



materialise

innovators you can count on

Magics Print Metal

Rev. 001



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1 Installation

Your Machine Manufacturer is responsible for supplying you with an installer for the Materialise Magics Print Metal Software.

This is a 'bundled installer', meaning that it will install all the necessary components to run the product. These include:

- Microsoft® .NET Framework 4.5
- Materialise Local License Server 6.0
- Build Processor System 2.0
- Standard Metal Build Processor 1.0 or similar OEM rebranded Metal Build processor
- Magics Print Metal data prep environment

How to install:


Notifications

We recommend that you close all other applications before installing Magics Print Metal

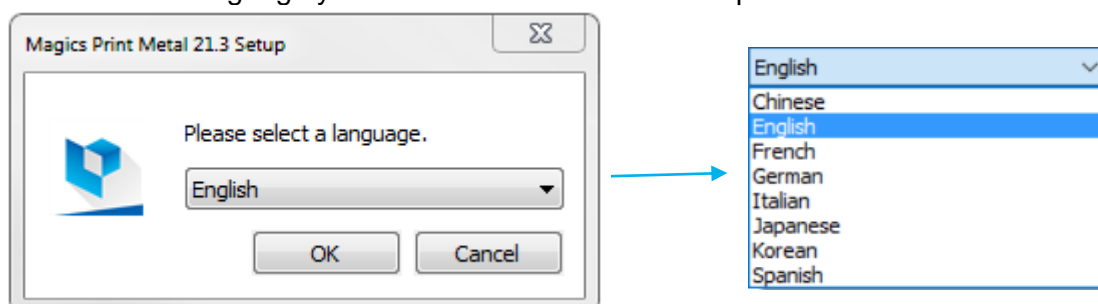
Technical Requirement

Please note that administrative rights are required to install the software.

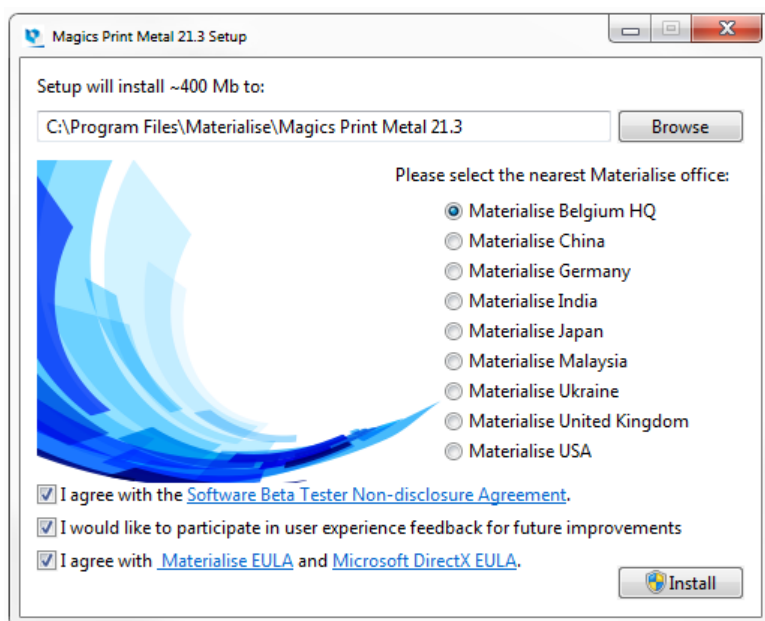
1. Double click the product installer:

 MagicsPrintMetalSetup64bit21.3.0.0.exe

2. Select the language you want to use and click OK to proceed:



3. Select the folder where you want to install Magics Print. Via the browse button you can specify a new directory.



After reading the license agreements:

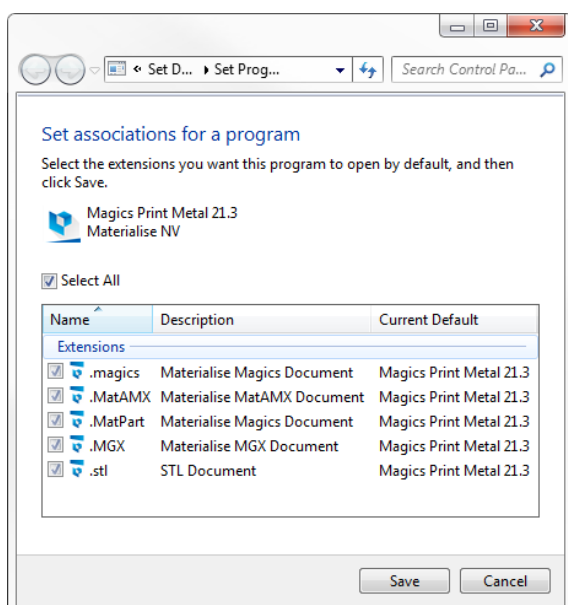
- Software beta tester non-disclosure agreement
- Materialise EULA
- Microsoft DirectX EULA

Select the “I agree with...” checkbox and click on the **Install** button.

Technical Requirement

If prompted to reboot your system after installation, please do so.

4. The software is now successfully installed. Click **Associate Files** to select the file types you wish to open with the Magics Print Metal software



Select the file types you want to open with the Magics Print software. It is advised to keep the standard settings. You can always change the associated files whenever needed via the Settings > File I/O > File associations menu

2 Licensing

For instructions on how to (re)activate your Materialise software licenses, please consult:

<http://software.materialise.com/frequently-asked-questions-materialise-software>

Once the Materialise Magics software and the Build Processor have been successfully installed, you will need to license it.

You can either license your software locally or use a floating license server to supply a license for you. This section will quickly describe these two different models of licensing.

2.1 Working with a Local License

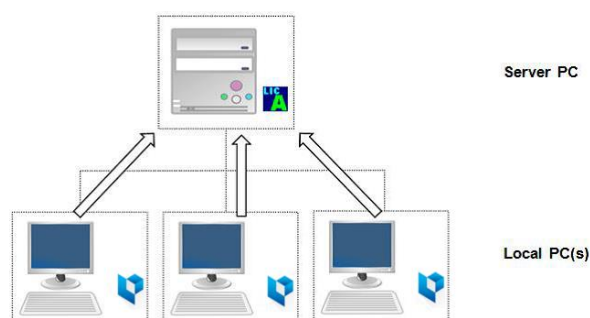
Local Licensing is the traditional system with the license stored locally on each computer (see figure below). The software can only be used on the computer for which the license is issued. However, more than one session of Materialise Magics software & Build Processor can be opened on a single computer.



2.2 Working with a Floating License

The licenses for Floating Licensing are stored on a central computer somewhere on the company network (Server PC). This computer has the Materialise Floating License Server installed to manage all the licenses available on the network.

When a session of Materialise Magics software and Build Processor is started on a computer, the software will contact the Floating License Server via the network. When there is a license available, the Floating License Server will assign a license to Materialise Magics software & Build Processor allowing it to open.

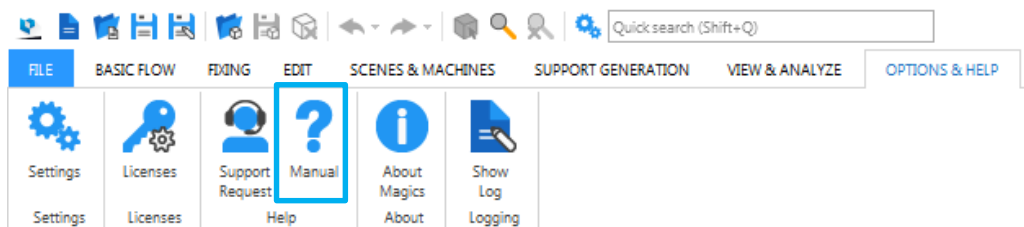


However, if all licenses are in use, Materialise Magics software & Build Processor will not open. The user must wait until elsewhere on the network an open session closes, thus making a license available.

You can install Materialise Magics software & Build Processor on every PC connected to the company network, but the number of open sessions is limited by the number of floating licenses available.

3 Manual & Other Documentation

When clicking the “Manual” button in Magics Print Metal, you will be redirected to a webpage managed by your machine manufacturer. Here you can find this manual and optionally additional documents.



4 Support Request

Magics Print Metal allows you to send a support request by email to the customer support team of your machine manufacturer. This can be done by filling out the request form and by selecting the type of additional information you want to add to the request.

 The image shows a 'Support Request' dialog box. It contains several input fields: 'Select Office *' (a dropdown menu), 'First Name *', 'Last Name *', 'Company *', 'E-mail Address *', and 'Phone number'. Below these is a 'Details: *' section with a large text area. At the bottom, there is a section titled 'Additional information' with checkboxes for 'License overview', 'Installation history', 'Preferences', 'GUI profile', and 'Screen picture'. The 'Submit' and 'Close' buttons are at the bottom right.

To make sure that our customer support team has enough information regarding the problem, additional information can be included. You can select to add this information to your support request, which will give the customer support team more information about your Magics Print Metal configuration. By sharing this information it is more likely that your support case will be solved more swiftly.

5 Versions

Magics Print Metal for ... can be offered in 3 versions:

- Base
- Standard
- Pro

All versions can import

Magics project files (*.magics)
STL files (*.stl)
Materialise AM Exchange files (*.MatAMX)
Stl Zip Files (*.mgx)
Connect Project File (*.mproject)
Connect Part File (*.mpart)

All versions can only export to specific machines of your machine's manufacturer.

In all versions, parts can be saved as .mpart and projects as .mproject.

High-level feature overview: (all higher versions contain all features from the lower version)

Base: Import, manual placement, cutting, manual support placement (cones & trees), measurements, out of bounds, collision detection, export

Standard: + Fixing, Editing tools (hollow, perforate, label), automatic placement, automatic support (points, lines, blocks, cones, trees), wall thickness analysis.

Pro: Extrude, Thickness for non-solid supports

Additionally, a **Structures module** is available.


6 Quick Access Bar



6.1 Load Project

 Create a new Magics Print project. (CTRL+N)

6.2 Load Project

 Load an existing project. (CTRL+O)

6.3 Save Project

 Save the current project. (CTRL+SHIFT+S)



6.4 Save Project as



Save the current project and select the desired name, file format and location.

6.5 Import Part



Import an existing 3D model into the current scene.

6.6 Save Selected Part(s) As



Save the selected part(s) and select the desired name, file format and location. (CTRL+S)

6.7 Unload Part



This command removes the selected parts. If the user has selected several parts, these parts are removed at once. The Unload function does not affect any platform settings. The user is prompted to save the parts that will be unloaded if they are changed. (CTRL+U)

6.8 Undo



With this command you can undo the previous action. All actions that change the STL file will be noted in a list, the Log Window (Menubar/View/Log Window). In case of a computer-crash when Magics Print Metal is open, you will be able to recover the work you did before (auto-recovery). (CTRL+Z)

The undo and auto-recovery functions are default ON. If you would like to change this, go to Settings (Settings > General > Undo and Recovery)

6.9 Redo



The actions that were undone by the undo operations can be redone by redo. (CTRL+Y)

6.10 Select




Select part(s) (F2)

6.11 Zoom



To zoom in on a region, this region has to be defined by means of a box (drag from the left upper corner to the right bottom corner). When the mouse button was pressed, but no rectangle was drawn, a zoom in of 25% will be applied. Zooming in and out can also be done using the mouse scroll.

6.12 Unzoom

 The zoom factor will be set so that all the active parts are displayed.

6.13 Settings

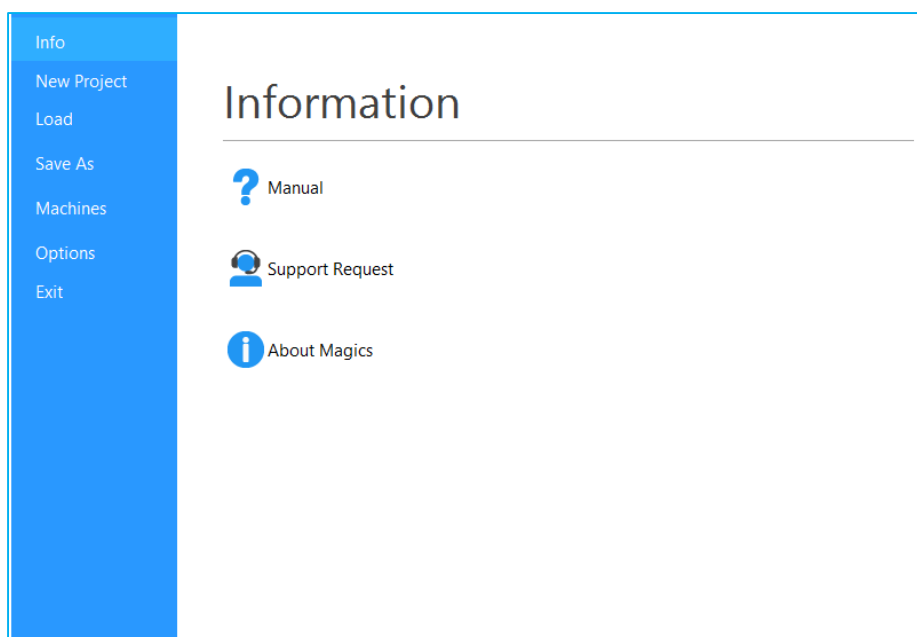
 Change Magics Print settings

6.14 Quick Search

Search a functionality within Magics Print Metal. Start entering the name of a functionality, and all relevant functionalities are instantly shown. Click on the desired functionality to directly activate. (SHIFT+Q)

7 File Operations

7.1 Info

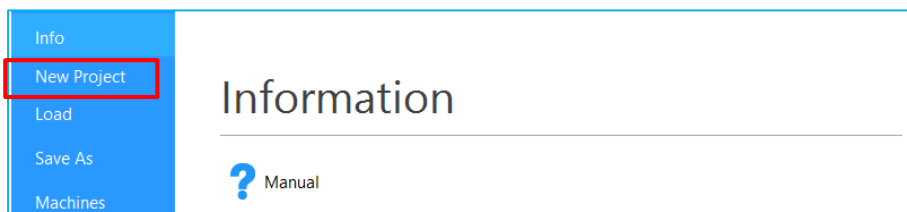


In this section you can find more information on the Magics Print Metal software:

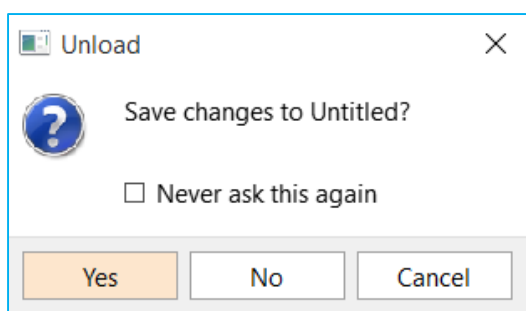
- Manual: hyperlink to Reference manual on the Magics Print Metal software
- Support Request: contact info to request support.
- About Magics: info about your currently installed Magics Print for Metal.

The features of this section are also available via the Options & Help ribbon.

7.2 New Project



The “New Project” command removes all parts from the current project and generates an empty project. The user is prompted to save the project before the current platform is closed.

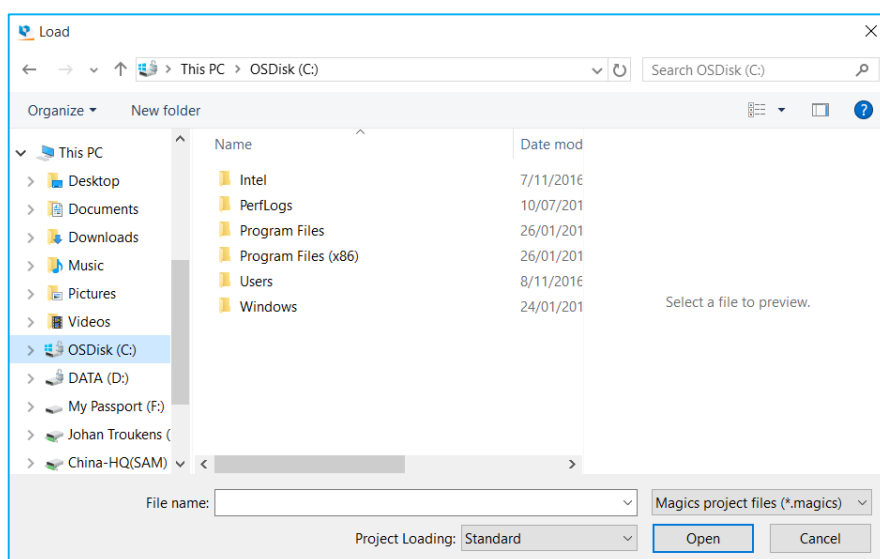


7.3 Load

Via this section you can load a project or import a part into an open project. Your recently opened or saved files can be accessed directly in this section.

7.3.1 Load project

The Load Project command starts the standard dialog box to open files.



The following types of files can be loaded:



Magics Project files	(*magics)
Materialise AM Exchange files	(*MatAMX)
3MF files	(*3mf)
3-matic project files	(*mxc)
STL files	(*stl)
STL Zip files	(*mgx)
Magics Connect Project file	(*mproject)
Magics Connect Part file	(*mpart)

The memory state of the loaded project can be defined, the following states can be chosen:

Standard	This is the standard memory state of a STL file. Magics knows the placement of the triangles and the mutual dependencies of the triangles. The user is able to perform actions on STL level (E.g. deleting triangles)
Compact	The STL resides in the memory as read-only, therefore it uses far less memory than the Standard memory state. Magics does not know the placement of the triangles nor the mutual dependencies of the triangles. The user is not able to perform actions on STL level.
On Disk	The STL is saved on disk and unloaded from the memory. The STL will stay in the project but the user can't perform any actions on it.
As Saved	The Project will be loaded as previously saved.

The default memory state for the loaded project can be defined in
Settings -> File I/O -> Import -> STL.

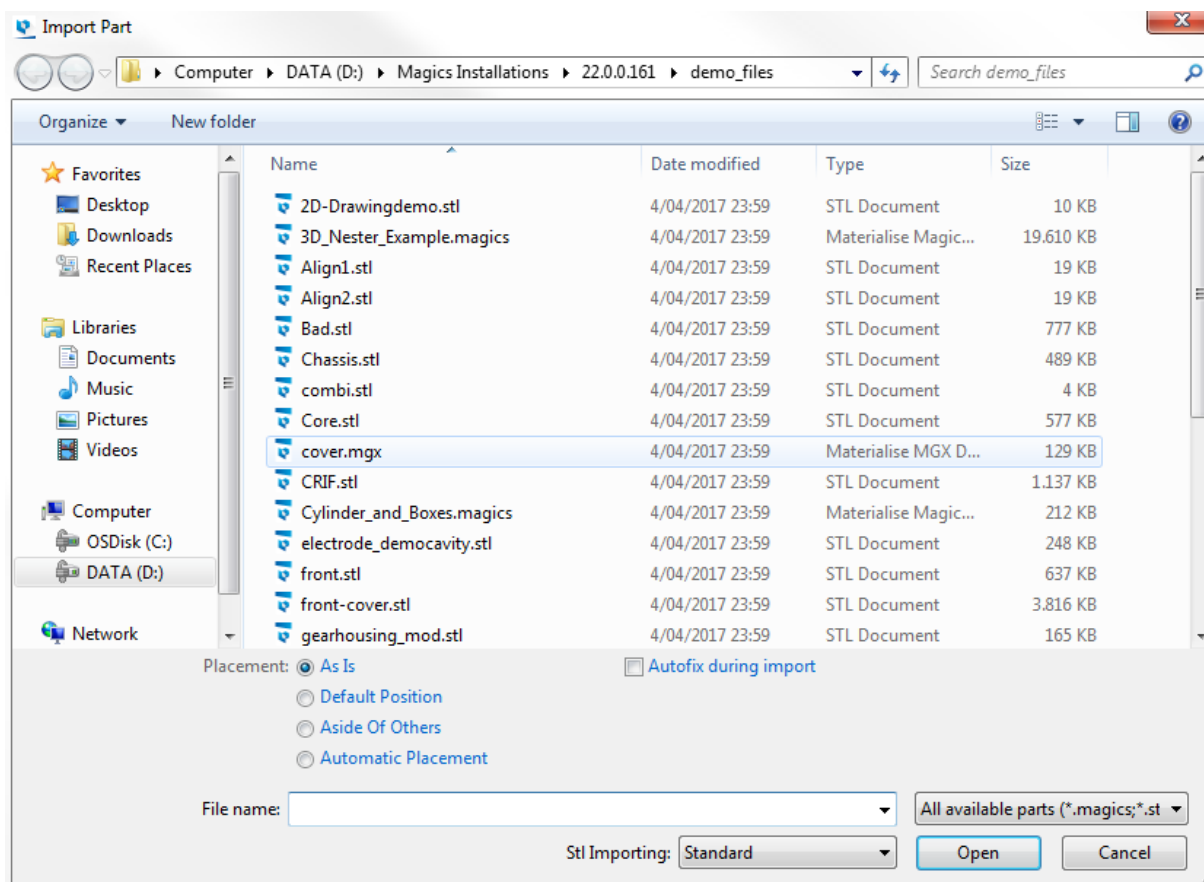
7.3.2 Import Part

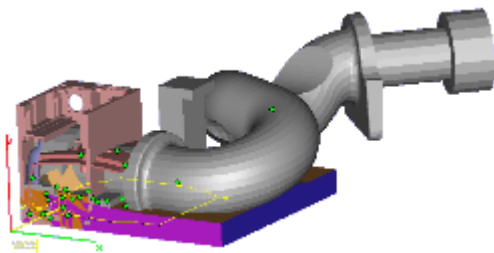

Notification

All formats can be imported by dragging and dropping the files in Magics Print Metal




This command loads a part on the current platform from a selected location. To load several parts at the same time, the CTRL or Shift buttons can be used. In this case, the preview can't be used.



As Is	The original STL-position is maintained
Default Position	<p>The part is placed at the default position. This default position is defined in the Machine Properties and represents the minimal X, Y and Z of a part. (default position: Xmin = 10mm; Ymin=10mm; Zmin = 10mm)</p> 
Aside Of Others	<p>Parts are loaded one after the other while the original Y-position is maintained. If a line is full, a new line is started.</p> 
Automatic Placement	<p>The part(s) will be added using automatic placement. The parts that already are loaded will not be moved. This can be done later by selecting all the parts and using Automatic Placement of the Tools menu. Changing the settings for automatic placement can be done in the Nesting settings (see Error! Reference source not found., page Error! Bookmark not defined.).</p>



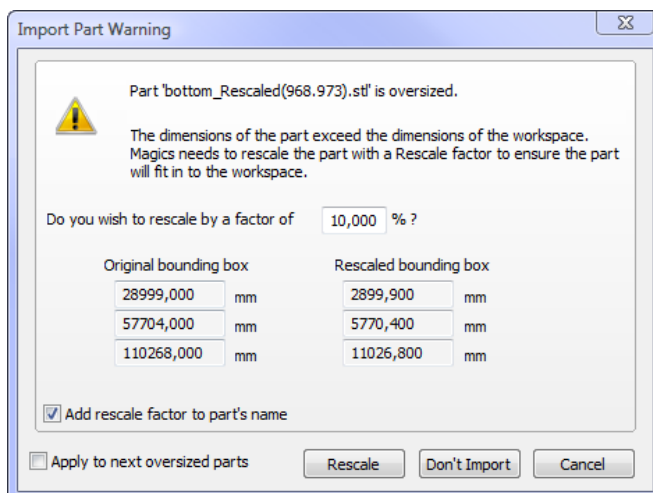
	
Autofix during import	When enabled, Magics will diagnose your files during import and attempt to fix the part if needed.

The memory state of the loaded part can be defined, the following states can be chosen:

Standard	This is the standard memory state of a STL file. Magics knows the placement of the triangles and the mutual dependencies of the triangles. The user is able to perform actions on STL level (E.g. deleting triangles)
Compact	The STL resides in the memory as read-only, therefore it uses far less memory than the Standard memory state. Magics does not know the placement of the triangles nor the mutual dependencies of the triangles. The user is not able to perform actions on STL level.
On Disk	The STL is saved on disk and unloaded from the memory. The STL will stay in the project but the user can't perform any actions on it.

The default memory state for the loaded part can be defined in
Settings -> File I/O -> Import -> STL.

When trying to load a part that is too large in standard mode, a dialog box asking to rescale the part will pop up.



Rescale factor	Magics proposes a factor to use to rescale the part so it will fit within the workspace.
Original bounding box	Represent the current size of the parts bounding box



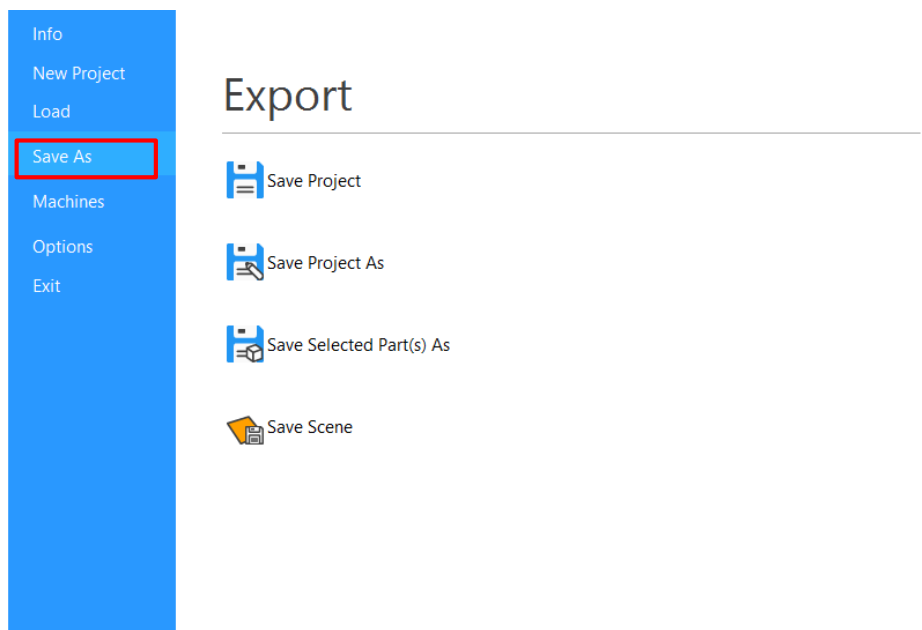
Rescaled bounding box	Represents the parts bounding box after the rescale take place
Add rescale factor to part's name	The used rescale factor will be added to the part name
Apply to next oversized parts	The same rescale factor will be used for other upcoming oversized parts
Rescale	The actual rescale is performed
Don't import	The part isn't rescaled and will not be imported

7.3.3 Recent Files

This list shows the most recent files you used in Magics Print.

7.4 Save As

Via this section you can save your opened project, select part(s) or scene.



7.4.1 Save Project




When you have prepared a project in Magics Print Metal, you can save it to disk in order to load it again later on. In order to save the project, the following types can be chosen:


Magics Connect Project files	(* .mproject)
------------------------------	---------------

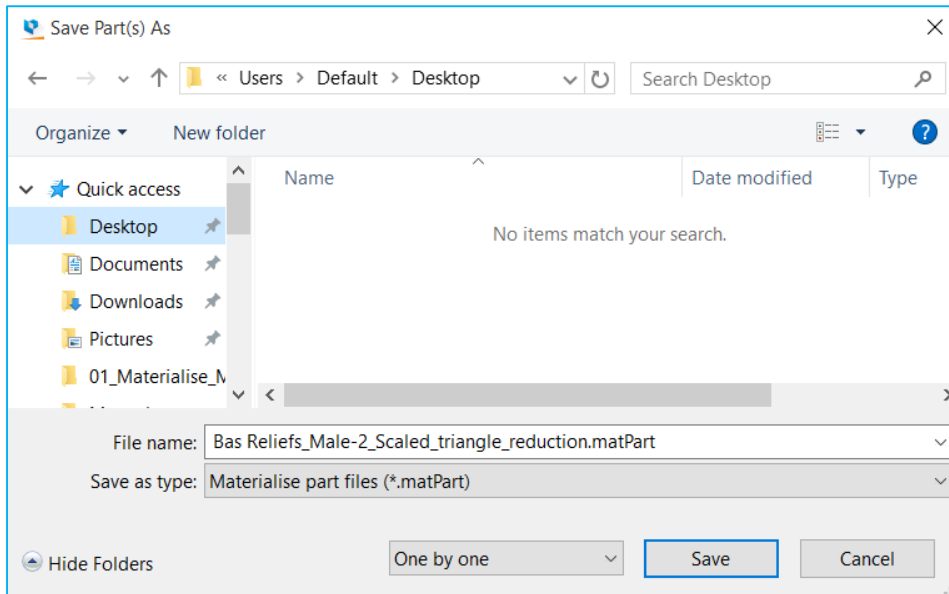
7.4.2 Save Project As



 **Save Project As** allows you to save the project with another name, it contains the same functionality as **Save Project**.

7.4.3 Save Selected Part(s) As


 With this command, the active (selected) files are saved. The destination of the saved parts can be changed when using this option. Each part is saved in a separate file.



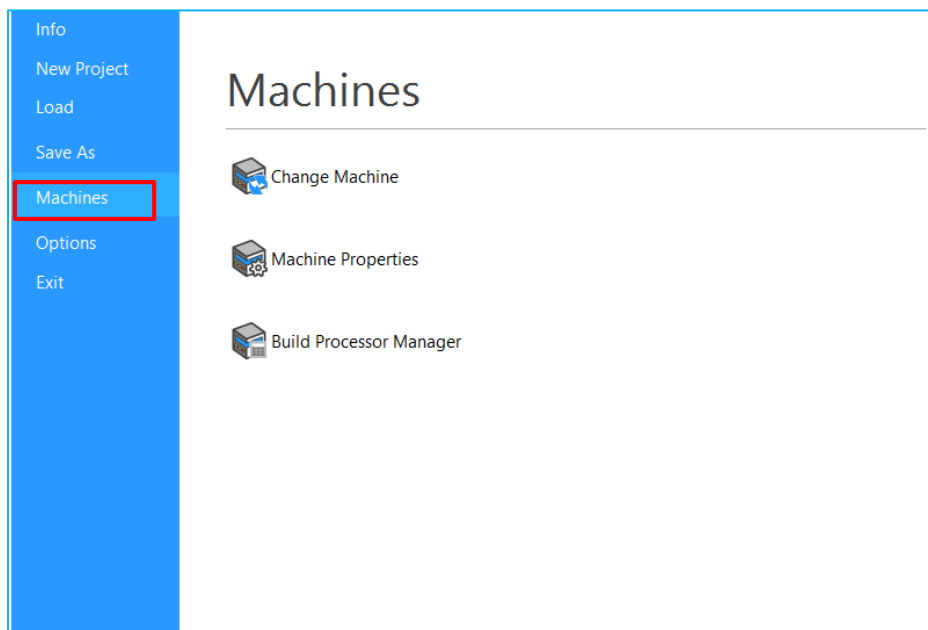
Following formats can be used to save your parts

<i>Name</i>	<i>Extension</i>
Connect part files	*.mPart

7.4.4 Save scene

 Save the active scene.

7.5 Machines



7.5.1 Change Machine

See Change Machine, page 74

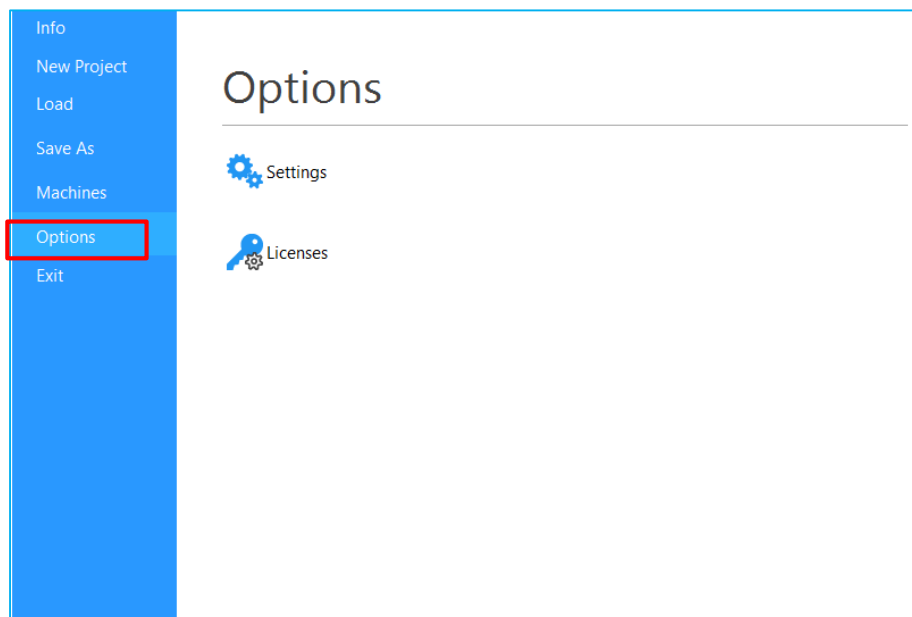
7.5.2 Machine Properties

See Machine Properties, page 69

7.5.3 Build Processor Manager

See Build processor, page 1874

7.6 Options



7.6.1 Settings

See Settings, page 134

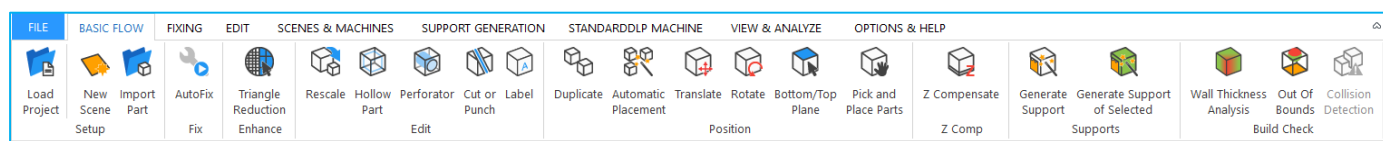
7.6.2 Licenses

See Licenses, page 142

7.7 Exit


Closes Magics.

