OptecCAD

User's Manual

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OptecCAD

User's Manual

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1. Table of contents

2. Introduction

2.1. Presentation

OptecCAD is developed in VB.NET. OptecCAD is available in English and French language.

The software's main function is the generation of PGM files which can be interpreted by the control system. It allows the management of different laser parameters for each drawing object or layer.

Many tools are also included in the software, such as slicing, segmentation drawing, cloning objects, the introduction of holes, or complete management of 3D objects.

OptecCAD is automatically launched by Power Process software at the end of the initialization of the machine.

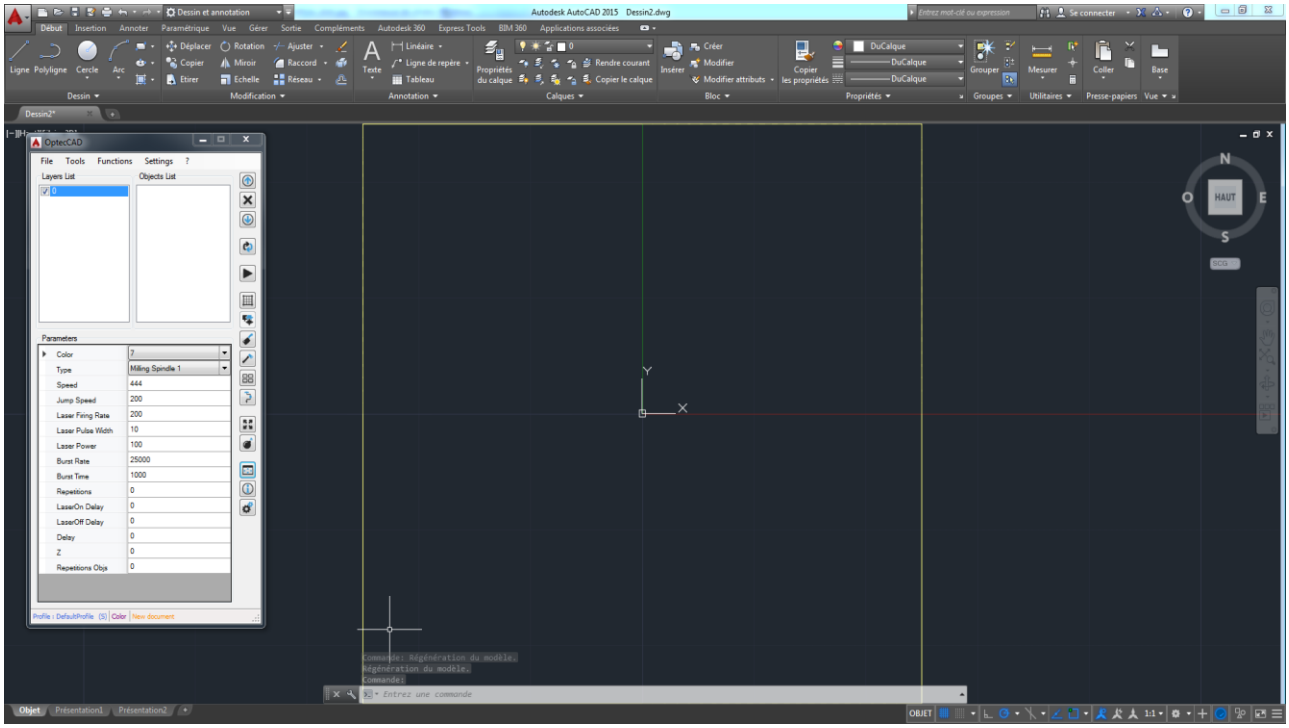


Figure 1: OptecCAD window

The main window is for drawing.
The secondary window is dedicated to the assignation of physical parameters to drawn objects and is directly integrated into OptecCAD. It will be automatically closed when closing OptecCAD.

2.2. Main window

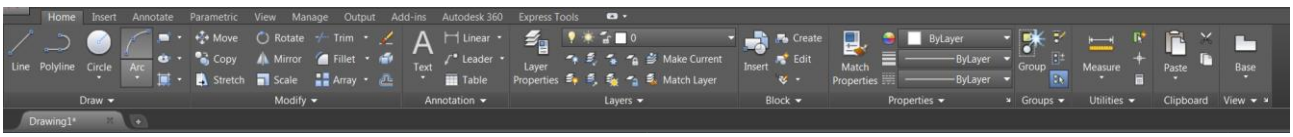


Figure 2: OptecCAD toolbar of Main window

The window contains all the tools needed for drawing objects in 2D or 3D.

2.3. Secondary window

OptecCAD window is the heart of the add-on. All information concerning the laser process will be implemented inside this window.
The OptecCAD window is divided in 5 parts as described on **Erreur ! Source du renvoi introuvable.**.

1. Main tabs
   See **3.1 Main Tabs**
2. Display of different layers or objects in the drawing
   See **3.2 Management of layers and objects of the drawing**
3. Management of process parameters for each object
   See **3.3 Management of layer and object process parameters**
4. Optec's main tools
   See **3.4 Main program tools**
5. Information zone
   3.5 Information Zone

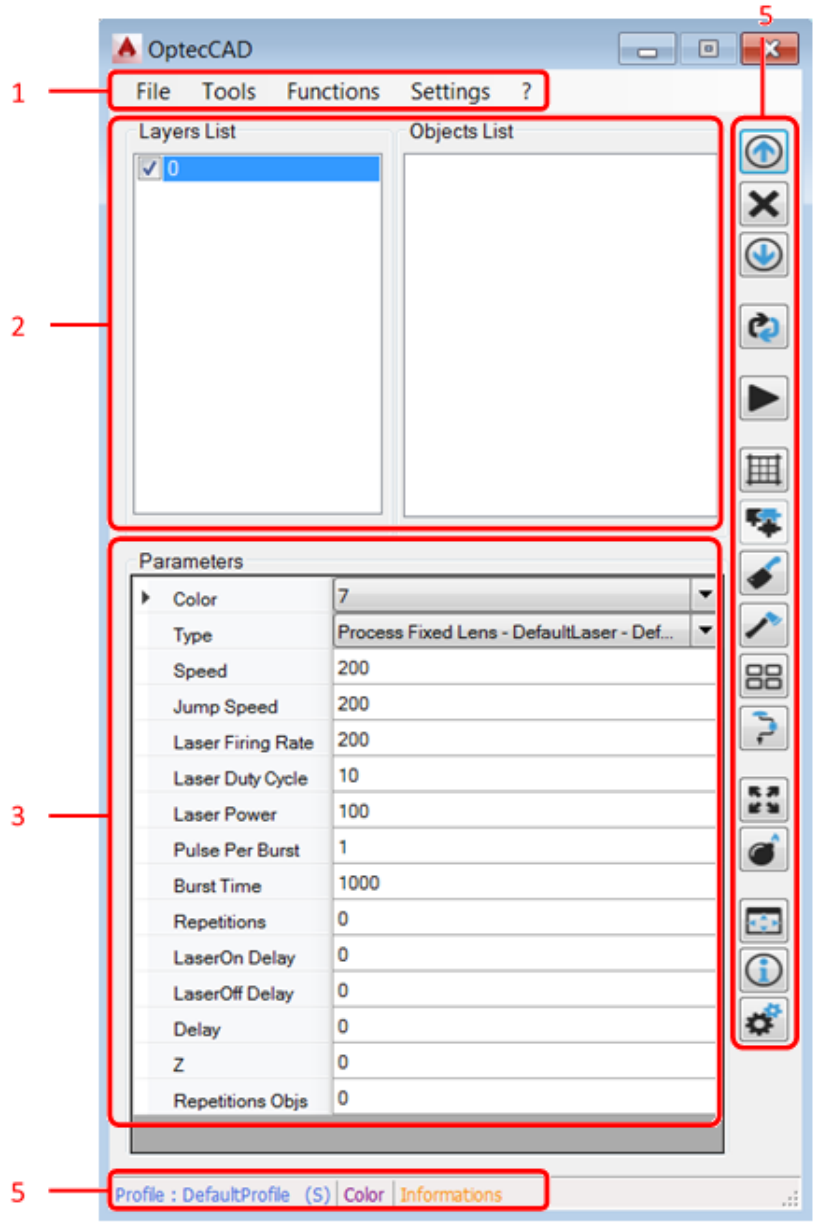


Figure 3: OptecCAD toolbar of Main window

The main window is divided into two tabs. The first is devoted to the different layers, while the second to separate objects/entities.
The user can work in two different ways: By Layer, applying common laser parameters to all object in the layer, or more precisely By Object, applying laser parameters to individual objects.

3. Secondary Menu description

3.1. Main Tabs

3.1.1. File Tab

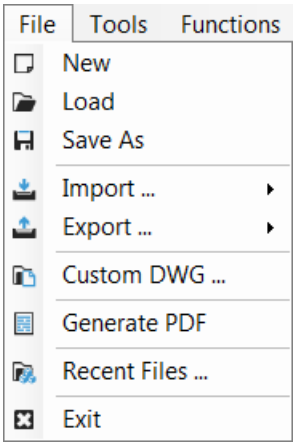


Figure 4: File Tab window

Provides most of tools for file management. It contains the creation of a new design, loading a DWG (or DXF) file, import of various file formats (STL file or point cloud into AutoCAD, other importable file), saving a DWG file, upload "customized" files by the user, PDF file generation of drawing and process parameters, loading the last files used, and the output function of the program.

- Create a new file
- Load a file in .dwg or .dxf format
- Save the file as … in .dwg format
- Import STL files
  - Import and draw the faces of a STL file
  - Import and draw the surfaces of a STL file
  - Import and draw the nodes of a STL file
- Import data from optical profilometers (Stil, Keyence or µEpsilon)
  - Raw data
  - Interpolated data
- Import other file formats (for instance .3ds, .fbx, .3dm, .step, etc…)
- Import files of points of .txt format
- MCH
- Points to file — Export points in .txt file
- Export points to PLF format — Export points in .PLF file. Please refer to ProcessPower Manual for more information on .PLF files
- Export points to CMF format — Export points in .CMF file.

Please refer to ProcessPower Manual for more information on .CMF files

- Custom .dwg
- Generate a .pdf file will all parameters of each objects and layers of the current drawing
- Open recent files
- Close OptecCAD Software

3.1.2. Tools Tab

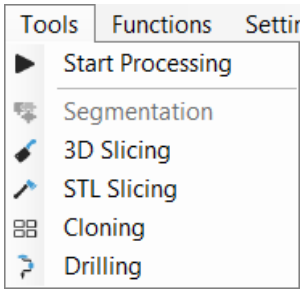


Figure 5: Tools Tab description

Allows the loading of different tools of OptecCAD, with functions for marking, segmentation, drilling, cloning, and slicing.

All those tools are described further in Section **4. Details of main tools**

- Start Processing: refer to section **4.1 PGM File Generation and Process Initialization** for more details
- Segmentation: refer to section **0 Hatch can** be realized in normal or raster mode. This option has to be selected in OptecCAD settings. See **4.2 Application settings parameters** Object Segmentation for more details
- 3D Slicing: refer to section for **4.4 3D Object Slicing** more details
- STL Slicing: refer to section **4.5 STL slicing tool** for more details
- Cloning: refer to section **4.6 Cloning Tool** for more details
- Drilling: refer to section **4.7 Drilling tool** for more details

3.1.3. Functions Tab

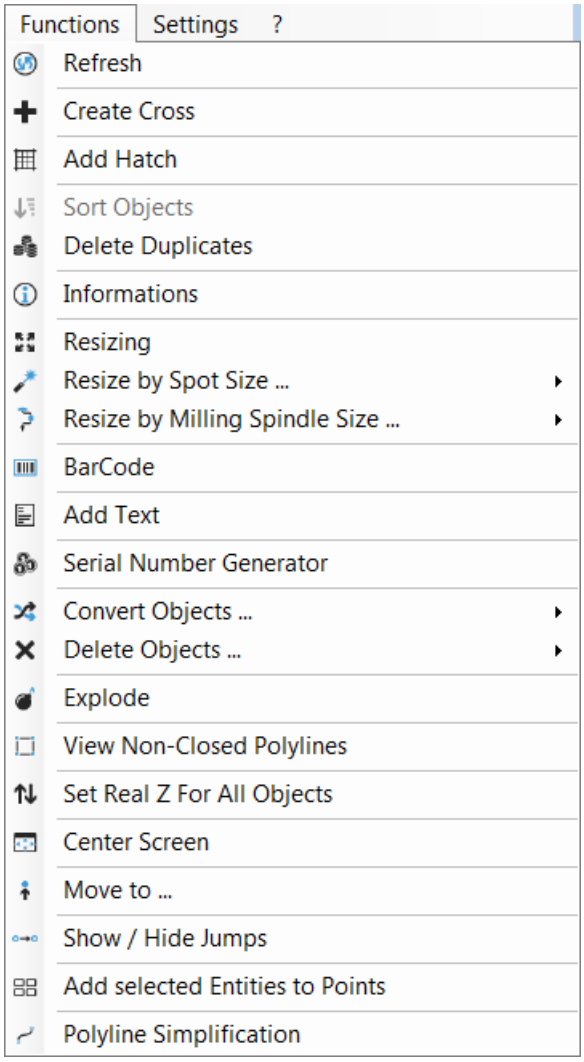


Figure 6: Functions Tab description

The third tab-menu contains various minor OptecCAD functions, such as refresh information in order to fulfill the lists in the basic interface, adding hatch to objects, a sorting function of objects (lines, arcs and circles), a function to remove duplicate objects, information on the current drawing, a function to resize drawing, a function to resize the drawing as a function of the focus laser spot size, bar code generation, a function to convert object type to another one as well as an "Explode" function to break down complex objects.

Refresh layer and object list

Tool used to easily create a cross.
Just enter the value of size of the cross in the new window. This function is mainly used to check the zone calibration of the machine.

