



CircuitPro 3.0 PL

[Online help](#)

Date of issue 2016-06-02

Contents

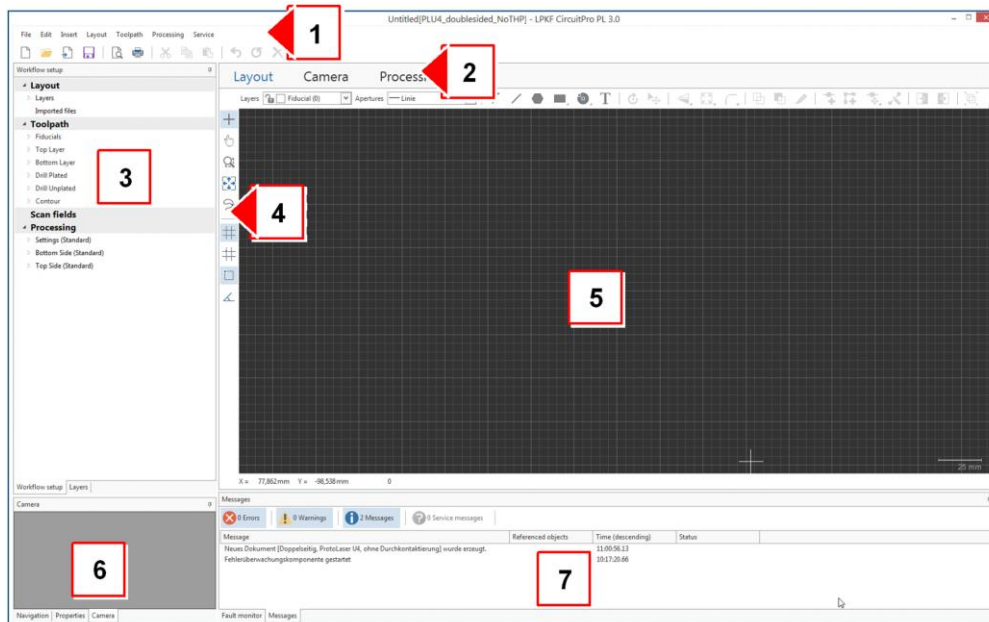
1	User interface	8
1.1	Pane <i>Workflow setup</i>	9
1.1.1	Material composition	9
1.1.2	Layout	10
1.1.3	Toolpaths	12
1.1.4	Scan fields	13
1.1.5	Processing	14
1.2	Pane Layers	16
1.3	Pane Properties	17
1.4	Pane <i>Camera</i>	17
1.5	Pane <i>Navigation</i>	18
1.6	Pane Fault monitor	18
1.7	Pane <i>Messages</i>	19
1.8	Toolbar <i>View</i>	20
1.9	Views	21
1.9.1	CAM	22
1.9.2	Camera	24
1.9.3	Processing	25
2	Menus	27
2.1	Menu <i>File</i>	27
2.1.1	New	28
2.1.2	Open	28
2.1.3	Recent files	28
2.1.4	Save	28
2.1.5	Save as	28
2.1.6	Import	29
2.1.7	Reimport	37
2.1.8	Export	37
2.1.9	Import old version	38
2.1.10	Recent files	38
2.1.11	Print	39
2.1.12	Print preview	43
2.1.13	Info	43
2.1.14	Help	43
2.1.15	Options	44
2.1.16	Exit	61
2.2	Menu <i>Edit</i>	61
2.2.1	Undo	61
2.2.2	Repeat	62
2.2.3	Redo	62
2.2.4	Cut	62
2.2.5	Copy	62
2.2.6	Paste	62
2.2.7	Delete	62
2.3	Menu <i>Insert</i>	63
2.3.1	Flash	64
2.3.2	Path	64
2.3.3	Polygon	65
2.3.4	Rectangle	65
2.3.5	Rectangle path	66
2.3.6	Circle by radius	66
2.3.7	Circle by points	67
2.3.8	Circle path by radius	67

2.3.9	Circle path by points	68
2.3.10	Text	68
2.3.11	Data Matrix Code	69
2.3.12	Rubout all layers	69
2.3.13	<Create new layer >	69
2.3.14	Fiducial	69
2.3.15	<Create new layer >	70
2.4	Menu <i>Layout</i>	71
2.4.1	Aperture list library	73
2.4.2	Move object	73
2.4.3	Rotate	74
2.4.4	Mirror horizontal	74
2.4.5	Mirror vertical	74
2.4.6	Scale	75
2.4.7	Expand	75
2.4.8	Round	76
2.4.9	Chamfer	77
2.4.10	Split	77
2.4.11	Merge	78
2.4.12	Difference	78
2.4.13	Change line width	79
2.4.14	Add point	79
2.4.15	Add mirror point	80
2.4.16	Move point	80
2.4.17	Split path	81
2.4.18	Set zero point	81
2.4.19	Convert to polygon	81
2.4.20	Convert to closed path	82
2.4.21	Group	82
2.4.22	Ungroup	82
2.4.23	Measure	83
2.4.24	Reduce number of elements	83
2.4.25	Close open path	84
2.4.26	Design rule check	84
2.4.27	Convert to flash	85
2.4.28	Combine to flash	85
2.4.29	Compare to flash	85
2.4.30	Explode flash	85
2.5	Menu <i>Toolpaths</i>	86
2.5.1	Add laser insulate	87
2.5.2	Add contour routing	89
2.5.3	Add conversion	90
2.5.4	Edit breakout tabs	91
2.6	Menu <i>Processing</i>	92
2.6.1	Material settings	92
2.6.2	Tool library	93
2.6.3	Placement	97
2.6.4	Fiducial settings	98
2.6.5	Alignment settings	99
2.6.6	Process all	99
2.6.7	Stop processing	99
2.6.8	Connect to machine	99
2.7	Menu <i>Service</i>	100
2.7.1	Send support information	100

3	How to work with the software	101
3.1	Typical production process	101

1 User interface

The user interface of your system software is divided in individual panes that can be shown or hidden as required. Additionally, you can move, minimize, and arrange the panes according to your needs. Thus, the user interface is variable and possibly structured differently.



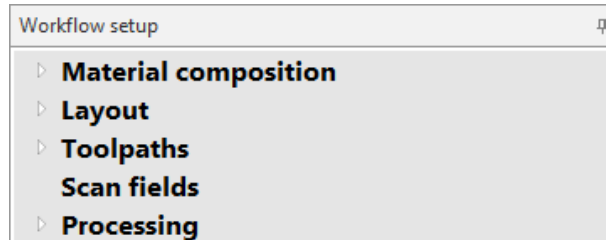
The following table describes the individual areas of the user interface:

No.	Item	Description
1	Menu bar and toolbar	Contains menu items and provides fast access to frequently used functions.
2	Buttons of the views	Contains buttons for accessing the different views (<i>CAM</i> , <i>Camera</i> and <i>Processing</i>) and the available tools.
3	Pane <i>Workflow setup</i>	Contains information on the tools, the scan fields, and other structures of the work file.
4	Toolbar of the view	Contains functions for displaying the objects.
5	Views	Two-dimensional view of the part that can be zoomed. Contains switchable views with different functions.
6	Panes <i>Navigation</i> , <i>Properties</i> , and <i>Camera</i>	Contains several panes with information on objects or on the current position.
7	Panes <i>Fault monitor</i> and <i>Messages</i>	Contains several panes with a list of errors and messages.

1.1 Pane *Workflow setup*

The pane *Workflow setup* contains information on the currently loaded processing data such as layer, scan fields, used tools, etc.

Most of the entries contain functions that can be activated via the context menu.

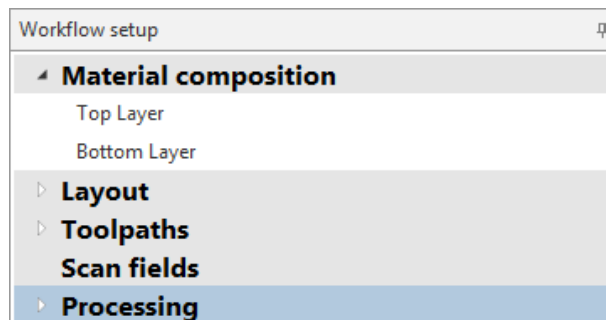


The entries of the pane *Workflow setup* are described in the following table:

Item	Description
Material composition	In this field, the settings of the materials used can be adjusted.
Layout	Displays the existing layers and the imported files.
Toolpaths	Contains the toolpaths' settings for calculation.
Scan fields	Displays the existing scan fields.
Processing	Here, structures of production phases, work packages, tasks, and tool assignment are displayed.

1.1.1 Material composition

This section of the *Workflow setup* displays the existing layers according to the material surface.

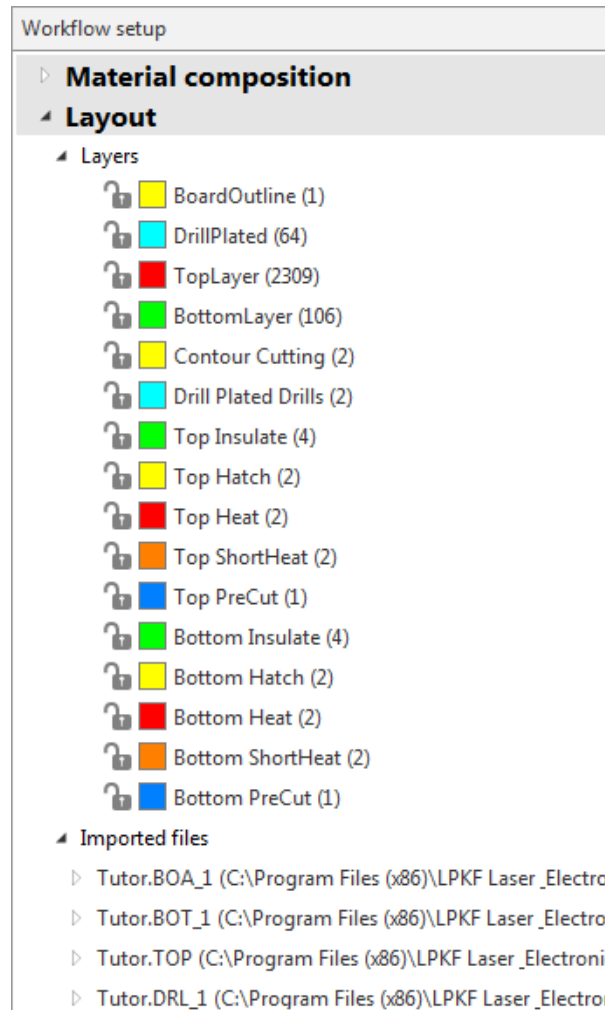


The entries of the context menu are described in the following table:

Section/Item	Name	Description
Material composition	Change number of layers	Here, the number of layers can be adapted.
Layer	Delete	Delete selected objects

1.1.2 Layout

This section of the *Workflow setup* contains information on the different layers of the processing data and the contained objects.



The entries of the section *Layout* are described in the following table:

Item	Description
Layers	Contains all existing layers.
Imported files	Name and path of the imported files.

Via this context menu, specific functions of the individual items can be activated. The menu is opened with a right-click on the section or item.

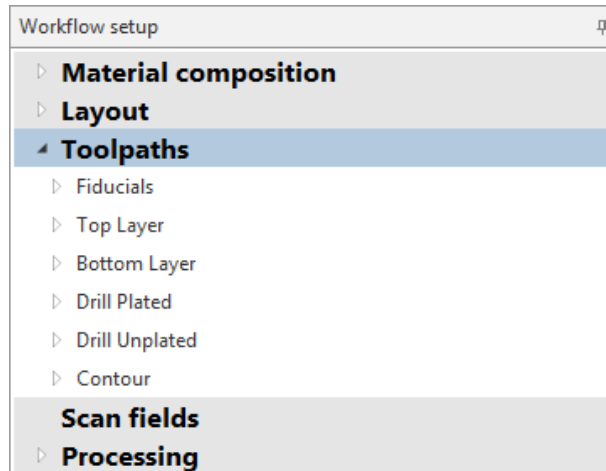
The entries of the context menu are described in the following table:

Section/item	Name	Description
Layout	Import old version	Imports CBF files that have been created with a former version of the application.
Layout	Import...	Opens a dialog for importing files. The existing data remain.
Layout	Reimport all	Reimports previously imported data.
Layout	Export...	Exports data to a foreign format.
Layers	Add layer	Adds a new layer.

Section/item	Name	Description
Layers	Show/Hide empty layers	Empty layers (with 0 elements) are shown/hidden.
Layers	Export...	Exports data to a foreign format.
Selected layer	Select by layer	Marks all objects of the selected layer.
Selected layer	Color...	Changes the color of the objects within a layer in the view <i>CAM</i> .
Selected layer	Visible	Shows/Hides the layer in the view <i>CAM</i> .
Selected layer	Selectable	Disables/Enables editing objects within the selected layer.
Selected layer	PCB layer	Assigns the layer to a PCB layer.
Selected layer	Display mode	Sets how the objects are displayed in the view <i>CAM</i> .
Selected layer	Technology	Assigns a technology to the layer. The selected technology determines which tools can be used.
Selected layer	Inverse	Structures the source layer from the inside. Example: In a letter or a number the inner area is structured.
Selected layer	Export...	Exports data to a foreign format.
Imported files	Reimport all	Reimports previously imported data.
Imported files	Export...	Exports data to a foreign format.
Selected imported file	Reimport	The selected group is reimported.
Selected imported file	Export...	Exports data to a foreign format.
Aperture (only visible if aperture is existing)	Modify aperture...	Opens the aperture view for editing the aperture.
Aperture (only visible if aperture is existing)	Select by aperture	Marks all objects that use this aperture.
Aperture (only visible if aperture is existing)	Export...	Exports data to a foreign format.

1.1.3 Toolpaths

This section contains the toolpaths' settings for calculation.



The entries of the section *Toolpaths* are described in the following table:

Name	Description
Algorithm parameters (e.g. Fiducial, Top Layer, DrillPlated, etc.)	The algorithm parameters contain various toolpath types.

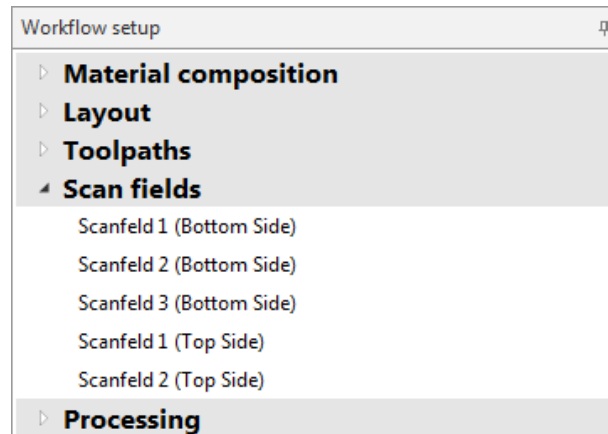
Via the context menu, specific functions of the individual items can be activated. The menu is opened with a right-click on the section or item.

The entries of the context menu are described in the following table:

Section/Item	Name	Description
Toolpaths	Compute all...	All toolpaths are computed. The message <i>Computing results</i> is displayed.
Toolpaths	Add laser insulate...	Opens a dialog with various insulation methods.
Toolpaths	Laser contour routing...	Opens a dialog with various contour routing methods.
Toolpaths	Add conversion...	Opens a dialog that enables you to create tool paths and fiducials.
Toolpaths	Export	Exports data to a foreign format.
Algorithm parameter	Compute	The toolpaths of the selected item are computed.
Algorithm parameter	Configure	Opens a dialog to configure the algorithm parameters.
Algorithm parameter	Export	Exports data to a foreign format.
Toolpath type	Set layer	Here, a layer can be assigned to the toolpath type. The current layer is check-marked.
Toolpath type	Export...	Exports data to a foreign format.

1.1.4 Scan fields

This section of the *Workflow setup* displays the existing scan fields.



The entries of the section *Scan fields* are described in the following table:

Item	Description
Scan field	Scan field name with consecutive numbering.

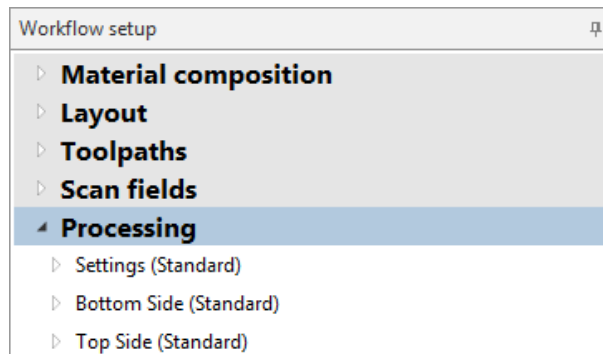
Via this context menu, specific functions of the individual items can be activated. The menu is opened with a right-click on the section or item.

The entries of the context menu are described in the following table:

Section/item	Name	Description
Scan fields	Hide/Show scan fields	The selected scan field is hidden or shown.

1.1.5 Processing

This section of the *Workflow setup* contains the production phases.



The entries of the area *Processing* are described in the following table:

Item	Description
Settings (Standard)	Contains the work packages.
PCB phase (e.g. Bottom Side, Top Side)	Contains the production work packages of the respective PCB side.

Via this context menu, specific functions of the individual items can be activated. The menu is opened with a right-click on the area or item.

The entries of the context menu are described in the following table:

Area/item	Item	Description
Processing	Add production phase	Adds a new production phase
Processing	Export	Exports data to a foreign format.
Settings (Standard)	Set phase ID	Sets the phase ID to <i>Undefined</i> or <i>Production</i> .
Settings (Standard)	Set mirrored	Determines whether the contents of the <i>Settings (Standard)</i> are mirrored or not mirrored.
Settings (Standard)	Add work package	Adds a new work package to the <i>Settings (Standard)</i> .
Settings (Standard)	Export	Exports data to a foreign format.
Work package	Set WP ID	Sets the ID of the work package.
Work package	Add task	Adds a new task to the work package.
Work package	Export	Exports data to a foreign format.
PCB phase (e.g. Bottom Side, Top Side)	Computing a toolpath	Computes the toolpaths of the selected PCB phase.
PCB phase (e.g. Bottom Side, Top Side)	Computing scan fields	Computes the scan fields of the selected PCB phase.
PCB phase (e.g. Bottom Side, Top Side)	Hide scan fields	Show/Hide the scan fields of the selected PCB phase.
PCB phase (e.g. Bottom Side, Top Side)	Set phase ID	Sets the phase ID to <i>Undefined</i> or <i>Production</i> .

Area/item	Item	Description
PCB phase (e.g. Bottom Side, Top Side)	Set mirrored	Determines whether the contents of the PCB phase are mirrored or not mirrored.
PCB phase (e.g. Bottom Side, Top Side)	Change sorting	Here, the sorting of the PCB phase can be changed. Standard (from the right upper side to the lower left side) or LPKF ProtoLaser optimized.
PCB phase (e.g. Bottom Side, Top Side)	Add work package	Adds a new work package to the selected PCB phase.
PCB phase (e.g. Bottom Side, Top Side)	Export	Exports data to a foreign format.
Work package (e.g. Drilling, Structure)	Computing scan fields	Computes the scan fields of the selected work package.
Work package (e.g. Drilling, Structure)	Hide scan fields	Show/Hide the scan fields of the selected work package.
Work package (e.g. Drilling, Structure)	Set WP ID	Sets the ID of the work package.
Work package (e.g. Drilling, Structure)	Add task	Adds a new task to the selected work package.
Work package (e.g. Drilling, Structure)	Export	Exports data to a foreign format.
Task	Assign tool	Assign the tool to the task.
Task	Export	Exports data to a foreign format.

1.2 Pane Layers

The pane *Layers* lists the layers. Depending on the template you selected at the beginning of the project, the number and types of the layers vary.

[Z]	Color	Vis	Sel	Layer	PCB layer	Mode	Tech	Inv
1		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Fiducial (0)	Bottom Layer	True Width	Fiducials	<input type="checkbox"/>
2		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	BoardOutline (0)	Top Layer	True Width	Mechanical	<input type="checkbox"/>
3		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	DrillPlated (0)	Bottom Layer	True Width	Drilling	<input type="checkbox"/>
4		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	DrillUnplated (0)	Bottom Layer	True Width	Drilling	<input type="checkbox"/>
5		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	SilkScreenTop (0)	Top Layer	True Width	Silk Screen	<input type="checkbox"/>
6		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	SolderPasteTop (0)	Top Layer	True Width	Solder Paste	<input type="checkbox"/>
7		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	SolderMaskTop (0)	Top Layer	True Width	Solder Mask	<input type="checkbox"/>
8		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	TopLayer (0)	Top Layer	True Width	Wiring	<input type="checkbox"/>
9		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	TextTop (0)	Top Layer	True Width	Wiring	<input type="checkbox"/>
10		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	RuboutTop (0)	Top Layer	Outline	Rubout	<input type="checkbox"/>
11		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	BottomLayer (0)	Bottom Layer	True Width	Wiring	<input type="checkbox"/>
12		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	TextBottom (0)	Bottom Layer	True Width	Wiring	<input type="checkbox"/>
13		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	SilkScreenBottom (0)	Bottom Layer	True Width	Silk Screen	<input type="checkbox"/>
14		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	SolderPasteBottom (0)	Bottom Layer	True Width	Solder Paste	<input type="checkbox"/>
15		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	SolderMaskBottom (0)	Bottom Layer	True Width	Solder Mask	<input type="checkbox"/>
16		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	RuboutBottom (0)	Bottom Layer	Outline	Rubout	<input type="checkbox"/>
17		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Contour Cutting (0)	Top Layer	Thin Line	Unknown	<input type="checkbox"/>

The icons/functions are described in the following table:

Icon	Name	Description
	New layer	Adds a new layer.
	Delete layer	Deletes a selected layer.
	Order by z	Sorting function: Sorts the layers according to their display priority in z direction.
	Move layer up	Moves up a selected layer by one position.
	Move layer down	Moves down a selected layer by one position.
	Hide empty	Shows/Hides layers without content.

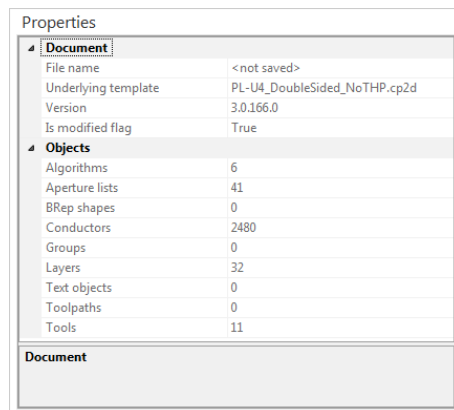
The entries of the pane *Layers* are described in the following table: Most of the settings can also be set in the context menus of the pane *Workflow setup*.

Name	Description
[Z]	Sorting function: Sorts the layers according to their display priority in z direction.
Color	In this column, a color is assigned to each layer. The layers in the view <i>CAM</i> correspond to the selected color in the respective column of the layer.
Vis (Visible)	Shows/Hides the respective layer in the view <i>CAM</i> .
Sel (Selectable)	Activate this function to make the layer selectable with the mouse in the view <i>CAM</i> .
Layer	Indicates the name of the layer. The following brackets contain the number of objects that are on the respective layer.
PCB layer	You can set the PCB layers in the drop-down list.

Name	Description
Mode	In this drop-down list you can determine which display mode is to be used for the respective layer.
Tech (Technology)	In this column, a technology is assigned to each layer.
Inv. (Inverse)	Structures the source layer from the inside. Example: In a letter or a number the inner area is structured.

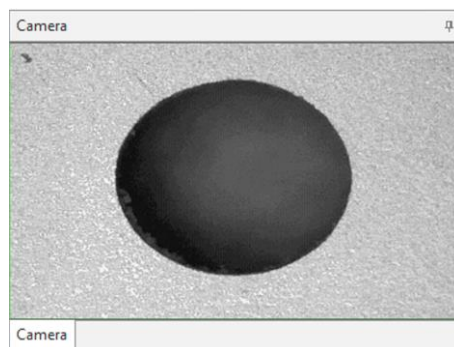
1.3 Pane Properties

The pane *Properties* contains information on the loaded processing data. Depending on the selected entry in the pane *Workflow setup*, different information is displayed.