8 Basic Flow



8.1 Setup

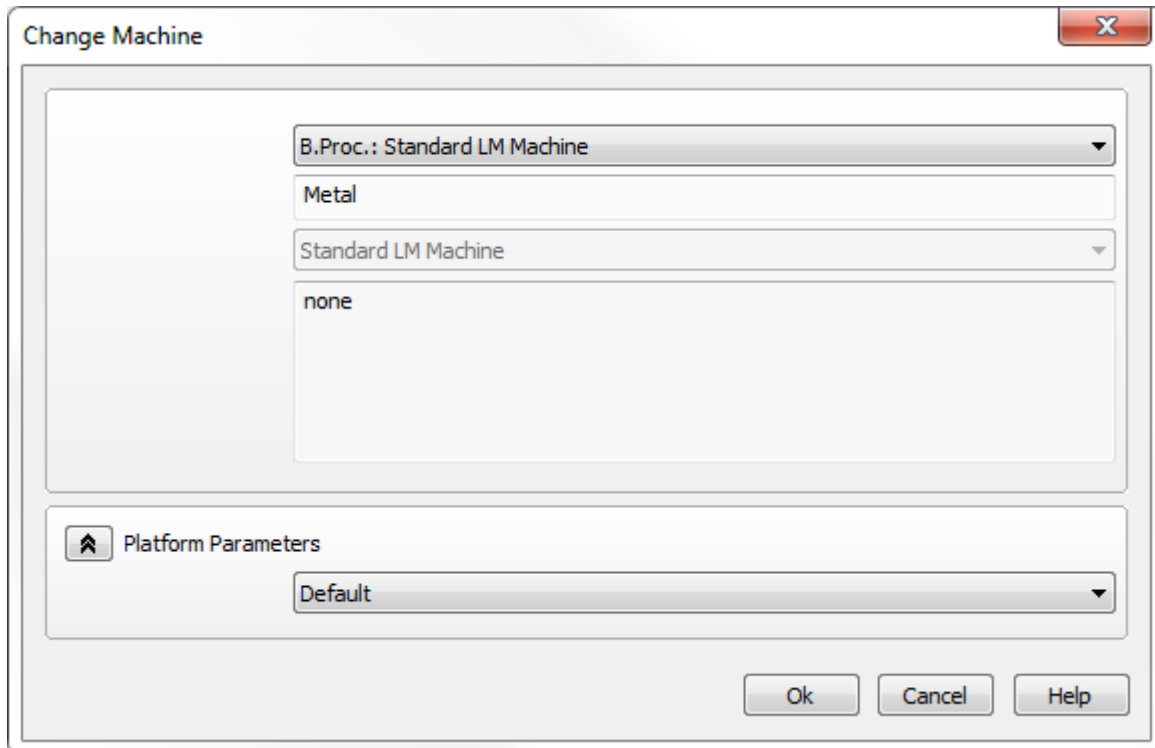
8.1.1 Load Project

 Load an existing project. (CTRL+O)

8.1.2 New Scene



With this function, you create a new Platform Scene in the main window. The platform size will depend on the machine you select.



The new scene will appear on the right of the present Platform Scenes.

If you create more than one platform for the same machine, the platform name will be the machine name extended with a number, e.g. 'Machine ABC (2)'. You can organize machines via drag and drop.

8.1.3 Import part



Import an existing 3D model into the current scene.

8.2 Fix

8.2.1 Autofix

See AutoFix, page 42.

8.3 Enhance

8.3.1 Triangle Reduction

See Triangle reduction, page 43

8.4 Edit

8.4.1 Rescale

See Rescale, page 45

8.4.2 Hollow part

See Hollow part, page 45

8.4.3 Perforator

See Perforator, page 47

8.4.4 Cut or Punch

See Cut or Punch, page 49

8.4.5 Label

See Label, page 52

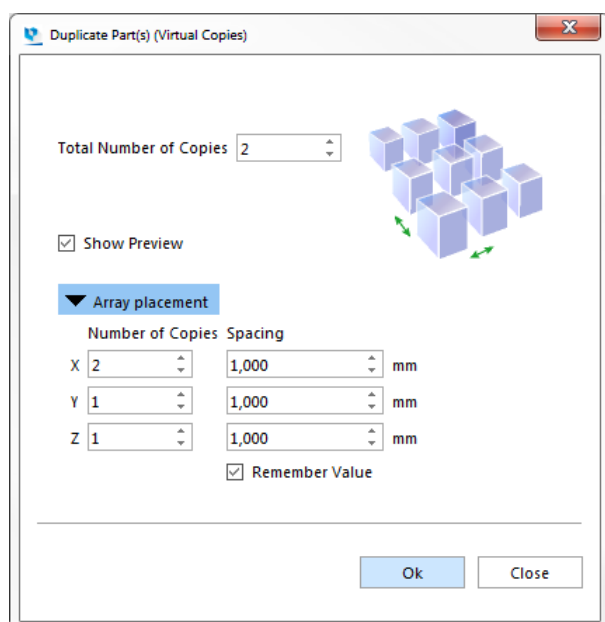
8.5 Position

8.5.1 Duplicate



Duplicate

This command duplicates the selected parts. The new parts automatically get the name of the original part with a counter at the end, like this: "PartName_1"





Total Number of Copies	Here you have to indicate the total number of parts (the original part included) you would like to have in the end.
Show Preview	When enabled, a preview will be shown
Number of Copies	Number of copies (original included) you would like to have in the indicated directions (X, Y, Z)
Spacing & Remember Value checkbox	The distance between 2 parts. Check “ <i>Remember Value</i> ” if you want this value to be remembered.

8.5.2 Automatic Placement

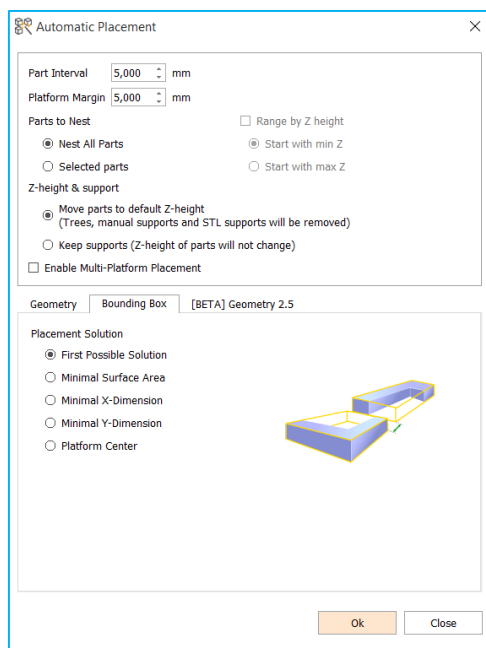


This command will nest the loaded parts on the building platform. Please note that for nesting the parts in 3D, the Sinter module is required. There are two options:

- Geometry based nesting
- Bounding box based nesting

Please recall, that while importing multiple parts you can also use the automatic placement algorithm to immediately position your parts on the platform.

Automatic placement is also possible when the platform isn't big enough to load all the specified parts on the platform. A dialog box will appear indicating no solution is found, but a search is performed to find a solution outside platform borders. So even if the parts don't fit the platform, they are spread out to have a better overview.

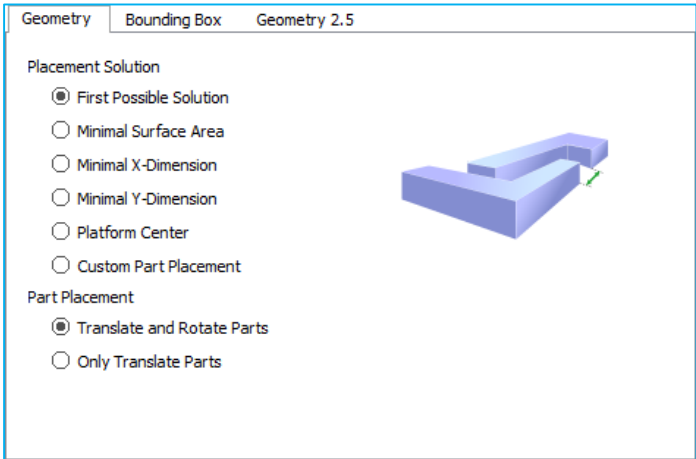
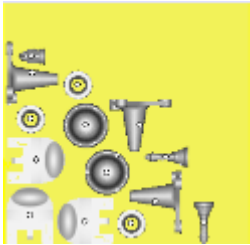




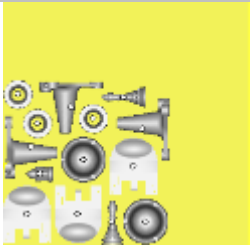
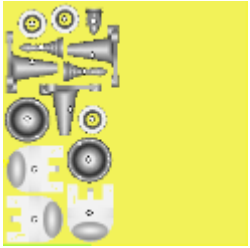
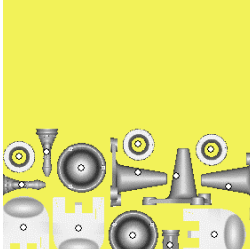
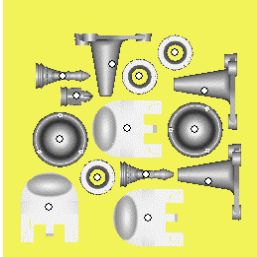
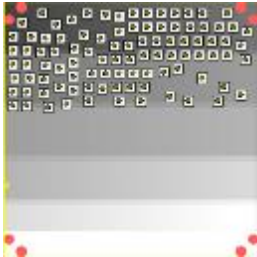
Part Interval	The minimum distance between two parts.	
Platform Margin	The minimum distance between (the bounding box of) a part and the edge of the platform	
Parts to Nest	Nest All Parts	Nests all the parts or only the selected parts.
	Selected Parts	
Z-height & support	Move parts to default Z-height	Moves the parts to the default z-height, but will remove the support
	Keep supports	Keeps the parts on the same z-height and maintains the support
Enable Multi-Platform Nester	If this option is checked and the nested parts don't fit on the current Platform, Magics Print will create as many as needed new Platforms to nest all (or the selected) Parts.	

8.5.2.1 Geometry

A nesting based on bounding box can cause a waste of capacity in case of parts, which are having a big bounding box but a small projected area. Magics Print will nest the parts using the actual form of the parts and so increase the efficiency of the nesting.

		
Placement solution		
	First possible solution	With this option, Magics offers the first placement it finds for which all parts are nested on the platform. 
	Minimal surface area	The total surface area of all the loaded parts is minimized.



			
	Minimal X-dimension	<p>The delta-X of the total surface area of the loaded parts is minimized.</p> 	
	Minimal Y-dimension	<p>The delta-Y of the total surface area of the loaded parts is minimized.</p> 	
	Platform center	<p>Parts are nested around the center of the platform. A circular shape is created.</p> 	
	Custom Part Placement	<p>With this option, you can add a grayscale image to assign priority or penalty zones for Autoplacement.</p> 	
Part placement			
	Translate and Rotate parts	Rotate will give Magics Print the liberty to rotate the parts by 90°. This will result in more efficient and faster nesting.	
	Only Translate	The parts will not be rotated, strictly translated.	
	Automatic Placement	This indicates the progress of the parts being placed on the building platform	



	<div><div><div>Progress [42%]</div><div>Automatic Placement 42%</div><div><div></div></div><div>Time elapsed: 1 seconds</div><div>Cancel</div></div><div><p>If the automatic nesting isn't able to nest all parts following message is shown:</p><div><div>Magics</div><div><div></div><div>All parts can't be placed on the platform. Would you like to place parts on multiple platforms?</div></div><div>Yes No</div></div><div><p>YES: New platforms will be created with parts on it NO: The parts that didn't fit can be found beside the platform</p></div></div></div>
Cancel	This cancels the calculations.

8.5.2.2 Bounding Box

Magics Print Metal will nest the parts, representing the parts by their bounding boxes. This will result in a fast nesting, however the full surface of your machine will not be used due to the rough representation of the parts.

<div><div>Geometry Bounding Box Geometry 2.5</div><div><div>Placement Solution</div><div><div><input checked="" type="radio"/> First Possible Solution</div><div><input type="radio"/> Minimal Surface Area</div><div><input type="radio"/> Minimal X-Dimension</div><div><input type="radio"/> Minimal Y-Dimension</div><div><input type="radio"/> Platform Center</div></div><div></div></div></div>	
First Possible Solution	With this option, Magics offers the first placement he finds for which all parts are nested on the platform.
Minimal Surface Area	The total surface area of all the loaded parts is minimized.
Minimal X-Dimension	The delta-X of the total surface area of the loaded parts is minimized.
Minimal Y-Dimension	The delta-Y of the total surface area of the loaded parts is minimized.
Platform center	Parts are nested around the center of the platform. A circular shape is created.



Notifications

Performing an automatic placement without a scene (platform) loaded will give you fewer possibilities than shown above.

8.5.3 Translate



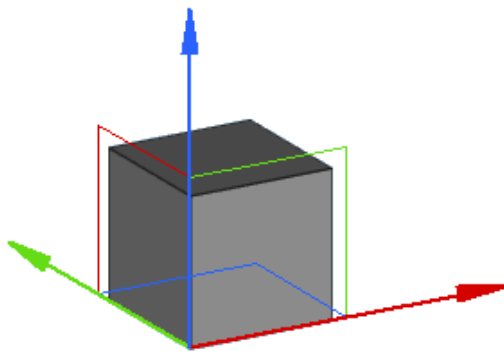
The translate operation allows to move a part or a group of selected parts to another position. Move the selected part(s) interactively or by inputting values.

Resulting coordinates	Use the resulting coordinates fields if you want to move a part to a specific location.
Relative translation	Use the relative translation fields if you want to move the part a specific distance away from the current position.
Enable snapping	Enable if you want to translate with specified intervals. (For example: only move per 1 mm.) You can use the snapping option both for interactive translation and with coordinate fields.
Size	The snapping value used.



Translate along line	After enabling, select a line (part/triangle edge) along which you want to translate. This function can only be used when translating interactively.
Make Copy	Enable if you want to make a copy on the desired place and keep the original part on its place.
Show preview	When enabled, a preview will appear to show the result of the inputted values.
Define origin for selected parts	Define the translation origin of the part to select which point of the part should be moved (to which point in space) by selecting minimum, middle, maximum or user defined. The gizmo will move to visualize your choice. With "Indicate point", you can easily select a translation origin.
To default position	Click to move the origin of the translation to the default position (see Default part position, page 7071).
To default Z	Click to move the part to the default Z-height. X and Y will remain unchanged.
Apply	Apply the changes. The dialog box won't close, so you can easily perform the translation in multiple steps.
OK	Apply the changes. The dialog will be closed automatically.

To move interactively, click on an axis of the translation gizmo and drag to move the part along that axis. It is also possible to click on a plane of the gizmo to move the part within that plane.



Notifications

By default, if only one part is selected, the translation gizmo will appear in the minimum point of the bounding box of the part. If multiple parts are selected, the gizmo will appear in the minimum point of the bounding box of all selected parts. All the parts will then be translated together, without changing the distances between the parts. The position of where the gizmo appears depends on what you select in "Define origin for selected parts"

8.5.4 Rotate



Rotate

Rotate the selected part(s) interactively or by inputting values.

Rotate

X

Rotation Angles

X

Y

Z

☐ Enable Snapping

Size:

45,00

°

☐ Rotate Around Line

☐ Keep Original Z Position

☐ Make Copy

☒ Show Preview

▼ Rotation Center

☒ Center of Selection

☐ Individual Part Center

☐ Custom Rotation Center

X

65,001

mm

Y

35,001

mm

Z

15,000

mm

Indicate Point

Default Center


Apply

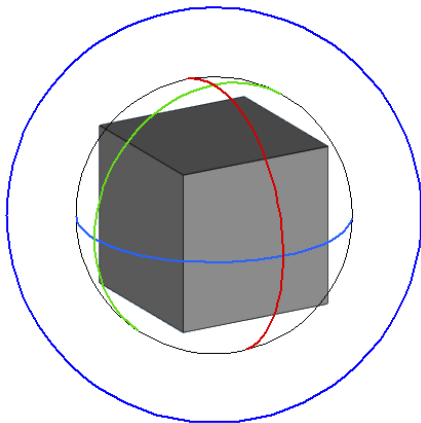
Ok

Close

Rotation Angles	Fill in the desired rotation angles in the X, Y and Z fields. The positive rotation sense is counter clockwise (CCK).
Enable snapping	Enable if you want to rotate with specified intervals. (For example: rotate per 45°) You can use the snapping option both for interactive rotation and with angle fields.
Size	The snapping value used.
Rotate around line	After enabling, select a line (part/triangle edge) around which you want to rotate. You can then rotate interactively or by inputting a value.



	<div>Rotation Angle</div> <div><input type="text" value="0,00"/></div> <div></div> <div><i>Remark: With this function it is fairly easy to create living hinges</i></div>
Keep original Z position	When enabled, the part's minimal Z-position will stay the same while rotating.
Make copy	Magics will create a copy on the desired place and keep the original part on his place.
Show preview	When enabled, a preview will appear to show the result of the inputted values.
Rotation Center	There are 3 options available: <u>Center of selection:</u> If multiple parts are selected, they will all rotate around the center of the selection, moving their position. <u>Individual part center:</u> Each part will rotate around its own center, so their position won't change, only the orientation. <u>Custom rotation center:</u> You can define a point around which the selected part(s) should rotate. With "Indicate point", you can easily select a rotation center. "Default center" resets the values to the center of the selection.
Apply	Apply the changes. The dialog box won't close, so you can easily perform the rotation in multiple steps.
OK	Apply the changes. The dialog will be closed automatically.

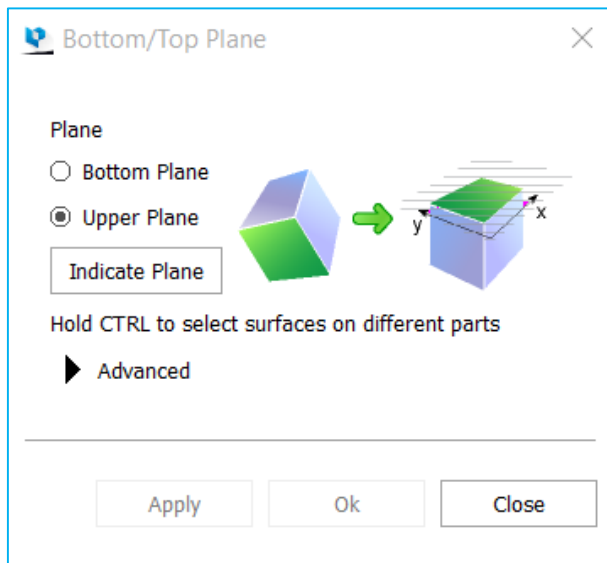


To rotate interactively, click on an axis of the rotation gizmo and drag to rotate the part along that axis. To rotate perpendicularly to the screen, use the outer (blue) circle. To rotate in an unrestricted way, click in between the axes of the rotation gizmo and drag.

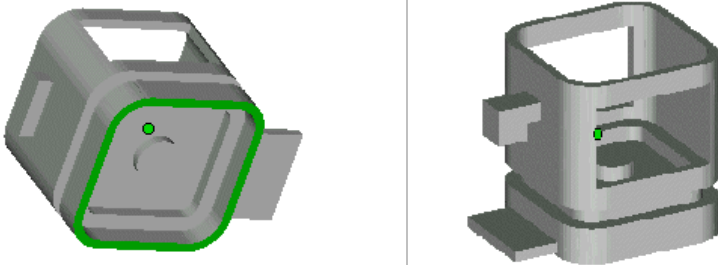
8.5.5 Bottom/Top Plane



This command allows easy orientation of the part by indicating a plane as the bottom/top plane. This plane will be automatically oriented parallel to the platform. The bottom/top plane window looks like this:



8.5.5.1 Advanced

Indicate Plane	<p>The user selects one triangle and a whole plane (according to the plane selection parameters) will be indicated by the default green marking color. The selected plane will be placed parallel to the platform (// XY-plane). E.g. Bottom plane selection in the following figure.</p>
	

Plane Selection Parameters

Surface Tolerance

10,000

mm

Angle Deviation

10,000

°

Positioning

☒ None

☐ Keep Original Z Position

☐ Translate to Default Position

☐ Translate to Default Z Position

Plane Selection Parameters	
Surface Tolerance	Indicates the maximum deviation in mm or inches that a related triangle may have to be part of the same plane that contains the selected triangle
Angle Deviation	Indicates the maximum angle in degrees between the normals of a related triangle and the selected triangle, in order to be part of the same plane.
Positioning	
None	No translation is done.
Keep Original Z Position	The part first will be rotated and next will be translated in such a way that the original minimum Z position remains the same.
Translate to Default Position	The part first will be rotated and next will be translated to the default part position.
Translate to Default Z position	The part will be translated to the default Z position.

Notifications

The indicate place function is only performed when the part is loaded in standard mode. If the part is loaded in compact mode, the indicate plane function is going to act like indicate triangle.

Use CTRL+click left mouse button so select multiple parts. Click a part a second time to deselect.

8.5.6 Pick and Place Parts



This command allows the user to translate and rotate (around the axis perpendicular to the platform) selected parts on a platform by mouse movements. You can select the part by first clicking on the icon and then clicking on the part. The pick and place tags will appear. There are nine tags on a selected part in the pick and place mode:

One translation tag: the filled green or white circle located in the center of the part.



Eight rotation tags: the hollow green or white tags located on the corners of the bounding box. This command allows easy positioning and nesting of the parts on the building platform. With the collision detection-feature, the user can check if the parts aren't positioned inside each other.

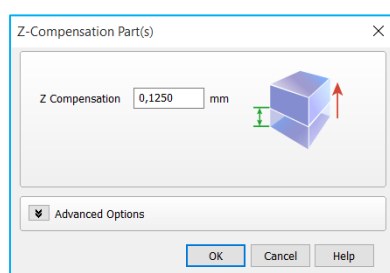
If the cursor is positioned above the translation tag, the cursor will change to the translation cursor (✎). To translate the part, push the left mouse button. If several parts are selected, they will all move in the same direction over the same distance.

8.6 Z Compensation



Z compensation will allow you to modify your part(s) in the Z direction in such a way that it will compensate for overcuring

Z Compensate



8.7 Build Check

8.7.1 Wall thickness analysis

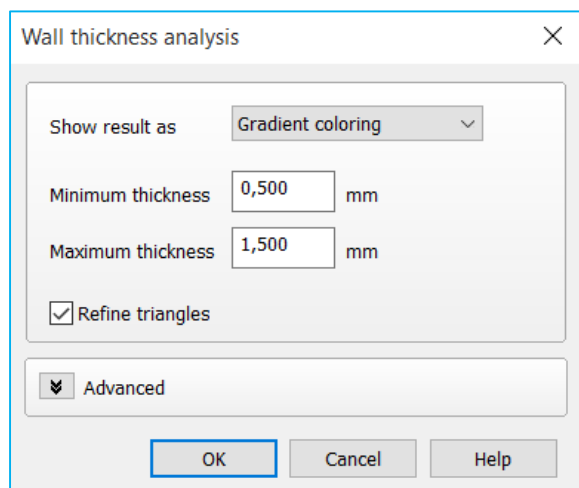


Wall Thickness Analysis

The wall thickness analysis helps you to detect small details, thin and/or thick walls. This can be very helpful, because you can predict where problems can pop up during building.

8.7.1.1 Principle

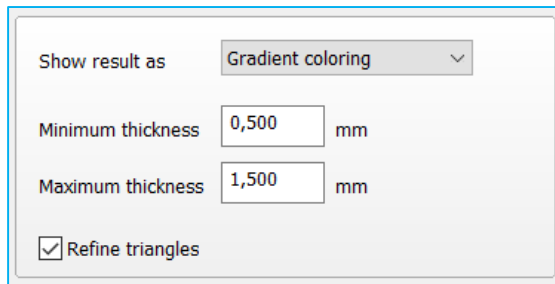
Magics determines the local wall thickness for each triangle separately. If requested, Magics divides bigger triangles in smaller ones according to the refine triangles parameters entered. This way, a more detailed figure of the wall thickness can be calculated.



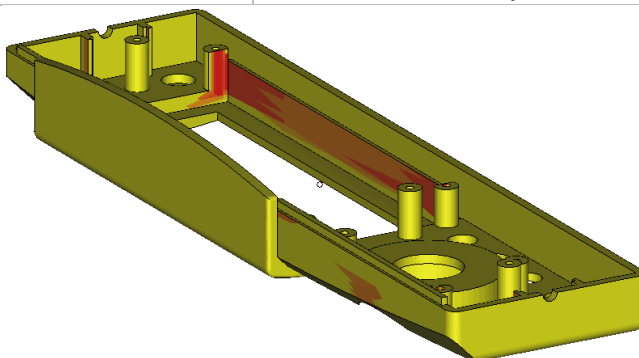


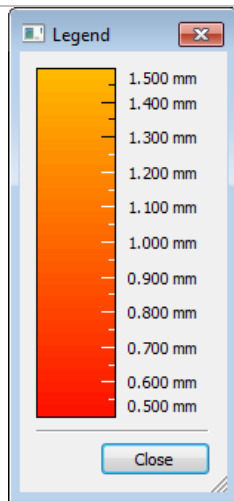
8.7.1.2 Gradient coloring

The triangles are colored corresponding their wall thickness. In the Legend you can see which wall thickness corresponds to which color.



Minimum thickness	This parameter defines the minimum wall thickness needed. Every triangle with a local wall thickness smaller than the entered value, will receive the begin color.
Maximum thickness	<p>The maximum thickness is the wall thickness for which you no longer expect to have problems. Local thickness bigger than the maximum thickness do not need special attention and will have the end color.</p> <p>Triangles with local thickness situated between the minimum and the maximum thickness will have a color gradually changing from the begin color (minimum) to the end color (maximum wall thickness) over the color spectrum. The minimum and maximum wall thickness also forms the borders of the Wall Thickness Color Legend.</p>
Refine triangles	If checked, the triangles that met the criteria are retriangulated. The analysis is based on the newly created triangles.





Triangles that met the criteria can be colored after the analysis.

In the legend you can see which wall thicknesses correspond to which color.

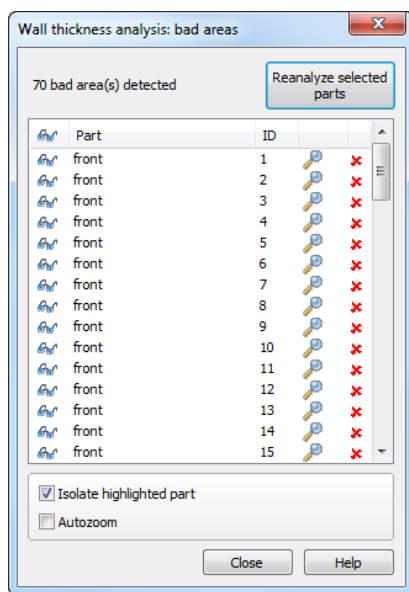
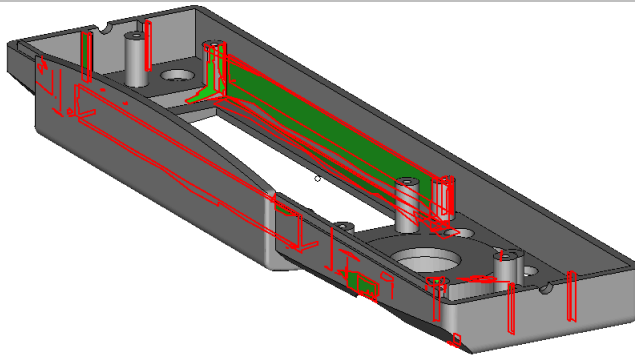
Color range can be customized from the customization settings.

8.7.1.3 Marking

Detect triangles of walls	Choose one of the detectors (Thinner than, Thicker than, Between or Outside) and enter the limiting value in the edit box.
Thinner than	Search walls thinner than the entered value
Thicker than	Search walls thicker than the entered value
Between	Search walls between the entered values
Outside	Search walls outside the entered values
Refine triangles	If checked, the triangles that met the criteria are retriangulated. The analysis is based on the newly created triangles.

After the analysis of the part(s) a list is shown with areas that match the WTA conditions.

Every group of triangles is indicated as a bad area. The list gives a clear overview of all problem areas on the part(s). By clicking on the magnifying glass, the view will zoom to that specific bad area.



Visible/ Invisible	Hide/ unhide bad areas
Part	Part name is displayed
ID	Every bad area is indicated with a unique ID to easily identify regions
Zoom	Zoom to indicated area
Delete	Remove the indicated area from the list
Reanalyze selected parts	The list is updated by performing a new wall thickness analysis
Isolate highlighted parts	Only the selected part in the part list is isolated. To have a good overview all other parts on the platform are invisible.
Autozoom	Zooms automatically to the bad area that is highlighted

8.7.1.4 Advanced

Advanced

Wall angle

45,000°

Refine triangles parameters

Iterations

3

Max edge size

2,000 mm

Wall angle	Defining a wall angle makes it possible to exclude certain areas/ surfaces from the analysis. (More information below)
Refine triangles parameters (More information below)	
Iterations	The value entered as the number of iterations places an upper limit on the number of iterations.

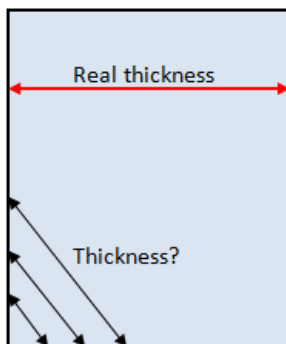


Max edge size	A triangle will only be split up in a smaller triangle if one dimension of that triangle is bigger than the maximum edge size. This parameter thus decides the accuracy with which you are going to visualize (and measure) the thickness distribution.
---------------	---

8.7.1.4.1 Wall angle

During the analysis of the part, certain areas of the part can be excluded from the calculations.

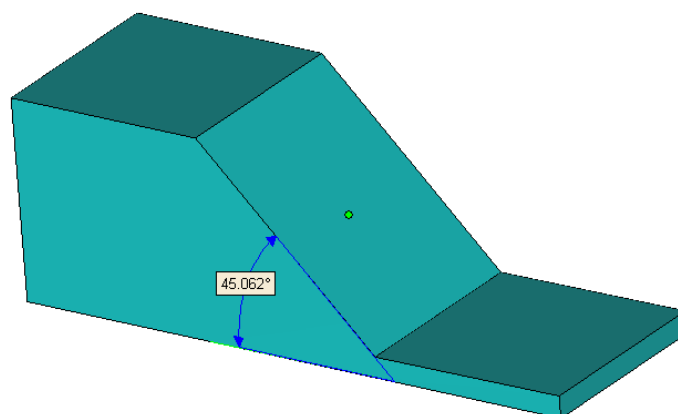
The following 2D drawing illustrates the case where you have a wall with two rectangular angles.



From a triangle point-of-view the local wall thickness approaches zero when coming closer to the edge of the part. The real thickness though remains the same throughout the whole wall. Therefore we can exclude the area around these edges from the thickness calculations.

The wall angle is the parameter that avoids that the above areas are taken into account. When the wall angle is for instance set to 60 degrees, thickness calculations will only be done for edges whose angle is smaller than 60 degrees. These edges will be interpreted as functional edges of the part and not just 'wall borders'.

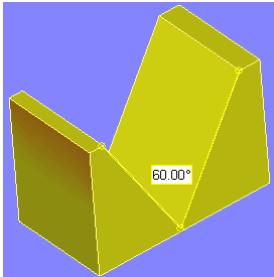
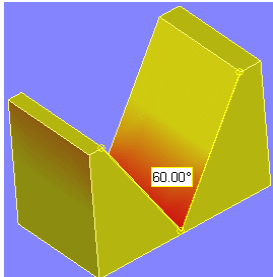
On the figure below you can see a sample of a file where the triangles have an angle of 45 degrees between each other.





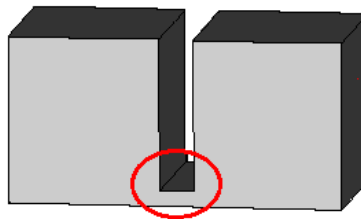
Set Wall Angle value less than the angle between triangles (in this case it is less than 45 deg.), these triangles won't be detected by WTA tool.

Set Wall Angle value higher than the angle between triangles (in this case higher than 45 deg.), these triangles will be detected by WTA tool.

Wall Angle = 50°	Wall angle = 70°
Critical gap angle = $180 - (2 \cdot 50) = 80^\circ$	Critical gap angle = $180 - (2 \cdot 70) = 40^\circ$
	
$60^\circ < 80^\circ$: the local thickness reduction is not taken into account	$60^\circ > 40^\circ$: the local thickness reduction is taken into account

8.7.1.4.2 Refine triangles parameters

Now let us take a look at the following part.

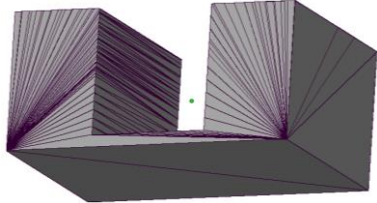
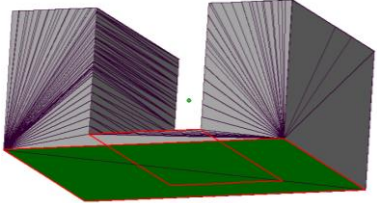
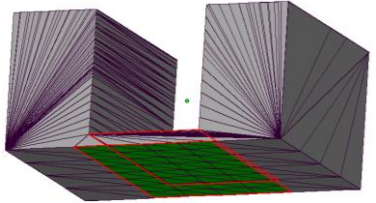


At the bottom of the rectangular gap, there is a significant thickness reduction. Therefore we expect that on the bottom plane, close to the gap, a region will show up to indicate this smaller thickness.

However, there is a small problem ... the bottom plane will probably exist out of two big triangles. During the analysis the complete plane will become indicated. 'Refining the triangles of the bottom plane solves this problem. The two big triangles are spitted up in smaller triangles, and the thickness variation can now be visualized more accurately.

Three parameters define this remeshing process.

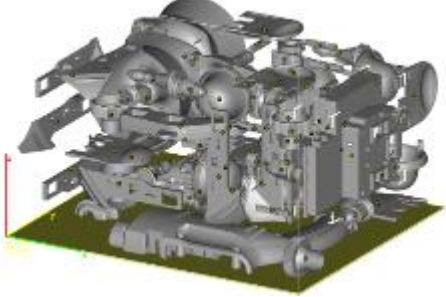
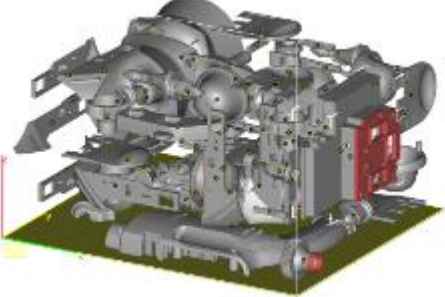


		
Original part	Analysis performed on original part	Analysis and refine triangles performed on original part

8.7.2 Out of Bounds



The out of bounds function will color parts which are placed outside of the platform bounds. Any placement tool can be used without losing the color indications.