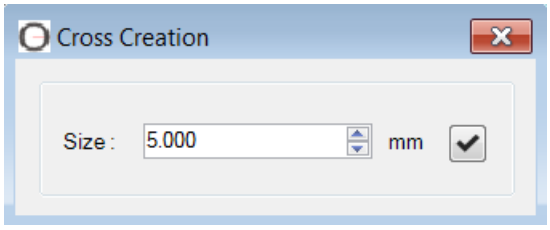


Figure 7: Cross creation tool

Add Hatch: refer to section **4.2 Add Hatching** for more details

Sort Objects tool: under development

Delete Duplicate Objects according to criteria mentioned on **Figure 8: "Delete Duplicate Objects" tool presentation**

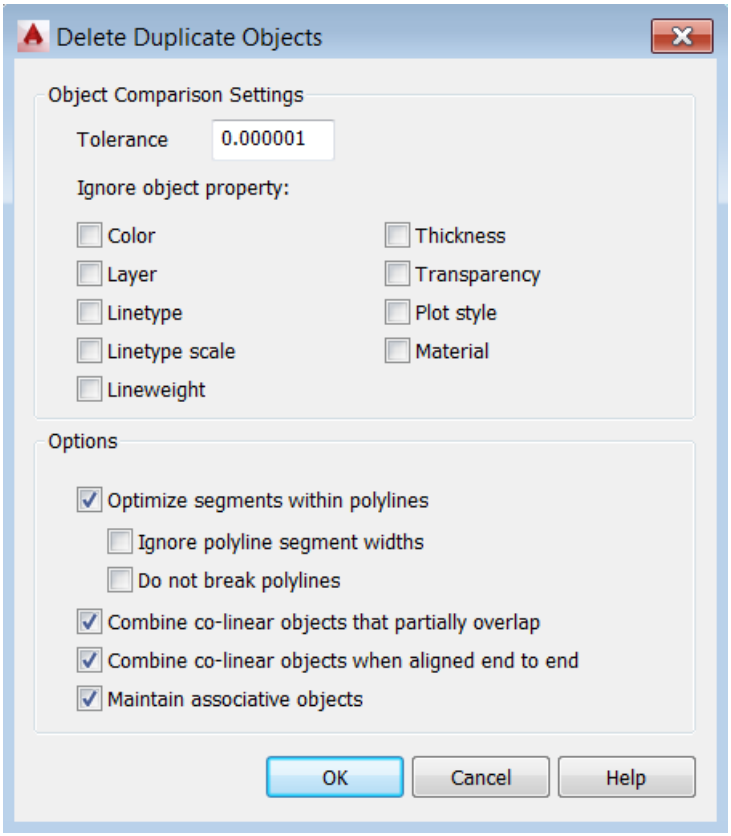


Figure 8: "Delete Duplicate Objects" tool presentation

refer to Section **4.8 General information** for more details

refer to Section **4.9 Automatic resizing** for more details

Resize by spot size. Value defined in Section **5.2 Application**
Allows resize the drawing as a function of the focus laser spot size. For example, if the user wishes to machining disk with a precise 20mm diameter, he can draw a disc a 20mm diameter and adjust the size of the disk to 20,010mm diameter if the focus spot size is 20µm. This function is equivalent to a tooling correction in a CNC machine

Positive	Draw a new bigger object by taking into account the spot size
Negative	Draw a new smaller object by taking into account the spot size

Resize by Milling Spindle Size

Positive	Draw a new bigger object by taking into account the milling spindle size
Negative	Draw a new smaller object by taking into account the milling spindle size

Insert Bar code in the drawing

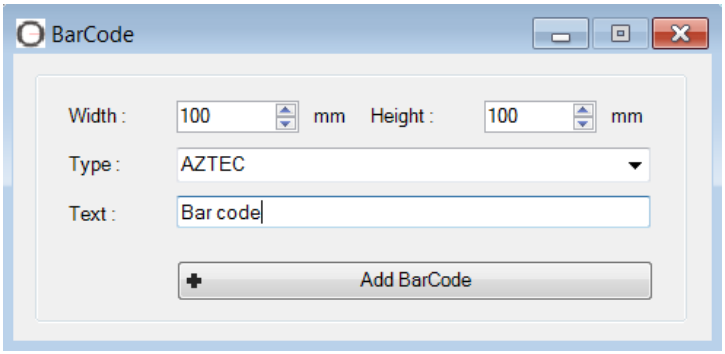


Figure 9: Bar Code Generation window

Insert Text in the drawing.

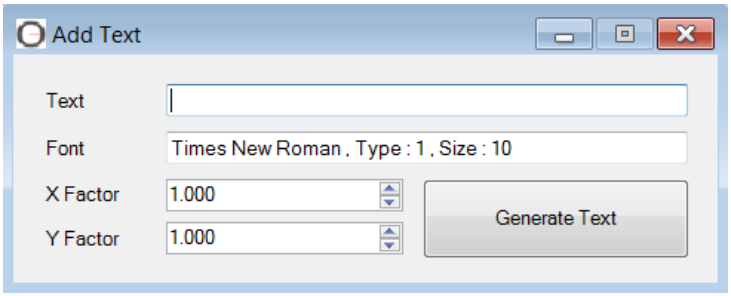


Figure 10: Tool to add text on the drawing

Serial Number Generator

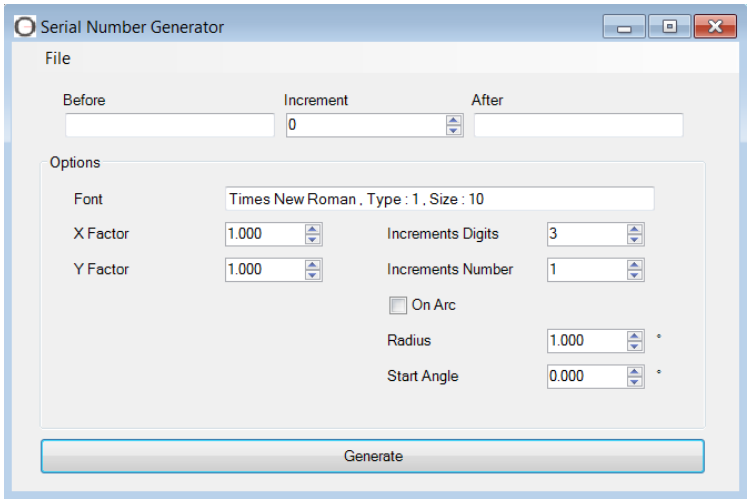


Figure 11: Serial Number Generator window

Convert an object into another type of object.

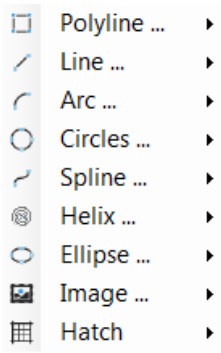


Figure 12: Objects list that can be converted into other type of objects

Delete all objects of a defined type present in the drawing.

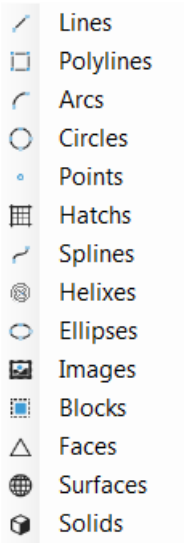


Figure 13: List of objects that can be deleted with "Delete Tool"

Refer to Section **3.4 Main program tools** for more information

View non-closed polylines: Change the color of non-closed polylines to green

This tool is used to detect unclosed polyline. A lot of tools request closed polyline to operate correctly. For example, drilling tool or wobble.
The following picture shows detection (brown circle) of a non-closed polyline.

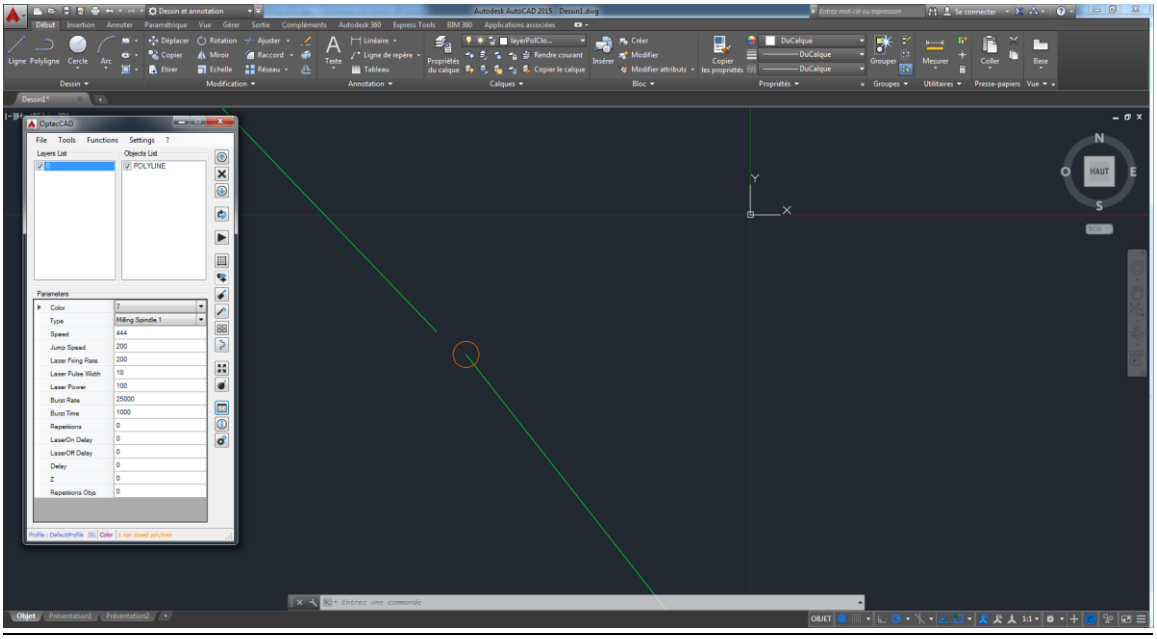


Figure 14: Non closed polylines detection

Set Real z for all objects:

Refer to Section **3.4 Main program tools** for more information

Allows to move the zoom position of the machine to a selected point on the drawing

Show / Hide Jumps: draw or erase the paths of stages or galvo head when the laser is not firing

Add Selected entities to points: realize a convolution between a selected object / group of objects and the points present in the drawing

Polyline Simplification: merge some consecutive lines of a polylines when their size or angle is below specified values

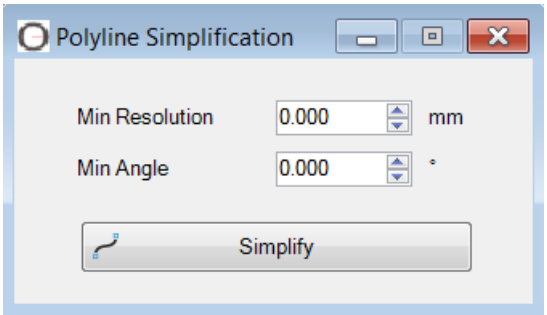


Figure 15 : Polyline simplification

3.1.4. Settings Tab

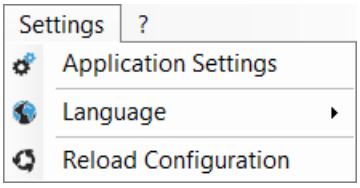


Figure 16: Settings Tab description

Allows loading of application settings (described in Section **5. OptecCAD's settings parameters**), language selection and reload configuration of process power if the user modified it without restarting OptecCAD.

Application Settings	Refer to Section **5 OptecCAD's settings parameters** for more information
Language	French or English languages are available
Reload Configuration	Allow to reload the configuration of OptecCAD when some values have been changed in ProcessPower

3.1.5. Help tab

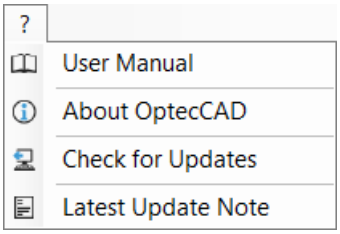


Figure 17: Help Tab description

Allows display of the user manual, information about OptecCAD and update information.

User Manual	Open the folder with all manuals and datasheets of the system
About OptecCAD	**OptecCAD v.3.0.1.0** Copyright © Optec S.A. 2015. All rights reserved. About Optec : www.optec.be info@optec.be Support : adrien.dicristofaro@optec.be OPTEC
Check for Updates	No more available
Latest Update Note	Show all improvements depending in the OptecCAD version

3.2. Management of layers and objects of the drawing

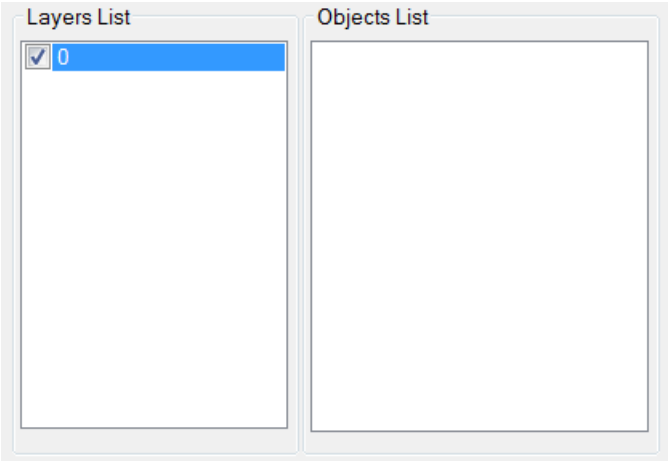


Figure 18: Window for the management of Layers and Objects

This part of the main window is dedicated to the management of layers and objects of the drawing. Checkboxes in the layers or object lists allows selection of those layers or objects which are to be processed. Unchecked layers or objects are not processed.

3.2.1. Right-Click on a Layer in the Layer List

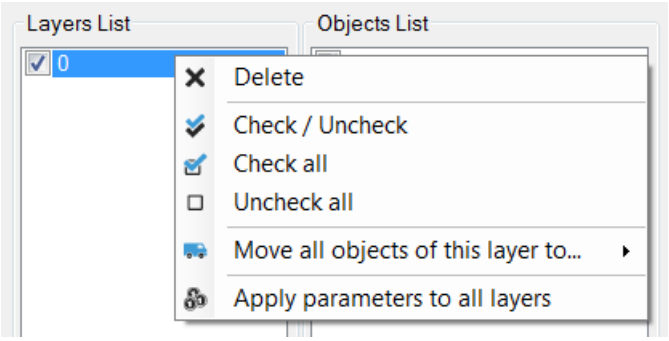


Figure 19: Window showed when right-click on a Layer

Delete	Delete selected layer (Layer 0 can't be suppressed)
Check / Uncheck	Check / Uncheck selected layer
Check all	Check all layers
Uncheck all	Uncheck all layers
Move all objects of this layer to...	Move all objects of the selected layers to another layer
Apply parameters to all layers	Apply parameters of the selected layer to all other layers

3.2.2. Right-Click on a Object in the Object List

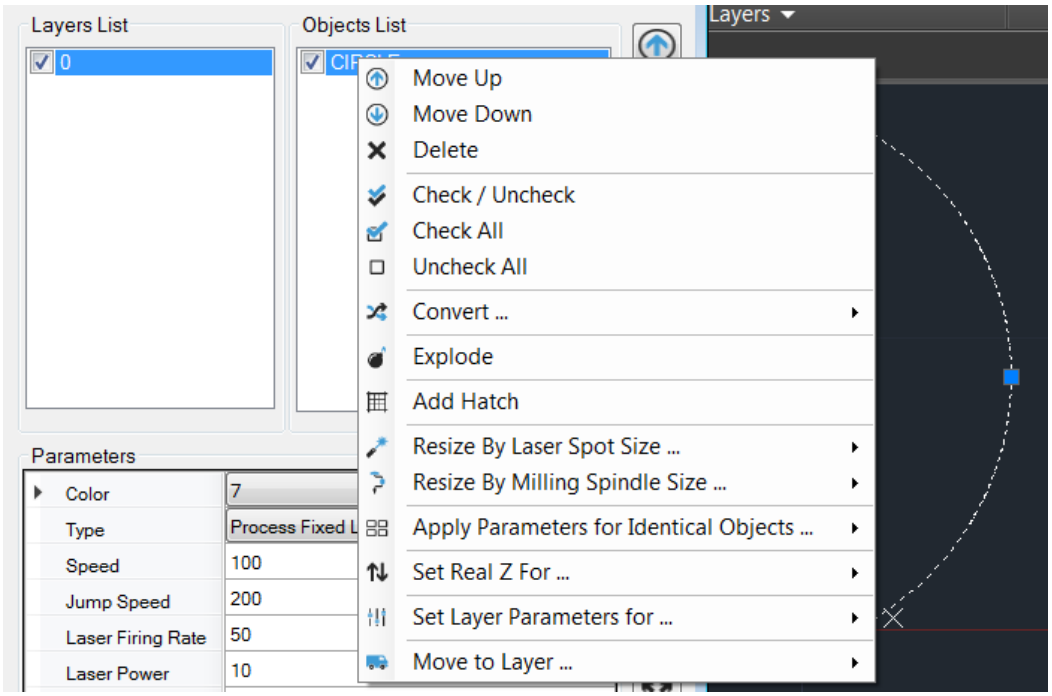


Figure 20: Window showed when right-click on an Object

The user can click with mouse right button on the object window. Several options will appear for helping object management. For example, "Move To Layer" allows moving an object from a layer to another one.

