



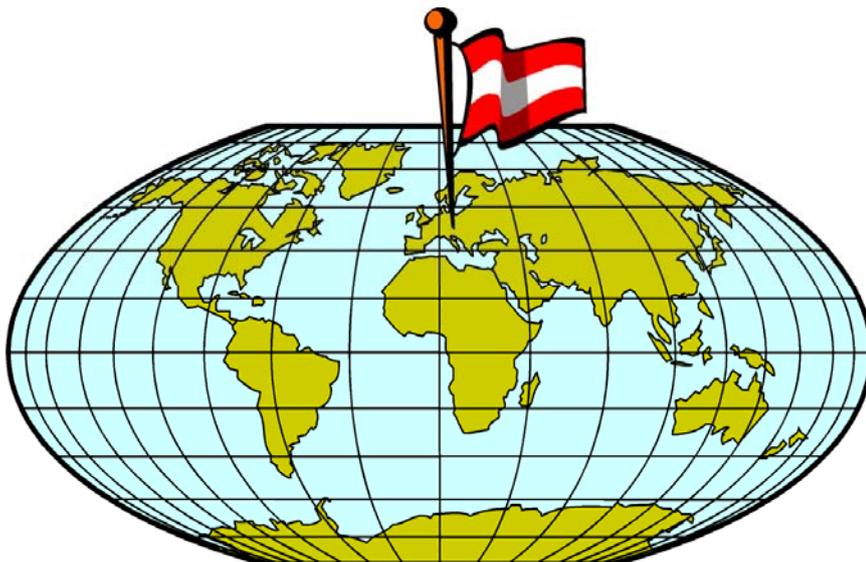
Operation Manual TroCAM V2 / AlphaCam V10

→ TroCAM



www.troteclaser.com





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2 Installation and Activation

2.1 Installation

1. Start the PC with **Administrator rights**.
2. Insert the installation CD and via autorun the language selection screen will show up.
If Autorun does not work, please run the **setup.exe** in the following directory
`\\.\Modele_CD_Trotec_2010R1\Setup_Alphacam_2010`



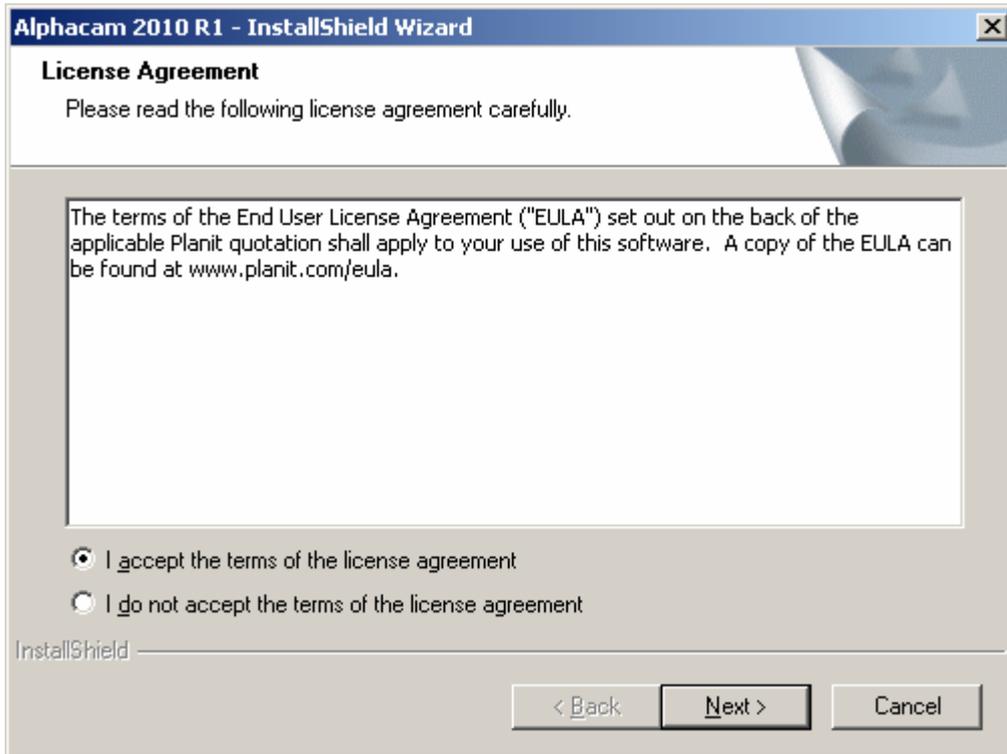
3. Select the required language



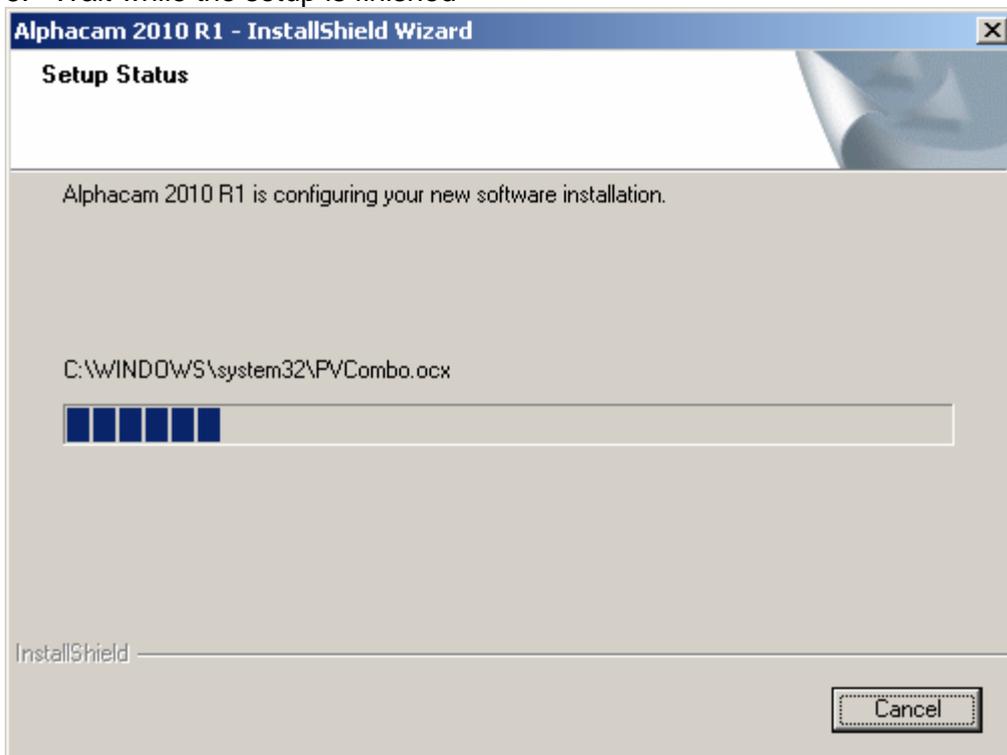
4. Wait while the setup is configured and prepared

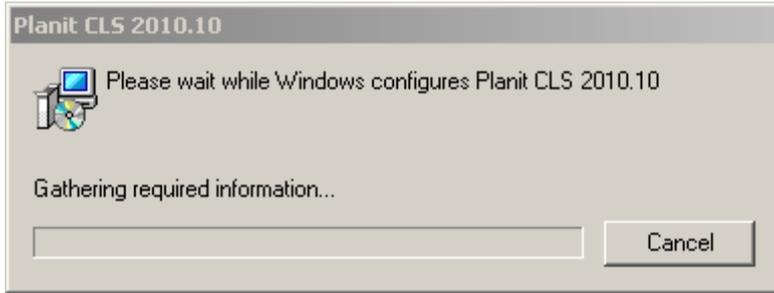


5. Accept the License Agreement



6. Wait while the setup is finished





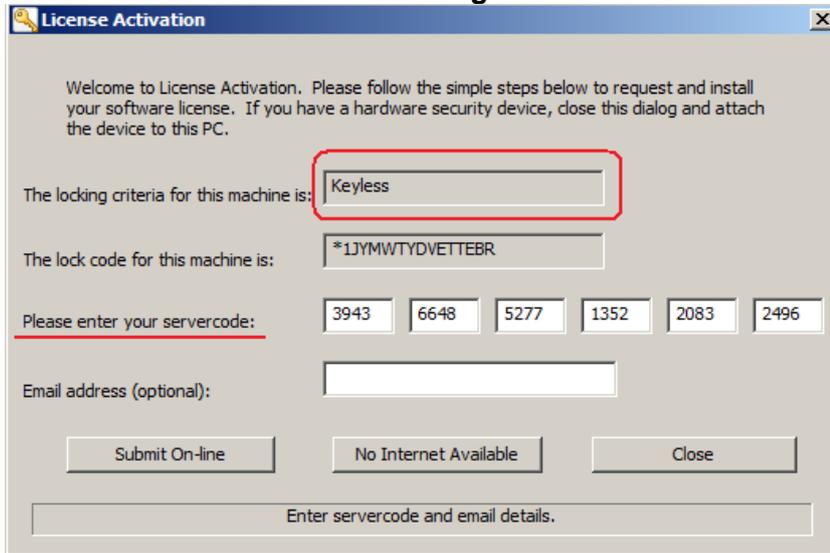
7. Finish the Installation with a restart of the PC



2.2 Activation

Remove an eventually installed old Dongle and have your 6x4-digit servercode ready from your installation CD booklet.

Start TroCAM with **administrator rights** and the License Activation window will show up.



Assure that the “locking criteria for this machine” is “Keyless”. That means, the license will be linked to the Hardware. If the “locking criteria” is different, it means that a Dongle is plugged. In that case, close the Window, remove the Dongle and restart the activation.

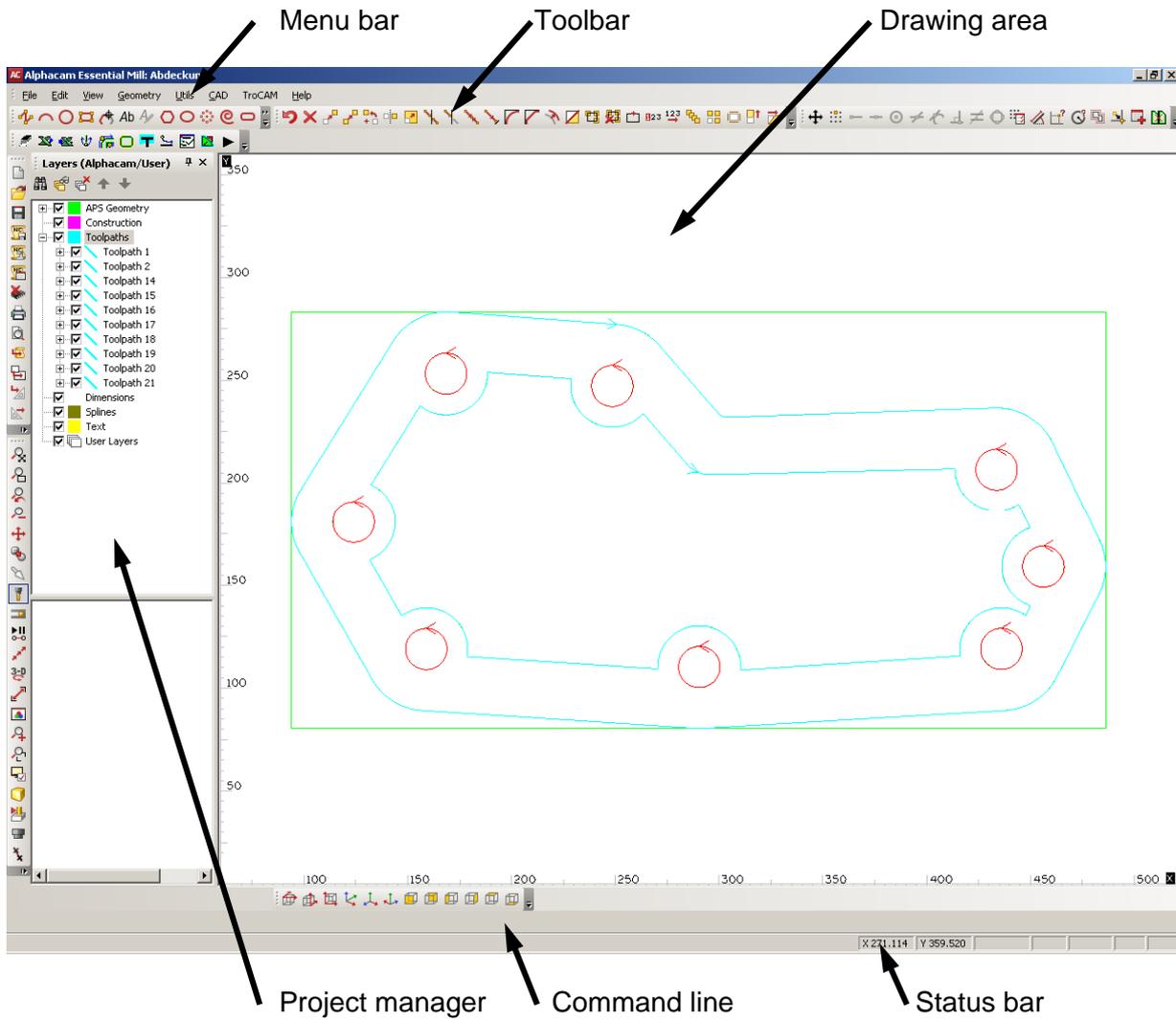
Enter the Servercode which you received with your Installation CD.

If internet is available, the activation is finished with click on „Submit On-line“ and you can work with TroCAM.