	
Out of bound: OFF	Out of bound: ON

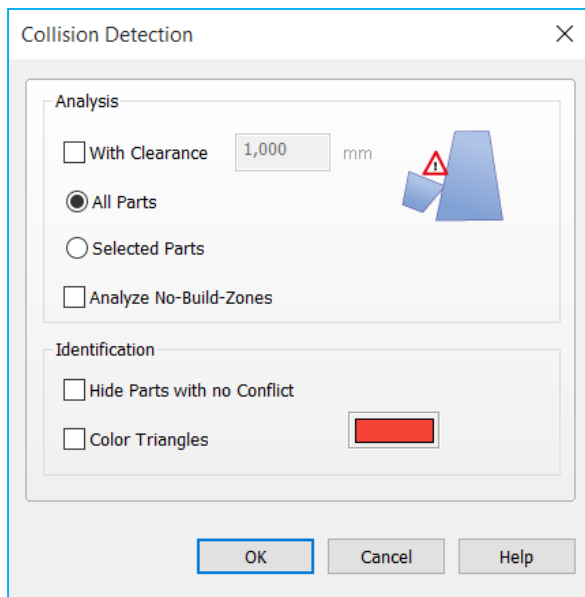
Notification

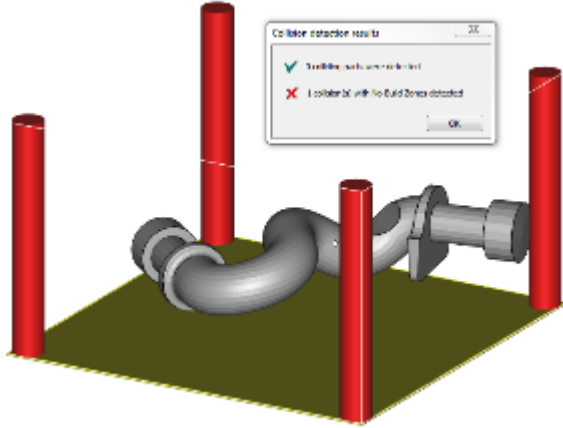
Round platforms are currently not supported.

8.7.3 Collision Detection



If several parts are loaded on the platform, Magics Print can detect if there is a collision. Collision can be detected between intersecting triangles or with an indicated clearance between different parts. The involved triangles are marked in the Marked Triangles Color (default green). A message-box appears to tell you if there are colliding triangles or not.



Analysis	
With clearance	Define the spacing allowed between parts. If they are located within a distance smaller than this value, they will be identified as colliding parts.
All parts	Collision is detected between all loaded parts on the platform scene.
Selected parts	Collision is only detected between selected parts
Analyze No-Build-Zones	Collision is detected between the part(s) and active 'No-Build-Zones'
	
Identification	
Hide parts with no conflict	Make parts where no collision is detected invisible after the analysis
Color triangle	Color triangles where collision is detected

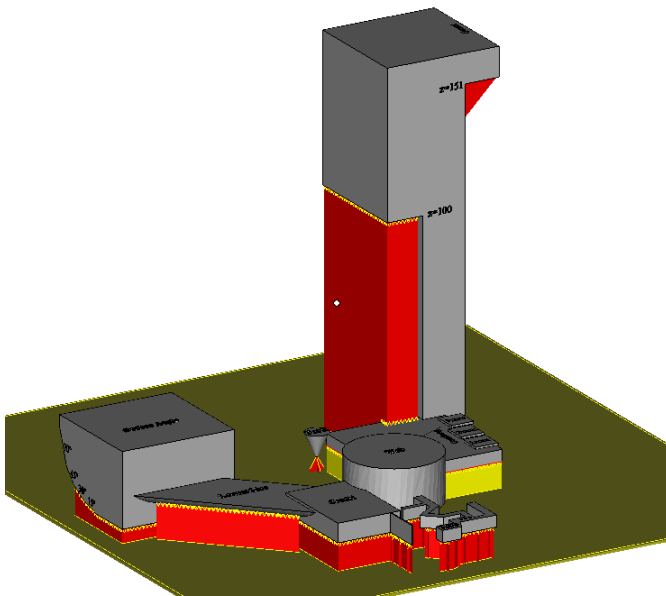
8.8 Supports

8.8.1 Generate Support



Generate
Support

Select a part on the platform and click this button to automatically generate support structures and enter Support Generation mode.



8.8.2 Generate Support of Selected

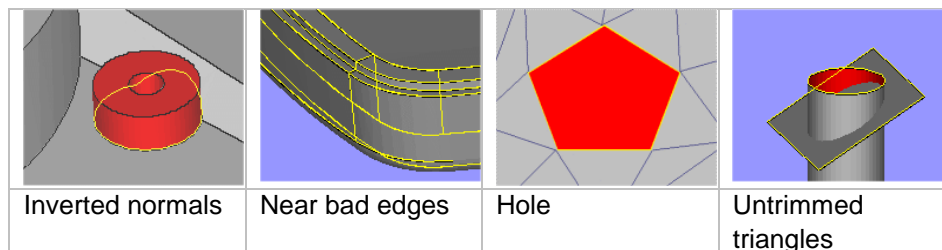


Generate support for selected parts without entering the support generation mode. To generate the supports, Magics Print Metal will utilize the support parameters which are found within the actual platform

9 Fixing

9.1 Errors explained

Some examples of common problems



9.1.1 Inverted Normals

In the STL format, a normal indicates the outside of a triangle. When the normal points to the wrong direction (the inside), the triangle needs to be inverted to have a watertight STL. This triangle is then called a flipped triangle.

9.1.2 Bad edges

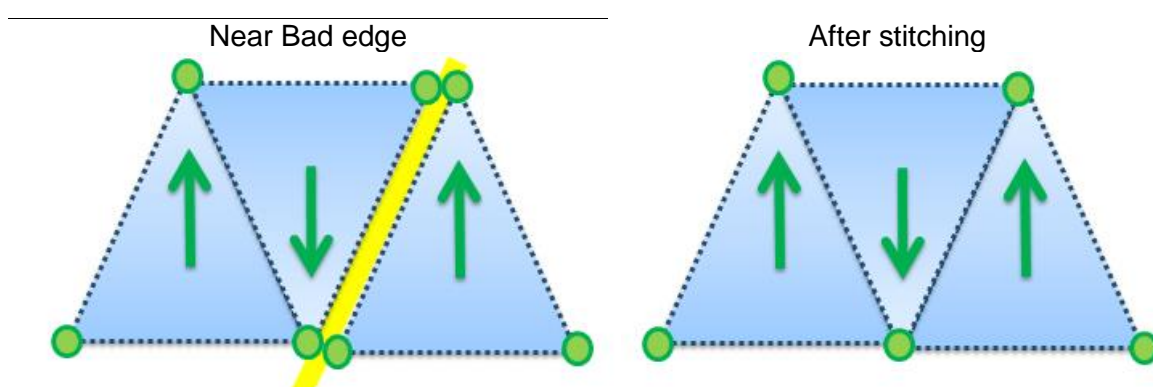
To have a correct STL file, all edges of each triangle should be connected properly to a neighbor. If an edge is not connected properly, the edge is called a bad edge and is indicated with a yellow line. A group of connected bad edges will make a bad contour. The STL file will be sliced in a subsequent step. To process the slicefiles correctly, every slice needs to be closed. This is why Bad edges need to be fixed.

9.1.3 Bad contours

A group of bad edges connected to each other form a bad contour. E.g. the hole below has 1 bad contour that consists of 5 bad edges.

9.1.3.1 Near bad edges

Near bad edges are bad edges that are near other bad edges. These are mainly caused by 2 surfaces that are not well connected. You can recognize them as long yellow lines on the part. You can fix them easily by stitching. Stitching is an automatic operation that will unite two neighboring triangles which both have a bad contour right next to each other.



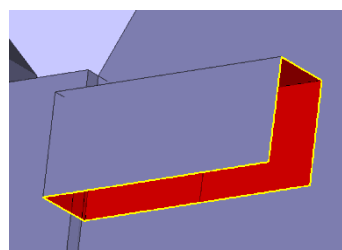
9.1.3.2 Planar hole

A hole consists of missing triangles. Use fill hole to fill it up. Magics is only able to recognize planar holes, which are recognized by the open contour which lies more or less in one plane. Holes caused by more irregular contours will not be recognized by Magics and be shown as a bad contour.

Planar hole



Bad Contour



9.1.4 Intersecting triangles

Intersecting triangles are triangles cutting each other. It can happen sometimes that the STL surface has intersections. Depending of the application of the STL file, it's advised to remove the intersections. You can remove them with the Unify function on the Triangles Page.



9.1.5 Overlapping Triangles

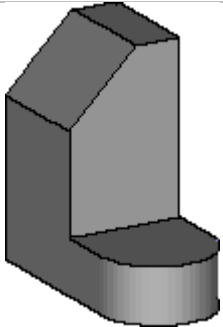
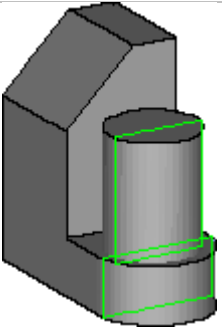
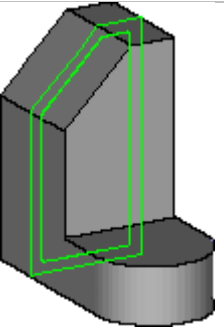
An STL-file sometimes has overlapping triangles. These triangles can be removed with the tools in the double surfaces page. 2 triangles are considered as overlapping as:

- The distance between them is smaller than the given tolerance. (E.g. 0,1 mm or 0,005 inch)
- The angle between the normal of the triangles is smaller than the given angle. (E.g. 5°)

Take into account that some "false alerts" may occur. When the triangles comply with the parameters, they will be marked as overlapping triangles, even when they are part of the geometry.

9.1.6 Shells

A shell is a collection of triangles connected to each other. Normally a part has only one shell because every triangle of the part is (indirectly) connected to every other triangle. Parts with:

		
1 shell	2 shells	2 shells
Every triangle is connected to each other.	The cylinder is not connected properly to the part. The overlap between the two shells can cause build failure. This can be solved with a Unify.	The part is hollow. The inner shell is not connected with the outer shell. This is normal with hollow parts.

9.1.7 Noise shells

Some shells have no geometrical meaning and are considered as noise (waste) that we can throw away. However, it is recommended to look at these shells first before removing them. Even a shell of a few triangles can be important.

9.2 AutoFix



AutoFix

The autofix option will execute a predefined list of repair actions. Some actions are conditional, this means that the action will only be performed when Magics Print Metal is sure that the result will be ok.

9.3 Manual

9.3.1 Fill Hole mode



Fill Hole
Mode

Click to activate. You can now click on holes to fill them.

9.3.2 Create Triangle



Create
Triangle

Click to activate. You can now manually create a triangle.

9.3.3 Create Bridge



Create
Bridge

Click to activate. You can now manually create bridges.

9.3.4 Delete Triangle



Delete
Triangle

Click to activate. You can now click on triangles to delete them..

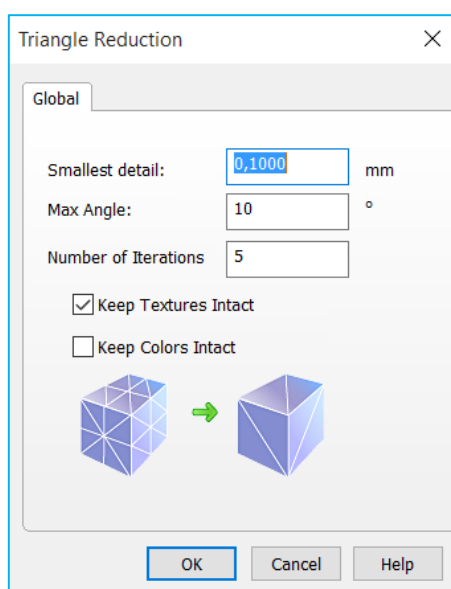
9.4 Enhance

9.4.1 Triangle reduction



Triangle
Reduction

Magics Print allows you to reduce the number of triangles in an STL file. This makes it easier to manipulate the file.





Smallest Detail	If 2 triangles are replaced by one triangle, there may be a little deviation in position. The tolerance indicates the maximum deviation allowed between the original surface and the new one.
Max Angle	<p>The Max Angle value defines two limits:</p> <p>When two triangles have an angle value bigger than Max Angle, they may not be reduced. The edge between them may not be eliminated; otherwise too much geometrical information would be lost. When the program meets such an edge, the reduction will keep the edge but reduce the number of points on it.</p> <p>When there is no critical edge, this Max Angle value determines the maximum angle that can be created during the reduction. This means where there is an edge present, there will remain one. Where there is no edge, no edge will be added.</p>
Number of Iterations	Magics can perform the operation in different iterations to improve the reduction of triangles. It is better to increase the number of iterations than performing the triangle reduction twice (to maintain the smallest detail).
Keep Textures Intact	Textures on the part stay intact. Some triangles may not be filtered out due to texture that is kept.
Keep Colors Intact	Colors on the part stay intact. Some triangles may not be filtered out due to color that is kept.

Notifications

It is advised not to use the reducer on very noisy objects.
If the tolerance and angle values are too big, essential part information may get lost.

10Edit

10.1 Rescale



A part can be rescaled with different factors in the three main directions or set to a certain size in the three main directions

10.1.1 Factor

	Factor	Resulting size	Difference	Original size
X	1,00000	24,638	mm 0,000	mm 24,638
Y	1,00000	18,778	mm 0,000	mm 18,778
Z	1,00000	30,736	mm 0,000	mm 30,736

☐ Uniform Rescale

☐ Make Copy ☐ Show Preview

► Match measurement

► Rescale Factor Library

► Rescale Center

Apply Close

The factor is a multiplying value for the dimensions in that direction. When the factor is 1, no rescaling is done, when the factor is 2, the size is doubled. A factor bigger than 1 will enlarge the part, a factor smaller than 1 will shrink the part.

	Factor	Resulting size	Difference	Original size
X	1,00000	24,638	mm 0,000	mm 24,638
Y	1,00000	18,778	mm 0,000	mm 18,778
Z	1,00000	30,736	mm 0,000	mm 30,736

☒ Uniform Rescale

☐ Make Copy ☐ Show Preview

► Match measurement

► Rescale Factor Library

► Rescale Center

Apply Close

10.1.2 Resulting Size

The resulting size column has a dual function. First of all it is showing the actual dimensions of the selected part but it also allows to set the dimensions of the part in the 3 main directions in absolute values

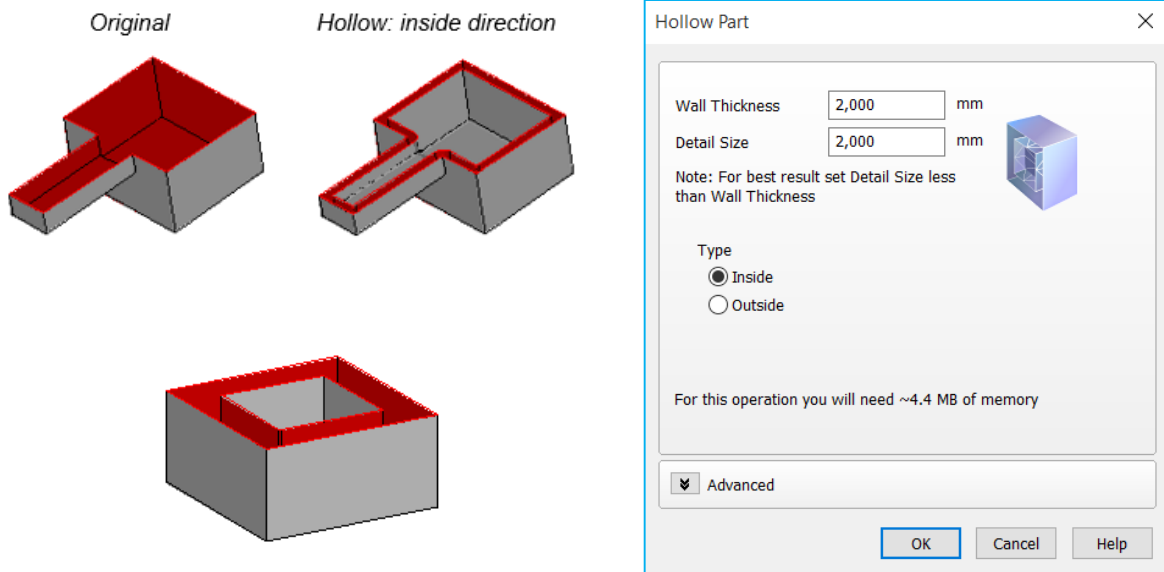
10.1.3 Checkbox Options

Uniform Rescale	The rescale factor is identical in all directions
Show Preview	Checking this box will show a preview of the rescale
Make copy	Make a copy of the original part before resizing or rescaling

10.2 Hollow part



The result of the hollow part operation is one STL file with two shells: the original shell and a new one that gives the part a thickness. The new shell is build from triangles whose size is determined by the parameter smallest detail. You can select several parts and make them hollow in one operation.

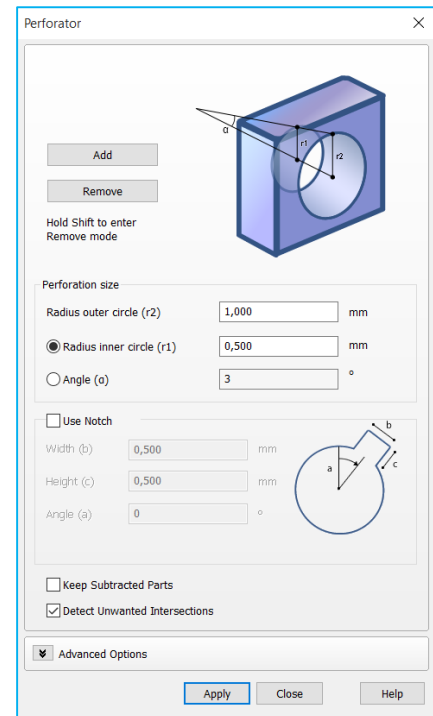
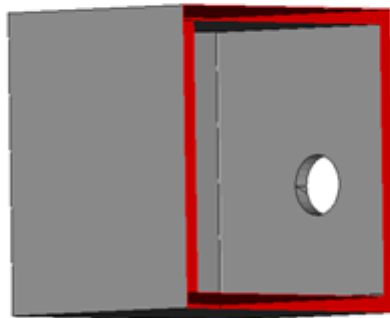


Wall Thickness	This value displays the distance over which the triangles of the original shell get an offset in order to generate a hollow part.
Detail Size	This value displays the level of detail that will remain in the new shell. Standard, this value should be the same as the smallest detail of the part. The smaller this value, the more triangles will be included in the new shell and the more detail can thus be incorporated. <i>Remark:</i> If the smallest detail is chosen too high, it is possible that the internal wall intersects with the external wall.
Type	Here you determine if you want to create a new shell at the interior or at the exterior of the existing shell
Memory requirements	While you set the parameters, Magics Print Metal makes an estimation of the quantity of free RAM that will be needed during the calculation and of the number of triangles that will be created. You'll need to enter new values in the Wall Thickness and Smallest Detail fields to see a new estimation of the amount of RAM and new triangles. The amount of triangles can later on be reduced with the Triangle Reduction function.

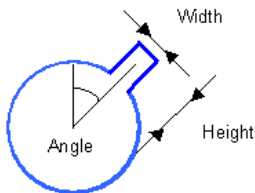
10.3 Perforator

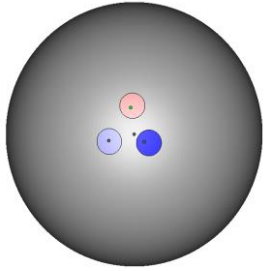
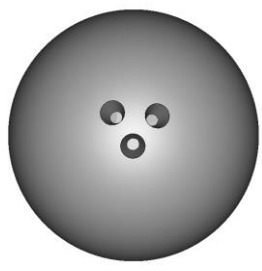


With this command you can make perforations through your parts. The perforation is defined by a flattened cone that will be subtracted from the part, thus creating a perforation. This is especially useful if you work with hollow parts.



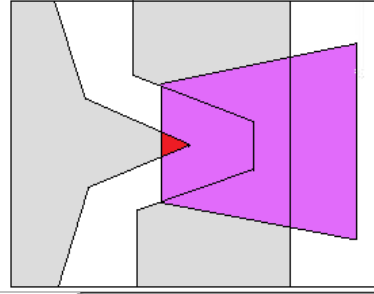
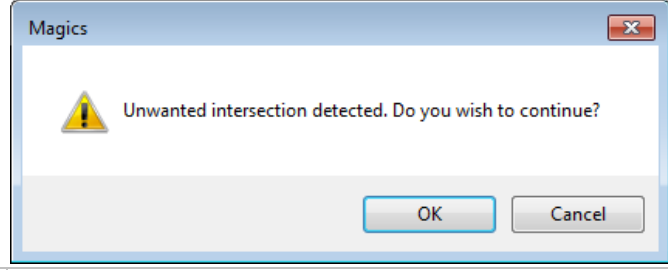
Add	<p>When clicking 'add' the perforation is being drawn when you click on the part. The hole is not immediately being subtracted.</p> <p>To have a better look where the cone will be placed a blue preview is shown.</p> <p>The "Add" mode is enabled by default when opening the Perforator function.</p>	
Remove	<p>Unwanted perforations can be deleted when pressing this button.</p> <p>While in the "Add" mode, it is possible to hold down Shift to activate the "Remove" mode.</p>	
Perforation size		
	Radius outer wall (r2)	Here you determine the radius of the outer circle of the perforation.
	Radius inner wall (r1)	Here you can determine the radius of the inner circle of the perforation.
	Angle	Here you can determine the angle of the perforation
Use notch	<p>You can choose to add a small notch. The notch is defined by the parameters Angle, Width and Height.</p>	
	Width	
	Height	

	Angle	
Keep subtracted parts	When checked, the subtracted part(s) are kept. If not checked subtracted part(s) are unloaded automatically.	
Subtract	The perforation takes place.	
Detect Unwanted Intersections	Collisions will be detected when a cone is added. Default on. (See remark)	

With subtractions	Without subtractions
	

Notifications

When you want to make a perforation, Magics Print might detect that an unwanted intersection will take place.

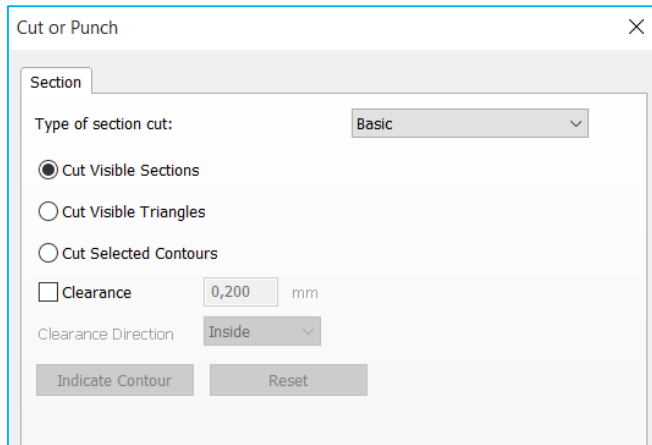
	The flattened cone makes an unwanted intersection with section A in the example.
	
Cancel	The flattened cone is not constructed.
OK	The cone will be constructed with the intersection.

10.4 Cut or Punch



Cut or
Punch

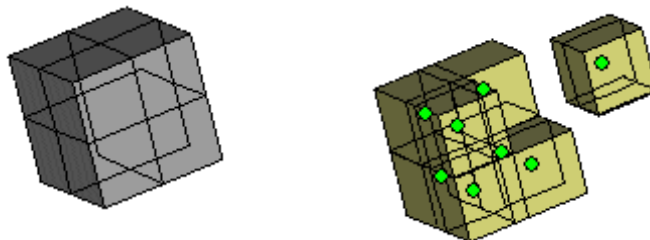
With this command you can cut parts. Magics Print Metal only provides a basic section cut



10.4.1.1 Cut Visible Sections

If you define some sections, you can make a cut along all these sections. For more information about how to define sections, please see [Sections](#).

In the figure below, an X, Y and Z section are defined. If you select 'Cut Visible Sections' this is what happens:



Total Clearance	If you would like to have a little gap between the two parts that result from the cutting line, you can add a clearance. This either to the inside, outside or on both sides.	
	Inside	
	Outside	
	Both sides	

10.4.1.2 *Cut Visible Triangles*

If you have defined a section ([Sections](#)), you can clip and flip to visualize only the part behind or before the section. With the Cut Visible Triangles function, you can cut out the visible part. It is possible to make different combinations of sections, with each their own clip or flip.

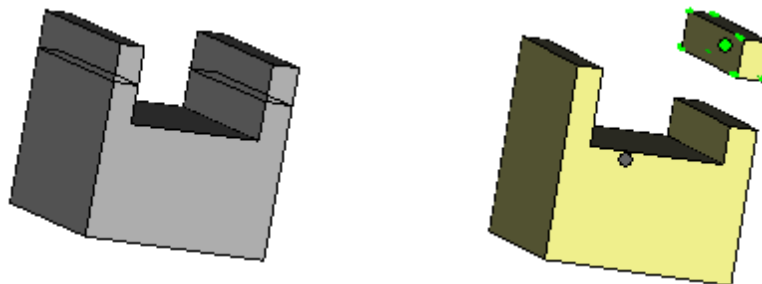
In the figure below, three sections are defined, and a clip is applied on each of them so only the part before the section is made visible. By selecting cut visible triangles, the visible part becomes a separate part.



10.4.1.3 *Cut Selected Contours*

If you have defined a section, and you only would like to cut away some parts at one side of it, you can do so with the cut selected contours function. Select the contour (the intersection line between the part and the section) you would like to cut with the Indicate Contour button and press the Apply button.

In the figure below a Z section is made. The contour on the right is selected, so only the right 'leg' will be separated from the main part.



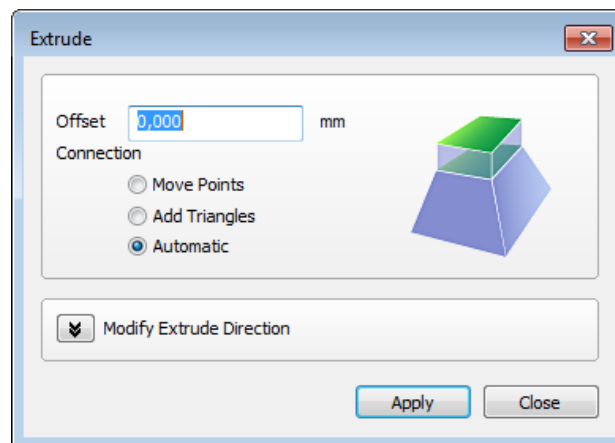
If you have indicated a section, and you would like to erase the indication, you can use the Reset button.

10.5 Extrude (PRO feature)

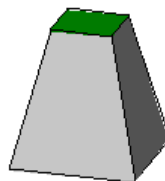
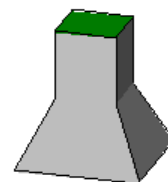


Extrude

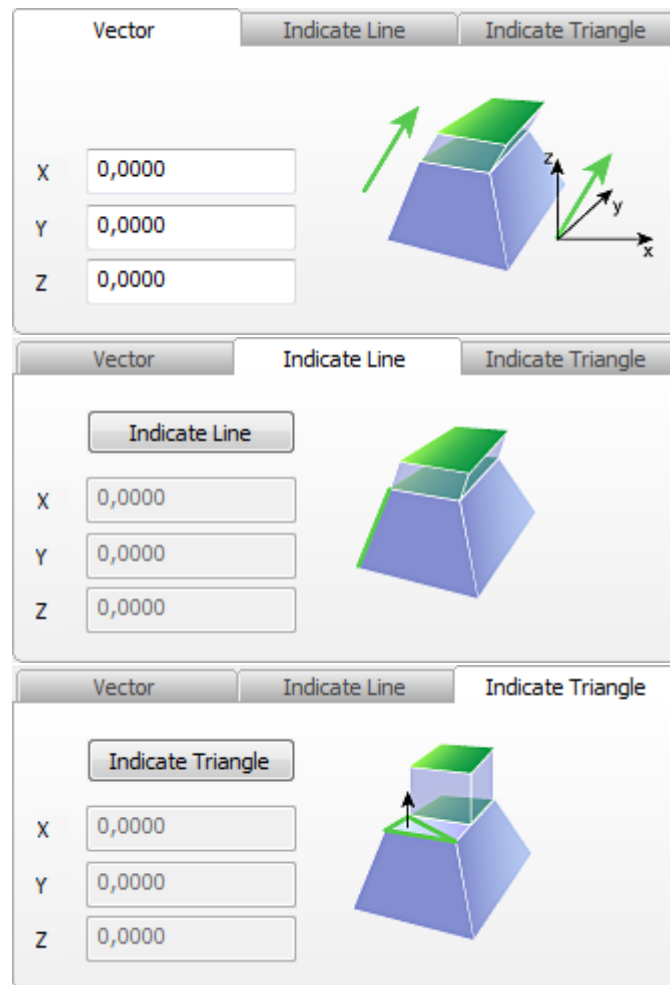
This command allows you to extrude triangles in a certain direction. Before the extrusion, you first have to mark the triangles you'd like to extrude. All marked triangles are moved in the same direction, over a defined distance.



Offset	The user must specify the extrude offset. Each triangle will undergo an offset in the defined direction over a distance defined by this value. The area of the surface formed by the triangles that are extruded will stay the same after extrusion.	
Connection	Move Points	The triangles adjacent to the selected triangles will be redrawn. They are stretched like shown in the figure below. The common points are moved. The area of the surface formed by the triangles that are extruded will stay the same after extrusion. The slope of the adjacent triangles will change a bit.
	Add Triangles	The triangles adjacent to the triangles that are extruded stay the same. The common points of the selected and adjacent triangles remain on their position. The gap between the latter and the triangles that have undergone an offset is filled with new triangles. This is shown in the figure below.
	Automatic	The program will make the choice between Move Points or Add Triangles.

Original part*Move points**Add triangles*

1.3.1.1. Modify Extrude Direction



Vector	You can give in direction coordinates in the X, Y and Z field.
Indicate Line	You can click the Indicate Line button and afterwards click on a line. The extrude offset will be in the direction of the line.
Indicate Triangle	You can click the Indicate Triangle button and afterwards click on a triangle. The extrude offset will be the direction of the normal of the triangle.

10.6 Label



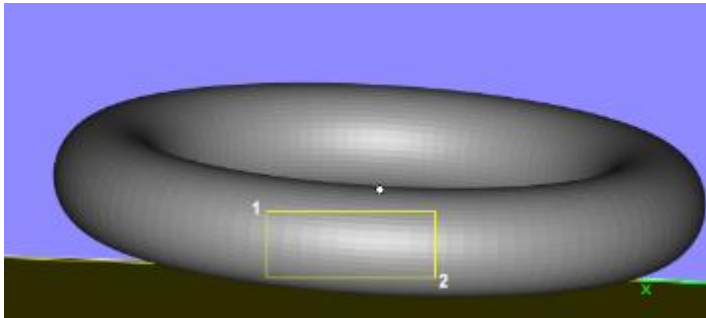
Label

This feature allows you to put text on a part. First you need to indicate the area where you want the label to be applied. There are 2 options for the label: rectangular or circular.

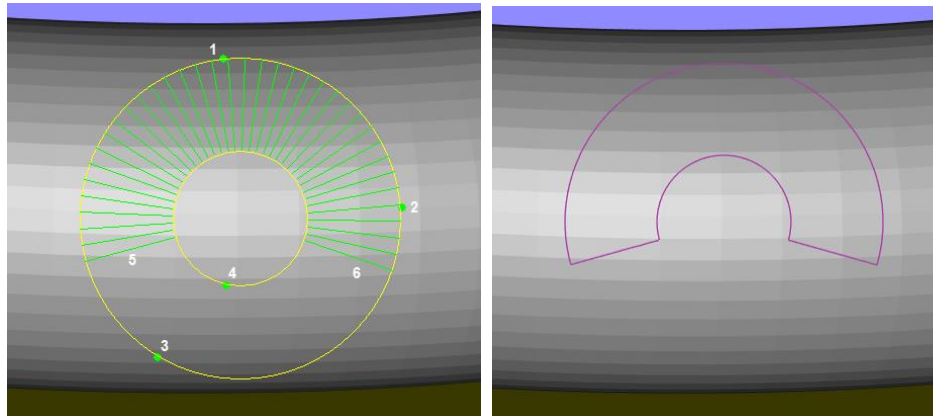
Indicate the area on the part where label will be applied

☒ Rectangular label ☐ Circular label

The rectangular label area needs to be defined by clicking on the part and drawing a rectangle. In the picture point 1 is the starting point of the rectangle, point 2 is the end point. This rectangular area can then be used as label area. Make sure the label area completely fits on the part. A warning message will be shown when the label doesn't fit on the part.



The circular label area needs to be defined by defining 3 points to define the main circular shape. The fourth point will define the size of the label area. The fifth and sixth click will determine the start and end point of the label area.



Label

Text

Indicate the area on the part where label will be applied

☒ Rectangular label
☐ Circular label

Label content

Part Name

Times New Roma

B

I

U

No color

☒ Remember current Text
☐ Auto-partname
☒ Fit text to label boundaries

Font size pt mm
Height mm
☒ Raised
☐ Engraved

▶ Advanced

Delete

Apply STL

Save planning

Close

Label content	Specify in this box the text which should be used as label content.
Part name	Pushing this button will automatically add the current part name to the label content.
Font	Specify the font type for the label.
Bold	Select if the font should be Bold.
Italic	Select if the font should be Italic.
Underline	Select if the font should be Underlined.
Color	Specify the color for the label.
Remember current text	The last entered value will be remembered the next time the labeling functionality is used.
Auto-part name	Not available in Magics Print Metal
Font Size	Specify the dimension of the label text.
Fit text to label boundaries	Overrules the size specification and will use the maximal possible size of the text in the label planning area.
Height	Specify the height of the label (in or outside).
Raised/Engraved	Specify if the label needs to be raised (outside) or engraved (inside).

Advanced options

Advanced

☐ Flip

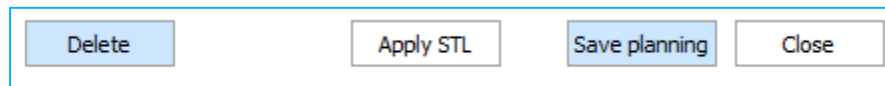
☐ Mirror

☐ Label through

☒ Automatically update preview

☐ As separate STL

Flip	The label content will be flipped before being applied.
Mirror	The label content will be mirrored before being applied.
Label through	Use this option to label multiple parts at once with the same label. Make sure the parts are aligned perpendicular to the view
Automatically update preview	The content of the label content textbox will be automatically updated in the label planning area.
As separate STL	The label will be generated as a separate part.