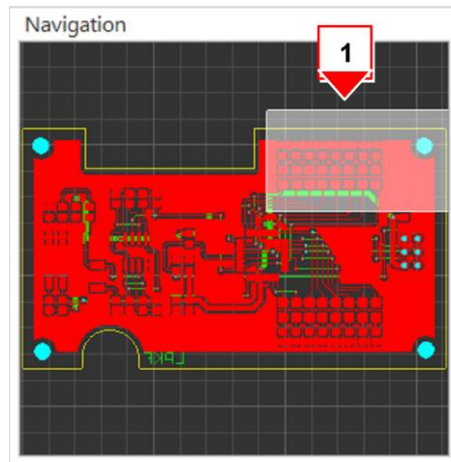
1.4 Pane Camera

The pane *Camera* displays the camera view of the object to be processed.



1.5 Pane Navigation

The pane *Navigation* displays the object to be processed in small format. The zoomed area in the view *CAM* is marked in the pane *Navigation* (1). By keeping the left mouse key pressed, the marked area can be moved.



1.6 Pane Fault monitor

The pane *Fault monitor* contains a list of all faults. These can refer for example to error messages during part production or to a problem while starting the system.



The icons/functions are described in the following table:

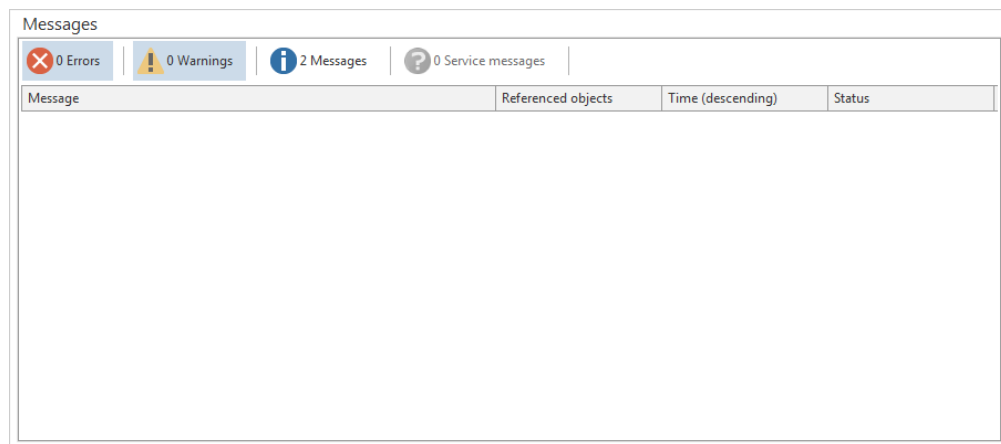
Icon	Name	Description
	Accept all	All errors not yet acknowledged are acknowledged automatically.
	Clear all	All errors already acknowledged are deleted from the list.

The entries of the pane *Fault monitor* are described in the following table:

Description	Description
Fault Time	Displays the time and date when the error occurred.
Fault description	Detailed description of the error that occurred.
Accept time	Time when the error was acknowledged.
Fault Code	Error code

1.7 Pane Messages

The pane *Messages* contains a list of all system messages. These are divided into *Errors*, *Warnings*, *Messages*, and *Service messages*.



The sections of the pane *Messages* are described in the following table:

Item	Description
Errors	Errors are critical system software errors. The errors can be displayed or hidden by clicking on <i>Errors</i> .
Warnings	Warnings are due to input errors that the user has caused. For example, these can be information on canceled actions or actions that have not been executed properly and that can cause a restricted program operation. The warnings can be displayed or hidden by clicking on <i>Warnings</i> .
Messages	Messages present statistical information of the system software. These can be feedback of the system software on certain actions that have been executed. For example: <i>New document created</i> The messages can be displayed or hidden by clicking on <i>Messages</i> .
Service messages	Service messages are displayed when maintenance of the system is due. Contact the LPKF Service. The service messages can be displayed or hidden by clicking on <i>Service messages</i> .

1.8 Toolbar View

The toolbar *View* is a vertical bar that is available for all views. Depending on the view, the available functions can vary.

The toolbar *View* contains the following icons/functions:

Icon	Item	Description
	Selection	By dragging the mouse a rectangular area is selected. All objects inside are marked.
	Pan	The view is moved around the mouse. Can also be activated by pressing the mouse wheel (if available).
	Zoom area	The selected area is zoomed in.
	Fit all	Displays the entire layout. In the view <i>Processing</i> the entire processing area is displayed.
	Polygonal selection	Enables a selection of objects by drawing a polygon.
	Display grid	The grid is shown/hidden.
	Snap to grid	If active, actions can only be executed on grid points. Also working if the grid is hidden.
	Snap to object	If active, the mouse cursor can be snapped to specified points on an object.
	Snap to angle	If active, the mouse cursor can be snapped to a specific angle when a second point is selected (not available for every function). In the options you can define additional angles in <i>Snap</i> .

In the view *Apertures* the following functions are available:

Icon	Item	Description
	Save current aperture	Saves the current aperture. If a new aperture is created, a name has still to be entered.
	Save current aperture under a new name	Saves the current aperture under a new name.
	Close aperture view	Closes the aperture view. If the aperture has been edited it can still be saved.

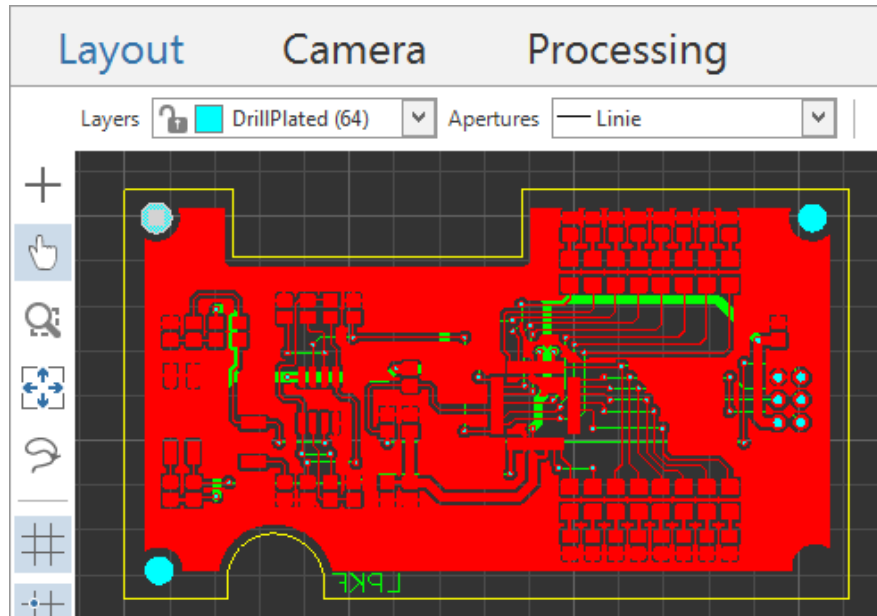
In the view *Camera* the following functions are available:

Icon	Item	Description
	Crosshair overlay	Shows the crosshair in the camera view.
	Crosshair overlay with circle	Shows the crosshair with circle in the camera view.
	Crosshair overlay with rectangle	Shows the crosshair with rectangle in the camera view.

1.9 Views

In the different views, the processing data are created, edited, and produced. It is possible to switch between the different views at any time.

Most of the functions that are available and applicable are displayed in the upper toolbar.



The views are explained in the following table:

Item	Description
CAM	View for editing the processing data. Here, objects can be created and edited. Imported data are displayed.
Camera	Here, the camera image is displayed.
Processing	In the view <i>Processing</i> the entire processing area with the production data is displayed.
Aperture	View for creating and editing apertures in order to use them as flashes in the CAM view. The same functions as in the view <i>CAM</i> are available.

1.9.1 CAM


















In the view *CAM* existing or imported data can be edited and new objects can be created.

Icons with a small triangle (see following figure) have a context menu that can be opened by keeping the left mouse button pressed. It contains additional related functions.



The icons/functions of the toolbar are described in the following table:







Icon	Item	Description
	Selected layer	Displays the currently selected layer. Left-click to open the drop-down list and change the layer by selecting another one.
	Aperture selection	Displays the currently selected aperture. Left-click to open the drop-down list and change the aperture by selecting another one.
	Flash	Creates a flash based on the aperture currently selected.
	Path	Creates a path in the current layer.
	Polygon	Creates a polygon in the current layer.
	Rectangle	Creates a filled rectangle in the current layer.
	Rectangle path	Creates a rectangle path in the current layer.
	Circle by radius	Creates a filled circle by defining a radius.
	Circle by points	Creates a filled circle by setting three points.
	Circle path by radius	Creates a circle path by defining a radius.
	Circle path by points	Creates a circle path by setting three points.
	Text	Creates a text.
	Rotate	Rotates one or multiple objects around a definable pivot point.
	Move object	Moves the marked object by a defined distance and direction.

Icon	Item	Description
	Mirror horizontal	Mirrors one or multiple objects around the horizontal coordinate axis (x axis).
	Mirror vertical	Mirrors one or multiple objects around the vertical axis of reflection (y axis).
	Scale	Scales up or scales down the marked object by the scale factor.
	Expand	Increases or decreases the marked object by a definable length.
	Round	Rounds the corners of the marked object.
	Chamfer	Chamfers the corners of the marked object.
	Merge	Merges adjoining or overlapping objects to a single geometrical object.
	Difference	Removes the area of a geometrical object that is overlapped by a second selected object.
	Split	Splits a marked object by using a predefined path.
	Add point	Adds a point on a marked line.
	Add mirror point	Adds two points with the same distance from the reference point.
	Move point	Moves a marked point.
	Split path	Splits the marked line segment of a path
	Convert to polygon	Fills a marked closed path.
	Convert to closed path	Removes the filling of filled objects.
	Group	Groups marked objects.
	Ungroup	Ungroups grouped objects.

1.9.2 Camera

In the view *Camera*, the camera image is displayed. The camera image can be moved by manually entered values or via double-click.

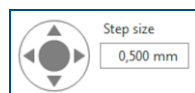
The icons/functions of the toolbar are described in the following table:

Icon	Item	Description
	Measure point to point	Measurement of the distance between two points.
	Measure point to line	Measurement of the distance between a line and a point. First, the line is defined by two points and then the point is positioned.
	Measure circle by 3 points	Measure circle The circle is measured by three points that are selected on the circle.
	Fiducial search	The fiducials are searched in the current camera image.
	Extraction system turn on/off	Switch on/off the extraction system. Switching on the extraction system produces a vacuum that fastens the material.
	Activate pilot laser	Activates/Deactivates the pilot laser

Tab Navigation


Using the functions of the tab *Navigation* the processing point can be manually moved in the directions x, y, and z.

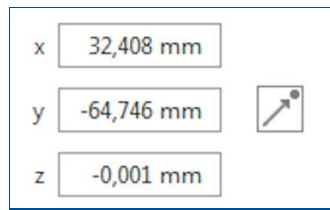
By clicking on the following buttons the processing point is moved in x and y direction. The point moves by the entered step width which can also be adjusted.



Use the button [AF] to activate the autofocus that automatically tries to focus the image. Additionally, you can move the position in z direction by using the up or down buttons.



By using the button  the processing point can be moved to the position indicated in the fields x, y, and z. The current zero point is used as reference point (0, 0, 0).



1.9.3 Processing

In the view *Processing* the generated toolpaths are displayed on the material.

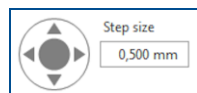
The icons/functions of the toolbar are described in the following table:

Icon	Item	Description
	Material settings	In the dialog <i>Material settings</i> , several parameters of the material to be processed can be set.
	Tool library	In this dialog, tool parameters can be modified. Custom tools can also be created.
	Process all	Starts processing of all toolpaths and work packages.
	Stop processing	The current processing procedure is stopped.
	Pilot laser turn on/off	Turn pilot laser on/off.
	Activate laser	Starts the warm-up phase of the laser and opens the laser shutter.
	Extraction system turn on/off	Switch on/off the extraction system. Switching on the extraction system produces a vacuum that fastens the material.
	Loading position	The x/y table moves to the loading position.

Tab Navigation


Using the functions of the tab *Navigation* the processing point can be manually moved in the directions x, y, and z.


By clicking on the following buttons the processing point is moved in x and y direction. The point moves by the entered step width which can also be adjusted.



By clicking on the following buttons the processing point is moved in z direction.



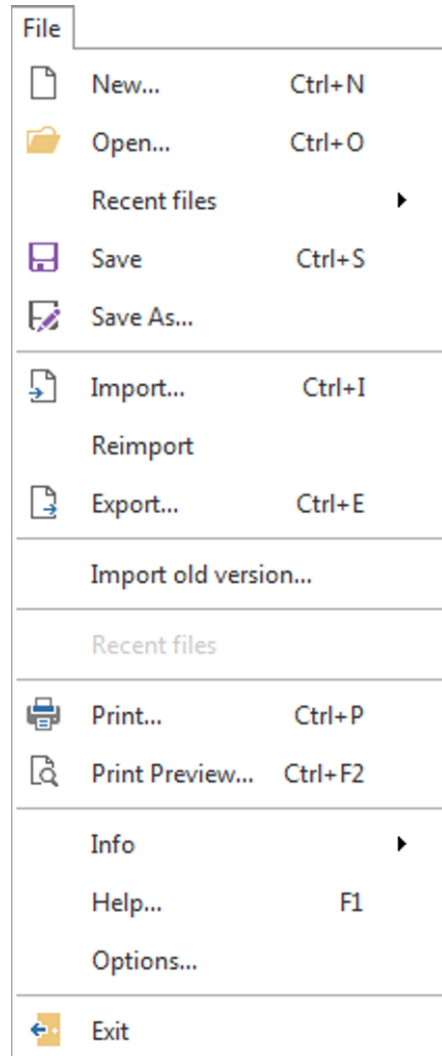
Using the button  the processing point can be moved to the position indicated in the fields x, y, and z. The current zero point is used as reference point (0, 0, 0).

x	<input type="text" value="32,408 mm"/>	
y	<input type="text" value="-64,746 mm"/>	
z	<input type="text" value="-0,001 mm"/>	





2 Menus





2.1 Menu *File*

This menu contains the standard functions of the application.



The entries of the menu *File* are described in the following table:

Icon	Item	Description
	New...	Starts a new project from a selected template or opens a project that is already existing (file extension *.cp2d or *.cbf).
	Open...	Opens an existing project file (file extensions *.cbf and *.cp2d).
	Recent files	Displays the five files that have been opened/edited recently.
	Save	Saves the currently edited project file containing all changes with the same name and storage location.
	Save as...	Saves the currently edited project file containing all changes with a different name and/or storage location.

Icon	Item	Description
	Import...	Imports CAD files of various formats.
	Reimport	Provides the possibility to reimport the data previously imported or to edit the files before the import.
	Export	Exports the current project.
	Import old version...	Imports *.cbf files that have been created with a former version of the application.
	Recent files	Displays the last five files that have been opened/edited recently.
	Print...	Prints the current layout. Use the diverse settings to optimize your print result.
	Print preview...	Displays the preview of the print results using the current print settings.
	Info	Contains information on software and hardware.
	Help...	Displays the detailed help.
	Options...	Contains application settings, such as language settings.
	Exit	Exits and closes the current application.

2.1.1 New

Starts a new project from a selected template or opens a project that is already existing (file extension *.cp2d or *.cbf).

Summary

The command *New* enables you to create a new project file based on an existing, installed template or to search on your computer for a custom template that is suitable. The tab *Projects* lists the recently edited projects.

2.1.2 Open

Opens an existing project file (file extensions *.cp2d and *.cbf).

Summary

In the dialog to be displayed, navigate to the desired file and click on *Open*. The data are displayed in the CAM view.

2.1.3 Recent files

Displays the files that have been recently opened/edited.

2.1.4 Save

Saves the currently edited project file containing all changes with the same name and storage location.

2.1.5 Save as

Saves the currently edited project file containing all changes with a different name and/or storage location.

2.1.6 Import

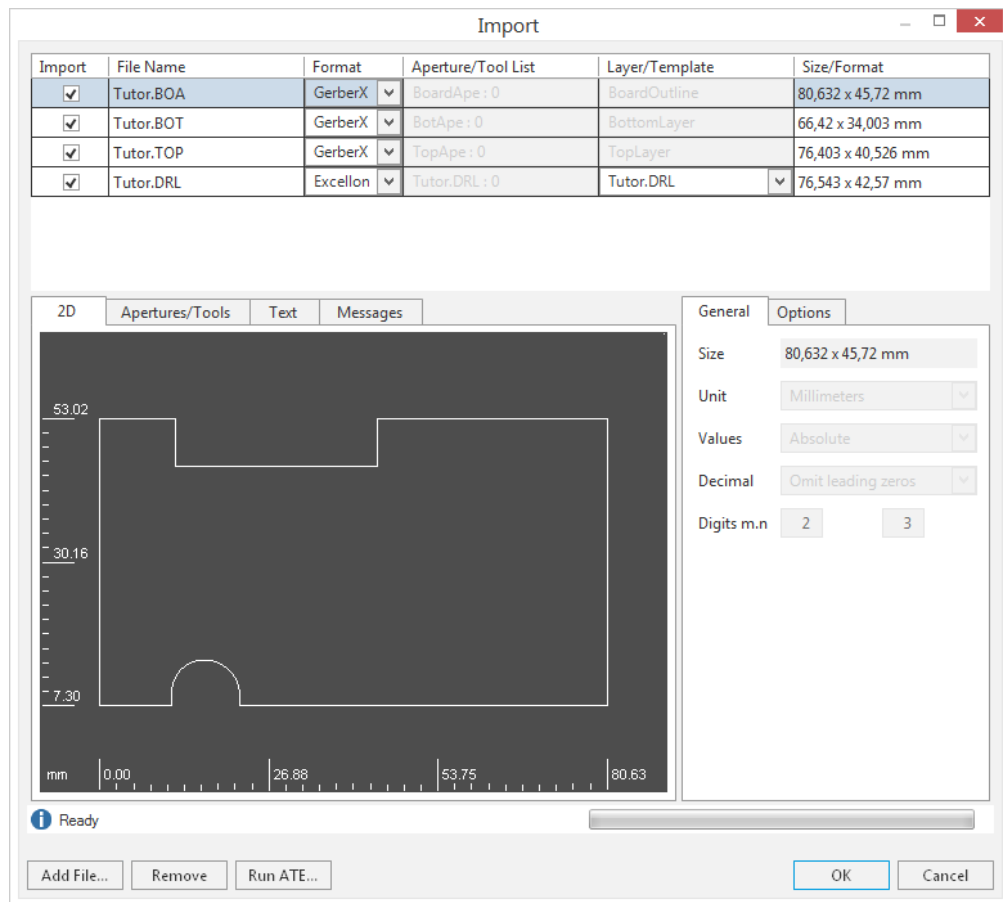
Imports CAD files of various formats.

Summary

The following formats are supported:

Format	Description	Extension
CAM	Data format of the system	*.cam
Excellon	Data format for drilling and milling operations on PCBs.	*.dri; *.drd
Gerber	Data format for PCB image files	*.gbr
Gerber X, Gerber X2	Extended data format for PCB image files	*.gbx
JOB files	Data format for BoardMaster JOB files	*.job
LMD	LPKF Mill Drill Data format for data transfer between LPKF software products	*.lmd
HPGL	Data format for drawings, formerly used for operating pen plotters.	*.plt
DXF	Data format for drawings created in AutoCAD	*.dxf
Sieb & Meyer	Data format for drilling and milling operations on PCBs.	*.dri *.sm1; *.sm2
ODB++	Data format for the PCB layout, drill data, netlists, and component data.	*.zip
TIFF	Data format for image data	*.tiff; *.tif

The dialog is arranged as follows:



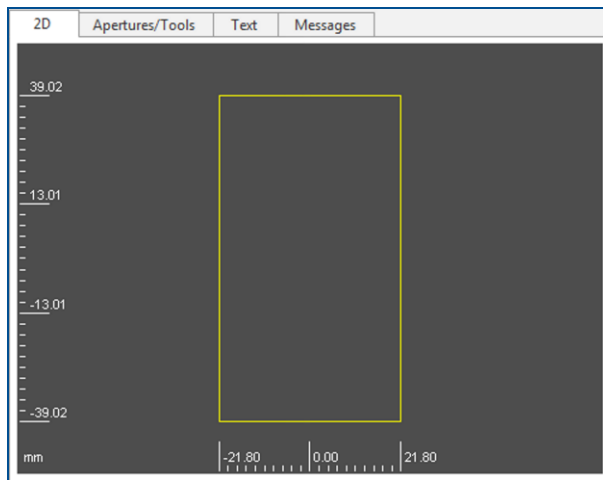
The following information on the imported files are displayed:

Column	Description
Import	Activates/Deactivates the import of the file.
File name	Indicates the file name of the file to be imported.
Format	Displays the original format of the file to be imported. The selection can be changed. Click on the arrow to open the drop-down list.
Aperture/Tool list	Displays the assigned <i>Aperture/Tool list</i> . The selection can be changed. Click on the arrow to open the drop-down list.
Layer/Template	Displays the layer/template that is to be assigned in CircuitPro. The selection can be changed. Click on the arrow to open the drop-down list.
Size/Format	Displays the size/format of the layer.

The dialog *Import* contains the following tabs:



2D

Displays the layout and the dimensions of the imported file:





Apertures/Tools

Displays the list of the apertures and the tools that you need for your imported project:

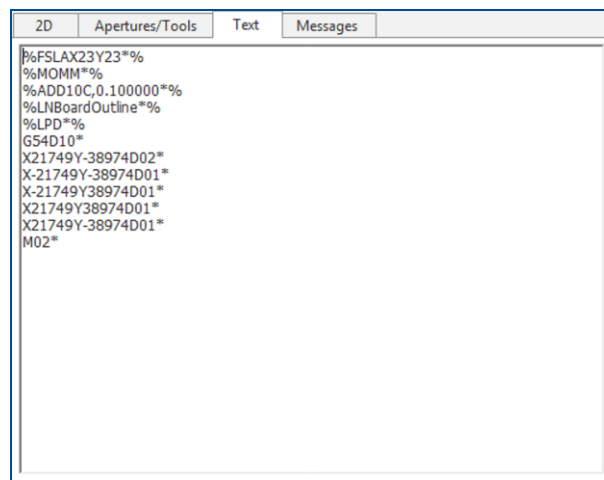
Image	Name	Mode	Rotation	a	b	c	d
	D10		0°	0,1			

The columns have the following meaning:

Column	Description
Image	Displays the shape of the aperture.
Name	Displays the name of the aperture.
Mode	Indicates if the aperture has been imported as a drawn object  or as a flash  .
Rotation	Indicates if the aperture has been rotated (circular apertures are set to 0° by default).
a-d	Display parameters that describe the aperture size. Depending on the aperture shape, not all parameters are required.