Without internet connection click on „No Internet Available“ and you get a text file with further information and a link. Follow the link to the “Planit” homepage on a PC with internet connection and enter the lock code of your machine and the Server Code. You get a .one file which you should transfer to the Desktop of the TroCAM-PC. With double-click on the .one file the activation is finished and you can work with TroCAM.

Perform the first startup of TroCAM with **administrator rights**.

3 TroCAM Main Window



You can customise the appearance of the main window. You can add or remove tools on the toolbar. You can change the positions of the tool bars, command line and project manager. You can change the background colour of the drawing area.

Via right mouse click on a toolbar a list of all active and inactive toolbars is shown.

Via mouse click on the symbol with four dots the toolbar can be moved. Toolbars within the drawing area can be caught and moved via left mouse click on the header bar of the toolbar.

Via right mouse click on the drawing area a context menu is shown.

Via the tool bar "View" different display modes can be selected.



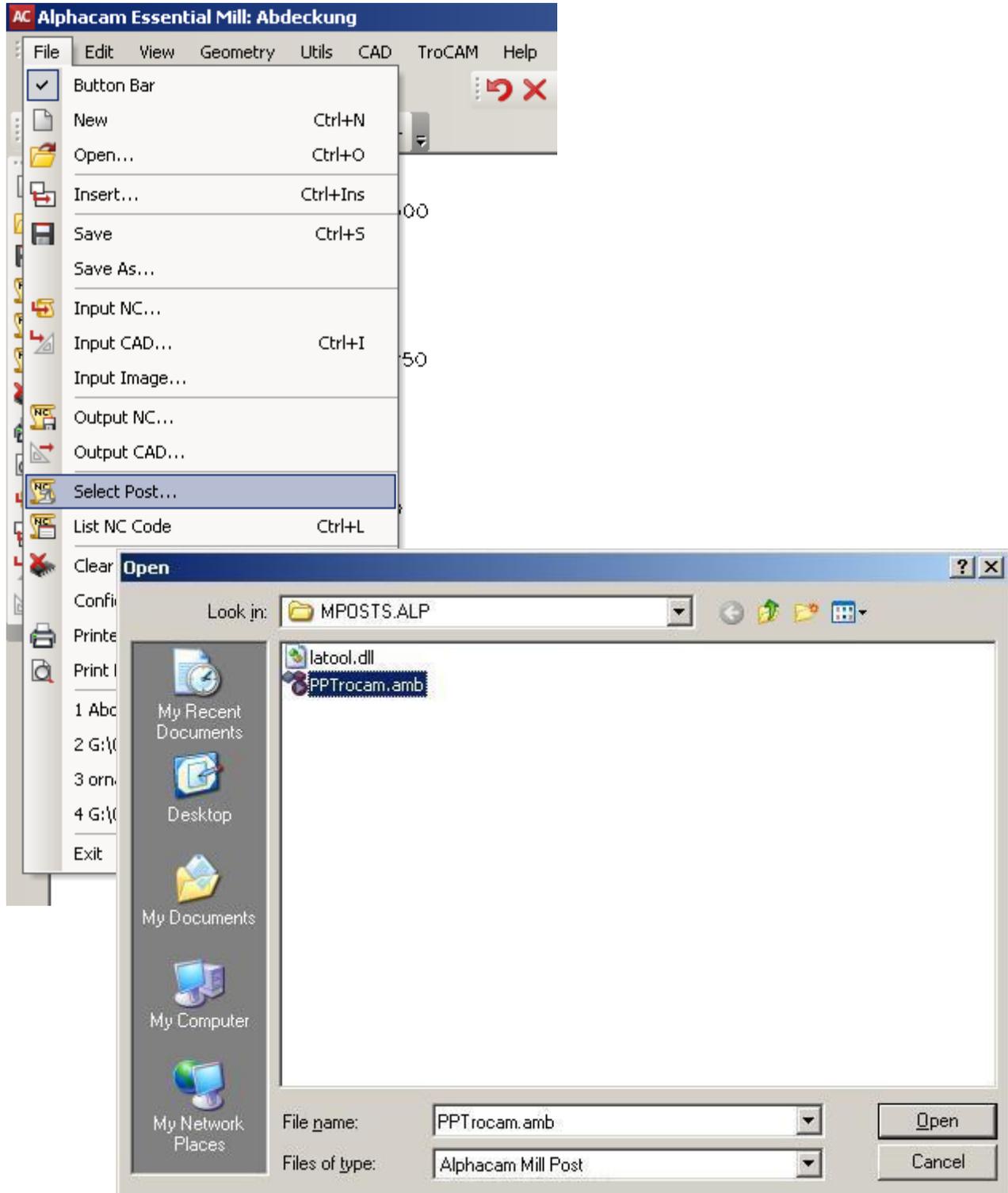
The same buttons can be found in the menu bar.

With the wheel on a mouse the zoom function is activated. Focus is defined by the cursor position.

4 Configurations

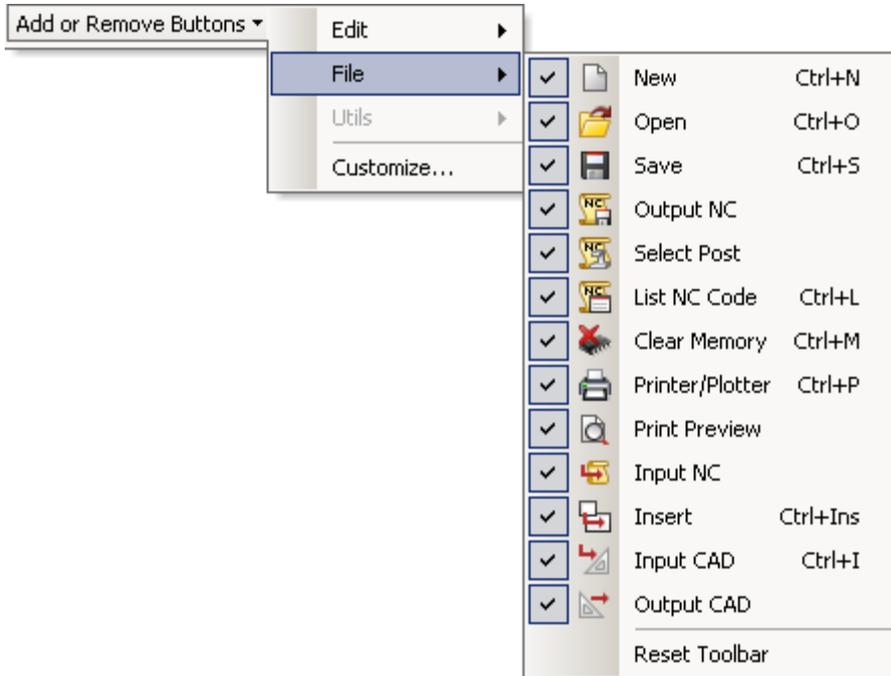
4.1 Selecting the Postprocessor

During first program start the selection window for the postprocessor opens automatically. Please select PPTrocam.amb.



4.2 Configuring the toolbar

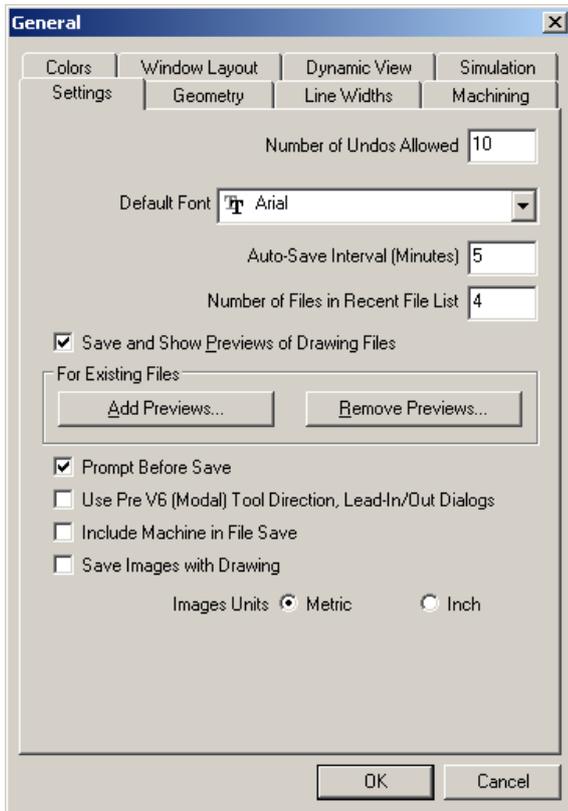
Each toolbar has a small black arrow. Clicking on this arrow brings up the **Add or Remove Buttons** menu and a choice of toolbars. By checking or un-checking the buttons, you can select which toolbars are displayed.



Via **Customize** the buttons can be edited. The buttons can be copied and changed. The Symbol can be changed or set to text view.

4.3 Configuring the general settings

In the menu bar **File**, select **Configuration → General**.



“Settings”

“Number of undos allowed” defines the number of entries that can be undone.

“Default font” specifies the font for all text editing.

“Auto-Save Interval” defines the intervals of automatic saving of the data.

The most recently opened files are listed in the menu **File**.

Display preview for drawing files:

Add preview:

In “Licomdir” select the directories for which preview should be active.

Remove preview:

In “Licomdir” select the directories for which preview should be deactivated.

“Prompt Before Save”: when active, user is asked if the actual graphics should be overwritten.

“Geometry”

The processing direction – CW or CCW – and start point for circles can be preset here.

“Line Widths”

Use this to set the line width for standard lines when printing out.

“Machining”

The default values for relieve level and safety level are entered here.

“Colours”

The colour adjustments for lines and planes can be made here. The settings can be saved. Reset returns to the original colours.

“Window layout”

Open and save different layouts to adjust the layout of the TroCAM screen to your needs.

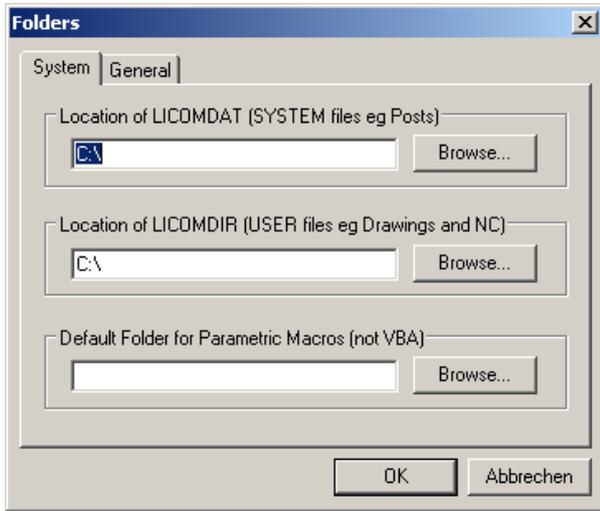
“Dynamic View”

Adjust the speed settings for mouse and keyboard move-commands.



4.4 Configuring the system folders

In the **file** menu bar, select **configuration / system folder**.



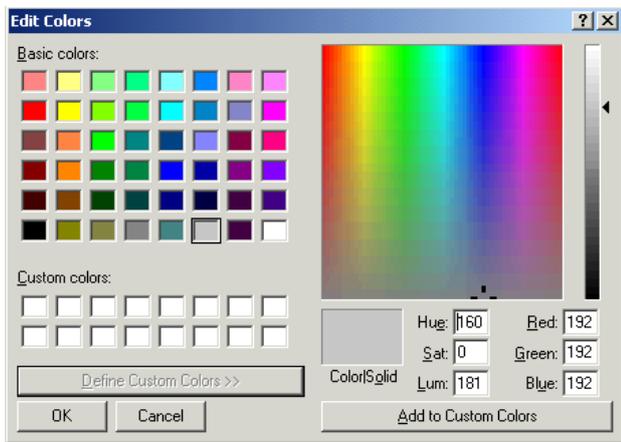
Here the TroCAM system paths can be changed.

Programs must always be saved in the Licomdir directory.

Additional directories and subdirectories can be created in the Licomdir directory.

4.5 Configuring the background colour for the drawing area

In the **View** menu bar, select **Background Colours**.



The background colour can be set using this table.

4.6 Configuring the ruler for the drawing area

In the **View** menu bar, select **Set Limits**.

First the bottom left corner will be defined, and after clicking on OK, the upper right corner.

In the **View** menu bar, select **Zoom Limits**.

Scaling will be adapted to the new ruler.

5 CAD Geometry

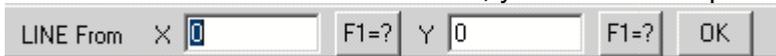
Entries Enter coordinates via the command line or object snaps.



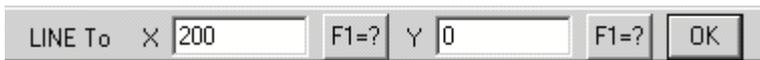
5.1 Simple 2D-Geometries – lines, arcs, circles, rectangles



Line: In the **Geometry** menu bar, select **Line**.
In the **Command Line**, you will see the prompt:



Enter coordinates X and Y, and confirm. Confirm with OK or Enter.
Next the **Command Line** will ask for the end point (“LINE To”).

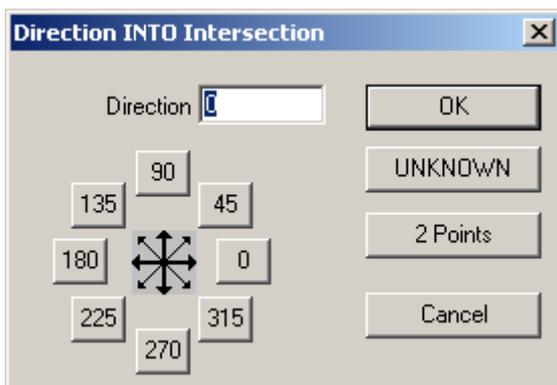


In TroCAM, all commands remain active until a new command is selected or the active command is ended with ESC. The previous command can be reactivated with the space bar.