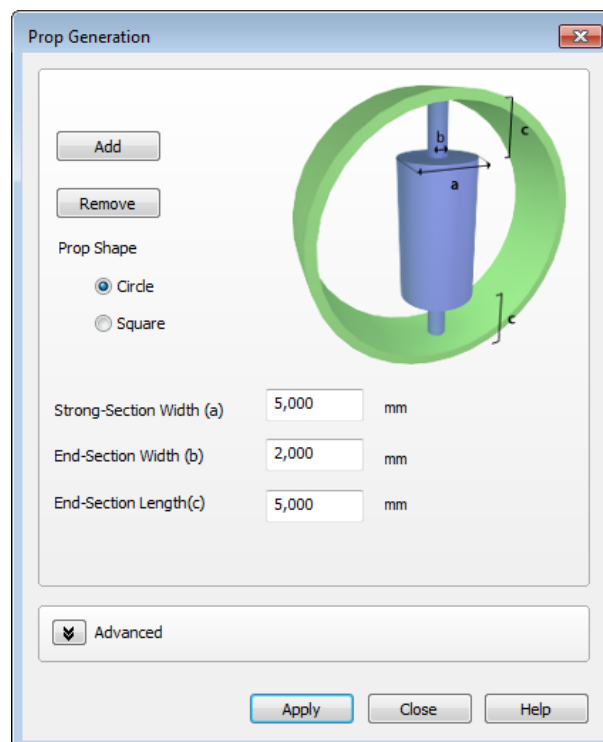


Delete	Use this button to delete previously defined label planning areas.
Apply STL	Pressing this button will generate the label and modify the STL.
Save planning	Pressing this button will keep the label planned, but not yet generate it as STL. It can still be modified in a later stage.
Close	Press this button to close the dialog.

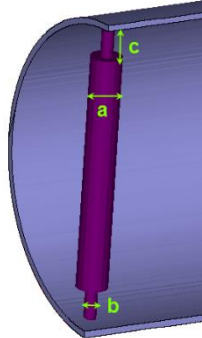
10.7 Prop Generation



To avoid distortion on your part during building you can create 'props' to make sure that the shape of the part is kept.



Add	When clicking add, the prop can be drawn on the part, but it's not yet created. To have a better look where the prop will be placed a preview is shown (Advanced)
-----	---

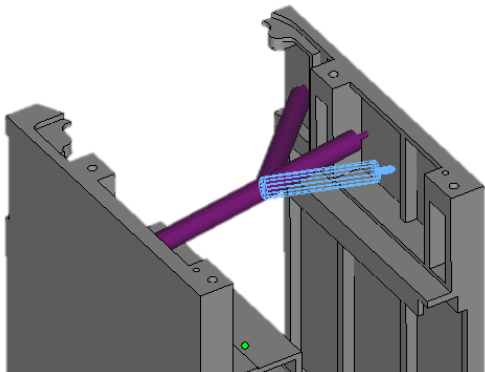
Remove	Unwanted props can be deleted when pressing this button	
Prop Shape	Circle/ Square	
	The shape of prop of this cross section can be changed between a circle or a square.	
Strong- section width (a)	The width of the circle/ square connector	
End- section width (b)	The width of the connection (in between the strong section and the part)	
End- section length (c)	The length of the connection between the strong section and the part.	

1.3.1.2. Advanced

☐ Advanced

☒ Perform Boolean Unite

☒ Show Preview

Perform Boolean Unite	The part and prop(s) are united into one file and all surfaces are trimmed to make one shell of both parts.
Show Preview	While adding the props a preview is created of how the prop will be placed on the part <div>  </div>

Remark: After creating the prop, it will be merged together with the part.

10.8 Structures (Additional Module)

The wizard consists out of 3 pages:

- Define outer Shell
- Choose Structure
- Add Drain Holes

1.3.2. Define outer shell

The screenshot shows the 'Create Structures' dialog box with the 'Define Outer Shell' step selected. The 'Outer Shell' radio button is chosen. The 'Thickness' and 'Detail Size' are both set to 2,000 mm. The 'Direction' is set to 'Inside'. A 3D preview of a cube with a hollow interior is shown. Below the preview, it states 'For this operation you will need ~3.1 MB of memory'. The 'Reduce Triangles of Core' checkbox is unchecked, with 'Tolerance' at 0,050 mm, 'Angle' at 5,000 degrees, and 'Number of Iterations' at 3. The 'Smoothen Core' checkbox is also unchecked, with a slider set to 50% between 0 and 100. At the bottom are buttons for '< Back', 'Next >', 'Cancel', and 'Help'.

Create Structures

1. Define Outer Shell
2. Choose Structure
3. Add Drain Holes

☐ No Outer Shell
☒ Outer Shell

Thickness mm
Detail Size mm

Direction
☒ Inside
☐ Outside

For this operation you will need ~3.1 MB of memory

☐ Reduce Triangles of Core
Tolerance mm
Angle °
Number of Iterations

☐ Smoothen Core
0 50% 100

< Back Next > Cancel Help

No outer shell	The part will be fully replaced by a lattice and will not have an outer shell	
Outer shell	The part will receive a shell	
Thickness	This value displays the distance over which the triangles of the original shell get an offset in order to generate a hollow part.	
Detail Size	<p>This value displays the level of detail that will remain in the new shell. Standard, this value should be the same as the smallest detail of the part. The smaller this value, the more triangles will be included in the new shell and the more detail can thus be incorporated.</p> <p><i>Remark:</i> If the smallest detail is chosen too high, it is possible that the internal wall intersects with the external wall.</p>	
Direction	Here you determine if you want to create a new shell at the interior or at the exterior of the existing shell.	
Memory requirements	While you set the parameters, Magics makes an estimation of the quantity of free RAM that will be needed during the calculation and of the number of triangles that will be created. You'll need to enter new values in the Wall Thickness and Smallest Detail fields to see a new estimation of the amount of RAM and new triangles. The amount of triangles can later on be reduced with the Triangle Reduction function. The memory requirements depend greatly on the value set for Smallest Detail.	
Reduce triangles of Core	Because the hollow function creates a lot of triangles, you have the possibility to reduce these at once.	
	Tolerance	Triangle Reduction
	Angle	
	Number of Iterations	
Smoothen Core	By checking this option a smoothing will be performed on the created core.	

1.3.3. Choose Structure

Create Structures

1. Define Outer Shell
2. **Choose Structure**
3. Add Drain Holes

Choose Structure

body diagonals with nodes
body diagonals with nodes[]
Cross
Cross-1
Cross-2
Cross-3
Cross-X
Cross-X_reinforced
diamond 20 percent relative
diamond 30 percent relative

Add Delete

Structure Preview

Structure Dimensions

X 10,000 mm
Y 10,000 mm
Z 10,000 mm

☒ Keep Aspect Ratio
☐ Invert Structure

Sample-data to Process: 4.81 MB

Advanced Options

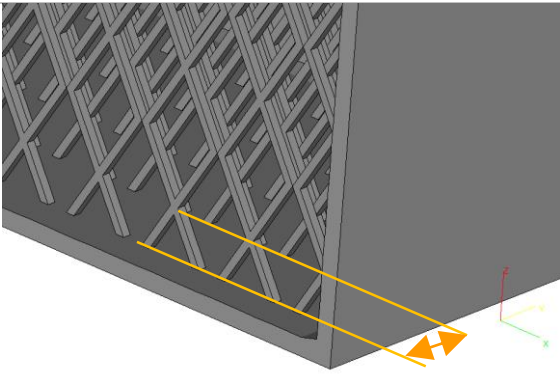
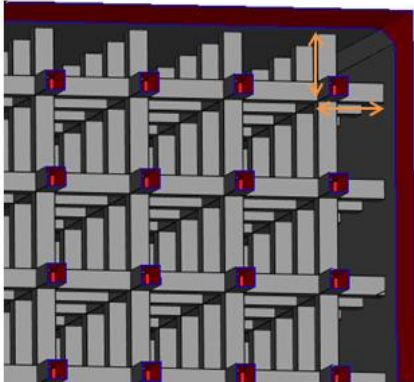
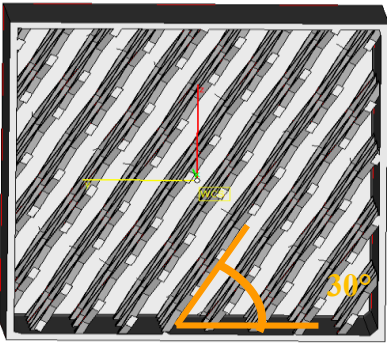
☐ Spacing ☐ Start position ☐ Angled Growth

dX 0,000 mm dY 0,000 mm dZ 0,000 mm
dX 0,000 mm dY 0,000 mm dZ 0,000 mm
dX 0,000 mm dY 0,000 mm dZ 0,000 mm

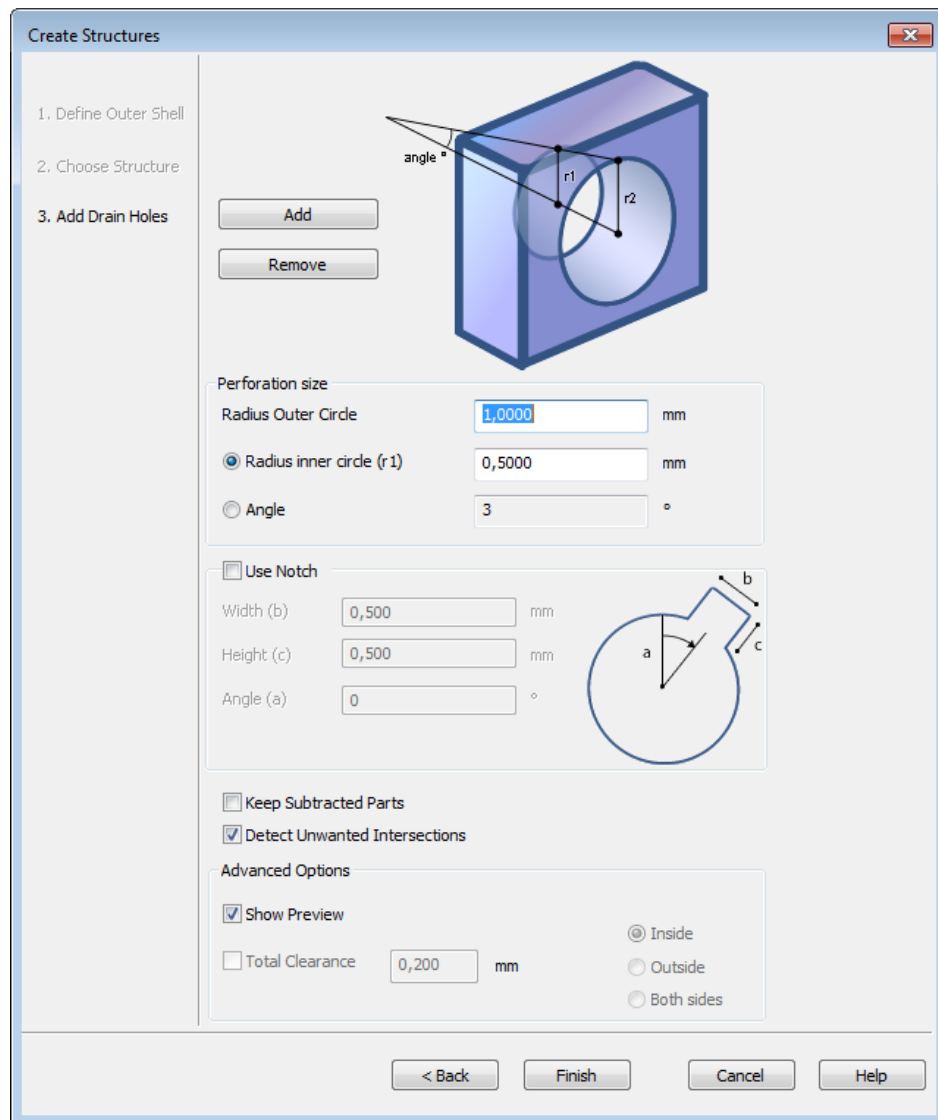
☒ Perform post-fixing
(Removes most of the overlapping and intersecting triangles, but may deform small structures. Disable if the result doesn't look smooth enough)

< Back Next > Cancel Help

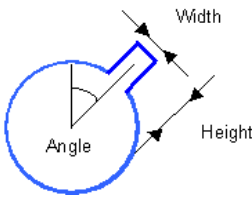
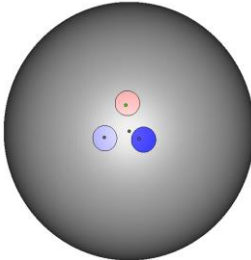
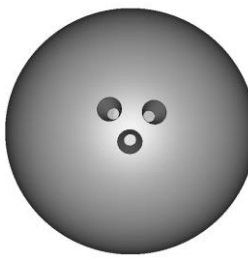


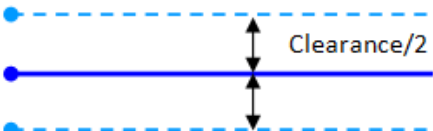
Choose Structure	This shows a library with unit structures that can be used for lattice generation.	
	Add	Add structures to the library
	Delete	Delete structures from the library
	Structure Preview	A preview of the unit structure is shown
Structure Dimensions	Here you can specify the length in X, Y and Z of the unit structure	
	Keep Aspect Ratio	When this is checked the Y and Z length will be rescaled uniformly with the X length
	Invert Structure	Instead of converting the part by the lattice, the lattice will be subtracted from the part
	Sample Data to Process	The amount of memory necessary to create specified lattice

Advanced Options	Spacing	A spacing will be given between the bounding boxes of the unit structure
	<div> <input type="checkbox"/> Spacing dX <input type="text" value="0,000"/> mm dY <input type="text" value="0,000"/> mm dZ <input type="text" value="0,000"/> mm </div>	
	Start position	The start position of structure can be defined
	<div> <input type="checkbox"/> Start position dX <input type="text" value="0,000"/> mm dY <input type="text" value="0,000"/> mm dZ <input type="text" value="0,000"/> mm </div>	
	Angled Growth	The whole lattice will be generated under specified angle
	<div> <input type="checkbox"/> Angled Growth X <input type="text" value="0,000"/> ° Y <input type="text" value="0,000"/> ° Z <input type="text" value="0,000"/> ° </div>	

1.3.4. Add Drain Holes

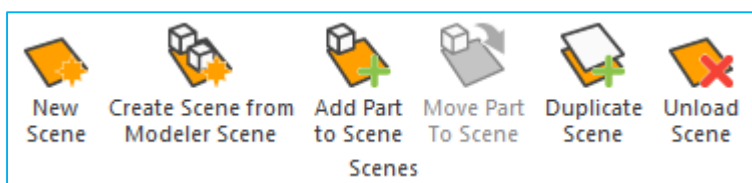


Add	When clicking add the perforation is being constructed but not yet subtracted.
Remove	Unwanted perforation can be deleted when pressing this button.
Perforation size	Define the size of the perforation
Radius outer circle (r2)	Here you determine the radius of the outer circle of the perforation.
Radius inner circle (r1)	Here you can determine the radius of the inner circle of the perforation.
Angle	Here you can determine the angle of the perforation
Use notch	Define the size of the notch
Width (b)	
Height (c)	

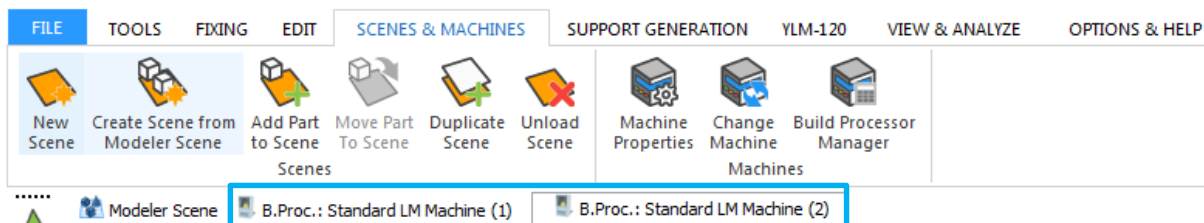
Angle (a)	
Keep subtracted parts	When checked, the subtracted part(s) are kept. If not checked subtracted part(s) are unloaded automatically.
	
With subtractions	Without subtractions
Detect unwanted intersections	Collisions will be detected when a cone is added. Default on. (See remark)
Advanced options	
Show preview	When checked a preview of the perforation is shown
Total clearance	Define an offset towards the inner, outer or both sides of the intersecting line between the parts. This way you introduce a little gap between the parts that result from the perforation.
Inside	
Outside	
Both sides	

11 Scenes and Machines

11.1 Scenes



With Scenes, platforms can be created to prepare your build. It gives you a workspace where you can orientate and position your parts in the same way as they should be built by the machine. A lot of parameters can be stored in such a scene. Your Magics Print software will come with the optimized parameters for the machine you have purchased. You can also work on different platforms in parallel. The active scene is the one showed on the screen. You can switch between different scenes by clicking on the name of the platform in the main window (see picture below).



In Scenes, platforms are handled. The available platforms will correspond to the machine portfolio of your machine manufacturer. If a new scene is generated, you can see that a second tab “modeler scene” is opened. The modeler scene can be recognized by its different background color and a lack of platform. Every part that is imported into Magics Print, will be visible in the modeler scene.

To orientate a part on the platform Indicate top or bottom view can be used. There is also a collision detection tool (see Collision Detection) to see if the parts are well positioned on the platform. The automatic placement tool (see Automatic Placement) makes it possible to easily and economically position different parts on the platform.

11.1.1 Scenes: Virtual Copies

This section will explain what virtual copies are and how you have to handle them.

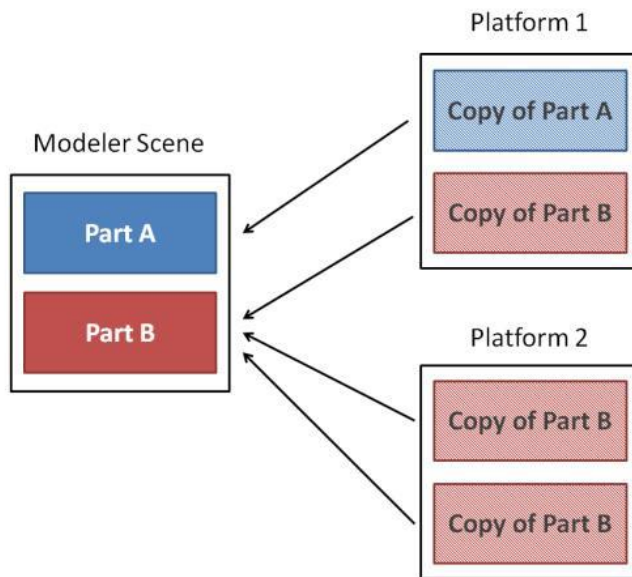
The goal of using virtual copies is to save memory. If you need e.g. 100 copies of a part, there will be a big difference in memory usage if you have to load (and save) 100 parts or only 1 part.

11.1.2 A Part and his Virtual Copies

The real parts are collected in the modeler scene. The modeler scene acts as the database of loaded parts. From this database you can create virtual copies on platforms. This virtual copy contains a reference to the real part and a translation matrix. To make it possible and user friendly to work with virtual copies, the structure of parts and copies is as shown in the picture below.

Example

The picture below shows an example of the principle of real parts and their virtual copies. This example will be used in the next sections to illustrate the behavior of parts and virtual copies.



In this example:

The modeler scene contains 2 real parts, i.e. part A and part B.

Platform 1 contains 1 virtual copy of part A and 1 of part B.

Platform 2 contains 2 virtual copies of part B.

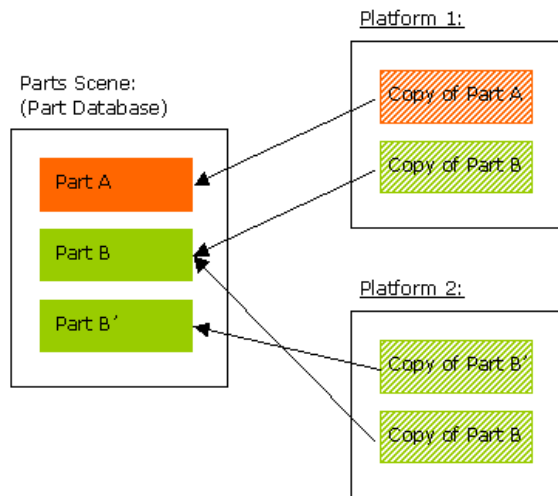
The arrows on the picture below, indicate that “*Copy of Part B*” is based on the real “*Part B*” from the modeler scene.

11.1.3 Edit a Virtual Copy

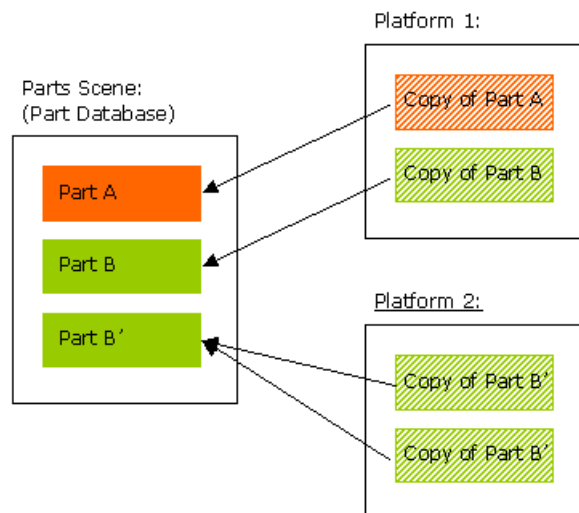
If you edit a real part (in the modeler scene), all virtual copies of that part, present in the current Magics session, will be edited in the same way.

Example

Suppose you select and edit one of the virtual copies of part B on platform 2. Magics will ask if you want to apply the changes only on the selected copy or on all virtual copies of part B present on platform 2. If you apply the changes only on the selected copy, this is the result:



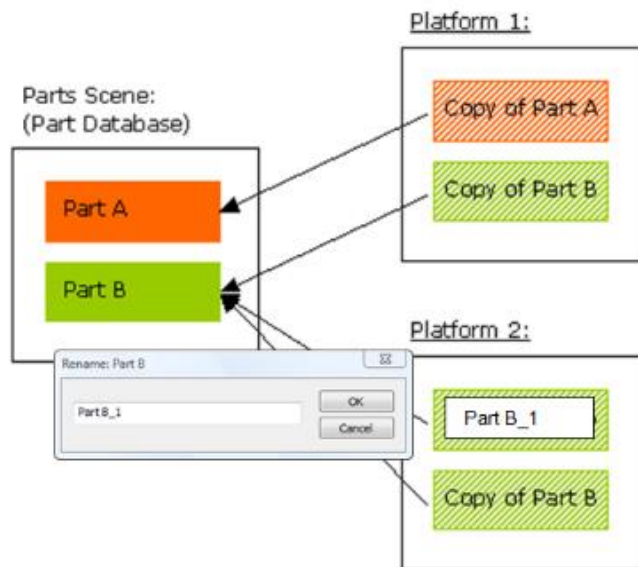
A new part is created in the part database. The edited copy will refer to a new real part. If you apply the changes on all virtual copies of that mother part, this is the result:



All the virtual copies of the same mother part, present on that platform, will refer to a new database part.

11.1.4 Naming of virtual copies

Virtual copies inherit the name of the mother part when it is created. Within the platform scene however, virtual copies can be assigned with a unique/ different name.

Example**Notification**

Editing virtual copies is only possible for virtual copies of the same mother part and present on the current platform! This is for safety reasons. If you want to edit all virtual copies of the same mother part, present on all the platforms, you should edit the part in the Modeler Scene.

Names of virtual copies change when the name of the mother part (in the Modeler Scene) is changed, even if virtual copies are already renamed. The part status however stays the same.

11.1.5 Advised ways of working**Method 1: Working in platform scenes**

When you open Magics Print Metal, the modeler scene will be present. Create a new Platform Scene, then load or create a part. In the background this part will be loaded in the Modeler Scene (part database) and immediately a Virtual Copy of that part is created on the platform. You can edit and prepare this part in the Platform Scene. Each operation you do on the copy in the Platform Scene will automatically be performed on the real part in the Modeler Scene.

11.1.5.1 Multiple Copies

If you want to build more than one copy of a part on that Platform, you can duplicate the part (see Duplicate). Most advised is to create the copies after you finished the preparation of the files. Otherwise, Magics Print will ask for each operation if you want to apply it on all copies or only on the selected ones. (If you select all copies, of course, the message won't be prompted).

11.1.5.2 *Hide Modeler Scene*

Because you can perform each operation on Virtual Copies, it can be less confusing when you hide the Modeler Scene. To hide the Modeler Scene, type “Modeler Scene” into the ‘Quick search’ bar and click on ‘Modeler Scene’. To make the Modeler Scene reappear, repeat the previously mentioned process.

Method 2: Prepare files in the Modeler Scene and assign them to a Platform Scene.

You can also work in the opposite way. This means that you load all parts in the Modeler Scene, you prepare the files in the Modeler Scene and afterwards you assign the parts (read: create Virtual Copies) to the Platforms.

The disadvantage of this method is that you cannot perform machine dependent operations, e.g. translate to default position, in the Modeler Scene.

The advantage of this way of working is, when you need to edit a part that need to be built on different platforms, you only have to edit it once.

Of course, you can use a combination of these two methods, depending on what you want to do in Magics Print. Combining these two methods will give you the most added value, i.e. preparing your builds in a very fast and flexible way!

11.1.5.3 *Scenes: Platform Operations*

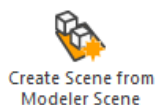


11.1.5.3.1 New Scene



With this function, you create a new Platform Scene in the main window. You have to choose the machine of which you want to create a Platform Scene. It's also possible to select a specific support profile directly from this window. If you create more than one platform for the same machine, the platform name will be the machine name extended with a number, e.g. '[Machine name] (2)'. You can organize machines via drag and drop.

11.1.5.3.2 Create Scene from Modeler Scene

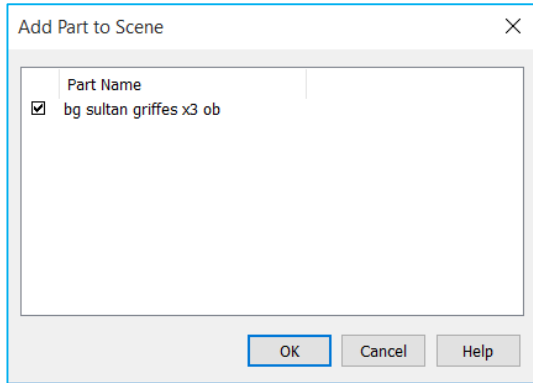


Choose the machine for which you want to create a Platform. Then, for each of the parts present in the Modeler Scene, a Virtual Copy will be created on the current platform.

11.1.5.3.3 Add Part to Scene



This operation opens a window showing all the parts loaded in the Modeler Scene. Here you can select from which of these parts you want to assign a virtual copy to the active Platform Scene. If the parts you selected don't fit inside the platform, a message will appear indicating a solution will be found but outside platform borders.



11.1.5.3.4 Move part to Scene



This function lets you easily move selected parts from the modeler scene to any of the loaded platform scenes. A platform machine dropdown list is shown with all available scenes.

11.1.5.3.5 Duplicate Scene

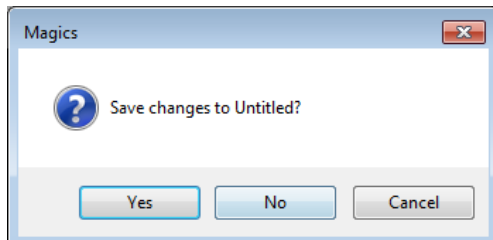


This operation creates a Platform Scene, identical to the active Platform Scene. The Platform name will be the machine name extended with a number, e.g. '[Machine name] (2)'. If the platform contains parts, the parts will also be copied to the new platform.

11.1.5.3.6 Unload Scene



With this operation you can unload the active Platform Scene. If there are virtual copies present on the current Platform Scene, Magics will pop up following dialog box:



Yes	Magics proposes to save all parts in a project file before unloading the scene. After saving all parts/ copies are unloaded.
No	The scene is unloaded without saving any parts/ copiers

11.2 Machine

11.2.1 Machine Properties



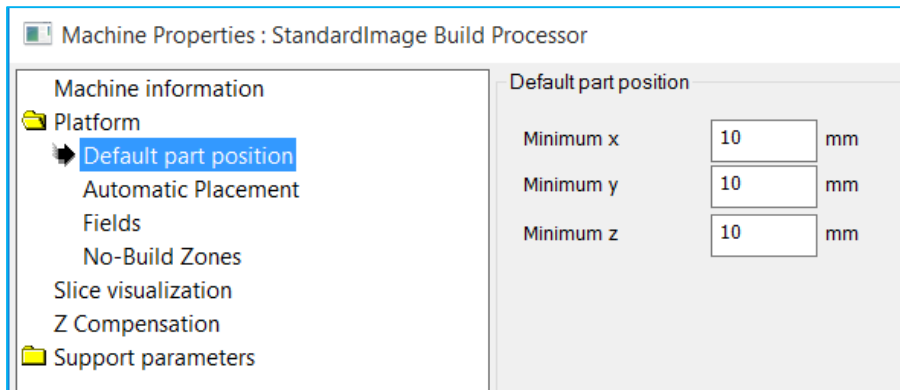
This function will open the Machine Properties dialog of the active Platform. The machine properties contain all the information related to the chosen machine type.

10.2.1.1 Machine Information Properties

Machine Name	Each machine type has a name. If you are building with different parameters, it is best to have a machine type for each set of parameters (e.g. layer thickness).
Material name	The material of the selected machine.
Comment	Comment on the selected machine.

11.2.1.2 Platform properties

11.2.1.2.1 Default part position



Machine Properties : StandardImage Build Processor

Machine information

- Platform
 - Default part position**
 - Automatic Placement
 - Fields
 - No-Build Zones
 - Slice visualization
 - Z Compensation
- Support parameters

Default part position

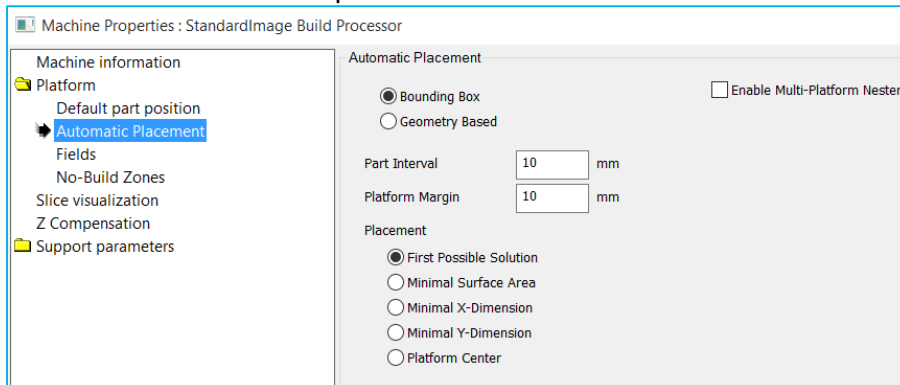
Minimum x: 10 mm

Minimum y: 10 mm

Minimum z: 10 mm

Dimensions	The minimum X, Y and Z value of the part on the platform.
------------	---

11.2.1.2.2 Automatic placement



Machine Properties : StandardImage Build Processor

Machine information

- Platform
 - Default part position
 - Automatic Placement**
 - Fields
 - No-Build Zones
 - Slice visualization
 - Z Compensation
- Support parameters

Automatic Placement

☒ Bounding Box ☐ Enable Multi-Platform Nester

☐ Geometry Based

Part Interval: 10 mm

Platform Margin: 10 mm

Placement

☒ First Possible Solution

☐ Minimal Surface Area

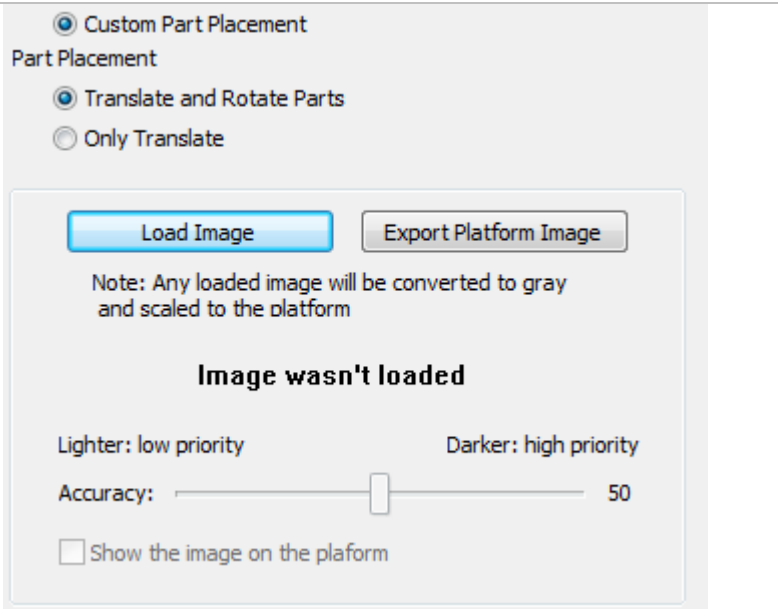
☐ Minimal X-Dimension

☐ Minimal Y-Dimension

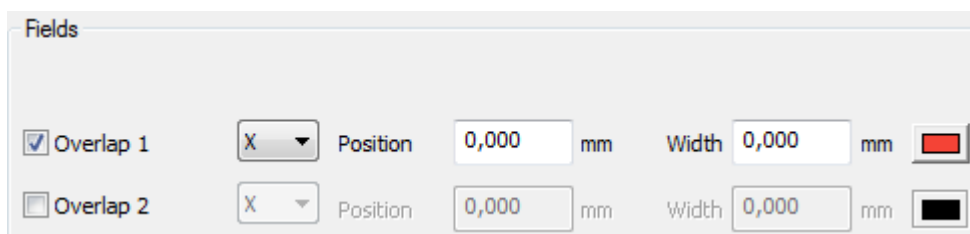
☐ Platform Center

Enable multi-Platform Nester	Allows the automatic placement on multiple platforms.	
Bounding box	<p>Automatic Placement</p> <p><input checked="" type="radio"/> Bounding Box <input type="radio"/> Geometry Based</p> <p>Part Interval: 10 mm</p> <p>Platform Margin: 10 mm</p> <p>Placement Solution</p> <p><input checked="" type="radio"/> First Possible Solution</p> <p><input type="radio"/> Minimal Surface Area</p> <p><input type="radio"/> Minimal X-Dimension</p> <p><input type="radio"/> Minimal Y-Dimension</p> <p><input type="radio"/> Platform Center</p>	
	Part interval	The interval between parts
	Platform Margin	The margin of the platform

	Placement Solution	The placement solution that will be applied: First Possible Solution Minimal Surface Area Minimal X-Dimension Minimal Y-Dimension Platform Center
Geometry Based	<div> <div>Automatic Placement</div> <div> <input type="radio"/> Bounding Box <input checked="" type="radio"/> Geometry Based </div> <div> Part Interval <input type="text" value="5"/> mm Platform Margin <input type="text" value="5"/> mm </div> <div> Placement Solution <input checked="" type="radio"/> First Possible Solution <input type="radio"/> Minimal Surface Area <input type="radio"/> Minimal X-Dimension <input type="radio"/> Minimal Y-Dimension <input type="radio"/> Platform Center <input type="radio"/> Custom Part Placement </div> <div> Part Placement <input checked="" type="radio"/> Translate and Rotate Parts <input type="radio"/> Only Translate </div> </div>	
	Part interval	The interval between parts
	Platform Margin	The margin of the platform
	Placement Solution	The placement solution that will be applied: First Possible Solution Minimal Surface Area Minimal X-Dimension Minimal Y-Dimension Platform Center Custom Part Placement
	Part Placement	How the parts are placed: Translate and rotate Parts Only Translate

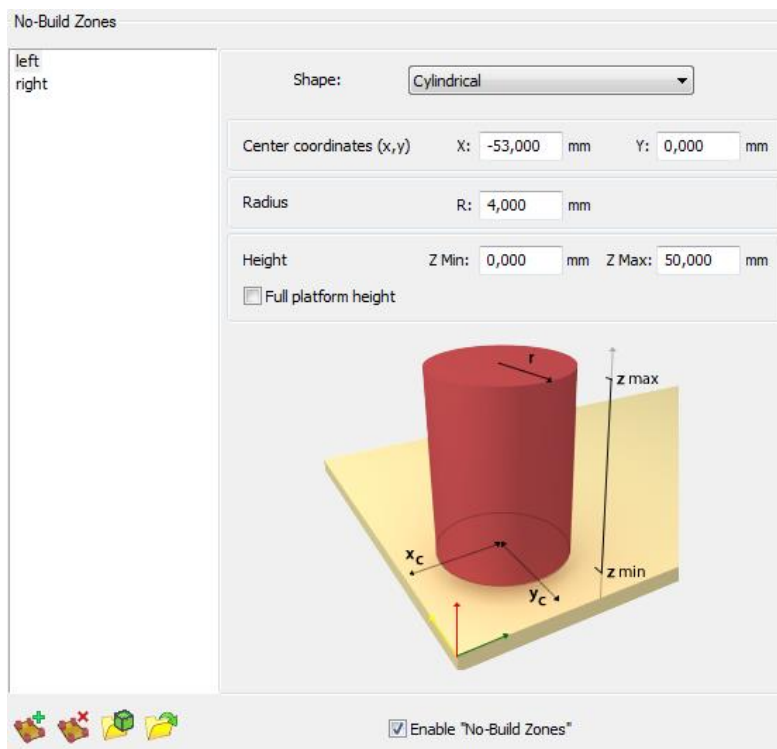
Custom Part Placement	
	<p>Load an image that can be shown on the platform. The darker areas indicate higher priority, while the lighter areas indicate lower priority.</p> <p>Export the Platform image to get an image with the correct platform dimensions, that you can immediately edit.</p> <p>Lower accuracy will be faster, but the image used for the positioning of parts will be less detailed. Higher accuracy will give a more detailed image, but might be slower.</p>

11.2.1.2.3 Fields



11.2.1.2.4 No Build Zones

The No Build Zones page allows you to define cylindrical, rectangular and STL shapes on the platform that indicate no-build zones.