Move Up	Refer to Section **3.4 Main program tools** for more information
Move Down	Refer to Section **3.4 Main program tools** for more information
Delete	Refer to Section **3.4 Main program tools** for more information
Check / Uncheck	Check / Uncheck selected object
Check All	Check all objects in the current layer
Uncheck All	Uncheck all objects in the current layer
Convert ...	Refer to Section **3.1.3 Functions Tab** for more information
Explode	Refer to Section **3.4 Main program tools** for more information
Add Hatch	Refer to Section **4.2 Add Hatching** for more information
Resize By Laser Spot Size ...	Refer to Section **3.1.3 Functions Tab** for more information
Resize By Milling Spindle Size ...	Refer to Section **3.1.3 Functions Tab** for more information
Apply Parameters for Identical Objects ...	In Same Layer In All Layers

Copy the different parameters of the selected objects to all identical objects in the same layer or all layers

Set Real Z For ...

Refer to Section **3.1.3 Functions Tab** for more information

This Object
All Objects in Selected Layer

Set Layer Parameters for ...

Apply the layer parameters to the selected objects or to all objects in the current layer

Move to Layer ...

Move the selected object to another layer

3.3. Management of layer and object process parameters

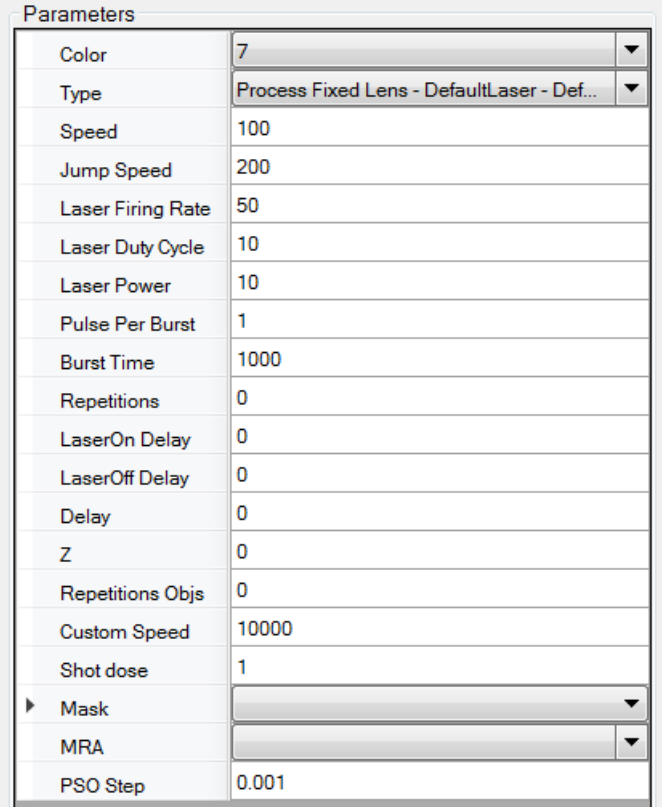


Figure 21: Description of window for process parameters values

This section details the different laser parameters for each object or layer. To modify parameters, select the layer or object you want to edit. Personal settings are displayed and can be modified readily as needed. If a parameter of a layer is changed, then ALL objects inside this layer will be affected by the parameter modification.

Color Some parameters can be defined in favorites and associated to a color and a number. They can be selected here

Type Defined the process zone used for the process. (generally define the focal length and the wavelength used.)

Speed	Marking speed
Jump Speed	Speed for movment without laser process (movment from an object to another one)
Laser Firing Rate	Repetition rate of the laser
Laser Duty Cycle	Ratio in percent between the pulse duration and the inverse of the repetition rate. Option only available for specific type of lasers.
Laser Power	Laser power on the part defined in percent of the maximum power
Pulse Per Burst	Number of laser pulses in a burst. Option only available for specific type of lasers.
Burst Time	Exposure time for static process (realized by drawing a dot)
Repetitions	Numbers of repetitions to be done for the layer.
Laser On Delay	The Laser On Delay define the latency time between the first scanner movement and the laser is firing first photons This option is used to compensate this time latency.

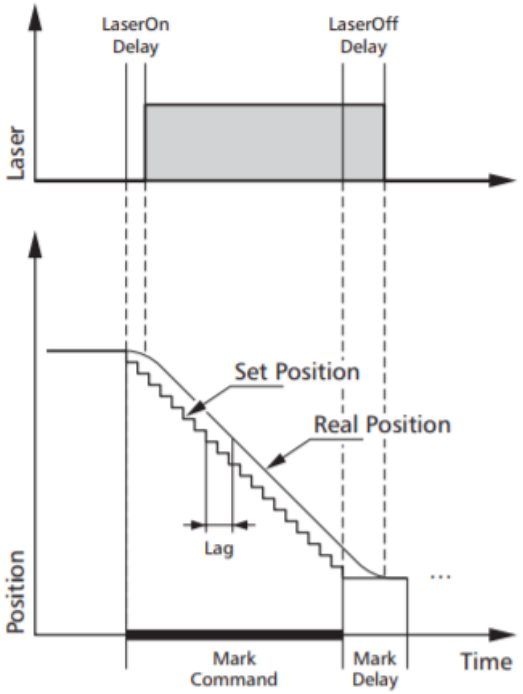


Figure 22: Laser On and Laser Off delays

Laser Off Delay	After execution of a process marking, the laser should not be turned off immediately because of electronic latency between the scanner and the laser. The scanners have not yet reached the final set position before the laser switchs off. The Laser Off Delay is used to keep the laser on during this latency time.
Z	Z position is shifted compare to the define Z origine position
Milling Spindle Speed	Rotation speed of a milling spindle.
Shot Dose	Number of shots per location. Mainly for projection based systems.

Masks	Mask number. Only for projection based systems.
MRA	Aperture of the Motorized Rectangular Aperture. Only for projection based systems.
PSO Step	Step in µm of the Pulsed Synchronized Output. The laser is synchronized with the displacement of the stages and a laser pulse is emitted only when stages have reached defined positions.

3.4. Main program tools


Move the selected object up to change the order of processing


Delete the object or layer selected


Move the selected object down to change the order of processing


Refresh layer and object list

Following tools are described in Section **4. Details of main tools**


Start the process and creation of the associated PGM (G-code) file


Add hatch to the selected object. This object must be a closed contour (see below for details)


Segmentation tool: allow to segment the drawing when the size is higher than the scanner field


Slicing tool: slicing of 3D object


Slicing STL file: allow to slice a STL file without volume conversion


Cloning 2D / 3D objects with variation of laser parameters in rows and columns as required; useful in determining optimum process parameters


Nesting function objects. Allows to drill any form (preferably closed) whilst defining a nesting parameter for a sequence of closely spaced contours.


Resize the drawing according to user-selected value.


Explodes the object


Drawing general Information


Centering the galvo field (yellow square) on the screen


OptecCAD settings. More details in Section **5 OptecCAD's settings parameters**

3.5. Information Zone

Figure 23: Information Bar

4. Details of main tools

4.1. PGM File Generation and Process Initialization

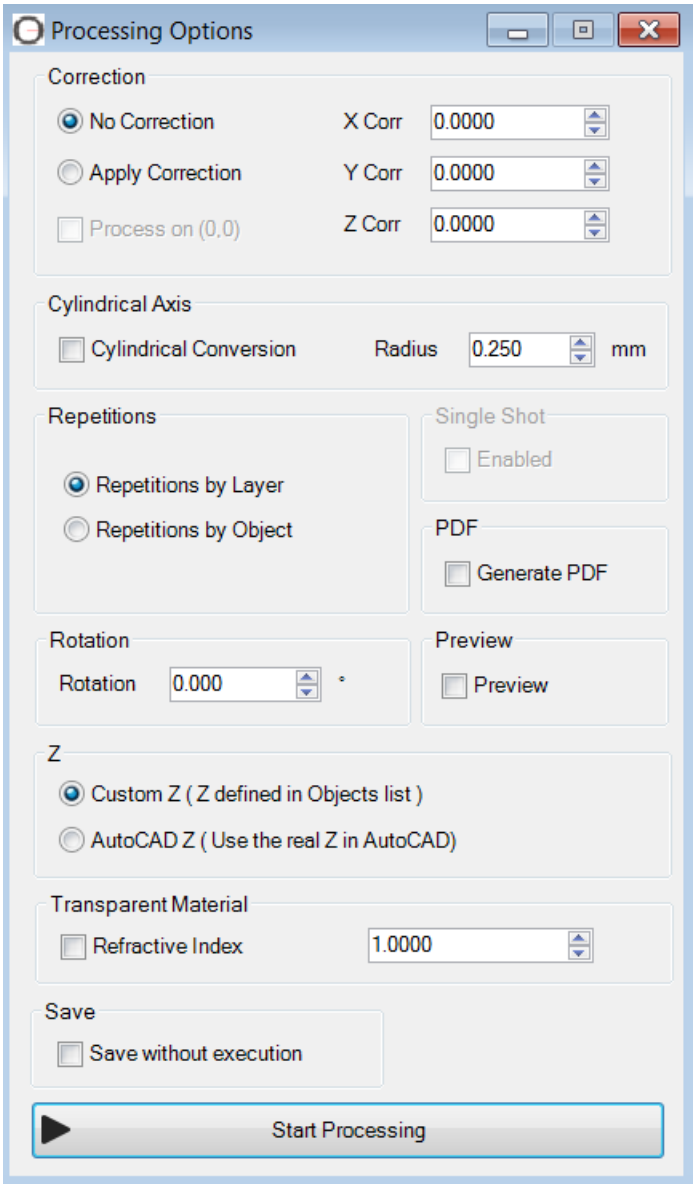


Figure 24: Start Processing window

Available from the "Tools" menu → "Start Processing" or by the button  .

NB: When the user clicks on the Start Processing button, the laser process starts.

The user can specify different process options as described below.

4.1.1. Correction

Applies a scale factor to the drawing. Only effective for Lines and Polylines.

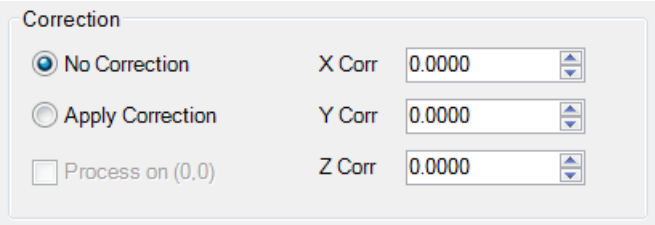


Figure 25: Correction Tab of Processing Options

4.1.2. 5 axis

Generation of Gcode for 5 axis tools. This option can be used only for 3D structuration with dots (static ablation on determined position). This 3D feature is especially useful when doing the 2D projection on a 3D mapping previously done.

4.1.3. Cylindrical axis

This option is available when a 4th rotation axis is present on the machine. This option allows converting Cartesian coordinates to cylindrical coordinates. Mainly used for tube processing.
Just check the box for using the tool and indicate the radius of the tube (not diameter!). Then OptecCAD will calculate automatically the rotation angle necessary to reproduce the drawing along the tube surface.

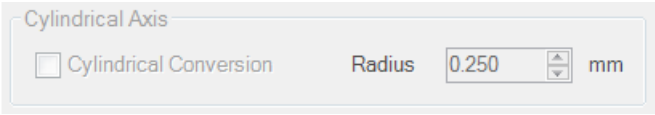


Figure 26: Cylindrical Axis of Processing Options

4.1.4. Repetitions

By layers: Each layer will be fully processed before repeat it again.
By object: Each object will be repeated before processing the next one.

Figure 27: Repetitions Tab of Processing Options

4.1.5. PDF

The user is able to generate a PDF file which included all process parameters.

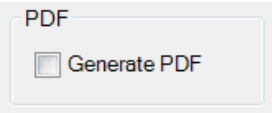


Figure 28: PDF Tab of Processing Options

4.1.6. Rotation

Rotate the drawing with angle (see degauch. option on Process power user manual) when process. Do not rotate the drawing itself in OptecCAD. This can be used if there is no theta stages on the machine

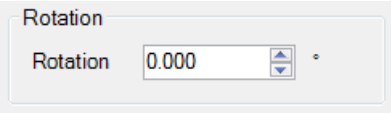


Figure 29: Rotation Tab of Processing Options

4.1.7. Preview

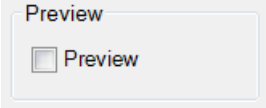


Figure 30: Preview Tab of Processing Options

4.1.8. Z

OptecCAD offers the ability to work in "real" 3D by the use of "OptecCAD Z" function. Instead of generating PGM files based on a Z-set by the user (in the parameter lists for objects / layers), the user can choose to draw directly in 3D and use the Z coordinates of the 3D drawing.

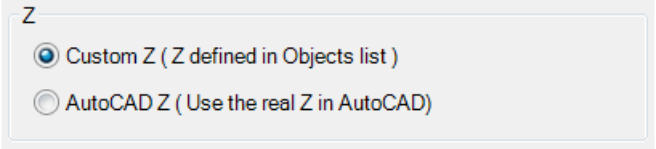


Figure 31: Z Tab of Processing Options

4.1.9. Transparent material

This box needs to be checked when the user wants to process inside a transparent material, typically Inner Glass Marking. The user must indicate the refractive index of the material. This value allows to OptecCAD to modify automatically the Z values as a function of the ablation depth. This avoids a deformation of the 3D artwork.

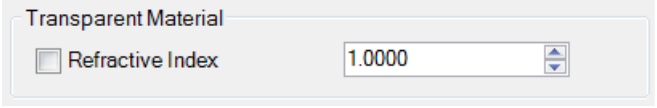


Figure 32: Transparent Material Tab of Processing Options

4.1.10. Save without execution

Allow the ADR and PGM files to be saved without executing the process.