Text

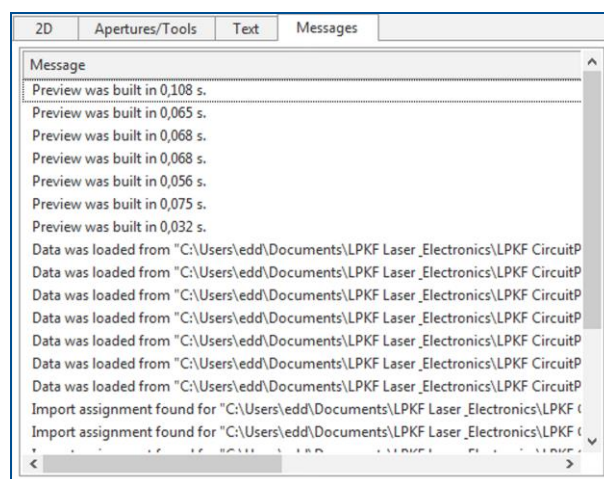
Displays the ASCII text format of the imported file:



```
%FSLAX23Y23*%
%MOMM*%
%ADD10C,0.100000*%
%LNBoardOutline*%
%LPD*%
G54D10*
X21749Y-38974D02*
X-21749Y-38974D01*
X-21749Y38974D01*
X21749Y38974D01*
X21749Y-38974D01*
M02*
```

Messages

Displays the system messages of the current actions:



```
Message
Preview was built in 0,108 s.
Preview was built in 0,065 s.
Preview was built in 0,068 s.
Preview was built in 0,068 s.
Preview was built in 0,056 s.
Preview was built in 0,075 s.
Preview was built in 0,032 s.
Data was loaded from "C:\Users\edd\Documents\LPKF Laser_Electronics\LPKF CircuitP
Data was loaded from "C:\Users\edd\Documents\LPKF Laser_Electronics\LPKF CircuitP
Data was loaded from "C:\Users\edd\Documents\LPKF Laser_Electronics\LPKF CircuitP
Data was loaded from "C:\Users\edd\Documents\LPKF Laser_Electronics\LPKF CircuitP
Data was loaded from "C:\Users\edd\Documents\LPKF Laser_Electronics\LPKF CircuitP
Data was loaded from "C:\Users\edd\Documents\LPKF Laser_Electronics\LPKF CircuitP
Data was loaded from "C:\Users\edd\Documents\LPKF Laser_Electronics\LPKF CircuitP
Import assignment found for "C:\Users\edd\Documents\LPKF Laser_Electronics\LPKF (
Import assignment found for "C:\Users\edd\Documents\LPKF Laser_Electronics\LPKF (
```

The dialog *Import* contains the following sub tabs, depending on the tab you are currently using (*2D*, *Apertures/Tools*, *Text* or *Messages*):

General

Displays the dimensions of the imported file:

General	Options
Size	43,598 x 78,048 mm
Unit	Millimeters <input type="button" value="v"/>
Values	Absolute <input type="button" value="v"/>
Decimal	Omit leading zeros <input type="button" value="v"/>
Digits m.n	<input type="button" value="2"/> <input type="button" value="3"/>

The following settings are available:

Setting	Description
Size	Displays the total size of the imported layout.
Unit	Displays the unit of measurement (millimeters or inches).
Value	Indicates if absolute values or relative values are used for calculating.
Decimal	Indicates if leading or trailing zeros are suppressed.
Digits m.n	Indicates the number of decimal places in the coordinates: m = integer digits n = decimal places

Options

Provides various options:

Setting	Checked
Use layer name	<input type="checkbox"/>
Use layer polarity	<input checked="" type="checkbox"/>
Rotate Square	<input type="checkbox"/>
Step and Repeat to flash	<input type="checkbox"/>
Rotate AM-Octagon	<input type="checkbox"/>
Set 360 interpolation as default	<input type="checkbox"/>
Apply to all Gerber files	<input type="checkbox"/>

The following settings are available:

Setting	Description
Use layer name	Uses the layer names defined in the Gerber file.
Use layer polarity	Activates/Deactivates the layer polarity analysis during the Gerber import.
Rotate Square	Activates/Deactivates the automatic rotation of square objects during the Gerber import.
Step and Repeat to flash	Activates/Deactivates combining object collections to flashes for <i>Step and Repeat</i> commands within the file.
Rotate AM-Octagon	Always adjusts the octagon edges to the axes.
Set 360° interpolation as default	Activates by default a 360° interpolation for circles, regardless of the corresponding commands in the file.
Apply to all Gerber files	Applies the setting to all imported Gerber files.

Attributes

Is only displayed when the tab Apertures/Tools is activated and indicates the properties of the apertures and the tools:

Allgemein
Optionen
Attributes

Type: ▼

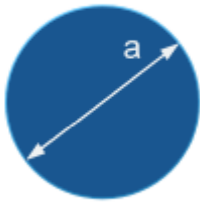
Rotation:

a:

b:

c:

d:

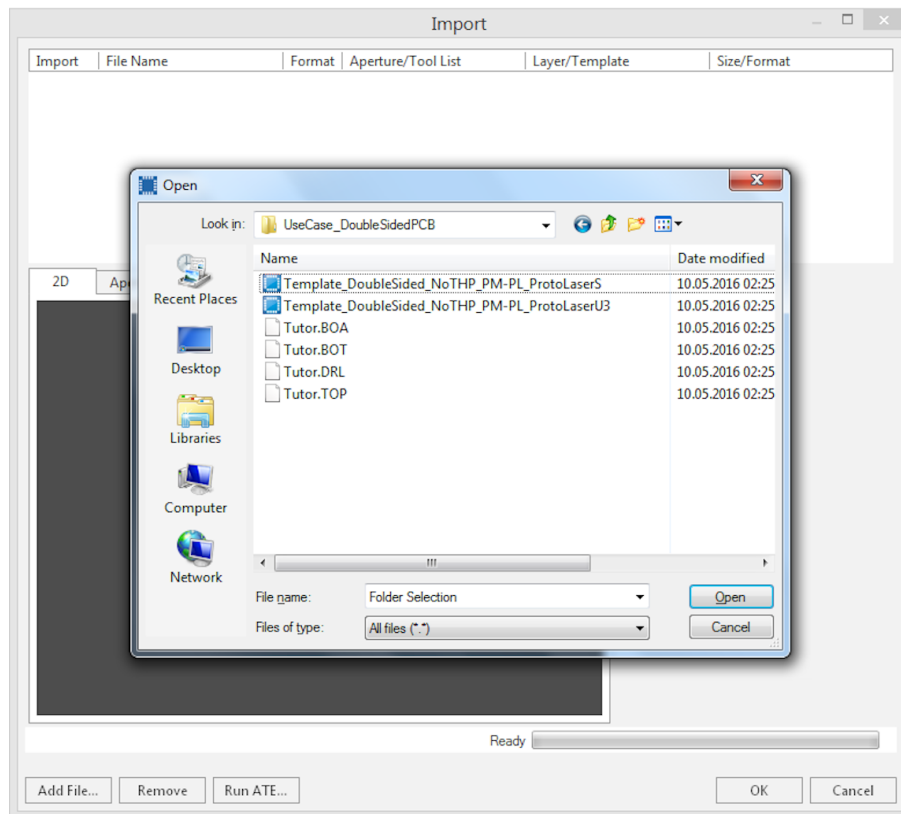


The following settings are available:

Attribute	Description
Type	Indicates the aperture type. Changing the type is possible in the drop-down list.
Rotation	Indicates a rotation of the aperture. Manual changes are possible.
a-d	Displays parameters that describe the aperture size. Depending on the aperture shape, not all parameters are required.

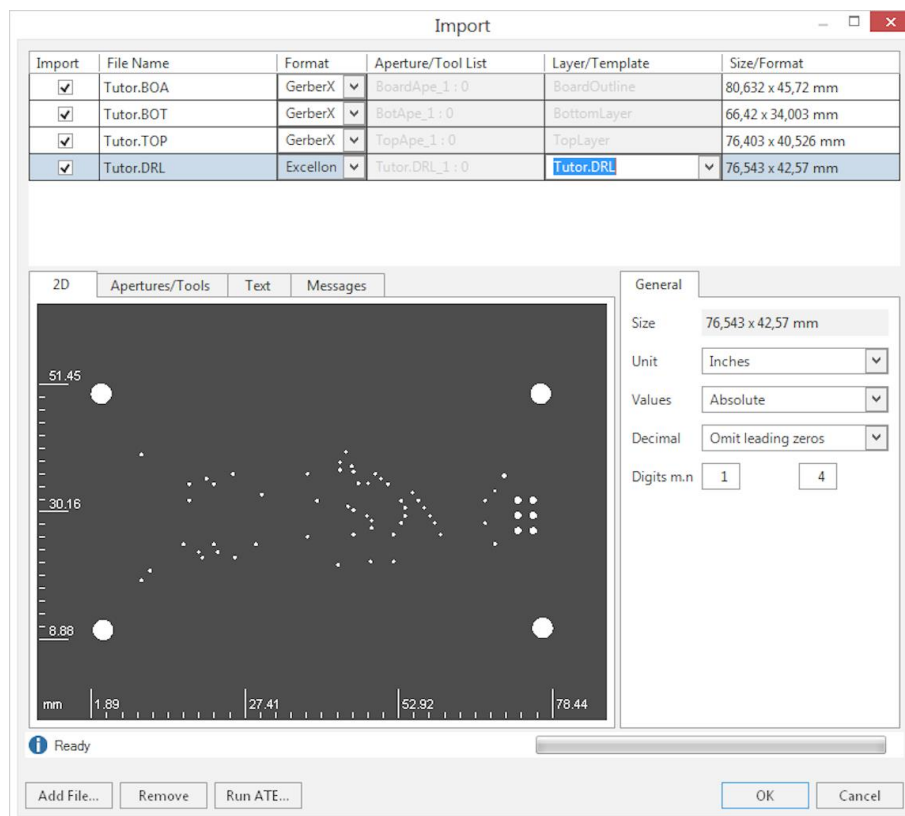
■ Importing CAD data

1. Click on *File > Import...*
2. Select the data for the import in the displayed dialog.



3. Click on [Open].

- According to your imported file, the following contents are displayed (in this case a Gerber file):



4. Check the imported data. If necessary, assign the corresponding layers.
 5. Click on [OK].
- The CAD files are imported and placed on the layers. The layout is displayed in the CAM view.
 - The CAD data have been imported.

2.1.7 Reimport

Provides the possibility to reimport the data previously imported.

Refer to Import on 29.

2.1.8 Export

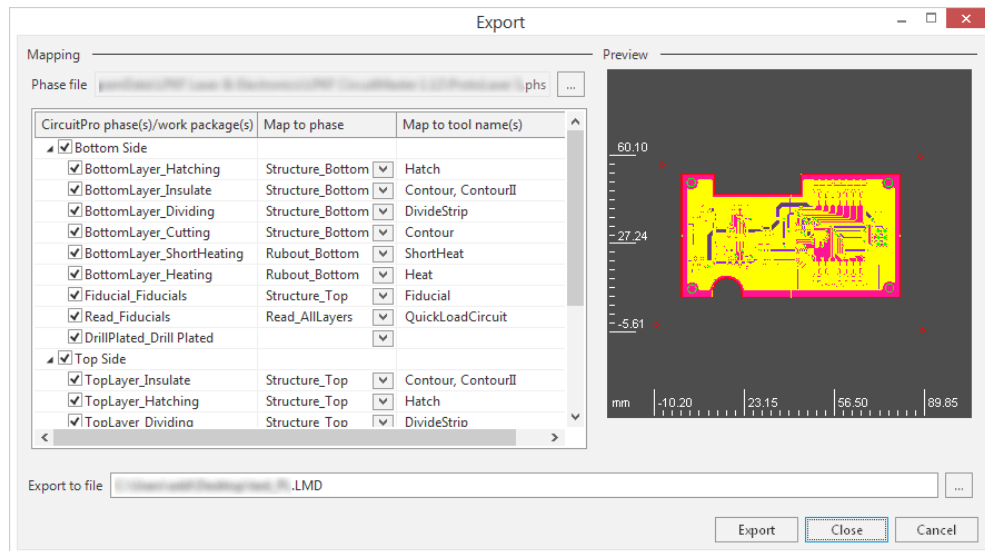
Exports data to an *.LMD file.

Summary

The LMD file is used for data transfer between LPKF software products.

■ Exporting the project

1. Click on *File > Export...*
2. The following dialog is displayed:



- The phase file is attached automatically. The columns *CircuitPro phase(s)/work package(s)*, *Map to phase*, and *Map to tool name(s)* are filled with the required information from the phase file.



If the phase file is not attached automatically you can find it in the installation folder of CircuitMaster or BoardMaster.

3. In the field *Export to file* enter a name for the LMD file and select a saving location.
 4. Click on [Export].
- ☑ The project has been exported.

2.1.9 Import old version

Imports *.cbf files that have been created with a former version (2.x) of the application.

2.1.10 Recent files

Displays the files that have been recently opened/edited.

2.1.11 Print

Prints the current layout. Use the diverse settings to optimize your print result.

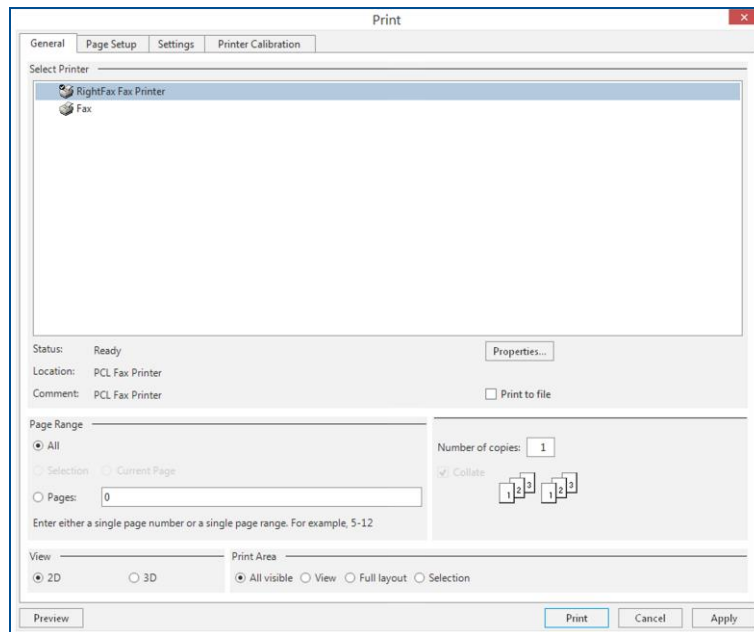
Summary

Click on [Print], to start the print process with the current settings.

To change the print options, various tabs are available.

Tab *General*

Contains general settings for the print process (number of pages, page range, etc.).



Select Printer

Select in this group the printer that is to be used for executing the print job. Use the button [Properties], to change the settings for the printer.

Page Range

In this group, select the pages to be printed. As soon as you want to print more than one copy, the option *Collate* is activated. This setting ensures that a complete copy is printed, before the next copy is started to be printed.

View

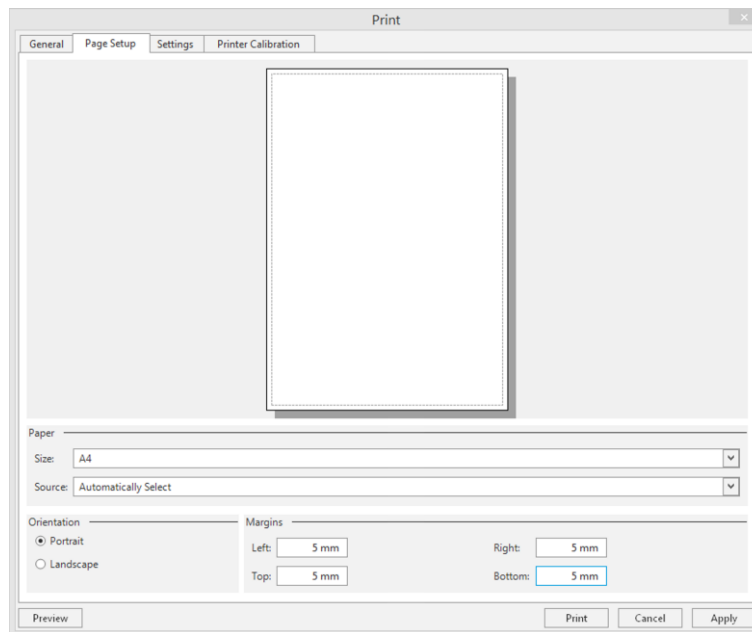
Here, you can define which view is to be printed.

Print area

Define in this group if the current view, the entire layout, the marked areas, or all is to be printed.

Tab *Page Setup*

Contains general settings for the page to be printed (paper size, orientation).



Paper

Select the paper size and the paper tray of the printer.

Orientation

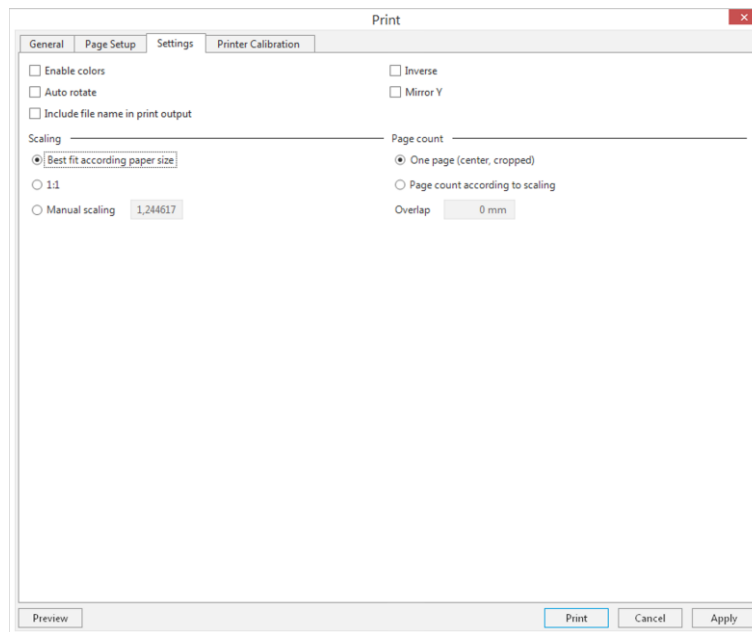
Select the orientation of the paper (portrait, landscape).

Margins

Defines the size of the margins.

Tab Settings

Contains settings for the layout of the image to be printed (scaling, mirroring etc.).



The upper section provides the following options:

- **Enable colors:**
Activates the color printing.
- **Auto rotate:**
Adjusts the page orientation in accordance with the entered orientation set in the printing properties
- **Include file name in print output:**
Prints the file name of the project on each sheet.
- **Inverse:**
Causes a display inversion of the rubout area. I.e. the area that is removed during production (e.g. rubout area) is not printed.
- **Mirror Y:**
Mirrors the object to be printed along the y axis.

Scaling

This group provides the following options:

- **Best fit according paper size:**
Automatically adjusts the printout to the preselected paper size.
- **1:1**
Causes that the printout is printed in the actual size. There is no scaling/adjusting to the actual paper size. Large graphics can be spread across several sheets. Small graphics can be too small and may be unreadable in some circumstances.
- **Manual scaling:**
Scales the printout according to the entered value.

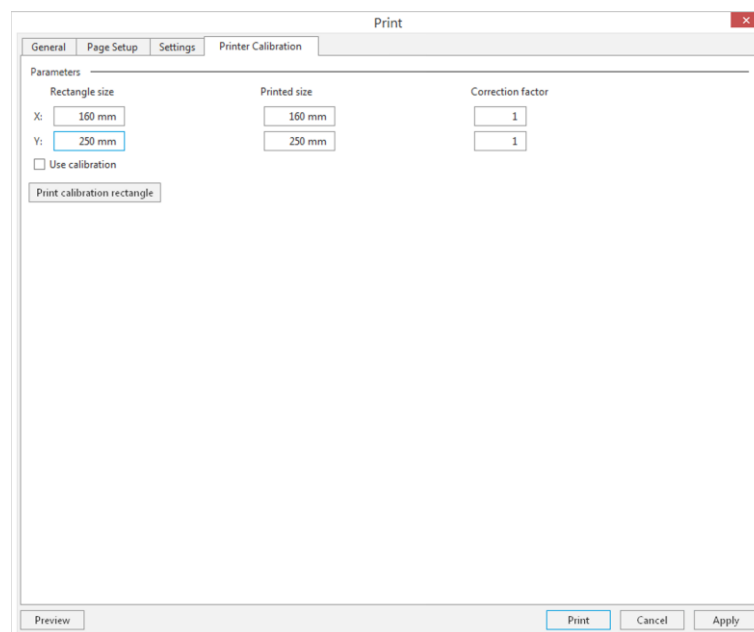
Page count

In this group, you can define which view is to be printed.

- *One page (centered, cropped):*
Prints the graphic centered on one page. I.e. that possible enlarged graphics that are printed on several sheets are trimmed.
- *Page count according to scaling:*
Prints the pages exactly in accordance with the specified number of pages in the print preview.

Tab Printer calibration

Contains parameters (rectangle size, printed size etc.) for calibrating the printer.



Parameters

This group provides the following options:

- *Rectangle size:*
Defines the size of the calibration rectangle by entering values for x and y.
- *Printed size:*
Used for the entry of the actual printed rectangle size.
- *Correction factor:*
Automatically displays the difference between the *Rectangle size* and the entered size in the *Printed size*.

2.1.12 Print preview

Displays a preview of the printed layout.

Summary

Use [Print area] to set which elements of the layout are to be printed. The following print areas can be selected:

- All visible: Prints all objects on visible layers.
- View: Prints the current display of the view *CAM*.
- Full layout: Prints all existing objects without regard to their visibility.
- Selection: Only prints the selected objects.

2.1.13 Info

Contains information on software and hardware.

Software

Displays the version numbers and copyright of the program component.

Hardware

Displays information about the PC running the application.

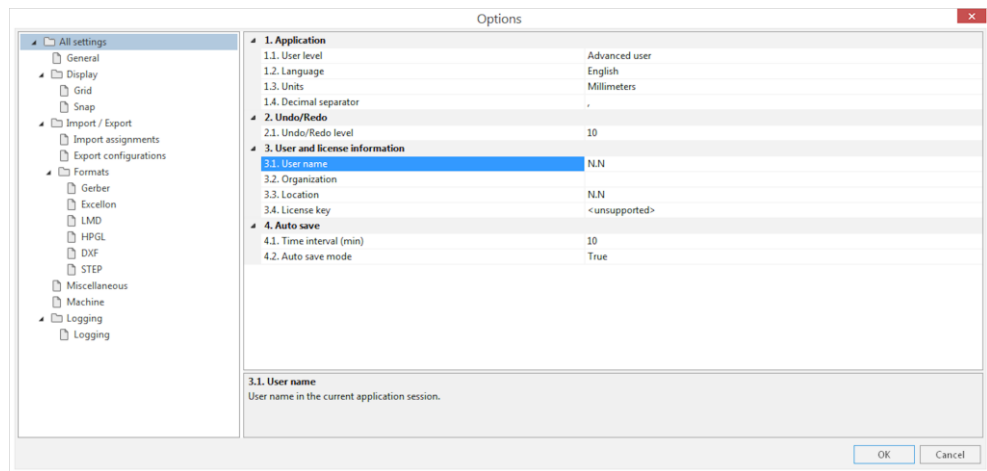
2.1.14 Help

Displays the detailed help.

2.1.15 Options

Contains application settings, such as language settings.

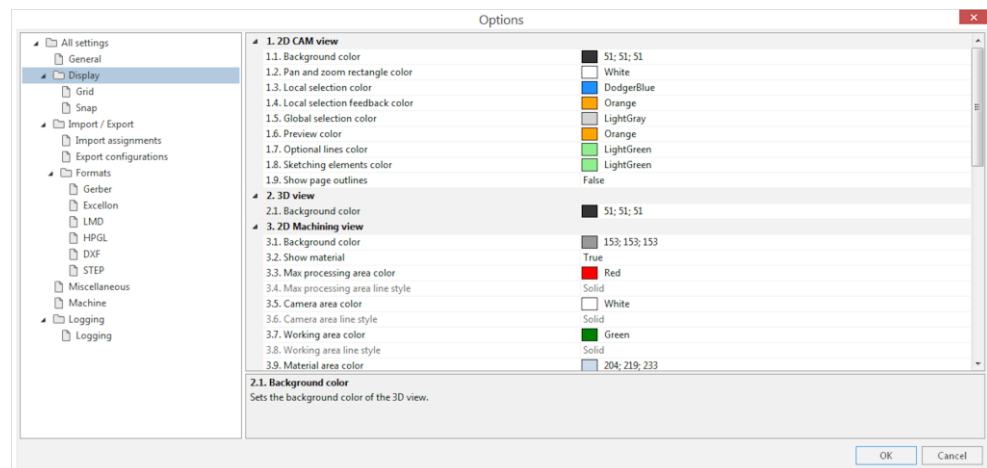
General



The options of the section *General* are described in the following table:

Setting	Description
Application	
User level	Selection between <i>Advanced user</i> and <i>Service</i> .
Language	Sets the language of the application interface.
Units	Units used in the application.
Decimal separator	Selection between dot (.) and comma (,).
Undo/Redo	
Undo/Redo level	Number of the maximum undo and redo actions.
User and license information	
User name	User name in the current application session.
Organization	User organization of the current application runtime license.
Location	Organization location of the current application runtime license.
License key	Customized license key for using this application.
Auto save	
Time interval (min)	Sets the time until a document is saved automatically.
Auto save mode	Switches on/off the auto save mode

Display



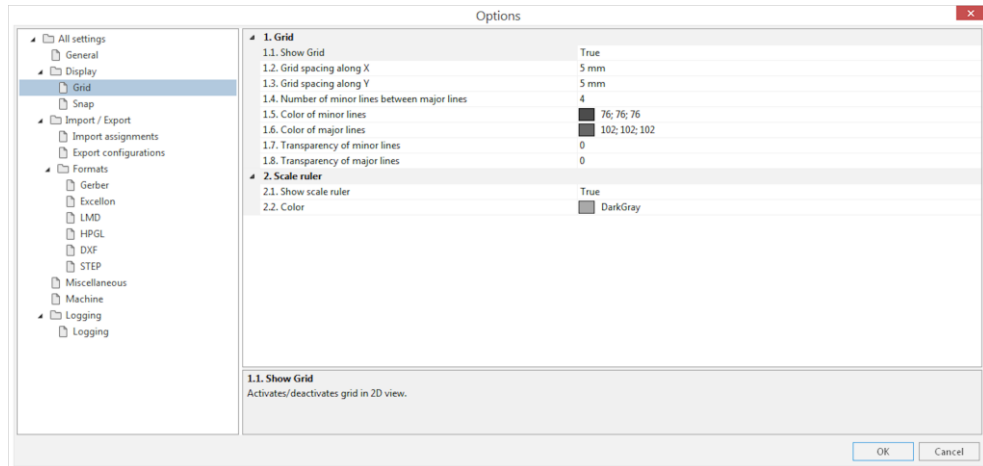
The options of the section *Display* are described in the following table:

Setting	Description
2D CAM view	
Background color	Sets the background color of the view <i>CAM</i> .
Pan and zoom rectangle color	Sets the color of the rectangle of the visible area in the navigation view.
Local selection color	Sets the color for locally selected elements.
Local selection feedback color	This color serves as visual feedback while the mouse is moved over the selected control point. This ensures that the control point is changed with the next click.
Global selection color	Sets the color for globally selected elements.
Preview color	Sets the preview color.
Optional lines color	Sets the color of optional lines.
Sketching elements color	Sets the color for freely drawn elements.
Show page outlines	Displays how the area to be printed is divided into several pages.
3D view	
Background color	Sets the background color for the 3D view.
2D Machining view	
Background color	Sets the background color for the view <i>Production</i> .
Show material	Activates/deactivates the display of the material area, of the maximum processing area, and of the tool magazine.
Max processing area color	Sets the display color of the maximum processing area.
Max processing area line style	Sets the line style for the border of the maximum processing area.
Camera area color	Sets the color of the camera area.
Camera area line style	Sets the line style for the border of the camera area.

