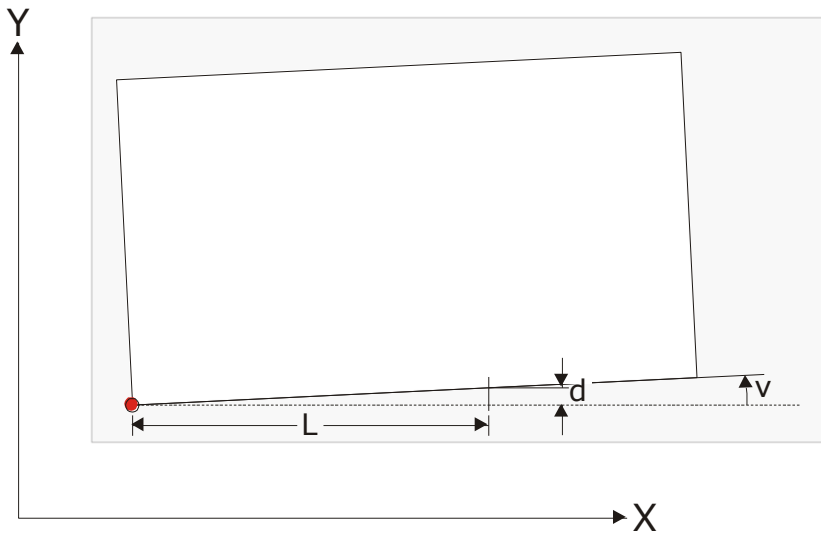
You can enter both + and - values.

### 7.12.4 Current Job Only

Check this box to make these transformations valid for the current selected input file only.



## 7.12.5 Rotation angle calculation



Use the table below to calculate the angle from a simple measurement.

In a distance L from the lower left corner, measure the deviation from the horizontal line (d).

Find the corresponding d – value in the table below and read the angle v in degrees.

L = 1 m / 40 inches.

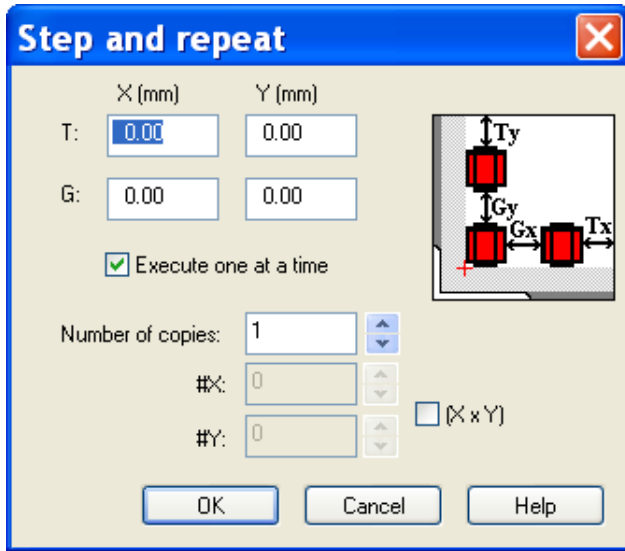
d (mm)	v (deg)		d (mm)	v (deg)		d (in)	v (deg)		d (in)	v (deg)
0,5	0,029		20	1,146		1/64	0,022		21/32	0,940
1	0,057		21	1,203		1/32	0,045		11/16	0,985
1,5	0,086		22	1,260		1/16	0,090		23/32	1,029
2	0,115		23	1,318		3/32	0,134		3/4	1,074
3	0,172		24	1,375		1/8	0,179		25/32	1,119
4	0,229		25	1,432		5/32	0,224		13/16	1,164
5	0,286		26	1,489		3/16	0,269		27/32	1,208
6	0,344		27	1,547		7/32	0,313		7/8	1,253
7	0,401		28	1,604		1/4	0,358		29/32	1,298
8	0,458		29	1,661		9/32	0,403		15/16	1,343
9	0,516		30	1,718		5/16	0,448		31/32	1,387
10	0,573		31	1,776		11/32	0,492		1	1,432
11	0,630		32	1,833		3/8	0,537		1 1/8	1,611
12	0,688		33	1,890		13/32	0,582		1 1/4	1,790
13	0,745		34	1,947		7/16	0,627		1 3/8	1,969
14	0,802		35	2,005		15/32	0,671		1 1/2	2,148
15	0,859		36	2,062		1/2	0,716		1 5/8	2,326
16	0,917		37	2,119		17/32	0,761		1 3/4	2,505
17	0,974		38	2,176		9/16	0,806		1 7/8	2,684
18	1,031		39	2,233		19/32	0,850		2	2,862
19	1,088		40	2,291		5/8	0,895			

## 7.13 Step and Repeat

The Step and Repeat dialog is available from:



- **Job View** tool bar button
- Pop-up dialog in **Job view**



Use this function to create multiple copies of a job.

**T** - **Trim** (distance from sheet edge).  
**G** - **Gap** (distance between each item).

### 7.13.1 Execute one at a time

This function depends upon Sequencing being enabled.

When enabled, one and one design is completed. If disabled, all crease lines in all designs are completed before the knife lines are carried out.

### 7.13.2 (XxY)

The Step and Repeat layout is available in two modes, determined by the **(XxY)** check box:

#### 7.13.2.1 (XxY) disabled

Select a suitable **board size**, and specify the number of copies in the **Number of Copies** edit box. The number of copies will be distributed on the specified board with Y-axis priority, that is, one Y-column of jobs will be filled up before a new one is established.

#### 7.13.2.2 (XxY) enabled

You specify the number of copies in the #X and #Y edit boxes. The total number of copies will be X x Y.

The job will be distributed in X columns and Y rows regardless the size of the board.

The **Execute one at a time** checkbox determines whether each copy should be completed before moving on to the next. Alternatively, all crease operations for all copies are completed before moving on to knife operations, and so on.

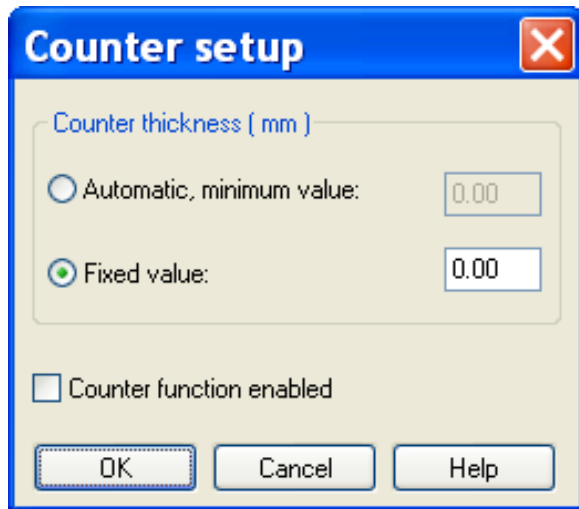
**Note:** If Sequencing is disabled, job execution will be as **Execute one at a time**.

## 7.14 Counter setup dialog

This function is available when **Application** is set to **Folding Carton** from:



- **File View toolbar->Matrix**
- **Options->Counter setup**



The Counter function is used when the job is executed on top of a matrix. The purpose of this function is to avoid cutting through the matrix.

### 7.14.1 Counter thickness, Automatic, minimum value

Used when the thickness of the matrix and the material to be cut is equal. The thickness of the matrix and the material will be measured. The cutting depth is set to the half of the measured value. If the matrix thickness in this manner becomes less than the minimum value specified, the value specified will be used.

The minimum value should be within 0.1 - 8 mm (0.004 - 0.3 ").

### 7.14.2 Counter thickness, fixed value

The specified value is used as the matrix thickness. The fixed value should be within 0.1 - 8 mm (0.004 - 0.3 ")

### 7.14.3 Counter function enabled

Use this check box to enable/disable the counter function. The Matrix button in the **File View toolbar** will change face accordingly:



The **Counter** function is available, but disabled.



The **Counter** function is enabled.

## 7.15 Vacuum control

**Note:** Vacuum quick release and vacuum section selection will not work before the Vacuum push-button on the Operator panel has been operated once.

### 7.15.1 Vacuum control modes

Two control modes are available, selectable from the **Option->Table setup** - dialog:

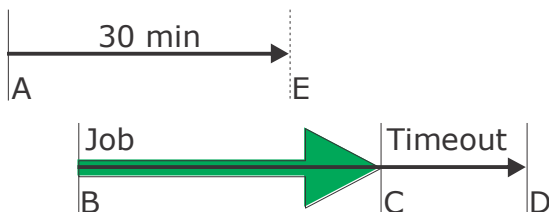
- Disable 'I Cut controlled' function to select XP vacuum control.
- Enable 'I Cut controlled' function to select i-cut vacuum control.

### 7.15.2 XP vacuum on/off control





From Option->Table dialog, two modes of vacuum control is available:

- Manual (the **Manual control** function is enabled):  
Vacuum on / off is controlled from the Vacuum push-button on the Operator panel.
- Automatic (the **Manual control** function is disabled).  
The function is illustrated as follows:



A	Vacuum is switched on using the <i>Vacuum on</i> push-button. If no job is started within 30 min. after the vacuum is switched on, the vacuum pump is switched off automatically (E).
B	A job is started. The vacuum pump will be started automatically.
C	The job is finished.
D	The vacuum pump is switched off a time 'Timeout' after the job is finished. The time is entered in the Vacuum control dialog shown above.

### 7.15.2.1 Vacuum quick release mode (option)

	<p>Enable the vacuum quick release mode by pressing the <i>Vacuum release</i> push-button. The function is enabled when the button lamp is lit.</p>
	<p>If you are in the Vacuum quick release mode and the vacuum is switched off using the <i>Vacuum on</i> push-button, a valve will open to allow a quick release of vacuum inside the cutting table. When vacuum is switched on again, the valve will close.</p>

### 7.15.3 i-cut vacuum control

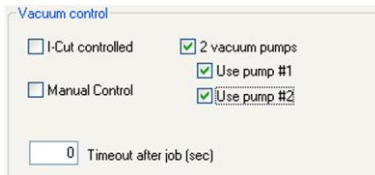
Pressing the *Vacuum on* pushbutton will start the vacuum pump. Pressing the button a second time will stop the pump.

Pressing the Vacuum release pushbutton on the Operator panel will open the vacuum valve to allow quick release of the vacuum inside the cutting table.

Pressing the button a second time will close the valve and provide vacuum on the table as long as the pump is running.

Note: When running i-cut, the 'i-cut vacuum control' should be enabled.

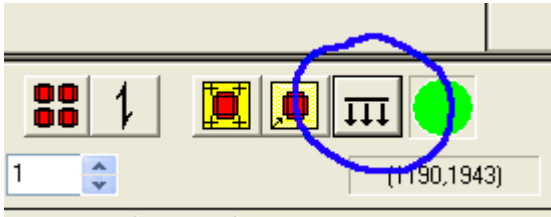
### 7.15.4 XP using two vacuum pumps



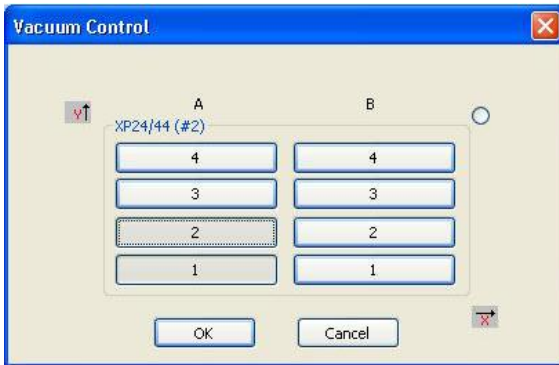
If your XP is equipped with two vacuum pumps (option), a pump enable / disable setting is available in the **Table setup** dialog:

- Enable **2 vacuum pumps**
- Select if pump 1 or pump 2 or both should start when *Vacuum on* is pressed.
- If both are selected, start of the second pump will be delayed.

### 7.15.5 Vacuum section selection

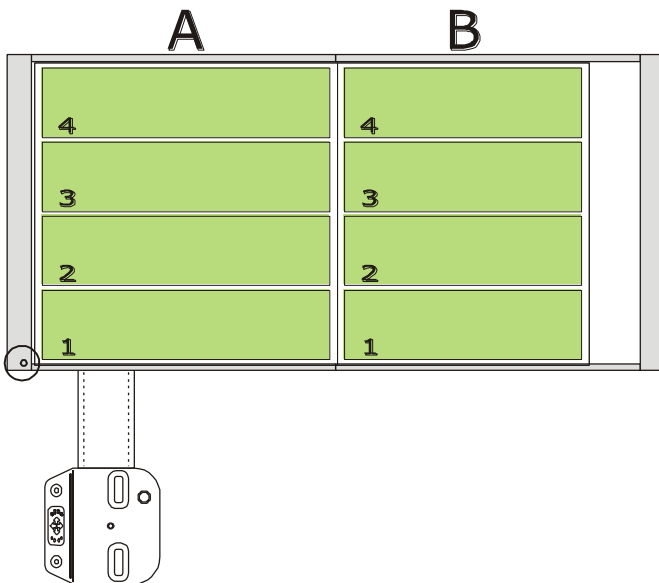


Press Vacuum Section Selection button to enter the Vacuum Section Selection dialog:



From this dialog, you prepare a suitable vacuum - area on the table by selecting vacuum sections. The numbers correspond to the Cutting Table as shown in the picture below.

Press a button once to enable a section, push the button a second time to disable.



**Note:** The vacuum section configuration depends upon the actual delivery. Only one max-configuration is shown here.



## 8. Tooling system, introduction

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**Laser radiation. Do not stare into beam!**  
**The tool head is equipped with a class II laser pointer.**  
**Emitted laser power < 1 mW.**



**Knife blades are extremely sharp. Therefore, take care**  
**when handling knife tools.**

### 8.1 Tool handling and care

All tools are precision instruments and should be treated as such to ensure proper operation. Take special care when:

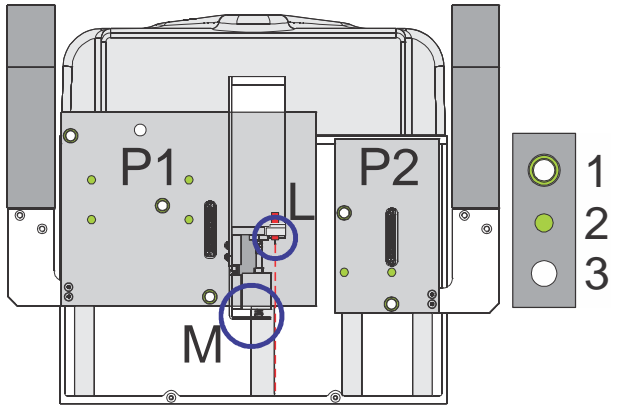
- Tools are inserted or removed from their stations. No excessive force should be applied.
- Tools should not come in contact with hard surfaces while removed from their stations either temporarily or for storage.
- The tools and their stations should be kept clean with a soft brush.



## 8.2 Tool configuration

Kongsberg XP offers two different tool positions, P1 and P2, where different interchangeable tools can be mounted.

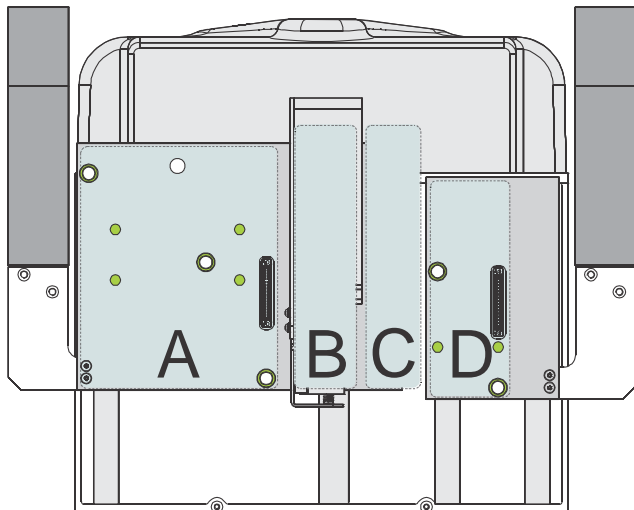
In addition, there are separate fixtures for laser pointer, measuring foot, camera, drill and pen tools:



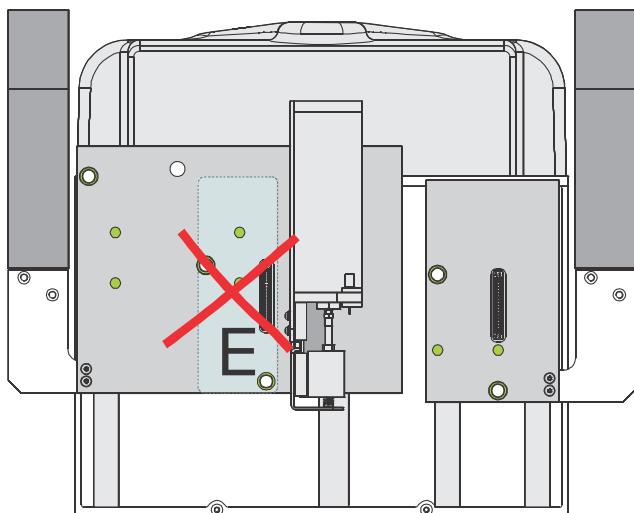
L - Laser pointer  
M - Measuring foot

Symbols used:

- 1 - Tool alignment
- 2 - Tool fixture
- 3 - Tool fixture



- A - P1 tool position, see table below
- B - camera position
- C - drill / pen / ink tool holder position
- D - P2 tool position, see table below



There is a space reserved for future tools in the E - position.  
Technically, it is possible to put P2 - tools here, but none of the tools available now will work in this position.

The following tool configuration is available:

<b>Tool type</b>	<b>Available tool inserts</b>	<b>P1</b>	<b>P2</b>
HDU - Heavy-Duty Unit	HD Crease V-notch knife HD knife tool	Yes	
Foam Cutting Unit		Yes	
HD knife tool		Yes	
HSMU – High Speed Milling Unit		Yes	
HPMU – High Power Milling Unit		Yes	
VibraCut knife tool			Yes
HF VibraCut knife tool			Yes
Hi-Force knife tool			Yes
RM knife tool			Yes
RotaCut knife tool			Yes
PressCut tool			Yes
Drill / pen holder	Drill tool Ball point pen Ink tool (Fiber tip tool)		

## 8.3 How to replace a tool



When mounting a tool head onto the Z1 or Z2 tool positions, ensure that the alignment pins and the electrical connector on the tool head fits those on the bracket.

Use an Allen key, 6 mm, to fix the tool head.

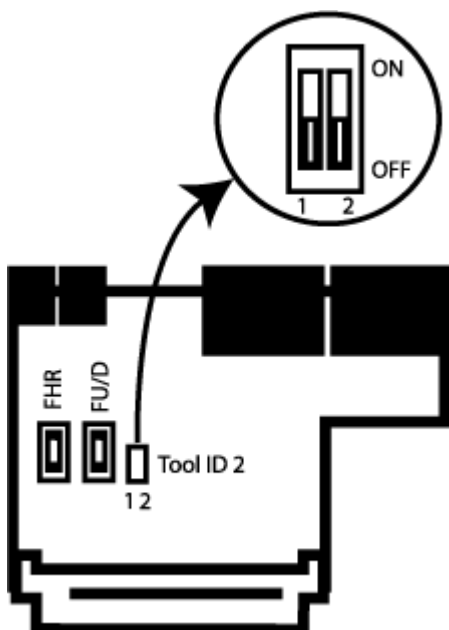
Ensure both screws are properly fixed.

## 8.4 Two or more tools of the same type

Each tool is identified to the system by type. In addition, it is possible to identify up to four different tools of the same type.

One example: If you have two different Static knife tools, you can specify one to be number 1 and one to be number 2. In this way, all adjustment parameters will be stored and recalled automatically as the tool is mounted onto the machine.

### How to define individual tool numbers



Inside each tool, there is a Tool Board.

By means of dip-switches, you can specify 4 unique tool numbers as illustrated at left.

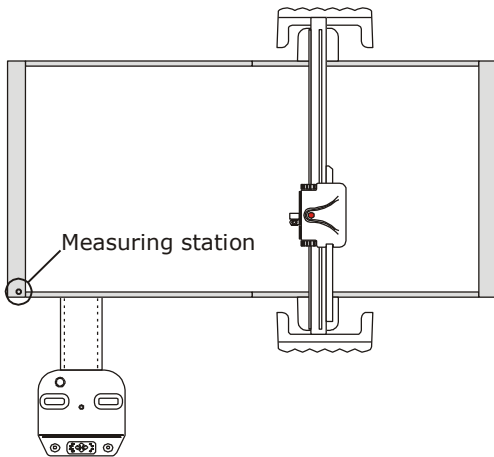
The different tool numbers are defined as follows:

	Tool board switch setting
Tool 1	1 & 2 off
Tool 2	1 on & 2 off
Tool 3	1 off & 2 on
Tool 4	1 & 2 on

Note: Depending upon the tool type, 2 or 4 individual tools can be specified.

## 8.5 Measuring station

XP is equipped with a Measuring station:



The Measuring station eliminates the manual adjustment of tool height.

The Measuring station covers the following functions:

- Calibrates the Measuring foot.
- Automatically measures the height of the tool tip.

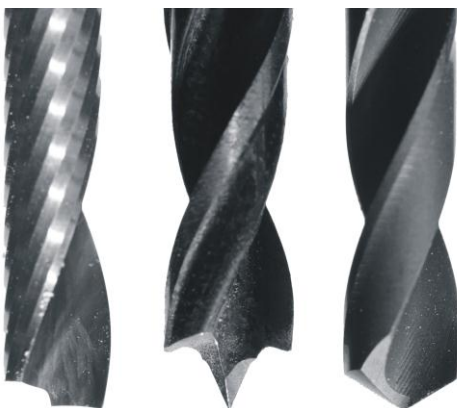
If you, for any reason, would like to add an adjustment value to the measured value, a height adjustment dialog is available from the **Tool Configuration** menu.

The measuring sequence is carried out as follows:

- During the first Table zero sequence after power on.
- After any tool change and the tool is not calibrated.
- After the safety system has been broken for 30 sec. or more.
- After the servo system has been off for 30 sec. or more.

It is possible to start a tool measuring sequence manually, see **Forced tool height measure** (38).

### 8.5.1 Tool depth and measuring station



Be aware how the Measuring station is working; it is the tool tip that is measured. Depending upon the actual tool, it might be necessary to add depth in order to achieve cut or drill hole through the material.

Additional depth is entered in two ways:

1. The general depth of a tool is entered in the **Tool height wizard** available from the Tool Configuration menu (88).
2. The depth for a certain material or job is entered in the **Job setup** dialog (78).