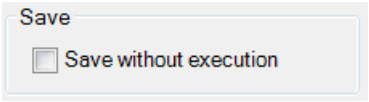


Figure 33: Save Tab of Processing Options

4.1.11. Run

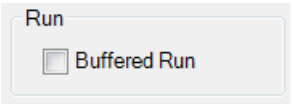


Figure 34:Run Tab of Processing Options

4.1.12. Start Processing

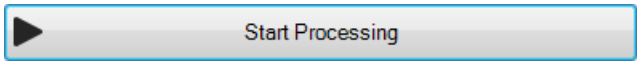


Figure 35: Start Processing Button of Processing Options

4.2. Add Hatching

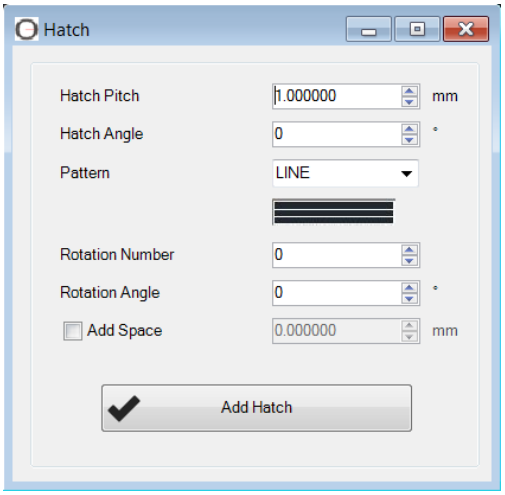
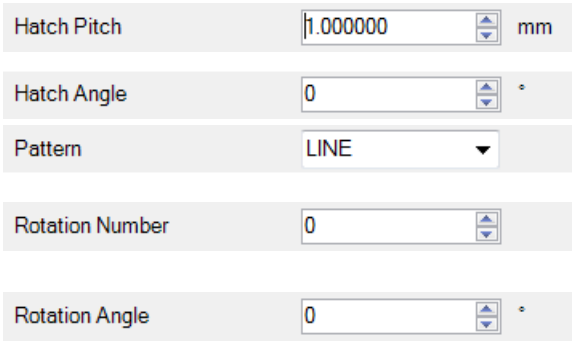


Figure 36: Hatch parameters

Available in the "Functions" menu → "Add Hatch" or by clicking on the button  or by right clicking on the object. The user must select an object in the list to have access to this feature.
The user will be able to define:



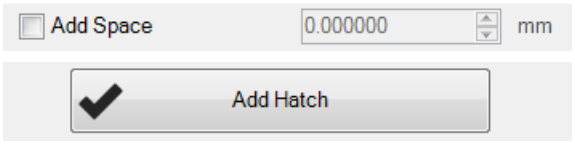
Hatch Pitch: the spacing between the hatching, defined in mm

Angle: angle in degrees

Pattern: type of hatch. The most common is "LINE"

Rotation Number: number of rotations to be done during the process for the same initial feature. Those rotations will not appear in the drawing on the screen.

Rotation angle: rotation angle defined in degrees. Starting angle is "Hatch Angle" parameter.



Add Space: the spacing between the outer contour and the hatching perimeter, defined in mm.

NB: The hatch function will only work with closed objects.

Hatching is mainly used to dig a cavity or create surface texturing on a material. Th following picture shows an example:

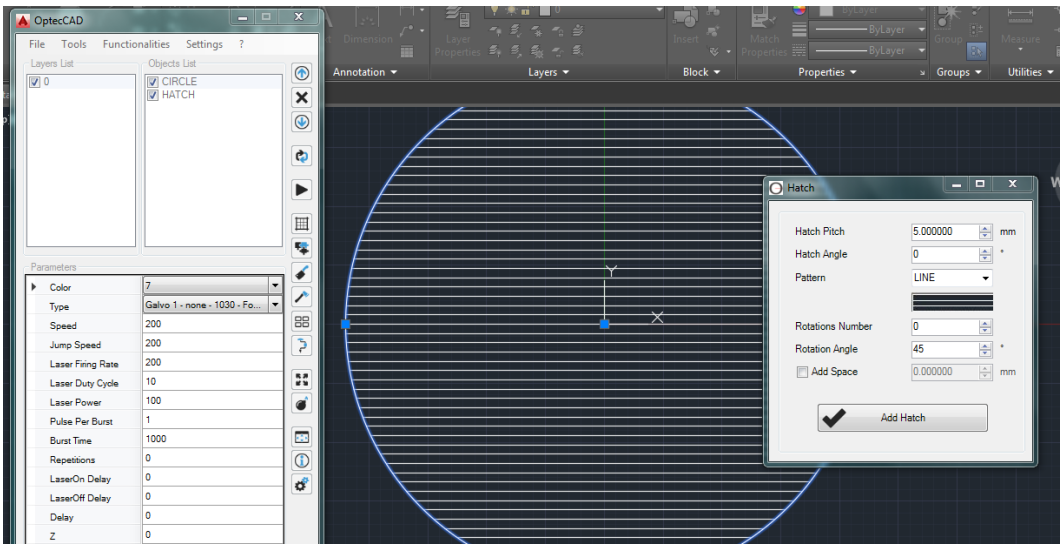


Figure 37: Hatch parameters

Hatch can be realized in normal or raster mode. This option has to be selected in OptecCAD settings. See 4.2 Application settings parameters

4.3. Object Segmentation

Available via the "Tools" menu → "Segmentation Tool" or by the button  .

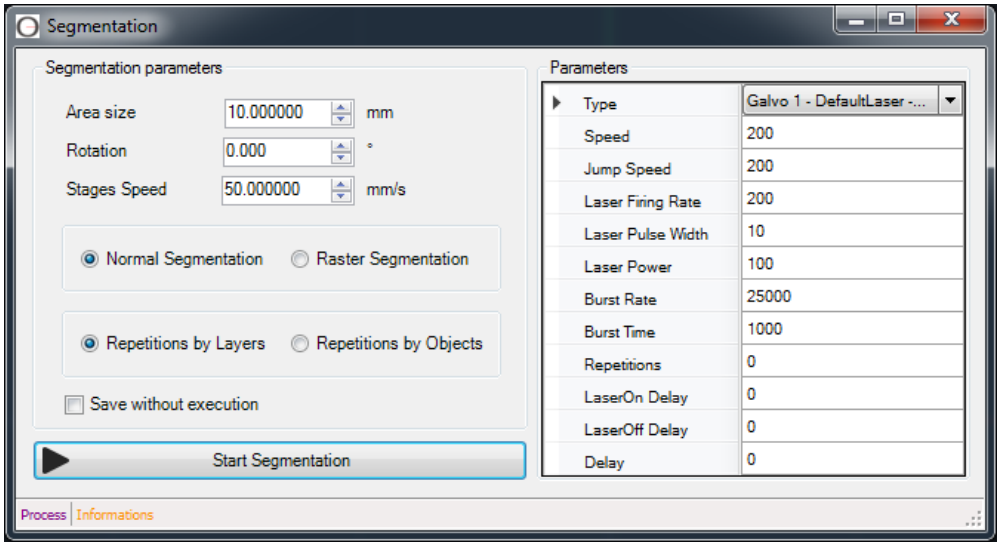


Figure 38: Segmentation tool

This tool is used when the drawing size is bigger than the field of the scan lens. It allows division of the drawing into different processing areas compared to the field of the scanner. X-Y stages are used to move to each processing areas.

The user can define:

- Area size: Define the size of the segmented field in mm.
- Rotation: angle of a rotation, in degrees.
- Stages Speed: speed of the stages to go to a processing area to another one.
- Parameters: laser parameters for segmentation as described in **3.3 Management of layer and object process parameters**

For information on:

- "Normal Segmentation" & "Raster Segmentation", please refer to ???
- "Repetitions by Layers" & "Repetitions by Objects, please refer to **4.1.4 Repetitions**
- "Save without execution", please refer to **4.1.10 Save without execution**

Once settings are selected, the user must choose the starting point of its segmentation (preferably at the top left of the drawing). A PGM file will be generated and the processing will launch. Each area will be processed by the scanner. Tables will automatically move to the correct position.

4.4. 3D Object Slicing

The slicing tool allows slicing of 3D objects (Solid 3D type). Each object can be sliced and processed.

This function is available via the "Tools" menu → "Slicing Tool" or by the button  .
Slicing window is divided into two distinct parts. The first tab concerns slicing and the second allows hatching to be applied to each slice for a complete 3D process.

The main window is divided in two tabs, Slicing Parameters, Hatch

4.4.1. Slicing Parameters

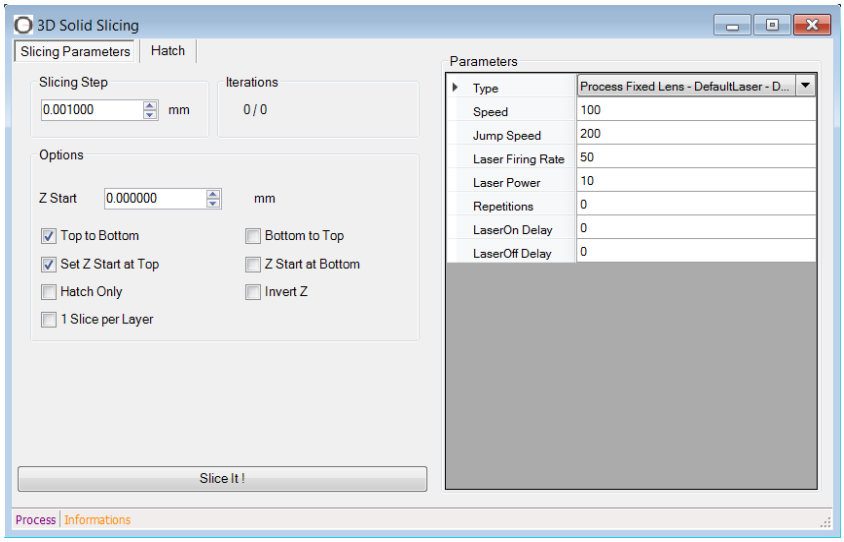
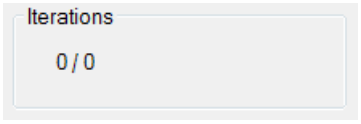


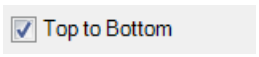
Figure 39: Slicing Tool

The user can define :

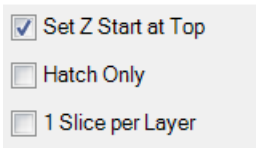
step in µm between each slice



value of the Z starting position

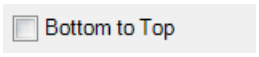


- from top to bottom: 3D material removing process
- From bottom to top: transparent material marking or additive process

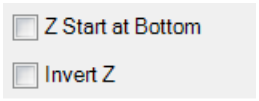


Only process the hatch (not the contour of the slice)

Each slice is put inside one independent layer



Slices are created from the minimum Z to the maximum Z (used for transparent materials)



- Laser parameters: For more information, please refer to Section **3.3 Management of layer and object process parameters**

4.4.2. Hatch

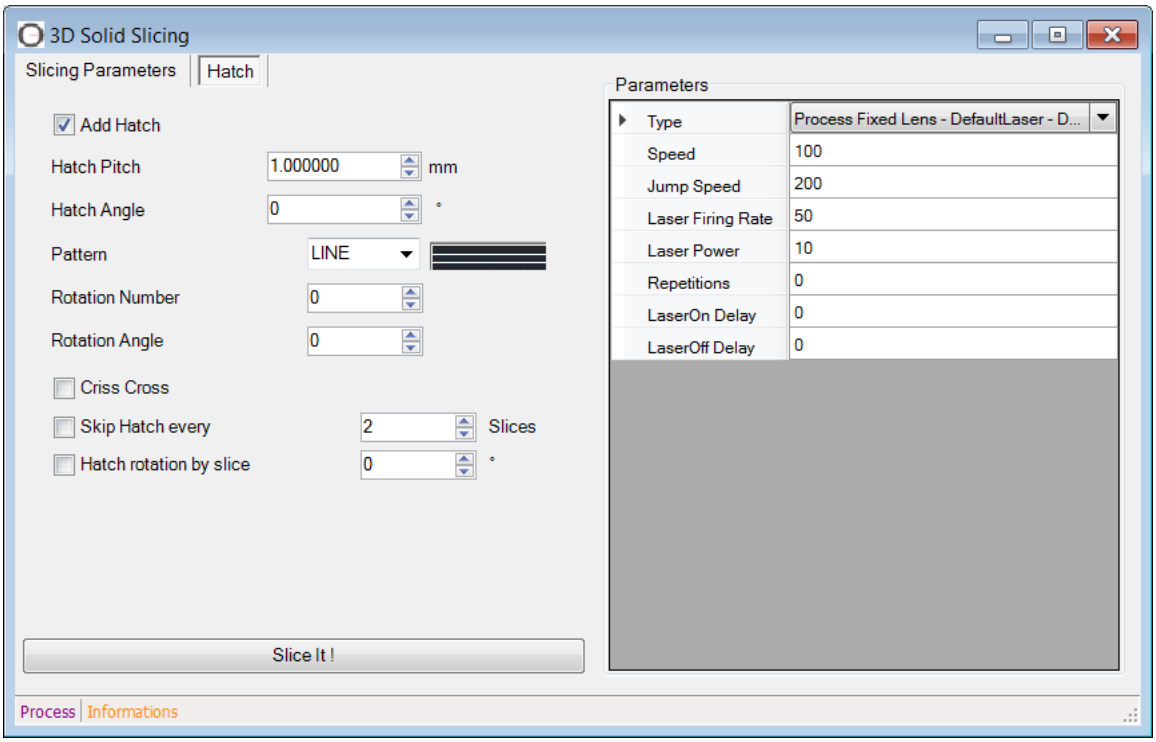


Figure 40: Slicing Tool - Hatch parameters

In the second tab, the user can define parameters of hatching.
When parameters are set, calculation starts. (depending on the drawing complexity).

For more parameters on Hatch parameters, please refer to **4.2 Add Hatching**

Description of other parameters:

one hatch at 0° and the next hatch at 90°

defined a number of slices for which hatch is not realized

rotate hatch between each slice of an angle defined in degrees

A progress bar is visible. When calculations are complete, all layers will be placed in a specific slicing layer.

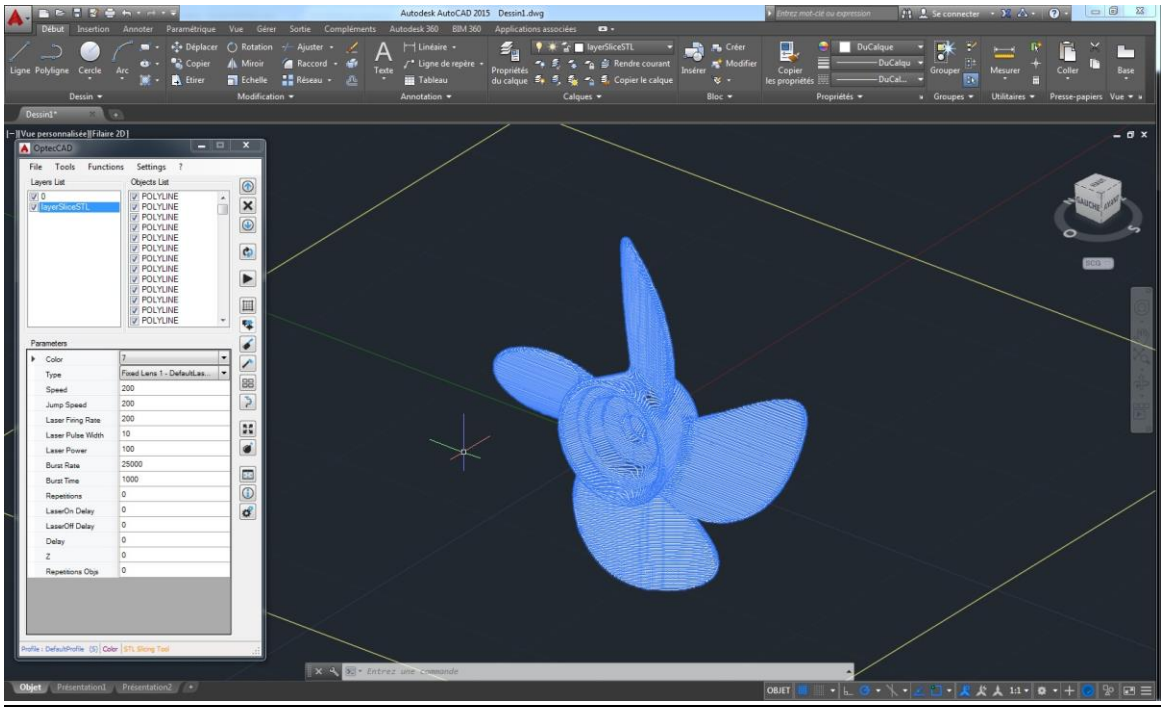


Figure 41: Example of a sliced object

4.5. STL slicing tool

The STL slicing tool allows slicing directly a STL file without file conversion being necessary. Each object can be sliced and be processed.