Setting	Description
Working area color	Sets the color of the working area.
Working area line style	Sets the line style for the border of the working area.
Material area color	Sets the color of the material area.
Material area line style	Sets the line style for the border of the material area.
Placement rectangle color	Sets the color for the rectangle of the production data during the placement operation.
Cursor	
Cross cursor full screen	Switches on/off the full-screen mode of the cross cursor.
Cross cursor size	Sets the size of the cross cursor.
Cross cursor width	Sets the width of the cross cursor lines.
Zoom cursor delay	Sets the delay after which the zoom cursor disappears.
Common	
Dynamic highlighting	Sets the display behavior of objects under the mouse cursor in graphic views. Options: Off, Always, Only when Shift key is pressed.
Show jumps in toolpath	Activate/Deactivate display of jumps between toolpath lines
Performance and quality settings	Options: High performance, Performance, Quality, High quality
Tooltip delay time	Time before the tooltip is displayed [ms].
Tooltip display time	Time how long the tooltip is displayed [ms].
Tooltip expand delay	Time how long the tooltip is displayed with short information, before it expands and displays detailed information [ms].
Dynamic tooltip offset	Offset for the dynamic tooltips from the current mouse position.
Additive selection	Activates/Deactivates an additive selection workflow.
Max number of displayed objects	Maximum number of displayed objects under a tree node; 0 represents no limit.
Text	
Font	Default font
Size	Default font size
Alignment	Text alignment
Edit text color	Text color during editing.
Edit text box background color	Text box background color during editing.
Edit text box margins [pixels]	Edit the margin between text and text box border.
Edit text box border width [pixels]	Edit text box border width.

Setting	Description
Edit text box border color	Edit text box border color.
Text position cursor margin	Positioning the cursor margins of the font height in percent.

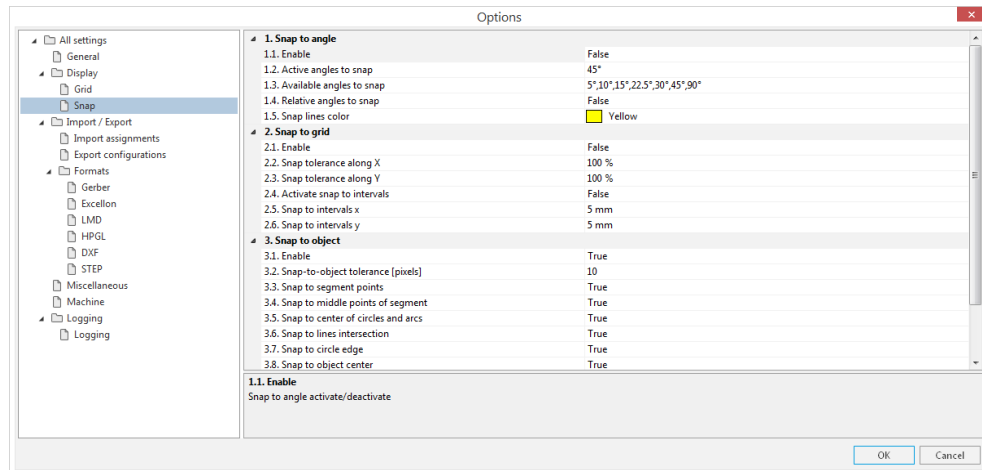
Grid



The options of the section *Grid* are described in the following table:

Setting	Description
Grid	
Show Grid	Activates/Deactivates the grid in the view.
Grid spacing along X	Sets the grid spacing in x direction.
Grid spacing along Y	Sets the grid spacing in y direction.
Number of minor lines between major lines	Sets the number of minor lines between major lines.
Color of minor lines	Sets the color of the minor lines.
Color of major lines	Sets the color of the major lines.
Transparency of minor lines	Sets the transparency of the minor lines.
Transparency of major lines	Sets the transparency of the major lines.
Scale ruler	
Show scale ruler	Activates/Deactivates the scale ruler in the view.
Color	Sets the color of the scale ruler.

Snap

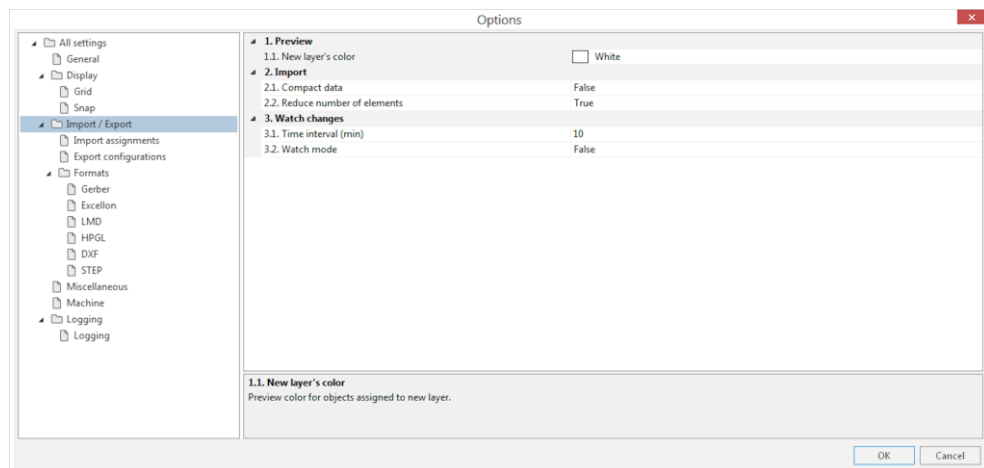


The options of the section *Snap* are described in the following table:

Setting	Description
Snap to angle	
Available	Activate/Deactivate snap to angle.
Activate angles to snap	Options: 5°, 10°, 15°, 22.5°, 30°, 45°, 90°
Available angles to snap	Makes it possible to create user-defined angles to snap.
Relative angles to snap	Activate/Deactivate snap to relative angle.
Snap line color	Sets the color of the snap lines.
Snap to grid	
Available	Activate/Deactivate snap to grid.
Snap tolerance along X	Indicates the minimum percentage in front of the snap interval in x direction for the snap function to be activated. At 100%, shifting from one to the next snap interval is activated.
Snap tolerance along Y	Indicates the minimum percentage in front of the snap interval in y direction for the snap function to be activated. At 100%, shifting from one to the next snap interval is activated.
Activate snap to intervals	Activate/Deactivate snap to intervals.
Snap to intervals x	Determines that two points always have this distance while editing. If the snap to tolerance value is set to 100%, the mouse cursor moves by this value.
Snap to intervals y	Determines that two points always have this distance while editing. If the snap to tolerance value is set to 100%, the mouse cursor moves by this value.
Snap to object	
Available	Activate/Deactivate snap to object.
Snap to object tolerance [pixels]	Is the tolerance within which objects can be snapped, in pixels.
Snap to segment points	Determines if snapping to a segment end point is executed when drawing an object.

Setting	Description
Snap to middle points of segment	Determines if snapping to a segment center point is executed when drawing an object.
Snap to center of circles and arcs	Determines if snapping to a circle center is executed when drawing an object.
Snap to lines intersection	Determines if snapping to the intersection of two lines is executed when drawing an object.
Snap to circle edge	Determines if snapping to a circle edge is executed when drawing an object.
Snap to object center	Determines if snapping to the center of any object is executed when drawing an object.
Snap to segment	Determines if snapping to the segment is executed when drawing an object.
Color of snapping marker	Sets the color of the snapping marker.
Color of snap target element	Color that is used to highlight the object that is snapped to.

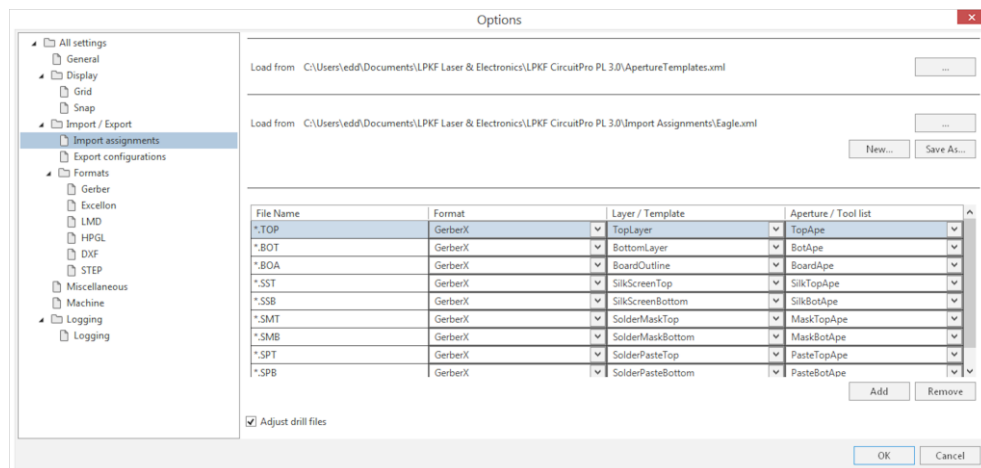
Import/Export



The options of the section *Import/Export* are described in the following table:

Setting	Description
Preview	
New layer's color	Preview color for objects assigned to the new layer.
Import	
Compact data	If set to <i>True</i> , geometrical objects that are composed of a lot of smaller objects are replaced with a single polygon that fills the same area.
Reduce number of elements	If set to <i>True</i> , the number of elements for open/closed paths and polygons is reduced.
Watch changes	
Time interval (min)	Sets the time interval to check for source file changes.
Watch mode	Activate/Deactivate watch mode.

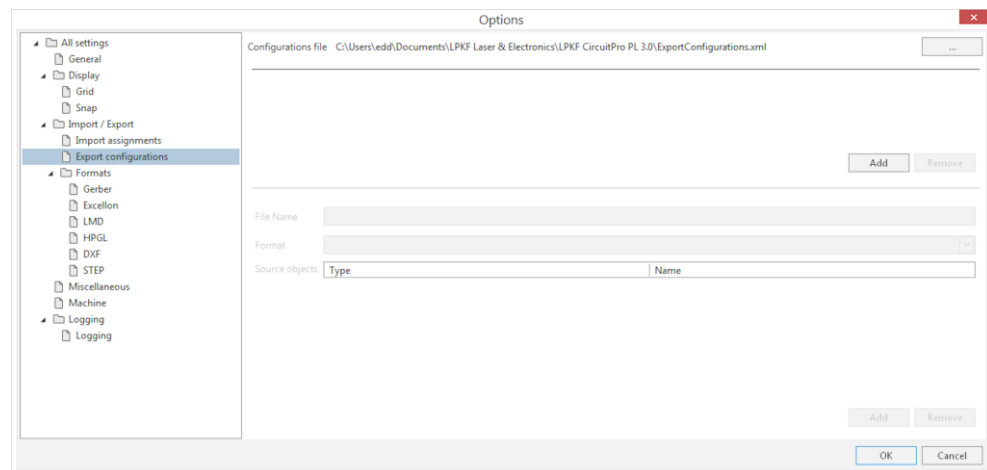
Import assignments



The options of the section *Import assignments* are described in the following table:

Setting	Description
Aperture templates	Selects the path to an existing aperture templates file.
Import assignments	Selects the path to an existing assignments file. Additionally, you can assign a new XML file by entering a new file name.
Assignments	
File name	File extension for assignment
Format	Assign the format for the import.
Layer/Template	Select the target layer for the import.
Aperture/Tool list	Select <i>Aperture /Tool list</i> .

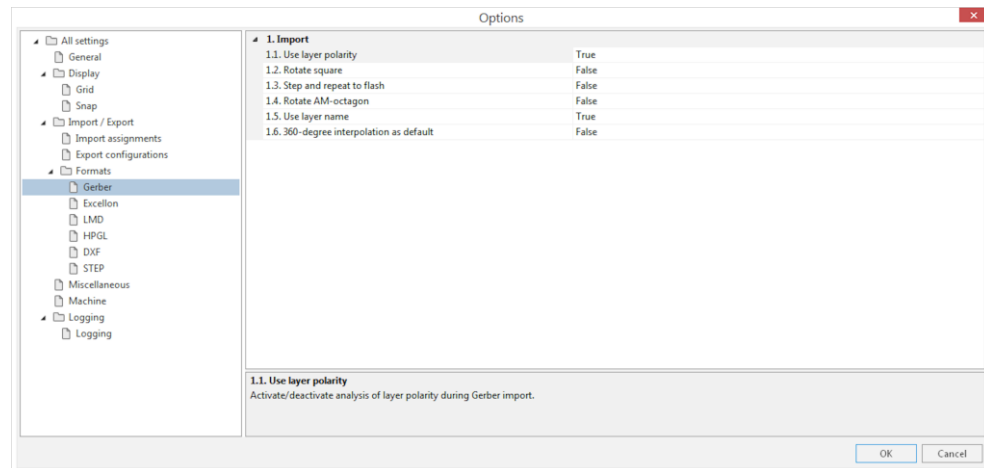
Export configurations



The options of the section *Export configurations* are described in the following table:

Setting	Description
Configurations file	Indicates the path to the configuration file. The path can be selected/edited via the adjacent button
Configurations	Lists the existing configurations that are in the current configuration file. You can add or remove configurations by clicking on [Add] or [Remove].
Parameters	
File name	Indicates the file name that is used for the file to be exported.
Format	Indicates the file format that is used for the file to be exported.
Source objects	Indicates the source objects that are to be exported in the file.

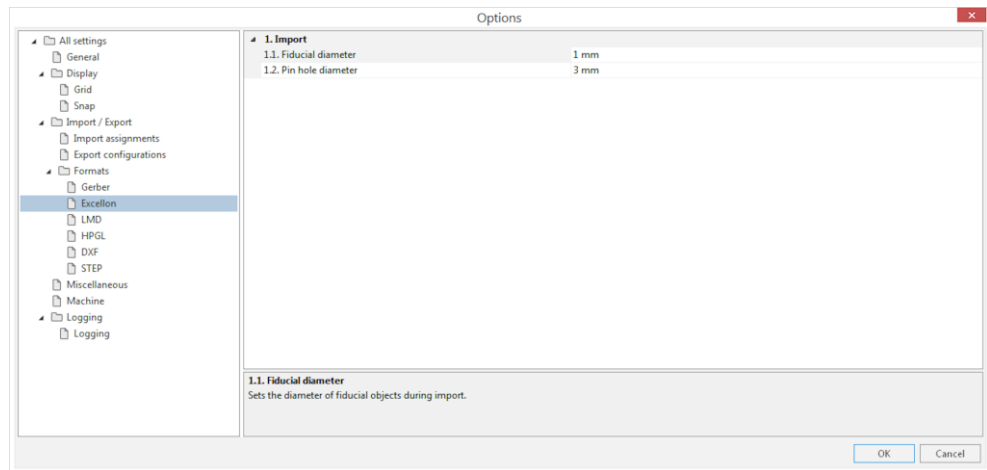
Gerber



The options of the section *Gerber* are described in the following table:

Setting	Description
Import	
Use layer polarity	Activates/Deactivates analysis of layer polarity during Gerber import.
Rotate square	Activates/Deactivates automatic rotation of square objects during Gerber import.
Step and repeat to flash	Activates/Deactivates combining object collections to flash objects for step and repeat commands.
Rotate AM octagon	<i>True</i> always aligns the octagon borders to the axes.
Use layer name	Use layer name definition from Gerber file.
360-degree interpolation as default	Activates/Deactivates the <i>360-degree interpolation as default</i>

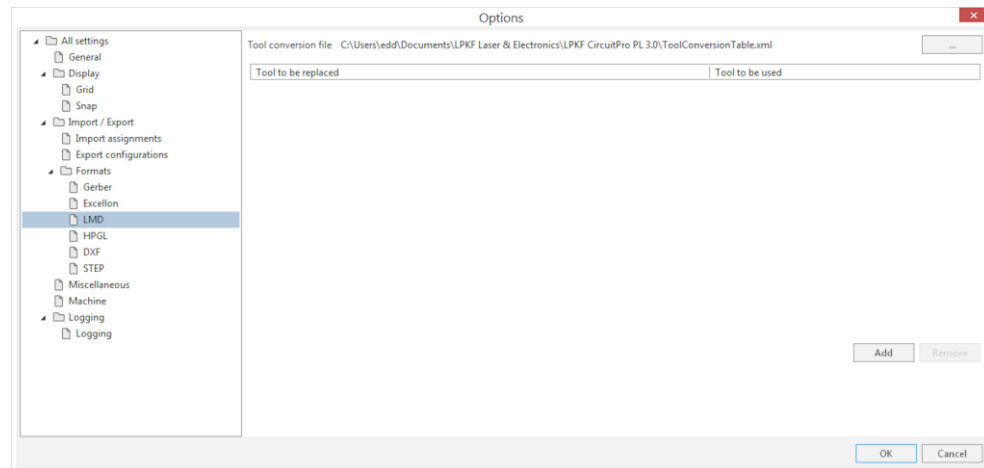
Excellon



The options of the section *Excellon* are described in the following table:

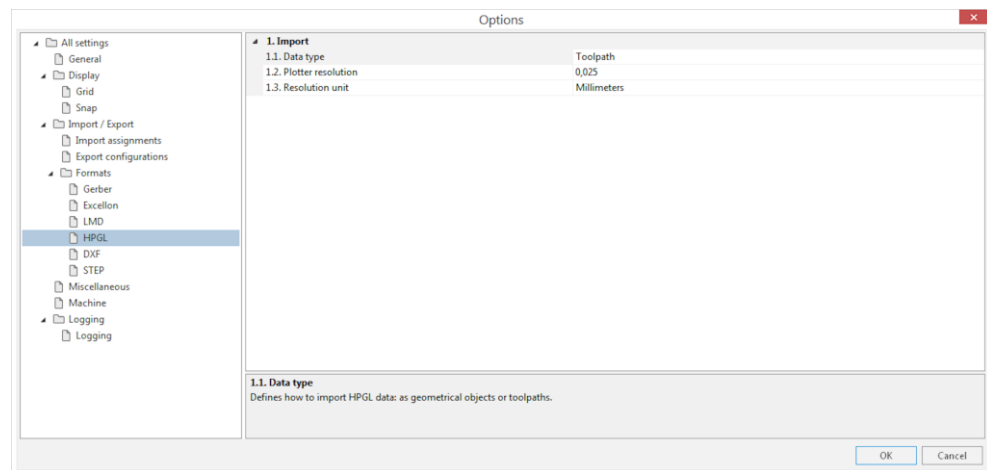
Setting	Description
Import	
Fiducial diameter	Sets the diameter of the fiducial during import.
Pin hole diameter	Sets the diameter of the pin hole.

LMD



The options of the section *LMD* are described in the following table:

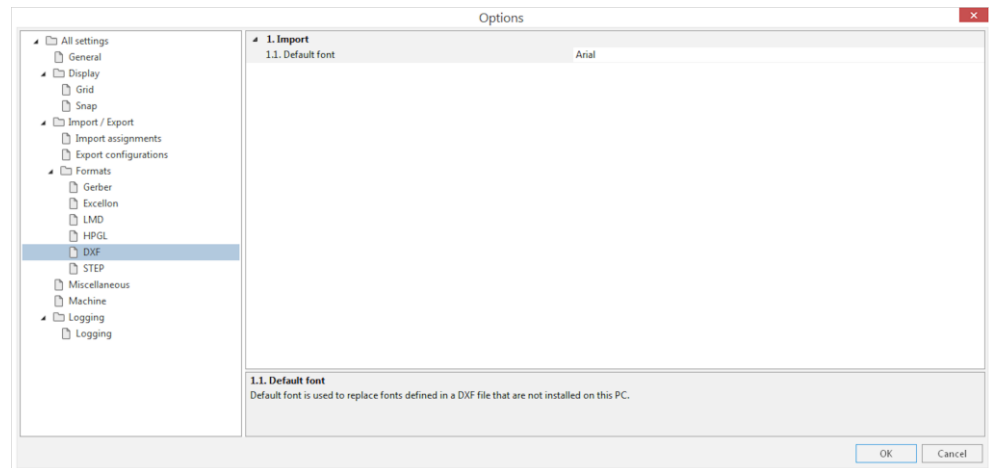
Setting	Description
Tool conversion file	Sets the path of the tool conversion file. Additionally, you can assign a new XML file by entering a new file name.
Tool to be replaced	Sets the tool to be replaced.
Tool to be used	Sets the tool to be used.

HPGL

The options of the section *HPGL* are described in the following table:

Setting	Description
Import	
Data type	Defines how to import HPGL data, either as geometrical objects or as toolpaths.
Plotter resolution	Sets the plotter resolution used by the HPGL file.
Resolution unit	Defines resolution units (mm or inch).

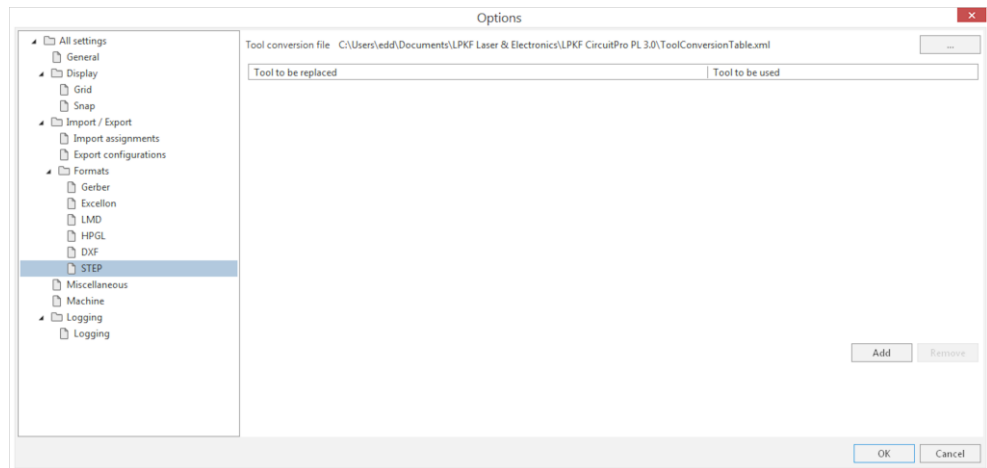
DXF



The options of the section *DXF* are described in the following table:

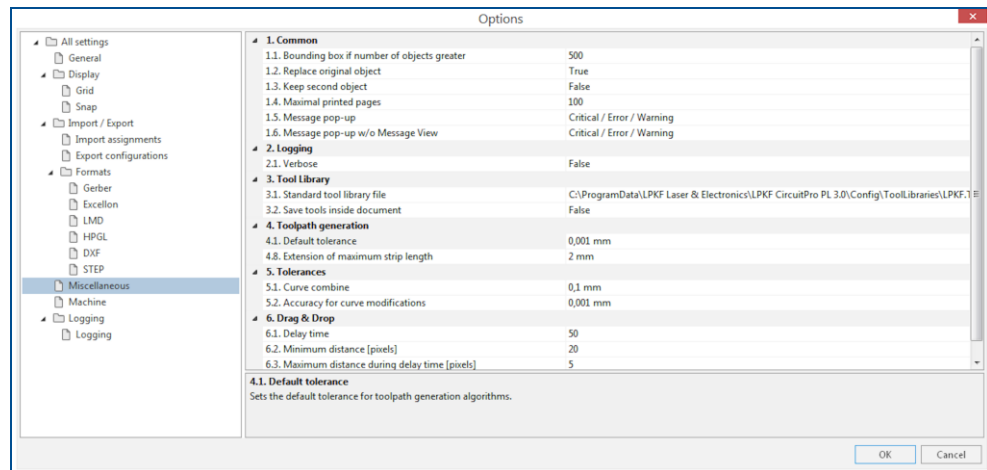
Setting	Description
Import	
Default font	The default font is used to replace fonts that are defined in a DXF file that are not installed on this PC.