## 8.6 HDU - Heavy-Duty Unit



**Knife blades are extremely sharp!**

### 8.6.1 Description



HDU with V-notch

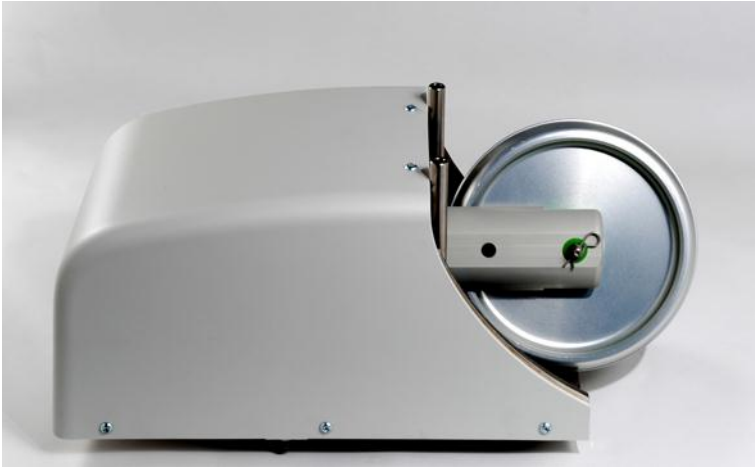


HDU with  $\varnothing$ 150 mm crease wheel

The Heavy-Duty Unit is a single position tool head specially prepared for V-notch and HD knife tools. In addition, the tool head can be equipped with a  $\varnothing$ 150 mm crease wheel. For detailed description, see separate chapters for V-notch (112), HD knife tools (116) and  $\varnothing$ 150 mm crease wheels (110).

## 8.7 ø150mm Crease Wheel

### 8.7.1 Description



A ø150mm Crease wheel mounted on an Heavy-Duty Unit.

This crease wheel has the equivalent of 50kg [110lb.] of down-pressure. The additional pressure, combined with the large frontal area of the big wheel enables excellent crease quality in heavy-duty corrugated board and even permits creasing board with high recycle content without breaking the liner.

A broad range of wheels with different shapes is available.

### 8.7.2 How to mount / dismount the crease wheel



Insert / remove the cotter pin.



Insert / remove the latch pin.

### 8.7.3 Tool adjustment

For this tool, complete the following adjustments:

Lag setting	The lag value depends upon the blade adapter. Nominal value is 0 mm.
Tool height	Measured automatically, possible to add an offset value.
Tool rotation	Adjust tool angle tangential to moving direction.
Center Offset	Adjust tool sideways until centered.
Tool Offset	Adjust offset relative to laser pointer.

For more information about how to run the adjustment wizards, see the Tool Configuration chapter (88).

## 8.8 V-Notch Knife tool



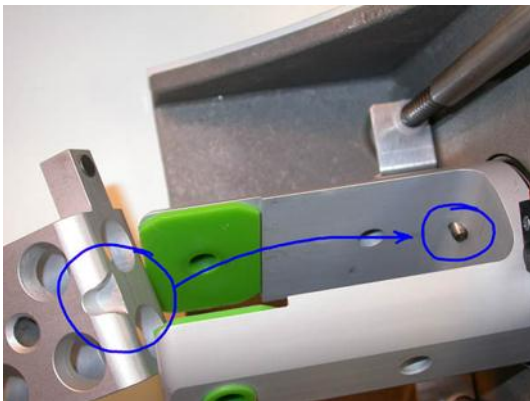
**Knife blades are extremely sharp!**

### 8.8.1 Description

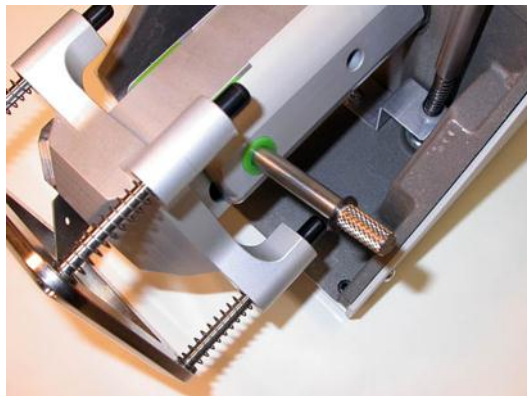


The V-notch knife tool mounted on a Heavy-Duty Unit.

### 8.8.2 How to insert / remove the V-notch knife tool



1 Turn the V-notch knife tool correctly to fit the alignment pin.



2 Insert the first latch pin.



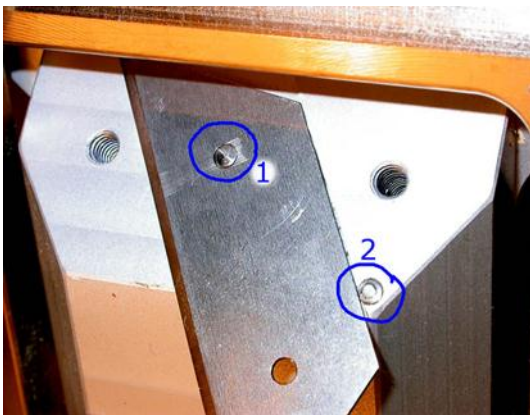


3 Insert the cotter pin.

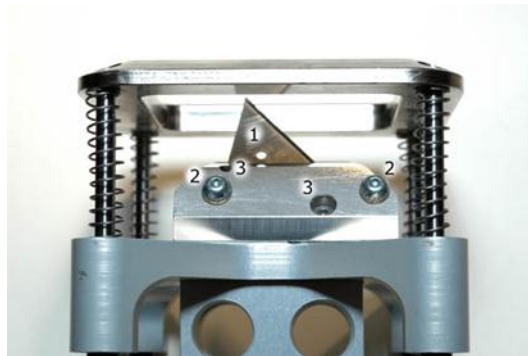


4 Insert the second latch pin and cotter pin.

### 8.8.3 How to replace a knife blade



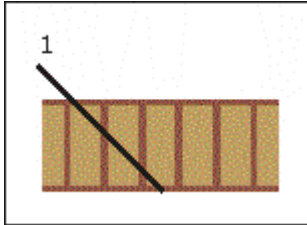
This picture shows how the knife blade is aligned using two guide pins beneath the blade clamping.



1. Loosen the two screws (2) of the knife blade clamping.
2. Carefully remove the blade (1).
3. Insert a new knife and make sure that it is aligned with the alignment pins (3) in the tool head.
4. Mount the new tool. (Note the position of the guide pin).
5. Select **Option, Tool Configuration (CTRL+T), Adjust active tool, Tool height calibration** wizard, to assure correct height of the new knife.

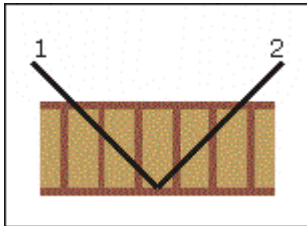
## 8.8.4 V-notch knife, modes of operation

Note: V-notch knife adapters for different angles are available. The programming and operation will be similar to the 45 degree version shown here.



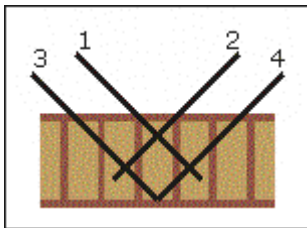
### Single Cut

Set from Job setup, Extended.



### Double Cut (1)

This is the default mode if neither Single Cut nor 4-Cut are enabled.



### 4-Cut (1)

Set from Job setup, More V-notch.

(1) – it is a pre-requisite for this function to work that the **Sequencing** function is enabled, set from System Option dialog (74).

## 8.8.5 About tool adjustment

- For the V-notch knife, we recommend the manual procedures for tool rotation and centre offset adjustment.
- When adjusting tool rotation and centre offset, use a thin folded carton material.
- Remember that you should look at the bottom side of the material for correct alignment.
- The adjustment depends upon the actual material due to weight, structure and thickness. For optimal result, a fine tuning of the adjustments in the actual material should be carried out.

For this tool, complete the following adjustments:

Lag setting	The knife lag depends upon the blade adapter. Nominal value is 0-7 mm.
Tool height	Measured automatically, possible to add an offset value.
Tool rotation	Adjust tool angle tangential to moving direction.
Center Offset	Adjust tool sideways until centered.
Tool Offset	Adjust offset relative to laser pointer.

For more information about how to run the adjustment wizards, see the Tool Configuration chapter (88).

### 8.8.6 How to set the depth of the V-notch knife

1. The default depth of the V-notch knife is cut through the entire material.
2. Define the depth of the V-notch cut in the **Option, Job Setup** (CTRL+J)
3. Normally the cut should extend down to just above the bottom liner closest.

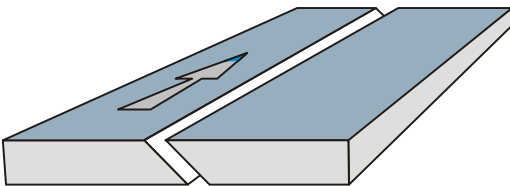
### 8.8.7 How to set the width of the V-notch cut

Enter **Job Setup, More V-Notch** to make adjustment to the default width.

### 8.8.8 How to run the 4-cut function

Enter **Job Setup, More V-Notch** to make adjustment to the default width.

### 8.8.9 V-notch cut direction



The blade angle and the cut direction must be taken into account when cut jobs are prepared.

The arrow indicates the cut direction.

## 8.9 HD Knife Tool



**Knife blades are extremely sharp!**

### 8.9.1 Description

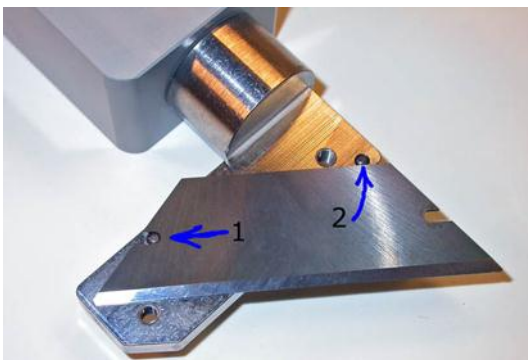


The HD knife tool mounted on a HDU.

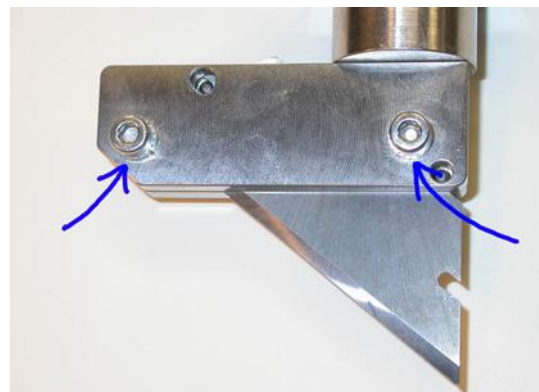
The HD knife tool is used for rigid board such as ReBoard and triple wall material. The tool is limited to straight lines longer than 50mm (2").

The tool is prepared for special, trapezoid shaped knife blades.

### 8.9.2 How to replace a knife blade

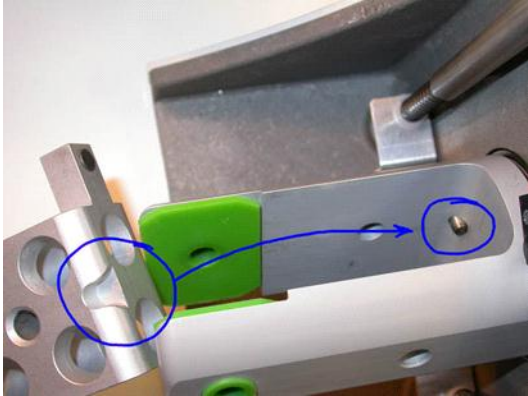


This picture shows how the knife blade is aligned against two alignment pins.

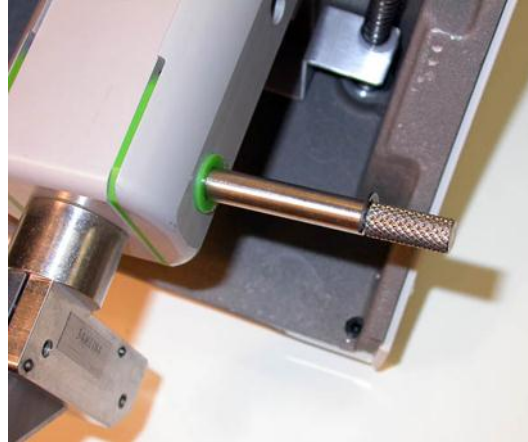


Use these two screws to fix / release the knife blade.

### 8.9.3 How to insert / remove the HD knife tool



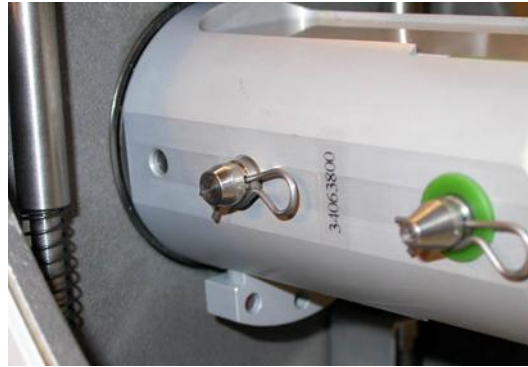
1 Turn the HD knife tool correctly to fit the alignment pin.



2 Insert the first latch pin.



3 Insert the cotter pin.



4 Insert the second latch pin and cotter pin.

For this tool, complete the following adjustments:

Lag setting	The knife lag depends upon the blade adapter. Nominal value is 10 mm.
Tool height	Measured automatically, possible to add an offset value.
Tool rotation	Adjust tool angle tangential to moving direction.
Center Offset	Adjust tool sideways until centered.
Tool Offset	Adjust offset relative to laser pointer.

For more information about how to run the adjustment wizards, see the Tool Configuration chapter (88).

## 8.10 Foam Knife Tool



**Knife blades are extremely sharp!**

**Please note: Be careful where to place the tool head when not in use.**

If the tool head is left down on a table surface, the knife might be exposed, as the material hold down wheels moves up.



### 8.10.1 Tool head mounting

The Foam knife tool head is mounted onto the Z1 – carriage in the same way as the other Z1 tool heads.

For this tool, complete the following adjustments:

Lag setting	The knife lag depends upon the blade adapter. Nominal value is 3 (5) mm.
Tool height	Measured automatically, possible to add an offset value.
Tool rotation	Adjust tool angle tangential to moving direction.
Center Offset	Adjust tool sideways until centered.
Tool Offset	Adjust offset relative to laser pointer.

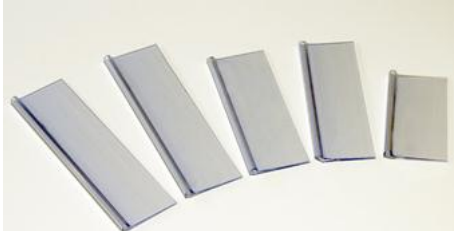
For more information about how to run the adjustment wizards, see the Tool Configuration chapter (88).

### 8.10.2 How to replace a knife blade



Loosen the fixing screw, replace the knife blade and fix it again.

No additional adjustments are necessary, as the tool height is measured automatically.

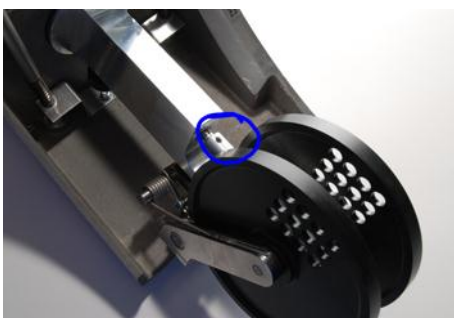


A set of knife protection handles are available. Use them for safe knife handling.



When not in use, protect the knife blade using the handle.

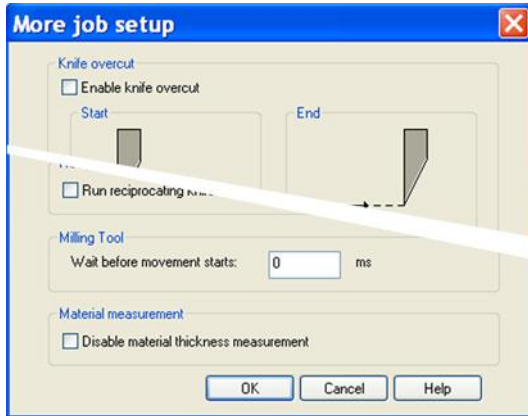
### 8.10.3 How to replace the knife adapter



Loosen the fixing screw, replace the adapter and fix it again.

No additional adjustments are necessary, as the tool height is measured automatically.

## 8.10.4 Disable material thickness measurement



Set from **Job setup -> More**

For the Foam Knife tool, the **Disable material thickness measurement** function is available. Use this function if

- Your foam material is too soft for the measuring system.
- The surface of your material is un-even.

When the **Disable material thickness measurement** function is enabled, the following rules applies:

- In Job setup, the **T** – function must be used for depth settings.
- In Job setup, the **Depths unit** must be set to mm/inches (Percent not allowed).
- During tool up movements, the knife is lifted to its top position.



## 8.10.5 Cutting quality

To obtain best quality when cutting details, as small circles, we recommend:

- Reduce the cutting speed (from Job setup).
- Cut in two or three passes, each pass going a step deeper (Multi pass (33)).

## 8.11 HSMU/HPMU



**Router bits are extremely sharp!**

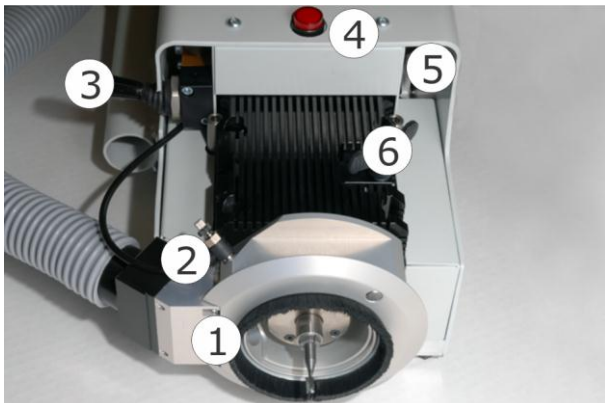


**Use Eye protection to prevent accidents caused by breaking milling bit or small pieces of processed material.**

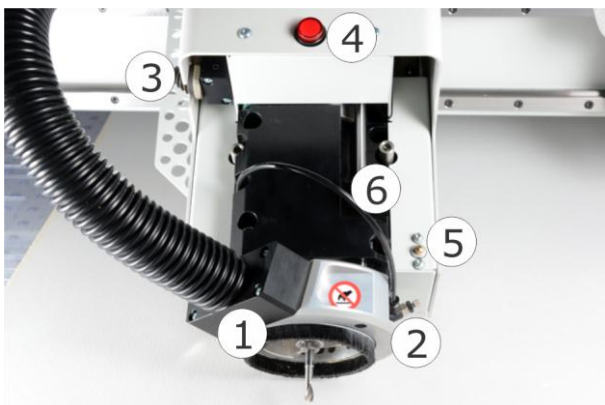
### 8.11.1 Introduction

Two different milling tool heads are available; HSMU and HPMU. Both models are covered by this chapter.

### 8.11.2 Tool head description



HSMU



HPMU

1. Suction house with brush for chip removal. During normal operation, the house is in down position. When changing bit, the house should be locked in its upper position.
2. Air blow adjustment. Air blow is used for router bit cooling and to ease chip removal. Adjust for proper operation. There is also an air blow inside the spindle, but no user adjustment is necessary.
3. Chuck open/close. The shown position is closed.

Note: To protect the chuck from damage and the spindle from contamination, do not close the chuck empty over time. Never start the spindle without a bit / dummy bit in the chuck.

4. Warning lamp for spindle running.
5. Air clean button to help remove contamination.
6. Locking screw for the suction house. Note: When in lower position, the house should be free to move up / down. Therefore, the house should never be locked when in lower position (HSMU).



1. Router bit. Shaft diameter is 6 mm (HSMU) and 6/8 mm (HPMU).
2. Chuck. The HSMU/HPMU is equipped with one 6 mm chuck on delivery.
3. Spindle

### 8.11.3 Tool head mounting



The HSMU/HPMU tool head is mounted onto the Z1 - carriage in the same way as the other Z1 tool heads.

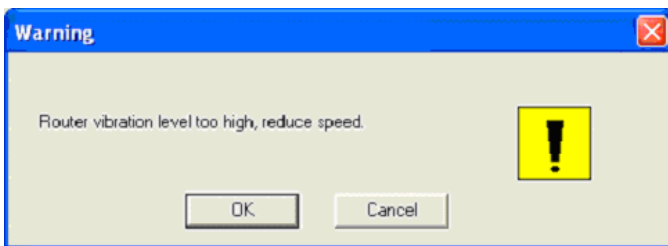
### 8.11.4 Tool head park position



Use the HSMU/HPMU park position for safe tool head storage.

Note:  
For safety reasons, always use a dummy bit when parking.

### 8.11.5 Vibration monitoring (HSMU)



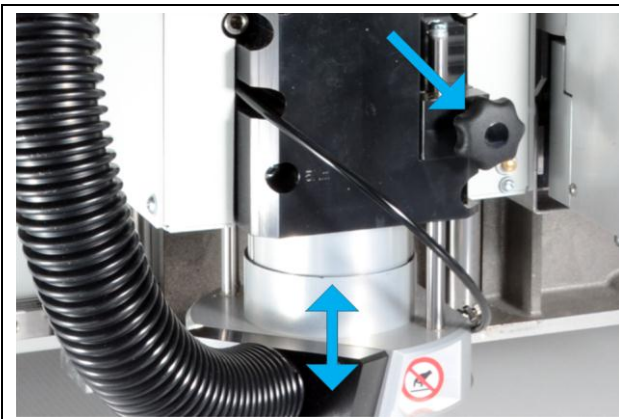
To protect the spindle, a vibration monitoring system is implemented. A warning will tell the user to reduce RPM. If very high level occurs, the machine will stop. See "HSMU precautions" (127).

## 8.11.6 HPMU specific issues

### 8.11.6.1 Chiller / HPMU start up time

Depending upon the environmental temperature, the chiller needs some start-up time after power on before it is ready to operate. Typical delay is 2 – 3 minutes.

### 8.11.6.2 Suction house, adjustable height



On HPMU, you can lock the suction house in any height; still it is allowed to move upwards.

This function is useful in order to

- Adapt to different material thicknesses.
- Allow false air input in order to reduce suction force.