This function is available by at the "Tools" menu → "STL Slicing" or by the button  . Slicing window is divided into two distinct parts. The first tab concerns the parameters of slicing and the second allows hatching of each slice and for a 3D process.

4.5.1. Slicing parameters

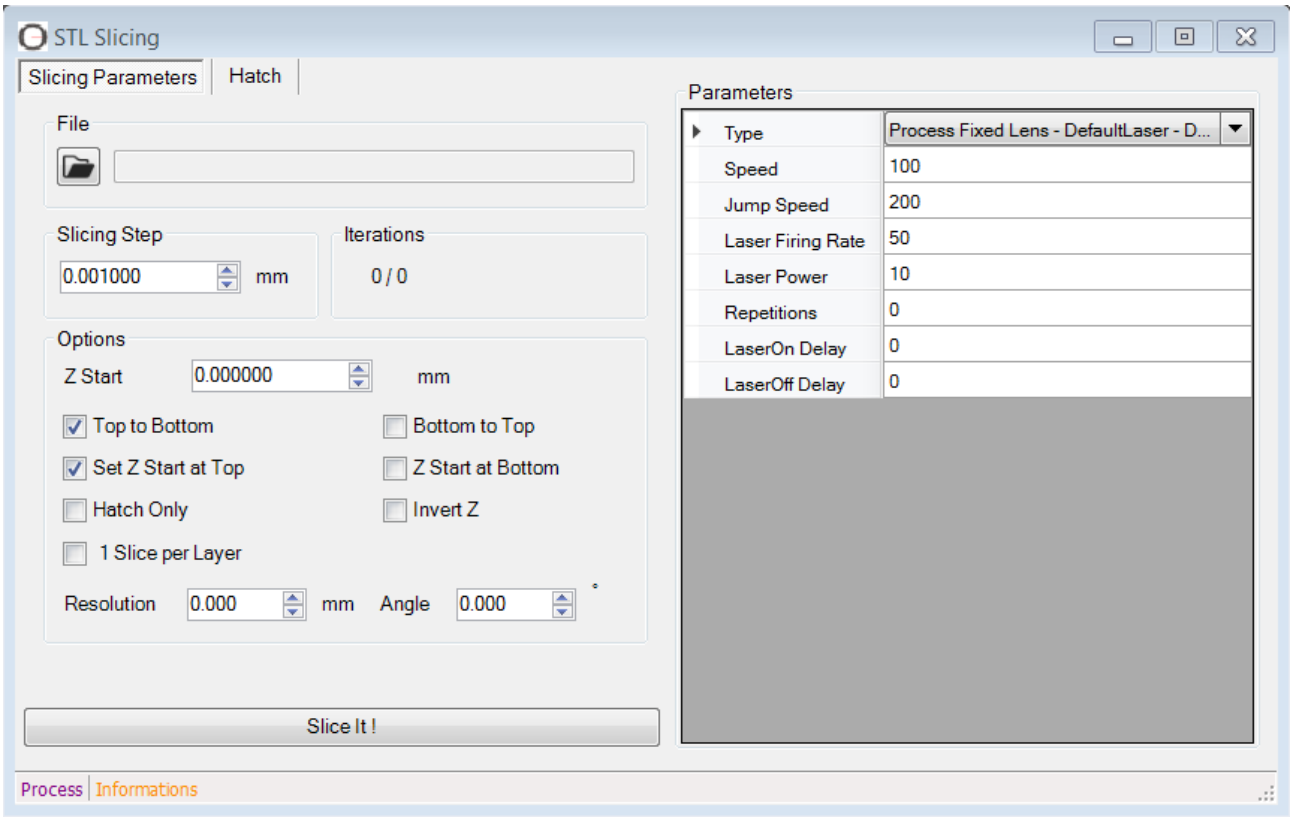
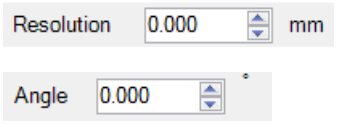


Figure 42: STL Slicing parameters

For main parameters please refer to **4.4.1** Introduction**Slicing Parameters**

Other parameters:



if a line in a polyline is smaller than this parameter, the line is joined with the previous line in the polyline
if the angle between two lines in a polyline is smaller than this angle, the two lines are joined.

4.5.2. Hatch

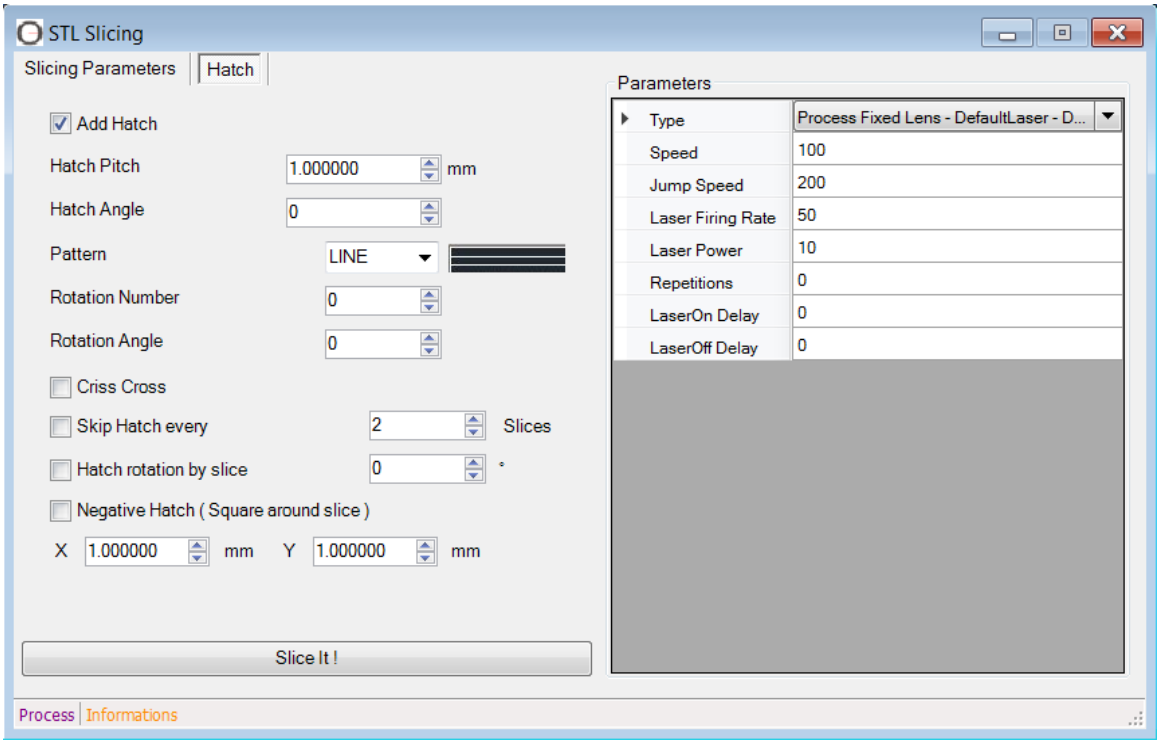
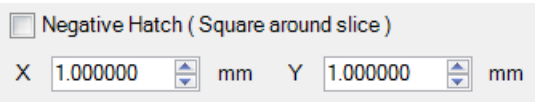


Figure 43: STL slicing - Hatch parameters

In the second tab, the user can define hatching parameters. When parameters are set, calculation can start (depending on the drawing complexity). For more information, see Section **-**
Hatch
Regarding other parameters:



Create a box around the STL drawing to hatch the negative volume

A progress bar is visible. When calculations are complete, all layers will be placed in a specific slicing layer.

4.6. Cloning Tool

The cloning tool allows easy cloning one or more clones of objects in the drawing, for varying or not the laser parameters of the object. This tool can help to optimize ablation parameters. The idea is to clone an object by a matrix method. This tool can be used for process parameters optimization.

Available by the "Tools" menu -> "Cloning Tool" or by the button  .

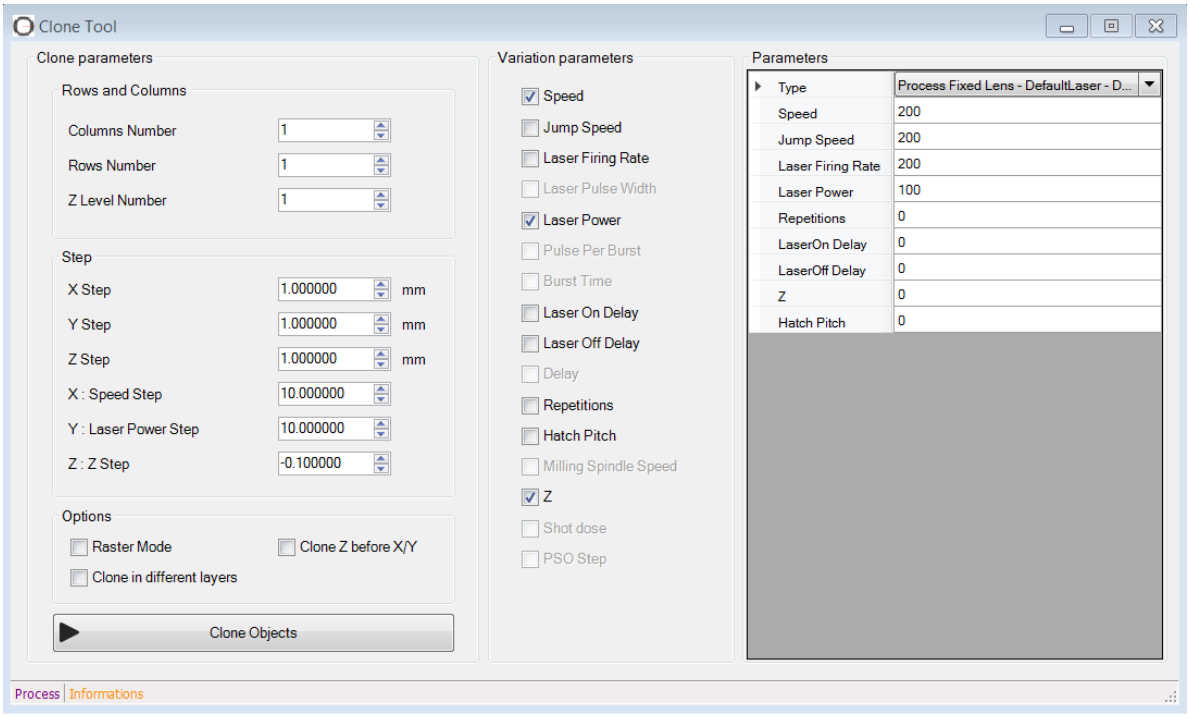


Figure 44: Cloning Tool

The user can select the number of columns, row and level for a 3D cloning and spacing between each object. Process parameters are also available and the user has the possibility to vary 2 different parameters.

Rows and Columns

Number of columns of the cloning matrix

Number of rows of the cloning matrix

Number of Z level inside the 3D matrix

Step

Step between 2 column

Step between 2 rows

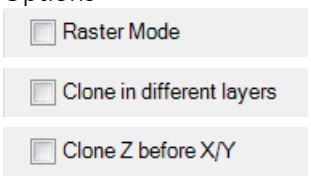
Step between 2 levels

Step of the selected parameters on column

Step of the selected parameters on rows

Step of the selected parameter on level

Options



Raster or standard matrix mode

Each clone will be cloned inside a new layer (for multiple object cloning)

Clone the Z level before clone the 2D matrix

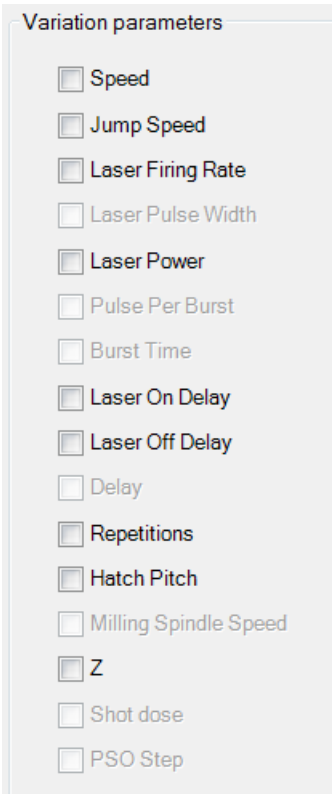


Figure 45: Variation Parameters Tab of the Cloning Tool

The figure above shows the possible parameters which can be selected for variation study inside the matrix. The figure below shows an example.

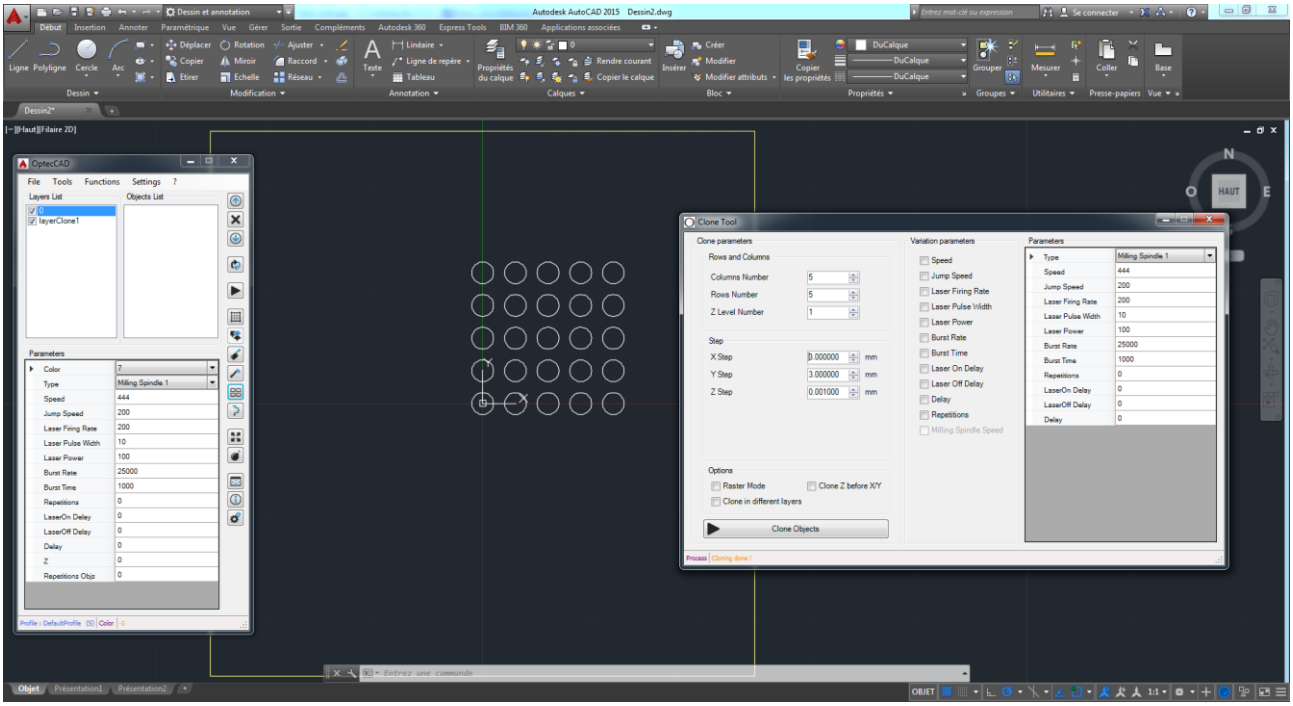


Figure 46: Cloning tool example

Here the user has chosen to make a matrix of cloning 5 x 5 by choosing a pitch of 1.2mm in X and Y. He also made the choice to vary the laser speed and the jump speed with a step of -10 and -20. So he will get 25 clones where laser speed will vary on the columns and jump speed on the lines.