Instead of the ESC button, the right mouse button can be used.

F1 identifies the window as unknown.

As a result, the window below is opened to allow the direction of angle to be entered.



Arc: In the menu bar **Geometry**, select **Arcs**→ **2 points and radius**.
In the **Command Line**, you will see the prompt:



Arcs are always constructed counter clockwise. The starting point must be selected accordingly.

You will then be asked for the end point in the **Command Line**.

ARC: End Point X Y

You will be asked for the radius in the **Command Line**.

ARC: Radius



Circle: In the menu bar **Geometry**, select **Circles → Centre and Diameter**.
In the **Command Line**, you will see the prompt:

Circle Diameter

Once the diameter has been defined, you will be asked for the circle centre.

Circle Centre X Y



Rectangle: In the menu bar **Geometry**, select **Rectangle**.
In the **Command Line**, you will see the prompt:

RECTANGLE: Pick First Corner X Y

Once the coordinates of the first corner have been confirmed, you will be asked in the **Command Line** for the second corner, diagonally opposite the first.

Pick Second Corner X Y



Construction: In the menu bar **Geometry**, select **Construction**.

When Construction is active, the geometries are drawn in purple rather than green. Construction geometries cannot be edited. They simply serve as guides.

5.2 Special 2D-Geometries

In the menu bar **Geometry** select **Special 2D Geometries**



Polygon



Slot



Ellipse



Equi-Spaced Holes



Bolt Hole Circle



Enclosing Rectangle



Involute Curve



6 Utils

The **Utils** menu contains a lot of useful auxiliary functions for determining coordinates.



6.1 Object Snaps

Object snaps can only be used in combination with another command. Object snaps do not remain active once they have been executed. In this respect, object snaps are an exception in TroCAM. They have to be reactivated each time except **Ctrl** has been pressed during activation. Use the function keys and buttons described below to activate the object snaps.

In the menu bar **Geometry**, select **Object Snaps**.

	END-point of	F6	Select end points of lines and arcs
	MID-point of	F7	Select middle points of lines and arc
	Arc CENTRE of	F8	Select centre of lines and arcs
	INTERSECTION of	F9	Select intersections of lines and arcs
	TANGENT to	F10	Tangential intersection of an arc
	PERPENDICULAR to	F11	Line perpendicular to a line or arc
	PARALLEL to	F12	Line parallel to a line
	QUADRANT Point		Quadrants of a circle

After an object snap has been selected, the mouse pointer changes to a representation of the active object snap.

A prompt in the **Command Line** asks you to select a **Line** or an **Arc**.

When Auto Snap is active, the mouse pointer automatically jumps to the next possible object snap.



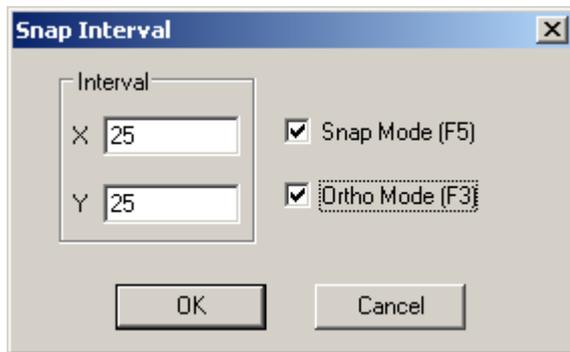
Auto Snap: In the **Utils** menu bar, select **Auto Snap**.
The function is displayed in the **Status Line** when it is active.



Auto Snap can also be activated and deactivated using the **Function Key F2**.



Grid Ortho: In the **Utils** menu bar, select **Grid / Ortho**.



A rectangular grid is laid over the entire screen. When snap to grid is active (SNAP), the mouse pointer automatically jumps to the grid nodes. The distance between the nodes is defined in X and Y.

The functions Orthogonal (ORTHO) and Snap to Grid (SNAP) are displayed in the status line when they are active.



Ortho mode can be activated and deactivated either using this button or with **F3**.



Snap mode can be activated and deactivated either using this button or with **F5**.



6.2 Calculating coordinates and mass sizes

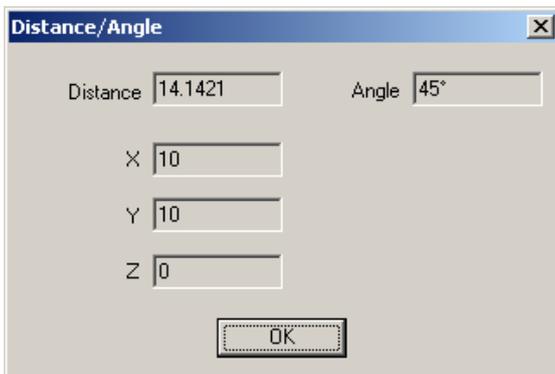
The following auxiliary functions are available for checking X, Y, Z coordinates, angles, lengths and radii.



Distance, Angle: In the **Utils** menu bar, select **Distance / Angle**.
In the **Command Line**, you will see the prompt:



The first point is defined by entering the coordinates or by using object snap.
The second point is defined in the same way.



Angle and Absolute Distance are displayed from the first to the second point.
Distance in X, Y and Z is measured from the first to the second point.



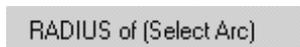
Coordinates: In the **Utils** menu bar, select **Report Coordinates**
In the **Command Line**, you will see the prompt:



The point for which coordinates are required can be selected using Object Snap.
The global coordinates of this point are displayed in the **Command Line**.



Radius of: In the **Utils** menu bar, select **Radius of**.
In the **Command Line**, you will see the prompt:



When you click on the arc with the mouse pointer, the value of the radius is displayed in the command line.



6.3 Special functions

In the **Utils** menu bar, select **Special Functions**.

Compress Geometries



Generate Border Contours

Delete hidden Contours → Add-Ins



7 Editing

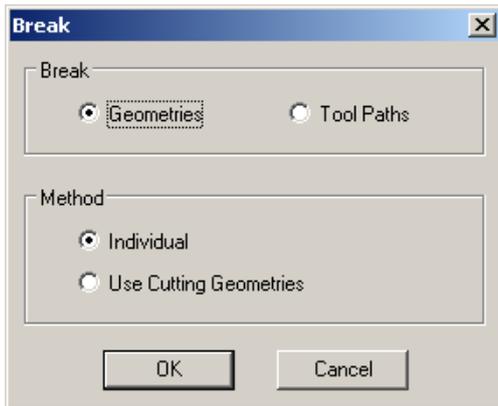


7.1 Break, Join



Break

In the **Edit** menu bar, select **Break, Join** → **Break**.



You next have to decide whether **Geometries** or **Tool paths** will be broken.

Select **Individual** to break a single geometry at a specific point.

Use Cutting Geometry causes two geometries to cut each other, one geometry serving as the borderline on whose intersection points the other geometry is broken.

Individual

In the **Command Line**, you will see the prompt:



Define the point by using object snap or by entering the coordinates.

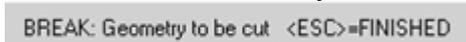
Use Cutting Geometry

In the **Command Line**, you will see the prompt:



The cutting geometry is the geometry that acts as a borderline. Select the geometries that act as borderlines and end with ESC.

In the **Command Line**, you will see the prompt:



Select the geometries to be broken up and end with ESC.

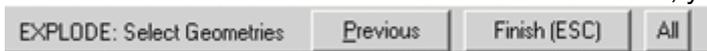
A white cross will appear at the intersection points where the geometry has been broken open.



Break everything

In the **Edit** menu bar, select **Break, Join** → **Break open contour pass**.

In the **Command Line**, you will see the prompt:



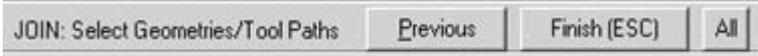
After ending with ESC, the selected geometries are broken into their individual elements.

Editing



Join

In the **Edit** menu bar, select **Break, Join → Join**.
In the **Command Line**, you will see the prompt:



Select the geometries that are to be joined and end with ESC.

7.2 Erase



Undo

In the **Edit** menu bar, select **Undo: Entry**.

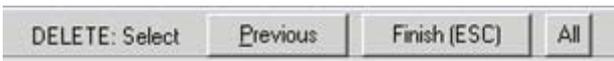
A window will appear with a list of the functions to be undone, and must be confirmed with **OK** or **Cancel**.

The number of actions to be undone can be defined in the configuration.



Erase

In the **Edit** menu bar, select **Erase**.
In the **Command Line**, you will see the prompt:



Use the mouse to click on the geometries to be erased, and end with ESC. A window will appear with the number of geometries to be erased, and must be confirmed with **OK** or **Cancel**.
Selecting **All** will erase everything. With **Previous**, the geometries that were selected previously are reselected.

7.3 Move, Copy, Offset



Move

In the **Edit** menu bar, select **Move, Copy → Move**.
In the **Command Line**, you will see the prompt:



Select the geometries to be offset and confirm with ESC.
In the **Command Line**, you will see the prompt:



Define the basis point using object snap or by entering the coordinates.
In the **Command Line**, you will see the prompt:



Enter the coordinates of the offset point or mark the new position using object snap.



In TroCAM, all functions remain active until a new function is selected or the active function is ended with ESC.



Copy

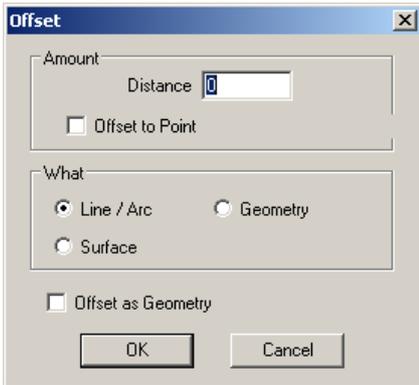
In the **Edit** menu bar, select **Move, Copy → Copy**.

The other steps are the same as for Move, except that here a copy of the geometries is made.



Offset

In the **Edit** menu bar, select **Break, Join → Offset**.



With Offset, geometry is offset by a given **Distance**. The original is preserved.

Individual elements, complete geometries or surfaces can be offset.

Individual elements are recreated as construction elements with Offset.

Lines/arcs:

In the **Command Line**, you will see the prompt:



Select line or arc to be offset. Only one element can be selected.

In the **Command Line**, you will see the prompt:



Click on the side on which the element is to be offset.

Geometry:

In the **Command Line**, you will see the prompt:



Select the geometry to be offset. Only one geometry can be selected at a time.

In the **Command Line**, you will see the prompt:



Click on the side on which the geometry is to be offset with the mouse, or define the side by entering its coordinates.



7.4 Rotate, Mirror



Rotate

In the **Edit** menu bar, select **Move, Copy → Rotate**.
In the **Command Line**, you will see the prompt:

Select the geometries to be rotated and confirm with ESC.
In the **Command Line**, you will see the prompt:

Enter the coordinates for the centre of rotation
In the **Command Line**, you will see the prompt:

The angle for clockwise rotation must be preceded by a minus sign.



Mirror

In the **Edit** menu bar, select **Move, Copy → Mirror**
In the **Command Line**, you will see the prompt:

Select the geometries to be mirrored and confirm with ESC.
In the **Command Line**, you will see the prompt:

With Mirror, an axis must be defined around which the geometries are mirrored. Once you have defined the first point, you will be prompted to enter the second point:

A window will then appear asking if the original should be kept. Selecting yes means that a mirror-image copy of the original is created. Selecting No means that the original is flipped. In both cases the mirror image is rotated around the axis of reflection.

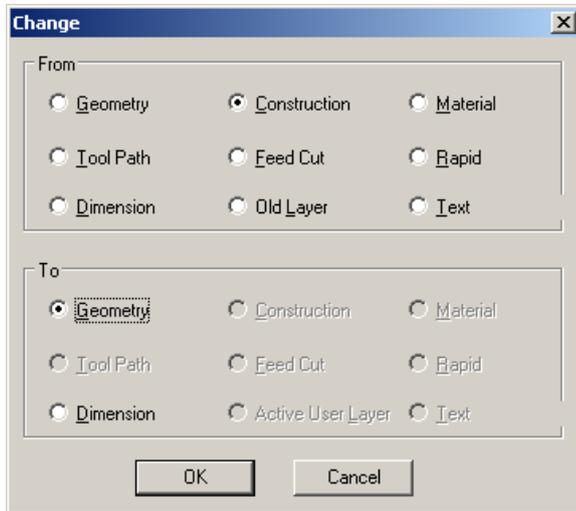


7.5 Change Element Type



Change

In the **Edit** menu bar, select **Change Element Type**.



This table allows an existing element to be changed into another element. For instance, a construction element can be changed into geometry.

Elements can be moved from the original layer into the active layer.

Text as Fonts can be changed to geometry etc.