### 8.11.6.3 RPM limitation

Running 8 mm bits at a high RPM rate can generate vibrations and excessive wear. Using bits with extended lengths at high RPM can also be dangerous. Therefore, using long bits is subject to an automatic RPM reduction. If you are using short 8 mm bit, these must be limited manually to 40.000 RPM. In general, 6 mm bits are preferable in materials up to 20–25 mm thickness.

### 8.11.6.4 Chiller error codes

If any chiller failure occurs, look at the chiller display to see the real reason for the problem:



Code	Description
E0	Sensor failure: cable defective, connection failure, sensor defective.
IA	Water level of water flow too low.
HI	Temperature of cooling medium too high
LO	Temperature of cooling medium too low

## 8.11.7 HSMU/HPMU - safety issues

### 8.11.7.1 Suction house

Always, when executing a job, let the suction house float on top of the material. In addition to chip removal, the house reduces the risk of being hit by small work pieces or by a breaking router bit.

### 8.11.7.2 Eye protection

Use eye protection when working with HSMU/HPMU.

### 8.11.7.3 Hearing protectors

The noise generated by HSMU/HPMU highly depends upon the material processed, and running parameters. Use hearing protectors when necessary.

### 8.11.7.4 Spindle speed

Never use speeds higher than recommended by the bit supplier. Special care should be taken when using bits with cutting diameter larger than shank diameter.

### 8.11.7.5 Router bits

Router bits are very sharp - handle with care.

**Never touch a rotating bit. Ensure the warning lamp is dark, and also observe that the bit is not rotating before approaching the bit.**

Always insert a dummy bit before dismounting a tool head from the machine.

### 8.11.7.6 High temperatures

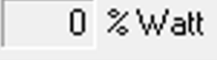
Be aware that the HSMU may become hot during operation.

### 8.11.7.7 Clean surface

Keep the table and material surface clean, free from obstacles.

## 8.11.8 HSMU/HPMU precautions

### 8.11.8.1 Spindle motor power consumption supervision

	<p>The router is prepared for continuous operation between 0 – 100 % Watt. Too high spindle power consumption indicates critical conditions for the motor and immediate actions should be taken:</p> <ul style="list-style-type: none"> <li>• Use correct and sharp milling bit.</li> <li>• Use correct RPM for the actual bit and material.</li> <li>• Reduce the X/Y speed.</li> </ul> <p>If the motor is running above a critical limit, the execution will stop and a message is displayed.</p>
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### 8.11.8.2 Use of non-balanced bits



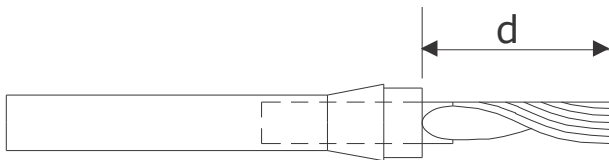
One-flute bits are by nature non-balanced, and **may destroy the spindle** if used wrong.

Therefore, one-flute bits with cutting diameters above 4 mm, 5/32 inch must be run with a **maximum RPM of**

**40.000 (HSMU)**

**60.000 (HPMU)**

### 8.11.8.3 Keep distance d small



For best performance and minimum wear, do not let the bit stick out more than necessary. Use bits with short cutting lengths for thin materials.

#### 8.11.8.4 Air valve operation



Never operate the air valve while the spindle is running.

**This will destroy the spindle.**

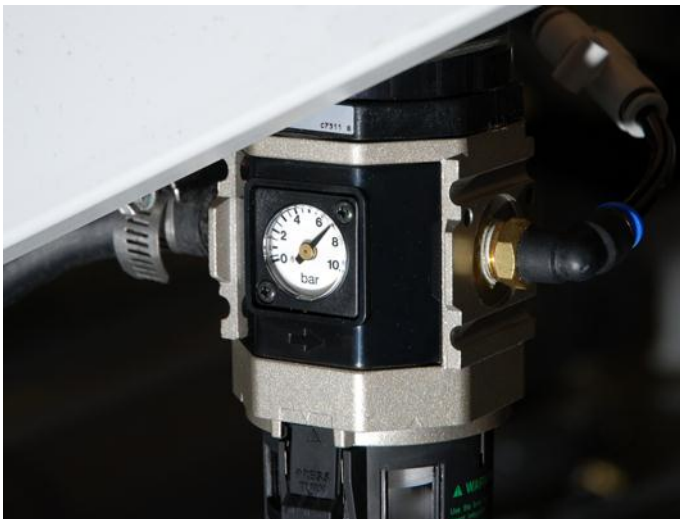
#### 8.11.8.5 Air pressure

Never run IBAG spindle with air pressure disconnected

**This may destroy the spindle.**

Keep this in mind also for test purposes.

#### 8.11.8.6 Use clean air

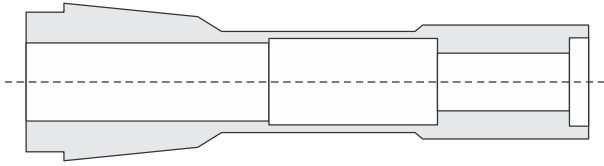


The spindle is sensitive for the pressurized air quality.

Regularly check the air pressure reduction valve according to the maintenance section.



### 8.11.8.7 Maintain bit clamping

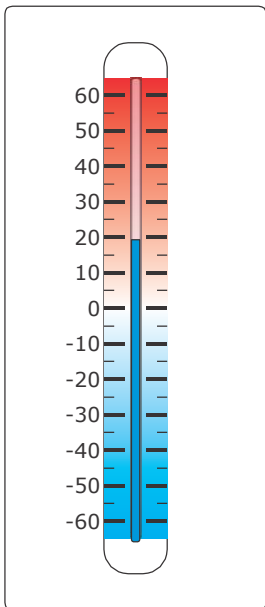


Un-proper clamping may cause the bit to slip in the chuck and **damage to the table top.**

1. Keep the bit shafts clean. Avoid greasy fingers. Clean the bit shafts with acetone if necessary, but use only dry cotton tips on the chuck.
2. Maintain air supply pressure of 7 bar.

Follow procedures for Chuck change and clean strictly.

### 8.11.8.8 Operation at low and high temperatures



Never run a spindle when ambient temperature is below 10 °C, 50 °F.

Continuous operation at temperatures above 30 °C, 86 °F is not recommended (HSMU)!

HPMU spindle is water cooled, thus, the ambient temperature is not that critical for the spindle itself.

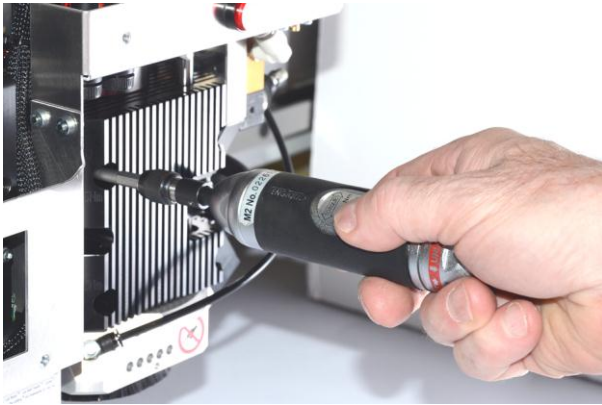
### 8.11.8.9 Long term storage



More than 4 weeks storage of a spindle or a HSMU/HPMU requires:

- Turn the spindle by hand about 20 turn every 4 weeks.
- Spindle must be stored horizontally

#### 8.11.8.10 Consider having a replacement spindle



If the HSMU/HPMU is used in regular production, it is recommended to have a replacement spindle.

The service interval will depend on the type of operation, and is difficult to predict. Indication of worn bearings may be increasing noise, increasing vibrations or decreasing surface finish.

Note:

When replacing a spindle, torque the motor clamp to 5 Nm, 44 lbf-in using a torque wrench. **This is a low torque for that screw size.**

Also check by hand that the spindle rotates smooth without any resistance.

#### 8.11.8.11 Empty vacuum cleaner in time



Do not leave the machine running if the vacuum cleaner can go full.

**This might cause damage.**

## 8.11.9 HSMU/HPMU routing advice

### 8.11.9.1 Milling bits



Use bits with short cutting lengths for thin materials.



For best performance and minimum wear, do not let the bit stick out more than necessary.



Never use higher RPM than recommended by the bit supplier. Special care should be taken when using bits with cutting diameter larger than shank diameter.



Bits with small cutting diameters (3-4 mm; 0.12-0.16 in) are more balanced than bits with larger cutting diameters, and can be run with higher RPM, normally 60.000.

Use large diameter bits (5-6 mm; 0.20-0,24 in) when needed to get rid of the chips in thick materials.

**Max RPM (HSMU) 40.000**

**Max RPM (HPMU) 60.000**



Edges are brittle. Never let bits touch each other, or other hard surface. Always store in proper container.

#### 8.11.9.2 Acrylic or Multi Purpose bits



Acrylic bits (A) are polished, extra sharp for Acrylic, wood etc.

Multi Purpose bits (MP) have a higher wear resistance, and are suitable for aluface, plastics, MDF, plywood, wood etc.

MP bits can be identified by a small tooth at the tip.

### 8.11.9.3 Feed rates



One-flute bits do have a good chip flow, and allow for large feed rates. 0.1-0.2 mm/tooth (0.004-0.008 in/tooth) can be a starting point for optimization in most materials: This gives a feed rate of of 4-8 m/min (2.6-5.2 ips) at 40.000 RPM, and 6-12 m/min (3.9-7.9 ips) at 60.000 RPM.

Light materials like PVC foam can be run much faster.

The surface finish or the power consumption will normally determine the final feed rate for an application.

A large drop in RPM, or a high %Watt value in the display, indicate too high feed rate. Large diameter bits require more power than small diameter bits. Worn bits increase the power consumption.

### 8.11.9.4 Number of passes in thick materials

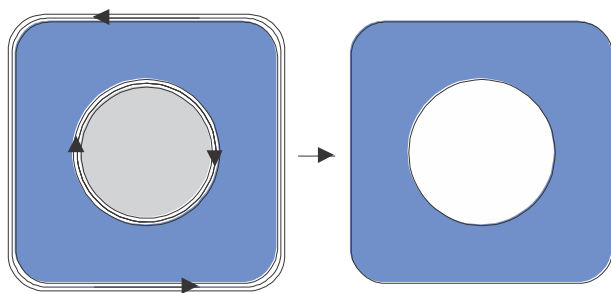
The number of passes depends on material type, thickness and bit diameter. Use a pass depth that makes the groove free of chips, normally that is a depth equal to the cutting diameter.

### 8.11.9.5 Material hold down

Material hold down may be a limiting factor. Especially parts cut loose can be a problem if they are small. This can be done to improve the situation:

- Use bits with smaller cutting diameter
- Cover unused table area
- Use wash-out functions instead of cutting loose small waste parts.

### 8.11.9.6 Milling direction



The milling direction is important in order to obtain a good result.

Correct directions, especially in foam materials, are illustrated in the figure at left.

The blue part is our product where we want the edges to be smooth and nice.

**Note**

Altering the milling direction is to be carried out in the CAD program.

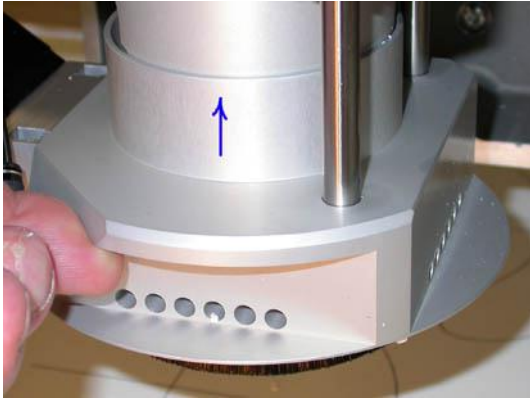
### 8.11.9.7 PressCut knife tool in combination with HSMU/HPMU

It might be necessary to reduce the acceleration in order to achieve an optimal cutting quality when combining a heavy tool head with high quality cutting tools.

## 8.11.10 HSMU/HPMU - bits and bit change

### 8.11.10.1 How to insert / replace a router bit

Ensure the spindle is not running - lamp is dark.  
Mind the sharp bit, and move the suction house up.



Lock the house in its up position.



Observe that the bit is not rotating.  
Use a cloth to hold the bit.  
Move the lever down to open the chuck.  
Put the bit in a proper storage container.  
Insert a new bit.  
Close the chuck



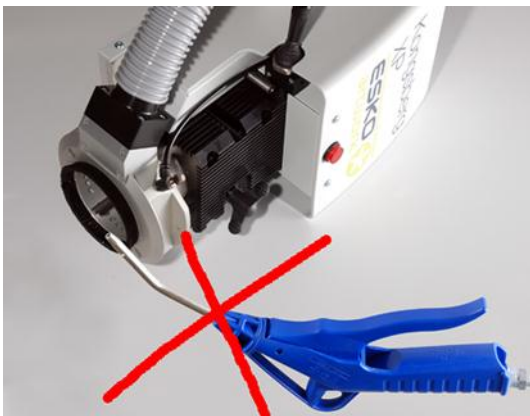


Only the round part of the shaft should be inside the chuck.

See the 'HSMU/HPMU - bit length and position' – chapter for more information.



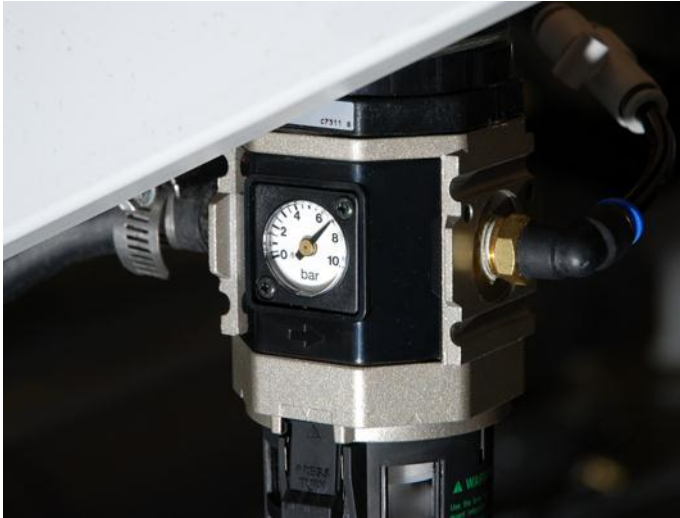
Release the lock to allow the suction house moving down to its down position.



Regularly, perform a chuck holder and chuck cleaning, following the dedicated procedure.

Note:  
Never apply compressed air for cleaning.

### 8.11.10.2 If a bit is stuck



If a bit is stuck in the chuck, the probable cause is low air pressure.

To release a router bit from the chuck, a pressure of approximately 7 bar is required.

If necessary, check the table regulator setting, or the pressurized air source.

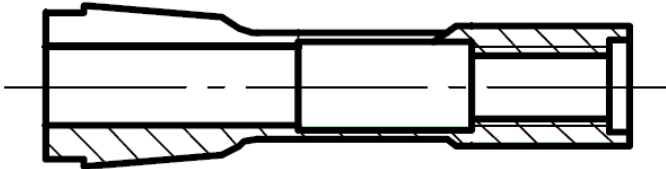
If the bit is still stuck, see the *Chuck change and clean* section how to unscrew the chuck.



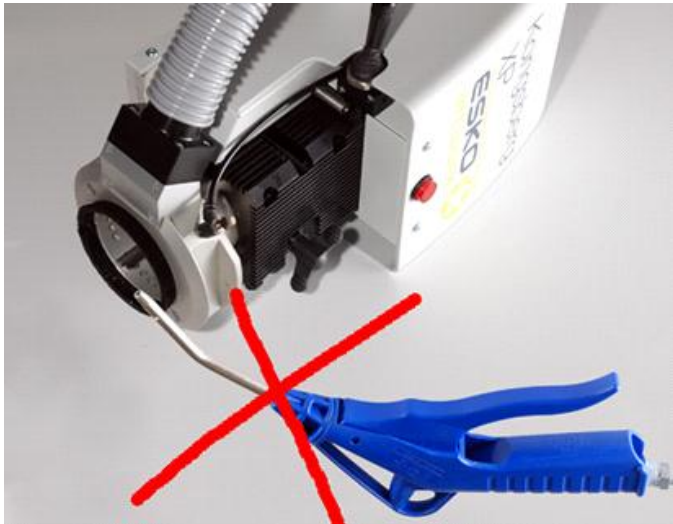
### 8.11.11 Chuck change and clean

Clean the taper and the chuck regularly for proper operation and optimum life time of spindle and chuck; at least once a week, but more often if necessary. Follow the procedure strictly.

Normally, the chuck has a long lifetime. Extended vibrations or impacts may hurt the chuck, and cause bad milling results. Trying a new chuck is the easiest way to identify if the chuck is the problem. Running with a bad chuck will also increase the spindle wear.

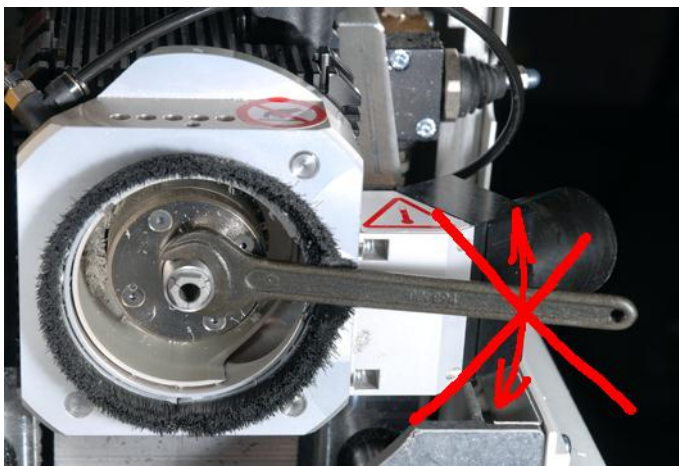


The IBAG chuck is lockable, meaning it needs no adjustment when entering the bit.



Place the tool head on the table.  
Open the chuck and remove any bit.

Note:  
Never apply compressed air for cleaning.

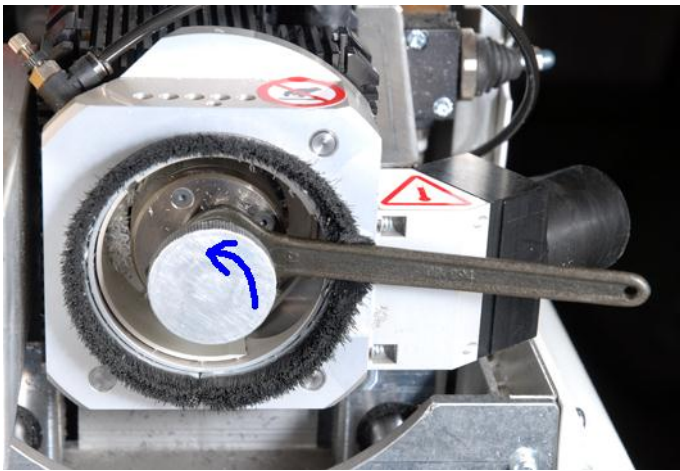


Apply the 13 mm / 17 mm (HPMU) key to hold the spindle rotor.

Note:  
Do not turn the rotor when in CHUCK OPEN position. This might damage the spindle.



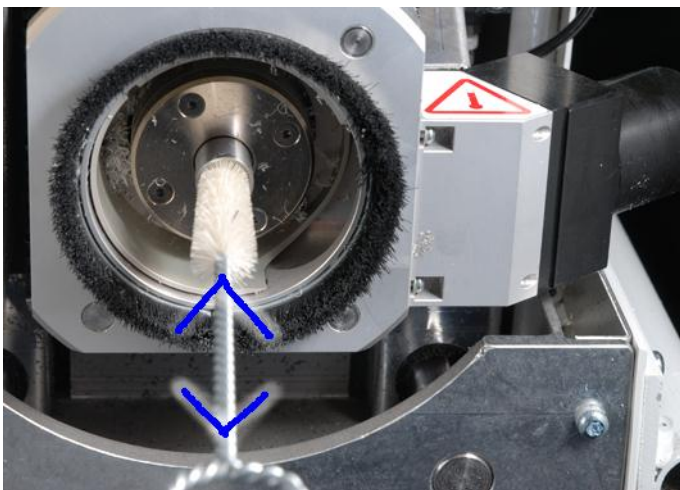
Enter the chuck tool with a dummy bit to the chuck.



Hold the rotor with the 13/17 mm key and unscrew the chuck with the chuck tool.

Note:

If you can not move the chuck with the chuck tool, another 10 mm (12 mm for HPMU) key might be used, together with a bit, to **unscrew** the chuck. This procedure might be necessary if a bit is stuck.



Apply the taper brush to clean the taper.

Push the air clean button to help remove contamination.



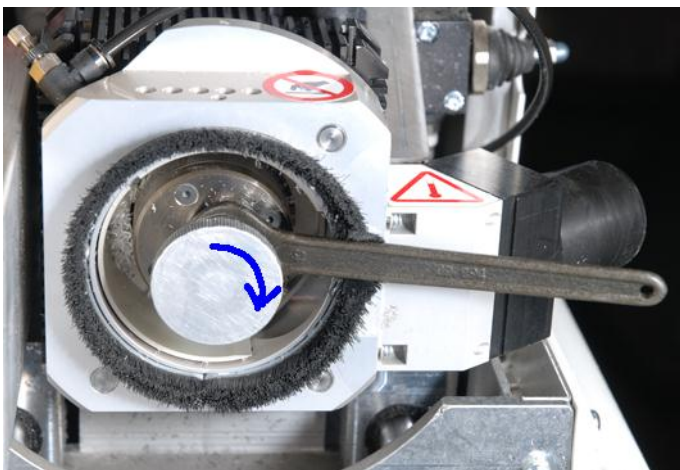
Clean the chuck.



Apply small quantities of grease to the threads of the chuck when necessary. Avoid the clamping area. Do not use oil, as it could enter the clamping area and reduce the clamping force. Also apply small quantities of grease to the outer cone of the chuck.



Torque up the chuck by hand, using the chuck tool and a dummy bit. (Maximum torque 2 Nm, 18 lbf-in). Hold the rotor with the 13/17 mm key.



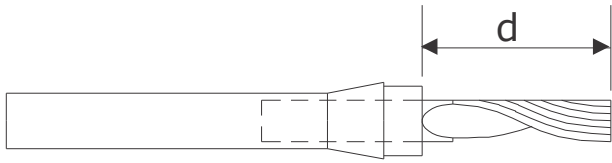
Close the chuck on a dummy bit.



Chuck maintenance kits are available on the Esko web shop, [www.esko.com](http://www.esko.com).