With following controls you can manage the no build zones:



Add a shape to the platform as no build zone



Remove a shape from the platform as no build zone

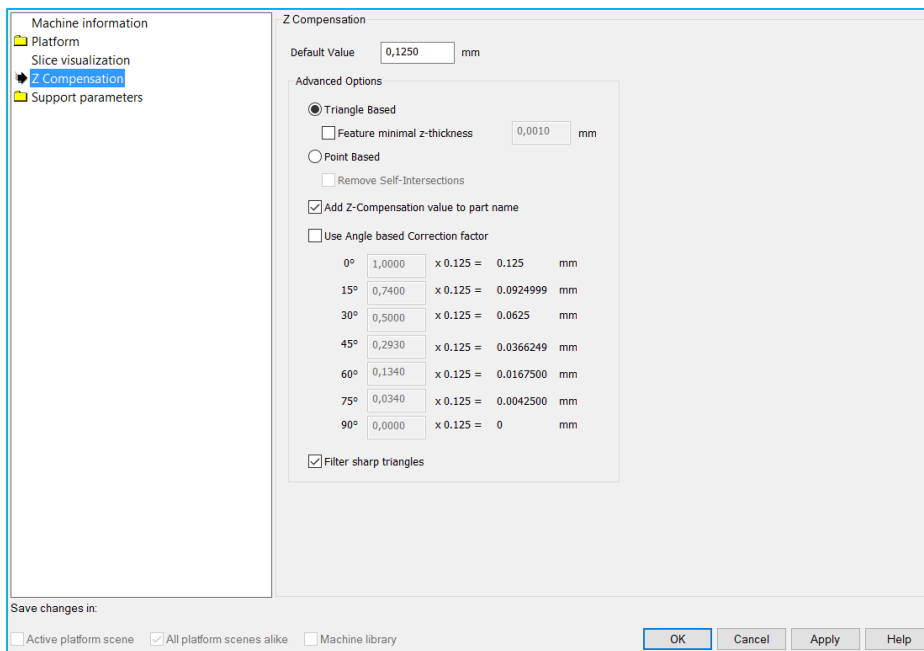


Add a STL to the platform as no build zone



Copy the no build zones from another machine

11.2.2 Z Compensation



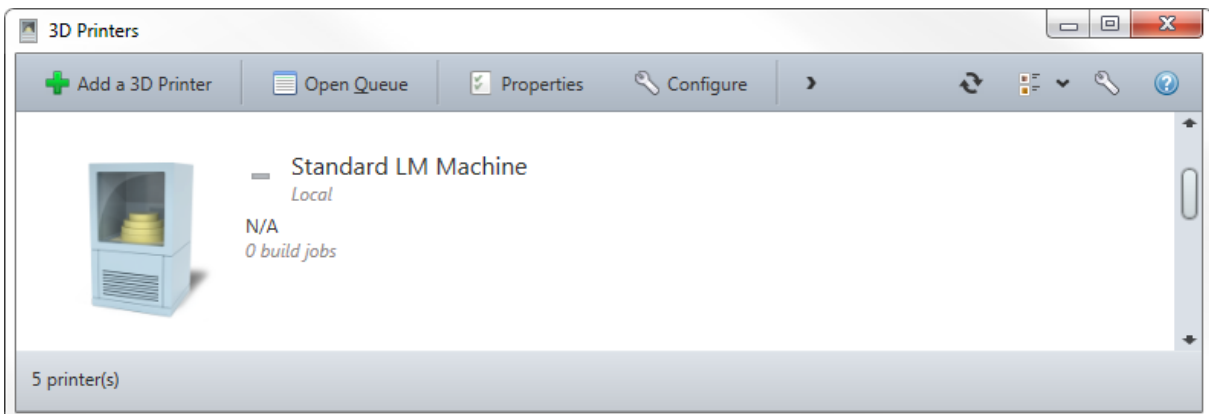
11.2.3 Change Machine



Change Machine

If you want to change the machine of the active Platform Scene, you can do this with this operation. The Select Machine dialog will pop up and you can choose another machine and another support profile for this machine.

11.2.4 Build Processor Manager

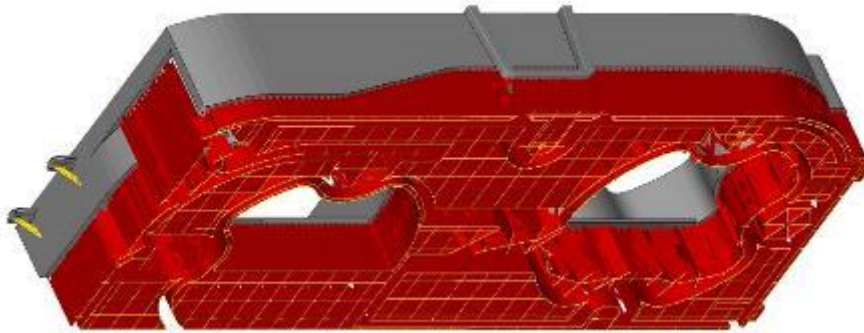


The Build Processor Manager gives the user an overview of all the machines that are compatible with the user's version of Magics Print.

12 Support Generation

Support generation is important in Metal 3D printing. Generating support structures quickly and easily is crucial in Rapid Prototyping. Final part quality depends on verifying and adapting the

supports you've generated. Magics Print offers several support types and combinations of these different support structures on one surface.



12.1 Introduction

Magics Print for Metal is equipped with a module for support generation. The support generator allows you to generate supports for a whole platform and then edit the support on each surface individually. This support generation work routine allows you to easily adapt supports, also after the part has been replaced on the building platform.

Support is only needed on certain surfaces. The selection is based upon the selection parameters from the Machine Properties (1: Support generation parameters). Magics Print Metal selects these surfaces when entering the support generation module (2: Automatic support generation). Once you've arrived in the support generator module, Magics Print allows you to adapt the support to your needs (3: Modifying surfaces, support types and parameters). The support generation parameters are crucial during the initial automatic support generation but can be modified for each individual support. In the first place you can adapt the construction parameters, which are interactively defined in the Machine Setup. This interactive change applies only to the active support. The active support is the one that is visible on your screen or when you made them all visible, it is the one with a different color (the bad edges color; default yellow). Secondly you can remove parts of the support in 3D or remove and if necessary redraw portions of the support in the 2D-edit window. At last you can save or export the support you've made.

Schematically a support is generated in the following steps:

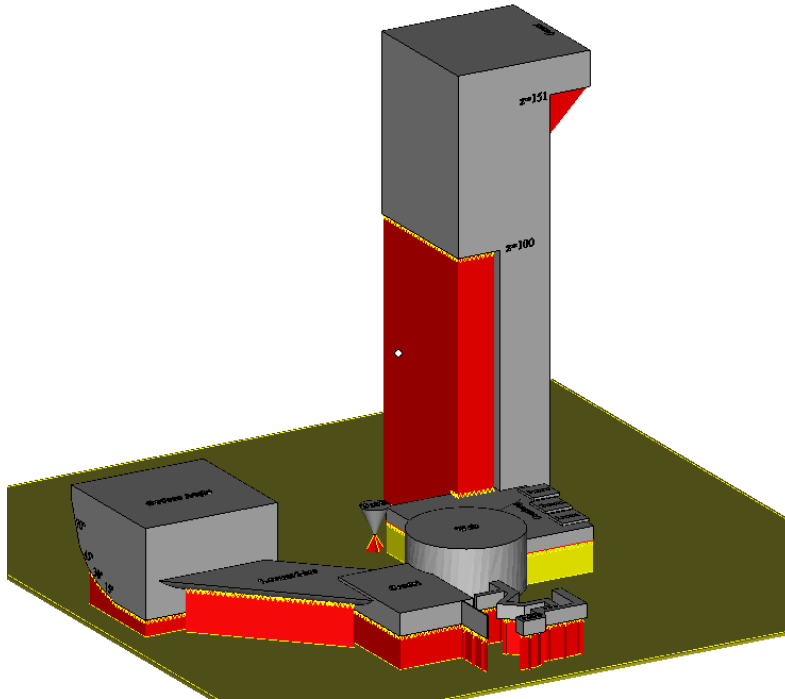
- Definition of the selection and the construction parameters in the Machine Setup;
- Automatic support generation;
- Modification of the support types and construction parameters;
- 2D and 3D editing of the supports;
- Saving and exporting the supports.

12.2 Support Generation ribbon

12.2.1 Generate support



Easily create support structures on your part. Simply chose your platform, place your parts and generate your support one by one or multiple copies at the same time.

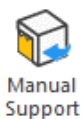


12.2.2 Generate support of selected



Generate support for selected parts without accessing the support generation module. To generate the supports, Magics Print will utilize the support parameters which are found within the actual platform.

12.2.3 Manual support

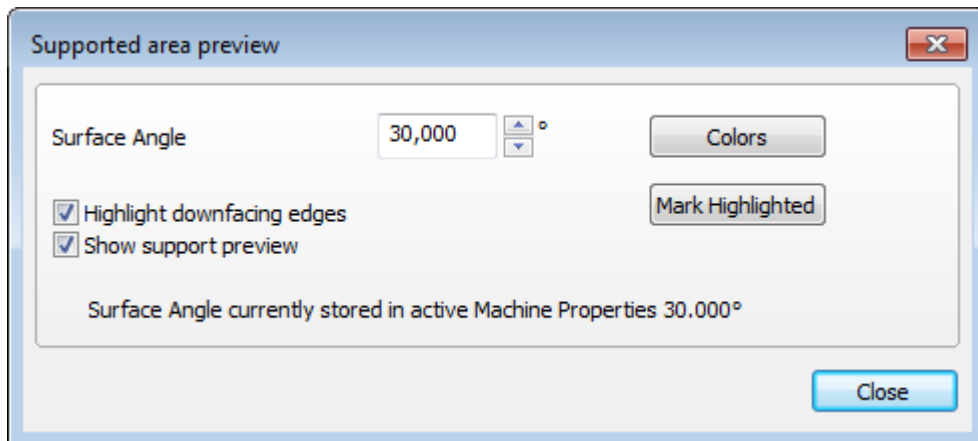


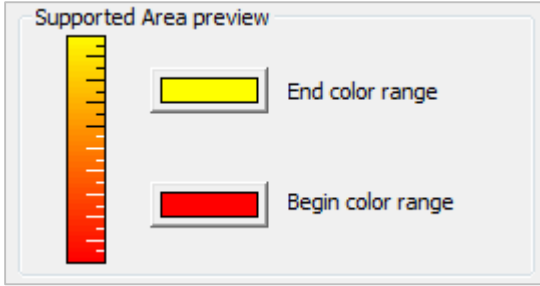
Let Magics Print Metal subdivided your part into the different surfaces that need support. Within the support generation module you can manually create the needed support structures for the already existing surfaces.

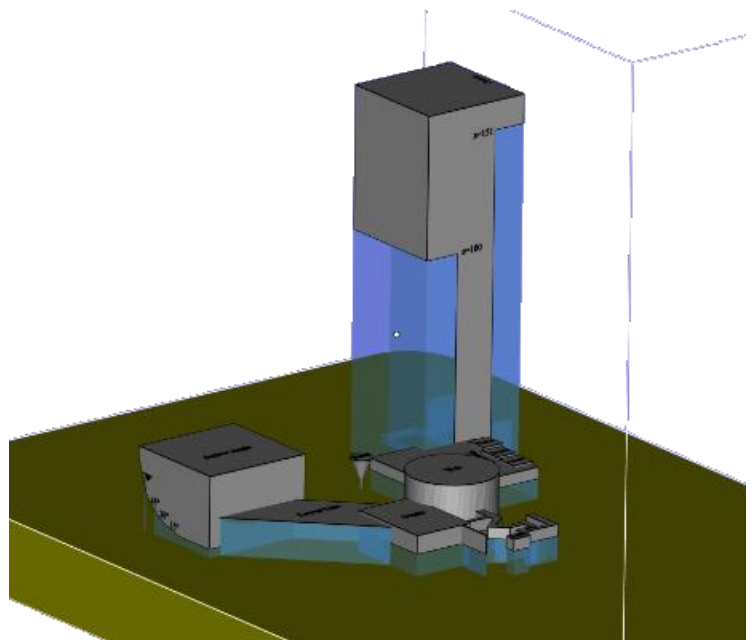
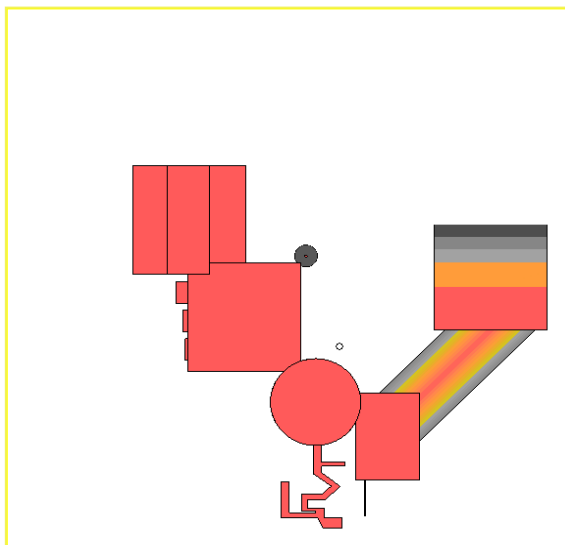
12.2.4 Supported area preview



Before generating your support within the support generation module, you can in advance visualize the areas that would need support. Based on the surface angle, the supported areas are indicated with color codes. Additionally it is possible to highlight the down facing edges. When checking the 'Show support preview' checkbox, a provisional display of the support is visualized. At the same time of the visualization you can change the surface angle or re-position your part based on the analysis of the surfaces and edges.



Surface Angle	Adjust the surface angle and see immediately on your part how the surfaces that need support change.
Colors	Change the colors to visualize the areas which need support 
Mark highlighted	Marks the highlighted areas.



12.2.5 Unload support



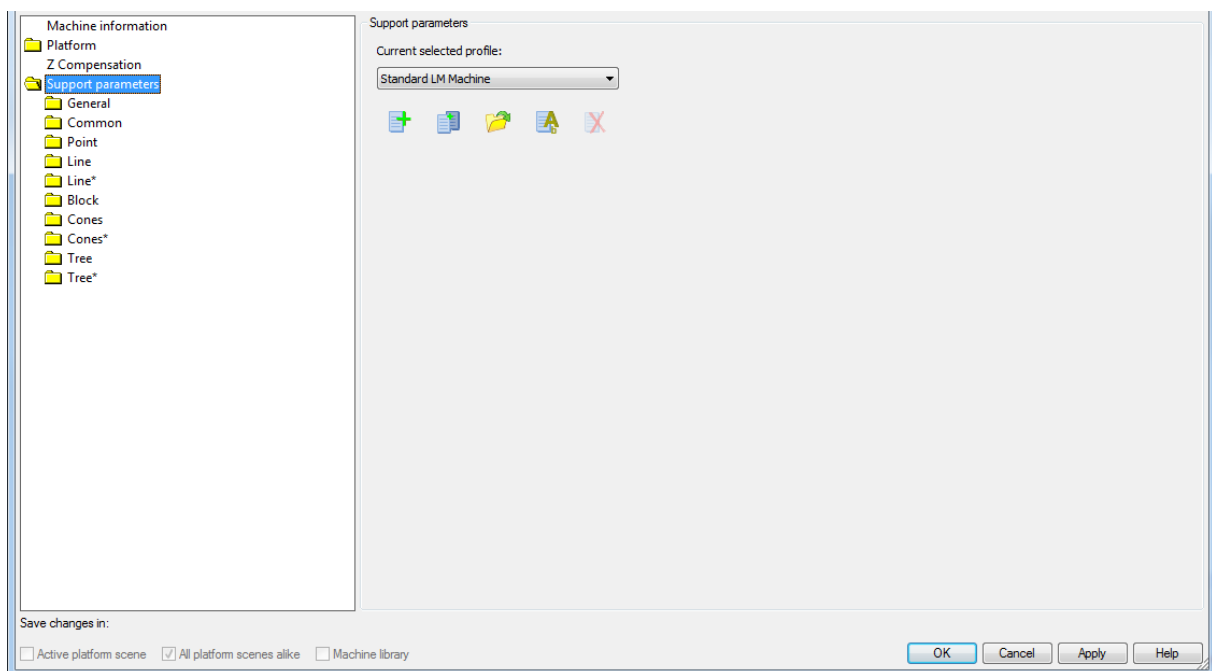
Unload
Support




Unload generated supports of parts that are selected.



12.3 Support Parameters – Machine properties

12.3.1 Support parameters profile

Magics Print Metal offers the possibility to manage different support parameters profiles for the same machine. This represents something useful when working with different kind of parts, different materials or different part size which might request different supports and parameters.

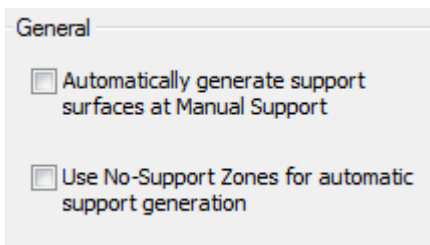


<p>Create new profile</p> 	<p>Create a new support profile for the selected machine.</p>
<p>Copy profile</p> 	<p>Use an existing profile to create a new profile by copying. After copying the profile you can make the needed modifications. Make sure to save your modifications to the 'Machine library'.</p>
<p>Load profile</p> 	<p>Load an already existing profile into your instance of Magics Print. Profiles generated on other systems can also be loaded.</p>
<p>Rename profile</p>	<p>Add a new name for the profile</p>

	
Delete profile	Remove a profile from the list when it is no longer used
	

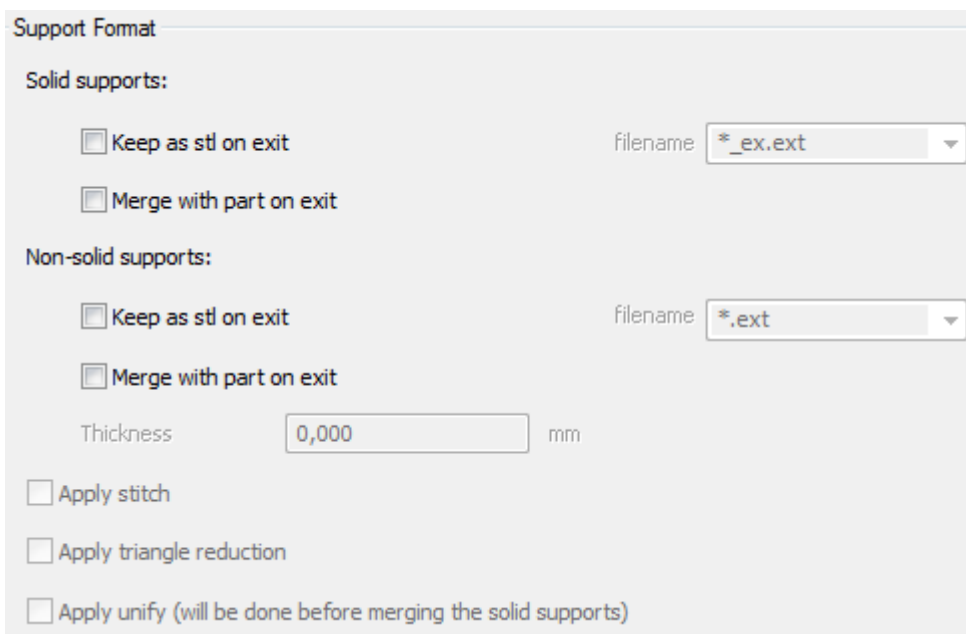
12.3.2 General

Useful feature for those who want to mark specific areas for support and do not want to wait too long for auto-generating of support surfaces which are not needed. Disable “Automatically Generate support surfaces at Manual support” to not calculate and generate these support surfaces in your support list.

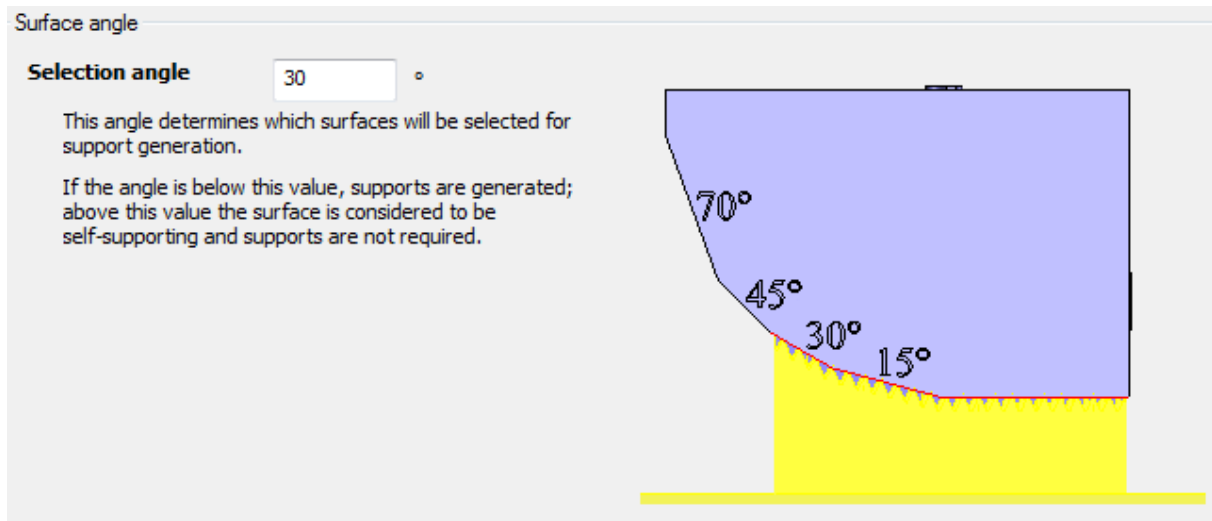


12.3.2.1 Support Format

Defines how supports are handled when exiting the support module



12.3.2.2 Surface Selection



Selection Angle	The Selection Angle defines which triangles are selected for support generation and which are not. It is defined as the angle between the horizontal plane and the surface. Surfaces whose angle to the horizontal plane is bigger than the selection angle are supposed to be self-supporting. This angle can be changed individually for each supported surface in the Support Generation Module (see Modifying Surfaces, Support, Types and Parameters).
-----------------	---

Surface filter

This function defines areas that are so small "noise" that they do not need support.

Surface filter mm²

surfaces smaller than the defined area won't be supported unless they are critical

☐ **Unconditional surface filter**

ALL surfaces smaller than defined area won't be supported. It doesn't matter if it is critical.

Sharp edge filter mm

Sharp edges shorter than indicated value won't be supported.

☐ **Maximum height** mm

Surfaces higher than defined height won't be supported.

☐ Automerge surfaces

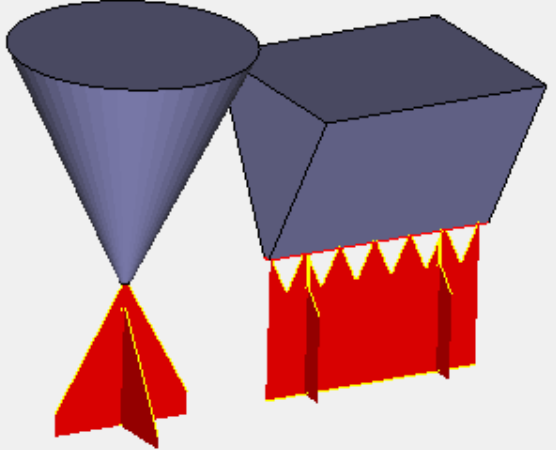
☐ **Platform support only**


☒ Keep support on partial platform contact

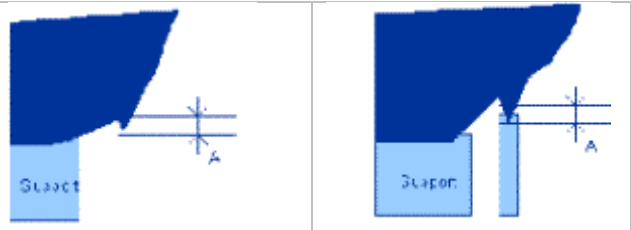
☐ Keep support only on full platform contact

☐ Keep individual support segments on platform contact

☐ Keep individual support segments on platform contact while avoiding internal support



Surface filter	Noise in the STL file can give rise to a huge amount of surfaces. The Surface Filter will filter out all surfaces which are smaller than this parameter, and which are supported by at least one other triangle. These surfaces will not be visible in the interactive support generator.
Unconditional surface filter	The unconditional surface filter will filter out all surfaces smaller than this parameter, also those that are not supported by other triangles.
Sharp edge filter	<p>Magics Print will support sharp down facing edges or points in the STL-file, in cases where there is no complete down facing surface available like for example in the following figures:</p>  <p>The surface area of a sharp edge support is 0. Consequently these sharp edges will be found at the end of the surface list in the Support Generation Module. This functionality is very sensitive to STL noise. STL noise can create a lot of situations in which sharp edge supports are placed. The Sharp Edge Filter will minimize the effect of STL noise and avoid unnecessary supports. The value of the Sharp Edge Filter determines the height of the details for which sharp edge supports will be generated. If this</p>

	<p>value is 0, all sharp edges will be supported. Typically you can set this parameter at the same value as the slice distance.</p> 
Maximum height	Surfaces higher than the maximum height will not be supported.
Auto merge surfaces	Surfaces with small sharp triangles can be automerged.

12.3.2.3 Type Selection

Support types

Indicate the type of supports that can be used for support generation.

☐ None

☒ Non-solid

☒ Point

☒ Point*

☒ Line

☒ Line*

☒ Block

☐ Cones

☐ Cones

☐ Cones*

☐ Trees

☐ Trees

☐ Trees*

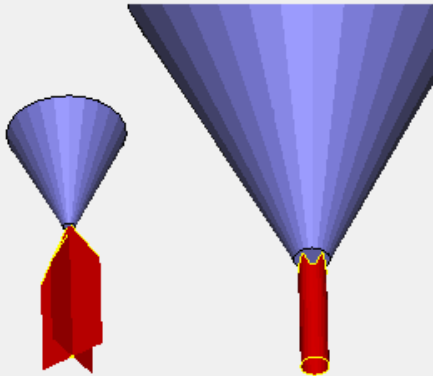
Support types	The user can define which types of support are generated automatically.
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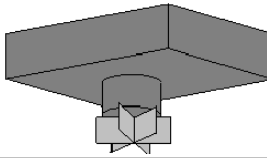
Point supports

Define the maximum size of a support surface where Magics will place a point support.

Maximum area mm²

Point supports provide more stable support for small surfaces, while other support types may be too small or potentially unstable during the build process.



Point supports	A Point Support will typically be selected for very small surfaces, where a Block Support would be too small and unstable.	
		
	Maximum Area	A Point Support will be selected if the surface is smaller than the 'Max Area' defined on this page.

Line supports

Define the maximum surface size that can be supported with a line support.

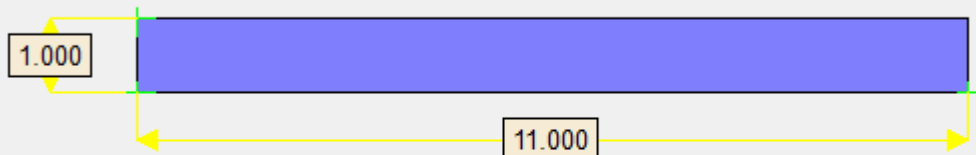
Minimum thinness (= Contour² / Surface)

The thinness of the surface area indicates how narrow the shape of the surface is; long small parts have a high thinness. Use this parameter to influence block or line support generation.

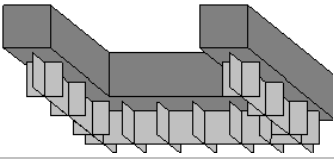
Maximum width mm

A line support will be generated when the width of an area is less than or equal to this value. If the width is greater this value, Magics will generate a more effective support type for this feature. Otherwise a different type of support will be generated, for example a block support.

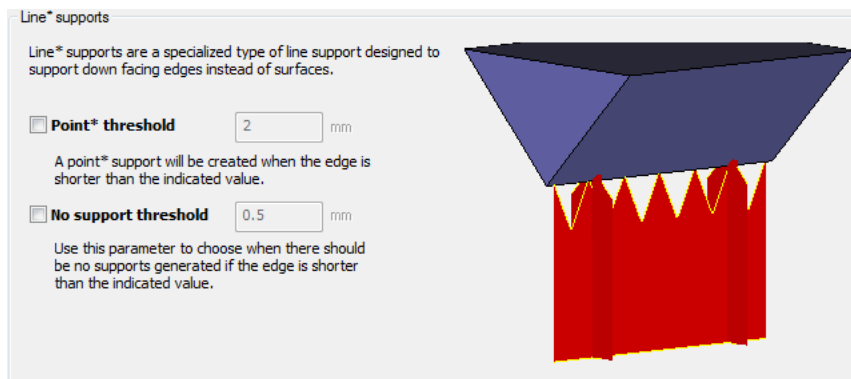
Example of a thinness calculation:

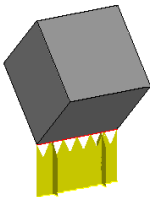


Contour = 2 x 1mm + 2 x 11mm = 24mm
 Surface area = 11mm x 1mm = 11mm²
 Thinness = contour² / surface = 24²/11 = 52.4

Line support	A line support is used for narrow down facing areas. This support type consists of a single wall down the center of the area and a number of crossing walls. A line support is not as strong as but easier to remove than classical block support. Since high line supports can become unstable, the user can reinforce them with an additional contour wall.	
		

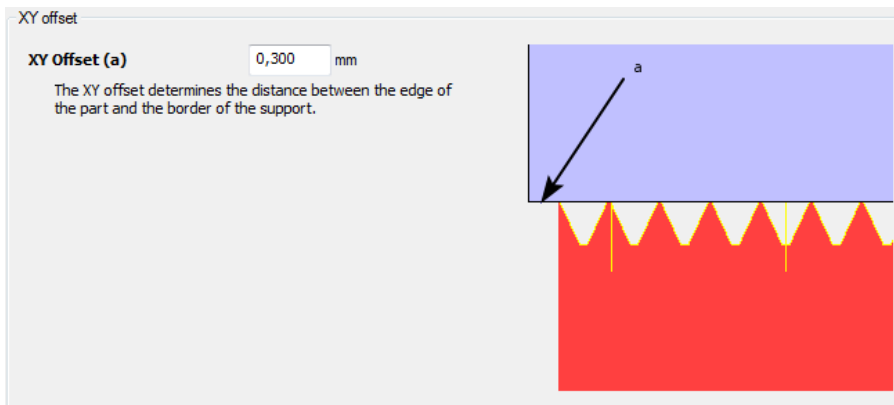
	Minimum thinness	The thinness of the surface area must at least be equal to this value. The thinness indicates how narrow the shape of the surface is. It is calculated as the ratio of the square contour length and the area of the surface. With this parameter the user can influence the number of automatically generated line supports.
	Maximum width	In order to receive a line support automatically, the average width of the surface area may not exceed this value.