STEP



At the moment, there are no options for the STEP format.

Miscellaneous

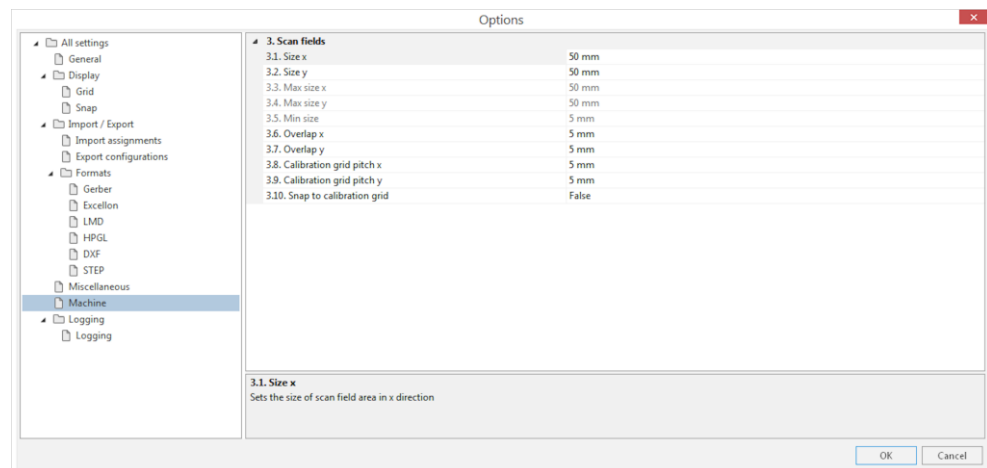


The options of the section *Miscellaneous* are described in the following table:

Setting	Description
Common	
Bounding box if number of objects greater	Displays the bounding box if the number of objects to be moved exceeds this value.
Replace original object	Determines whether the source object is to be replaced by the newly created object.
Keep second object	Determines whether it is necessary to keep the tool object in operations
Maximal printed pages	Defines the maximum number of pages that can be printed.
Message pop-up	Sets types of messages that are displayed as pop-up message boxes (in addition to the entry in the Message View).
Message pop-up w/o Message View	Sets types of messages that are displayed as pop-up message boxes when the Message view is closed.

Setting	Description
Logging	
Verbose	If <i>Verbose</i> is set to <i>True</i> application diagnosis messages are displayed in the Message View as <i>Service messages</i> .
Tool library	
Standard tool library file	Location of the standard tool library file (ToolLibrary.xml), used for new projects.
Save tool inside document	<i>True</i> All settings of the tool library are saved in a separate file for the respective project. <i>False</i> All settings of the tool library are saved in the parent file ToolLibrary.xml and are available for each project.
Toolpath generation	
Default tolerance	Sets the default tolerance for toolpath generation algorithms.
Extension of maximum strip length	Defines the minimum allowed length of a strip. If a strip exceeds the maximum length and the remaining length is less than the given value, the strip will not be divided.
Tolerances	
Curve combine	Tolerance for combining selected geometrical objects.
Accuracy for curve modifications	Precision value used for curve modification operations. Decreasing the value improves the accuracy but increases the calculation time and memory consumption. This value affects all geometry operations such as Close path, Convert to path, Combine open paths, Convert to polygon, Convert to flash.
Drag & Drop	
Delay time	After mouse click, it is necessary to wait this time to move an object by dragging.
Minimum distance [pixels]	Dragging an object is not possible unless the mouse is moved for at least this distance.
Maximum distance during delay time [pixels]	Dragging an object is not started if the mouse is moved more than this distance during the set delay time.

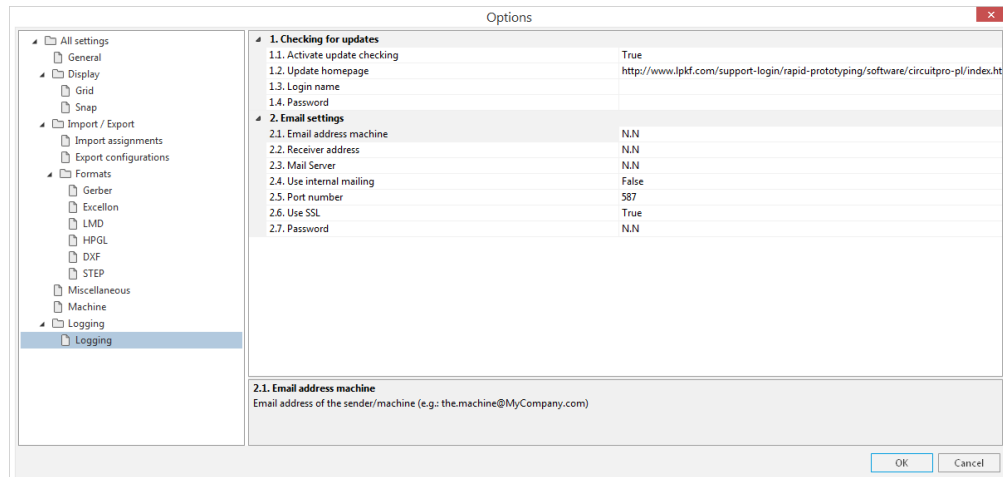
Machine



The options of the section *Machine* are described in the following table:

Setting	Description
Scan fields	
Size x	Sets the size of the scan field area in x direction.
Size y	Sets the size of the scan field area in y direction.
Overlap x	Sets the overlap of neighboring scan field areas in x direction.
Overlap y	Sets the overlap of neighboring scan field areas in y direction.
Calibration grid pitch x	Sets the spacing of the calibration grid covering the scan field in x direction.
Calibration grid pitch y	Sets the spacing of the calibration grid covering the scan field in y direction.
Snap to calibration grid	Defines whether the overlapped scan field areas share the common (overlapped) calibration grid points.

Logging



The options of the section *Logging* are described in the following table:

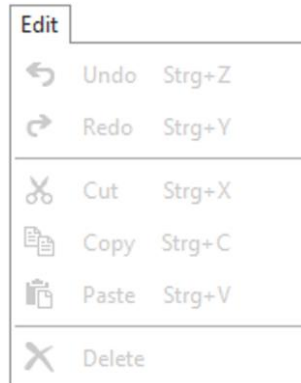
Setting	Description
Checking for updates	
Activate update checking	Here, checking for updates on the LPKF homepage can be switched on/off.
Update homepage	LPKF homepage where the update information is stored.
Login name	Your login name to access the LPKF homepage. You have to sign in to get a password.
Password	Your login name to access the LPKF homepage. You have to sign in to get a password.
Email settings	
Email address machine	Email address of the sender/machine (this address also receives the email as Cc).
Receiver address	Email address of the receiver. Email addresses of several receivers are separated with a comma.
Mail Server	Mail server of your company or an external mail server.
Use internal Mailing	Set to <i>True</i> if the PC is connected to a local user profile and the company's mail server is used. If this value is set to <i>False</i> the values <i>Port number</i> , <i>Use SSL</i> and <i>Password</i> have to be entered. Note: At the moment, only the SMTP protocol is supported. Check if it is available via your provider.
Port number	Port number of the external mail server. Refer to the provider to ask for the port number.
Use SSL	Determines if the connection is encoded with SSL.
Password	Password of your mail provider.

2.1.16 Exit

Exits and closes the current application.

2.2 Menu *Edit*

This menu contains functions to edit objects and their properties



The icons/functions of the menu *Edit* are explained in the following table:

Icon	Name	Description
	Undo	The last action is undone.
	Redo	Executes the last action once more that was performed by clicking on [Undo].
	Repeat	Executes the last action once more.
	Cut	The selection is removed and added to the clipboard.
	Copy	The selection is copied to the clipboard.
	Paste	Pastes the contents from the clipboard to the cursor position.
	Delete	The marked contents are deleted.

2.2.1 Undo

The last action is undone.

Summary

Click on [Undo] to undo the last action and to restore the previous state.

The number of actions that can be undone can be set in the options.

[Undo] can also be executed with the key combination Ctrl + Z.

2.2.2 Repeat

Executes the last action once more.

Summary

Click on [Repeat] to execute the previously performed action again.

[Repeat] can also be executed with the key combination `Ctrl` + `Y`.

2.2.3 Redo

Executes the last action once more that was performed by clicking on [Undo].

Summary

Click on [Redo] to execute the previously performed action again that was performed by clicking on [Undo].

[Redo] can also be executed with the key combination `Ctrl` + `Y`.

2.2.4 Cut

The selection is removed and added to the clipboard.

Summary

Click on [Cut] to remove the marked contents and to add them to the clipboard. These contents can be reinserted via [Paste].

[Cut] can also be executed with the key combination `Ctrl` + `X`.

2.2.5 Copy

The selection is copied to the clipboard.

Summary

Click on [Copy] to copy the marked contents to the clipboard. Use [Paste] to insert these contents to the cursor position.

[Copy] can also be executed with the key combination `Ctrl` + `C`.

2.2.6 Paste

Pastes the contents from the clipboard to the cursor position.

Summary

Click on [Paste] to add contents from the clipboard to the cursor position. For example, these can be added to the clipboard via [Cut] or [Copy].

[Paste] can also be executed with the key combination `Ctrl` + `V`.

2.2.7 Delete

The marked contents are removed.

Summary

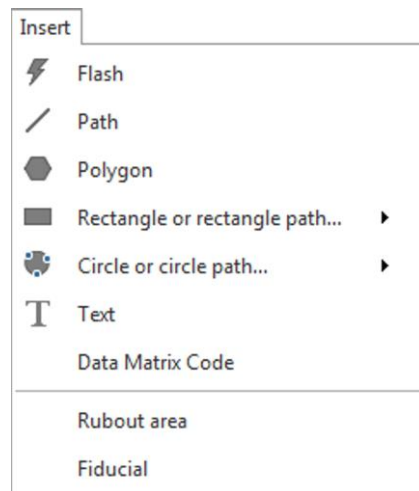
Click on [Delete] to remove the marked texts or objects (e.g. layers, toolpaths, etc.).

Accidentally removed contents can be restored with [Undo].











[Delete] can also be executed with `Del`.

2.3 Menu *Insert*

This menu contains various objects that can be created in the *CAM* view.



The entries of the menu *Insert* are described in the following table:

Icon	Name	Description
	Flash	Creates a flash based on the aperture currently selected.
	Path	Creates a path in the current layer.
	Polygon	Creates a polygon in the current layer.
Rectangle or rectangle path...		
	Rectangle	Creates a filled rectangle in the current layer.
	Rectangle path	Creates a rectangle path in the current layer.
Circle or circle path...		
	Circle by radius	Creates a filled circle by defining a radius.
	Circle by points	Creates a filled circle by setting three points.
	Circle path by radius	Creates a circle path by defining a radius.
	Circle path by points	Creates a circle path by setting three points.
	Text	Creates a text object in the current layer.
	Data Matrix Code	Creates a Data Matrix Code in the current layer.

Icon	Name	Description
Rubout area		
	Rubout all layers	Creates a rubout area on all rubout layers.
	<Create new layer>	Creates a new layer <i>Rubout</i> .
Fiducial		
	Fiducial	Creates a fiducial on the layer Fiducial
	<Create new layer>	Creates a new layer <i>Fiducial</i> .

2.3.1 Flash

Creates a flash based on the aperture currently selected.

Summary

Use the function [Flash] to create a flash on the basis of the apertures in the aperture library. If no aperture is selected the first aperture in the library is used.

The flash is assigned to the currently selected layer.

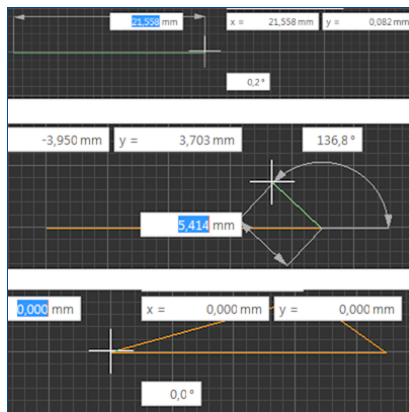
2.3.2 Path

Creates a path in the current layer.

Summary

Use the function [Path] to create open and closed paths in the CAM view. These paths are automatically assigned to the currently selected layer and use the selected aperture or line. Only circular apertures can be used for paths.

To close a path you have to create the last point and select [Close contour] in the context menu. To close the shape, the lines are automatically connected.



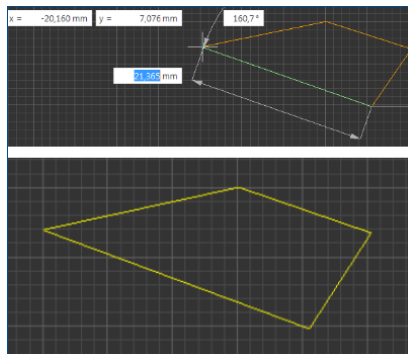
2.3.3 Polygon

Creates a polygon in the current layer.

Summary

Use the function [Polygon] to create polygons in the *CAM* view. These polygons are automatically assigned to the currently selected layer. The individual lines can be created in straight lines or in arcs. After completing the element, the content is filled automatically.

Open the context menu and click on [Finish] to close the polygon.

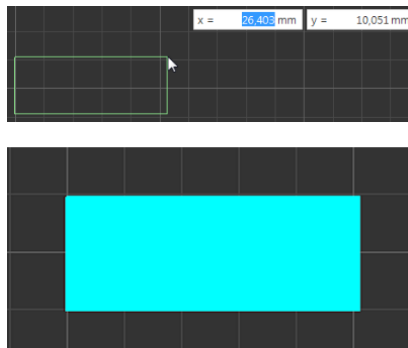


2.3.4 Rectangle

Creates a filled rectangle in the current layer.

Summary

Use the function [Rectangle] to create filled rectangles in the *CAM* view. The objects are automatically assigned to the currently selected layer.

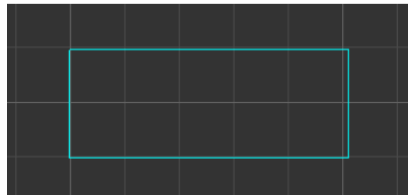
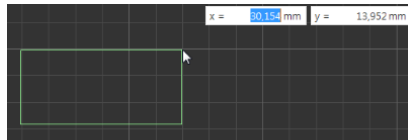


2.3.5 Rectangle path

Creates a rectangle path in the current layer.

Summary

Use the function [Rectangle path] to create rectangle paths in the CAM view. The objects are automatically assigned to the currently selected layer.

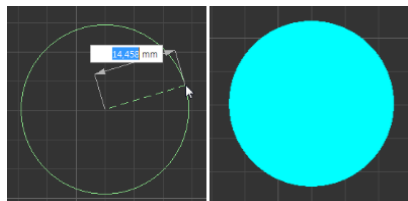


2.3.6 Circle by radius

Creates a filled circle by defining a radius.

Summary

Use the function [Circle by radius] to create circles in the CAM view. After the circles have been created, they are automatically filled and assigned to the currently selected layer.

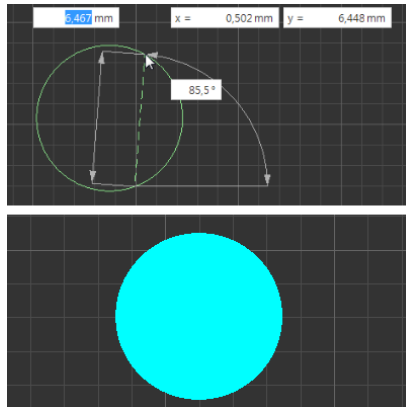


2.3.7 Circle by points

Creates a filled circle by setting three points.

Summary

Use the function [Circle by points] to create circles in the *CAM* view. After the circles have been created, they are automatically filled and assigned to the currently selected layer.

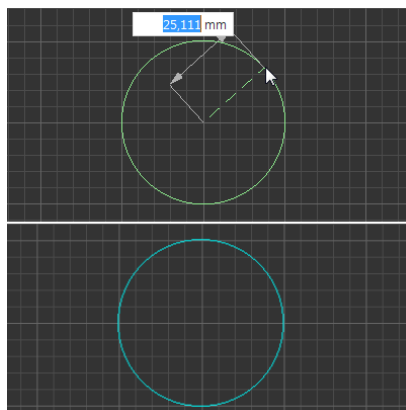


2.3.8 Circle path by radius

Creates a circle path by defining a radius.

Summary

Use the function [Circle path by radius] to create circle paths in the *CAM* view. After the circles paths have been created, they are automatically assigned to the active layer.

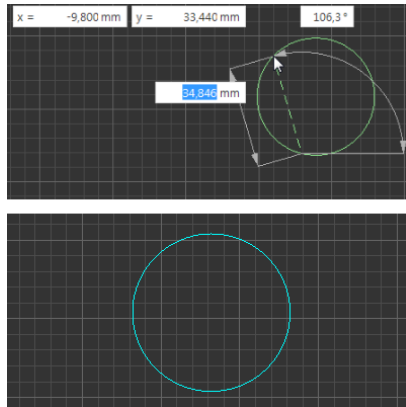


2.3.9 Circle path by points

Creates a circle path by setting three points.

Summary

Use the function [Circle path by points] to create circle paths in the *CAM* view. After the circles paths have been created, they are automatically assigned to the currently selected layer.



2.3.10 Text

Creates a text in the current layer.

Summary

Use the function [Text] to create texts in the *CAM* view. The texts are automatically assigned to the currently selected layer.

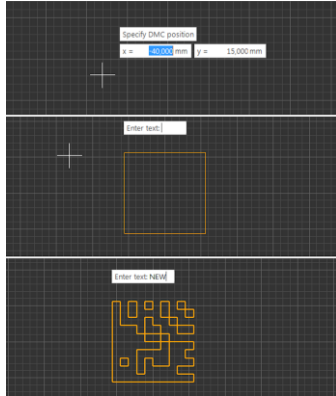


2.3.11 Data Matrix Code

Creates a Data Matrix Code in the current layer.

Summary

Use the function [Data Matrix Code] to create Data Matrix Codes (DMC) in the view *CAM*. The Data Matrix Codes are automatically assigned to the currently selected layer.



2.3.12 Rubout all layers

Creates a rubout area on all rubout layers.

Summary

Use the function [Rubout all layers] to create rubout areas in the *CAM* view. The areas are automatically created in all rubout layers.

2.3.13 <Create new layer >

Creates a new layer *Rubout*.

Summary

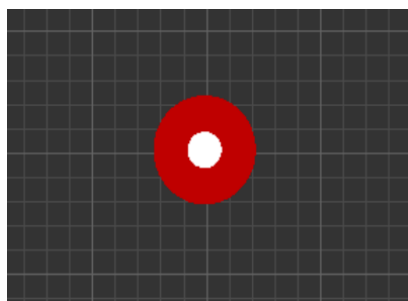
Use the function [<Create new layer>] to create an area in the *CAM* view. After the area has been created, it is automatically assigned to the new layer *Rubout*.

2.3.14 Fiducial

Creates a new fiducial.

Summary

Use the function [<Create new layer >] to create fiducials in the *CAM* view.

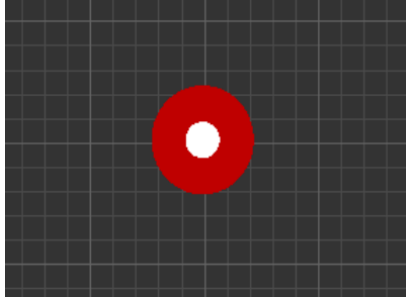


2.3.15 <Create new layer >

Creates a fiducial on the layer *Fiducial*.

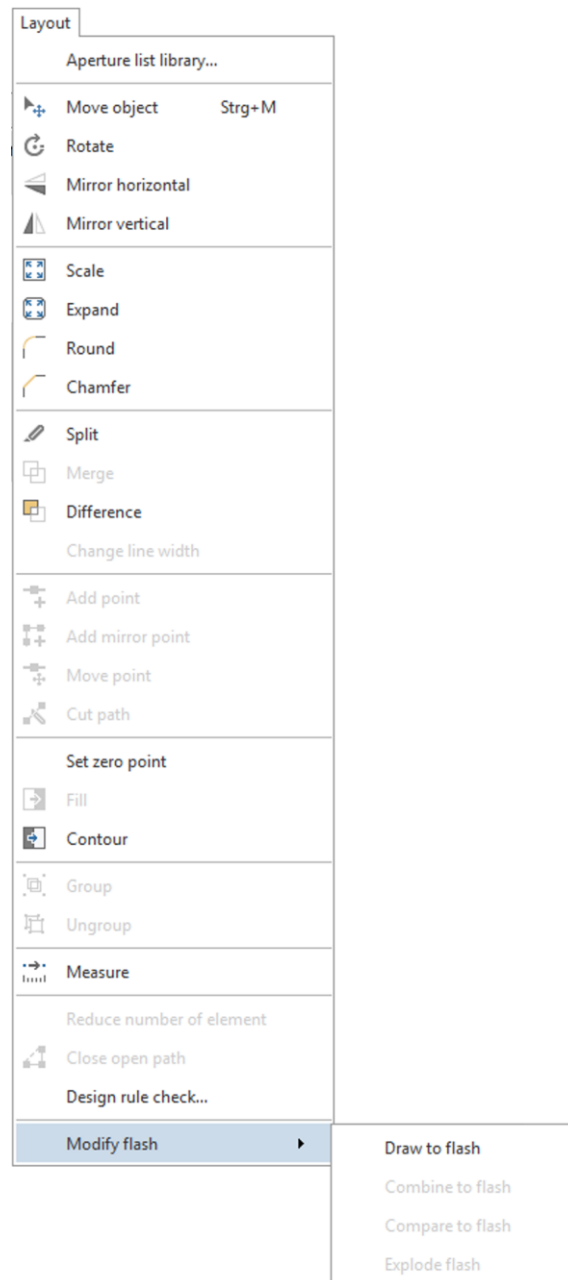
Summary

Use the function [<Create new layer >] to create fiducials in the *CAM* view. After the fiducial has been created, it is automatically assigned to the new layer *Fiducial*.





















2.4 Menu *Layout*

This menu contains functions for editing geometric objects in the *CAM* view.



The entries of the menu *Layout* are described in the following table:

Icon	Name	Description
	Aperture list library	Opens the dialog that displays all apertures used in the current project.
	Move Object	Moves the marked object by a defined distance and direction.
	Rotate	Rotates one or multiple objects by a definable pivot point.
	Mirror horizontal	Mirrors one or multiple objects around the horizontal coordinate axis (x axis).

Icon	Name	Description
	Mirror vertical	Mirrors one or multiple objects around the vertical axis of reflection (y axis).
	Scale	Scales up or scales down the marked object by the scale factor.
	Expand	Increases or decreases the marked object by a defined length.
	Round	Rounds the corners of the marked object.
	Chamfer	Chamfers the corners of the marked object.
	Split	Splits the marked object by using a predefined path.
	Merge	Merges adjoining or overlapping objects to a single geometrical object.
	Difference	Removes the area of a geometrical object that is overlapped by a second selected object.
	Change line width	Changes the line width of the marked path.
	Add point	Adds a point to a marked line.
	Add mirror point	Adds two points with the same distance from the reference point.
	Move point	Moves a marked point.
	Split path	Splits the marked line segment of a path.
	Set zero point	Sets the zero point to the selected location in the CAM view.
	Convert to polygon	Fills a marked closed path.
	Convert to closed path	Removes the filling of filled objects.
	Group	Groups marked objects.
	Ungroup	Ungroups grouped objects.
	Measure	Measures the distance starting from the selected position.
	Reduce number of elements	Reduce number of elements for open and closed paths and polygons.
	Close open path	Closes an open path by connecting the end points.