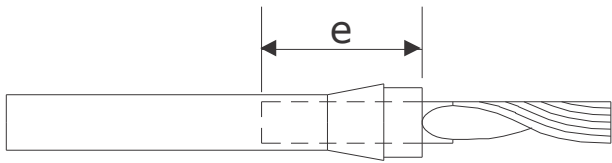
### 8.11.12 HSMU/HPMU - bit length and position



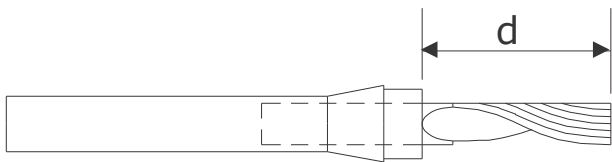
**Keep distance d small.**

For best performance and minimum wear, do not let the bit stick out more than necessary.

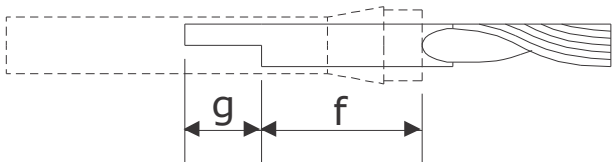
Use bits with short cutting lengths for thin materials.



For proper clamping, keep distance e 20 mm, 0.8 inch as a minimum.



To achieve material through-cut, the distance d must be at least 18 mm, 0.7 inch.



**Balanced bits**

Bits with balanced surface should have a clamping length f of min. 20 mm/0.8 inches. Maximum balancing length g is 12 mm / 0.5 inches.

## 8.11.13 HSMU/HPMU - Tool adjustment

### 8.11.13.1 Adjustments for the standard tool positions:

For this tool, complete the following adjustments:

- Tool height Measured automatically, possible to add an offset value.
- Tool Offset Adjust offset relative to laser pointer.

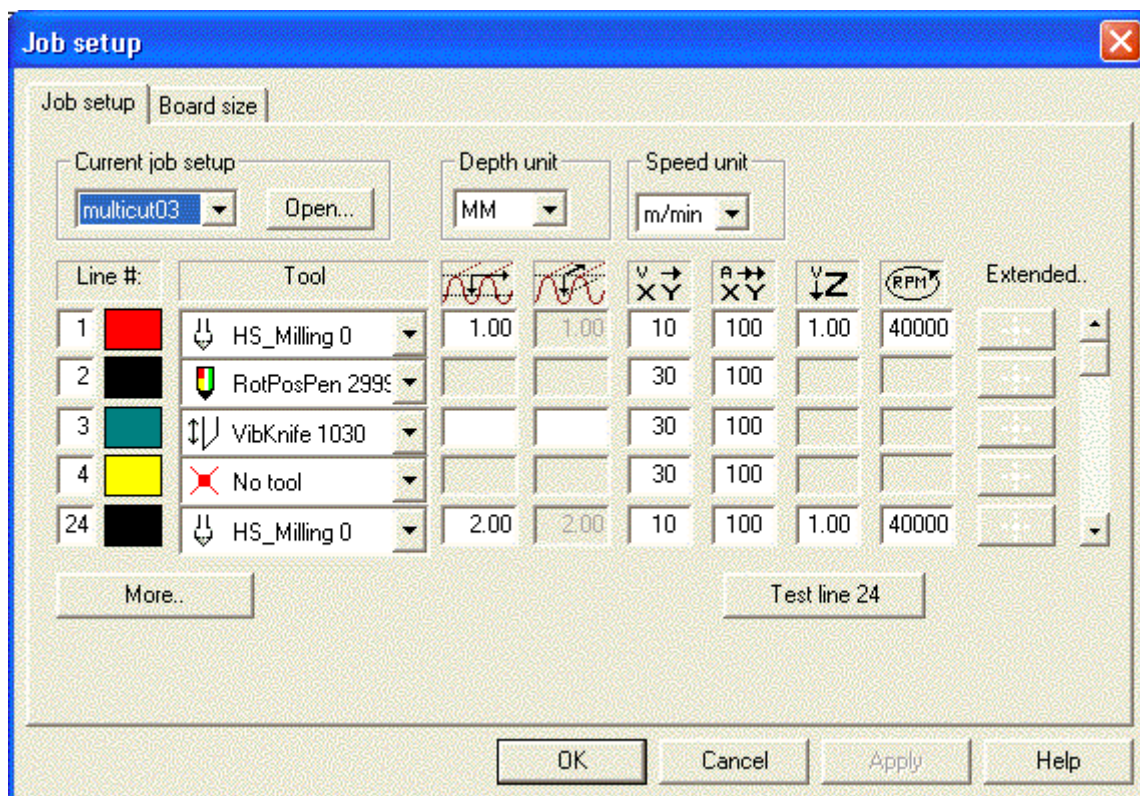
For more information about how to run the adjustment wizards, see the Tool Configuration chapter (88).

Notes regarding Tool height adjustment:

When properly adjusted, the router bit should barely touch the top surface of the material.

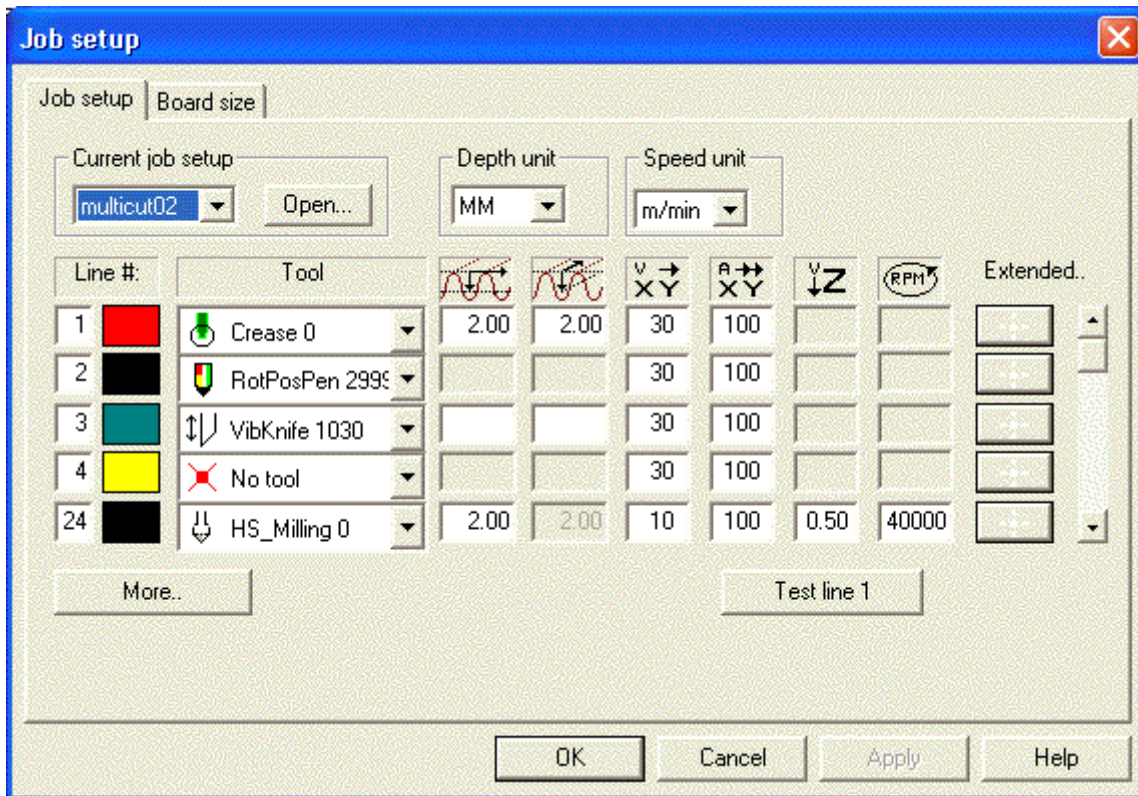
Notes regarding Tool offset adjustment:

Before executing the wizard for tool offset adjustment, the Job setup file has to be prepared as follows:



In the first line in Job setup, specify HS milling tool with parameters as illustrated. Then execute the wizard for tool offset adjustment.

## 8.11.14 HSMU/HPMU - Job setup



General information about the job setup dialog is found in the 'How to..' chapter. In this chapter, only the Router tool specific issues are described:



Specifies the router depth measured from the top of the material. The depth is specified as an absolute value in mm or inch, or i % depending upon the 'Depth unit' setting.



Not used. Will display the same value as entered in the above line.



Specify X/Y speed in % or m/min ( ips ).



Specify X/Y acceleration in %



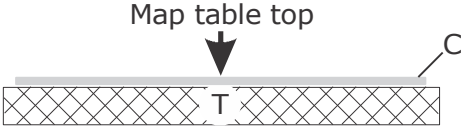
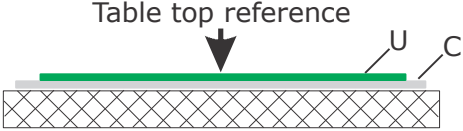
Specify Z-axis speed in % or m/min ( ips ).



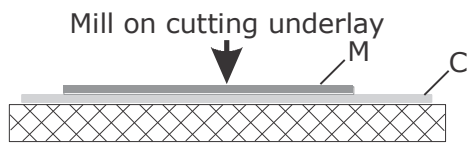
Specify speed in RPM for Router spindle.

## 8.11.15 HSMU/HPMU - Table top and height adjustment

8.11.15.1 The following rules apply when adjusting HSMU/HPMU:

	<p>T = Cutting table C = Cutting underlay</p> <p><b>Map table top</b> function is carried out on top of the Cutting underlay.</p>
	<p>U = Milling underlay</p> <p>The <b>Table top reference</b> function is carried out on top of the Milling underlay</p>
	<p>The tool height is measured automatically.</p> <p>If, after a test cut, you want to modify the milling depth, this is possible from the tool height adjustment dialog.</p>

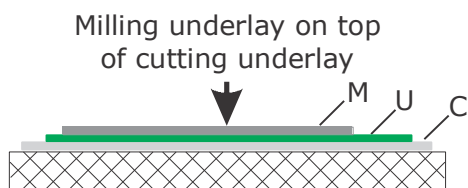
8.11.15.2 The following rules apply when milling:



### Mill on cutting underlay (C):

To avoid damage to the cutting underlay, the downward movement of the drill-bit is stopped 2 mm / 0.08 inch above the cutting underlay. Thus, it is not possible to mill through the material in this case.

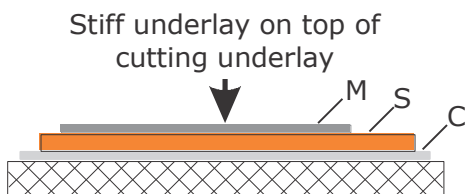
Tool height will follow the mapped tabletop.



### Milling underlay (U) on top of the cutting underlay:

To be able to mill through the material, the thickness of the milling underlay must be > 2 mm / 0.08 inch.

If the thickness of the milling underlay (U) is < 5 mm ( 0.2 inches ), the tool height will follow the mapped table top.



### A stiff milling underlay (S) on top of the cutting underlay:

If the thickness of the milling underlay (S) is > 5 mm (0.2 inch), the underlay is supposed to be more or less stiff. One typical milling underlay material is MDF, face milled on top.

In this case, when the underlay is supposed to be stiff, the measured 'table top reference' value is used for height control



### 8.11.16 Face milling

For face milling, an acm - file prepared for the actual material is required. A program dedicated for this purpose is installed together with XP-Guide.

#### **Procedure:**

##### Generate acm - file

From the desktop, double click the icon 'FaceMill'.

The FaceMill user interface appears on the screen.

Fill in relevant information and generate a new acm - file. Press the 'Help' button to get information about the different parameters.

##### XP-Guide

In XP-Guide, disable the 'Origin in lower left corner' function.

Prepare a job setup file.

A reduced acceleration is recommended (30 - 50 %). It will improve the surface quality.

### 8.11.17 Square cut-out

To prepare an acm - file for simple cut-out of a square, a dedicated program is available: FaceCut. This program is installed together with XP-Guide.

#### **Procedure:**

##### Generate acm - file

From the desktop, double click the icon 'FaceCut'.

The user interface appears on the screen.

Fill in relevant information and generate a new acm - file. Press the 'Help' button to get information about the different parameters.

##### XP-Guide

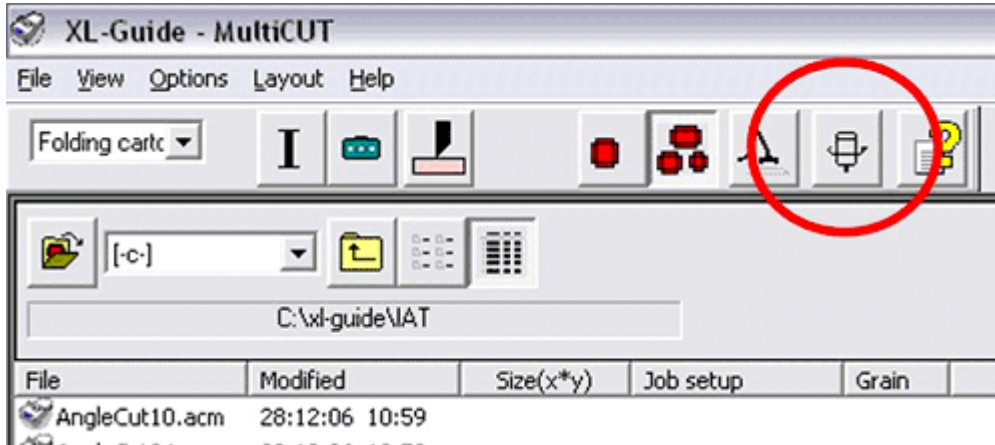
In XP-Guide, disable the 'Origin in lower left corner' function, and prepare a suitable job setup file.

## 8.11.18 Miscellaneous

### 8.11.18.1 Warm Up

To protect the spindle, mandatory WarmUp is implemented.

If the spindle has been inactive for 8 hours or more, a 3 min. WarmUp is required. WarmUp is started with this button:



If the spindle has been inactive for 4 weeks or more, an extended sequence is required, called RunIn. This takes 20 minutes.

### 8.11.18.2 Suction house

Clean the suction house when necessary with acetone and a q-tip. A smooth surface will ease the chip removal.

### 8.11.18.3 Vacuum clean the milling underlay



The vacuum cleaner can be used for automatic cleaning of the felt:

Use the FaceMill.exe to make a file that covers the actual area. Set "bit size" to 65 mm (2.5 inch), and set trim sizes to zero. Hint: Make a file name that reflect the size used. Make a job setup file with low spindle speed, zero depth, and maximum feed. Insert the dummy bit into the chuck, and adjust tool so the brush is working properly.

## 8.12 The VibraCut knife tool



**Knife blades are extremely sharp!**

### 8.12.1 Description

The VibraCut knife tool is available in two models:

VibraCut knife tool



Running with 6000 RPM and amplitude +/- 0.15 mm (0.006 inches), this tool is recommended for light duty corrugated materials.

High Frequency VibraCut knife tool



Running with 12000 RPM and amplitude +/- 0.6 mm (0.024 inches), this tool is recommended for more demanding corrugated materials.

Note: Hearing protection is recommended when working with this tool.

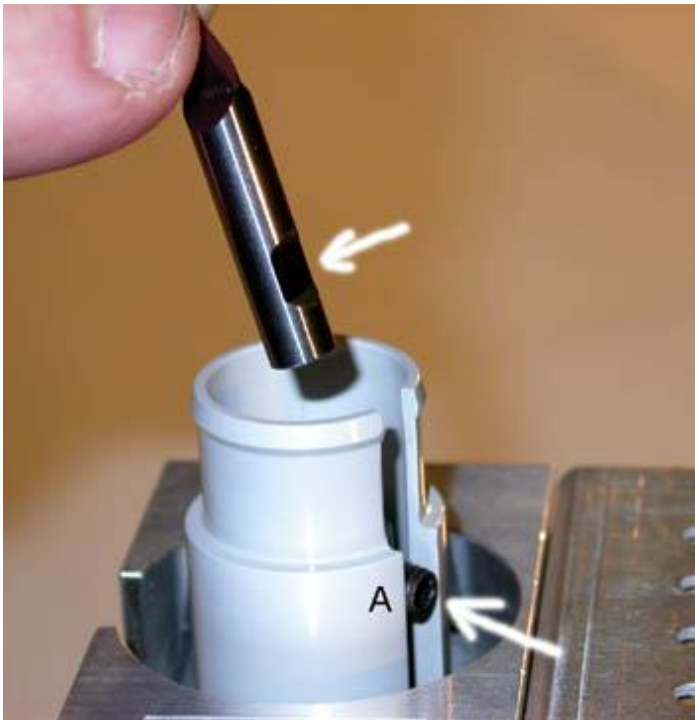
#### **Common to both models:**

- To reduce material tear, a foot is available.
- The same set of knife adapters can be used.

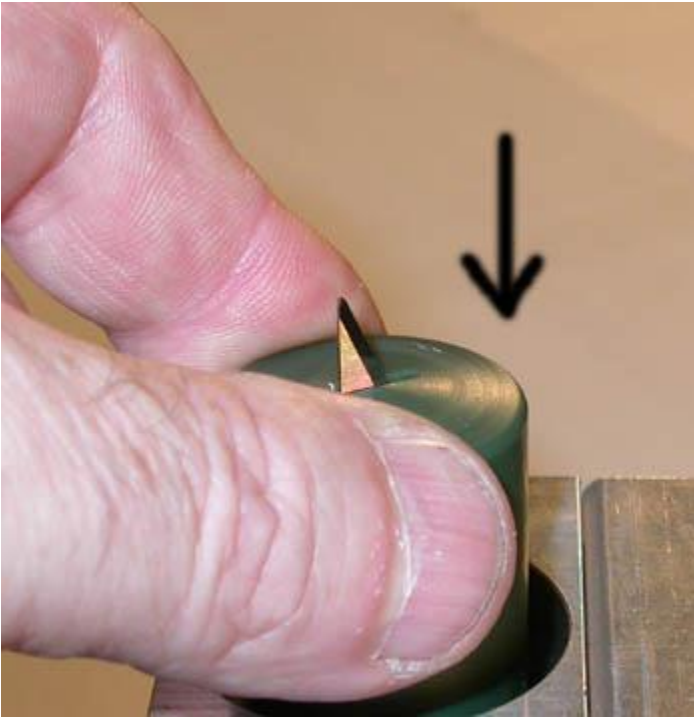
### 8.12.2 Replace knife blade



Remove the foot by pulling the foot straight out.



Loosen the screw A and replace the knife. Ensure the knife has correct position relative to the screw. Push the knife down while the screw is fixed.



Extreme care should be taken when inserting the knife foot again.

Keep fingers away from knife as illustrated at left.

### 8.12.3 Tool adjustment

For this tool, complete the following adjustments:

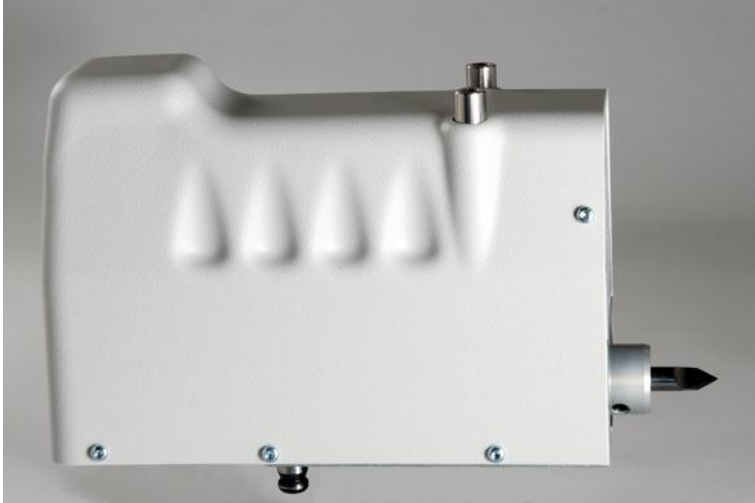
Lag setting	The knife lag depends upon the blade adapter. Nominal value is 0-3 mm.
Tool height	Measured automatically, possible to add an offset value.
Tool rotation	Adjust tool angle tangential to moving direction.
Center Offset	Adjust tool sideways until centered.
Tool Offset	Adjust offset relative to laser pointer.

For more information about how to run the adjustment wizards, see the Tool Configuration chapter (88).

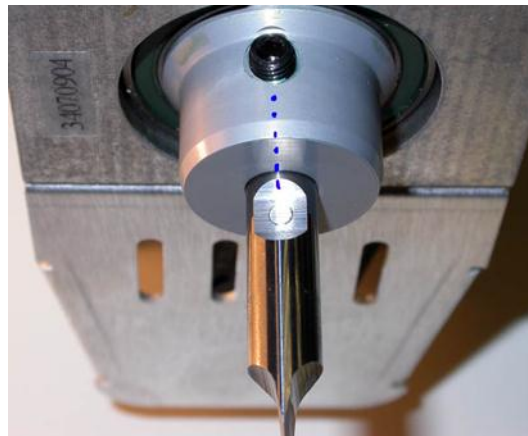
## 8.13 RM Knife Tool (Rigid Material)



**Knife blades are extremely sharp!**



### 8.13.1 Insert / remove knife blade



Use a 3 mm Allen key to fix / loosen the knife blade. Ensure the blade is correctly aligned.

No additional adjustments are necessary, as the tool height is measured automatically.

### 8.13.2 Tool adjustment

For this tool, complete the following adjustments:

Lag setting	The knife lag depends upon the blade adapter. Nominal value is 0-4 mm.
Tool height	Measured automatically, possible to add an offset value.
Tool rotation	Adjust tool angle tangential to moving direction.
Center Offset	Adjust tool sideways until centered.
Tool Offset	Adjust offset relative to laser pointer.

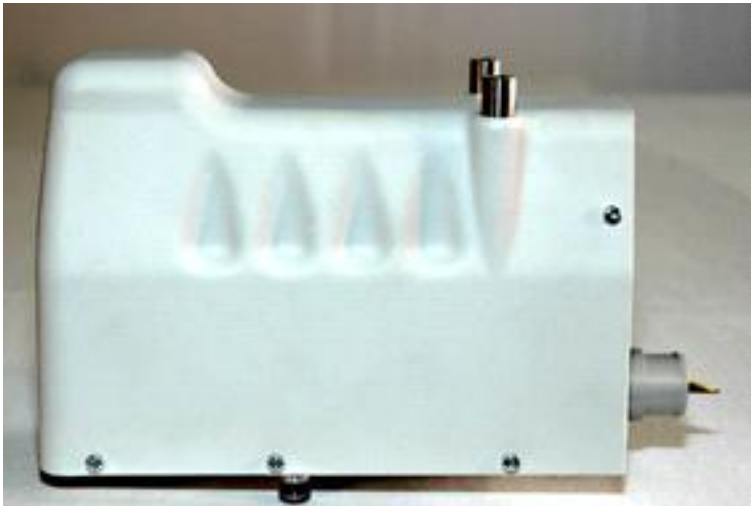
For more information about how to run the adjustment wizards, see the Tool Configuration chapter (88).