8 Import CAD file

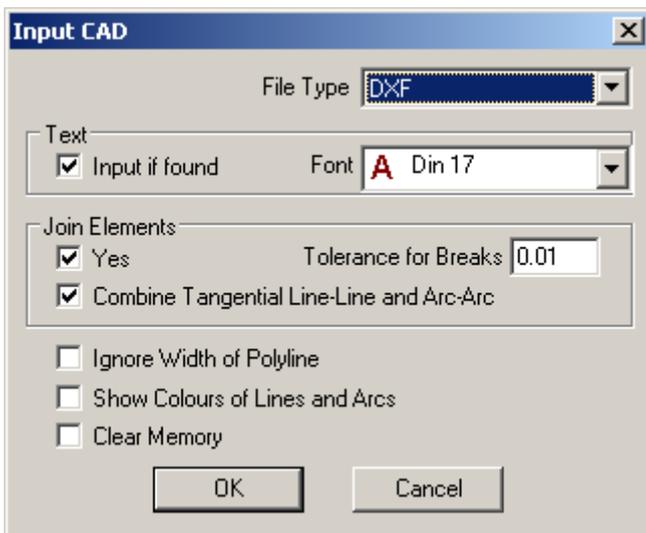
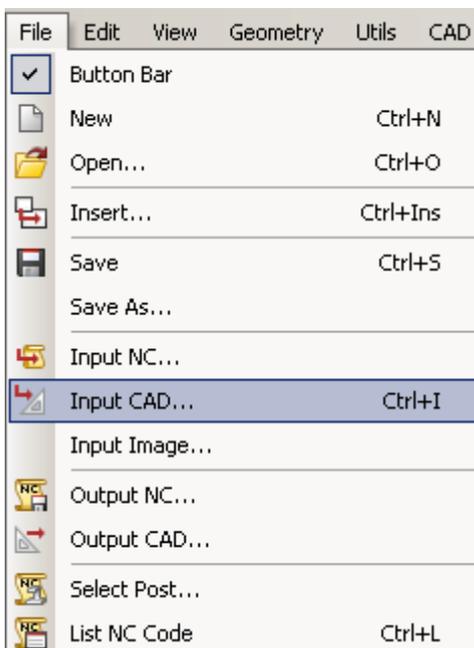
Drawings from other CAD systems in DXF and DWG formats can be imported into TroCAM.

DXF is a widely used, standardised file format for digitised 2D drawings.

DWG is the format used by AutoCAD.

8.1 Import files

In the **File** menu bar, select **Input CAD...**



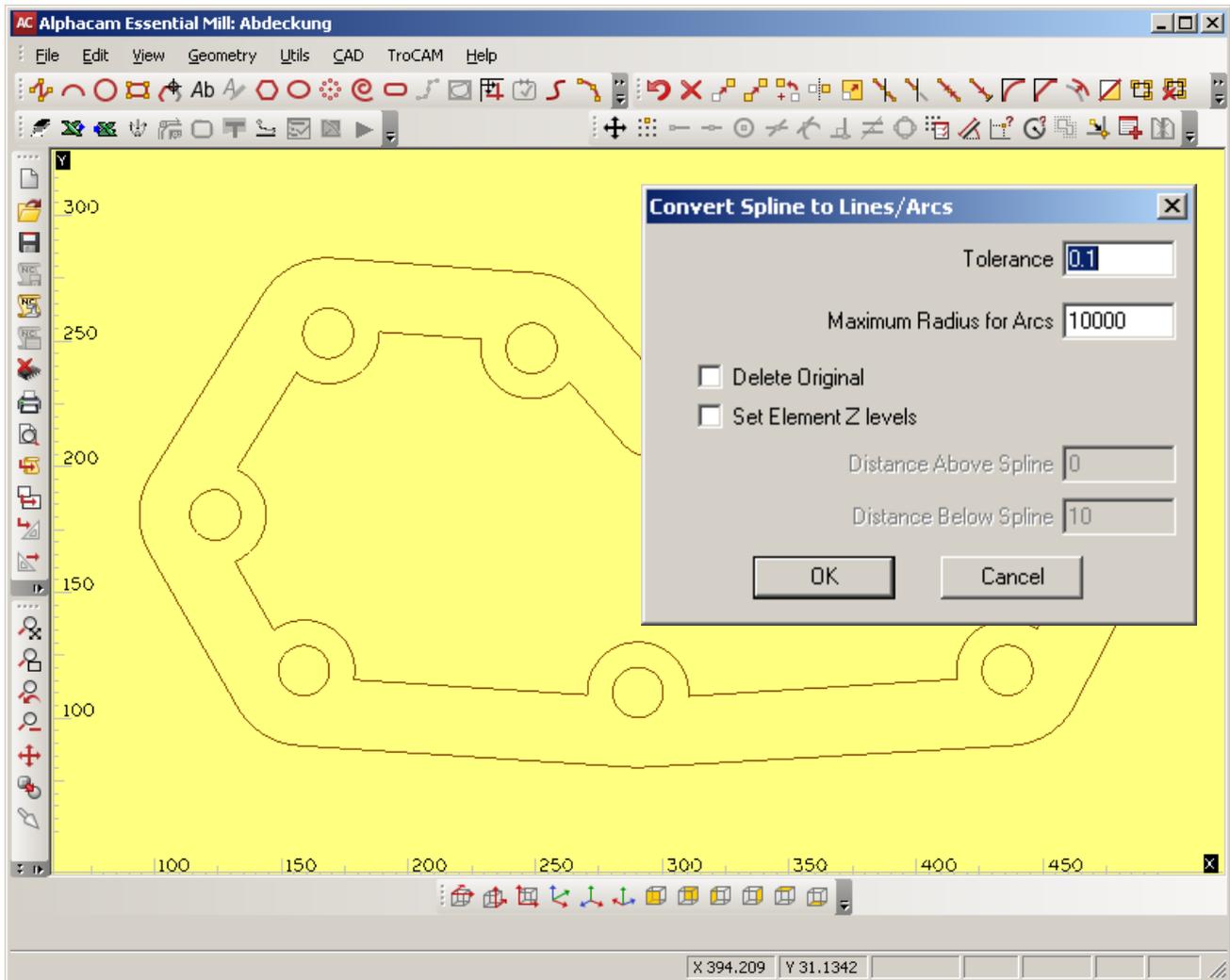
Text is not transferred as geometry and a font must be defined for it.

With Join Elements, unwanted line interruptions can be avoided with the appropriate tolerance selection.

8.2 Convert splines to polyarcs

Any splines in the drawing will be brown lines instead of the usual green for polyarcs. If there are splines, they must be converted to polyarcs before they can be toolpathed.

In the **Geometry** menu bar, select **Splines → Convert Spline to Line/Arc**



Change the tolerance to 0.001 and click OK.

Click on **All** at the Command line and confirm with **Finish** or ESC.

Check if the transformation was OK

If not, reduce the tolerance to e.g. 0.01 or 0.001 instead of 0.1.

If the outcome is fine, delete the splines.



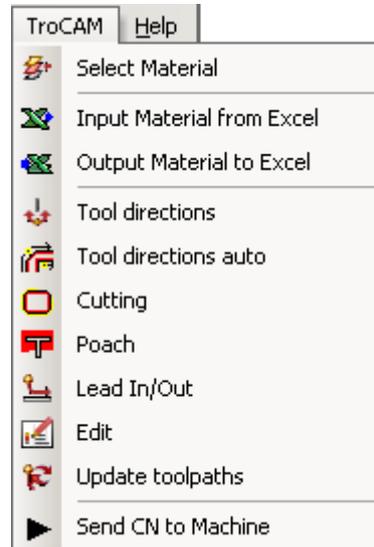
9 Laser Functions and TroCAM Bar

The TroCAM functions can be found as button bar and in the menu bar.

Operation via tool bar



or menu bar



Find a description of the different functions below.

9.1 Create and select materials in the material database

TroCAM offers a database to save materials. To Create and Save Materials proceed as follows:



Select Materials

In the **TroCAM** menu bar, select **Select Materials**.

The screenshot displays three overlapping dialog boxes from the TroCAM software:

- Select material TROTEC:** This is the main dialog box. It features two large empty rectangular areas labeled "Material group" and "Material name". To the right, there are seven input fields for material properties: Thickness, Width, Performance, Performance correction, Speed, Laser frequency, and Gas Type, each with a "0" value. At the bottom, there are buttons for "Edit", "New", "Delete", "Select", and "Cancel".
- Material group:** A smaller dialog box titled "Material group" with a close button (X). It contains the text "TROTEC" and a large empty rectangular area. At the bottom, there are buttons for "Select", "New", and "Cancel".
- New group of material:** A dialog box titled "New group of material" with a close button (X). It has a text input field labeled "Name of the group of material" and buttons for "OK" and "Cancel".

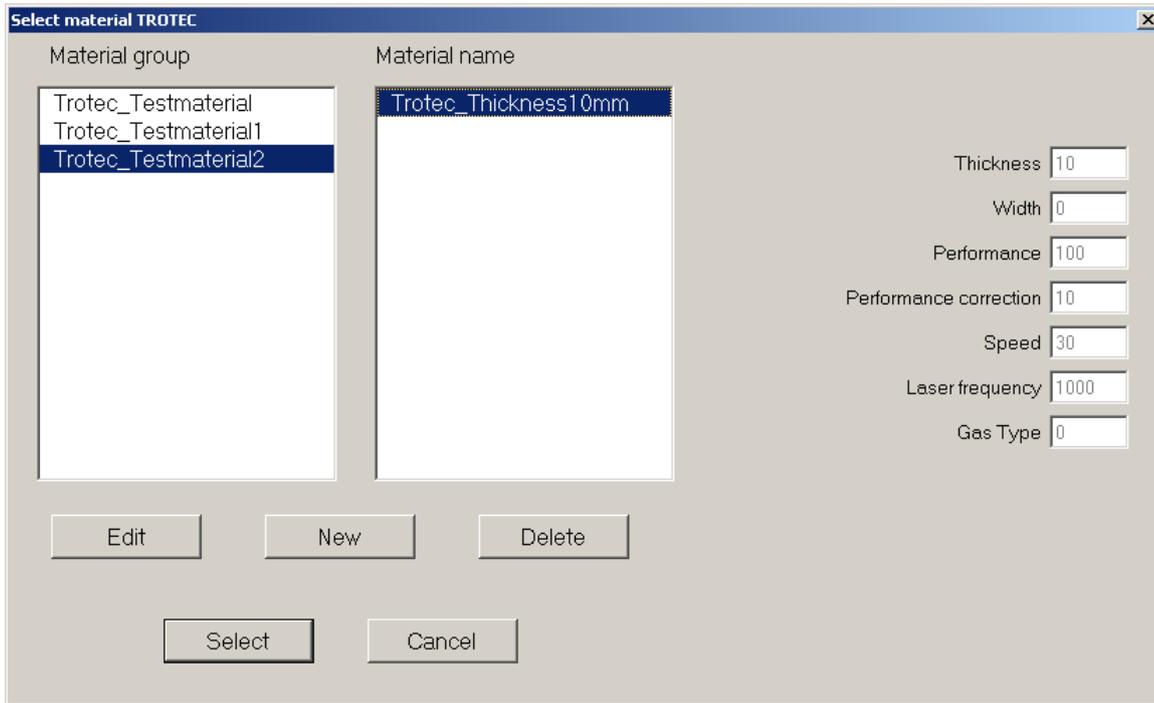
To create a new **material group** click on NEW without selecting an existing material group and click on NEW in the material group window and choose a name.

To create a new **material** select the desired material group, click on NEW and enter the wished settings in the right area. Click on "safe" when finished.

A Folder for each material group and a file for each material will be created.



To select a material, mark the material group and material name and click on “Select”.



9.2 Import and Export Material from Excel



Input Material In the *TroCAM* menu bar, select *Input Material from Excel*.

Browse to your Excel file with Material data and import it. The format of the Excel file has to be like the one below:

Material group	Material name	Parameter ->>>	Thickness	Op Type	Width	Performance	Performance correction	Speed	Laser frequency	Gas Type
Trotec_Testmaterial	Trotec_Thickness3mm		3	Cut	0,0001	50	10	50	1000	0
Trotec_Testmaterial	Trotec_Thickness5mm		5	Cut	0,0001	80	10	50	1000	0
Trotec_Testmaterial1	Trotec_Thickness8mm		8	Cut	0,0001	100	10	50	1000	0
Trotec_Testmaterial2	Trotec_Thickness10mm		10	Cut	0,0001	100	10	30	1000	0



Output Material In the *TroCAM* menu bar, select *Output Material to Excel*

An Excel file will be created with name of material group and material name and the according parameters as the table above.



9.3 Tool directions



Ghost Tools

In the **View** menu bar, select **Ghost Tools**

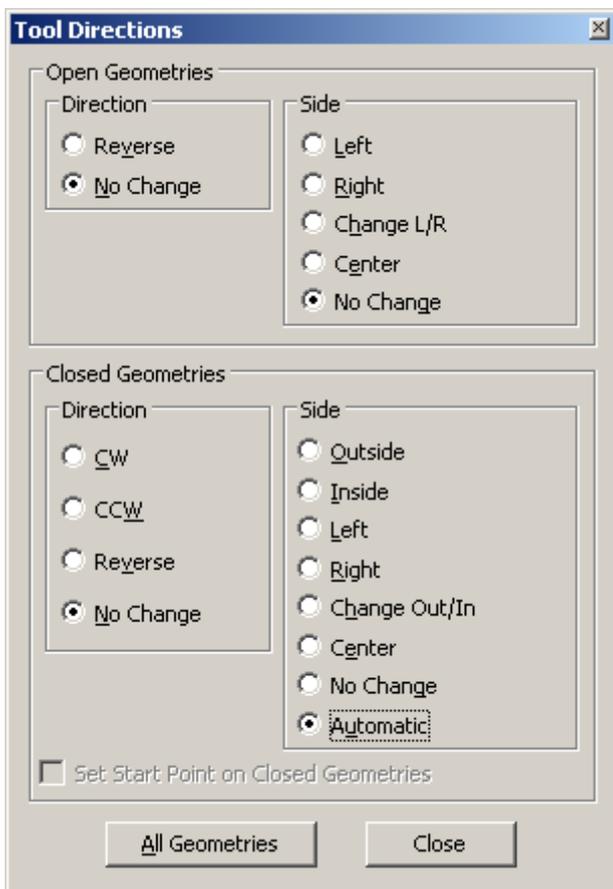
Arrows will show up at each tool path showing in which direction and on which side of the line the tool (laser beam) will pass.