Line* supports	Line* supports are a special kind of line supports. They support down facing edges. They do not support a surface (the surface is 0 mm ² and contains 0 triangles).	
		
	Point threshold	When the edge is shorter than the given length, a point support will be set.
	No support threshold	This filter will not put supports when the edge is shorter than the given length.

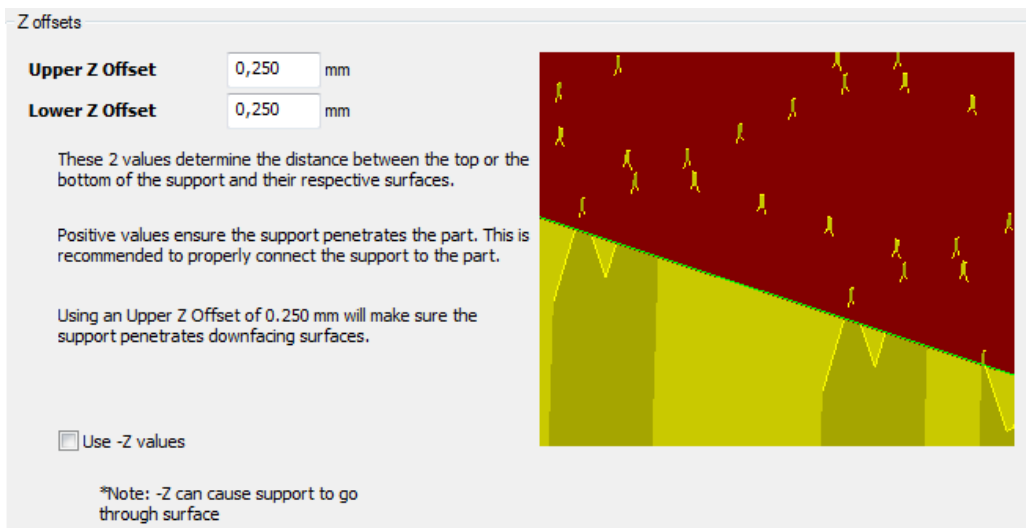
12.3.3 Common

12.3.3.1 XY offset



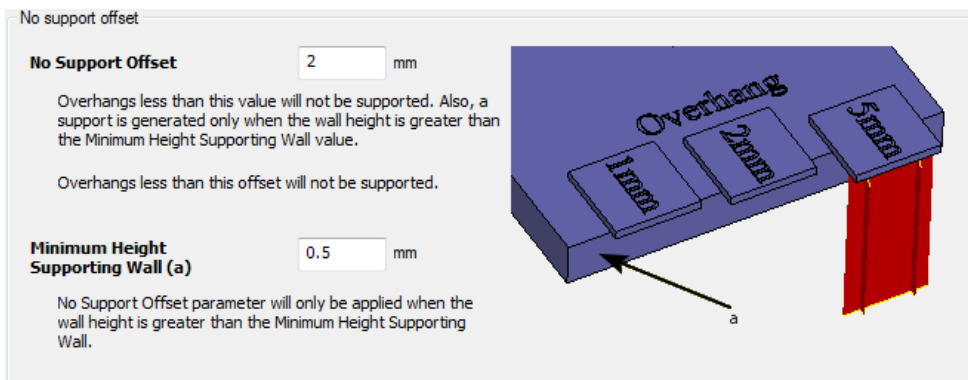
XY offset	This offset defines how far the support must be from the border of the part.
-----------	--

12.3.3.2 Z offsets



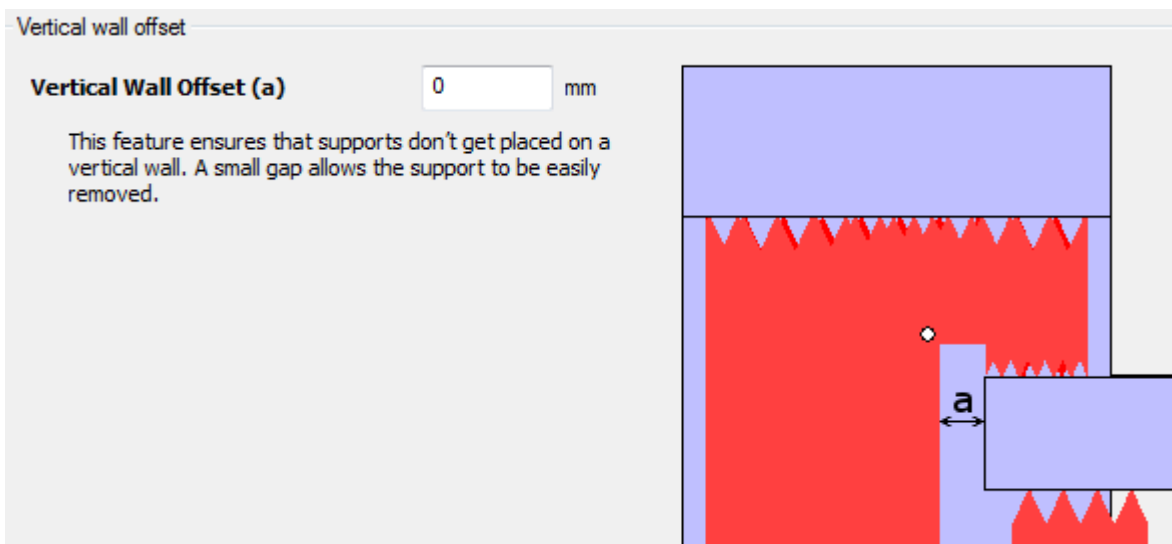
Z offsets	All the supports can have a certain offset into the part in order to ensure a better contact between part and support.	
	Upper Z Offset	You can specify an offset in the supported surface.
	Lower Z Offset	You can specify an offset in the supporting surface.

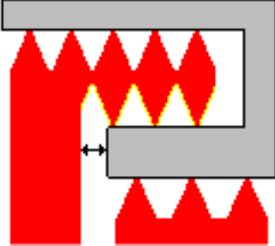
12.3.3.3 No support offset



No support offset	A (more or less) vertical wall gives support to another surface. For this reason, there is no support needed if there is only a very small overhang.	
	No Support Offset	You can define the distance up till where the vertical wall is supporting.
	Minimum Height Supporting Wall	You can define the minimum height of the wall to be a supporting wall.

12.3.3.4 Vertical wall offset



Vertical wall offset	<p>In case a support is generated beside a vertical wall, the parameter Vertical Wall Offset makes sure a distance is kept between the vertical wall and the support. This avoids support being attached to the vertical wall and hence, unnecessary difficulties and marks on the part when removing the support.</p> 
----------------------	---

12.3.3.5 Lowest line

Lowest line

☐ Draw Lowest Line

Minimum Length mm

When lowest line is checked, an extra line of support is created so that this lowest line (the imaginary line connecting the lowest points of the surface) is supported.



Lowest Line	<p>When placing a support under a curved surface, it can happen that the lowest line (= the imaginary line connecting the lowest points of the surface) is not supported correctly. This can cause problems when building the part with some RP-techniques. When lowest line is checked, an extra line of support will be placed so that this lowest line is correctly supported.</p> <p>Due to the surface triangulation it can be that some 'noise' lowest lines pop up. In that case you can better use the Local Minima.</p>	
	Minimum Length	Lowest Lines smaller than this length will be filtered out.

12.3.3.6 Thickness (PRO feature)

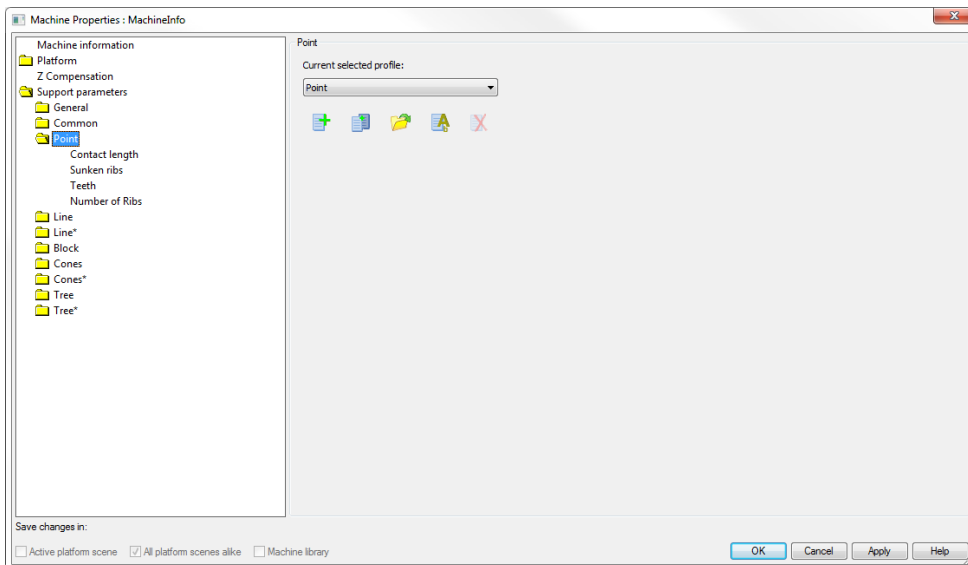



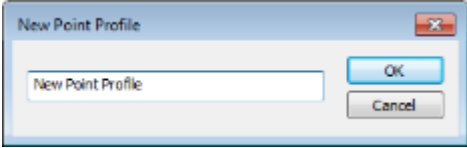

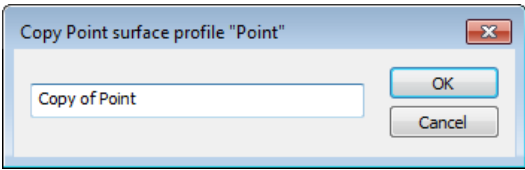
Thickness	Set the thickness for non-solid supports.	
	Upper teeth (a)	The thickness of the upper teeth in mm.
	Wall (b)	The thickness of the wall in mm
	Lower teeth	The thickness of the lower teeth in mm
	Trim at surface	The trim Z offset in mm


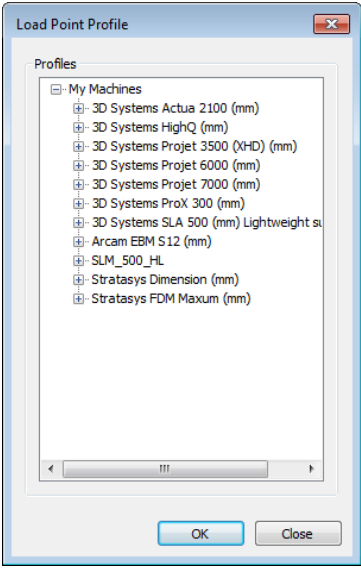

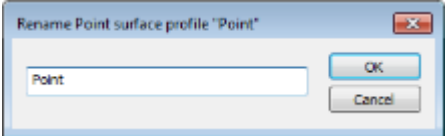

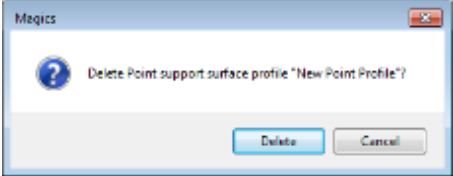
12.3.4 Point

12.3.4.1 Current selected profile

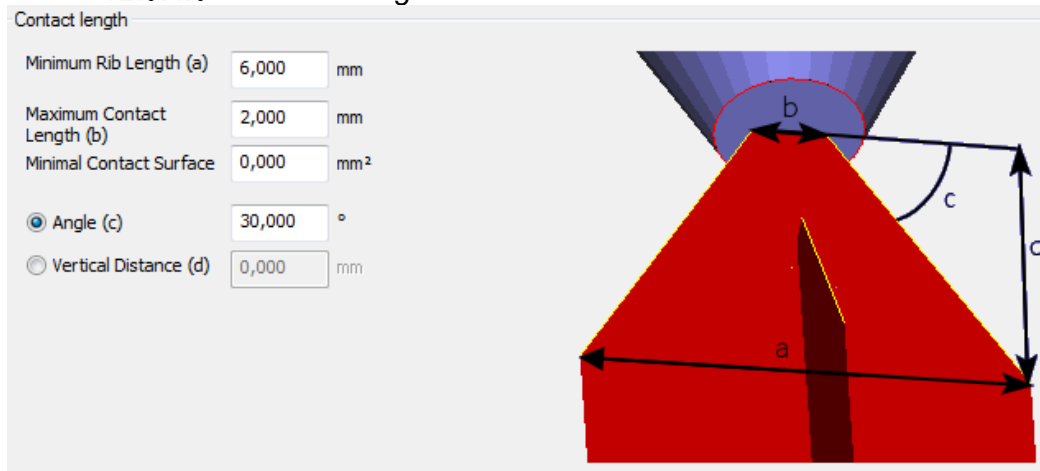
For every support type, it is possible to have multiple profiles. Select, create, copy, open rename or delete profiles in the main tab of the support type.

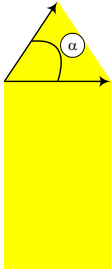



Current selected profile	Use the drop-down to select a different profile. There is always at least one profile available.	
	Create a new profile.	<p>Enter a new name in the pop-up window.</p>  <p>The created profile is available in the drop-down list.</p>
	Copy Profile	<p>Copy the current selected profile to create a new profile Enter a new name in the pop-up window for the copy.</p>  <p>The created copy is available in the drop-down list.</p>

	<p>Load an existing profile.</p>	<p>You can load any profile from the available machines.</p> 
	<p>Rename profile</p>	<p>Enter a new name for the selected profile.</p> 
	<p>Delete profile</p>	<p>Delete the selected profile.</p>  <p>It is not possible to delete all profiles. At least one profile will remain available.</p>

12.3.4.3 Contact length



Contact length	Minimum Rib Length	Determines the length of the ribs. <i>Note: you need a minimal length in order to have enough stability and to prevent the support from falling through the platform grid.</i>
	Maximum Contact Length	You also can define whether to support the complete surface or only a certain Contact Length.
	Angle	You can choose the angle α , from the support to the part. 
	Vertical Distance	You can choose the distance from the support to the part. 

12.3.4.4 Sunken ribs

Sunken ribs


☐ Sunken Rib

Sunken ribs stabilize the other ribs; it is not connected to the part surface

Number

The number of sunken ribs cannot be greater than total number of ribs -1

Distance (a) mm



Sunken ribs	To minimize the contact area of the support with the parts, some ribs of the point support can be sunken. This means that they will not go till the part. They will stop at a certain distance before the part.	
	Distance	The distance that a sunken rib will stop before the part.

12.3.4.5 Teeth

Teeth

☒ Lower

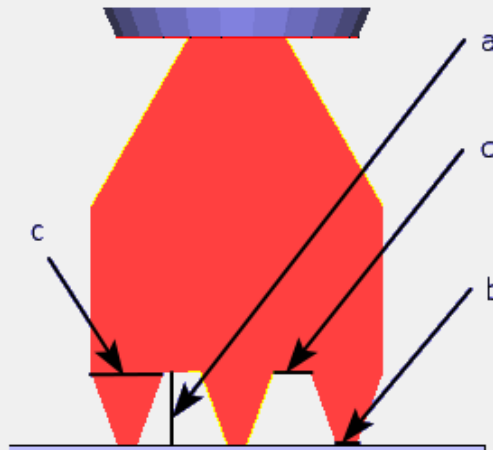
Height (a) mm

Top Length (b) mm

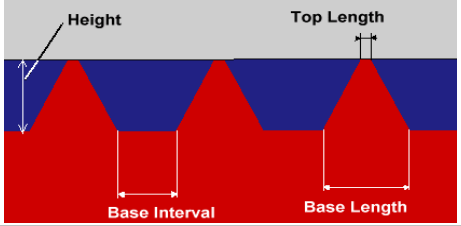
Base Length (c) mm

Base Interval (d) mm

Lower teeth are created if support leans on an upfacing surface. If support leans on a platform, no teeth are created



Teeth	In order to remove the supports easily from the part, the line supports are equipped with teeth profiles on the top and on the bottom.	
	Upper	You can specify whether you want Upper Teeth and/or Lower Teeth. Lower Teeth are only used if the support is trimming on another part. If the support is trimmed on the platform, there are no lower teeth.
	Lower	
	Height	
	Top Length	
	Base Length	

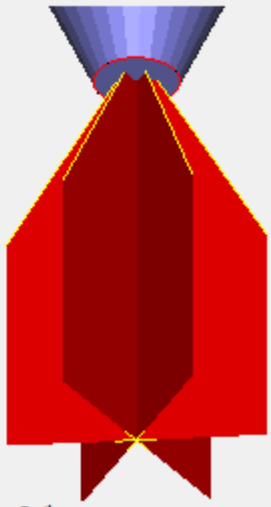
	Base Interval	
	Lower Teeth Same as Upper Teeth	The Lower Teeth have the same specifications as the Upper Teeth.
	Full teeth in ends	You can decide to half a full tooth at the end of a support, instead of half a tooth.
	Copy current parameters to all teeth	Copy the teeth parameters from this support type to all types which are using teeth.

12.3.4.6 Number of ribs

Number of Ribs

Number of Ribs

Define the number of ribs that make up the Point support



This support has 3 ribs

Number of Ribs	Determine the number of the ribs.
----------------	-----------------------------------

12.3.5 Line & Line *

12.3.5.1 Current selected profile

For every support type, it is possible to have multiple profiles. Select, create, copy, open rename or delete profiles in the main tab of the support type. See **Error! Reference source not found.** of the Point support type

12.3.5.2 Cross line length

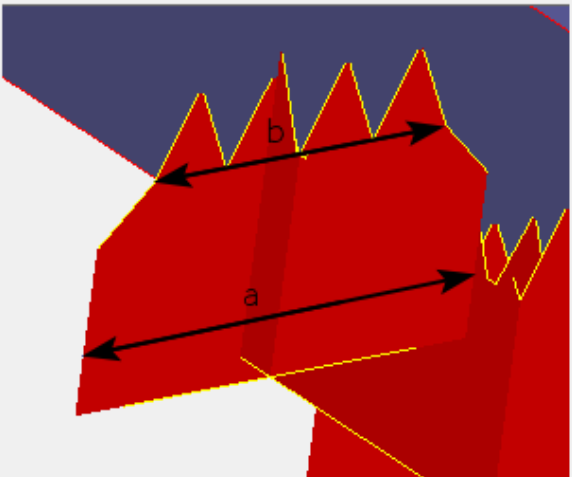
Cross line length

Minimum Rib Length (a) mm

The minimum rib length determines the length of the cross line. Larger ribs are more stable but may be harder to remove

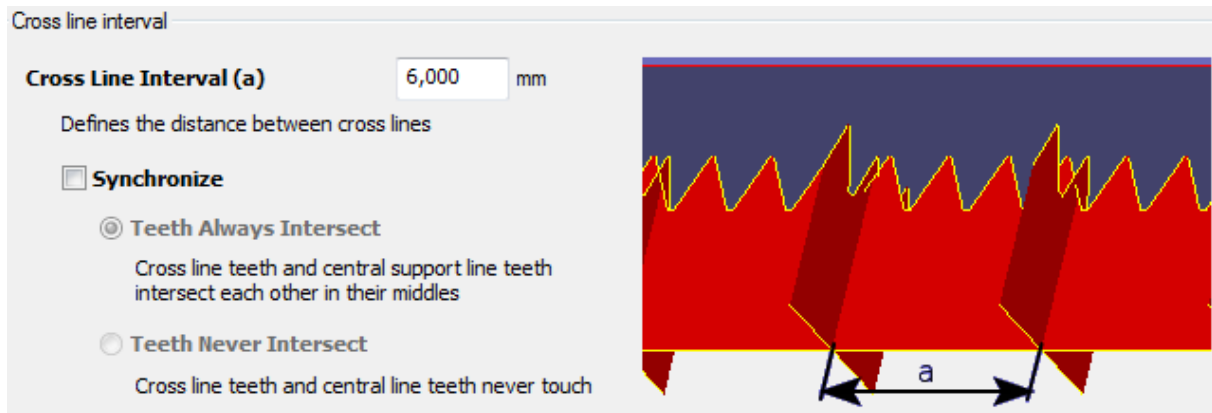
Maximum Contact Length (b) mm

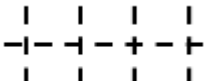
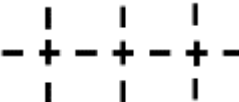
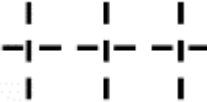
Maximum contact length limits the length of the contact between the support and the surface



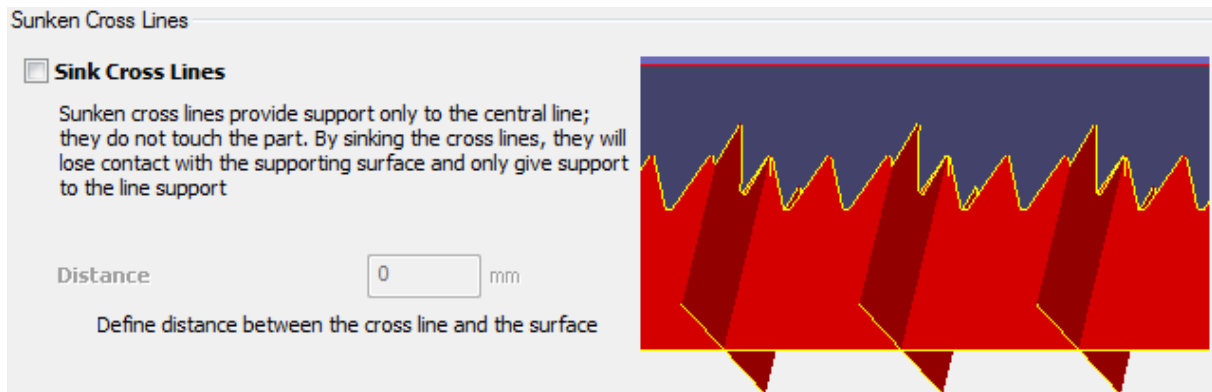
Cross line length	Here, you can enter the length of the crossing lines.	
	Minimum Rib Length	The length of the crossing lines.
	Maximum Contact Length	The contact length of the crossing lines with the support.

12.3.5.3 Cross line interval



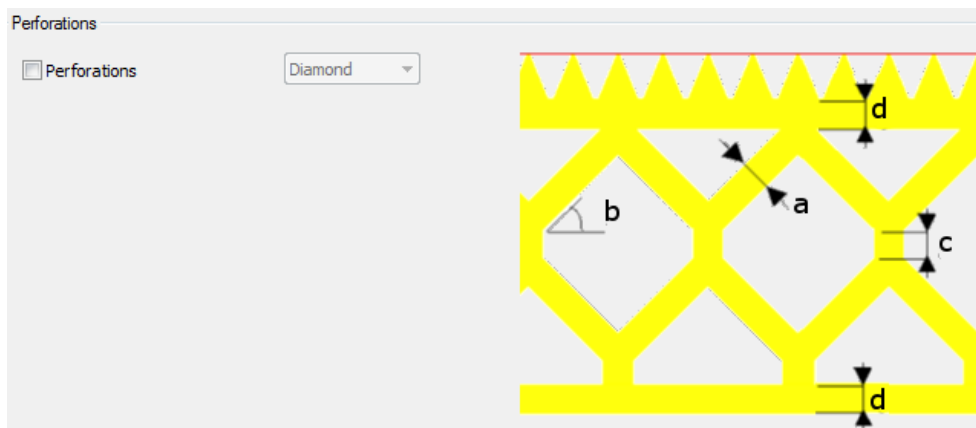
Cross line interval	Here you can set the distance between two consecutive cross lines of a line support.	
	Synchronize	The user can allow the synchronization of the teeth of the cross lines and the teeth of the central line. An example of Line support without synchronization is shown below.
		
	Teeth Always Intersect	The teeth of the cross lines and the central line cross each other right in the middle.
		
	Teeth Never Intersect	The teeth of the cross lines avoid to cross the teeth of the central line.
		
	Upper and lower teeth synchronization	Upper and lower teeth will be synchronized

12.3.5.4 Sunken cross lines

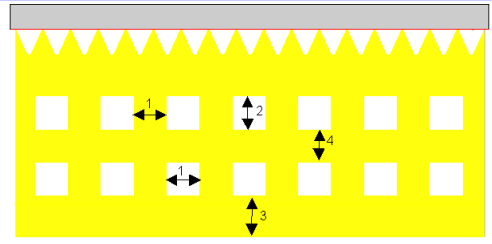


Sunken Cross Lines	To minimize the contact area of the support with the parts, the cross lines can be sunken, this means that they will not go till the part. They will stop at a certain distance before the part.	
	Distance	The distance that a sunken cross line will stop before the part.

12.3.5.5 Perforations



Perforations	If this option is checked, the support will be perforated. There are two kind of perforations possible:	
	Diamond	The shape and the size of the perforations are user defined by setting four parameters:
		Beam
		The beam thickness (1) defines the thickness of the beams.
	Angle	The perforation angle (2) determines the angle of the perforations
		Height
	Height	The height (3) of the vertical part is set with this parameter.

		Solid Height	The separate parameter Solid Height (4) guarantees a good connection to the platform and the teeth.
	Rectangular	<p>The shape and the size of the perforations are user defined by setting four parameters:</p> 	
		Width	The width parameter (1) defines the width of the rectangular holes.
		Height	The Height parameter (2) defines the height of the rectangular holes
		Solid Height	The Solid Height (3) parameter guarantees a good connection to the platform and the part.
		Interval	The interval parameter (4) defines the interval between the holes.
		Only Perforate... rows	The support will only be perforated for the given rows, starting from the bottom. This enables the drainage of resin and ensures stable supports.

12.3.5.6 *Teeth*

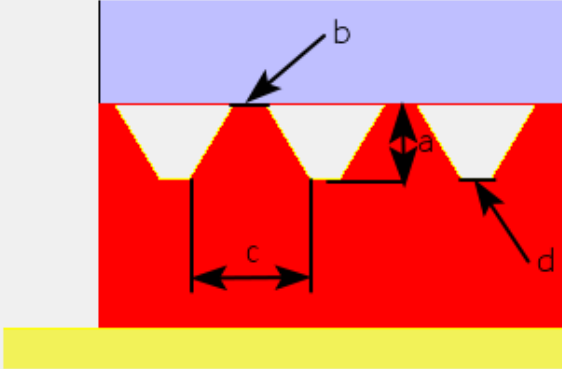
Teeth

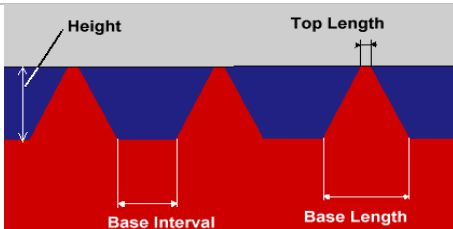
	<input checked="" type="checkbox"/> Upper	<input checked="" type="checkbox"/> Lower
Height (a)	<input type="text" value="1,5"/>	<input type="text" value="1,5"/> mm
Top Length (b)	<input type="text" value="0,1"/>	<input type="text" value="0,1"/> mm
Base Length (c)	<input type="text" value="1,5"/>	<input type="text" value="1,5"/> mm
Base Interval (d)	<input type="text" value="0,2"/>	<input type="text" value="0,2"/> mm

☒ Lower Teeth Same as Upper Teeth

☐ Full Teeth in Ends

Lower teeth are created if support leans on an upfacing surface. If support leans on a platform, no teeth are created



Teeth	In order to remove the supports easily from the part, the line supports are equipped with teeth profiles on the top and on the bottom.	
Upper	Lower	You can specify whether you want Upper Teeth and/or Lower Teeth. Those Lower Teeth are only used if the support is trimming on another part. If the support is trimmed on the platform, there are no lower teeth.
Height		
Top Length		
Base Length		
Base Interval		
Lower Teeth Same as Upper Teeth	The Lower Teeth have the same specifications as the Upper Teeth.	
Full teeth in ends	You can decide to have a full tooth at the end of a support, instead of half a tooth.	
Copy current parameters to all teeth	Copy the teeth parameters from this support type to all types which are using teeth.	

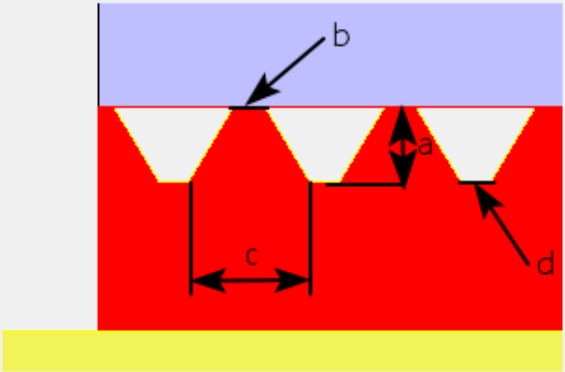
12.3.5.7 *Cross line teeth*

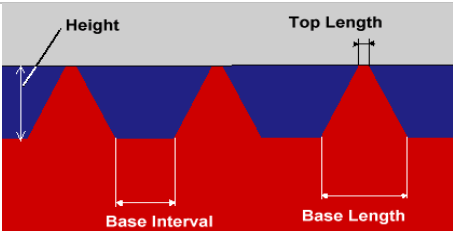
Cross line teeth

	<input checked="" type="checkbox"/> Upper	<input checked="" type="checkbox"/> Lower	
Height (a)	<input type="text" value="1,5"/>	<input type="text" value="1,5"/>	mm
Top Length (b)	<input type="text" value="0,1"/>	<input type="text" value="0,1"/>	mm
Base Length (c)	<input type="text" value="1,5"/>	<input type="text" value="1,5"/>	mm
Base Interval (d)	<input type="text" value="0,2"/>	<input type="text" value="0,2"/>	mm

☒ Lower Teeth Same as Upper Teeth

Lower teeth are created if support leans on an upfacing surface. If support leans on a platform, no teeth are created



Cross Line Teeth	These parameters are exactly the same as the teeth but they will be applied only for the cross lines used in line supports.	
Upper	You can specify whether you want Upper Teeth and/or Lower Teeth. Lower Teeth are only used if the support is trimming on another part. If the support is trimmed on the platform, there are no lower teeth.	
Lower		
Height		
Top Length		
Base Length		
Base Interval		
Lower Teeth Same as Upper Teeth	The Lower Teeth have the same specifications as the Upper Teeth.	
Full teeth in ends	You can decide to have a full tooth at the end of a support, instead of half a tooth.	

12.3.6 Block

12.3.6.1 Current selected profile

For every support type, it is possible to have multiple profiles. Select, create, copy, open rename or delete profiles in the main tab of the support type. See **Error! Reference source not found.** of the Point support type.

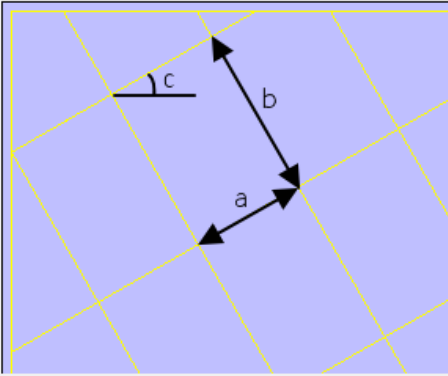
12.3.6.2 Hatching

Hatching

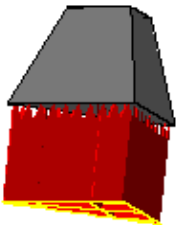

Set the parameters for the hatching strategy of block supports depending on Surface area

	Dimension	X Hatching (a)	Y Hatching (b)
<input type="checkbox"/> Surface < 0,000 mm ²	0,000 mm ²	6,000	6,000 mm
<input type="checkbox"/> Surface < 0,000 mm ²	0,000 mm ²	6,000	6,000 mm
<input type="checkbox"/> Surface < 0,000 mm ²	0,000 mm ²	6,000	6,000 mm
<input type="checkbox"/> Surface < 0,000 mm ²	0,000 mm ²	6,000	6,000 mm
Other: default		6,000	6,000 mm

Rotation Angle (c) 0,000 °



To create only a border and remove all hatching, select a large hatching size (100mm)

Hatching	<p>Block Supports are generated for larger surfaces, they are made with a grid of X and Y lines which are separated at a certain distance (X Hatching and Y Hatching). Hatching can be chosen depending on the surface area.</p> 
X Hatching	The distance between two X or Y hatchings. You can add 4 constraints to adjust the hatching distance depending on the surface dimensions.
Y Hatching	
Rotation Angle	<p>The hatchings on the first picture have no angle and they are parallel to the X- and Y-axes. On the second picture, they have an angle of 45°.</p> 

12.3.6.3 Hatching teeth

Hatching Teeth

☒ Upper ☒ Lower

Height (a) mm

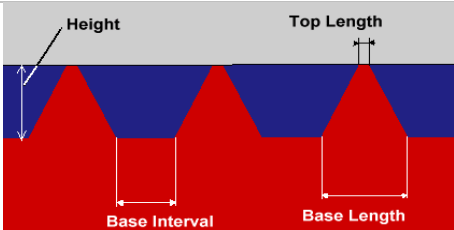
Top Length (b) mm

Base Length (c) mm

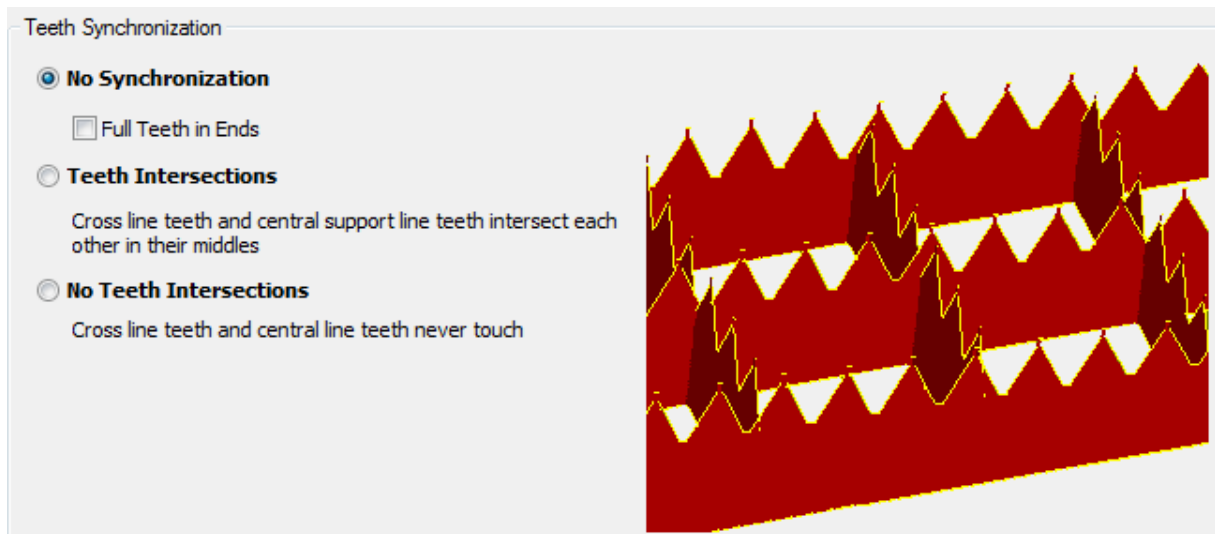
Base Interval (d) mm

☒ Lower Teeth Same as Upper Teeth

Lower teeth are created if support leans on an upfacing surface. If support leans on a platform, no teeth are created

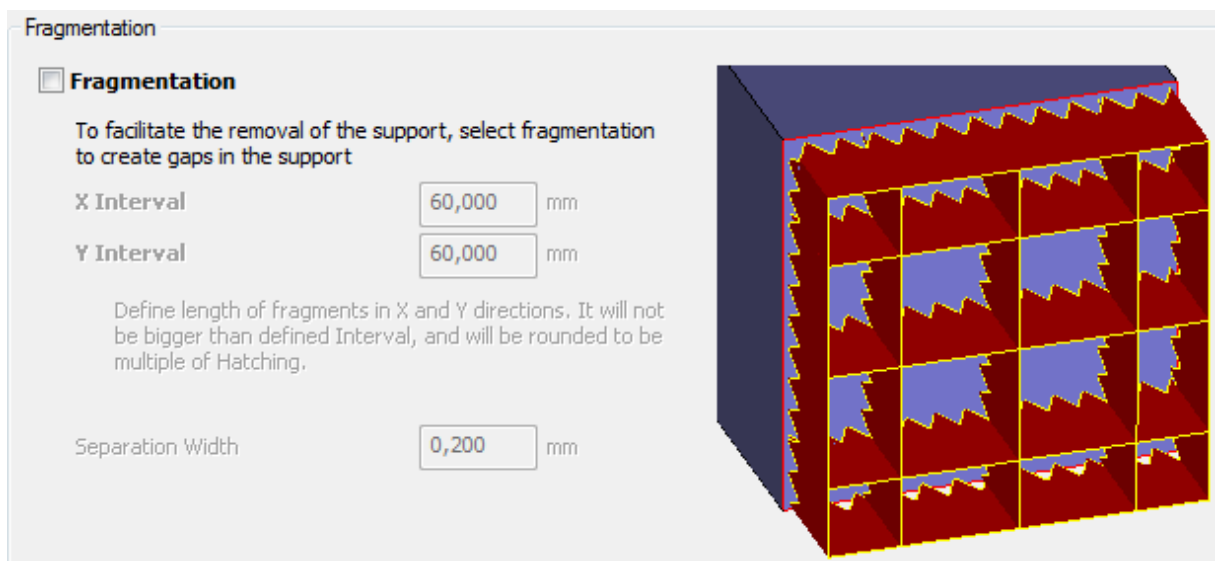
Hatching teeth	In order to remove the supports easily from the part, the hatchings are equipped with teeth profiles on the top and on the bottom.	
Upper	You can specify whether you want Upper Teeth and/or Lower Teeth. Lower Teeth are only used if the support is trimming on another part. If the support is trimmed on the platform, there are no lower teeth.	
Lower		
Height		
Top Length		
Base Length		
Base Interval		
Lower Teeth Same as Upper Teeth	The Lower Teeth have the same specifications as the Upper Teeth.	
Full teeth in ends	You can decide to have a full tooth at the end of a support, instead of half a tooth.	