4.7. Drilling tool

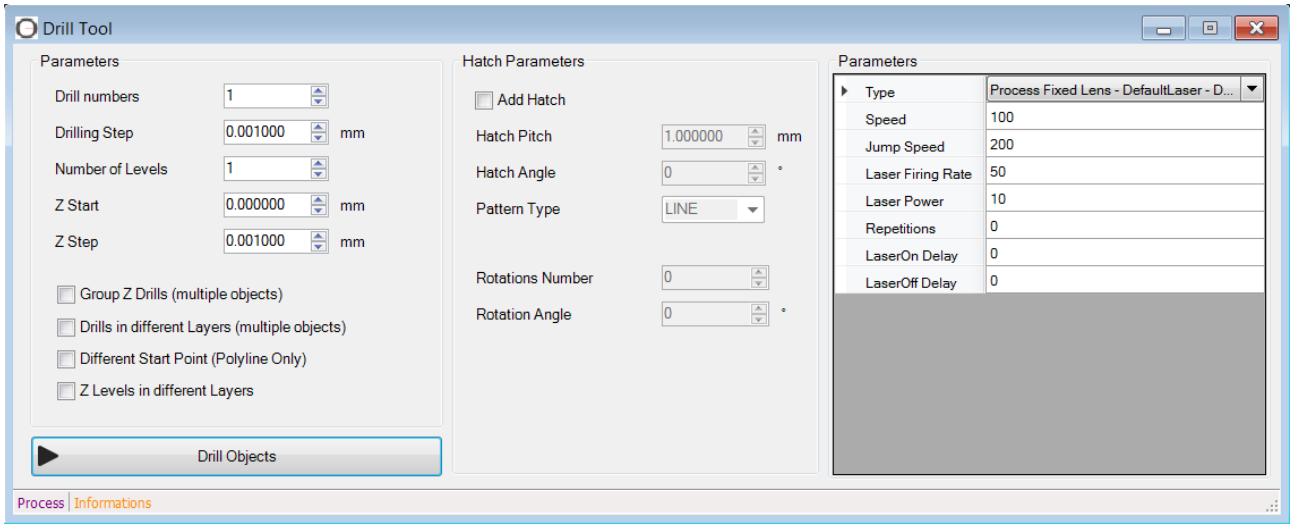
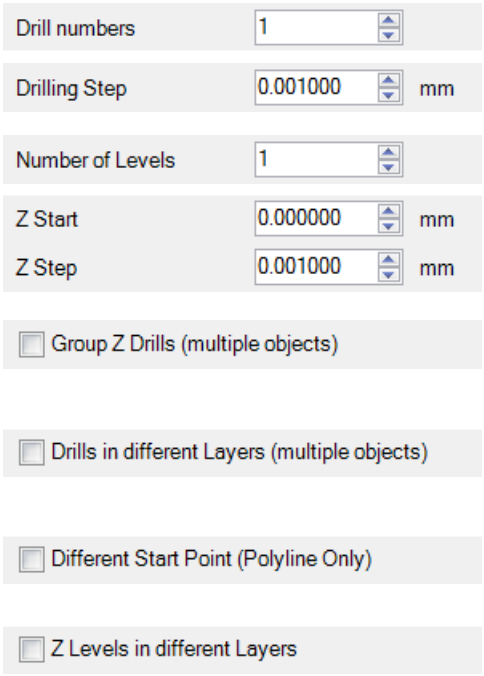


Figure 47: Drilling tool

Allows to drill any form (preferably closed) whilst defining a nesting parameter for a sequence of closely spaced contours. This tool is mainly used to simulate a bigger spot size and allows to drill high thickness material.

Available by the "Tools" menu -> "Drilling Tool" or by the button  .



Number of drill

defined in mm. Positive for outer contours, negative for inner ones

clone the objects at different z level Z

Z start: this level will be executed first

Z step: distance between two consecutive z levels.

Allow to repeat each object in a defined Z before process the next Z. This option allows to drill the shape like a mechanical drill, layer by layer

If the drawing contains several object, the user can separate each in separate optecCAD's layers. Allows to drill object one by one and optimize process time.

Allows starting each drill at different point to increase ablation homogeneity. Only for polylines, not available for circles

In case of multiple z levels, all objects with same z values are group in a new layer

For more information on "Hatch", see Section -

Hatch

For more information on Laser "Parameters", please refer to Section **3.3 Management of layer and object process parameters**

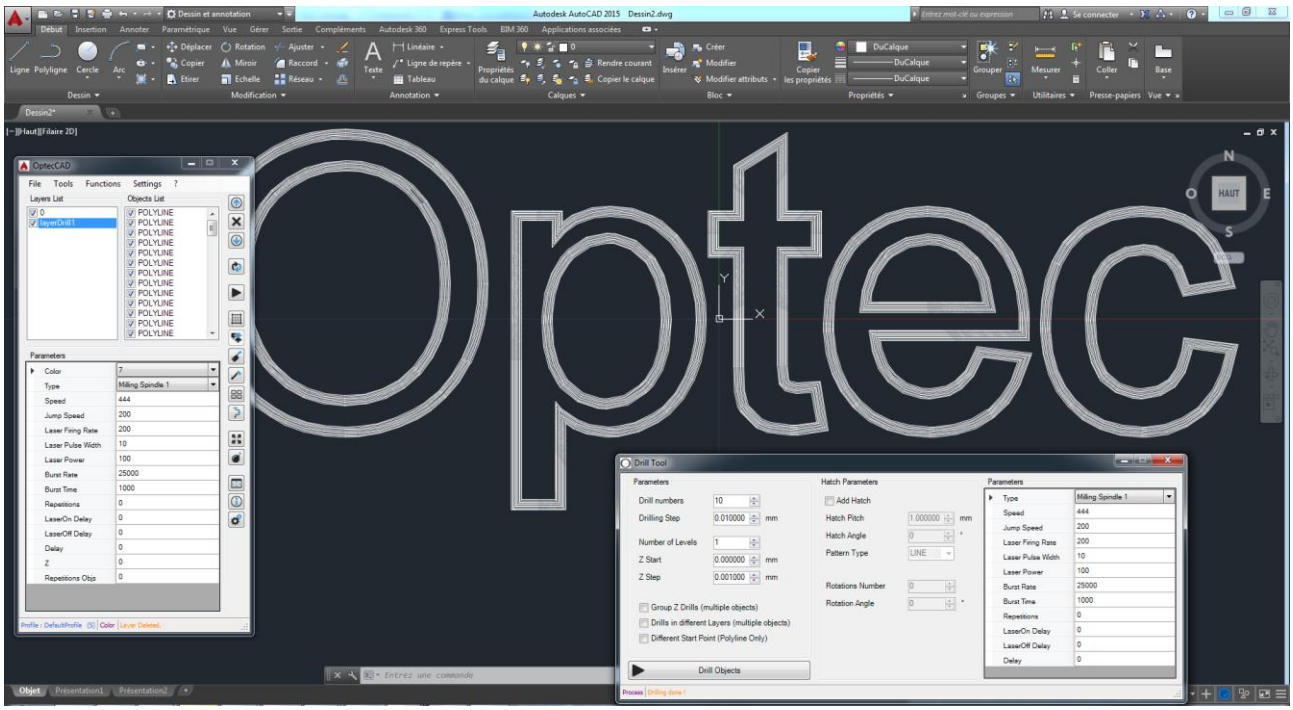


Figure 48: Example of drilling tool

4.8. General information

Allows to obtain information on the drawing: number of each object type, total length of the drawing and an estimation of the processing time.

Available by *« Functions »* → *« Drawing Information »* or by the button  .

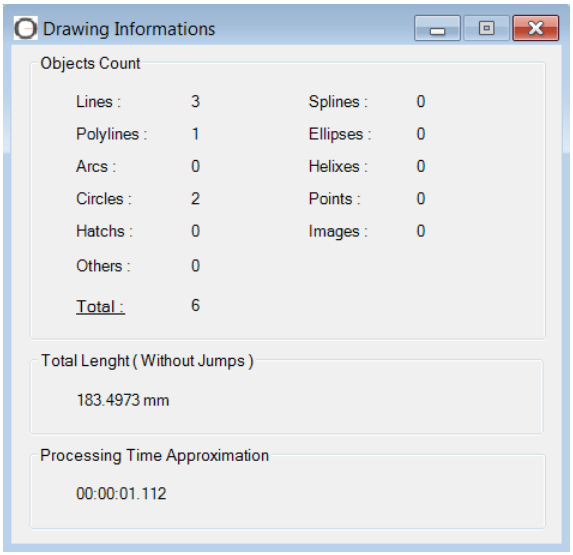


Figure 49: Drawing information window

4.9. Automatic resizing

Resize the drawing automatically with the possibility to change the length or width. The user can also add a gap on the edge of the drawing and also modify the position of the center of the drawing.

Available by the tab *« Functions »* → *« Auto Resize Drawing »* or by the button  .

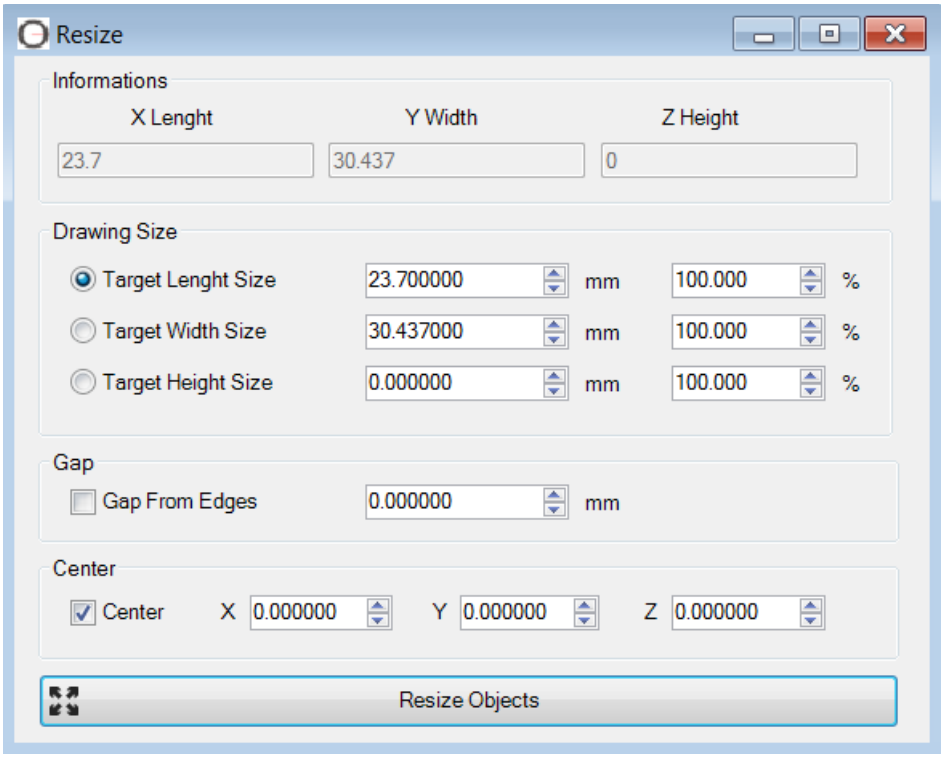


Figure 50: Resize window

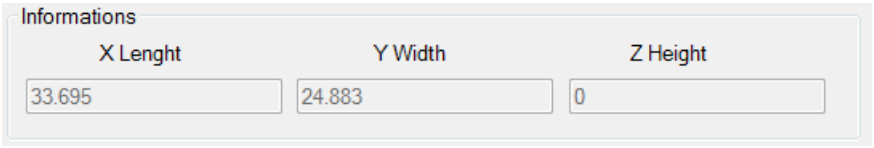


Figure 51: Information Tab of Resize window

The drawing size is use to change the size, like a scale facor, of the drawing.

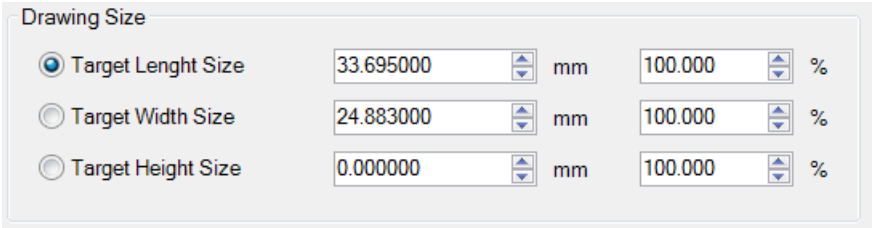


Figure 52: Drawing Tab of Resize window

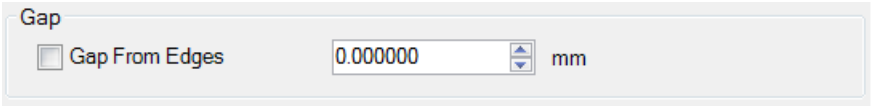


Figure 53: Gap Tab of Resize window

The following picture shows the possibility to change the center of the drawing. Very usefull to center your process to a reference position.

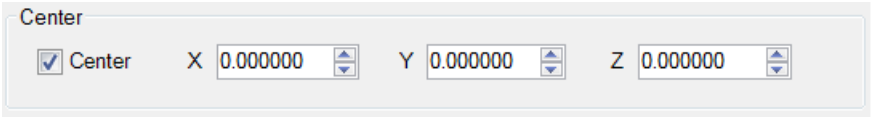


Figure 54: Center Tab of Resize window

4.10. Object exploding

Allows to explode a complex object in simple objects, for example, from polyline to lines/arcs. A surface could also be exploded in regions then in lines.

Available by the tab « *Functions* » → « *Explode* » or by the button  .

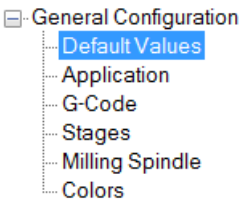
5. OptecCAD's settings parameters

Available by the Tab « Settings » → « Global Settings » or by the button  .

In these windows, the user can find the management tabs of all OptecCAD parameters.