Tool Directions

In the **TroCAM** menu bar, select **Tool Directions**

In the Tool Directions Window you can choose different settings for Open Geometries and Closed Geometries.



Open Geometries have different Start- and Endpoints.

On closed geometries the coordinate of Start- and Endpoint is the same.

Set Start Point

When activated, the start point on a closed geometry can be defined. On open geometries this checkbox has to be deactivated.



Tool Directions auto

In the **TroCAM** menu bar, select **Tool Directions auto**

The Software will automatically calculate the tool paths. When using this option for more complicated tool paths, always double check the paths. If necessary make manual changes via previous Tool Directions interface.



9.4 Create toolpaths



Cutting In the *TroCAM* menu bar, select **Cutting**

In this Machining interface you can select the settings for cutting geometries. You might select another material or adjust the settings of the material directly in this window. The changes in this window will not be saved in the material database but will only be working for the actual jobs.

- All: All Geometries will be processed with the parameters set below
- Selected: The geometries have to be selected manually for procession.
- Partial: Only parts of a geometry will be processed.
- Loop: The cutting quality on the corners will be improved.

Editable parameters of the chosen material.



Poach

In the **TroCAM** menu bar, select **Poach**

In this Machining interface you can select the settings for filling (fillet) geometries. You might select another material or adjust the settings of the material directly in this window. The changes in this window will not be saved in the material database but will only be working for the actual jobs.

The setting of pitch and angle might need some experience and tests.

Machining

Op No.

Geometries

All

Selected

Partial

Pitch Angle

TROTEC_THICKNESS10MM

Loop Radius

Performance

Performance correction

Speed

Laser frequency

Gas Type

OK Select material Cancel



9.5 Lead In/Out



Lead In/Out

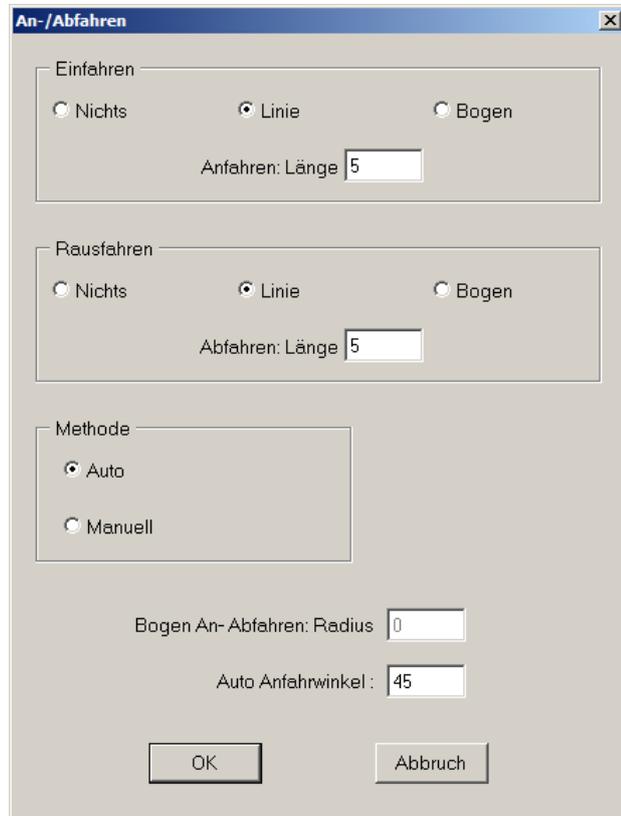
In the **TroCAM** menu bar, select **Lead In/Out**

The “Lead In/Out” interface will open.

Choose your settings for lead-in and lead-out separately. You can select type of the lead (straight line or arc) and according to these selections the length of the line or the radius and approach angle of the arc.

Say OK and select the desired geometries or click on ALL in the command line.

Click on FINISH or press ESC to confirm the command.



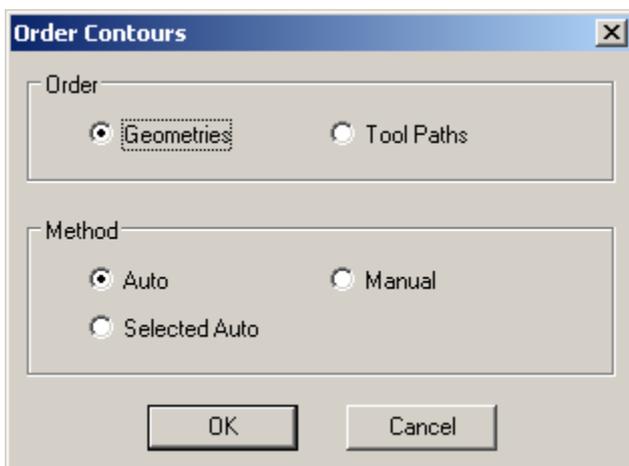
9.6 Optimize cutting order (manual/auto)

123



Order

In the **Edit** menu bar, select **Order**



Choose “Geometries” and “Auto” to do an automatic change of processing order.



If you want to change the order manually, select “Manual” and select the single geometries in the order you want them to be processed.

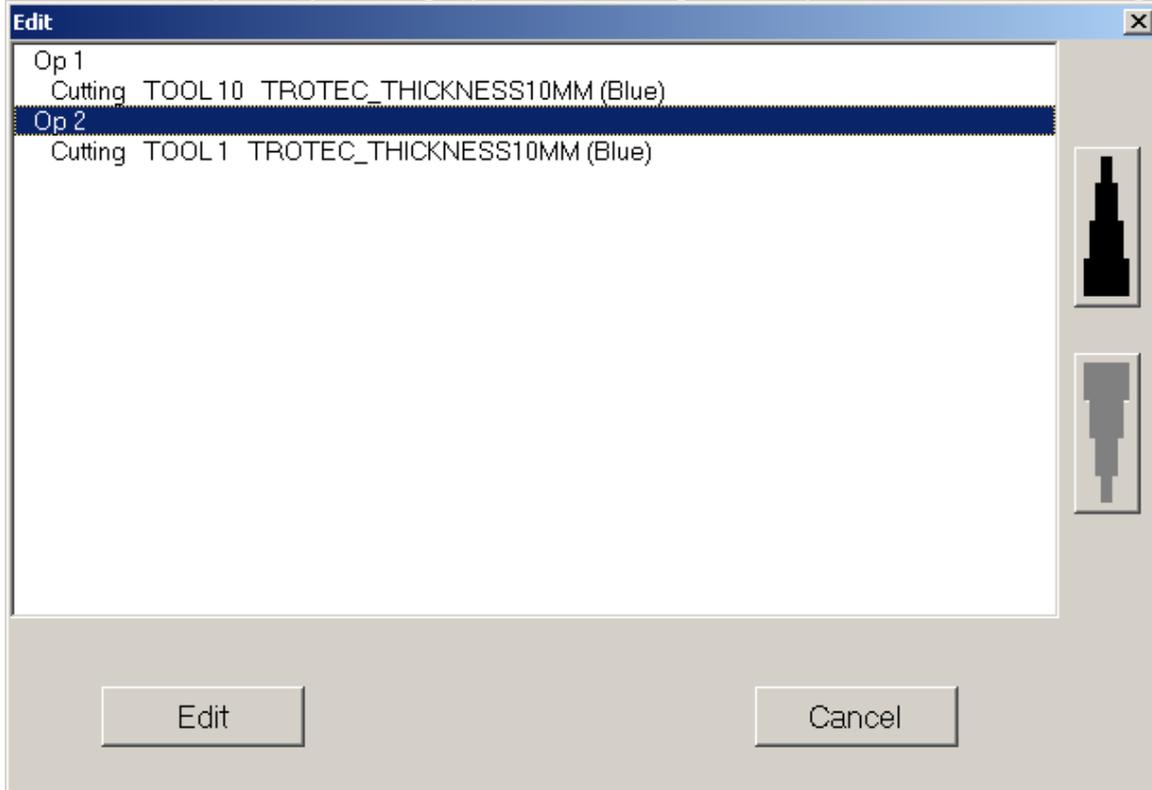
9.7 Edit toolpath



Edit

In the **TroCAM** menu bar, select **Edit**

Mark an operation path and click on “Edit” to change the settings of machining. You may change the order of the paths by marking a path and clicking on the up or down arrow on the right.



9.8 Update NC-Paths



Update NC-paths

In the **TroCAM** menu bar select **Update NC-Paths**.

With this function all tool paths will be adjusted to the changes of geometries.



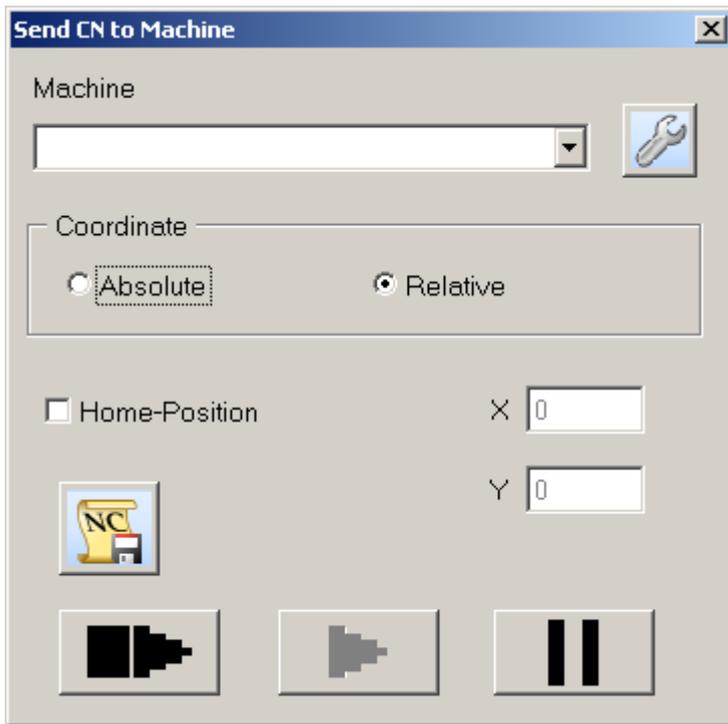
9.9 Send tool path to the laser



Send to machine

In the **TroCAM** menu bar, select **Send CN to Machine**

The NC-program will be sent directly to the machine. The settings of the data transfer have to be done in AlphaEDIT.



Choose the right machine and with it the right Post Processor for your machine.



IPC-Configuration

Press this button only if you need to change the settings of the „Intelligent Path Control“. For further details please refer to *Trotec IPC (Intelligent Path Control)* on page 49.

Coordinate

Choose relative to process the geometry starting with the 0/0 of the TroCAM drawing area at the actual position of the laser head.

The **Home-position** to drive the laserhead to after job end can be defined additionally.



Save NC-path – with click on this button you can save the generated paths to make them available in future for processing without further handling.

Before you press  make sure you focused on the material and positioned the laser head on the desired position.



Generate and send NC Code

With this function the program “findLaser” will be started and the transfer-parameters are registered in Alphaedit.



Resend last NC-Code

With this function the NC-program is sent directly to the machine without activating “find laser”.



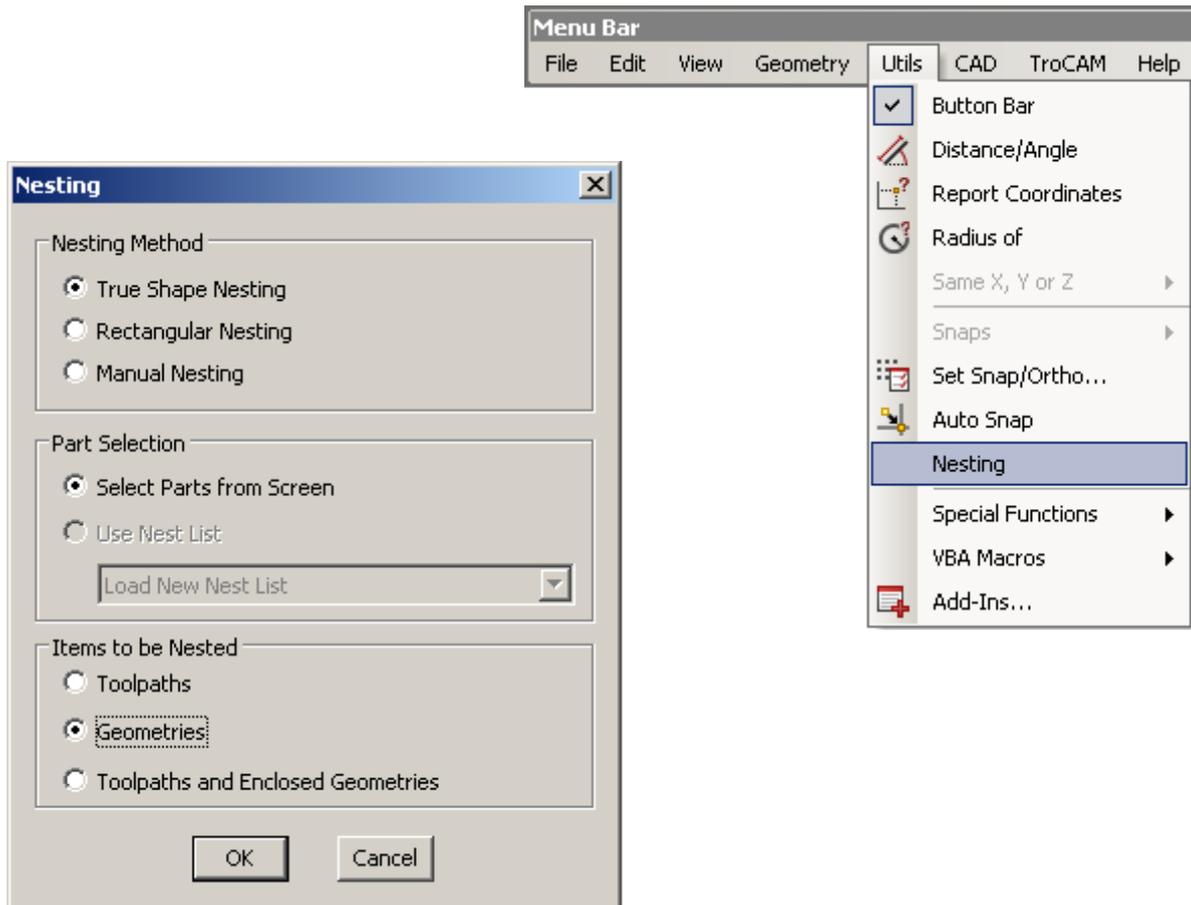
10 Nesting module

10.1 TroCAM

Start with drawing a “sheet” to nest the shapes to. This might be a rectangle fitting your working area or any other object fitting your material.