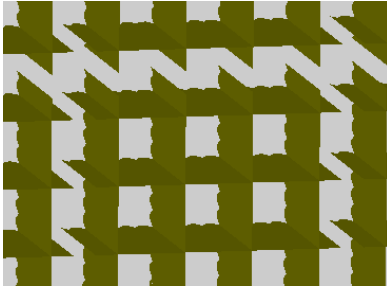
12.3.6.4 Teeth synchronization



The user can allow the synchronization of the teeth of the cross lines and the teeth of the central line.	
No Synchronization	
Teeth Intersections	
No Teeth Intersections	

1.3.4.1. Fragmentation



Fragmentation	Fragmentation will leave a small gap in the hatching of the block support each chosen distance, so the removal of block supports will become a lot easier.	
		
	X Interval	The interval of the gaps according the X direction.
	Y Interval	The interval of the gaps according the Y direction.
	Separation Width	The width of the gaps in the hatching.
Fragmentate Borders	Check this option if you want the borders to be fragmented too.	

12.3.6.5 Hatch removal

Hatch removal

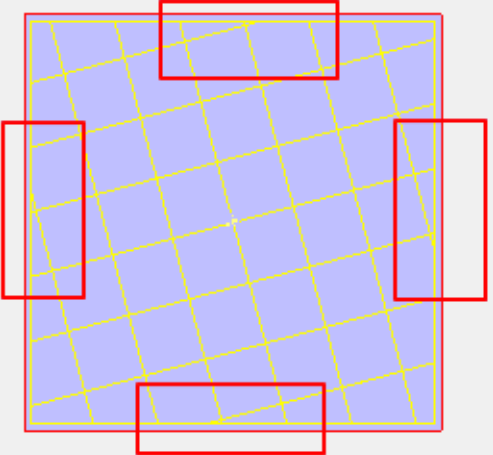
☐ **Remove Hatches**

Sometimes the software creates very small hatches, especially when using a small hatch size and a small angle. To remove these hatches, select hatch removal

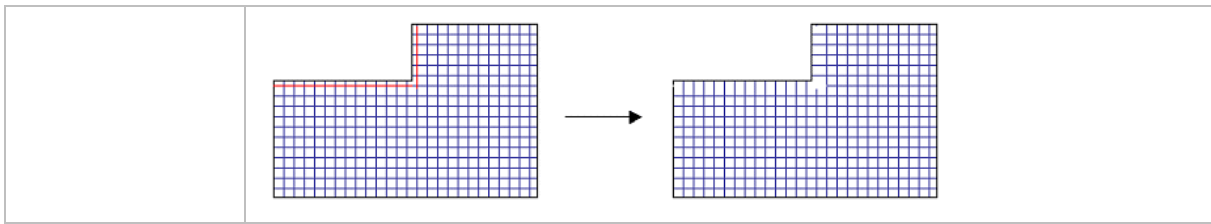
Closer Than mm

With an Angle °

Smaller Than



Hatch Removal	In case a hatch would be placed too close to the border, problems during the removal of the support can arise.	
	Closer Than	Closer Than defines the minimum distance hatching stays away from the border.
	With an Angle Smaller Than	Angle defines the minimum angle a rib has to make with the border in order not to be withdrawn with the clearance distance.



1.3.4.2. Borders

Borders

☒ **Draw Borders**

Select draw border to create a border around the support

☐ **Fragmentate Borders**

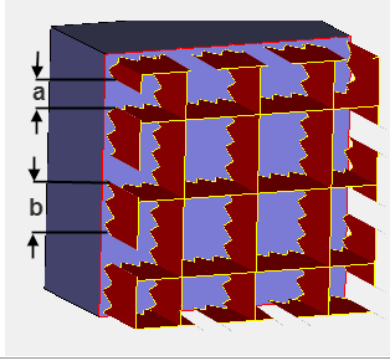
To facilitate the removal of support, select fragmentation to create gaps in the support

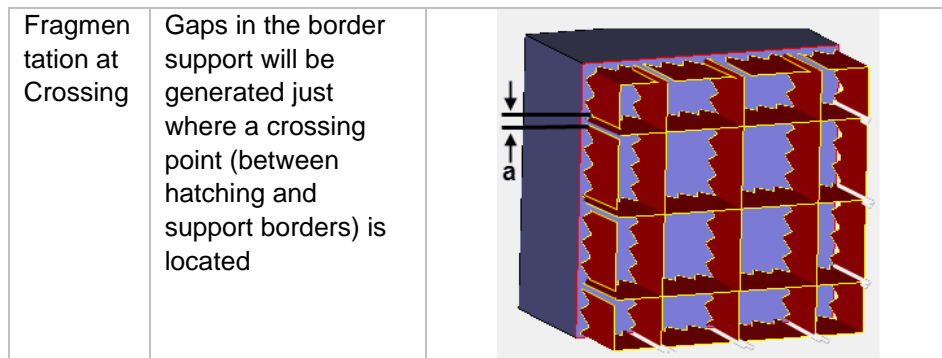
Separation Width (a) mm

Interval (b) mm

If border lenght cannot be divided without modulo, the last actual interval $< (b * 2 + a)$

☐ **Fragmentation at crossing**

Borders	The borders of the support will be reinforced with an additional contour wall.	
Fragmentate Borders	Gaps in the border support will be generated	
	Separation Width (a)	Gaps width
	Interval (b)	Distance between the end of a gap and the starting of the next



12.3.6.6 Border teeth

Border Teeth

☒ Upper ☒ Lower

Height (a) mm

Top Length (b) mm

Base Length (c) mm

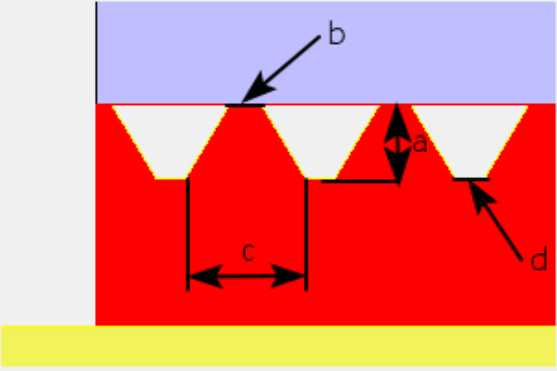
Base Interval (d) mm

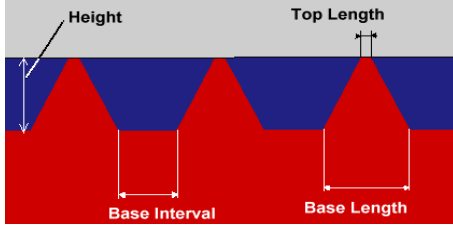
☒ Lower Teeth Same as Upper Teeth

☐ Full Teeth in Ends

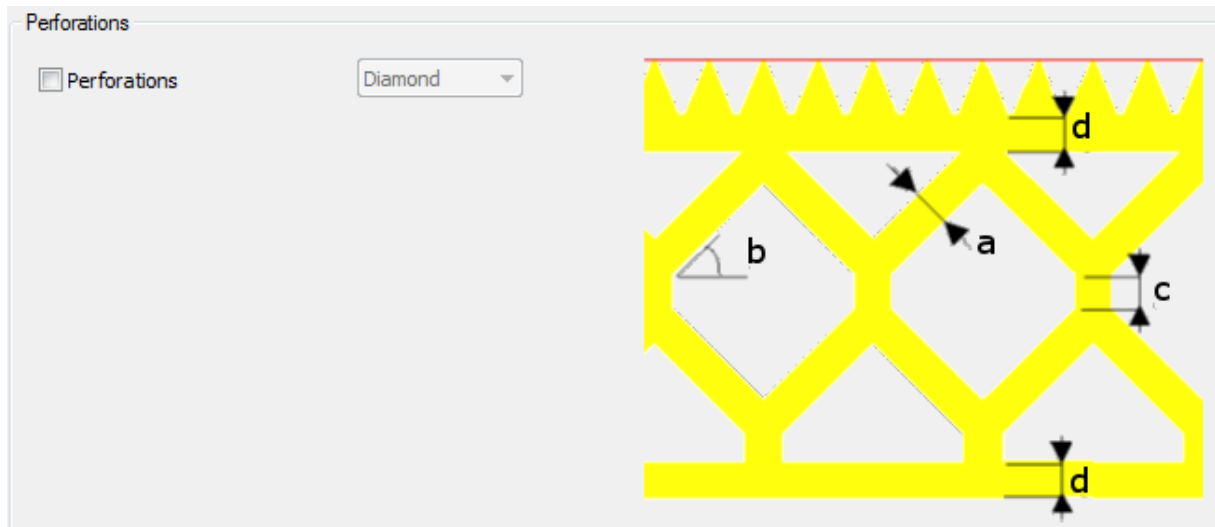
Copy current parameters to all teeth

Lower teeth are created if support leans on an upfacing surface. If support leans on a platform, no teeth are created



Border teeth	In order to remove the supports easily from the part, the hatchings are equipped with teeth profiles on the top and on the bottom.	
	Upper	You can specify whether you want Upper Teeth and/or Lower Teeth. Those Lower Teeth are only used if the support is trimming on another part. If the support is trimmed on the platform, there are no lower teeth.
	Lower	
	Height	
	Top Length	
	Base Length	
	Base Interval	
	Lower Teeth Same as Upper Teeth	The Lower Teeth have the same specifications as the Upper Teeth.
	Full teeth in ends	You can decide to have a full tooth at the end of a support, instead of half a tooth.

12.3.6.7 Perforations



Perforations		If this parameter is set, the support will be perforated. In Magics Print Metal There only one possible kind of perforations:
Diamond		The shape and the size of the perforations are user defined by setting four parameters:
Beam	The beam thickness (1) defines the thickness of the beams.	
Angle	The perforation angle (2) determines the angle of the perforations	
Height	The height (3) of the vertical part is set with this parameter.	
Solid Height	The separate parameter Solid Height (4) guarantees a good connection to the platform and the part.	
Width	The width parameter (1) defines the width of the rectangular holes.	
Height	The Height parameter (2) defines the height of the rectangular holes	

12.3.7 Cones

12.3.7.1 Current selected profile

For every support type, it is possible to have multiple profiles. Select, create, copy, open rename or delete profiles in the main tab of the support type. See **Error! Reference source not found.** of the Point support type.

12.3.7.2 Cones

Cones

Size

Contact part (R1)

from

0,1

to

0,5

mm

Contact platform (R2)

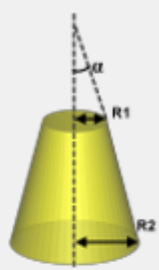
from

0,1

to

0,8

mm



*Cones can be merged when overlapping

Spacing

(1) Min distance between cones

1,5

mm

(2) Min distance between rows

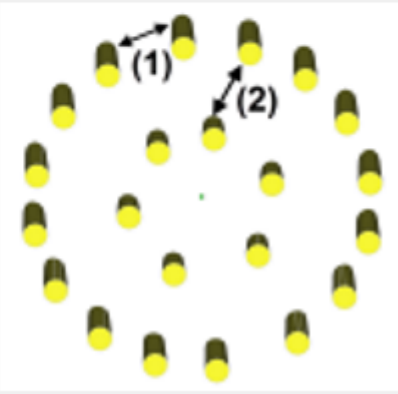
1,5

mm

Max distance between cones

3

mm



*Cones will be placed based on surfaces shape

Size	Here you can define the cones dimensions	
	Contact part	Diameter of cone when contacting the part
	Contact Platform	Diameter of cone when contacting the platform
Spacing	Here you can define the spacing of the cones	
	Min distance between cones	Min distance between cones in the spacing setup
	Min distance between rows	Min distance between 2 rows of the spacing setup
	Max distance between cones	Max distance between cones in the spacing setup

12.3.7.3 *Lowest Line*

Lowest line

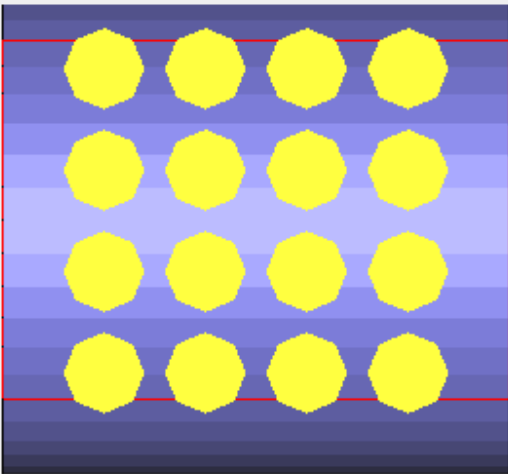
☐ Draw Lowest Line

When lowest line is checked, an extra line of supports is created so that this lowest line (the imaginary line connecting the lowest points of the surface) is supported

Minimal Spacing (a) mm

Minimum Length mm

Note: the effects of this parameter are also found in the common parameters -> lowest line



Draw lowest line	Will draw support at the lowest points of your parts	
	Minimal spacing	Space between cones
	Min length	Defines what the minimum length of the cones needs to be when drawing a lowest line. Cones smaller than this will not be drawn.

12.3.7.4 *Preview*

Preview

You can choose to generate a preview of the cones before the actual cones are generated.

This is recommended since the cones generation is time consuming

☒ Generate preview

☐ Generate actual cones

Generate preview	Cones will be visualized by wire frames
Generate actual cones	Cones will be generated as solids

12.3.7.1 *Z Offset Direction*

Z Offset Direction

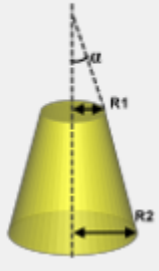
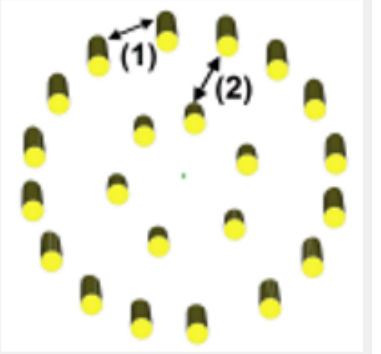
Direction ☒ Inside

☐ Outside

☐ Only trim at platform

12.3.8 Cones*

12.3.8.1 Size & Spacing

Size	<div data-bbox="443 450 1225 808"> <p>Size</p> <p>Contact part (R1) <input type="text" value="0,1"/> mm</p> <p>Contact platform (R2) <input type="text" value="0,1"/> mm</p>  </div> <p>Here you can define the cones dimensions</p> <table border="1"> <tr> <td>Contact part</td><td>Diameter of cone when contacting the part</td></tr> <tr> <td>Contact Platform</td><td>Diameter of cone when contacting the platform</td></tr> </table>	Contact part	Diameter of cone when contacting the part	Contact Platform	Diameter of cone when contacting the platform
Contact part	Diameter of cone when contacting the part				
Contact Platform	Diameter of cone when contacting the platform				
Spacing	<div data-bbox="443 958 1401 1384"> <p>Spacing</p> <p>Max distance between cones <input type="text" value="0,1"/> mm</p>  </div> <p>Here you can define the spacing of the cones</p> <table border="1"> <tr> <td>Max distance between cones</td><td>Max distance between cones in the spacing setup</td></tr> </table>	Max distance between cones	Max distance between cones in the spacing setup		
Max distance between cones	Max distance between cones in the spacing setup				

12.3.9 Tree & Tree *

12.3.9.1 Current selected profile

For every support type, it is possible to have multiple profiles. Select, create, copy, open rename or delete profiles in the main tab of the support type. See **Error! Reference source not found.** of the Point support type.

12.3.9.2 Trunk

Trunk

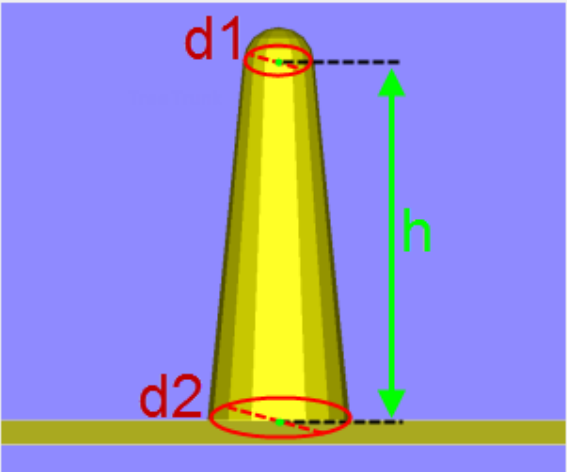
Defines tree support trunk parameters

Diameter top (d1) mm

Diameter bottom (d2) mm

Height (h) mm

Note: height will only be used in manual trees



Diameter top	Diameter top trunk cone
Diameter bottom	Diameter bottom trunk cone
Height	Height trunk cone

12.3.9.3 Branch

Branch

Defines tree support branch parameters

Diameter top (d1) mm

Diameter bottom (d2) mm

☐ Add break-off point

Diameter (d3) mm

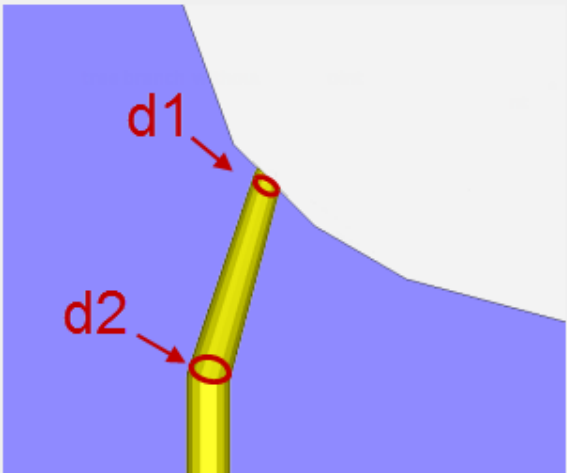
Distance from top (x) mm

Break-off point location

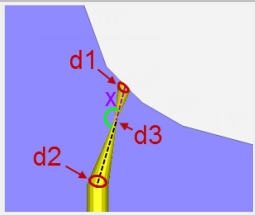
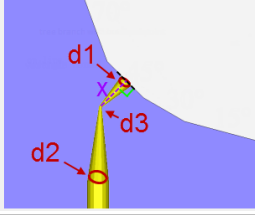
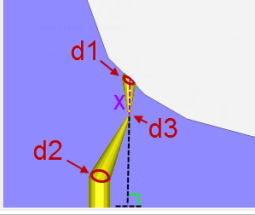
☒ On Branch Line

☐ Triangle Normal

☐ Vertical



Diameter top	Diameter top branch cone	
Diameter bottom	Diameter bottom branch cone	
Add break off point	Narrow the branch at a certain position	
	Diameter	Diameter narrowing
	Distance from top	Distance from contact point where the narrowing needs to be
Break-off point location		

	On branch line		
	Triangle normal		
	vertical		

12.3.9.4 *Branches per trunk*

Branches per trunk

Max branches per trunk

Note: only used in automatic tree

Max branches per trunk	Max number of branches on trunk
------------------------	---------------------------------

12.3.9.5 Spacing

Spacing

(1) Min distance between connection points mm

(2) Min distance between rows mm

Max distance between connection points mm

Note: only for autotree

☐ Draw Lowest Line

When lowest line is checked, an extra line of supports is created so that this lowest line (the imaginary line connecting the lowest points of the surface) is supported

Minimal Spacing (a) mm

Minimum Length mm

Note: the effects of this parameter are also found in the common parameters -> lowest line

Min distance between connection points	Space between connection points	
Min distance between rows	Space between rows of connection points	
Max distance between connection points	The maximum space between connection points	
Draw lowest line	When placing a support under a curved surface, it can happen that the lowest line (= the imaginary line connecting the lowest points of the surface) is not supported correctly. This can cause problems when building the part with some RP techniques. When lowest line is checked, an extra line of support will be placed so that this lowest line is correctly supported.	
	Minimal spacing	Defines the minimal spacing between the connection points along the lowest line.
	Minimum length	Lowest lines smaller than this value (length) will be filtered out.

12.3.9.6 Max height of trunk

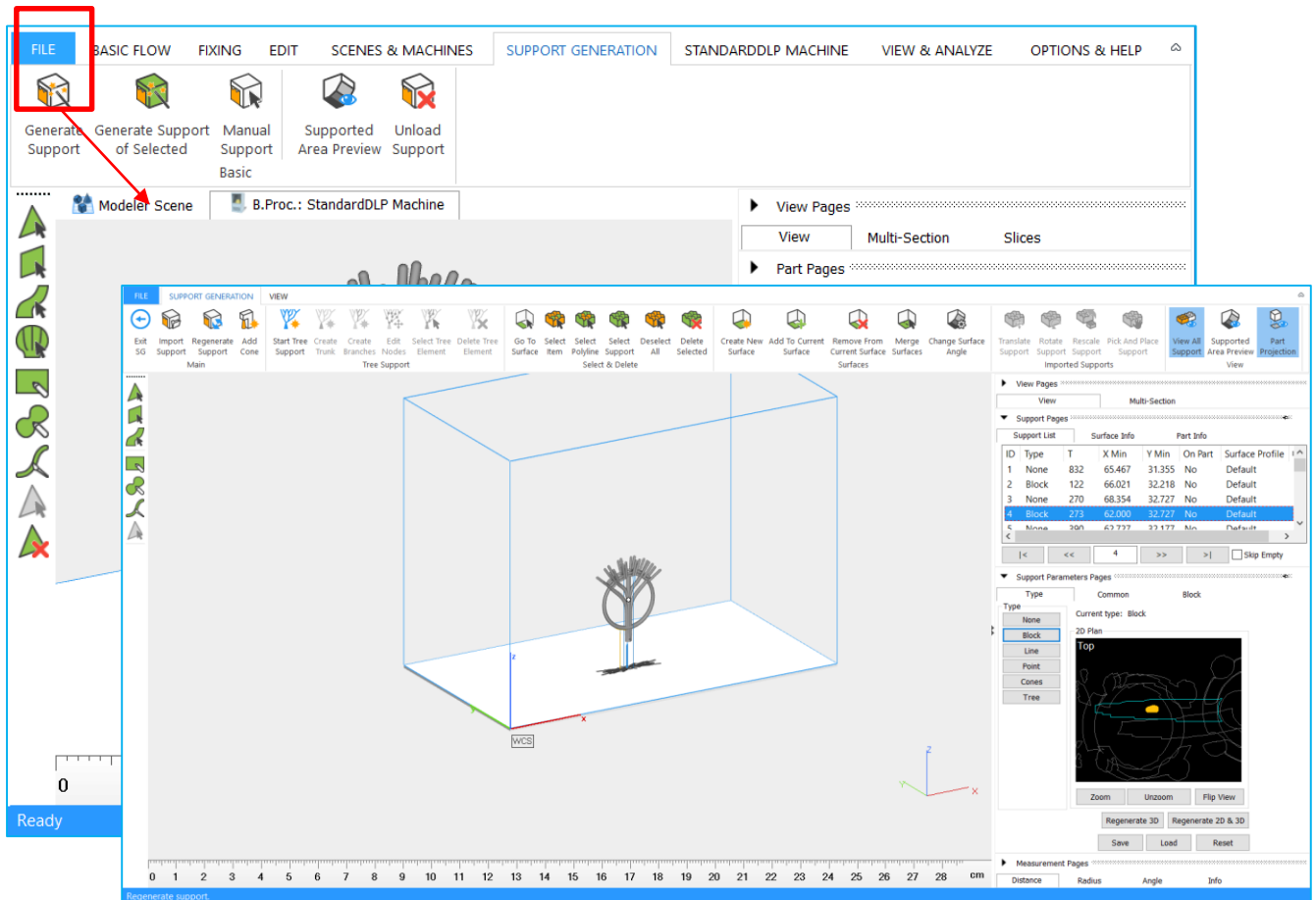
Max height of trunk

☐ Max height of trunks mm

Max height of trunk	If checked, the maximum height of trunks will be limited by the entered value.
---------------------	--

12.4 Support module

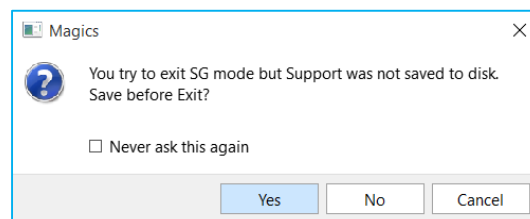
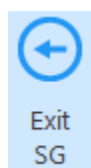
The support module allows you to interactively and manually manage your supports. You will enter the support module when clicking 'generate support' in the main dialog.



12.4.1 Main

12.4.1.1 Exit

This will allow you to leave the support module. You will be prompted if you want to save your support when exiting.



12.4.1.2 *Import Support*



Will allow to import support structure from external sources in a STL format

Import
Support

12.4.1.3 *Regenerate support*



Will allow you to regenerate the supports with the settings available in the machine properties

Regenerate
Support

12.4.1.4 *Add Cone*



This will allow you to add a cone support to your part(s). You will be prompted to enter your cone settings and position before cone generation

Add
Cone

Place Cone Support

Cone Properties

Contact to Part (r1) mm

☒ Contact to Platform (r2) mm

☐ Angle °

Z Offset

Upper Z Offset mm

Lower Z Offset mm

Indicating

☒ No Angle towards platform

☐ Angle by Indicating

Indicate OK Cancel Help

12.4.2 Tree Support

The tree support section will allow the manual creation / deletion of tree supports

12.4.2.1 *Start tree support*



Start Tree
Support

Start tree support allows to start create a tree support interactively with the mouse. The tree is represented by wires

12.4.2.2 *Create Trunk*



Create
Trunk

Allows you to create the trunk of the tree support manually. The trunk is represented by a wire diagram.

12.4.2.3 *Create branches*



Create
Branches

Allows you to create the branches of your tree support manually. The branch is represented by a wire diagram.

12.4.2.4 *Edit nodes*



Edit
Nodes

Allows you to modify the position of the nodes in the tree structure

12.4.2.5 *Select tree elements*



Select Tree
Element

Allows you to select trunks or branches of your tree structures in order to change or delete them.

12.4.2.6 *Delete tree element*

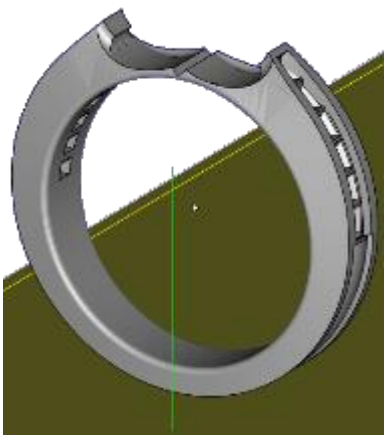
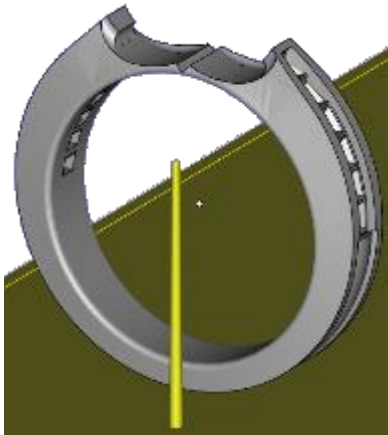
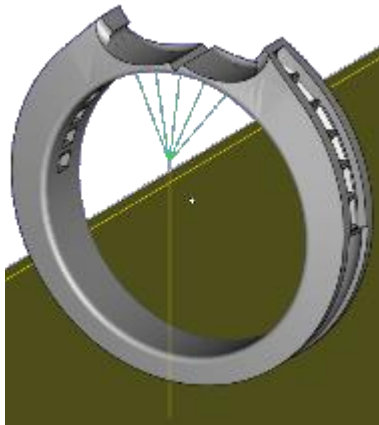
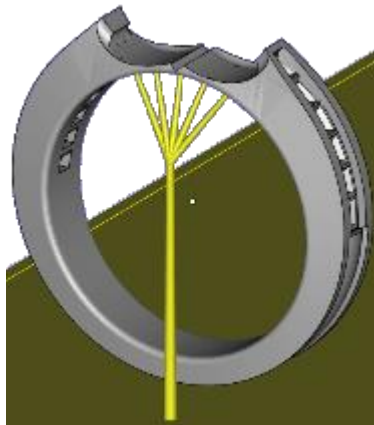


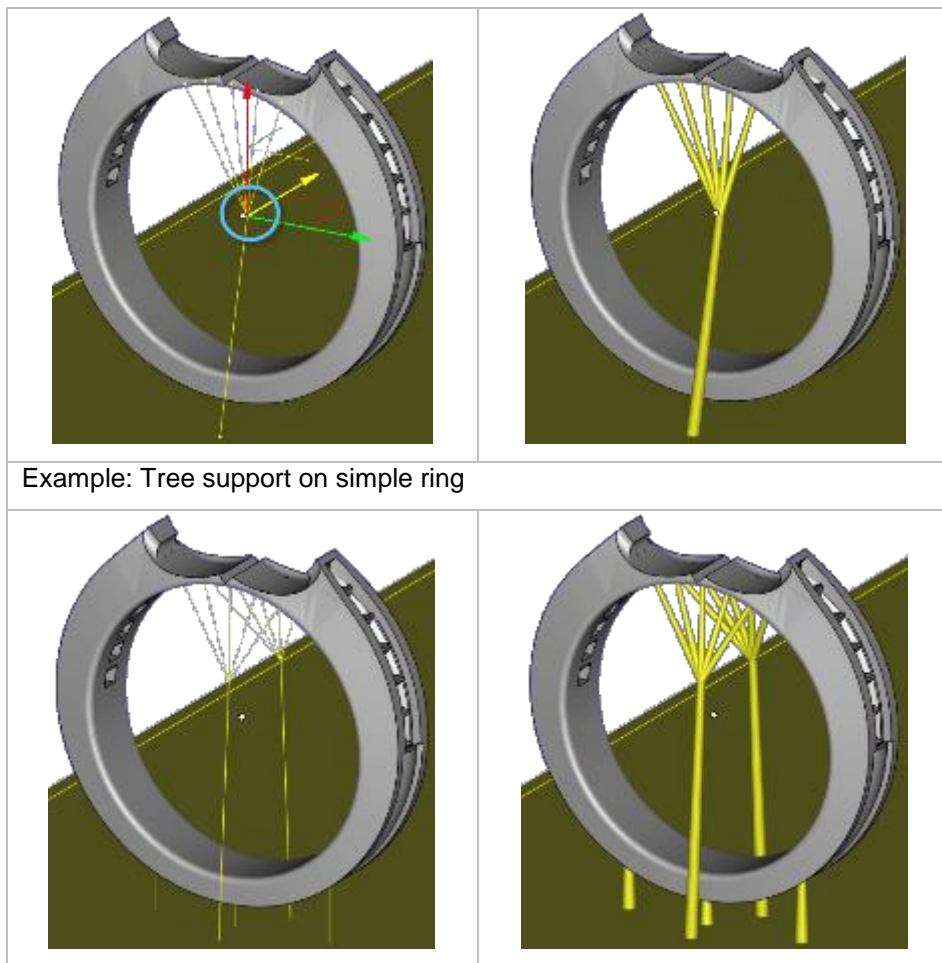
Delete Tree
Element

Allows you to delete selected parts of your tree structure.