## 8.14 The Hi-Force knife tool



**Knife blades are extremely sharp!**

### 8.14.1 Description



The Hi-Force knife tool is a general purpose knife tool suitable for cutting a wide range of materials. As the name indicates; this tool is prepared for a higher tool pressure compared to the Static knife tool.

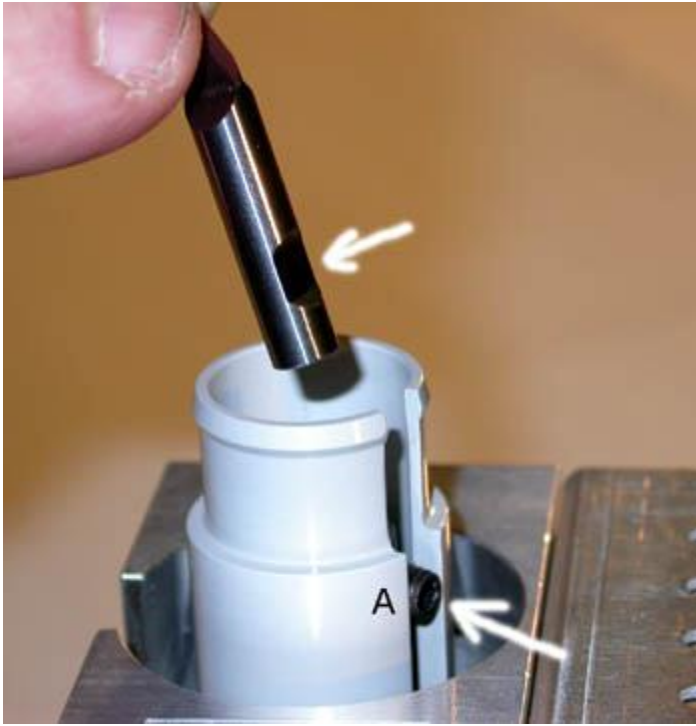
The tool is prepared for a wide range of knives.

To reduce material tear and also to keep the material down as the knife is pulled out, a foot is available.

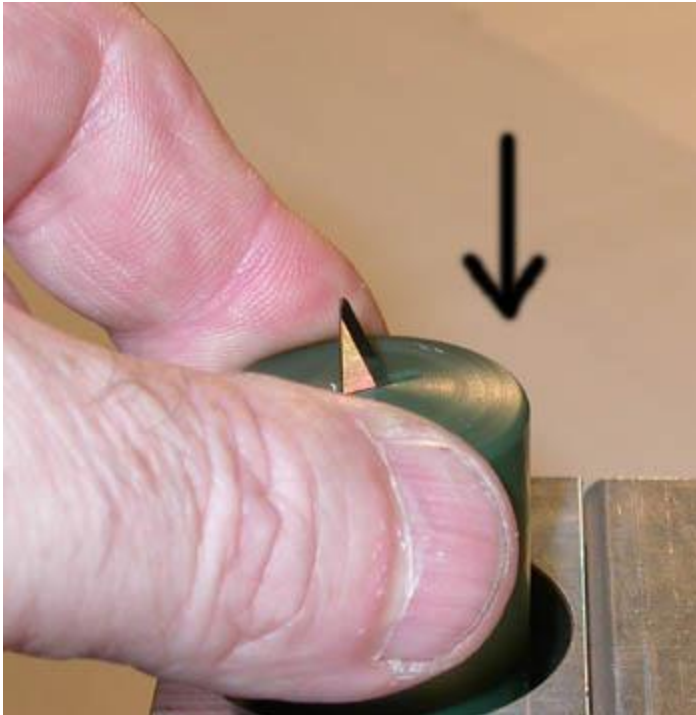
### 8.14.2 Replace knife blade



Remove the foot by pulling the foot straight out.



Loosen the screw A and replace the knife blade.  
Push the knife blade against the bottom of the slit while the screw is fixed.



Extreme care should be taken when inserting the knife foot again.  
Keep fingers away from knife blade as illustrated at left.

### 8.14.3 Tool adjustment

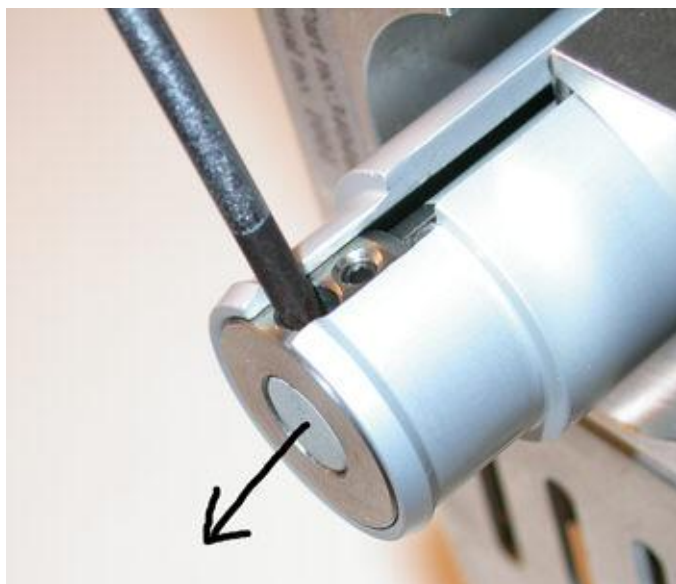
For this tool, complete the following adjustments:

Lag setting	The knife lag depends upon the blade adapter. Nominal value is 0-3 mm.
Tool height	Measured automatically, possible to add an offset value.
Tool rotation	Adjust tool angle tangential to moving direction.
Center Offset	Adjust tool sideways until centered.
Tool Offset	Adjust offset relative to laser pointer.

For more information about how to run the adjustment wizards, see the Tool Configuration chapter (88).



#### 8.14.4 Replace knife adapter



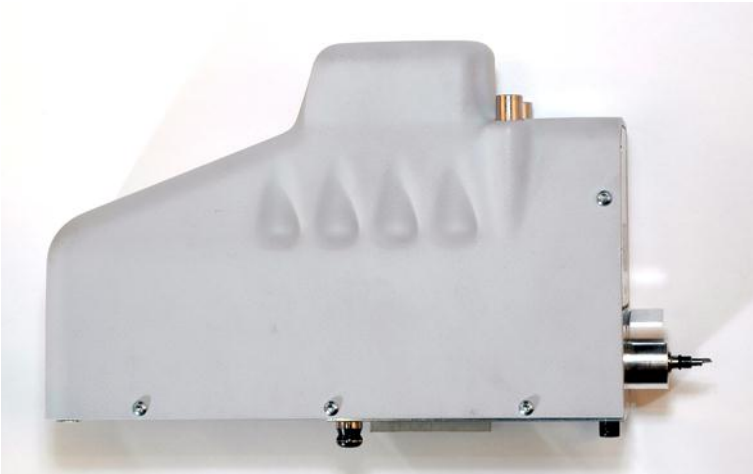
To remove the knife adapter, just pull it out from the holder.

## 8.15 PressCut knife tool



**Knife blades are extremely sharp!**

### 8.15.1 Description



The PressCut tool is a special knife tool for vinyl cutting. The cutting depth is controlled by the downward knife pressure. The pressure is adjustable from the XP-Guide Job setup dialog. For applications where a more accurate depth control is required, a simple foot solution is available. The tool is prepared for a wide range of knife blades.

### 8.15.2 Replace knife blade

<p>This figure shows how the knife is fixed inside the PressCut knife tool. The friction between the alignment pin A and the knife keeps the knife blade in place.</p>	<p>A special hand tool is available as an aid when replacing knives. Use this hand tool when removing and inserting knives into the tool.</p> <p>When inserting a new knife, ensure the knife is correctly positioned relative to the alignment pin.</p>

### 8.15.3 Tool pressure

The PressCut tool can run with a constant tool pressure or a speed dependent tool pressure. Both parameters are specified in the **Job setup** structure.

#### 8.15.3.1 PressCut knife down force



Specify the knife pressure when running the PressCut knife tool. The pressure is entered as a gram - value from 50 to 700 grams.

The knife pressure is modified if a "Speed dependent pressure" is specified, see below.

The tool pressure specified in the Job setup structure is automatically adjusted. During the tool down movement, the PressCut tool moves down until the material surface is detected and the proper knife pressure is achieved.

The tool pressure will vary depending upon the material. For a typical vinyl cutting job, a recommended start parameter is Pressure = 65-70 gram and Speed dependent pressure = 50%.

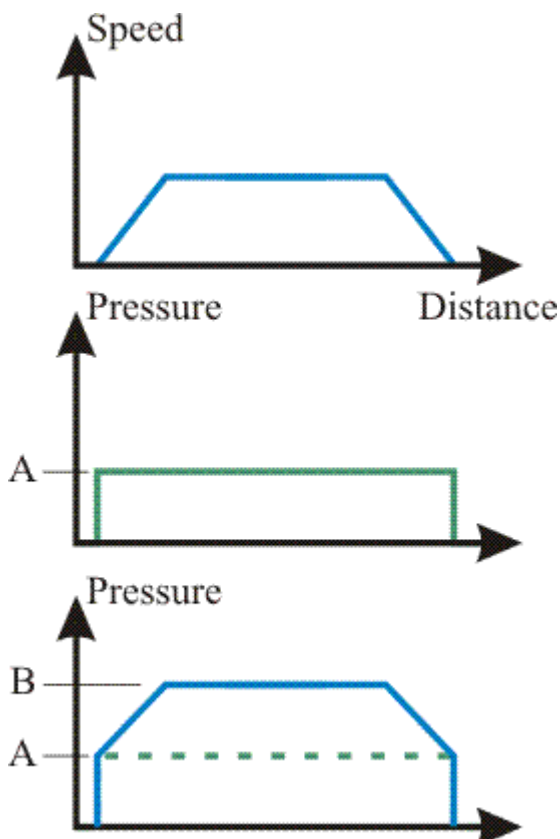
Note: For the PressCut knife tool to work properly, a sharp knife is very critical. Pay special attention to the tip of the knife, as it is easy to break.

#### 8.15.3.2 Speed dependent knife down force



The Speed dependent pressure function adds pressure to the PressCut knife tool depending upon the speed of the machine.

The function can be illustrated as follows:



The upper curve illustrates the speed of the machine when executing a line.

Curve A illustrates the knife pressure if the Speed dependent pressure is set to 0; the pressure is constant from start to stop. The pressure level is as specified by the "PressCut knife down force" parameter, see previous chapter.

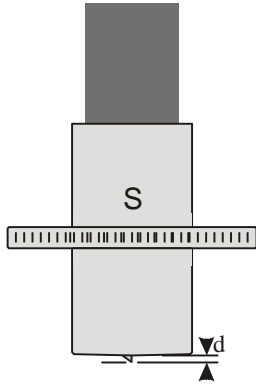
Curve B illustrates the knife pressure when the Speed dependent pressure is set to 100. When running at full speed, the pressure is the double of the "PressCut knife down force" A.

This function is useful as it allows a lower pressure in both ends of a line where the speed is low at the same time as you get a higher pressure when running at full speed.

Note:

The maximum Speed Dependent Pressure is 200%.

## 8.15.4 Foot solution



Normally, the PressCut knife tool is used without the foot mounted.

When the foot is mounted, the cutting depth  $d$  is controlled by the adjustable screw  $S$ .

**Procedure:**

1 - Press the clamp  $C$  as indicated to lock the knife shaft.

2 - Turn the screw  $S$  to adjust the cutting depth.

When seen from the knife side, a clockwise adjustment will increase the cutting depth.

## 8.16 RotaCut knife tool



**Knife blades are extremely sharp!**

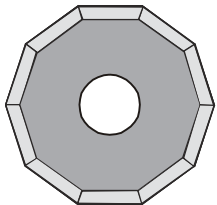
### 8.16.1 Description



The RotaCut knife tool is a special tool for cutting light materials, as thin fabric. Maximum cutting depth is 2 mm / 0.07 inch.

Note: Due to the characteristics of this knife tool, some restrictions apply to the use of it:

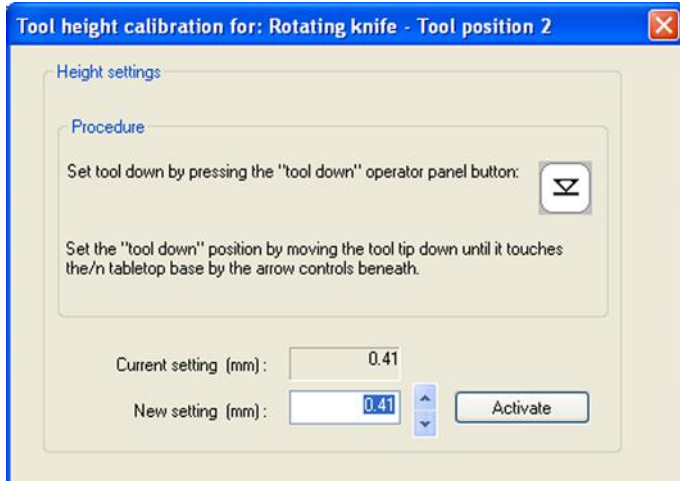
- It is not suitable for curves with small diameter.
- It is not suitable for designs containing short lines in combination with sharp angles.



The RotaCut knife tool is prepared for Decagonal knife blades,  $\varnothing 25$  mm / 1 inch.

## 8.16.2 Tool adjustment

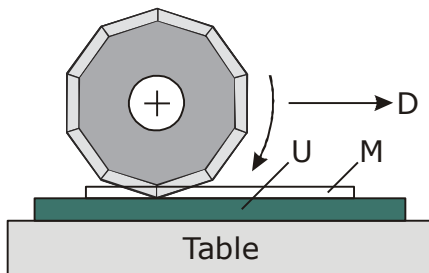
The RotaCut knife tool is adjusted in the same way as the other XP tools regarding rotation angle and offset, but tool height is manually adjusted:



### Tool height

Tool height for RotaCut is manually adjusted using the tool height adjustment wizard available from the **Tool configuration** dialog.

Follow the instructions in the dialog.



Be careful, though, not to adjust the cutting depth too deep into the cutting underlay (figure at left).

U - cutting underlay

M - material


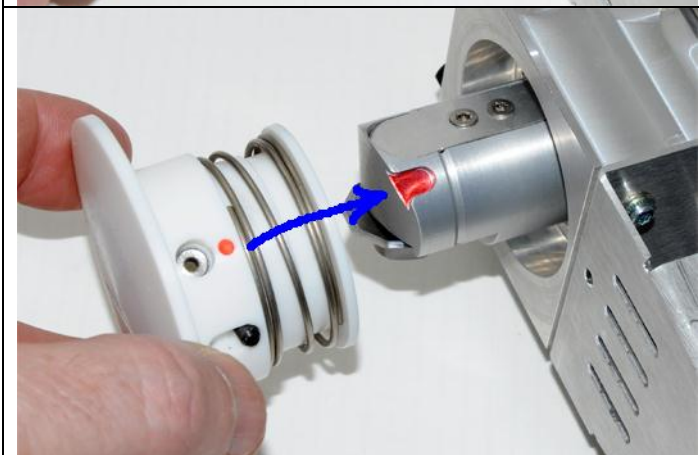

D - X/Y moving direction

For more information about how to run the adjustment wizards, see the **Tool Configuration** chapter (88).

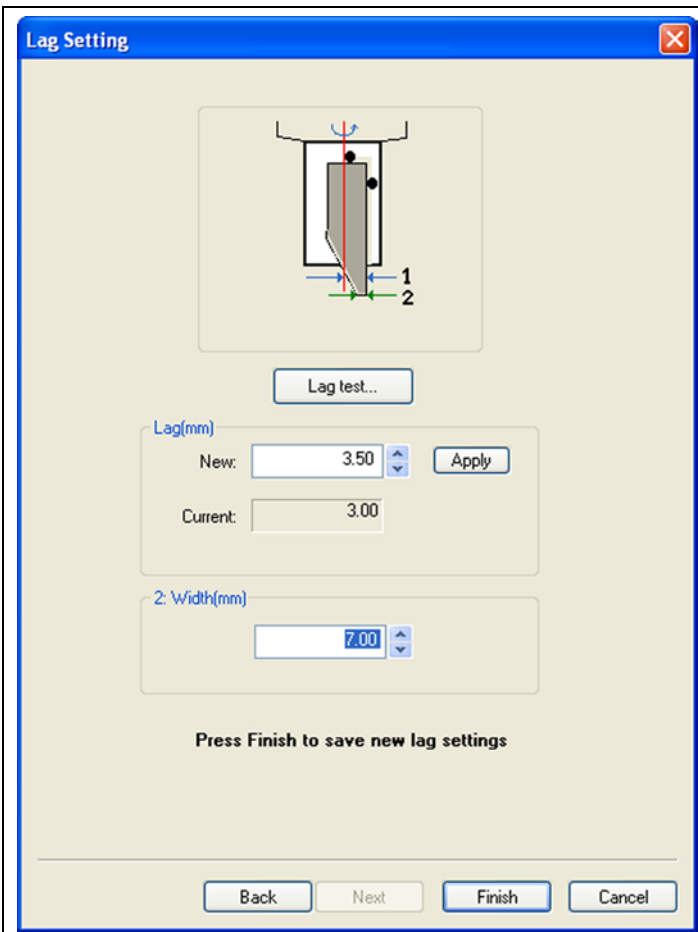
## 8.16.3 How to replace the knife blade



Use the spanner and the hexagonal screw driver to remove the knife blade fixing nut.

	<p>Carefully remove the old knife blade and insert the new one.</p> <p>Ensure the blade is properly seated.</p> <p>Mount the nut and fix it properly.</p>
	<p>Observe the alignment pin in the foot and the groove in the tool shaft.</p> <p>Position the foot onto the tool shaft as shown at left.</p> <p>Push the foot into position. A self-locking mechanism ensures the foot is kept in place.</p> <p>Note: Be careful not to hit the sharp knife.</p>
	<p>Verify by hand that the foot movement is smooth.</p>

### 8.16.4 Tool setup for RotaCut

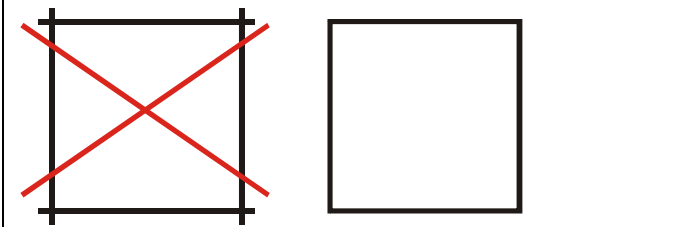


At left, correct setting of Lag- and Width - values are shown.

Lag = 3.5 mm / 0.14 inch

Width: 7.0 mm / 0.28 inch

Note: After modifying these values, the input-file has to be re-opened.



Use the lag and width parameters to achieve proper corner cutting.



## 8.17 Drill / Pen tool



**Drill bits are extremely sharp!**

### 8.17.1 Tool Insert Position

If included, the Tool Insert Position is permanently mounted on the Z1 - tool position. The holder is prepared for a ball point pen or a drill tool.

### 8.17.2 How to insert / remove a drill / pen tool



Inserting a tool - push down until the tool is locked in position.



To remove a tool - press the release button.



Drill motor connector:

To release, grab the housing and lift straight up.

To insert, move connector carefully down and turn it until it fits. Then just push the connector down until it is locked in position.

## 8.18 Drill Tool

This drill tool is for use in re-board and other paper - based materials. The tool is prepared for drill bits 0.5 – 6 mm (0.02 - 0.24 inches).



### 8.18.1 How to replace a drill bit



Push the drill bit towards the bottom of the chuck.  
Use the wrench to fix the bit in the chuck.

No additional adjustments are necessary, as the tool height is measured automatically.

### 8.18.2 Tool adjustment

For this tool, complete the following adjustments:

Tool height	Measured automatically, possible to add an offset value.
Tool Offset	Adjust offset relative to laser pointer.

For more information about how to run the adjustment wizards, see the Tool Configuration chapter (88).

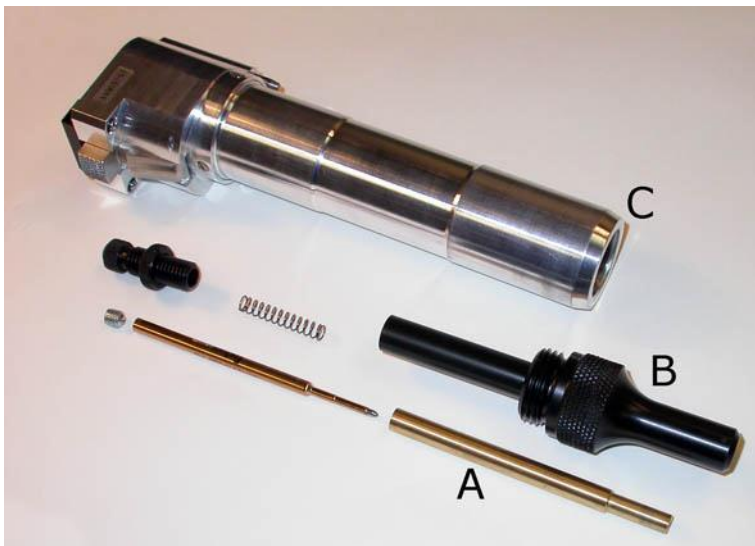
## 8.19 The Ball point tool

### 8.19.1 Description



The Ball point pen tool is available for pen drawing.  
Tool pressure is adjustable by a knob on top of the tool.

### 8.19.2 Tool assembly and pressure adjustment



A - Inner sleeve.

The ball point pen refill is fixed inside the sleeve using a screw.

Use Allen key, 3 mm.

B - Sleeve holder with spring and pressure adjustment knob.

C - pen tool



Adjust tool pressure using the screw s.

Lock the adjustment screw using the locking knob k.