Then draw or import your shapes to be nested. Proceed as follows

Nesting: Select **Nesting module** from the **Utils** menu bar.



Select the desired nesting method and define if you want to nest Geometries, Toolpaths or both. Then click on OK.

In the **Command Line**, you will see the prompt:

```
Select SHAPE to Nest (Window or Pick) <ESC>=No More Shapes
```

Click on the first shape to be nested.

Define the part parameters for the shape.

Define Part Parameters

Name of Part:

Number Required: Maximum possible

Rotations to try:
 Don't rotate
 Rotate by intervals of
 Rotate by these angles only

Try Mirrored Shape
 Try Rotated Part First

Priority (1=Highest):

Limit number on each sheet to

OK Cancel

Number Required: Enter a number if you only want a defined amount of shapes or choose "Maximum possible"

Rotate in intervals of: The part is rotated by the value given until the best position is found.

Rotate through a given angle: The part is rotated sequentially through the given angle until the best position is found.

Try to rotate part first: Normally the first part is nested in its original position. With this option, rotated parts are fitted first.

Priority (1=highest): The parts with the highest priority are nested first, followed by the parts with lower priority e.g. 2, 3, etc.

Select further shapes and proceed as described above until all shapes are selected and defined. Then click on <ESC>.

In the **Command Line**, you will see the prompt:

Select Sheet to Nest into <ESC=No More Sheets>

Click on the nesting sheet on the plot area. If there are several nesting sheets, nesting priority is established according to the order in which they are selected. Define the Sheet parameters.

Define Sheet Parameters

How Many of these Sheets (0 = No Limit):

Sheet Thickness:

Sheet Material:

OK Cancel

The prompt **Select nesting sheet** must be closed with ESC, once all the nesting sheets have been selected.

Define the Nesting Parameters.

NC Code: A subroutine generates shorter NC programs. In the case of control systems with limited memory, a potential “drip feeding” can be avoided in this way.

Pack to: Indicates from which side or corner nesting should begin.

Search resolution: Defines a grid in inches, in which the parts are placed before nesting, and before being placed based on the parameters. The search resolution should not be greater than 20% of the smallest dimension. A too small grid produces longer computing times without any significant improvement in utilisation.

Special Functions: With the following options, it is important to take into account whether only geometries or NC paths are being nested.

Assisted Nest: This option opens a new dialogue window in which all the parts are listed. Each part can be manually set on the nesting plate. Each part placed is removed from the list.

Cut Whole Part Together: With this, each part is finished before the next part is machined. This is used in connection with “first drilling, then inside machining” and linear NC Code.

Drill, then Cut Inner Paths First: All bore holes are first carried out, followed by the work inside the piece.

Group Each Part Separately: Normally, parts consisting of several geometries are created as a group. A part that consists of a single geometry is not defined as a group. With this option, however, these parts are also created as groups.

Leave Edge Gap Uncut: Normally the distance of the parts from the plate edge is equal to a predefined value. With this option, the tool diameter is added to the distance from the plate edge.





Minimise tool changes: The machining sequence is organised around the work tools in order to minimise tool changes.

Order By Part: This means that identical parts are processed first, before processing the next part.

Remove Groups: With this option, no groups are defined. Each geometry is listed individually.

Repeat First Row/Column: Use this when nesting needs to happen in strips.

Nest Small Parts First: When this option is not active, large parts are nested first.

Suppress Redraw: Normally certain steps in the optimisation process are updated on screen. With this option, the screen is only updated at the end of optimisation.

Try Rotated Parts First on all Parts: Normally, the first part is nested in its original position. With this option, rotated parts are used first.

Confirm with OK to create the nesting job.



10.2 TroCAM Nesting Upgrade

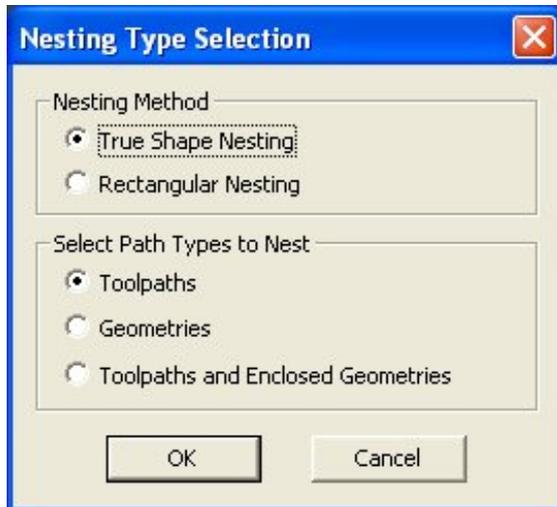
 Nesting: Select **Nesting module** from the **Utils** menu bar.

Load Nest List	Retrieve an existing list.
Nest Parts	
Create/Edit Nest List	Create a new nesting list.
Nesting Information	
Save Off-Cut	
Sheet Database	Define and select nesting sheets

Some of these functions are also available in the Project Manager under the **nesting** index.



10.2.1 Defining a new nesting job



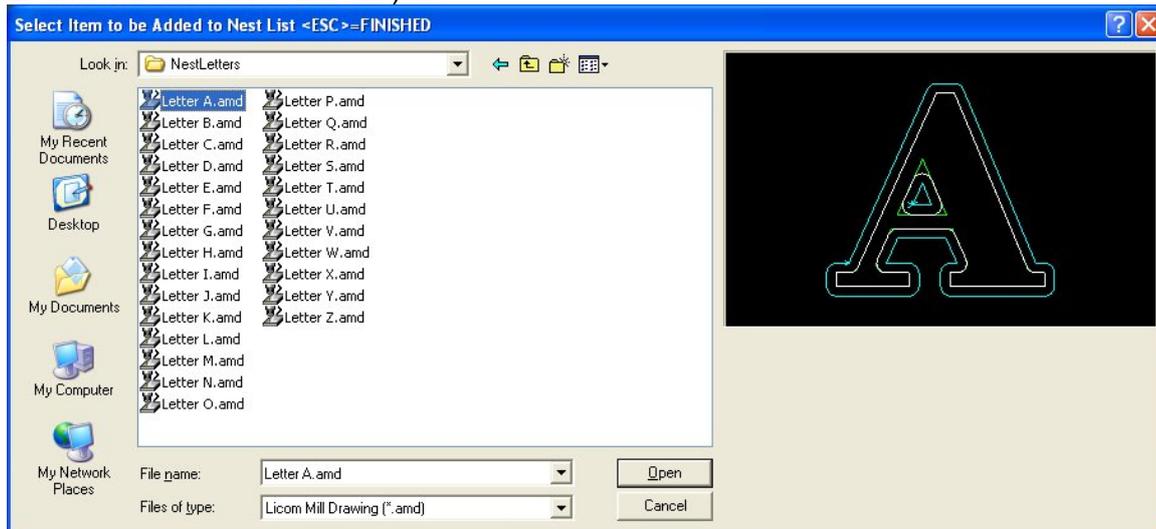
Depending on the shape of the parts, select either free-form or rectangular method. Free-form will be used for all non-rectangular parts.

Nesting module

Contour types:

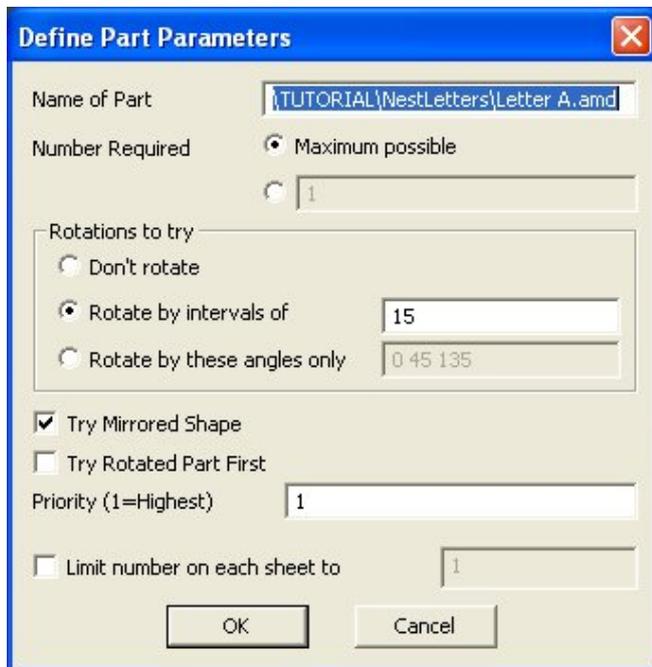
- NC paths Only the NC paths are transferred to the nesting sheet. The geometries are not transferred to the nesting sheet.
- Geometries Only closed geometries are nested.
- NC paths and inner geometries The NC paths are nested together with the geometries.

After confirmation, a list of files can be assembled for a nesting job (e.g. Licomdir\Tutorial\NestLetters).



Use Ctrl-A to select the entire list.

Each part, or all selected parts, is defined with the following parameters.



Rotate in intervals of: The part is rotated by the value given until the best position is found.

Rotate through a given angle: The part is rotated sequentially through the given angle until the best position is found.

Try to rotate part first: Normally the first part is nested in its original position. With this option, rotated parts are fitted first.

Priority (1=highest): The parts with the highest priority are nested first, followed by the parts with lower priority e.g. 2, 3, etc.

Next the nesting parameters are defined.

NC Code: A subroutine generates shorter NC programs. In the case of control systems with limited memory, a potential “drip feeding” can be avoided in this way.

Pack to: Indicates from which side or corner nesting should begin.

Search resolution: Defines a grid in inches, in which the parts are placed before nesting, and before being placed based on the parameters. The search resolution should not be greater than 20% of the smallest dimension. Too small a grid produces longer computing times without any significant improvement in utilisation.

Special Functions: With the following options, it is important to take into account whether only geometries or NC paths are being nested.

Group Each Part Separately: Normally, parts consisting of several geometries are created as a group. A part that consists of a single geometry is not defined as a group. With this option, however, these parts are also created as groups.

Remove Groups: With this option, no groups are defined. Each geometry is listed individually.

Drill, then Cut Inner Paths First: All bore holes are first carried out, followed by the work inside the piece.





Cut Whole Part Together: With this, each part is finished before the next part is machined. This is used in connection with “first drilling, then inside machining” and linear NC Code.

Assisted Nest: This option opens a new dialogue window in which all the parts are listed. Each part can be manually set on the nesting plate. Each part placed is removed from the list.

Nest Small Parts First: When this option is not active, large parts are nested first.

Repeat First Row/Column: Use this when nesting needs to happen in strips.

Suppress Redraw: Normally certain steps in the optimisation process are updated on screen. With this option, the screen is only updated at the end of optimisation.

Suppress Final Sort:

Order By Part: This means that identical parts are processed first, before processing the next part.

Try Rotated Parts First on all Parts: Normally, the first part is nested in its original position. With this option, rotated parts are used first.

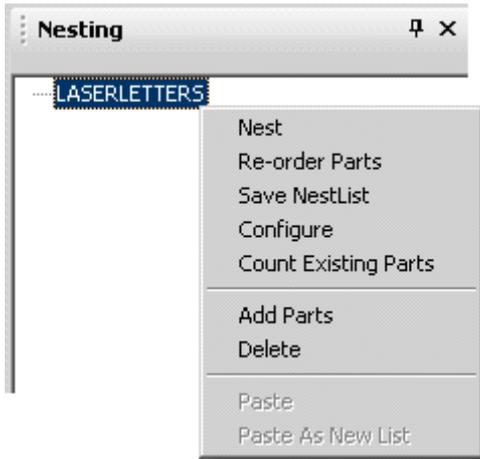
Minimise tool changes: The machining sequence is organised around the work tools in order to minimise tool changes.

Leave Edge Gap Uncut: Normally the distance of the parts from the plate edge is equal to a predefined value. With this option, the tool diameter is added to the distance from the plate edge.