The first tab is the Profile creator and saver. The user can:

- Select or create a new profile selection
- Select the process type
    - Galvo for process with scanners
    - Stages for process with fixed lens
    - IFOV: For Infinite Field Of View process
- Define some basic parameters in the following menu:



5.1. Default values

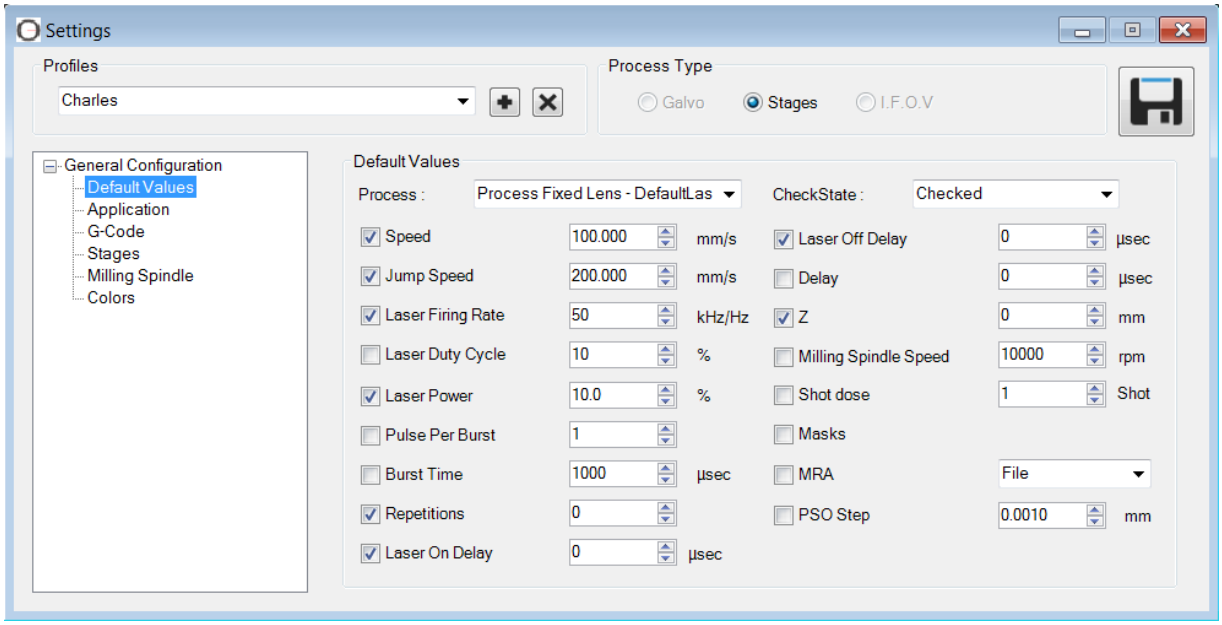


Figure 55: OptecCAD settings - Default values

Default values allow defining default parameters for a new file, layer or object. The user can also suppress some parameters if they are not used.

5.2. Application

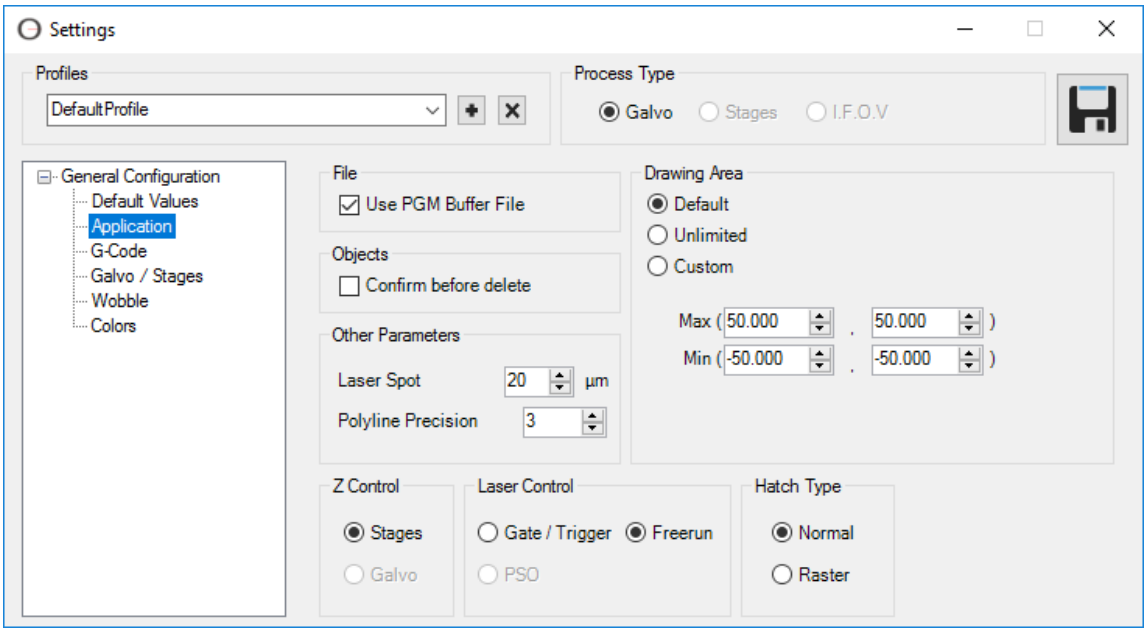
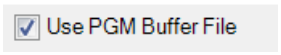


Figure 56: OptecCAD settings - Application

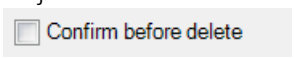
The application window allows giving geometrical information to optimize PGM compilation and drawing options of optecCAD.

File



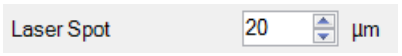
Select "Use buffer file" allows starting a process without saving ADR and PGM files

Objects

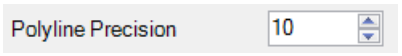


The user needs to confirm each object suppression

Other parameters

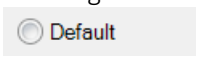


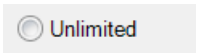
Laser spot is the spot diameter on the focus plane. This value depends on the focal length, wavelength and beam entrance size. This allows to use the drawing tool "resize by spot size" to adjust the drawing in function of the spot size

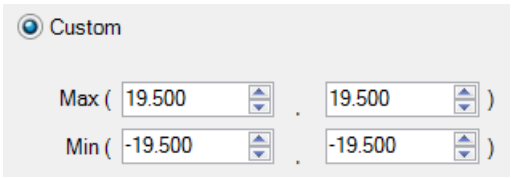


Polyline precision allows defining the precision of the drawing when the user converts an object to a polyline. Increased the value will increase the drawing precision but also the increase the size of the PGM file

Drawing Area

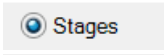


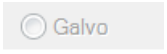




This area corresponds to the yellow square on AutoCAD and symbolizes the scanner field

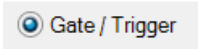
Z Control





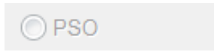
Defined if the user wants to move the Z with the Stage Z axis or with the optical Z axis. This option will adapt the Gcode conversion

Laser Control



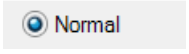
Trigger/gate automatically selected in function of the laser

Freerun option is used for excimer. Use it to guarantee homogeneous shot dose for high resolution polyline. Use this option for helix process for example.

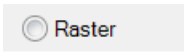


PSO can be selected only with stage. This allows to synchronize laser shots with stages movement. Then the PSO step parameter is activated

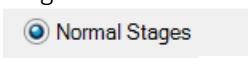
Hatch Type

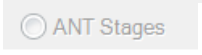


Select how the hatch will be convert in Gcode. Raster will increase the process speed but Normal will optimize edge homogeneity. To optimize edge homogenehity with raster process, it is necessary to optimize perfectly delay ON and OFF parameters



Stages





5.3. G-code

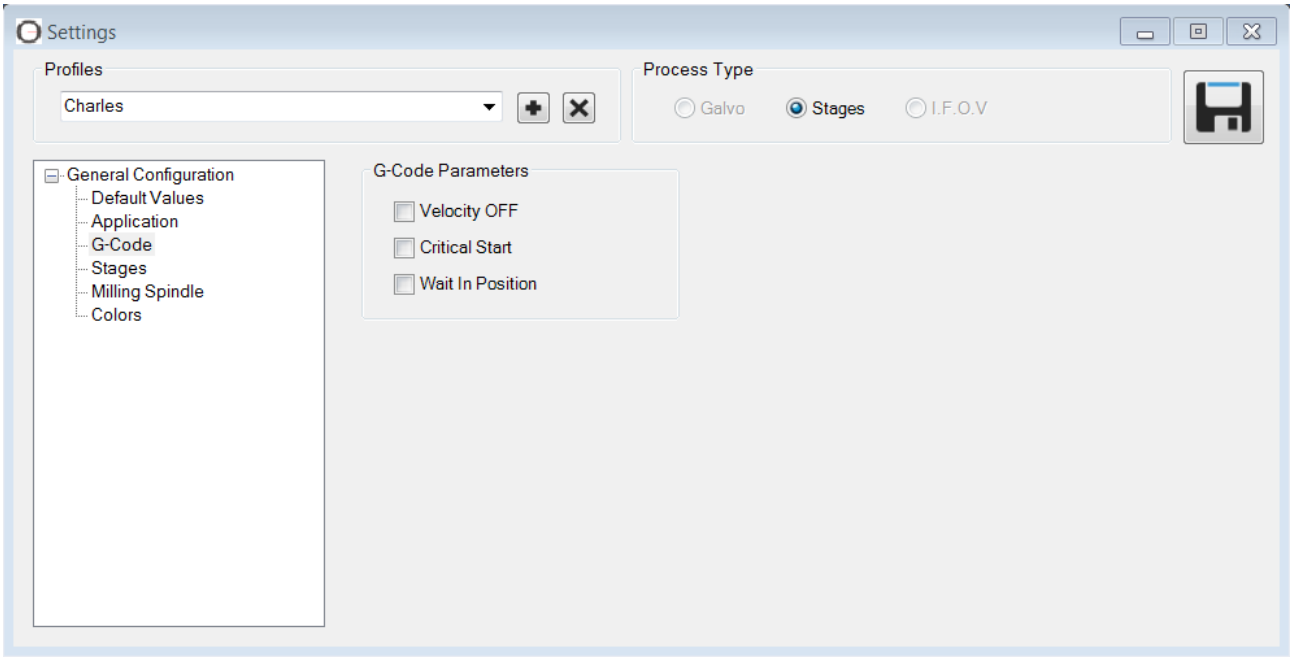


Figure 57: OptecCAD settings - G-code

This window allows you to integrate commands on the generated Gcode and active process parameters needed.

5.3.1. The "Velocity OFF"

Use the VELOCITY command to blend multiple coordinated motion commands into one continuous motion path. If the parameter velocity OFF is checked, the controller will always decelerate to zero velocity between consecutive coordinated moves. The following examples illustrate the difference between these two modes.

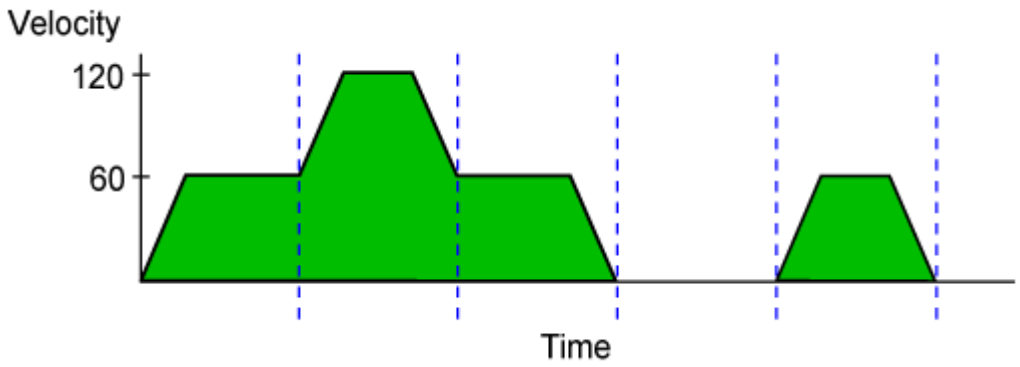


Figure 58: Example with velocitiy profiling ON

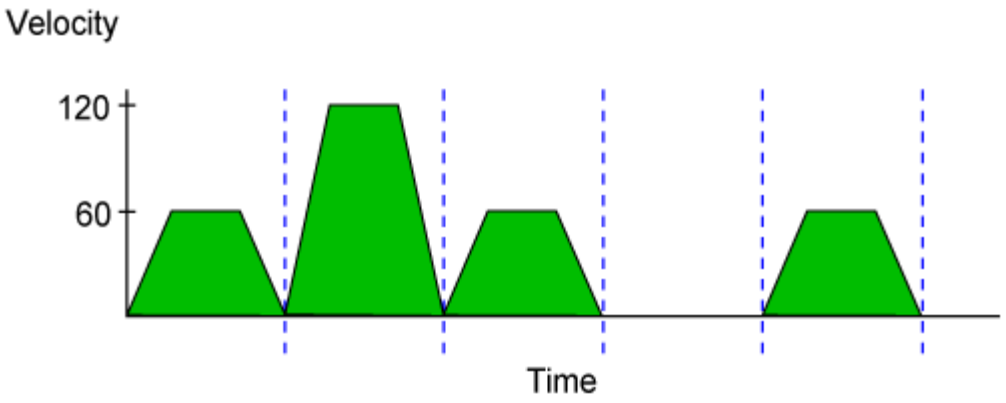


Figure 59: Example with Velocity profiling OFF

5.3.2. Critical Start

This option allows very small movements (<10µm)

5.3.3. Wait in position G361

Use the WAIT MODE INPOS command to set the wait mode to be in position. In this mode, the controller will wait for all axes in a move to be in position before the move is considered to be finished. Because of settling time, the wait interval in the WAIT MODE INPOS mode is longer then the interval used in the WAIT MODE MOVEDONE mode.

5.4. Galvo / stages

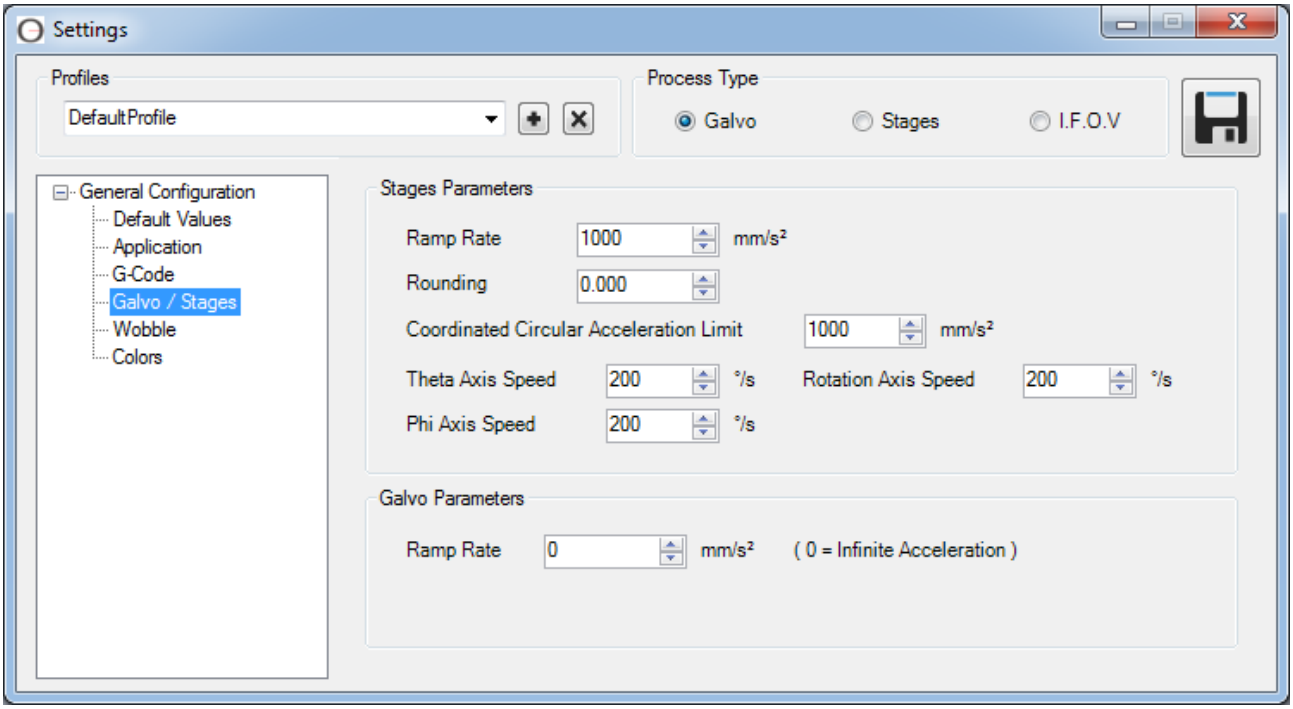


Figure 60: OptecCAD settings - Galvo / Stages

This window allows you to determined speed and acceleration parameters of motion axes.