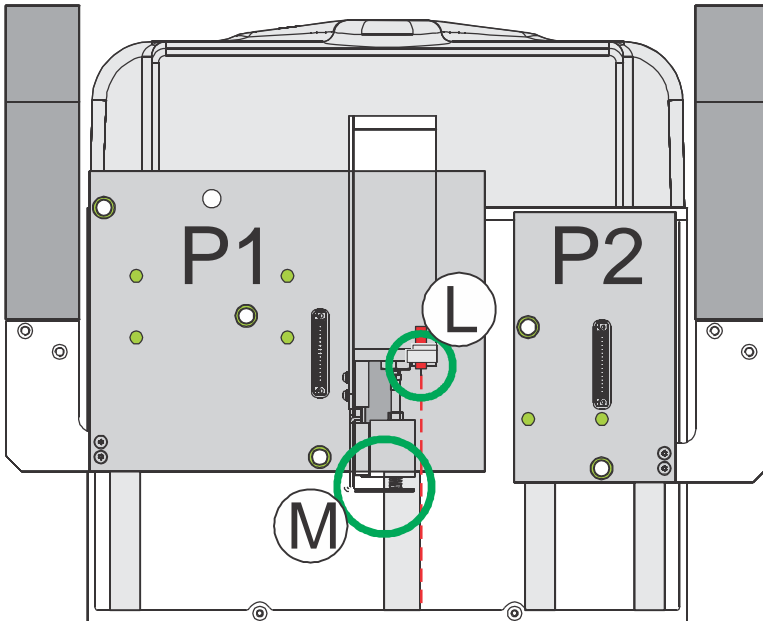
### 8.19.3 Tool adjustment

For this tool, complete the following adjustments:

Tool height	Measured automatically, possible to add an offset value.
Center Offset	Adjust tool sideways until centered.
Tool Offset	Adjust offset relative to laser pointer.

For more information about how to run the adjustment wizards, see the Tool Configuration chapter (88).

## 8.20 Measuring foot



The Measuring foot (M in the illustration) has 3 functions:

1. Measure the thickness of the material on the table
2. Map Table Top Surface.
3. Calibration of the Measuring station.

No adjustments are necessary.

## 8.21 Laser pointer

The Laser pointer (L in the illustration) is a Class II laser beam pointing device.

Wavelength: 650 nm, 1 mW.

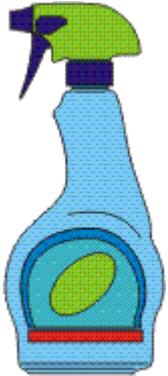
The laser pointer is used in adjustment wizards and job execution to indicate current position on the table.

The laser pointer is lit as long as it indicates the correct current position.

If there is no manual operation of the table, the laser pointer will be switched off after a 30 sec. time out. Pressing any button on the Operators panel will switch the laser pointer on again.

## 9. Maintenance

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### 9.1 General

**Warning**

**The main power should be switched off before cleaning is carried out.**

More detailed information about XP maintenance is available in the Maintenance Manual for Kongsberg XP.

### 9.2 Daily maintenance

**Inspect**

- Inspect the equipment in order to prevent any irregularities.

**Clean**

- The table surface should be kept clean at all times. For cleaning, use iso-propyl alcohol or white-spirit.
- The room should be cleaned regularly. Keep the cables free from grease, floor wax etc.
- Use a vacuum cleaner to keep the inside of the conveyor belt clean.

### 9.3 Weekly Maintenance

**Guide-ways and bearings**

The guide-ways and the bearings should be thoroughly cleaned and oiled very lightly with Tellus R10 oil.

**Photo cells**

The surface of the transmitter and receiver should be carefully cleaned using light soap and clean water.

**Air pressure reduction valve**

The automatic draining action of the air pressure reduction valve should be controlled: Switch off the air compressor and allow the air pressure to fall. Switch on the air compressor and check that any water in the glass bowl of the pressure reduction valve drains out automatically during the first few seconds of operation. Remove and clean the bowl if the automatic draining action does not operate or if it appears to be an excessive amount of dust in the bowl.

**Warning!**

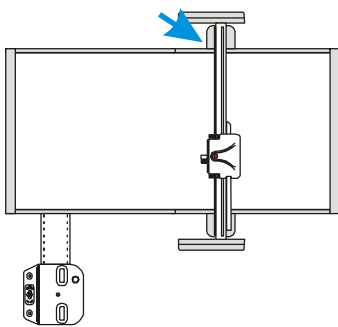
If the automatic draining action fails water can enter the tool holder assembly resulting in severe damage to the tool holder mechanism.

## 9.4 Monthly Maintenance

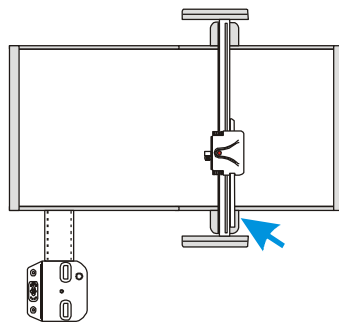
Monthly maintenance includes:

### 9.4.1 Gears

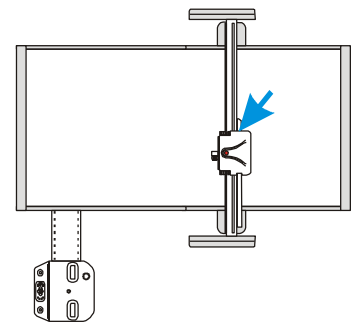
The gears in X1, X2 and Y should be re-greased using the grease gun:



**X1**



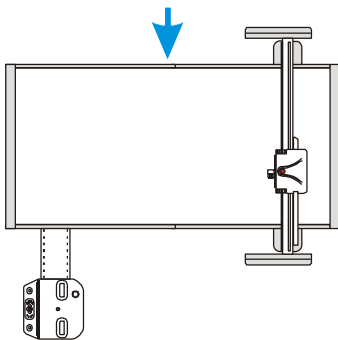
**X2**



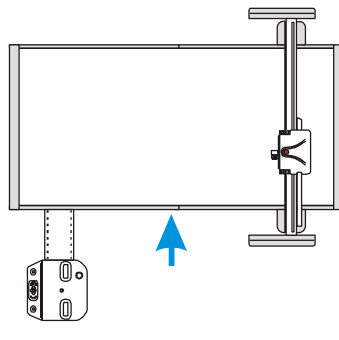
**Y**

### 9.4.2 Racks

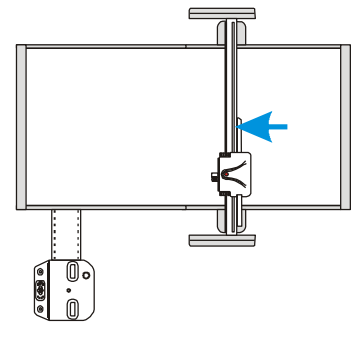
The racks in X1, X2 and Y should be re-greased:



**X1**



**X2**



**Y**

### 9.4.3 Vacuum table

Every other month, or after the table surface has been cleaned, the closed vacuum holes in the surface should be opened in order to retain the hold-down efficiency. Use a steel pin, 0.5 - 0.6 mm, and with the vacuum system switched on, free the vacuum holes by pushing the obstructions down into the table.

## 9.5 Maintenance, external equipment

All external equipment, as PC, Vacuum pump and compressor should be maintained according to the User Manual for the actual equipment.

## 10. Fuse replacement

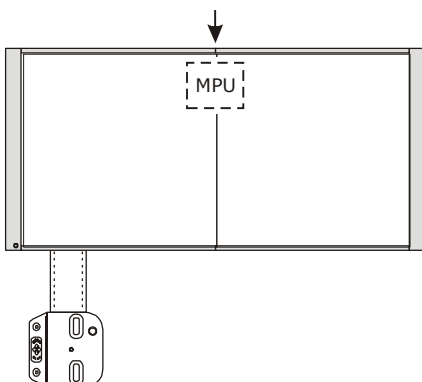
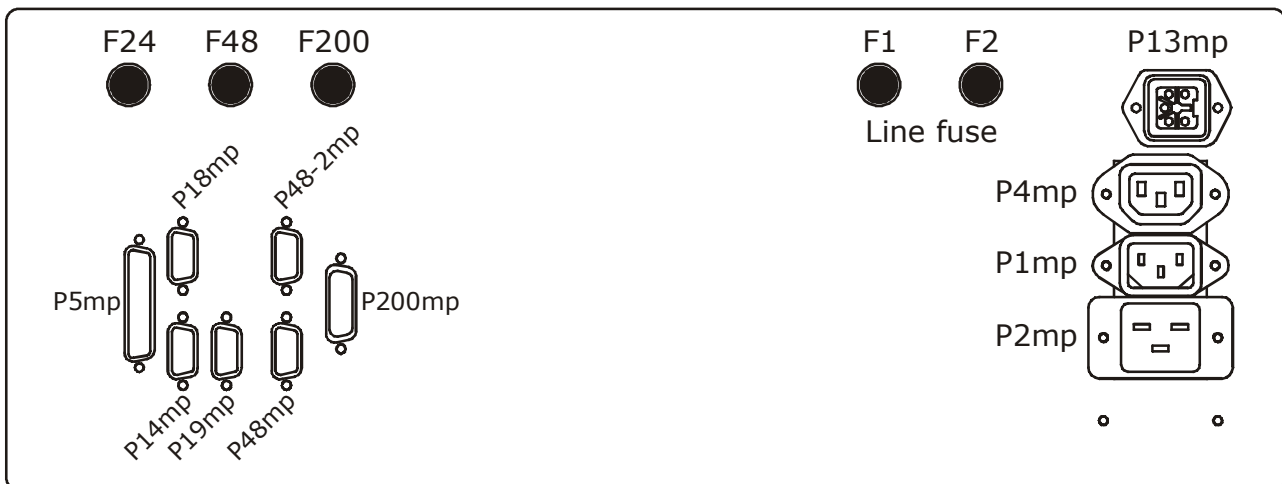


**Switch power off with the Main Power switch before starting the fuse replacement procedure.  
Remove the main power plug from the wall socket as an extra precaution before starting the fuse replacement procedure.**

### 10.1 MPU fuses

Fuse location	115V	230V
Line fuses F1 and F2	T 15A 250V 1 1/4 x 1/4 in (6,3 x 32 mm)	T 6,25A 250V 1 1/4 x 1/4 in (6,3 x 32 mm)
200V Servo power fuse F200	T 15A 250V 1 1/4 x 1/4 in (6,3 x 32 mm)	T 15A 250V 1 1/4 x 1/4 in (6,3 x 32 mm)
48V Servo power fuse F48	T 8A 250V 1 1/4 x 1/4 in (6,3 x 32 mm)	T 8A 250V 1 1/4 x 1/4 in (6,3 x 32 mm)
+24V fuse F4	T 6.25A 250V 1 1/4 x 1/4 in (6,3 x 32 mm)	T 6.25A 250V 1 1/4 x 1/4 in (6,3 x 32 mm)

All fuses are located on the rear side of the Main Power Unit (MPU):

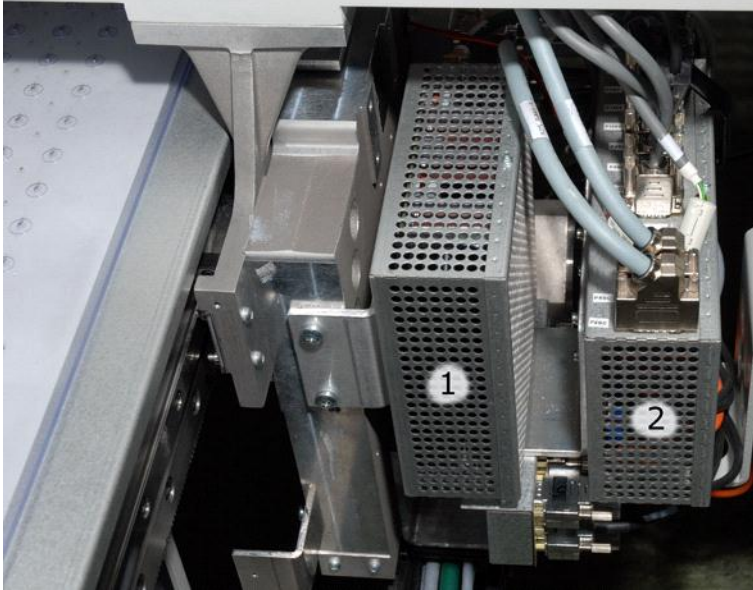


Fuse replacement procedure:

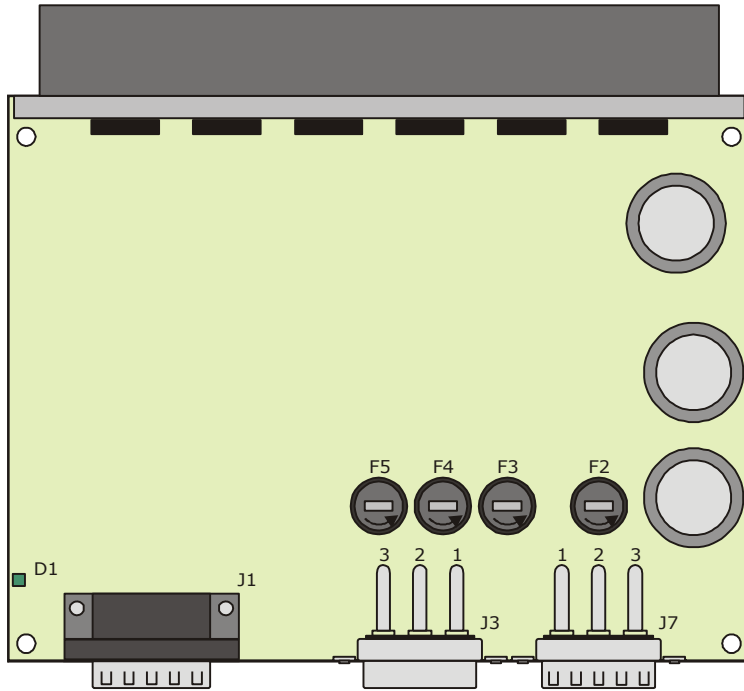
1. Remove base cover in front of MPU
2. Remove one fuse, check with ohm - meter, if blown, replace with a new identical fuse. Repeat for each fuse.
3. Replace base cover
4. Insert main power cable into the wall socket and turn main power ON.



## 10.2 X1 fuse



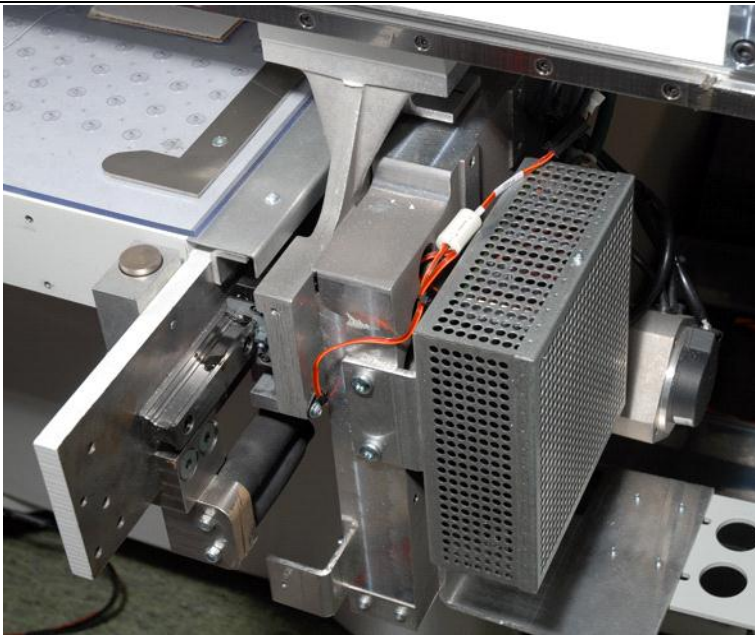
1 – 8/24A AC amplifier X1  
2 – SCU unit



1. Remove X1 cover.
2. Remove cover from AC amplifier unit.
3. Check fuses F2 – F5 with ohm - meter. If blown, replace with a new identical fuse.
4. Replace covers.
5. Insert main power cable into the wall socket and turn main power ON.

**Fuse:** T 10A 250V (5 X 20 mm).

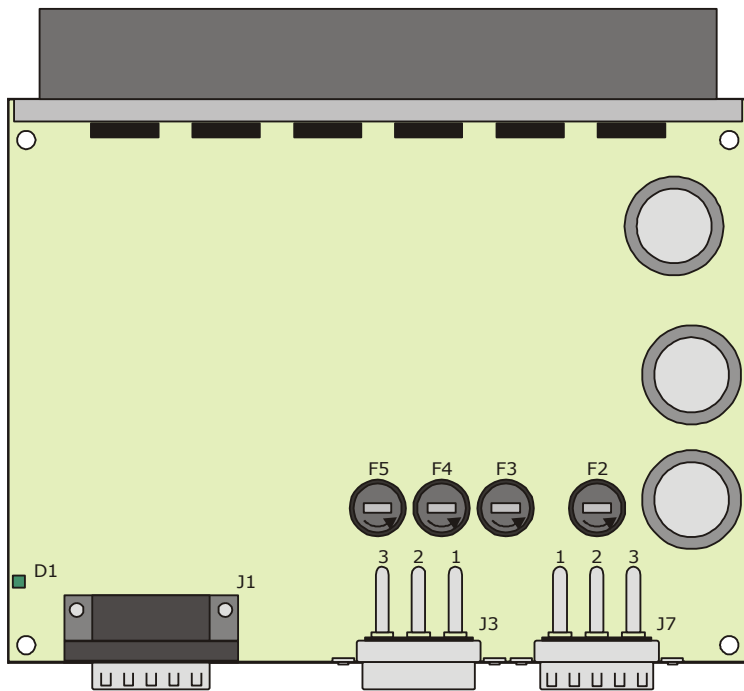
## 10.3 X2 fuse



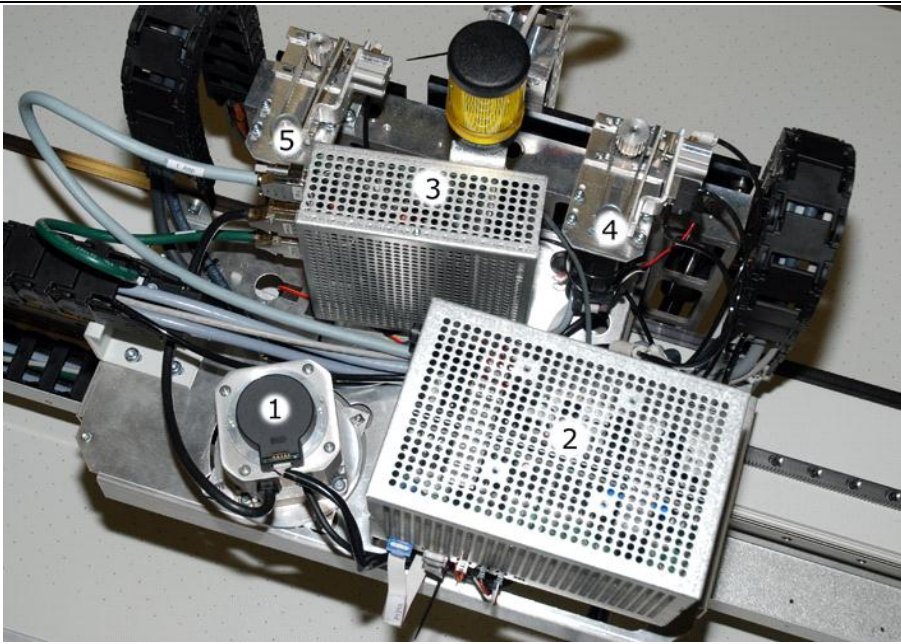
1. Remove X2 cover.
2. Remove cover from AC amplifier unit.
3. Check fuses F2 – F5 with ohm - meter. If blown, replace with a new identical fuse.
4. Replace covers.
5. Insert main power cable into the wall socket and turn main power ON.

**Fuse:**

T 10A 250V (5 X 20 mm).



## 10.4 Y fuse

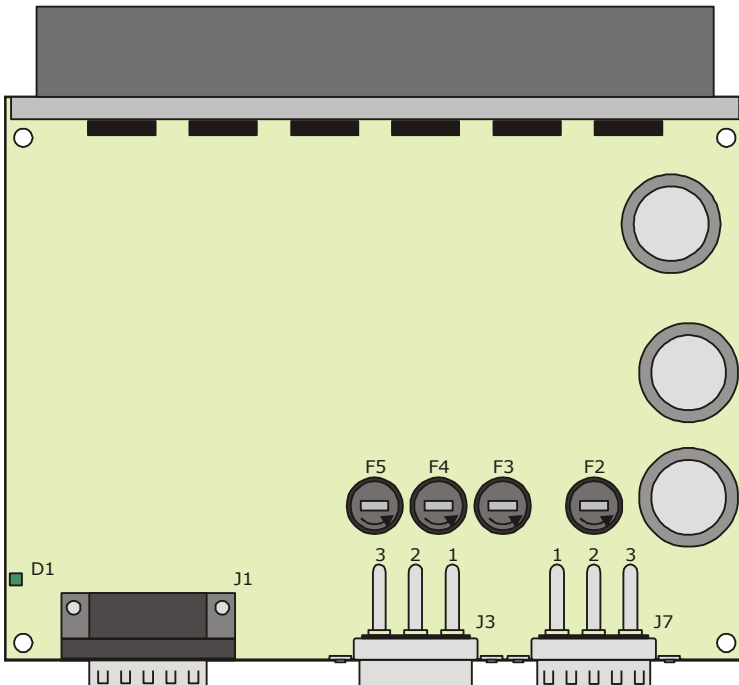


1. Remove Y cover.
2. Remove cover from AC amplifier unit.
3. Check fuses F2 – F5 with ohm - meter. If blown, replace with a new identical fuse.
4. Replace covers.
5. Insert main power cable into the wall socket and turn main power ON.

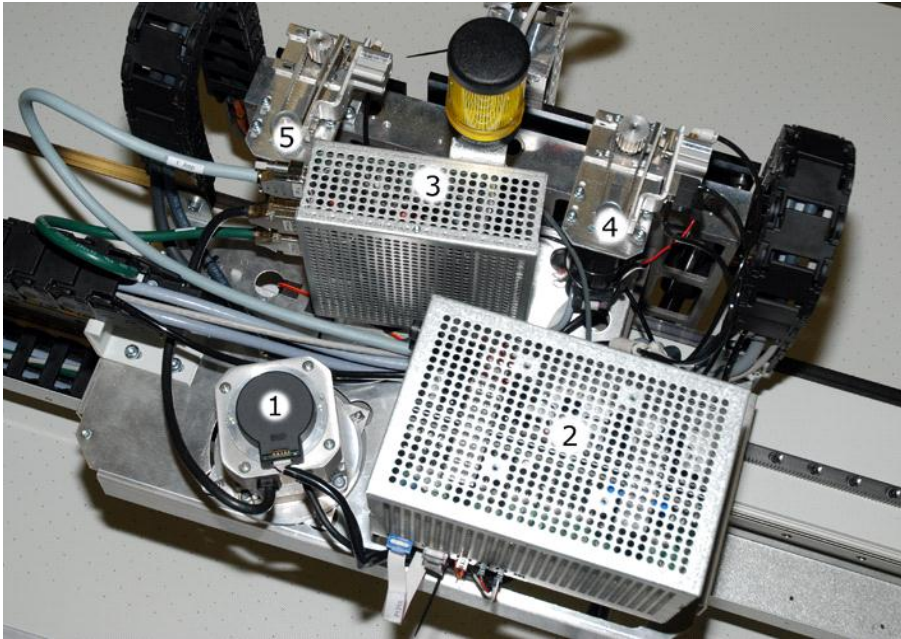
**Fuse:**

T 10A 250V (5 X 20 mm).