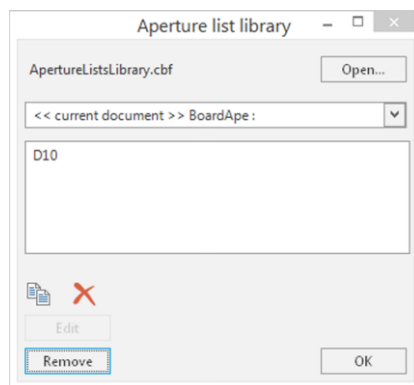
Icon	Name	Description
	Design Rule Check	Opens a dialog for setting the options of the Design Rule Check and for starting it.
	Convert to flash	Converts a marked object into a flash.
	Combine to flash	Combines two or more marked objects to one flash.
	Compare to flash	Compares the marked flash with objects on the same layer. Objects of the same shape are converted into flashes.
	Explode flash	Converts the flash into an object.

2.4.1 Aperture list library

Opens the dialog *Aperture list library*.

Summary

In the dialog *Aperture list library*, aperture lists can be copied, edited, deleted and imported.

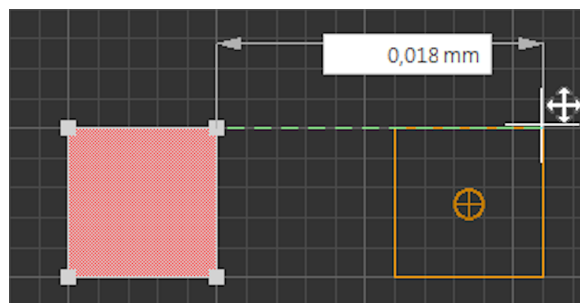


2.4.2 Move object

Moves the marked object by a defined distance and direction.

Summary

Before moving, a reference point has to be determined. This point can also be located outside of the marked object or even be created on other objects. After the reference point is defined, the distance and direction can be defined.

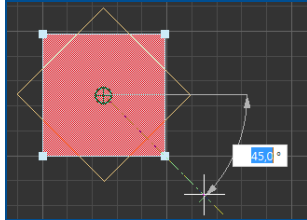


2.4.3 Rotate

Rotates one or multiple objects around a definable pivot point.

Summary

The marked objects are rotated around one point. Thereby, you choose the position of the angle point and the rotation angle.

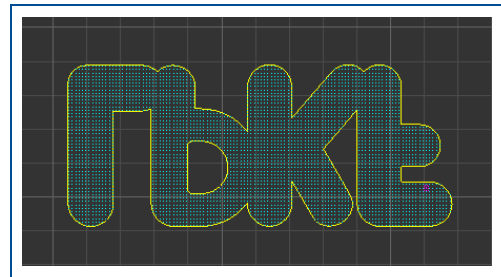
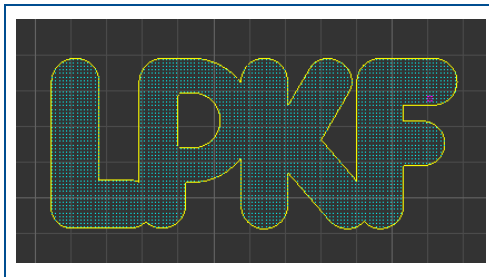


2.4.4 Mirror horizontal

Mirrors one or multiple objects around the horizontal coordinate axis (x axis).

Summary

The axis of reflection is located at the center of gravity of the selected object. If multiple objects are selected, a common center of gravity is calculated that is used for the reflection. The center of gravity can even be located outside of the objects.

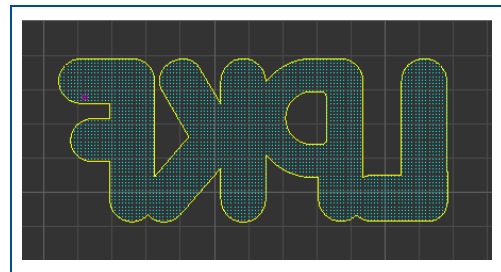
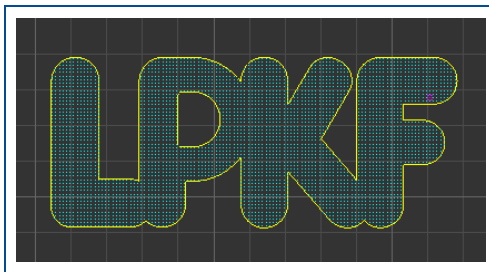


2.4.5 Mirror vertical

Mirrors one or multiple objects around the vertical axis of reflection (y axis).

Summary

The axis of reflection is located at the center of gravity of the selected object. If multiple objects are selected, a common center of gravity is calculated that is used for the reflection. The center of gravity can even be located outside of the objects.

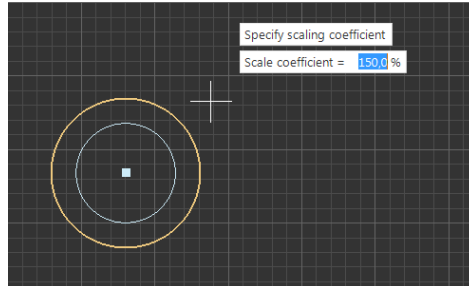


2.4.6 Scale

Scales up or scales down the marked object by the scale factor.

Summary

All lines of the object are scaled uniformly so they keep their shape even after increasing/reducing the size.



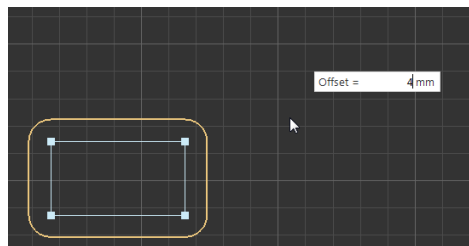
The function is only available if a single object is marked. Multiple objects cannot be scaled at the same time.

2.4.7 Expand

Increases or decreases the marked object by a definable length.

Summary

The marked object is increased or decreased uniformly around all sides. Increasing the object can cause a significant change of the shape.



The function is only available if a single object is marked. Multiple objects cannot be expanded at the same time.

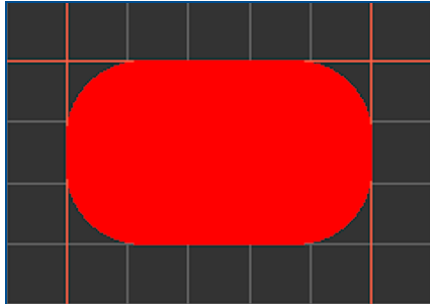
2.4.8 Round

Rounds the corners of the marked object.

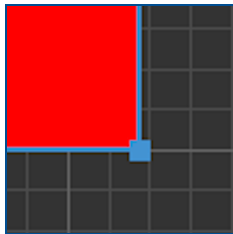
Summary

You can determine the radius of the rounding and select the angles to be rounded.

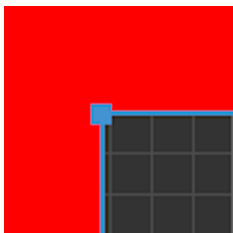
There is a differentiation between the outer and the inner angles.



Outer angles have an angle that is smaller than 180° within the geometrical object.



Inner angles have an angle that is greater than 180° within the geometrical object.



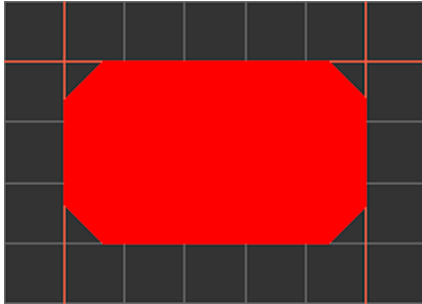
2.4.9 Chamfer

Chamfers the corners of the marked object.

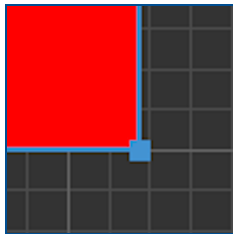
Summary

You can determine the length of the sides to be chamfered and the angles to be chamfered.

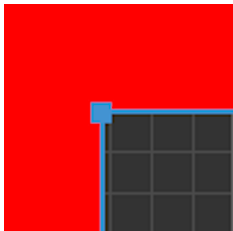
There is a differentiation between the outer and the inner angles.



Outer angles have an angle that is smaller than 180° within the geometrical object.



Inner angles have an angle that is greater than 180° within the geometrical object.

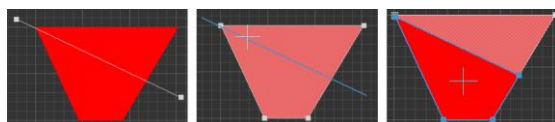


2.4.10 Split

Splits a marked object by using a predefined path.

Summary

When splitting, the first step is to draw a path across the object to be split. This path serves later as splitting line. After that, the object has to be marked and the function [Split] has to be activated. Mark the path to split the object at the position of that path.



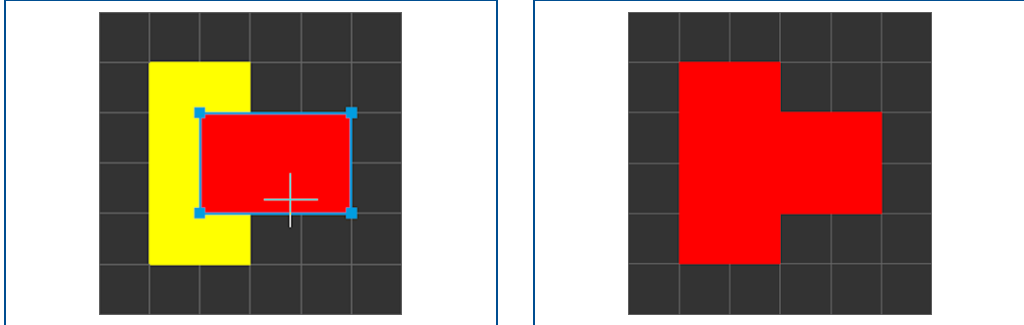
2.4.11 Merge

Merges adjoining or overlapping objects to a single geometrical object.

Summary

[Merge] is only available if at least two geometrical objects are marked.

Merged objects can only be restored to the previous state with [Undo].



The created object is assigned to the layer of the objects used. If the objects are located on different layers, the newly created object is assigned to the upmost layer used.

2.4.12 Difference

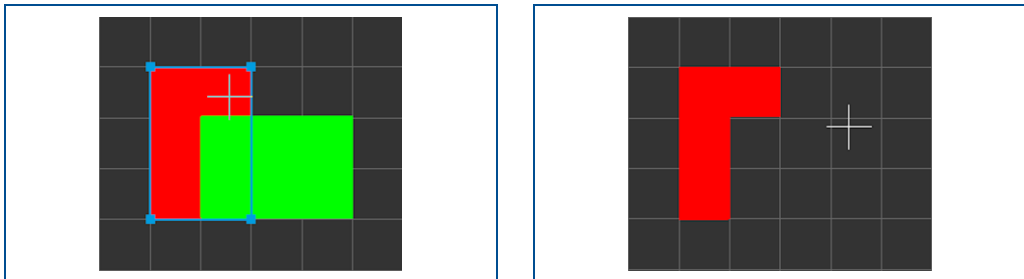
Removes the area of a geometrical object that is overlapped by a second selected object.

Summary

[Difference] is only available if an object is marked. If the function is activated, a second object has to be selected. The area where the objects are overlapping is deleted.

After using this function, the second object is deleted by default. This setting can be changed in the options.

Objects that have been edited with [Difference] can only be restored to the previous state with [Undo].



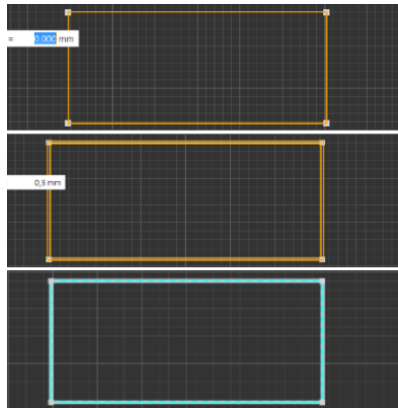
2.4.13 Change line width

Changes the line width of the marked path.

Summary

[Change line width] is only available if a path is marked. When increasing the line width, the outer corners are rounded.

The line width is entered as a fixed value in mm.

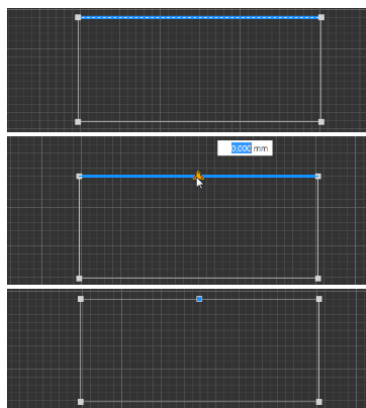


2.4.14 Add point

Adds a point on a marked line segment.

Summary

[Add point] is only available if a line or a point of a segment is marked.

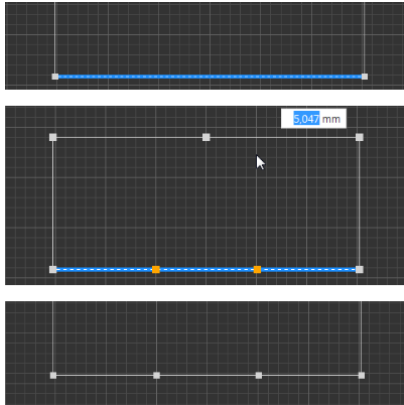


2.4.15 Add mirror point

Adds two points with the same distance from the reference point.

Summary

[Add mirror point] is only available if a line or a point of a segment is marked.

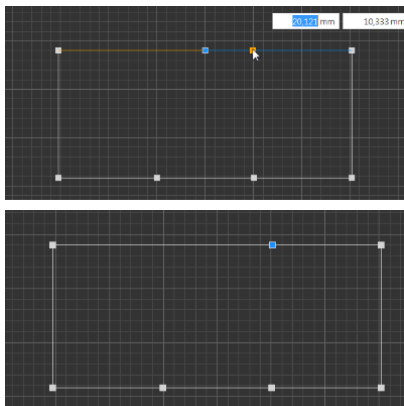


2.4.16 Move point

Moves a marked point.

Summary

The marked point can be moved by using the mouse or by entering the relative coordinates. Multiple points can be marked as long as they are within the same object.

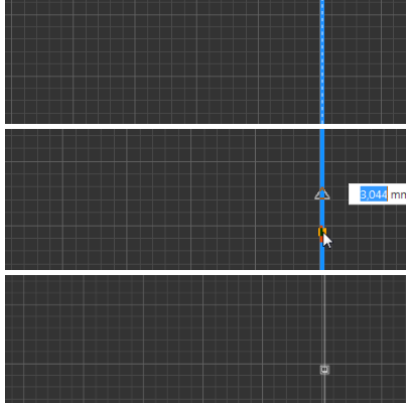


2.4.17 Split path

Splits the marked line segment of a path.

Summary

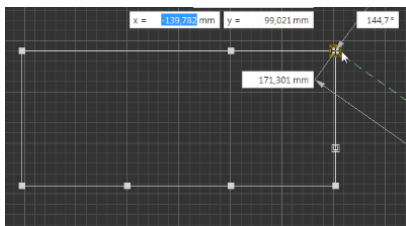
The line segment can be split at the mouse position or by entering relative coordinates referring to the center of the path or the selected point.



[Split path] cannot be used for filled objects.

2.4.18 Set zero point

Sets the zero point to the selected position in the CAM view.

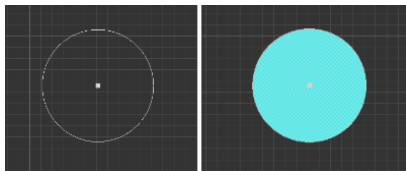


2.4.19 Convert to polygon

Fills a marked closed path.

Summary

[Convert to polygon] is only available if a closed path is marked.

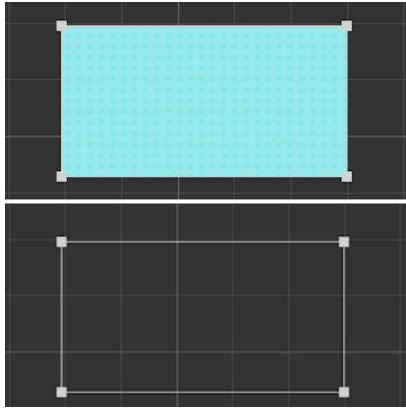


2.4.20 Convert to closed path

Removes the filling of filled objects.

Summary

[Convert to closed path] is only available for marked and filled objects.

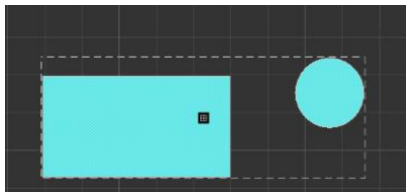


2.4.21 Group

Groups marked objects.

Summary

[Group] is only available if at least two objects are marked.



2.4.22 Ungroup

Ungroups grouped objects.

Summary

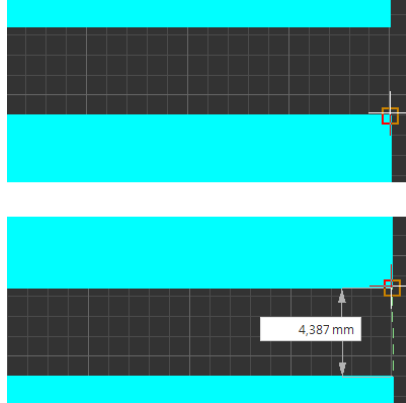
[Ungroup] is only available if grouped objects are marked.

2.4.23 Measure

Measures the distance, starting from the selected position.

Summary

The selected position is used as the initial point for measurement. As soon as you select another position, it is used as initial point for measurement.

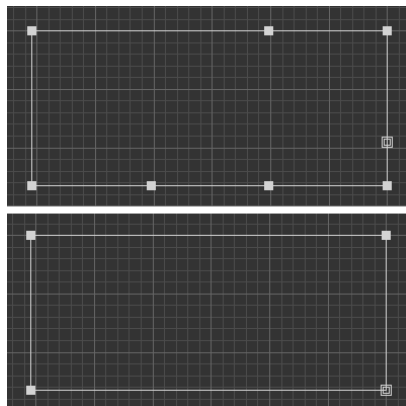


2.4.24 Reduce number of elements

Removes redundant points in the marked object.

Summary

The shape of the object is not changed. Only the points that are not required for the current shape are removed.

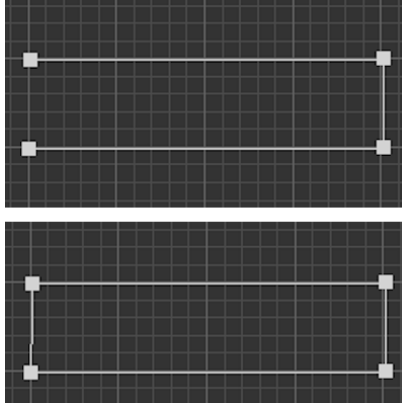


2.4.25 Close open path

Connects both end points of an open path with a line.

Summary

[Close open path] is only available if an open path is marked. The marked object is converted to a closed path.

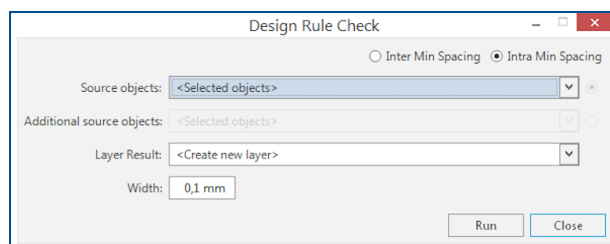


2.4.26 Design rule check

Opens the dialog *Design rule check*.

Summary

Use the Design rule check for checking if the PCB layout complies with the defined and recommended standards of the Design rule check.

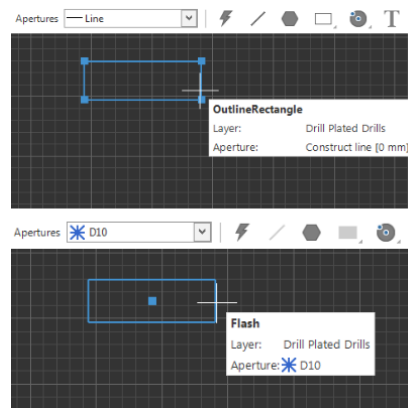


The following can be checked with the *Design rule check*:

- Spacing of objects on different layers.
- Spacing of objects on the same layer.

2.4.27 Convert to flash

Converts a marked object into a flash.



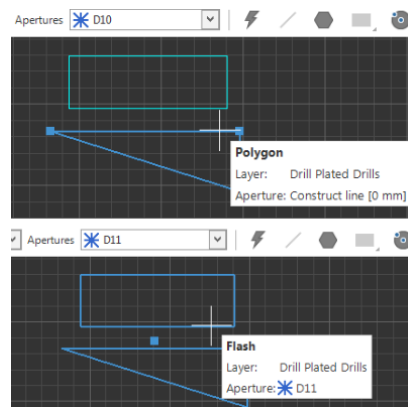
2.4.28 Combine to flash

Combines two or more marked objects to one flash.

Summary

Geometrical objects as well as flashes can be used. After combining the objects, an aperture based on the newly created flash is created.

The combined objects within the flash can only be moved together.



2.4.29 Compare to flash

Compares the marked flash with objects on the same layer. Objects of the same shape are converted into a flash.

Summary

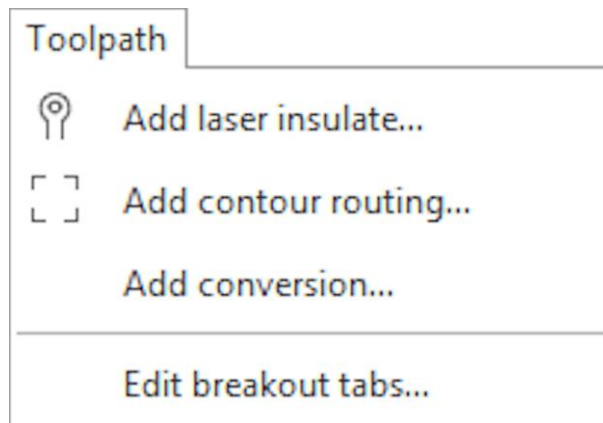
Smaller deviations of the object's size and angles can be adapted by entering tolerance values in the dialog.

2.4.30 Explode flash



Converts the flash into an object.

2.5 Menu *Toolpaths*

This menu contains settings for toolpaths.



The entries of the menu *Toolpath* are described in the following table:

Icon	Item	Description
	Add laser insulate	Opens a dialog with insulation methods.
	Add contour routing	Opens a dialog with contour routing methods.
	Add conversion	Opens a dialog that enables you to create drill data and fiducials.
	Edit breakout tabs	Opens a dialog with setting options of the breakout tabs.

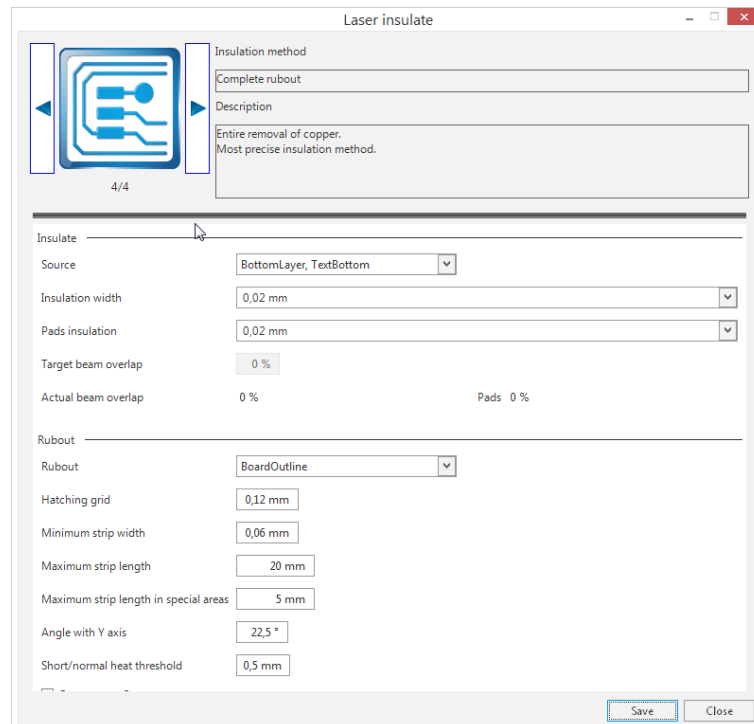
2.5.1 Add laser insulate

Opens a dialog with insulation methods.

Summary

In the dialog *Laser insulate*, the insulation methods *Basic*, *Basic, pads double*, *Partial rubout*, and *Complete rubout* are available.

Laser insulateThe dialog is structured as follows:



Insulation method

Basic

Insulation with a single insulation channel. Shortest processing time.