Stages parameters:

- Ramp rate is the acceleration value of stages.
- Rounding: Allows rounding of sharp corners. Define a radius in µm
- Coordinate Circular Acceleration Limit: Defines the acceleration of axes during curved portions
- Theta Phi and rotation axis: Defined the default value of rotation axis speed.

Galvo parameters:

- Ramp rate: Defined the ramp rate of both scanner axis. 0 is a default value and means infinity.

5.5. Wobble

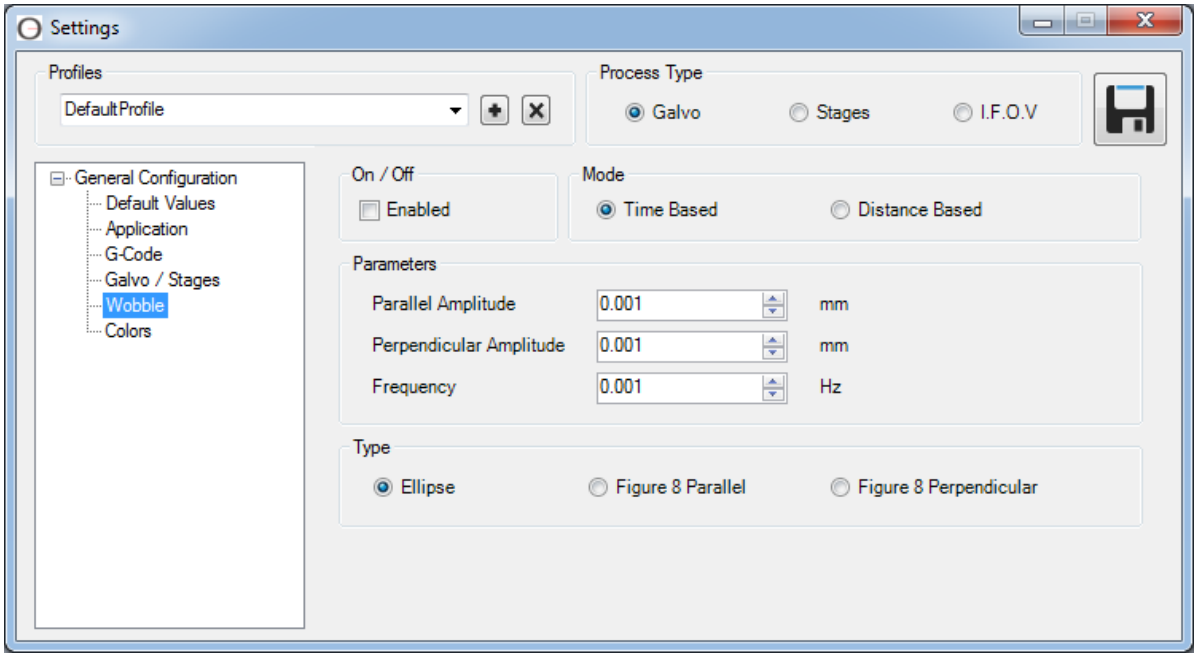


Figure 61: OptecCAD settings - Wobble

Wobble is a technique generally used to cut metallic parts with the objective to optimize the quality of the cut edge.

The objective is to create an oscillation on the beam trajectory. The picture on the right explains the process.

When the user activates the wobble option, the option appears on the main window of OptecCAD. The user can select or not the wobble for each layer or object.

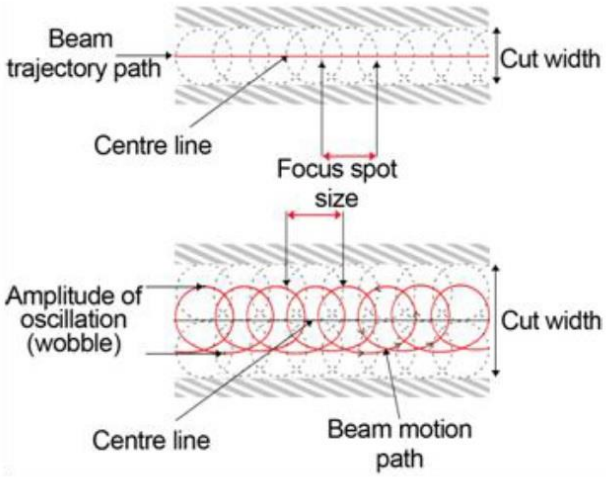


Figure 62: Wobble principle

The wobble can only be used with a closed polyline.

When repetitions are necessary, it's preferable to use repetition by object to average the laser passing.

5.6. Colors

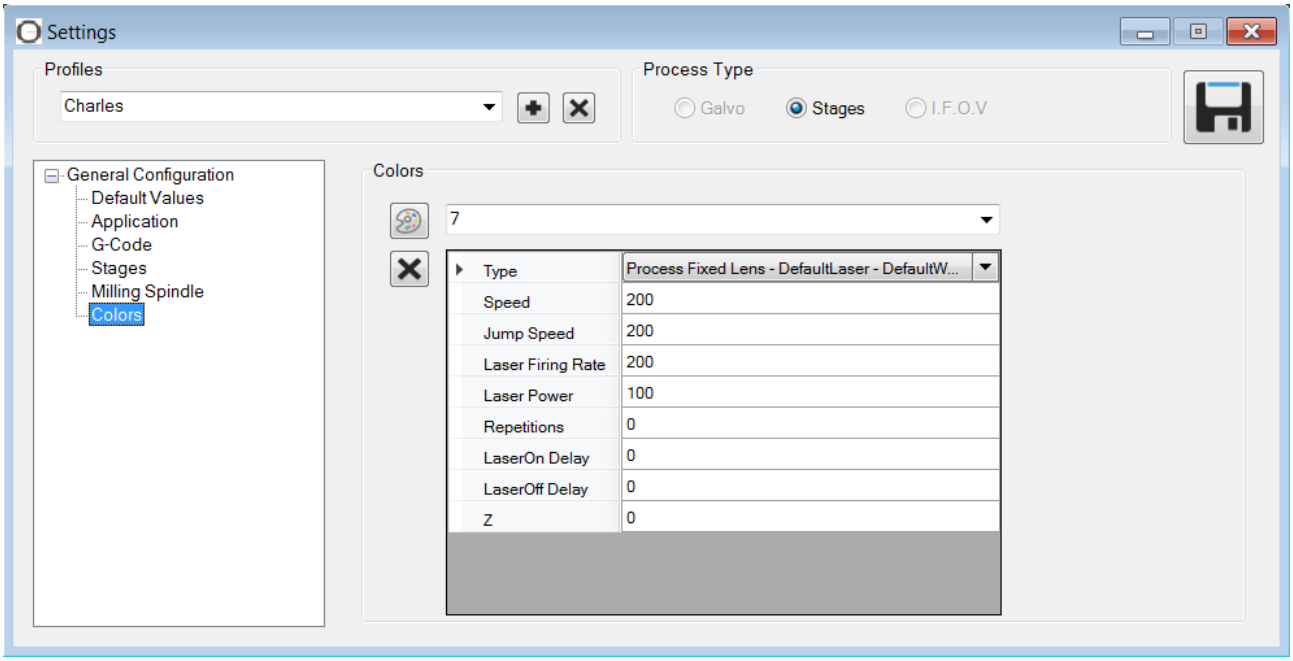


Figure 63: OptecCAD settings - Colors

Allows a management 'By Colour' on the drawing. The user can impose process parameters as a function of pen colour. Parameters are automatically applied to objects when the user changes its color.

5.7. Configuration Infinite Field Of View (IFOV)

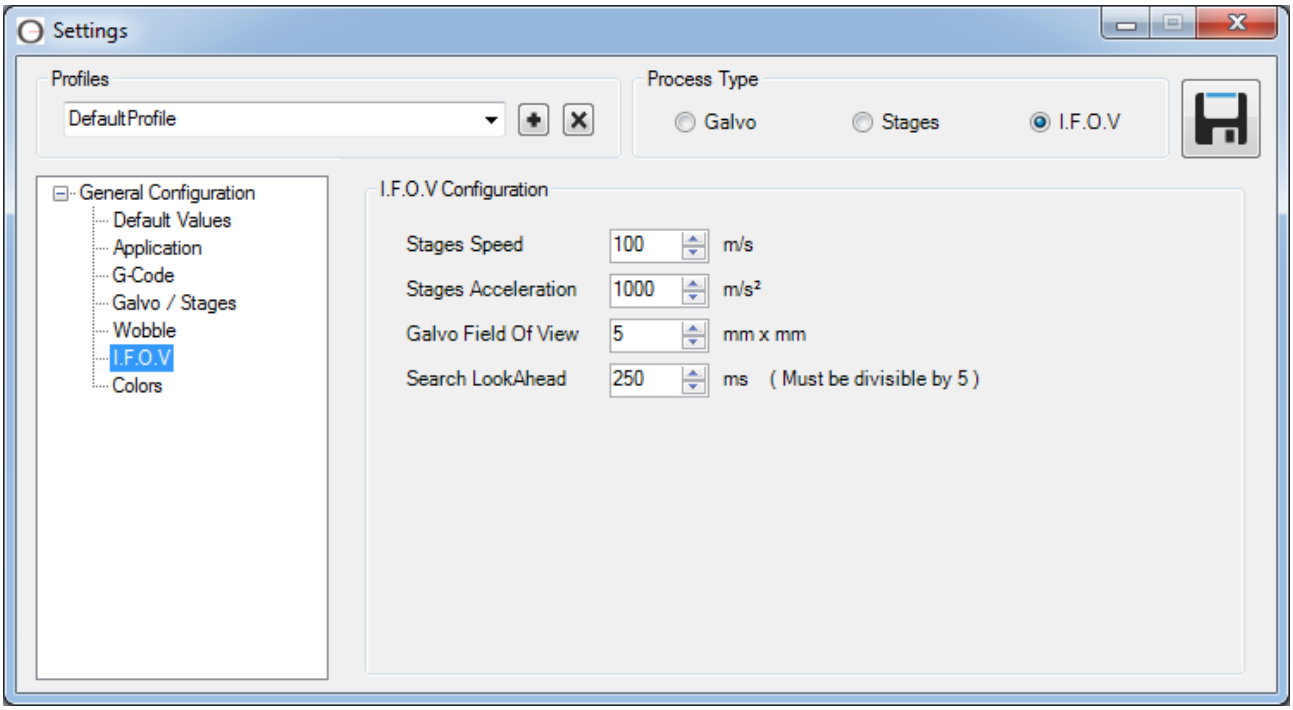


Figure 64: OptecCAD settings - Infinite Field of View

Allows configuring IFOV parameters for each drawing. Following explanation will guide the user to find good parameters in function of the application. Using IFOV successfully requires some learning; see also IFOV tutorial.

Before start an IFOV process, the machine needs to be perfectly calibrated.

- Optimize the counterPerUnit value
- Calibrate the scanner precisely
- Indicate to the machine the angle between stages axis and scanner axis (see process power manual and IFOV tutorial)

IFOV Configuration:

- Stage speed: Maximum speed for X Y stages
- Stages acceleration: Acceleration of X Y stages
- Galvo field of view: The user can fix the field of view of the scanner. This value must be lower than the physical field of view of the galvo scanner.
- Search LookAhead: Specify the maximum search time that the controller looks ahead into the aerobasics program to generate servo motion IFOV. Start with a value close to 200.

5.8. Options

When a milling mechanical tool is integrated, the user can calibrate the Z offset and the size (diameter) of the tool.

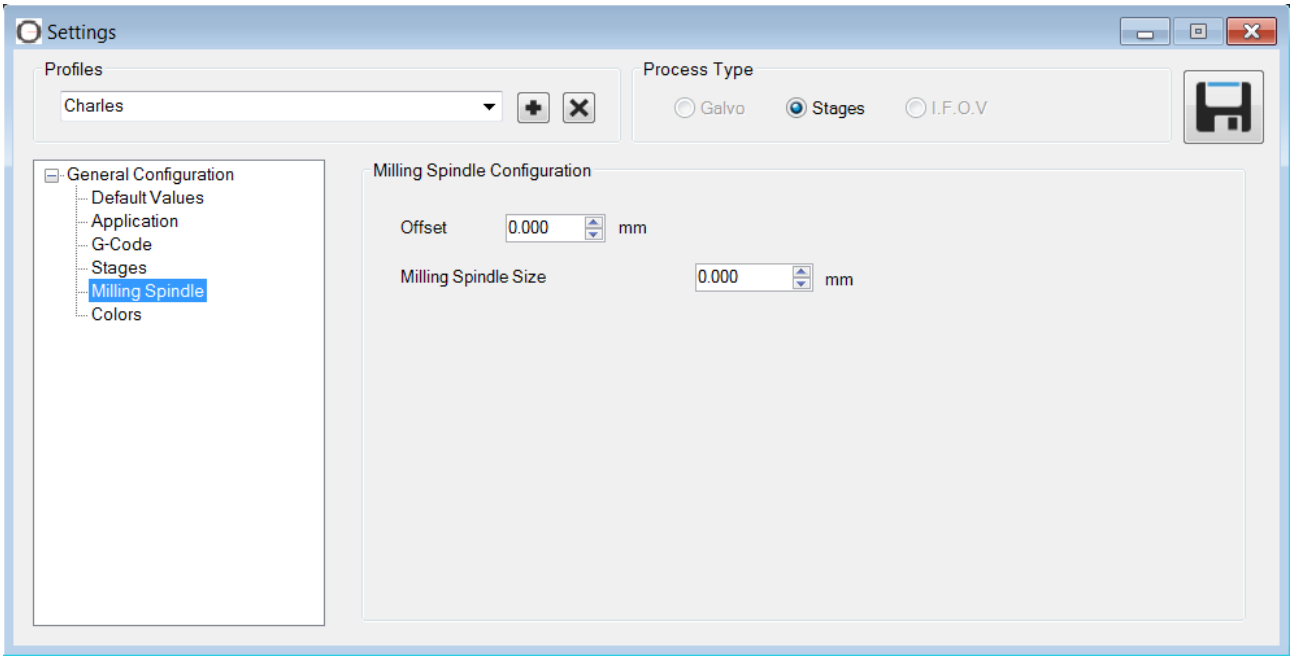


Figure 65: OptecCAD settings - Options: Milling Spindle