- 1 – Y-motor with encoder.
- 2 – TCU.
- 3 – AC amplifier for Y.
- 4 – Z1 – motor.
- 5 – Z2 – motor



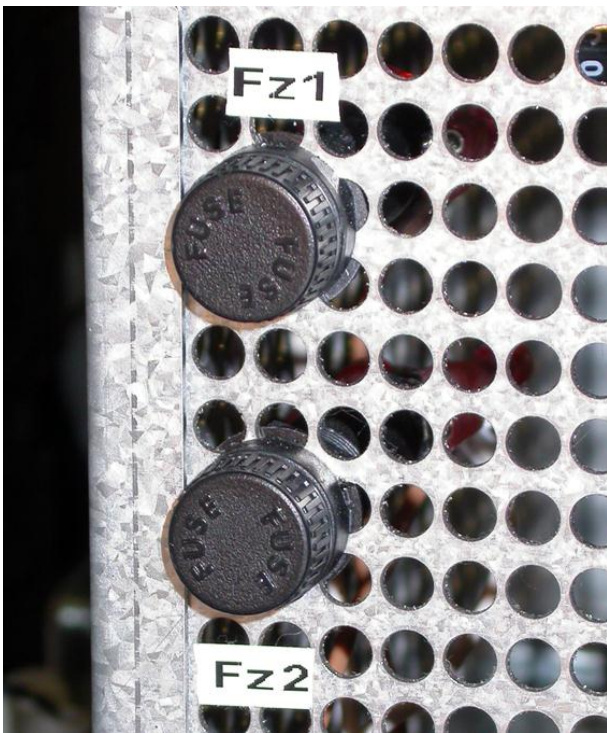
## 10.5 Z1 / Z2 fuses



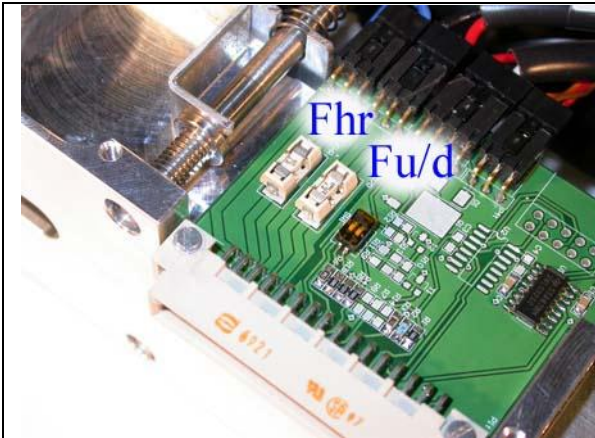
1. Remove Y cover.
2. On the TCU - unit, check fuses Fz1 and Fz2 with ohm - meter. If blown, replace with a new identical fuse.
3. Replace covers.
4. Insert main power cable into the wall socket and turn main power ON.

**Fuse:** T 4A 250V 1 1/4 x 1/4 in (6,3 x 32 mm).

- 1 - Y-motor with encoder.  
2 - TCU.  
3 - AC amplifier for Y.  
4 - Z1 - motor.  
5 - Z2 - motor



## 10.6 Fuses: Tool rotation / Reciprocating knife







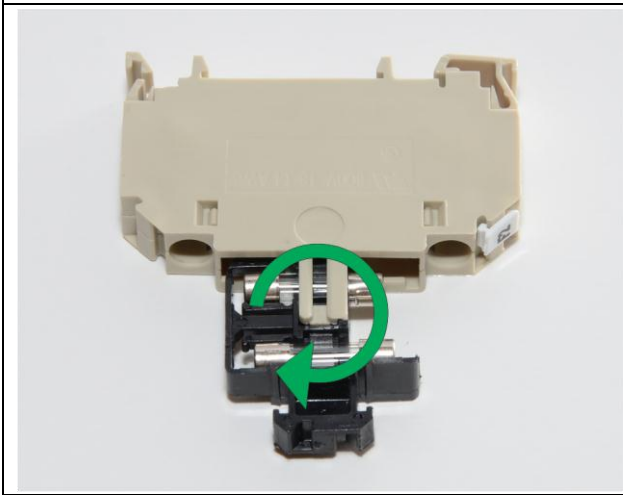
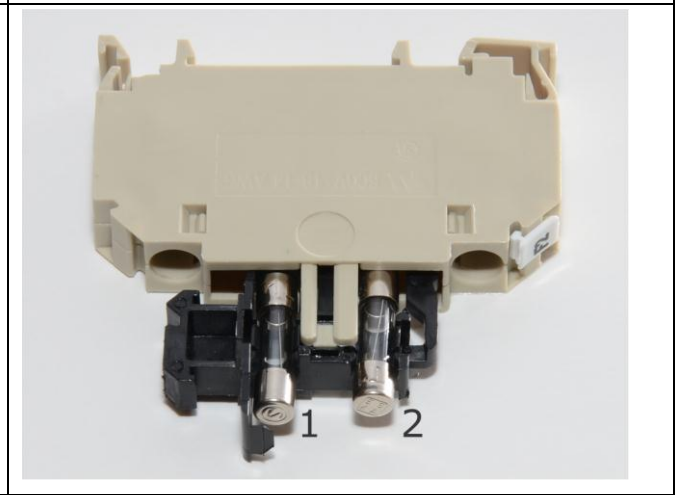
1. Fuses are available on the Tool Board inside the actual tool.
2. Remove the plastic cover on the tool.
3. Remove fuse Fhr or Fu/d, check with ohm - meter. If blown, replace with a new identical fuse.
4. Insert main power cable into the wall socket and turn main power ON

**For information about fuse sizes, see table below.**

(Esko part number)

Drill tool	Drill	FDr	2	T 2A 125V NANO (42441618)
Hi-force knife tool	Tool rotation	Fhr	2	T 2A 125V NANO (42441618)
Hi-Freq VibraCut knife tool	Tool rotation	Fhr	2	T 2A 125V NANO (42441618)
Hi-Freq VibraCut knife tool	Vib.	Fu/d	4	T 4A 125V NANO (42444828)
Presscut knife tool	Tool rotation	Fhr	2	T 2A 125V NANO (42441618)
Presscut knife tool	Tool u/d	Fu/d	0.75	T 0,75A 125V NANO (42442541)
RM knife tool	Tool rotation	Fhr	4	T 4A 125V NANO (42444828)
RotaCut	Knife RPM		2	T 2A 125V NANO (42441618)
VariCut knife tool	Tool rotation	Fhr	2	T 2A 125V NANO (42441618)
VariCut knife tool	Knife depth	Fu/d	0.5	T 0,5A 125V NANO (42441600)
VibraCut knife tool	Tool rotation	Fhr	2	T 2A 125V NANO (42441618)
VibraCut knife tool	Vib.	Fu/d	2	T 2A 125V NANO (42441618)
HDU	Tool rotation	Fhr	4	T 4A 125V NANO (42444828)

## 10.7 HPMU Chiller fuse

	
<p>Remove the on/off button</p>	<p>Remove cover (4 screws)</p>
	
<p>Fuse location</p>	<p>Pull out the fuse holder</p>
	
<p>Turn the fuse holder 90 deg.</p>	<p>Now you have easy access to the fuse.          1 - Spare fuse          2 - Fuse in action          Fuse: T 1A 250V (5x20 mm)</p>

## 10.8 HPMU Chiller heater fuse



F=  
4A 250V T 5x20mm Slow Blow (42448944)

## 11. Appendices, introduction

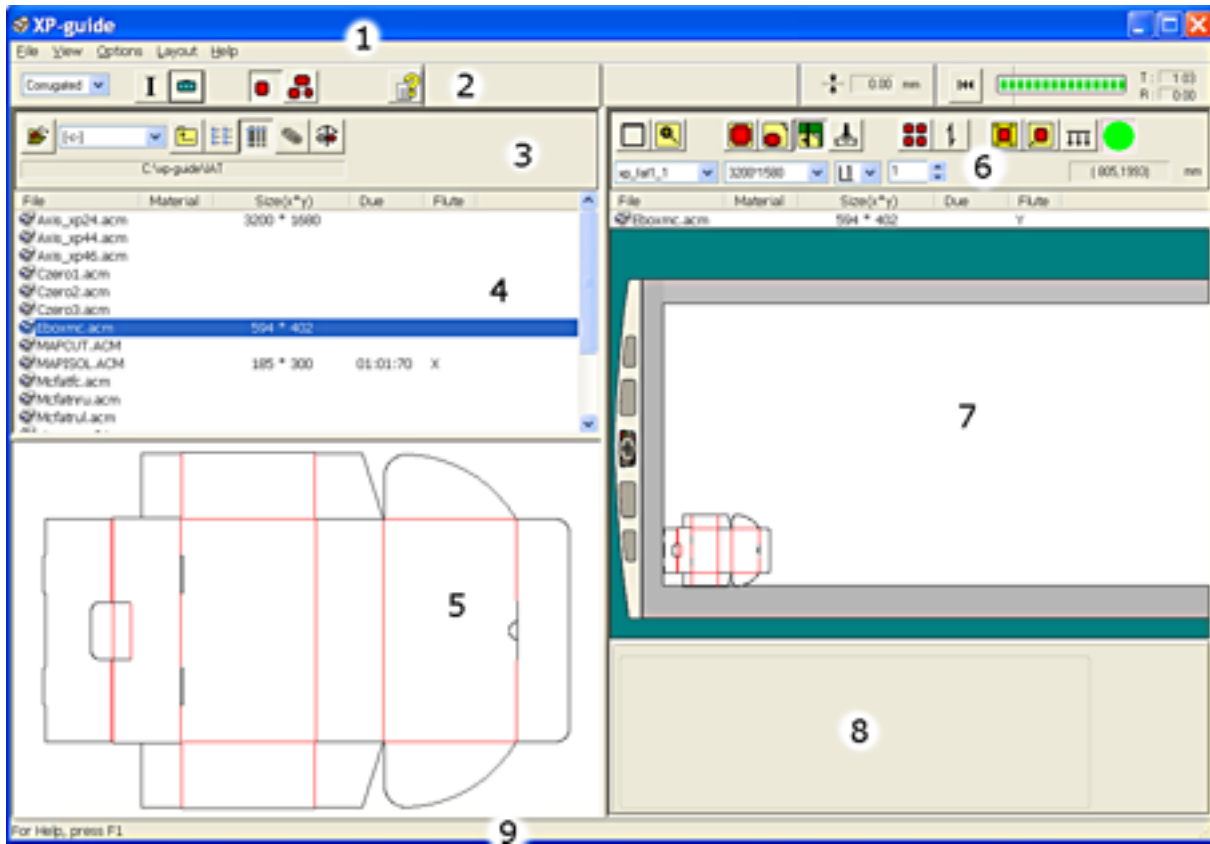
---

The appendices section of this manual contains mainly reference information. Much of this is available also in the context-sensitive help included in XP-Guide.

For that reason, you will find this section in English language only.



## 12. Appendix - The Graphical User Interface



The XP Graphical User Interface (GUI) contains these main elements:

- |                     |                    |
|---------------------|--------------------|
| 1 Main Menu         | 5 Preview          |
| 2 Main Toolbar      | 6 Job View Toolbar |
| 3 File View Toolbar | 7 Job View         |
| 4 File View         | 8 ARS Toolbar      |
|                     | 9 Status Bar       |

## 12.1 The Main Menu



The following functions are available from Main Menu and sub-menus:

12.1.1 File	
Open	Open an Input File (66).
Create a box	Work with 123Box (59).
Exit	Terminate XP-Guide.

12.1.2 View	
Position Display	Display of table positions and parameters (189).
View Messages	Message Display; provides a log of system messages (188).
Customize File View	File View configuration (181).
View Finished Jobs	List finished jobs when running in Auto Open mode (183).
Tool bars	Configure GUI tool bars
Status Bar	Configure Status Bar (187).

12.1.3 Options	
Tool configuration	Tool configuration and adjustments (88).
Job Setup	Select and edit job setup files (78).
Board Size setup	Edit table of available board sizes (95).
Toggle Flute Direction	Specify actual flute/grain direction to the system (95).
Transformation	Specify scale and rotation (96).
Step and Repeat	Specify multiple copies of current job (98).
Counter setup	Parameter setting for crease using a matrix (99). (For folding carton only).
System Option	Enter the System Option dialog (74).
Table Options	Enter the Table setup dialog (71).
Registration setup	Configure the ARS system (103).

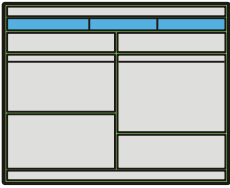
## 12.1.4 Layout

Toggle Layout Mode	Toggles between single and multi design layout (85).
Layout setup	Job layout configuration (85).
Delete	Delete selected design (85).
Delete All	Delete all designs (85).
Select All	Select all designs (85).
Rotate 90	Rotates selected design 90 degrees (85).
Rotate 180	Rotates selected design 180 degrees (85).
Rotate.	Rotates selected design a user defined angle (85).

## 12.1.5 Help

About XP-Guide	<p>XP-Guide version information.</p> <p>Information about maintenance intervals. You will find more information about this issue in the Technical Manual for XP.</p>
User Manual	A link to this document.

## 12.2 The Main Toolbar functions



The left part of the Main Toolbar contains the following general functions:



	Selects application from the drop down list.
	View the Message Display (188).
	Enter Tool Configuration (88).
	Set Single Design operation (85).
	Set Multi Design operation (85).
	Work with 123Box (59).
	Start HSMU/HPMU spindle warm up (HSMU/HPMU only).
	Start vacuum cleaner (HSMU/HPMU only).
	Enter the Help system.

The right part contains the following functions:

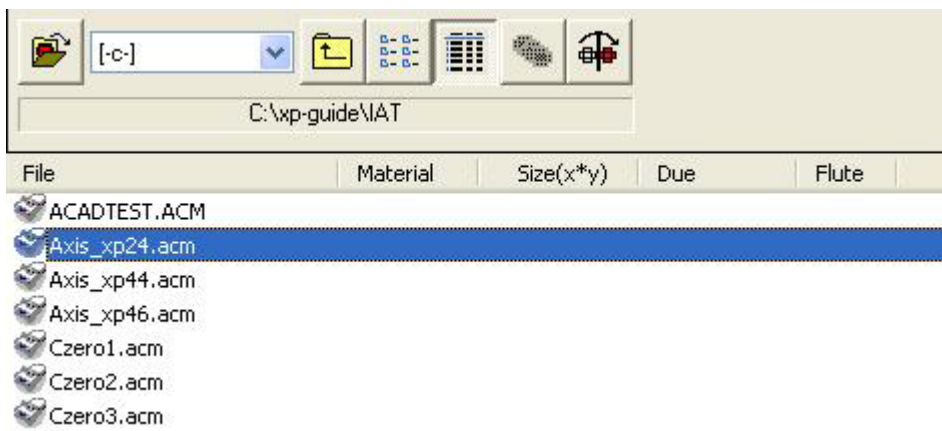
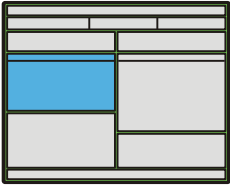


	Shows measured thickness of material on the table.
	Rewinds current job.
	T: Estimated total job time. R: Estimated remaining job time.

## 12.2.1 Main Toolbar configuration

From **View->Toolbars**, you can configure the Main toolbar to show left / right / none of the Main toolbar.

## 12.3 File View



A total of 5 columns can be displayed in the **File View**.

The file name is always displayed in column 1.

The other 4 columns can be customized in the **Customize File View** dialog.

The files in the **File View** are sorted in normal or reversed order. The sorting is toggled by clicking the header of the columns.

The files are ranged the way they will be executed when **Auto Open** is activated.

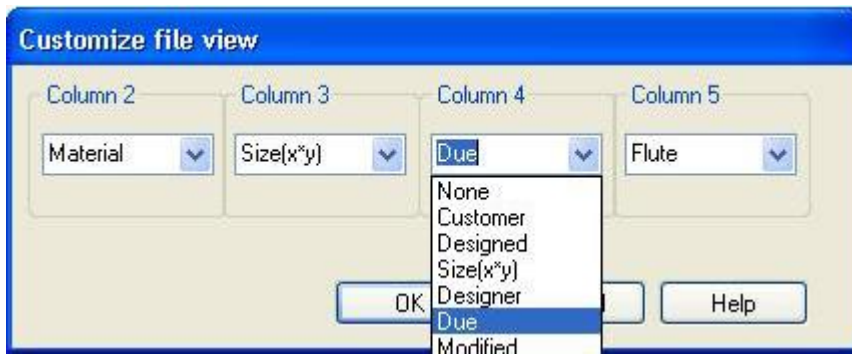
A single click on a file will display the design in the **Preview** window.

When a file is opened, that is selected as a job; the design will be displayed in **Job View**.

### 12.3.1 Customize File View

The Customize File View – dialog is available from:

- **Main Menu->View->Customize File View**
- **File View->Pop-up menu**



Use the **Customize File View** dialog to define the kind of data which you want displayed in the columns in **File View**.

Customize the 4 columns by selecting the appropriate field in the drop down list.






The content of the different fields are File Header - parameters in the **Input File**, except from the Size, which is calculated after the file has been opened.

## 12.4 File View toolbar






You will find the following buttons in the File View toolbar:

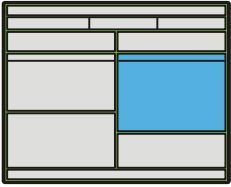


	Opens selected file.
	Selects disk drive for input files.
	Up one level.
	Shows file names only.
	Shows file names and details.

### 12.4.1 Auto Open function

	<p>Enable 'Move finished file' – mode.                      Moves the current job, when finished, to a sub-directory and removes it from the list of files in the File View.                      Press the button a second time to disable the 'Move finished file' – mode.                      Note: You can view finished job by selecting <b>View-&gt;View Finished Jobs</b> on the menu or by selecting View finished job from the pop-up menu in the file view.</p>
	<p>Auto Open function                      Pressing this button activates the Auto Open function. The file at the top of the File View list will automatically be opened as a new job when the current job is finished.                      Press the button a second time to disable the 'Auto Open' – function.                      Note: It is a pre-requisite for this function that the 'Move finished file' – mode is enabled.</p>
	<p>When the 'Move finished file' – button shows this face, it indicates that the 'Move finished file' – mode is disabled – no automation.</p>

## 12.5 The Job View



File	Material	Size(x*y)	Due	Flute
MAPCUT.ACM		125 * 61		Y

When you open a file, the design is displayed in the **Job View** window.

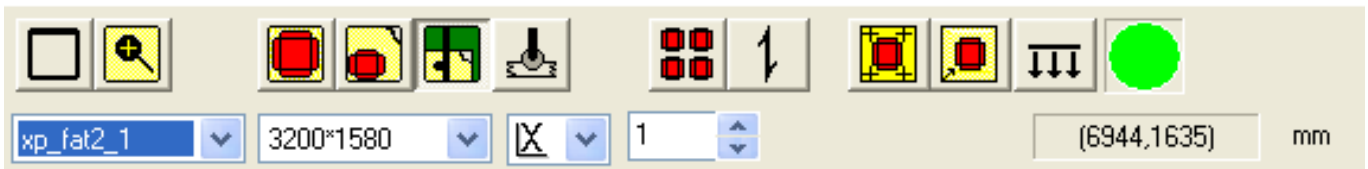
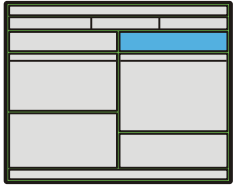
Designs placed in **Job View** can be manipulated according to the selected layout mode.













Various display options are available from the **Job View toolbar**.




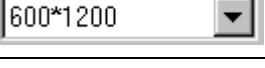







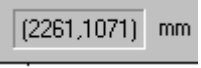
The **File Information Bar** on top of **Job View** display some parameters regarding the last Input File opened.



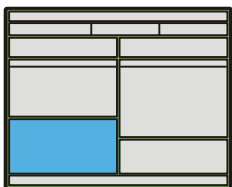
## 12.6 Job View toolbar



	Show job view in full screen. When in full screen display, the button face changes to this:
	Show job view in split screen.
	Enters zoom mode. The cursor changes to a magnifying glass. Select area to be zoomed.
	View design only.
	View design and selected board size.
	View design, selected board size and the table size.
	Enters the Job Setup dialog.
	Enter ARS registration setup dialog. XP-Guide is running with ARS enabled
	Enter ARS registration setup dialog. No ARS functions are enabled
	Rotate direction of flute (corrugated) or grain (folding carton).
	Rotate direction of flute (corrugated) or grain (folding carton).
	Automatic Register System (ARS).

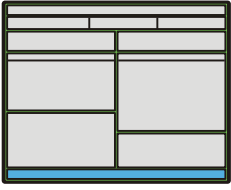
	Register to sheet edge. Enables XL-register functions. The select reference functions are disabled.
	Select Reference Point from the drop down list.
	Selects a <b>Job Setup</b> file from the drop down list.
	Selects <b>Board Size</b> from the drop down list.
	Enter the <b>Step and Repeat</b> setup dialog.
	Number of copies for the <b>Step and Repeat</b> function.
	Enters the <b>Matrix</b> function. ( Matrix function is for Folded Carton application only )
	Button face when the <b>Matrix</b> function is enabled.
	Vacuum section selection
	Indicates that all designs are inside the working area.
	Indicates that one ore more designs are outside the working area.
	Displays the mouse pointer position relative to the selected Reference Point.

## 12.7 Preview



A single click on a file in File View will display the job in the Preview window.