Basic, pads double

Insulation with a single insulation channel. Double insulation channel for pads. Short process time. This method requires a bit more time than the first method *Basic*.

Partial rubout

Insulation with a single insulation channel. Removal of copper in defined areas.

Complete rubout

Entire removal of copper. Most precise insulation method.

Insulation

Function	Description
Source	Indicates the layer where the insulation is created.
Insulation width	Indicates the insulation channel width in mm.

Function	Description
Pads insulation	Indicates the width of the pad insulation in mm if an insulation method with additional pad insulation is selected.
Target beam overlap	Is calculated by the tool parameters.
Actual beam overlap	Is calculated from the insulation width and the tool parameter.
Pads	Is calculated from the pad insulation and the tool parameter.

Rubout

Function	Description
Rubout	Indicates whether and on which layer the rubout is to be executed. Additionally, you can select how the rubout is to be executed.
Hatching grid	Indicates the distance between the two cutting toolpaths of the rubout.
Minimum strip width	If the distance between two PCBs is smaller than the minimum strip width, a rubout is not executed. Several laser toolpaths are added to remove the copper.
Maximum strip length	If a strip is longer than this value, the copper strip is divided by a cut.
Maximum strip length in special areas	Is valid for special areas (depends on the area size). If a strip is longer than this value, the copper strip is divided by a cut.
Angle with Y axis	The hatching grid is executed using this angle.
Short/normal heat threshold	If the heating strips are shorter than this value, the heating tool is switched automatically to the mode for short strips.
Generate preCut curves	Additional insulation lines are created to improve separation from the conductive track.

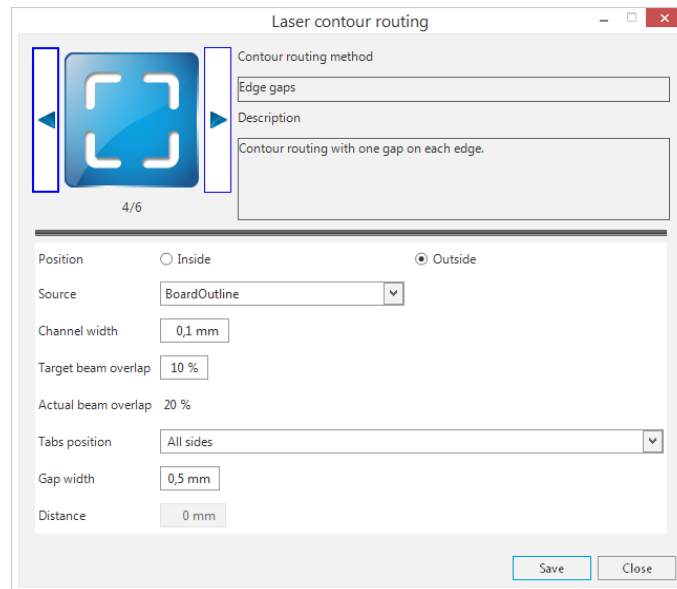
2.5.2 Add contour routing

Opens a dialog with contour routing methods.

Summary

In the dialog *Laser contour routing*, the contour routing methods *Basic*, *Horizontal gaps*, *Vertical gaps*, *Edge gaps*, *Corner gap* and *Equidistant gaps* are available.

Add contour routing The dialog is structured as follows:



Contour routing method

Basic

Contour routing without gaps.

Horizontal gaps

Contour routing with gaps on upper and lower edge.

Vertical gaps

Contour routing on left and right side.

Edge gaps

Contour routing with one gap on each edge.

Corner gap

Contour routing with one gap in each corner.

Equidistant gaps

Contour routing with equally spaced gaps.

Contour routing

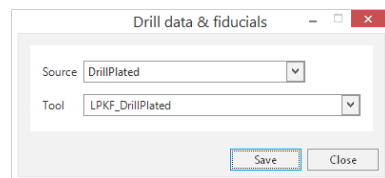
Function	Description
Position inside	The toolpath is inside the drawn BoardOutline
Position outside	The toolpath is outside the drawn BoardOutline
Source	Indicates the layer on which the contour is routed.

Function	Description
Channel width	Indicates the insulation channel width in mm.
Target beam overlap	Indicates the overlapping of the beam in %.
Actual beam overlap	The value is calculated from the <i>Target beam overlap</i> and the tool parameter.
Tabs position	Indicates the position of the tabs.
Gap width	Indicates the width of the gaps.
Distance	Indicates the distance between the gaps in mm. This value is only provided for the method <i>Equidistant gaps</i> .

2.5.3 Add conversion

Opens a dialog that enables you to create drill data and fiducials.

The dialog is structured as follows:



Function	Description
Source	Indicates the layer where the drill holes or the fiducials are to be created.
Tool	Indicates the tool the drill holes or the fiducials are to be created.

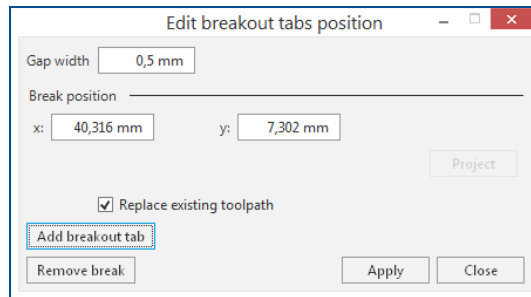
2.5.4 Edit breakout tabs

Opens a dialog for editing the settings of the breakout tabs.

Summary

In the dialog *Edit breakout tabs position* the *Gap width* can be modified, the *Break position* can be changed by entering values for *x* and *y*, the breakout tabs can be deleted, and the breakout tabs can be created.

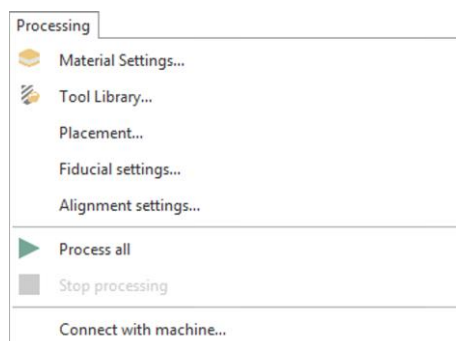
The dialog is structured as follows:











Function	Description
Gap width	Width of the breakout tabs.
Break position	Position of the selected breakout tab.
Replace existing toolpath	Replaces existing toolpaths during calculation.
Add breakout tab	Adds a new breakout tab.
Remove break	Deletes the selected breakout tab.

2.6 Menu Processing

This menu contains functions for processing the previously defined processing data.



The entries of the menu *Processing* are described in the following table:

Icon	Item	Description
	Material settings	Opens a dialog for setting several parameters of the material to be processed.
	Tool library	Opens a dialog for creating and editing tools.
	Placement	Opens a dialog for shifting the processing data.
	Fiducial settings	Opens a dialog with fiducial settings for the fiducial search.
	Alignment settings	Opens a dialog for configuring the fiducial search. While processing, these settings are used for the fiducial search.
	Process all	Starts the production of all processing data.
	Stop processing	The current processing procedure is stopped.
	Connect to machine	Opens a dialog for connecting the system software to a real or simulated machine.

2.6.1 Material settings

Opens a dialog for setting several parameters of the material to be processed.

Summary

In the dialog *Material settings* the *Machine type* and the *Material type* can be selected, the *Material thickness* can be entered and custom material can be created.

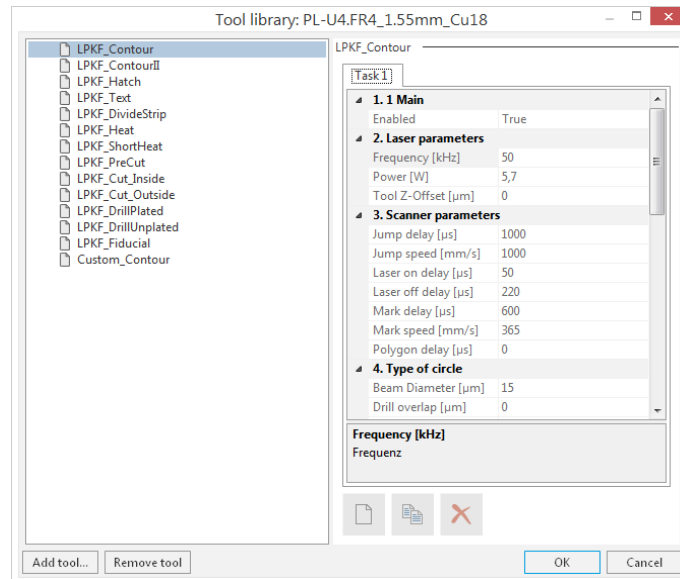
2.6.2 Tool library

Opens a dialog for creating and editing tools.

Summary

The available LPKF tools and their detailed information are accessible in the dialog *Tool library*. The LPKF tools cannot be edited. New tools can be created and edited. The newly created tools can be assigned to several tasks and their parameters can be defined. The parameters are divided into the following groups: *Main*, *Laser parameters*, *Scanner parameters*, *Type of circle*, *Start/End moves*, *Process parameters*, *Polygon moves*, and *Hatching parameters*.

The dialog is structured as follows:



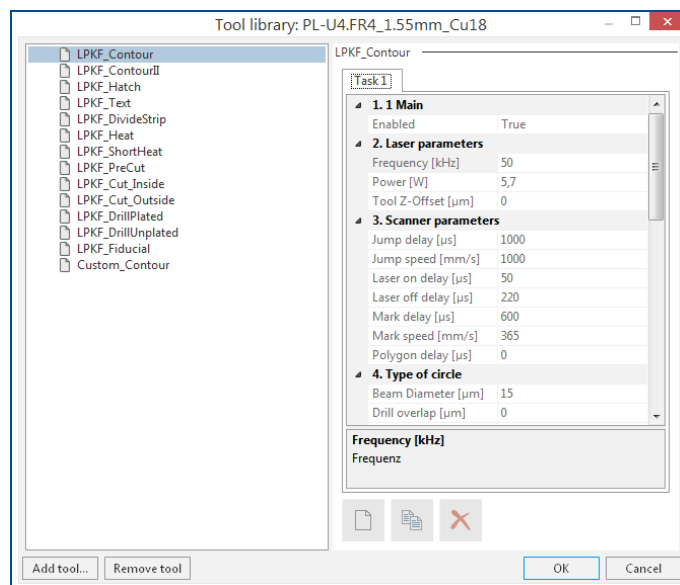
Item	Description
Main	
Enabled	Makes the task available/unavailable for the production process.
Laser parameters	
Frequency [kHz]	Sets the pulse frequency of the laser.
Power [W]	Sets the power of the laser.
z offset tool [µm]	z offset of the tool.
Scanner parameters	
Jump delay [µs]	Defines the delay before a jump. (A jump is the move between two toolpaths where the laser is not structuring).
Jump speed [mm/s]	Sets the speed of the jump move.
Laser on delay [µs]	Delay of the laser source when starting structuring.
Laser off delay [µs]	Delay of the laser source when stopping structuring.
Mark delay [µs]	Delay of the scanner before and after structuring.
Mark speed [mm/s]	Sets the speed of the movement of the

Item	Description
	structuring.
Polygon delay [μ s]	Delay of the laser source between the individual points of a polygon.
Type of circle	
Beam diameter [μ m]	This value sets the toolpath spacing. The laser beam diameter can vary due to material properties, power, and frequency. It is recommended to execute and measure a single test cut.
Drill overlap [μ m]	Overlap used for radius calculation for filling strategies.
Circle inner diameter [μ m]	With the circle type <i>Concentric fill</i> , the circle is not completely removed. The circle inner diameter indicates the area in the center that is not removed.
Circle type	Indicates the filling strategy of how to remove the inside of a drill hole. Outer circle: A line along the circle Concentric fill: The drilling is executed by concentric circles. Spiral: The drilling is executed by a spiral. From file: For future features.
Number of runs	Indicates the number of runs that are drilled.
Outward	True The processing is started from the inside to the outside. False The processing is started from the outside to the inside.
Start/End moves	
Start moves	Enables start moves.
Start move length [μ m]	Length of the start move.
Start move type	Type of move for start moves (with or without activated laser).
End moves	Enables end moves.
End move length [μ m]	Length of the end move.
End move type	Type of move for end moves (with or without activated laser).
Process parameters	
Air pressure	Enables air pressure
Processing mode	Determines whether the defocused mode (rubout) or focused mode (normal mode) is used.
Tool Z-Offset	Offset for this tool in z direction. In contrast to the parameter <i>Z-Offset</i> the calibration table is not switched.
Tool delay [ms]	Delay when switching between Tools/Tasks.
Repetition	Number of repetitions of a toolpath.
Polygon moves	

Item	Description
Polygon moves	Enable moves on intermediate polygon points.
Start move length [µm]	Type of move for start moves (with or without activated laser).
End move length [µm]	Type of move for end moves (with or without activated laser).
Start move type	Type of move for start moves (with or without activated laser).
End move type	Type of move for end moves (with or without activated laser).
Enable min angle	Enable/Disable use of minimal angle for sky writing.
Min angle	Minimum angle for sky writing.
Hatching parameters	
Stretch and shrink [%]	Used for correction and reduction of lines. It is measured in percents of the hatching overlap.
Hatch overlap [%]	It is measured in percents of the effective beam diameter. This value is used for computing toolpaths.
Beam compensation [µm]	Used for computing toolpaths near shape boundaries.
Triangle max size [mm]	Maximum size of triangle, used to triangulate surfaces for toolpath generation.

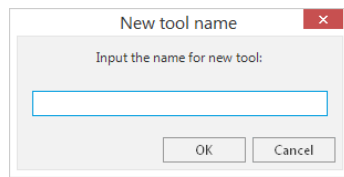
■ Copying tools

1. Click on *Production > Tool library....*
- The following dialog is displayed:



2. Select a tool you want to copy.
The values of the selected tool are adopted while copying.
3. Click on [Add tool...].

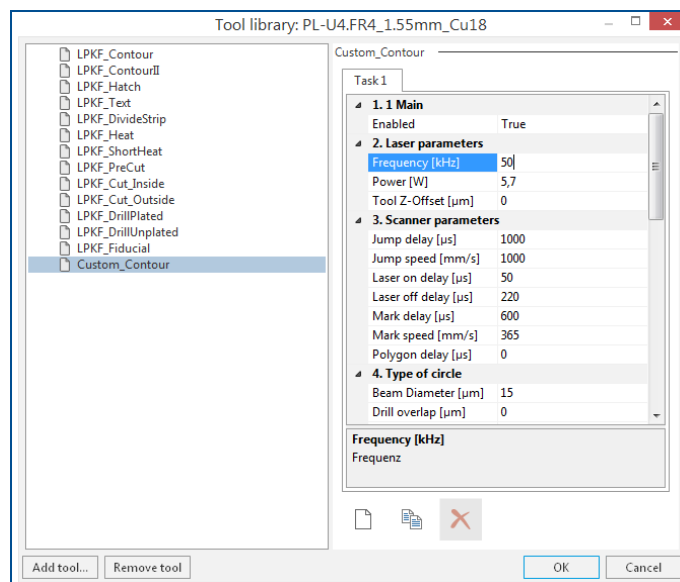
- The following dialog is displayed:



4. Enter the name of the new tool.
 5. Click on [OK].
- The new tool has been added.
 - The tool has been copied.

■ Editing tool parameters

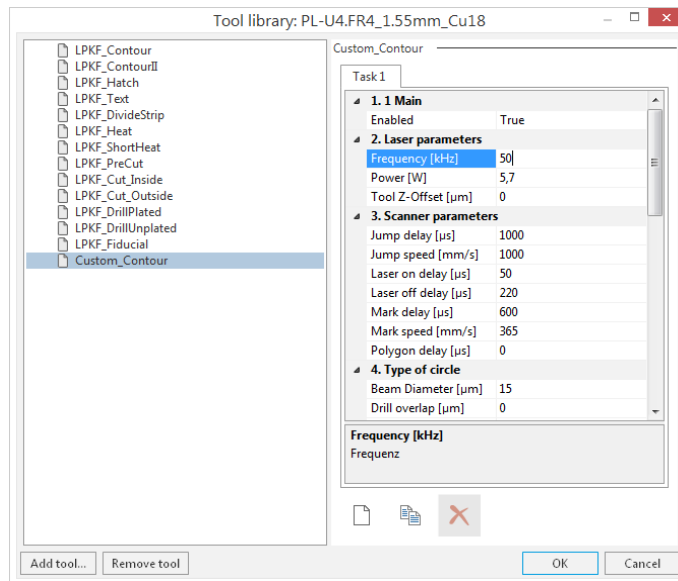
1. Click on *Production > Tool library...*
- The following dialog is displayed:






2. Select a newly created tool you want to edit.
 3. Adjust the tool parameters as required.
 4. Click on [OK].
- The tool parameters have been edited.

■ Adding a task

1. Click on *Production > Tool library...*
- The following dialog is displayed:



2. Select a  ted tool.
The task  this tool.
 3. Click on  .
- A new task (Task 2) is added to the tool.
4. Adjust the tool parameters as required.
 5. Click on [OK].
- The task has been added.

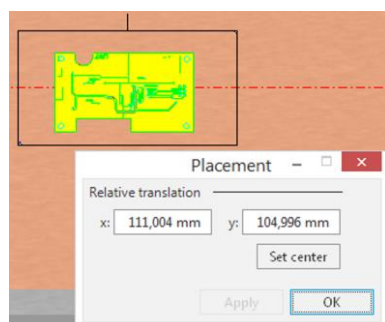
2.6.3 Placement

Opens a dialog for shifting the processing data.

Summary

The dialog *Placement* enables you to shift the processing data by entering the values *x* and *y*. You can move the data via drag & drop.

The button *Specify center point* positions the processing data to the center of the processing area.



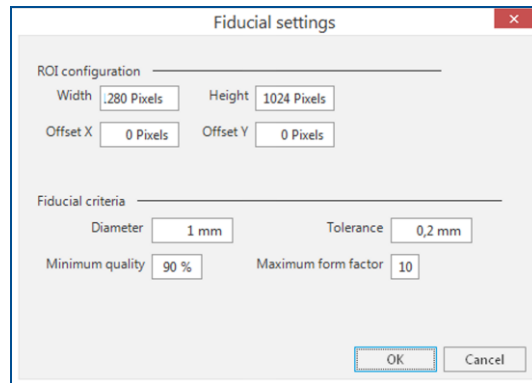
2.6.4 Fiducial settings

Opens a dialog for configuring the fiducial recognition for the manual fiducial search.

Summary

The dialog *Fiducial settings* enables you to configure the search area and to set the fiducial criteria.

The dialog is structured as follows:



Name	Description
ROI configuration	
Width	Within this pixel width the fiducial is searched. A small value increases the search speed. If the value is too small, the object is not recognized if it is located outside the search area.
Height	Within this pixel height the fiducial is searched. A small value increases the search speed. If the value is too small, the object is not recognized if it is located outside the search area.
Offset x	Indicates the distance of the search area to the left edge of the camera image.
Offset y	Indicates the distance of the search area to the upper edge of the camera image.
Fiducial criteria	
Diameter	Expected diameter of the object to be measured.
Tolerance	Allowed deviation of the diameter.
Minimum quality	Is the value that indicates the deviation between the camera image and the optimum image. If the values are too high only few fiducials are recognized. If the values are too small wrong objects are recognized. The optimum default value is 90%.
Maximum form factor	The maximum form factor is a calculation parameter within the fiducial recognition. This value can be changed for faster teaching. The default value is 10.

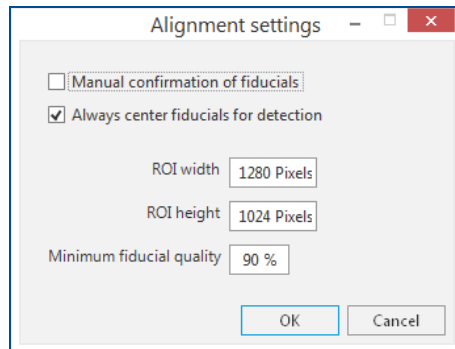
2.6.5 Alignment settings

Opens a dialog for configuring the fiducial search.

Summary

In the dialog *Alignment settings* you can configure the fiducial search settings. While processing, these settings are used for the fiducial search.

The dialog is structured as follows:



Name	Description
Manual confirmation of fiducials	If this function is activated, the position has to be manually confirmed, after a fiducial is found.
Always center fiducials for detection	If this function is activated, the camera is positioned above the center of the fiducial.
ROI width	This number of pixels is used for the search in the camera pane. If this value is decreased, teaching works faster. But large fiducials (larger than 1 mm) incur the risk of not being recognized.
ROI height	This number of pixels is used for the search in the camera pane. If this value is decreased, teaching works faster. But large fiducials (larger than 1 mm) incur the risk of not being recognized.
Minimum fiducial quality	The smaller this value, the less accurate the fiducial can be and still be recognized. The default value is 90% and should not set below 80%.

2.6.6 Process all

Starts the production of all processing data.

2.6.7 Stop processing

The current processing procedure is stopped.

2.6.8 Connect to machine

Opens a dialog for connecting the system software to a real or simulated machine.

Summary

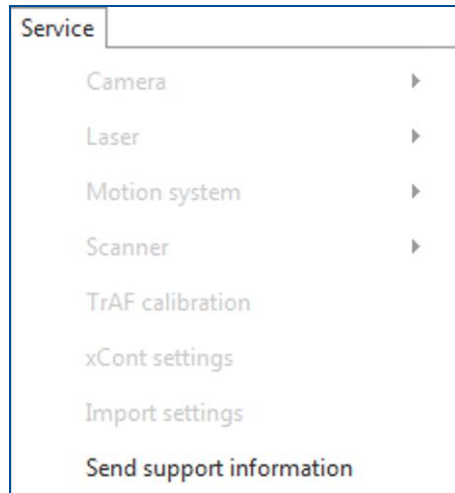
Select an appropriate machine for connection from the drop-down list.

You can also simulate a virtual machine without connecting to a real machine.

2.7 Menu Service

This menu contains password-protected menu items that are only available for the LPKF Service.

Use the menu item *Send support information* to send an email with support information to the LPKF Service.



The entries of the menu *Service* are described in the following table:

Icon	Item	Description
	Camera	Only accessible for the LPKF Service.
	Laser	Only accessible for the LPKF Service.
	Motion system	Only accessible for the LPKF Service.
	Scanner	Only accessible for the LPKF Service.
	TrAF calibration	Only accessible for the LPKF Service.
	xCont settings	Only accessible for the LPKF Service.
	Import settings	Only accessible for the LPKF Service.
	Send support information	Sends an email with support information to the LPKF Service.

2.7.1 Send support information

Sends support information to the LPKF Service

3 How to work with the software

3.1 Typical production process

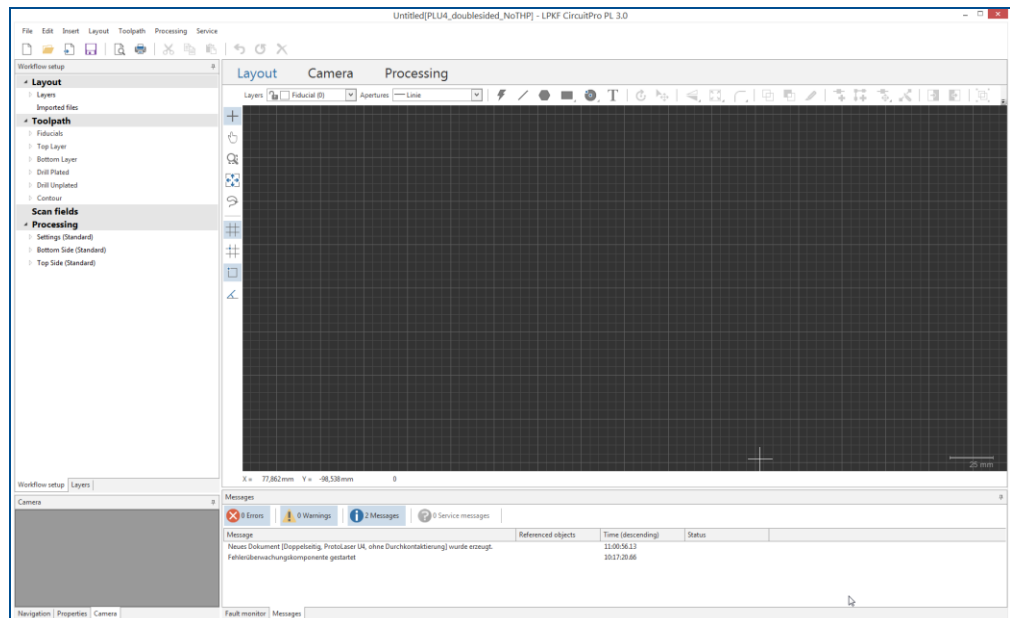
This chapter describes a typical production process. The following steps are performed:

■ Switching on the system

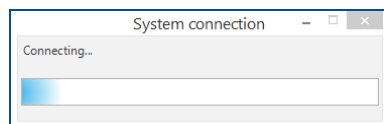
1. Press the on/off switch at the system front.
- The system is switched on. The PC boots automatically.
2. Double-click on the desktop icon of CircuitPro PL 3.0.