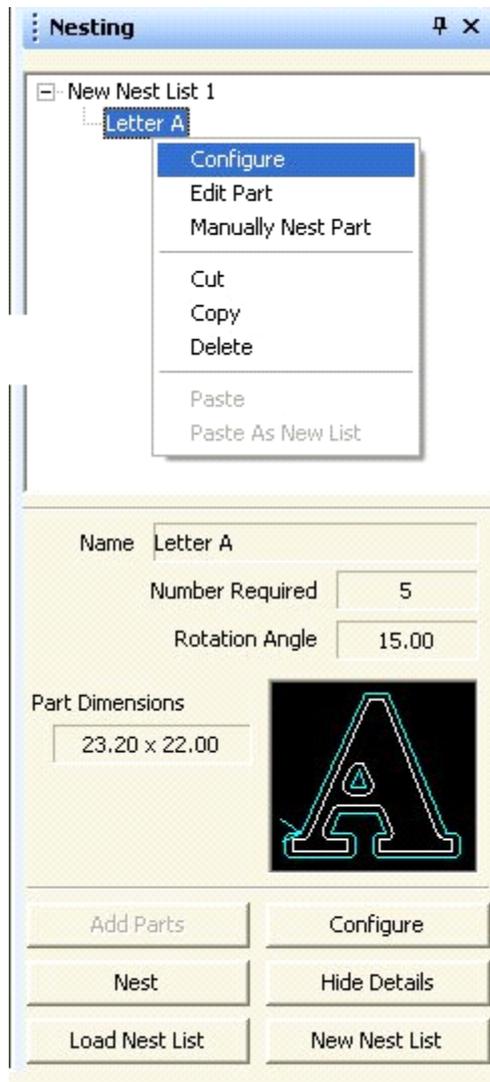
Confirm with OK to create the nesting job.



Nesting module



Use a right mouse click on the nesting job name to access the functions for processing the entire job:



Use a right mouse click on a part's file name to access the functions for processing the individual part.

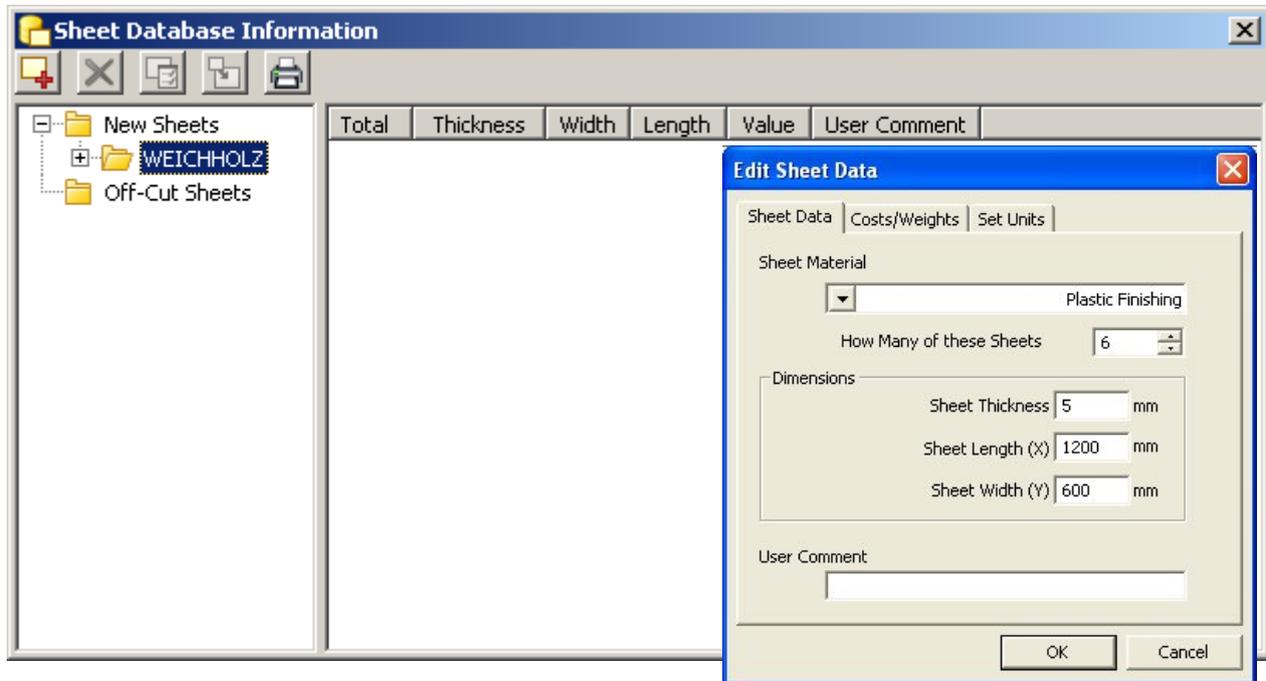
Clicking on the file name in the Project Manager displays the related parameters in the lower part of the Project Manager (nesting).

Using **configure**, the parameters for each nesting part can be defined.

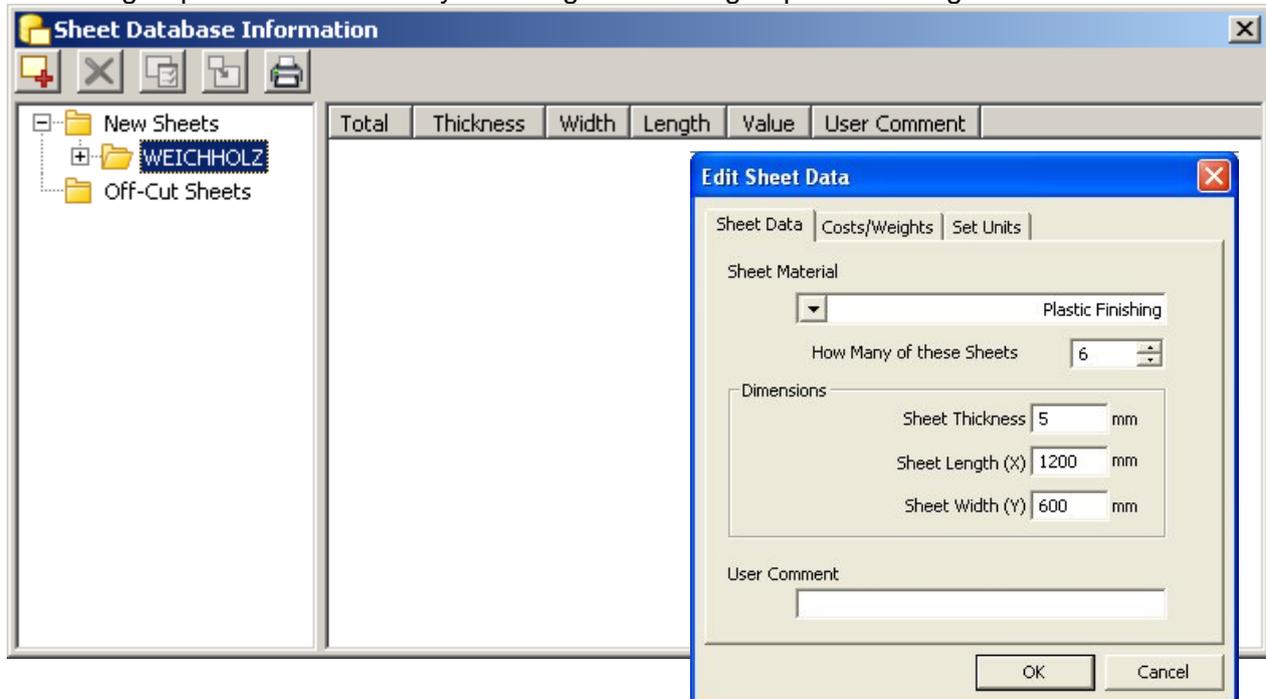
10.2.2 Nesting sheet data bank

In the **Utils** menu bar, select the **Nesting line** → **Nesting sheet data bank**.

New material groups can be created by checking the item **New sheets** and clicking on this button

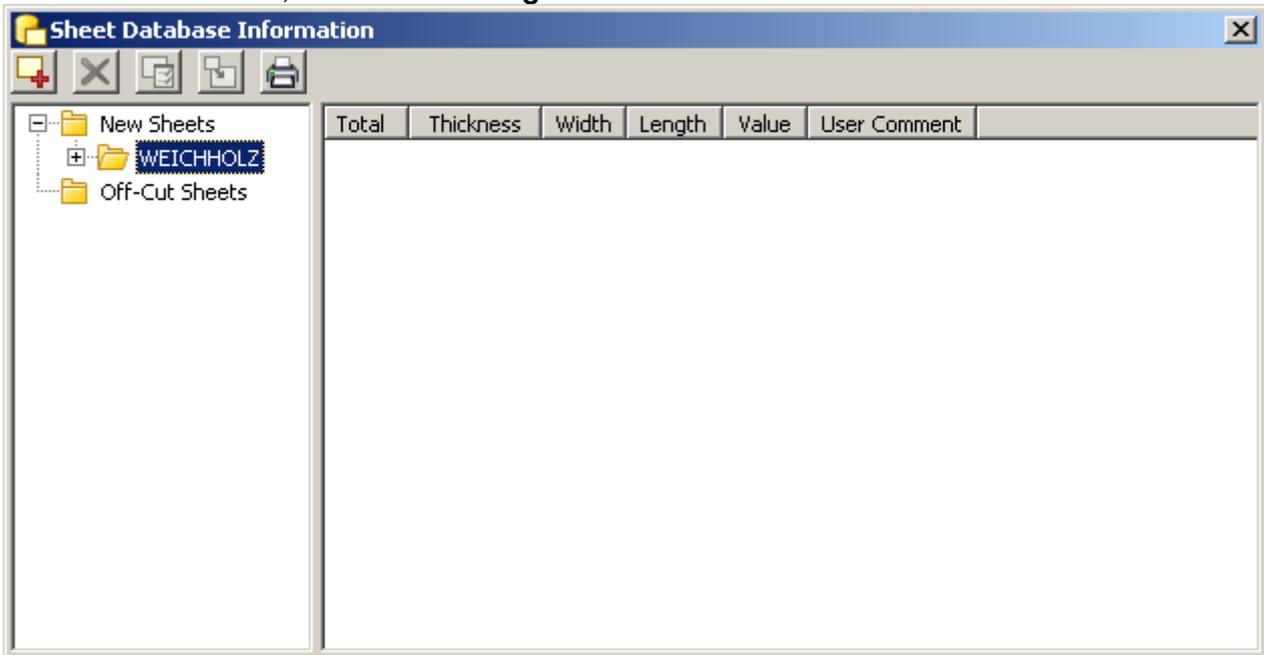


New subgroups can be created by checking a material group and clicking on this button



10.2.3 Nesting parts

In the **Utils** menu bar, select the **Nesting module line** → **Sheet data base**.



Select the nesting sheet and click on  this button.

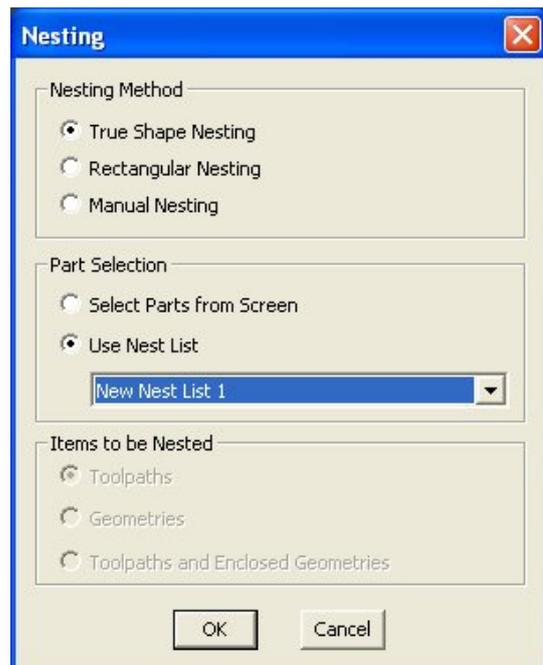
Paste the nesting sheet onto the plot area. If necessary, repeat the process for other nesting sheets.

The nesting sheet can also be drawn in the shape of a geometric rectangle.

Load nest list using the **Utils** menu bar → **Nesting module** or from the Project manager.



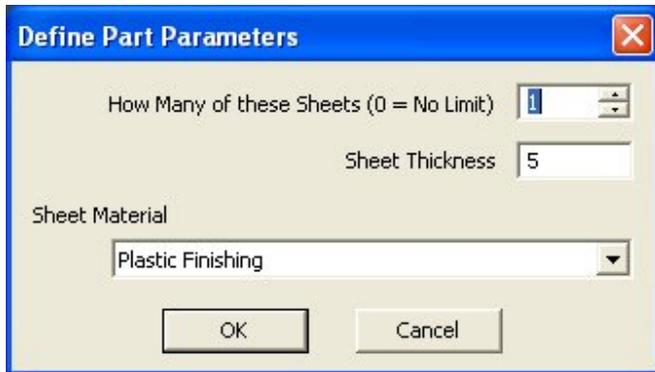
To perform nesting, select the command in the **Utils** menu bar → **Nesting module** → **Nesting**, or click on **Nest** in the Project Manager.