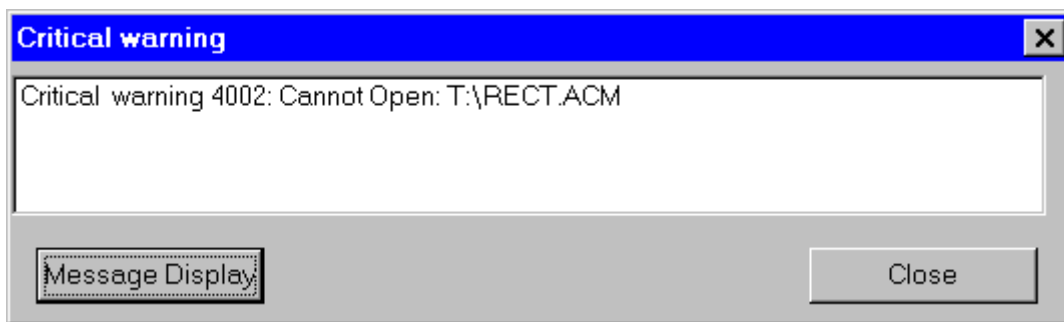
## 12.8 Status bar



The status bar at the bottom of the GUI shows brief descriptions of various functions in the GUI. The status bar can be toggled on and off from **Main Menu->View->Status bar**.

## 12.9 Critical Warning Display

When a situation that requires an action from the operator occurs in the system, the following message box will be displayed:

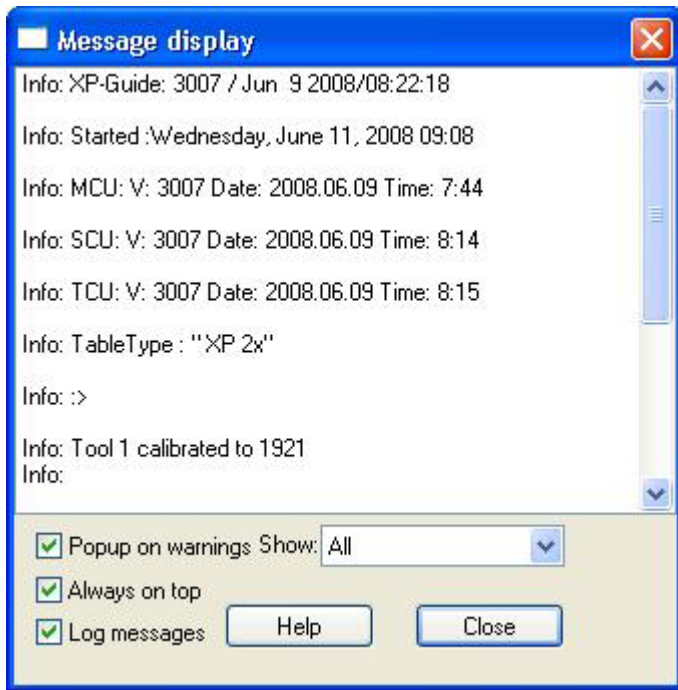


Additional information may be achieved in the Message Display:

## 12.10 Message Display

### I

- The Message Display is available from the Main Toolbar button.



The Message display offers additional information when troubleshooting the system. Normally you will get all the necessary information from the pop-up Critical Warning Display.

For additional information, please examine the **Message Display**.

### Pop-up on warnings

Check this box if you want warnings to be automatically displayed.

### Always on top

Check this box if you want the Message display to stay on top.

### Log messages

The system is prepared for output of additional system information, useful for service and troubleshooting. For normal operation disable this function to reduce the amount of messages.

### Show:

The type of information displayed in the Message display can be configured to:

1. Critical messages only
2. Critical and important messages
3. All messages.

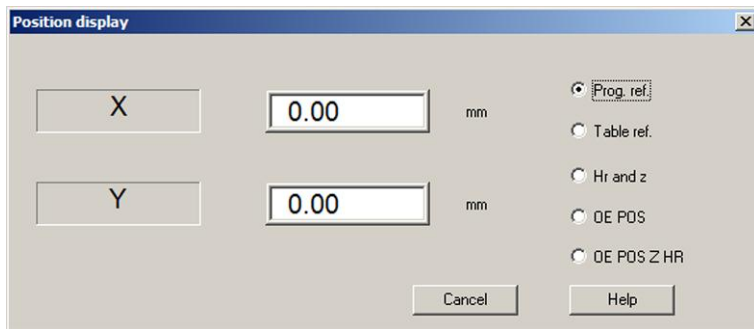
## 12.11 Position Display

The Position Display is available from:

- **Main Menu->View->Position display**
- **Ctrl + D**

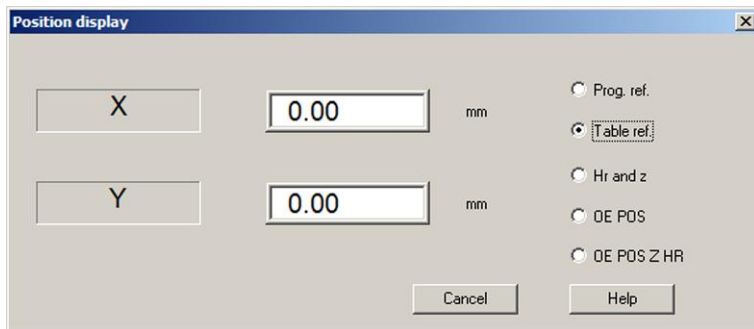
Use the set of radio-buttons to select one of the available displays:

### 12.11.1 Program reference



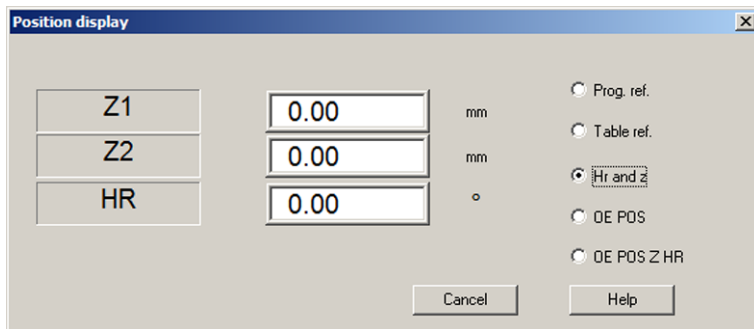
Displays table coordinates relative to program reference point

### 12.11.2 Table reference



Displays table coordinates relative to table reference point

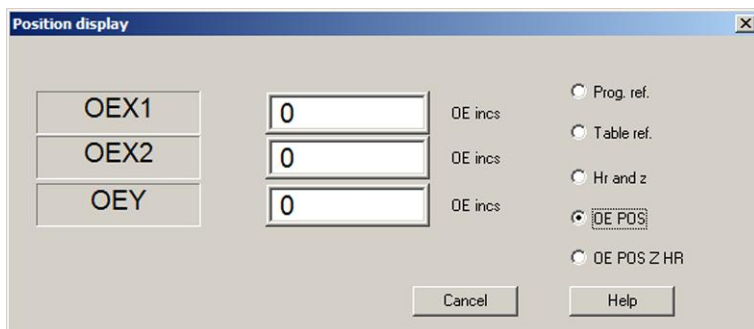
### 12.11.3 Tool Rotation and Z - axes



Display Z and Tool Rotation positions.

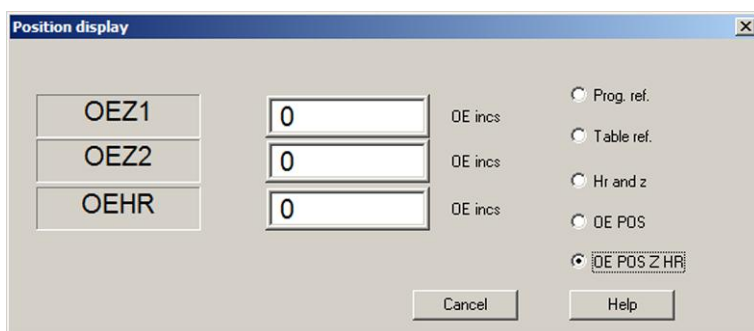
- Z shows actual distance from Z axis zero position
- Tool Rotation shows actual angle from Tool Rotation zero
- Material thickness shows measured thickness of material on the table
- 

### 12.11.4 Encoder count, X and Y



Shows encoder input as read for X1, X2 and Y encoders

### 12.11.5 Encoder count, Z and Tool Rotation



Shows encoder input as read for Z and Tool rotation encoders

## 12.12 Accelerator Keys

<b>Key</b>	<b>Function</b>
Ctrl + B	Board Size setup
Ctrl + D	Position Display
Ctrl + F	Toggle Flute Direction
Ctrl + J	Edit Job Setup
Ctrl + O	Open Input File
Ctrl + P	Set ball point pen pressure (N/A)
Ctrl + S	Step And Repeat setup
Ctrl + T	Tool Configuration
F1	Help in active window
Ctrl + Alt + D	Memory dump
Ctrl + Alt + L	Servo Log
Ctrl + Alt + O	System Setup
Ctrl + E	Display axis force
Ctrl + Alt + K	Keyboard command entry

## 13. Appendix - Install software

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### 13.1 Install XP-Guide system software

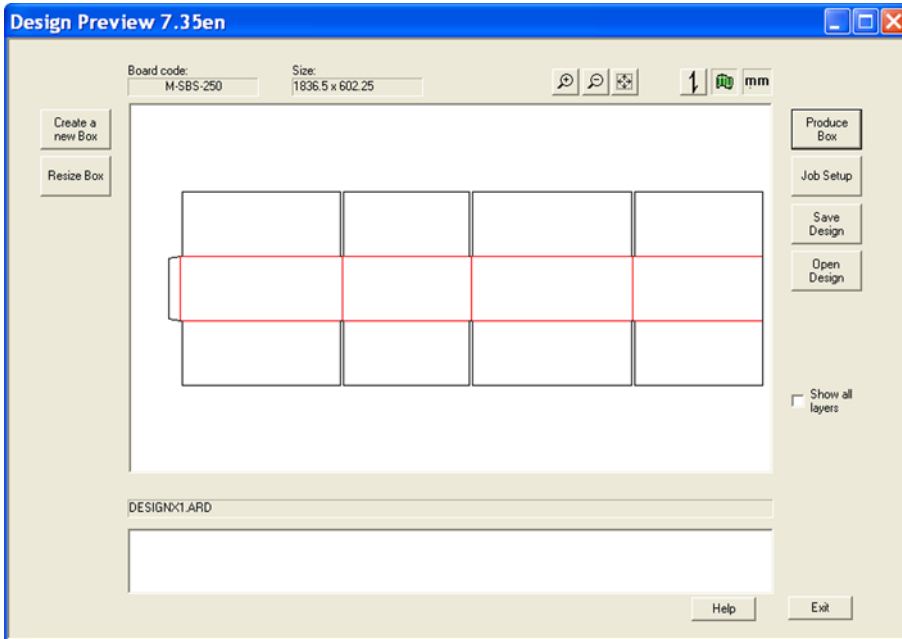
A detailed description of the installation of XP-Guide is found in the installation manual 3090\_InstallationMan\_xp\_us available on the XP-Guide CD.

### 13.2 Install ARS software

For the ARS option to work properly, a Scorpion sw installation has to be completed. You will find a detailed description in the service guide for XP, 3115\_ServiceGuide\_XP\_ARS.pdf, available on the XP-Guide CD.



## 14. Appendix - CAD-X preview dialog



This dialog is used when importing DXF, CFF2 or DDES files and when opening ArtiosCAD designs (.ARD).

The dialog shows the design as read by CAD-X.

At the lower left there is a field showing operator messages.




### 14.1 Board code

<p>Board code: M-SBS-250</p>	<p>Display the selected board code. Board code is a code used in the actual factory to identify the boards available.</p>
----------------------------------	---

### 14.2 Size



<p>Size: 1836.5 x 602.25</p>	<p>Display the size of the design (X x Y) in selected units, mm or inch.</p>
----------------------------------	--

## 14.3 Zoom functions

	Zoom rectangle. Push the button. Use the mouse to select the preview area you want to see in the window.
	Zoom out. Push the button to expand the view.
	Scale to fit. Preview is scaled to fit the window.



## 14.4 Flute button

Display the flute or grain direction. Direction may be altered by pushing the button.

	Flute/Grain is along X.
	Flute/Grain is along Y.

## 14.5 Design side display

Show which side of a design that is displayed.


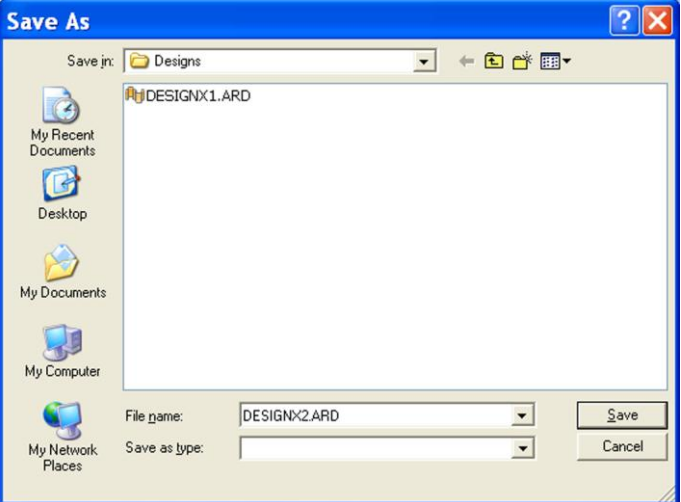
	Inside
	Outside

## 14.6 Unit display

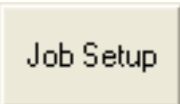
Show the units used for the preview display.

<b>In</b>	Inches
<b>mm</b>	mm


## 14.7 Produce box

	<p>Press the <b>Produce Box</b> button to create the cutting file and transfer it to XP-Guide.</p> <p>Before the CAD-X preview dialog is closed, you are asked to save current design:</p>
	<p>The recommended directory for design storage is: C:\esko\artios\designs.</p> <p>Give the design a name and press <b>Save</b>.</p> <p>After this, XP-Guide is displayed with the selected design displayed in <b>Job view</b>, ready to be cut.</p>


## 14.8 Job setup

	<p><b>Job setup</b> is opened for editing.</p> <p>For more information about <b>Job setup</b>, see XP-Guide Online Help.</p>
---	--

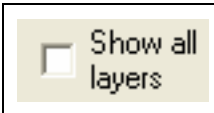
## 14.9 Save design

	<p>Save current design (.ard).</p> <p>The recommended directory for design storage is: C:\esko\artios\designs.</p>
---	--

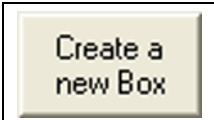
## 14.10 Open design

	<p>Open another design (.ard). Same as double-clicking an ard-file in XP-Guide File View.</p>
---	---


## 14.11 Show all layers

 The button is a rectangular box with a light beige background and a thin black border. It contains a small square icon with a white border and a black outline, followed by the text "Show all layers" in a black sans-serif font.	Show all layers in a design. Inside ArtiosCAD, a design is separated into layers. One layer contains the geometry; one layer contains all dimensions and so on. Use this option to verify your settings.
---	--

## 14.12 Create a new box

 The button is a rectangular box with a light beige background and a thin black border. It contains the text "Create a new Box" in a black sans-serif font.	Start from the beginning, select and specify a new box.
---	---

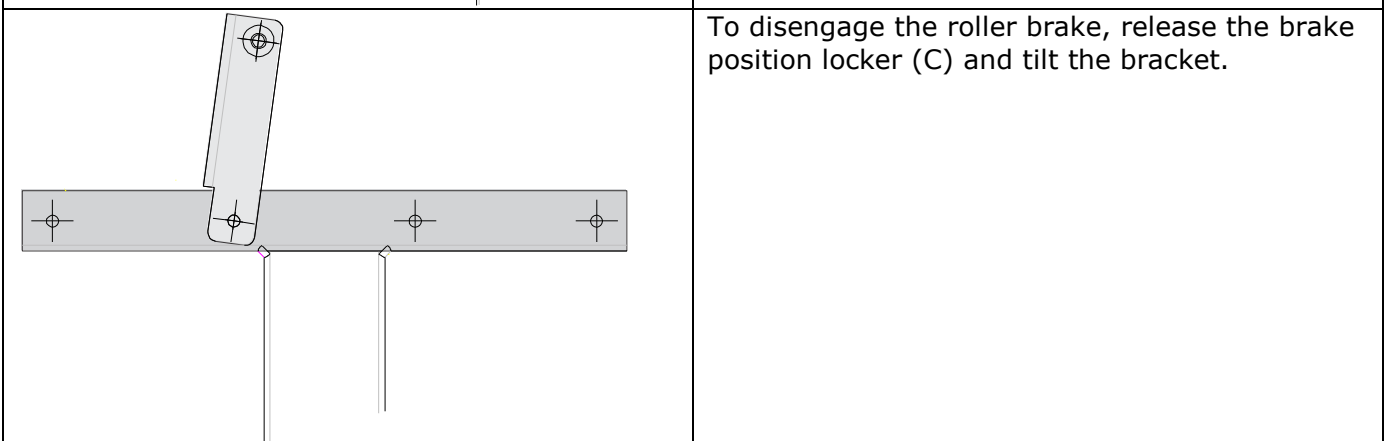
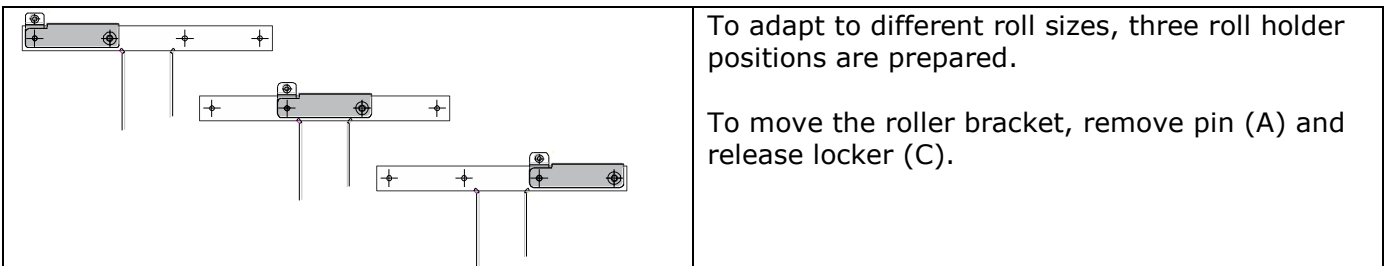
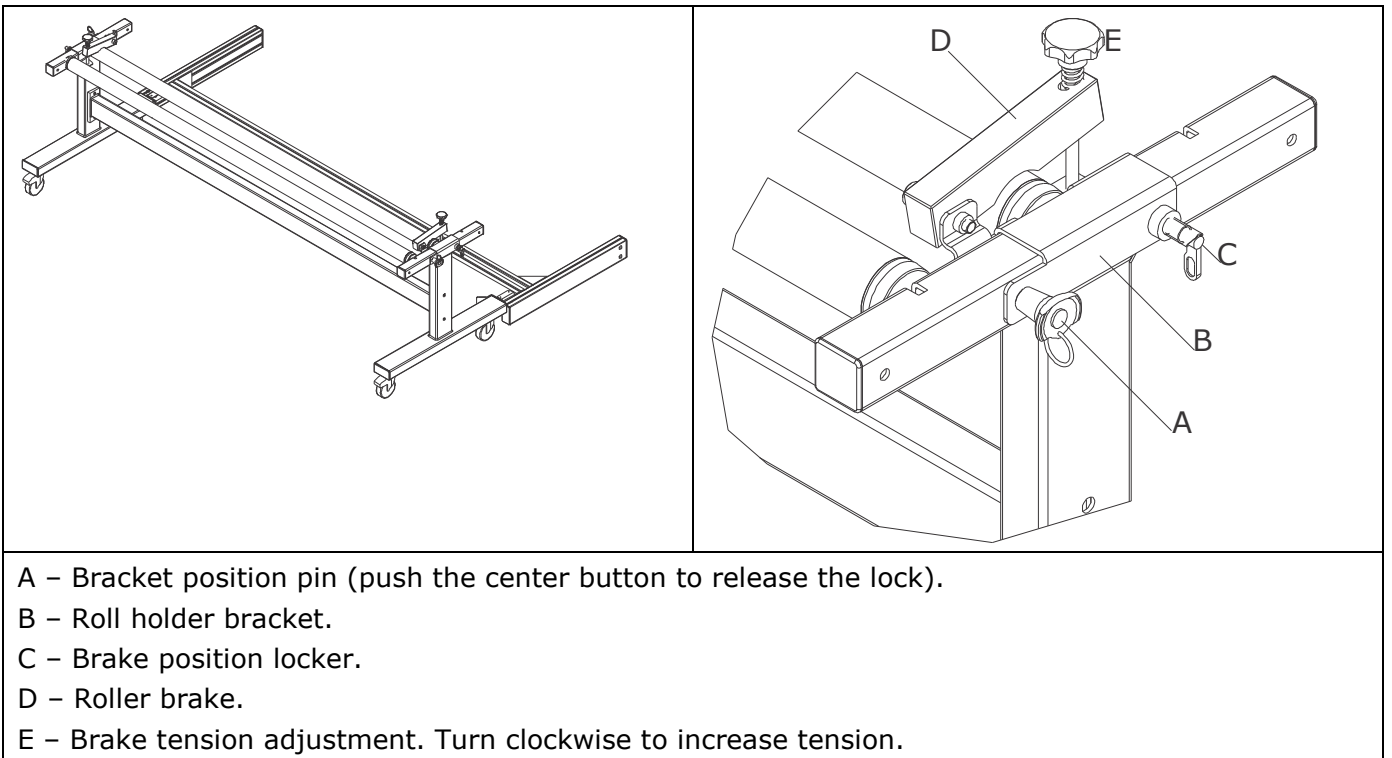
## 14.13 Resize Box

 The button is a rectangular box with a light beige background and a thin black border. It contains the text "Resize Box" in a black sans-serif font.	Enter dialog for modification of box parameters.
---	--

## 14.14 Exit

Close this dialog.

## 15. Appendix – Roll feeder



## 16. Appendix – Zefiro 75, vacuum cleaner

---

### 16.1 Introduction



- 1 – Filter chamber
- 2 – Filter shaking lever
- 3 – Removable material container

**Note:**

Carefully observe the vacuum cleaner filling level.

If the vacuum cleaner container is filled up completely, the dust removal function will stop with a high risk for HSMU/HPMU motor damage.

### 16.2 Filter shaking



Filter shaking is important in order to maintain a good vacuum cleaner performance.

Filter shaking is best operated every time before use and after prolonged operation.

**Note:** This operation must be performed only when the vacuum cleaner is switched off and the motor has stopped.

## 16.3 Remove material container



>



>>



Note:

You can use the container with or without plastic bags.

## 16.4 Use plastic bag in material container



Parts needed: Steel ring and plastic bag



Fix the plastic bag to the ring in this way



Ring and plastic bag ready for the container



Fold/fix the plastic bag around the container



Container with plastic bag ready for operation

Detailed information about how to operate the vacuum cleaner is available in the Zefiro 75 Operators and maintenance manual.