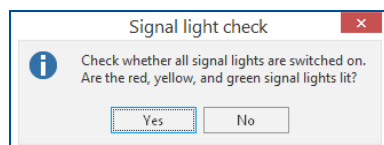
- The user interface of CircuitPro PL is displayed:



- The system software recognizes the connected system automatically, establishes the connection and the following message is displayed:

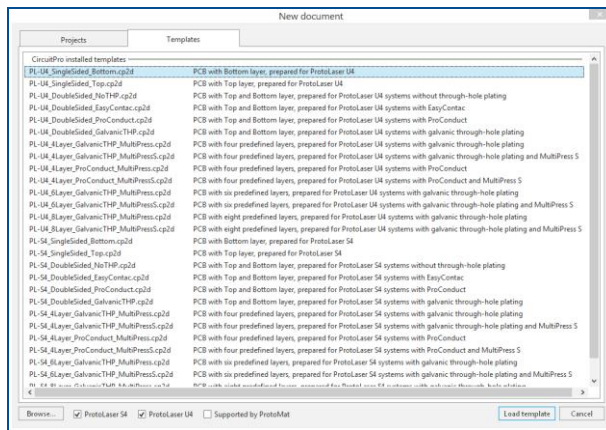


- The following dialog is displayed:



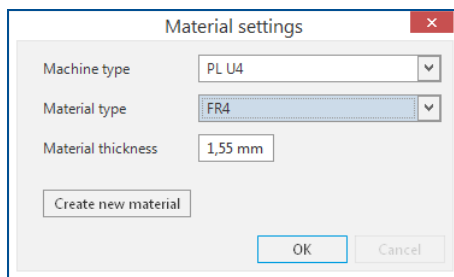
3. If all lamps of the stack light are lit, click on [Yes].

- The following dialog is displayed:



4. Select the template *PLU4_doublesided_NoTHP.cp2d*.
5. Click on [Load template].

- The following dialog is displayed:



6. Select the *Machine type* and the *Material type*.
7. Enter the *Material thickness*.
8. Click on [OK].

- The system has been switched on.




Connecting the system manually

If automatic connection of the system fails, you can connect the system manually with the system software:


- ▶ Click on *Production > Connect with machine...*
- ▶ Select your system in the drop-down list.
- ▶ Click on [Connect].

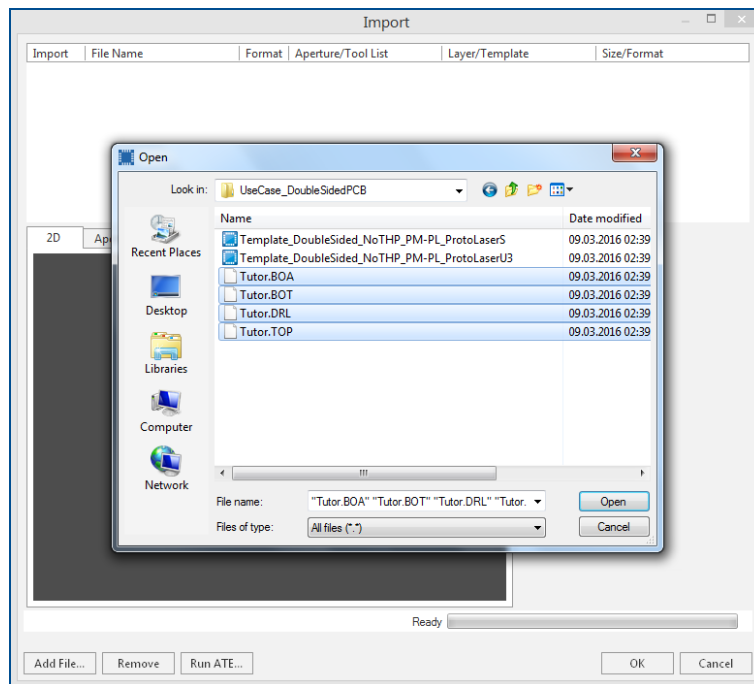


The system requires a warm-up time of approx. **20** minutes for the laser source to attain a constant diode temperature. The warm-up phase starts automatically with the processing of the first job.

Alternatively, you can start the warm-up phase manually. In the *Processing* view, click on . You can continue working in the *CAM* view during the warm-up phase.

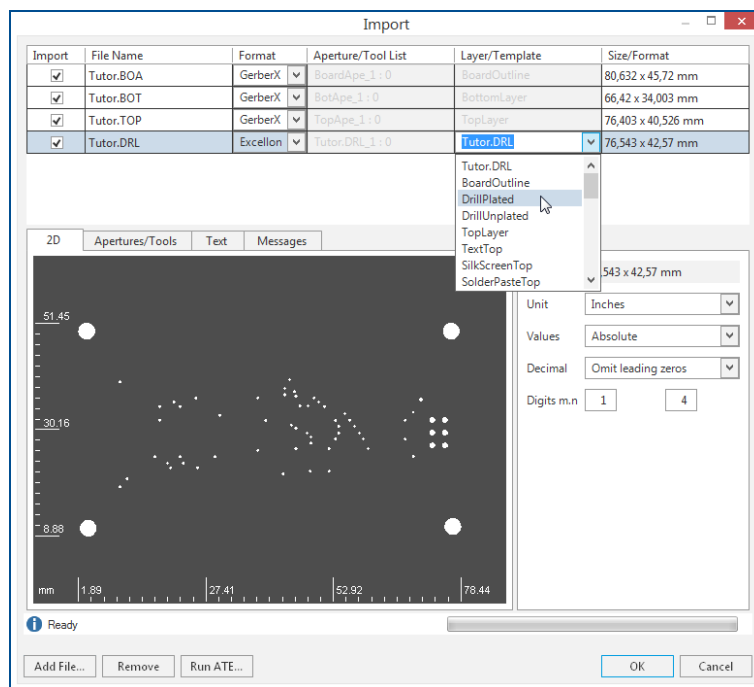
■ Importing the data

1. Click on *File > Import* or on .
- The following dialog is displayed:



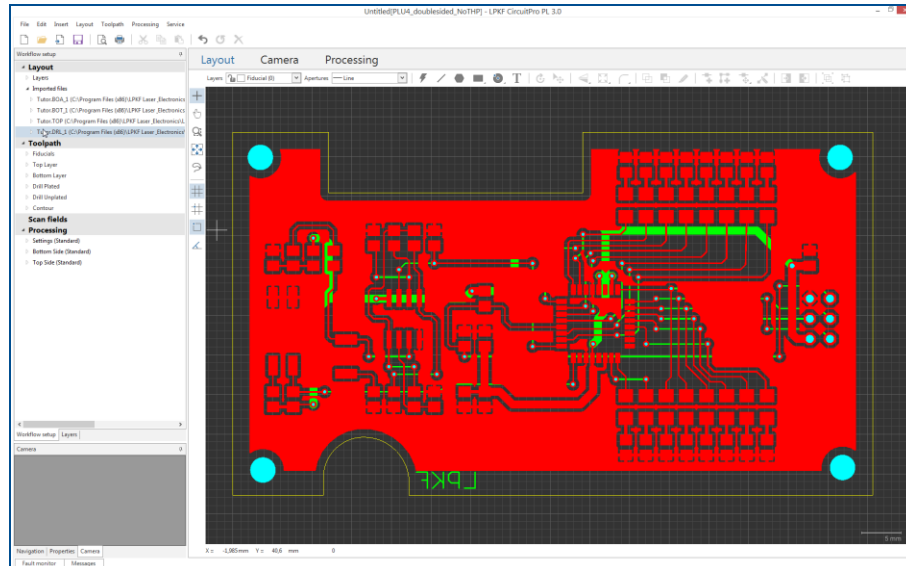
2. Navigate to the folder `C:\Users\User name\Documents\LPKF Laser & Electronics\LPKF CircuitPro PL 3.0\Example Data\UseCase_DoubleSidedPCB` and select the files *Tutor.BOA*, *Tutor.BOT*, *Tutor.DRL* and *Tutor.TOP*.
3. Click on [Open].

- The data are automatically assigned to the correct layers and the following dialog is displayed:



4. In the column *Layer/Template* select the layer *DrillPlated*.
5. Click on [OK].

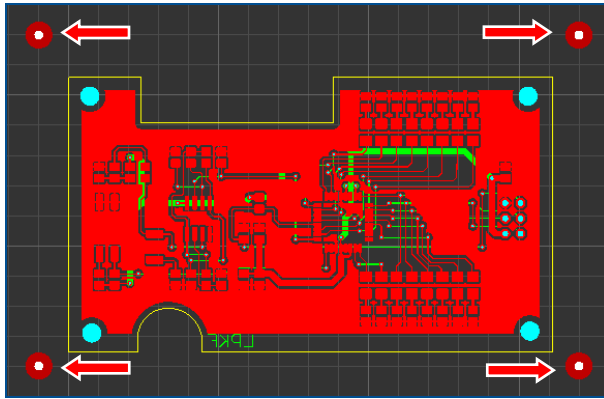
- The CAM view changes as follows:



- The data have been imported.

■ Inserting fiducials

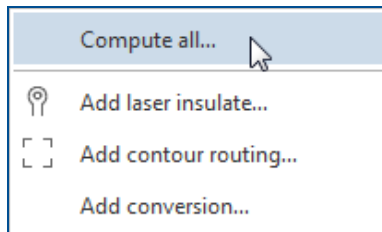
1. Click on *Insert > Fiducial > Fiducial*.
2. Insert four fiducials.



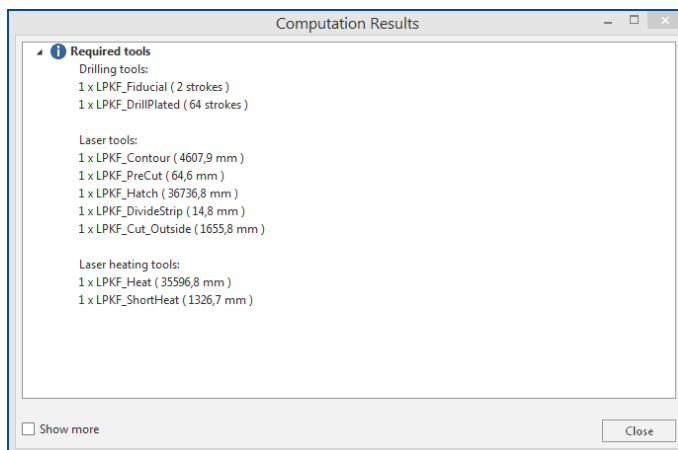
3. Press `[ESC]`.
 - The function is closed.
 - The fiducials have been inserted.

■ Computing toolpaths and scan fields automatically

1. In the pane *Workflow setup* right-click on the section *Toolpaths*.
 - The following context menu is displayed:



2. Click on the menu item *Compute all...*
 - The scan fields and toolpaths are computed automatically with default settings and the following message is displayed:



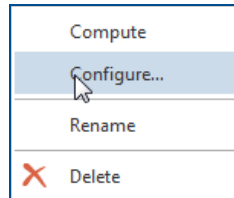
3. Click on `[Close]`.
 - The toolpaths have been computed.



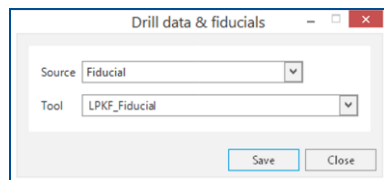
If you do not want to compute the toolpaths and scan fields with the default settings, you can adapt the settings to your needs (see *Configuring toolpaths manually* and *Computing scan fields manually*).

■ **Configuring toolpaths manually**

1. In the pane *Workflow setup* right-click in the *Toolpaths* section on *Fiducials*.
- The following context menu is displayed:

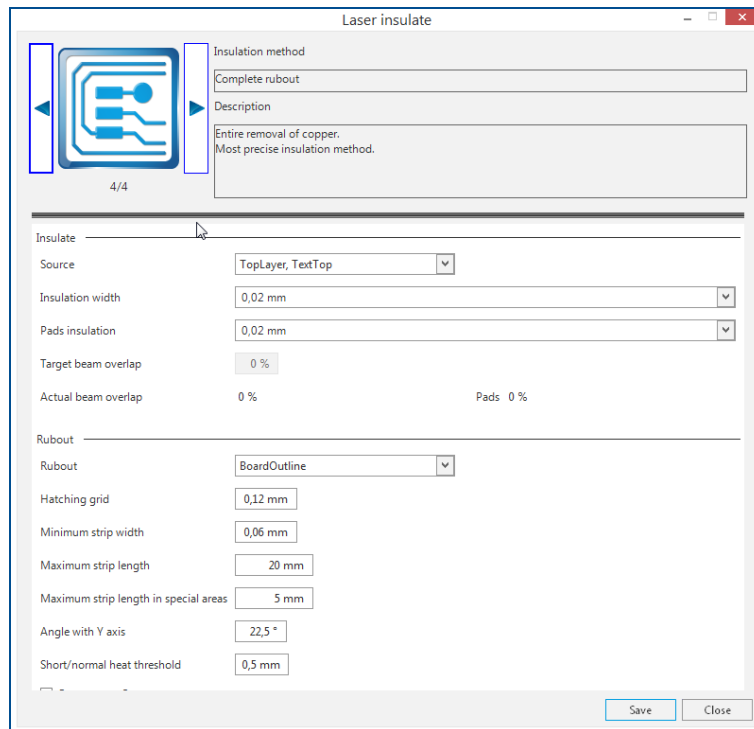


2. Click on the menu item *Configure...*
- The following dialog is displayed:

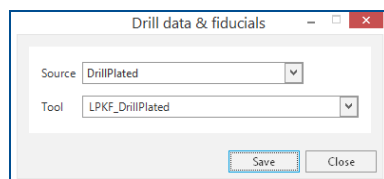


3. Adapt the settings if necessary.
 4. Click on [Save].
5. In the pane *Workflow setup* right-click in the *Toolpaths* section on *Top Layer*.
- The context menu is displayed.
6. Click on the menu item *Configure...*

- The following dialog is displayed:

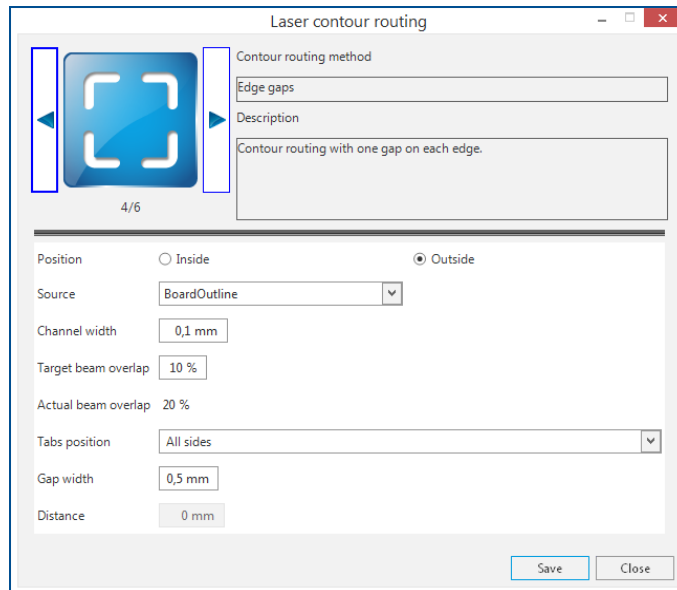


7. Adapt the settings if necessary.
8. Click on [Save].
9. In the pane *Workflow setup* right-click in the *Toolpaths* section on *Bottom Layer*.
- The context menu is displayed.
10. Click on the menu item *Configure...*
- The dialog *Laser insulate* is displayed.
11. Adapt the settings if necessary.
12. Click on [Save].
13. In the pane *Workflow setup* right-click in the *Toolpaths* section on *Drill Plated*.
- The context menu is displayed.
14. Click on the menu item *Configure...*
- The following dialog is displayed:



15. Adapt the settings if necessary.
16. Click on [Save].
17. In the pane *Workflow setup* right-click in the *Toolpaths* section on *Drill Unplated*.
The toolpath *Drill Unplated* is not used for this PCB and can be deleted.
- The context menu is displayed.
18. Click on the menu item *Delete*.
- The unused toolpath *Drill Unplated* is deleted.
19. In the pane *Workflow setup* right-click in the *Toolpaths* section on *Contour*.

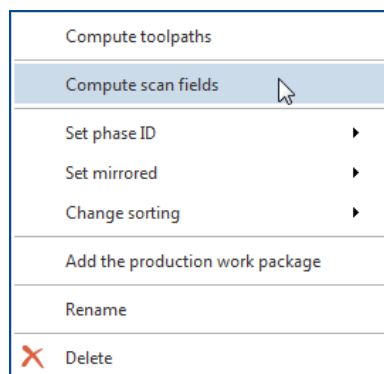
- The context menu is displayed.
- 20. Click on the menu item *Configure...*
- The following dialog is displayed:



- 21. Adapt the settings, if necessary.
- 22. Click on [Save].
- The toolpaths have been configured.

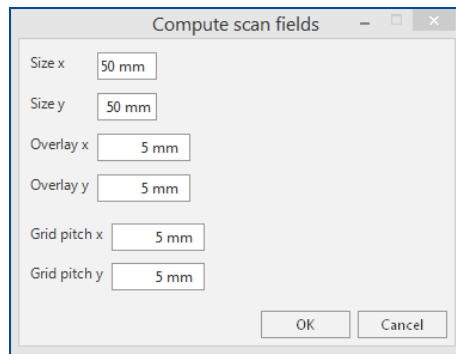
■ Computing scan fields manually

1. In the pane *Workflow setup* right-click in the *Production* section on *Bottom Side (Standard)*.
- The following context menu is displayed:

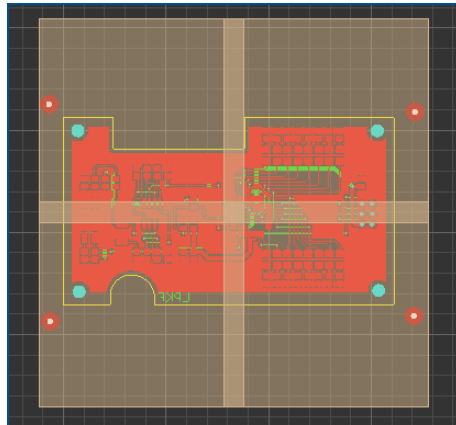


2. Click on the menu item *Compute scan fields*.

- The following dialog is displayed:

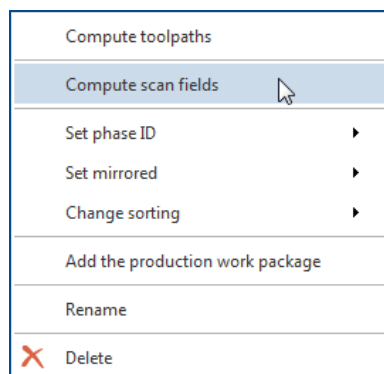


3. Adapt the settings, if necessary.
 4. Click on [OK].
- The CAM view changes as follows:



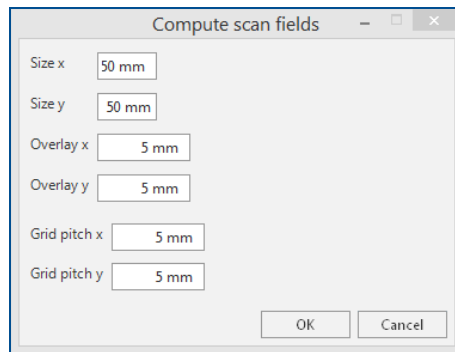
2. In the pane *Workflow setup* right-click in the *Production* section on *Top Side (Standard)*.

- The following context menu is displayed:

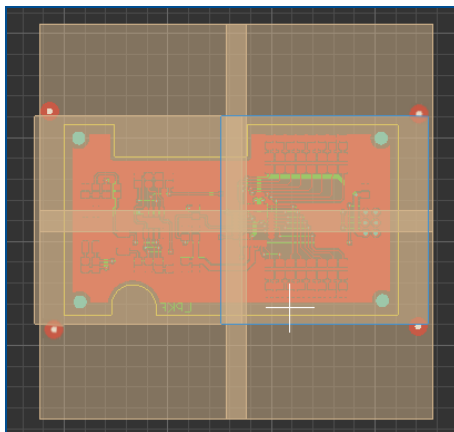


5. Click on the menu item *Compute scan fields*.

- The following dialog is displayed:



6. Adapt the settings, if necessary.
 7. Click on [OK].
- The CAM view changes as follows:



- The scan fields have been computed.

■ Processing a PCB

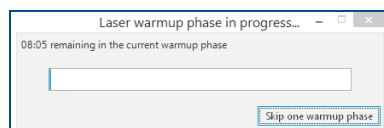
1. Measure the thickness of the material with a calliper gauge.

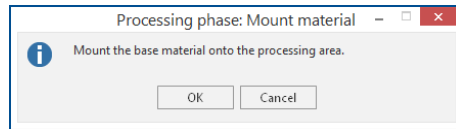



Clean the material surface with a micro etchant (e.g. ViaCleaner) if a discoloration (oxide layer) is discernible. Thus, a surface is achieved that always has the same characteristics.

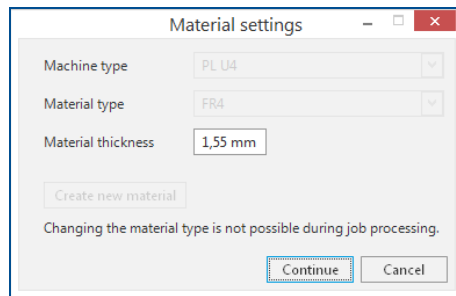
2. Click on *Processing* > *Process all* or in the *Production* view on ►.

- The following messages are displayed:

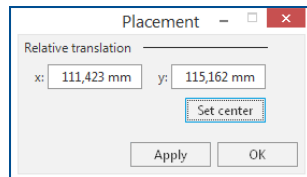




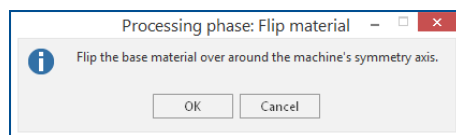
3. Open the cover.
4. Place the base material onto the x/y table.
5. In the *Production* view, click on .
- The base material is affixed to the x/y table.
6. Close the cover.
7. Click on [OK].
- The following dialog is displayed:



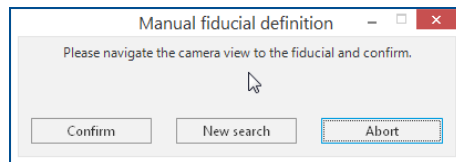
8. Enter the measured value in the field *Material thickness*.
9. Click on [Continue].
- The following dialog is displayed:



10. Place the processing data.
The production data can be moved using drag & drop or by entering the values in the fields *x* and *y*. Click on [Set center] to place the processing data at the center of the base material.
11. Click on [Continue].
- The structuring is started and the following message is displayed:



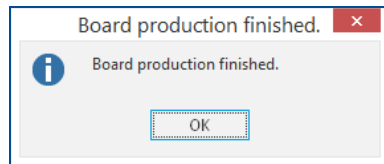
12. Turn the base material over around the symmetry axis of the system.
13. Fasten the material along its edges with adhesive tape.
14. Click on [OK].
15. If the fiducials are not found automatically, the following message is displayed:



16. Switch to the *Camera* view.


17. Move the camera image to the position of the fiducial and click on [Confirm].

The structuring is started and the following message is displayed:



The PCB has been processed.

■ Stopping processing

1. Click on *Processing* > *Stop processing*.
Alternatively, click on .

Processing has been stopped.

■ Switching off the system

1. Click on *File* > *Exit*.

The connection to the system is disconnected and the system software is closed.

2. Perform one of the following steps:

- In the Windows user interface, click on *Start* > *Shut down*.
- Press the *On/Off button* at the system front briefly.

The operating system is shut down.

The system has been switched off.

■ Cleaning the system

The processing area has to be cleaned if heavily soiled.

▶ Use a vacuum cleaner to remove chips and residues from the processing area.