The **Command line** contains the prompt

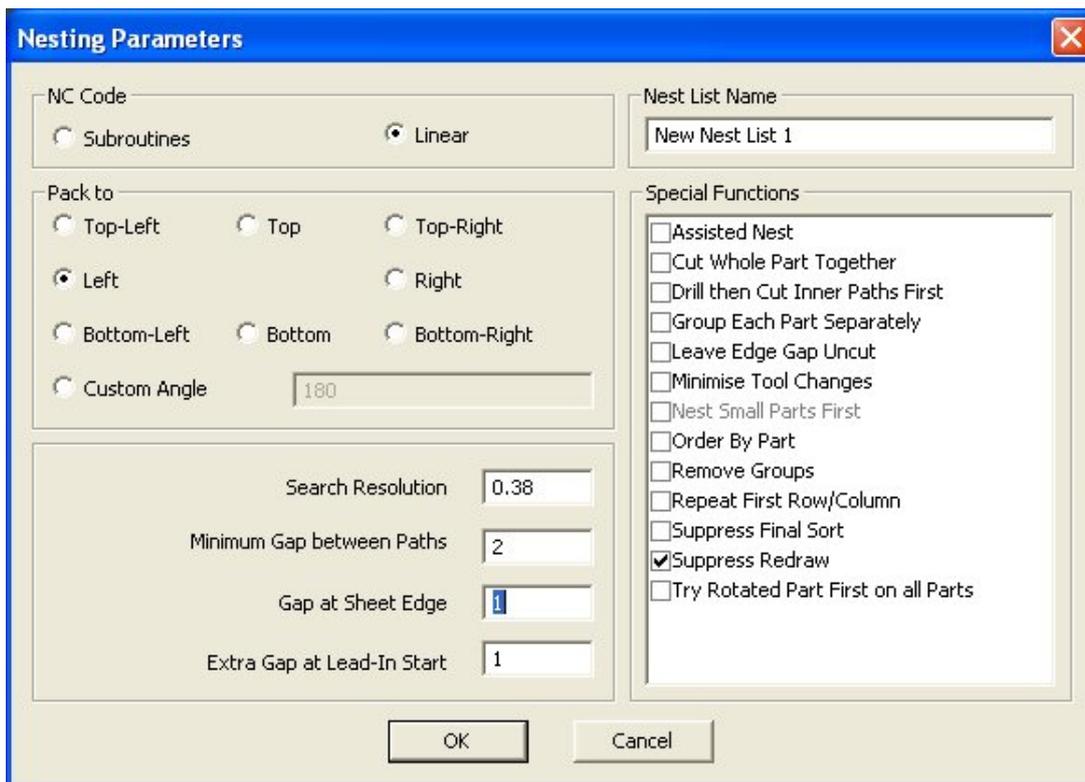
Select Next Sheet to Nest into <ESC=No More Sheets>

Click on the nesting sheet on the plot area. If there are several nesting sheets, nesting priority is established according to the order in which they are selected.



The prompt **Select nesting sheet** must be closed with ESC, once all the nesting sheets have been selected.

The nesting parameters can then be redefined again.



If the result is poor, this may be improved by reducing the **Search resolution** (grid in inches). The smaller the search resolution, the greater the optimisation time. Too small a search resolution can cause a system crash.



10.2.4 Nesting information

In the **Utils** menu bar, select the items **Nesting module** → **Nesting information**.

The nesting information contains information about the number of nested parts and which nesting sheets they are on.

Part Name	Item Number	On Sheet	Total	Required	File Name
From Scr...	1	1	1	1	From Screen 1

10.2.5 Calculation of areas

The calculation of areas is only available from TroCAM Advanced onwards.



Calculate: In the **Utils** menu bar, select the items **calculation of areas** → **Individually** or **Nested**.

With the **Individually** option, different areas can be added or subtracted. In other words, parts of areas can be subtracted from a total area, for instance.





Nesting module

With the **Nested** option, the nesting-sheet area, the parts area and the residual area are displayed. Wastage is given in %.

Nested Sheet

Sheet Scrap

Parts % Scrap

The cost calculation gives information about the parts costs and the scrap costs. The costs can be calculated according to area or weight.

Cost Estimate Parts Area = 75157.6

Weight

Weight per Unit Area Weight of Parts

Cost

By Area
Cost per Unit Area

By Weight
Cost per Unit Weight

Cost of Scrap Cost of Parts



11 Appendix

11.1 Trotec IPC (Intelligent Path Control)

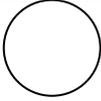
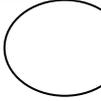
11.1.1 Working Description

IPC is a tool which takes a “HPGL” file (eg.: “input.txt”) and generates a modified new “HPGL” file (“eg.: “output.txt”).

IPC changes velocitys and accelerations in a hpgl file and adjusts laserpowers and laser correction values automatically to improve performance of vector cutting and vector engraving.

Benefits of IPC:

- its possible to print a vector job with max machine speed. All velocity and acceleration values are changed to prepare the job for max quality and/or max speed.
 - saved time because the user need not find the optimal velocity and laser correction values
 - saved time because of improved job performance
- the configuration is adjustable due xml configuration file
- the quality and performance of very complex jobs is improved uncompareable

<u>Examples</u>	with IPC	without IPC
Arc Quality and high speed	 round	 oval
Ringing	 no ringing	 ringing
Laserpower on lines	 closed	 open
Stuttering	 in one line	 stuttering

11.1.2 File Description

Following files are necessary for working:

- latool.dll (contains functionality)
- IPC.exe (includes latool.dll and builds interface)
- vbpost_config.xml (contains configuration)
- input.txt (hpgl file)

After Installation of TroCAM V10 one of the following directorys contains the IPC files and the postprocessors of all machines

C:\LICOMDAT\MPOSTS.ALP
 C:\TROCAMLICOMDAT\MPOSTS.ALP

11.1.3 Configuration

IPC takes info from configuration file: vbpost_config.xml
 vbpost_config.xml contains acceleration values and allowed max acceleration and velocity changes.

11.1.4 Execution of IPC for Testpurposes

1. Take your hppl file and rename it to "input.txt"
2. Copy it into the IPC folder C:\LICOMDAT\MPOSTS.ALP
3. Copy your vbpost_config.xml configuration file into the IPC folder LICOMDAT\MPOSTS.ALP or modify the current vbpost_config.xml file.
4. Run IPC.exe
5. The new file "output.txt" is beeing generated
6. optional: check the log file "log.txt"

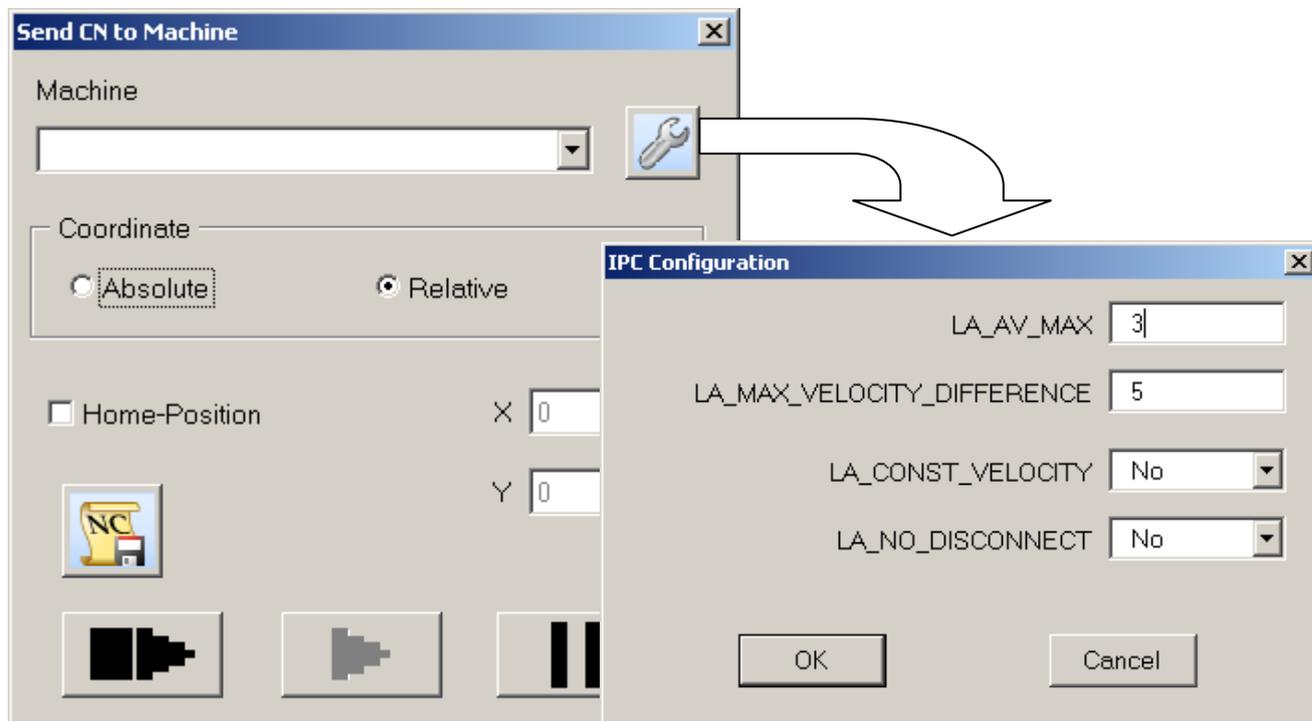
11.1.5 Execution of IPC within TroCam

IPC is called within visual basic postprocessor automatically.

11.1.6 Change settings of IPC within TroCAM

Click on the button in the TroCAM window "Send CN to Machine" to open the "IPC Configuration" window.

Refer to chapter 11.1.7 *Description of vbpost_config.xml file* on page 51 for further details of the specific values.





11.1.7 Description of vbpost_config.xml file

```
...
<LOOK_AHEAD_XML>
  <ACC_TUPELS> // this files are machine dependent
    <LA_AV0><ACC>1</ACC><T>80</T></LA_AV0>
    <LA_AV1><ACC>1</ACC><T>60</T></LA_AV1>
    <LA_AV2><ACC>1</ACC><T>40</T></LA_AV2>
    <LA_AV3><ACC>1</ACC><T>20</T></LA_AV3>
    <LA_AV4><ACC>2</ACC><T>80</T></LA_AV4>
    <LA_AV5><ACC>2</ACC><T>60</T></LA_AV5>
    <LA_AV6><ACC>3</ACC><T>80</T></LA_AV6>
    <LA_AV7><ACC>3</ACC><T>60</T></LA_AV7>
    <LA_AV8><ACC>4</ACC><T>40</T></LA_AV8>
    <LA_AV9><ACC>4</ACC><T>40</T></LA_AV9>
    <LA_AV10><ACC>4</ACC><T>50</T></LA_AV10>
    <LA_AV11><ACC>10</ACC><T>50</T></LA_AV11>
    <LA_AV12><ACC>10</ACC><T>50</T></LA_AV12>
    <LA_AV13><ACC>10</ACC><T>50</T></LA_AV13>
    <LA_AV14><ACC>10</ACC><T>50</T></LA_AV14>
    <LA_AV15><ACC>10</ACC><T>50</T></LA_AV15>
  </ACC_TUPELS>

  <LA_ACC_INDICES> // this is the maximum allowed acceleration – be conservative (high values lead to very bad quality)
    <LA_AV_MAX_X>3</LA_AV_MAX_X>
    <LA_AV_MAX_Y>3</LA_AV_MAX_Y>
  </LA_ACC_INDICES>

  // this is the maximum allowed velocity difference for every axis (has less influence than the maximum allowed acceleration)
  <LA_MAX_VELOCITY_DIFFERENCE_X>5</LA_MAX_VELOCITY_DIFFERENCE_X>
  <LA_MAX_VELOCITY_DIFFERENCE_Y>5</LA_MAX_VELOCITY_DIFFERENCE_Y>

  // this rs232 values could be ignored (sending due rs232 from ipc is not used)
  <LA_OUTPUT>
    <LA_RS232>
      <LA_RS232_ENABLE>0</LA_RS232_ENABLE>
      <LA_RS232_PORT>4</LA_RS232_PORT>
      <LA_RS232_BAUDRATE>19200</LA_RS232_BAUDRATE>
      <LA_RS232_XONXOFF>1</LA_RS232_XONXOFF>
    </LA_RS232>
    <LA_FILE>
      <LA_OUTPUTDIR>"/</LA_OUTPUTDIR>
      <LA_FILENAME>"output.txt"</LA_FILENAME>
    </LA_FILE>
  </LA_OUTPUT>

  <LA_START_LABEL>1</LA_START_LABEL>
  <LA_MAX_CONNECTED_MOVES>200</LA_MAX_CONNECTED_MOVES>

  // some engravers have scaled velocitys (look for fram) – machine dependent
  <LA_ACCELERATION_SHIFT>0</LA_ACCELERATION_SHIFT>

  <LA_OPTIMIZATION>
    // use relative moves instead of absolute to save memory in machines hardware – quality is the same
    <LA_RELATIVE_POLYGONS>1</LA_RELATIVE_POLYGONS>
    // allow acceleration changes in output.txt vs. input.txt
    <LA_ACCELERATION_CHANGE_ENABLE>1</LA_ACCELERATION_CHANGE_ENABLE>
    // allow velocity changes in output.txt vs. input.txt
    <LA_VELOCITY_CHANGE_ENABLE>1</LA_VELOCITY_CHANGE_ENABLE>
    // could be ignored – is not used
    <LA_CONST_VELOCITY>0</LA_CONST_VELOCITY>
    // ipc looks for constant velocity for all contours – could be a benefit when kiss cutting
    <LA_NO_DISCONNECT>0</LA_NO_DISCONNECT>
    <LA_CHANGE_CORRECTION_FACTOR>1</LA_CHANGE_CORRECTION_FACTOR>
    // blending is enabled when 1 – blending works only for vectors and not for circles – could be lead to velocity increase
    <LA_BLENDED_ENABLE blending_error="5">0</LA_BLENDED_ENABLE>
  </LA_OPTIMIZATION>
</LOOK_AHEAD_XML>
```