12.4.2.7 Tree preview

While creating trees manually, a preview of the tree will be displayed. The preview makes it easier to define the correct placement of the parts of the tree and shows how the support will look. The principle of WYSIWYG (What you see is what you get) is applied here. Depending on the element added you must reload your preview via the button “Create preview” from the support toolbox.

Trunk creation	
Preview of trunk	Created trunk
	
Branches created	
Preview of branches	Created branches
	
Movement of node	
Preview of node movement	Creation of moved node



12.4.3 Select & Delete

12.4.3.1 Go to surface



Allows you to select support surfaces

Go To
Surface

12.4.3.2 Select Item



Allows you to select a support item

Select
Item

12.4.3.3 *Select Polyline*



Allows you to select a polyline support item

Select
Polyline

12.4.3.4 *Select support*



Allows you to select a support item

Select
Support

12.4.3.5 *Deselect All*



Allows to undo all selections

Deselect
All

12.4.3.6 *Delete selected*



Delete the selected support items

Delete
Selected

12.4.4 Surfaces

12.4.4.1 *Create new surface*



Allows you to transform the marked triangles into a support surface

Create New
Surface

12.4.4.2 *Add to current surface*



Allows you to add the marked triangles to the selected support surface

Add To Current
Surface

12.4.4.3 *Remove from current surface*



Allows you to remove the marked triangles from the selected support surface

Remove From
Current Surface

12.4.4.4 Merge surface



Merge
Surfaces

Allows you to combine the selected surface with another surface identified by the surface number.

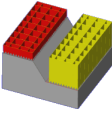
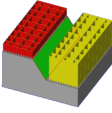
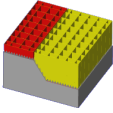
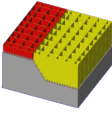
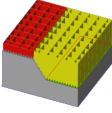
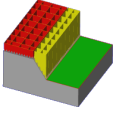
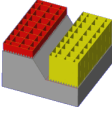
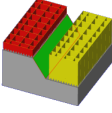
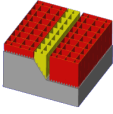
12.4.4.5 Change surface angle

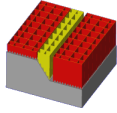

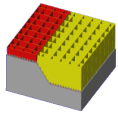


Change Surface
Angle

Allows you to change surface angle that was used to calculate the support surfaces. This will result in new surfaces

12.4.4.6 Examples of surface operations

Add To Current Surface	The marked triangles will be added to the current surface. When you press Regenerate 2D & 3D, Magics will also generate support for these triangles.		
	Begin situation 	Triangles to be added are marked 	Triangles are added to support 
Remove From Current Surface	The marked triangles will be removed from the current surface. When you click Regenerate 2D & 3D, Magics won't generate supports anymore for the marked triangles.		
	Begin situation 	Triangles to be removed are marked 	Triangles are removed from surface 
Create New Surface	The marked triangles will become a new surface, which you can support.		
	Begin situation 	Triangles to be added as new surface are marked 	Triangles are added as new surface 
Merge Surfaces	Magics will merge the current surface with a given support.		

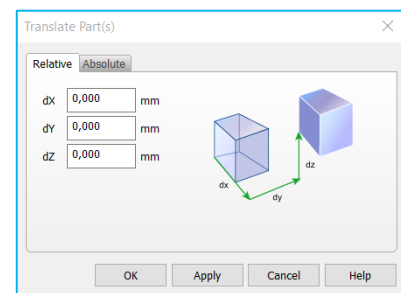
	egin situation 	The middle surface will be merged with surface nr 1 	The surfaces are merged 
Change surface angle	When a surface makes an angle smaller than the entered surface angle it is considered not self – supporting, so support is generated for the respective surface.		

12.4.5 Imported supports

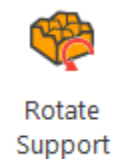
12.4.5.1 *Translate support*



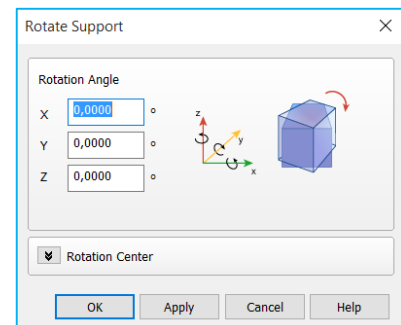
Allows you to translate imported STL supports with the translate dialog



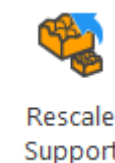
12.4.5.2 *Rotate support*



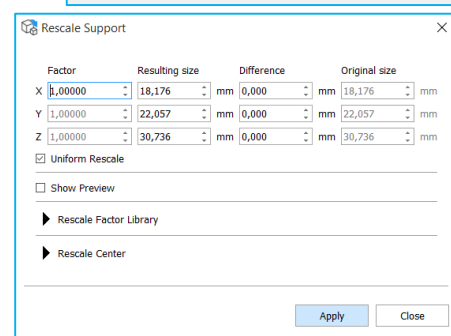
Allows you to rotate imported STL supports with the rotate dialog



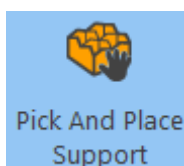
12.4.5.3 *Rescale supports*



Allows you to rescale the imported STL supports with the rescale dialog



12.4.5.4 *Pick and place support*



Allows you to move / rotate your imported STL supports interactively with the mouse.

12.4.6 View

12.4.6.1 View All Support

Show all generated supports present on the platform



View All
Support

12.4.6.2 Supported Area Preview



Show with a heat map the support surfaces

Supported
Area Preview

12.4.6.3 Part Projection

Show the projection of the parts on the platform



Part
Projection

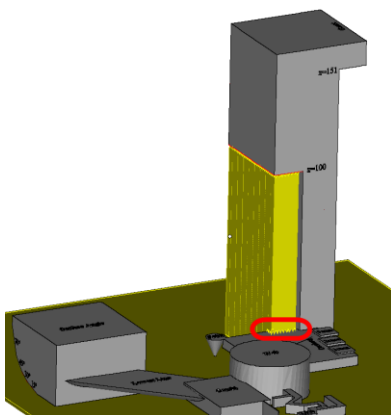
12.4.7 Support pages

12.4.7.1 Support list

The surface list gives you an overview of all surfaces with their support type created.

Support Pages						
Support List		Surface Info		Part Info		
ID	Type	T	X Min	Y Min	On Part	Surface Profile
1...	None	761	62.088	33.160	No	Default
1...	None	768	62.026	30.825	No	Default
1...	None	647	69.206	31.994	No	Default
1...	Line	512	69.384	34.254	Yes	Default
1	None	104	72.117	32.620	No	Default

The red items in the list indicate that the support touches a lower surface of the part itself.



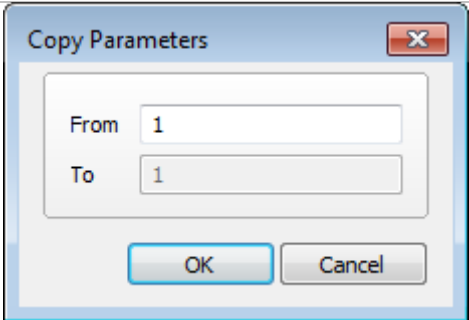
The columns of the Surface List can be set by clicking on the icon in the upper right corner of the list; the following dialog will pop up:

<input checked="" type="checkbox"/>	ID
<input checked="" type="checkbox"/>	Type
<input checked="" type="checkbox"/>	Triangles
<input checked="" type="checkbox"/>	X Min
<input checked="" type="checkbox"/>	Y Min
<input type="checkbox"/>	Z Min
<input type="checkbox"/>	X Max
<input type="checkbox"/>	Y Max
<input type="checkbox"/>	Z Max
<input type="checkbox"/>	Surface Area
<input type="checkbox"/>	Border Length
<input checked="" type="checkbox"/>	On Part
<input type="checkbox"/>	On Platform
<input checked="" type="checkbox"/>	Surface Profile

ID	The unique number of the surface
Type	The support type given to this surface.
Triangles	Amount of triangles of the surface.
X Min	The starting dimensions of the surface.
Y Min	
Z Min	
X Max	The ending dimensions of the surface.
Y Max	
Z Max	
Surface Area	The surface area of the surface.
Border Length	The border length of the surface.
On Part	The support surface is attached to the part.
On Platform	The support surface is attached to the platform.
Surface Profile	A support profile, created by the user, is used.

A right mouse click in the surface list will pop up the following:

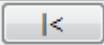


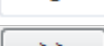

<u>I</u> nv <u>e</u> rt Selection
S <u>e</u> lect <u>A</u> ll
S <u>e</u> lect <u>N</u> one
<u>D</u> elete Surfaces
Duplicate Surfaces
<u>C</u> opy Parameters From
<u>M</u> erge Selected Surfaces
<u>S</u> ort
Reverse <u>O</u> der
<u>R</u> estore Order
<u>S</u> ave Order

Invert Selection	The unselected surfaces will become selected and the selected surfaces will not be selected anymore.
Select All	All surfaces will be selected.
Select None	All surfaces will be deselected.
Delete Surface	All selected surfaces will be removed from the surface list.
Duplicate Surfaces	The selected surface will be duplicated. This gives the possibility to use different support types for one surface. (e.g. Volume support in combination with block support for the metal market)
Copy Parameters From	 <p>Copy the support type and all parameters from the given support number to the selected support numbers.</p>
Merge Selected Surfaces	The selected surfaces will be merged into one surface.
Sort	You can sort the Surface List according to the columns. You can also sort by clicking on the title of the column.
Reverse Order	The sorted order is reversed.
Restore Order	The order is restored.
Save Order	The order is saved.

12.4.7.2 Browsing through the supports

The complete down facing surface will be split into multiple surfaces, which each have their support structure. You can browse through these surfaces by using these buttons:



	Return to surface one.
	Return to the previous surface.
	Window showing surface number.
	Go to the next surface.
	Go to the last selected surface.
Skip Empty Supports	All surfaces which are selected by the surface angle but do not need supports following the selection parameters (no support offset, surface filter...), are skipped.

12.4.7.3 Surface Info

▼ Support Pages

Support List	Surface Info		Part Info
	Min	Max	Delta
X	69.384	72.3702	2.9862 mm
Y	34.2535	35.4462	1.1927 mm
Z	33.4263	34.5701	1.1438 mm
Contour Length	8.7096	mm	
Surface	1.14861	mm ²	
Thinness	66.0431	(= Contour ² / Surface)	

of 48



☐ Skip Empty Supports

Dimensions	Min X Y Z	The dimensions of the surface.
	Max X Y Z	
	Delta X Y Z	
Contour Length	The contour length of the surface.	
Surface	The surface area of the surface.	
Thinness	This parameter represents the thinness (slenderness) of the surface.	
Browsing buttons	Browsing buttons are used to browse through the different surfaces. The buttons are explained above.	

12.4.7.4 Part Info

▼ Support Pages

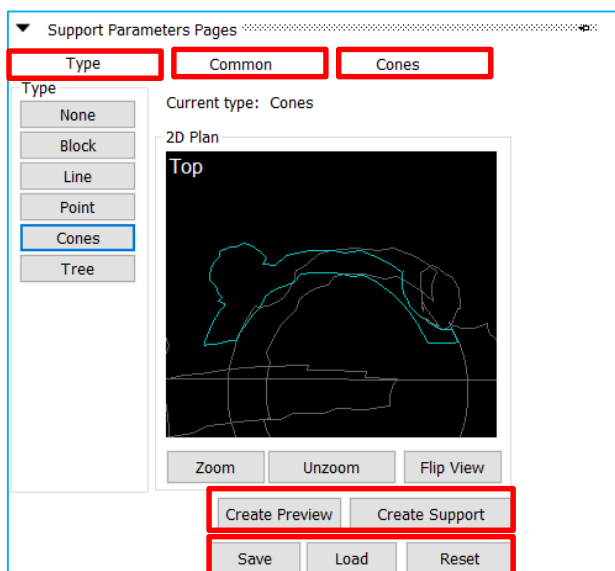
Support List	Surface Info	Part Info																				
Part name	bg sultan griffes x3 ob	<input type="button" value="Rename"/> <input type="button" value="Next"/>																				
Dimensions <table border="1"> <thead> <tr> <th></th> <th>Min</th> <th>Max</th> <th>Delta</th> <th></th> </tr> </thead> <tbody> <tr> <td>X</td> <td>55,001</td> <td>79,639</td> <td>24,638</td> <td>mm</td> </tr> <tr> <td>Y</td> <td>30,001</td> <td>36,279</td> <td>6,278</td> <td>mm</td> </tr> <tr> <td>Z</td> <td>10,000</td> <td>40,736</td> <td>30,736</td> <td>mm</td> </tr> </tbody> </table>				Min	Max	Delta		X	55,001	79,639	24,638	mm	Y	30,001	36,279	6,278	mm	Z	10,000	40,736	30,736	mm
	Min	Max	Delta																			
X	55,001	79,639	24,638	mm																		
Y	30,001	36,279	6,278	mm																		
Z	10,000	40,736	30,736	mm																		
Mesh info <table border="1"> <tbody> <tr> <td># Triangles</td> <td>134820</td> <td># Points</td> <td>67332</td> </tr> <tr> <td># Marked</td> <td>135</td> <td># Invisible</td> <td>0</td> </tr> </tbody> </table>			# Triangles	134820	# Points	67332	# Marked	135	# Invisible	0												
# Triangles	134820	# Points	67332																			
# Marked	135	# Invisible	0																			
Properties <table border="1"> <tbody> <tr> <td>Volume</td> <td>299,489</td> <td>mm³</td> <td><input type="button" value="Update"/></td> </tr> <tr> <td>Surface</td> <td>1007,436</td> <td>mm²</td> <td><input checked="" type="checkbox"/> Automatic</td> </tr> </tbody> </table>			Volume	299,489	mm ³	<input type="button" value="Update"/>	Surface	1007,436	mm ²	<input checked="" type="checkbox"/> Automatic												
Volume	299,489	mm ³	<input type="button" value="Update"/>																			
Surface	1007,436	mm ²	<input checked="" type="checkbox"/> Automatic																			
Status <input type="text" value="Changed"/> Z Compensated <input type="text" value="No"/>																						

Part Name	In this window the name of the selected part is displayed.	
		For renaming the selected part.
		For switching to the next part.
Dimensions	Min X Y Z Max X Y Z Delta X Y Z	The dimensions of the part.
Mesh info	# Triangles # Points # Marked # Invisible	The number of triangles the part exists off. The number of points. The number of marked triangles. The number of invisible triangles.
Properties	Volume Surface Automatic	The volume of the part. The surface area of the part. For updating the volume and surface number automatically.
Status	The status of the STL-part. If no modifications are made to the loaded part, the status is Not Changed. In the other case, the status is Changed.	
Z-compensated	Indicates the part is z-compensated or not.	

12.4.8 Support parameter pages

12.4.8.1 General

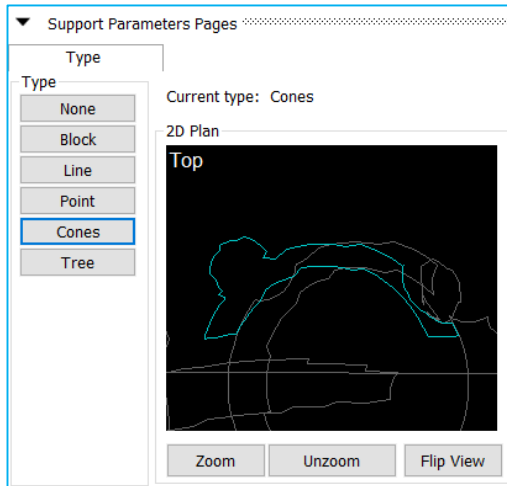
The support parameter pages will allow you to select and define the supports that you want to use for the selected support surface(s) in the support list of the support pages. It consists of 5 main control elements:



- **Type** tab sheet
- **Common** tab sheet
- **Support specific** tab sheet
- **Creation control**
- **Parameter manager**

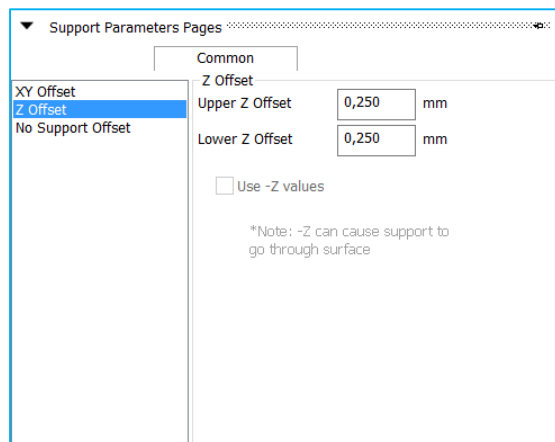
12.4.8.2 Type Tab Sheet

Will allow to select which type of support you want to use for the selected surface in the support list, to 2D Preview the support surface in 2D Plan and to manage the 2D view.



12.4.8.3 Common Tab Sheet

Will allow you to set the parameters that are common for all support types



XY offset	How much clearance the support position needs to have from an edge
Z offset	Clearance between support and part in the Z direction
No Support offset	How much overhang is allowed without supports

For more detailed information about the parameters check Support parameters – Machine properties

12.4.8.4 Block Tab Sheet

Will allow you to set the specific parameters for the block support type.

Support Parameters Pages

Block

Hatching

X Hatching 6,000 mm

Y Hatching 6,000 mm

Rotation Angle 0 °

Hatching	Defines the dimensions and angle of the cross hatch pattern
Hatching Teeth	Defines the dimensions of the connection teeth of the hatch pattern
Teeth Synchronization	Defines how teeth will intersect and how they will behave at the edges
Hatch removal	Defines where/when hatches will be removed
Border teeth	Defines the dimensions of the connection teeth of the border
Perforations	Defines if the block support will be perforated or not

For more detailed information about the parameters check Support parameters – Machine properties

12.4.8.5 Line Tab Sheet

Will allow you to set the specific parameters for the line support type.

Support Parameters Pages

Line

Cross Line Length

Minimum Rib Length 10,000 mm

Maximum Contact Length 6,000 mm

Cross line length	Here you can enter the length of the crossing lines.
Cross line interval	Here you can set the distance between two consecutive cross lines of a line support
Sunken Cross lines	To minimize the contact area of the support with the parts, the cross lines can be sunken, this means that they will not go till the part. They will stop at a certain distance before the part.
Perforations	If this option is checked, the support will be perforated. There are two kind of perforations possible
Teeth	In order to remove the supports easily from the part, the line supports are equipped with teeth profiles on the top and on the bottom.
Cross line teeth	These parameters are exactly the same as the teeth but they will be applied only for the cross lines used in line supports

For more detailed information about the parameters check Support parameters – Machine properties

12.4.8.6 Point Tab Sheet

Will allow you to set the specific parameters for the point support type.

Support Parameters Pages

Point

Contact Length

Sunken Ribs

Teeth

Number of Ribs

Minimum Rib: 6,0000 mm

Maximum Contact Length: 2,0000 mm

Minimal Contact Surface: 0,0000 mm²

☒ Angle: 30 °

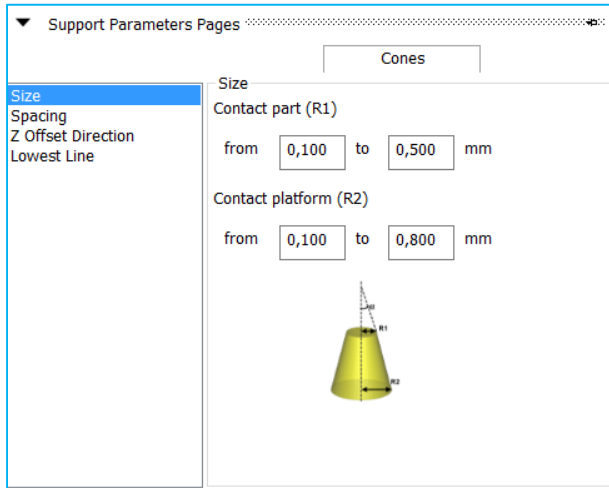
☐ Vertical Distance: 0,0000 mm

Contact Length	Determines the length of the ribs
Sunken Ribs	To minimize the contact area of the support with the parts, some ribs of the point support can be sunken. This means that they will not go till the part. They will stop at a certain distance before the part
Teeth	In order to remove the supports easily from the part, the line supports are equipped with teeth profiles on the top and on the bottom.
Number of Ribs	Determine the number of the ribs..

For more detailed information about the parameters check Support parameters – Machine properties

12.4.8.7 Cones Tab Sheet

Will allow you to set the specific parameters for the cone support type.

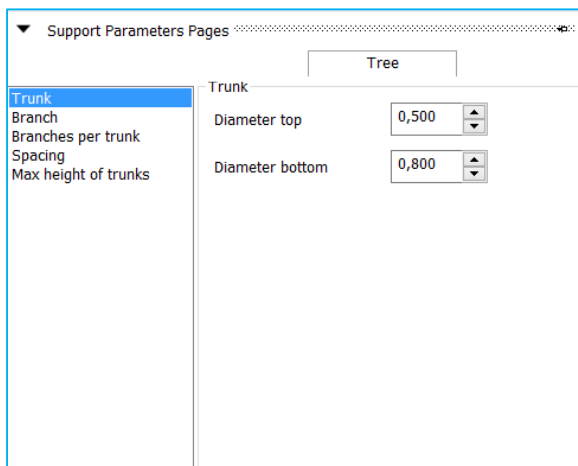


Size	Defines the geometry of the cone
Spacing	Defines which spacing the cones need to have when filling the surface
Z offset direction	Clearance between part and support
Lowest line	Define if and how the cones need to be placed at the lowest line

For more detailed information about the parameters check Support parameters – Machine properties

12.4.8.8 Tree Tab Sheet

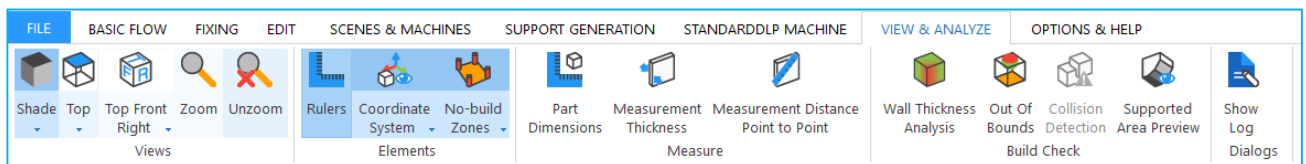
Will allow you to set the specific parameters for the tree support type.



Trunk	Defines the trunk of your tree structure
Branch	Defines the branch of your tree structure
Branches per trunk	Defines how many branches will be placed on a trunk
Spacing	Defines how the branches will be spread over the support surface
Max Height of trunks	Defines the height if the trunks


For more detailed information about the parameters check Support parameters – Machine properties

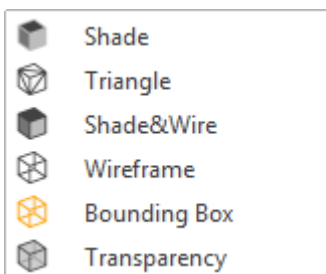
13 View & Analyze









13.1 Views

13.1.1 Shade

 The shade modes are the ways to visualize a part.



Shade		This visualization mode will display the part with shades according to the direction of the triangles.
Triangle		In Triangle mode the triangles will be displayed upon the shaded part.
Shade&Wire		This mode will show a combination of the Shade mode and the Wireframe mode.
Wireframe		This visualization mode shows the edges of the object. This representation is deduced from the STL file. It has been tried to approach the normal wireframe representation as good as possible. But due to the limited information, STL errors and noise in the STL file, abnormalities in this representation may show up. A line of wireframe is drawn when the angle between 2 triangles exceeds a certain value. You can change this

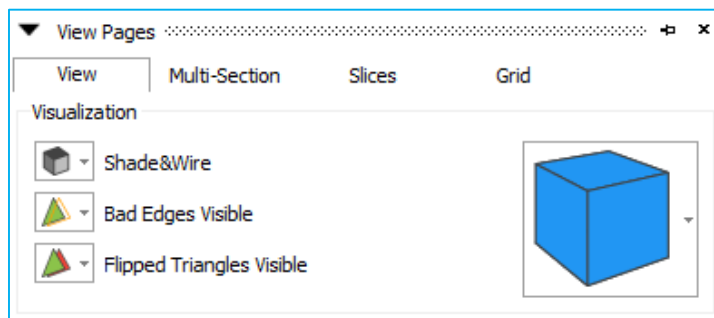
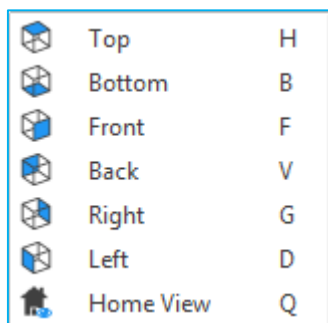
		value and so adapt the wireframe view (Settings > Visualization > Wireframe).
Bounding Box		This mode will only show the bounding box of the part. This mode is quick in visualization.
Transparency		All parts are shown in a transparent mode.

13.1.2 Top



Top

“Top” allows you select one of the following default views: Top, Bottom, Front, Back, Left, and Right. These views are also easy accessible in the View Pages Toolpage by clicking on the cube in the View tab.

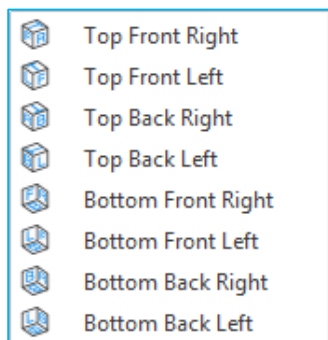


13.1.3 Top Front Right



Top Front Right

“Top Front Right” allows you select one of the following ISO views: Top Front Right, Top Front Left, Top Back Right, Top Back Left, Bottom Front Right, Bottom Front Left, Bottom Back Right, Bottom Back Left.



13.1.4 Zoom / Unzoom




Zoom Unzoom


To zoom in on a region, this region has to be defined by means of a box (drag from the left upper corner to the right bottom corner). When the mouse button was pressed, but no rectangle was drawn, the Zoom In 25% function will be applied. Zooming in and out can also be done using the mouse scroll. For unzooming the zoom factor will be set so that all the active parts are displayed.

13.2 Elements


13.2.1 Rulers

 Toggle the visibility of the Rulers. When toggled, the icon gets a blue background. Rulers have been introduced into Magics to give the user the possibility to estimate the dimensions in which he is working. The rulers can be placed at the bottom of the working area and/or in the left side of the working area. These settings can be defined in the Rulers visualization parameter window (Settings > Visualization > Rulers).

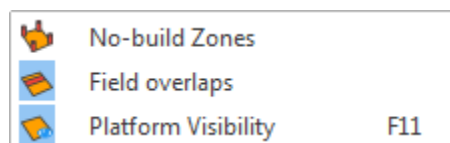
13.2.2 Coordinate System




 The Coordinate System is called WCS (World Coordinate System) and it is the default coordinate system in which you work. The origin is set in (0,0,0). Sometimes, for example when the part is zoomed in, or when the part is positioned far from the origin, this coordinate system is not visible on the screen. Therefore, you can switch on the Orientation Indicator. When toggled, the icon gets a blue background.

13.2.3 Orientation Indicator

 The Orientation Indicator is a coordinate system that is only there to indicate the direction of the X-axis, the Y-axis and the Z-axis of the WCS. It remains always in the bottom right of your screen, no matter how far you zoomed in on the part. This orientation indicator is drawn in fine lines to avoid confusion.

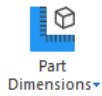
13.2.4 Visualization



No-build Zones		Toggle to show the No-build zones, if present.
Field Overlaps		Toggle to show Field overlaps, if present.
Platform Visibility		Toggle the Platform Visibility. (F11)

13.3 Measure

13.3.1 Part Dimensions



Activating the part dimensions gives a view on the bounding box with the dimension of each rib indicated.

13.4 Build checks

13.4.1 Wall Thickness Analysis



Visualize the wall thickness of your part with a color heat map.

13.4.2 Out of Bounds



The out of bounds function will color parts which are placed outside of the platform bounds. Any placement tool can be used without losing the color indications

13.4.3 Collision Detection



13.4.4 Supported Area Preview

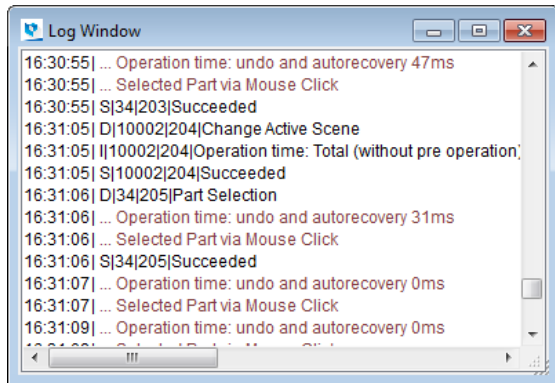


13.5 Dialogs

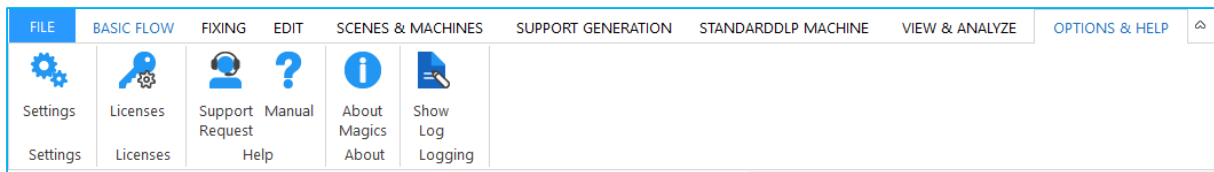
13.5.1 Show Log



From the moment Magics Print Metal runs, all the performed actions are written down in a log file. This file is automatically saved as a *.log file. Its name * is composed in the following way: 'Magics Print Metal +_year_month_date_time of first operation (hour, minutes, and seconds)'. In the Settings (Settings > File I/O > Working Folder > Logging) you can define where you would like the files to be saved.



14 Options & Help



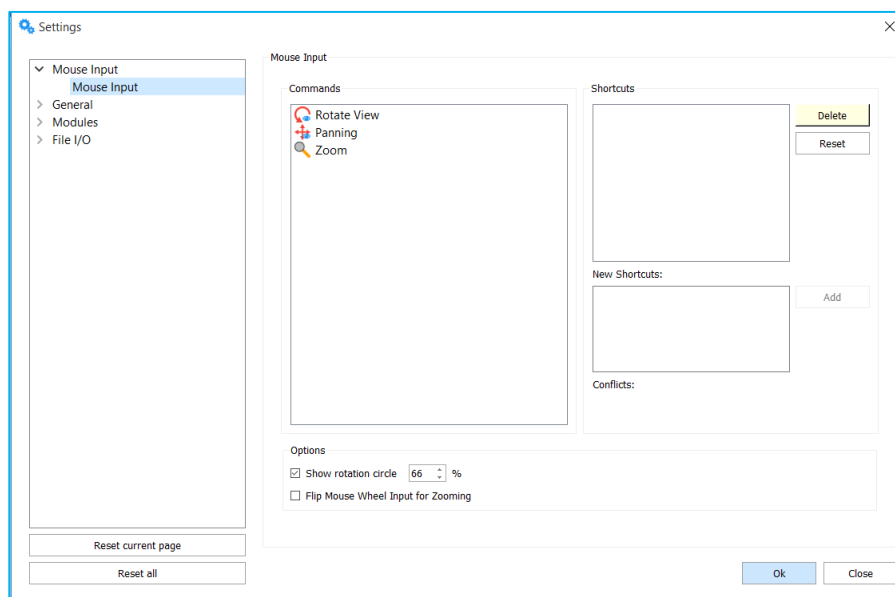
14.1 Settings



Settings In the Settings dialog you can alter all parameters of your Magics Print Metal Software.

14.1.1 Customize Mouse Input

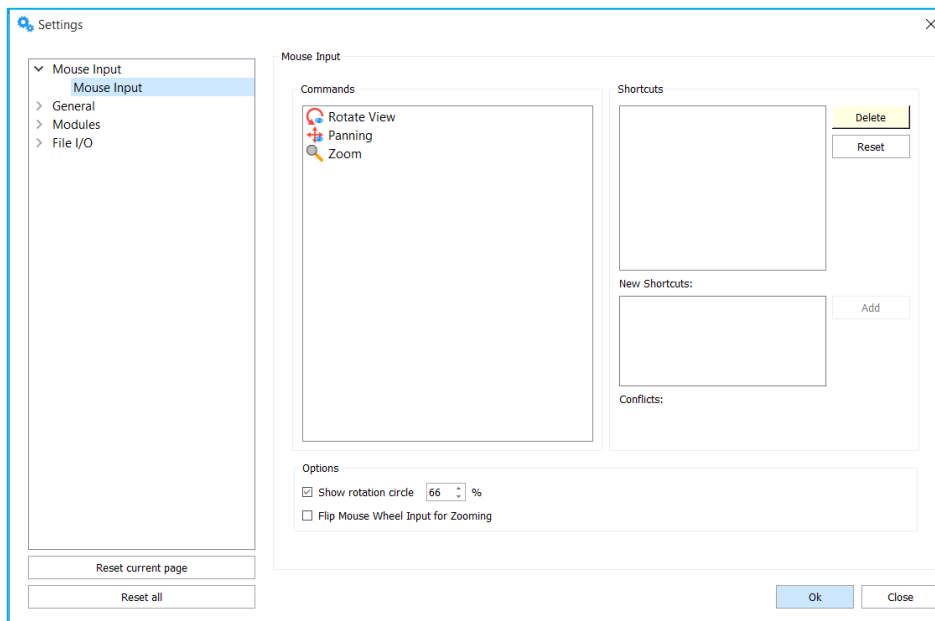
The mouse buttons are fully customizable by the user.



Command	This list contains the available functions for the mouse.
Shortcuts	This list represents the current shortcuts for the selected function in the Function List.
Delete	Deletes the selected shortcut.
Reset	The shortcuts for the selected function will be reset.
New Shortcut	By clicking in this textbox and clicking on the desired combination of (mouse) buttons, the shortcut will appear in this box.
Add	Adds the shortcut to the Shortcuts List.
Conflicts	This message alerts whether a shortcut for the selected function is in conflict with another shortcut of another function.
Apply	Designates the shortcut to the selected Command, the user is able to define more shortcuts without leaving the dialog.

14.1.1.1 *Advised Way of Working*

Select a command from the Command list. E.g. Panning. Panning already has a shortcut: SHIFT+Right Button and the middle mouse button. We'll create a new one.



Activate the New Shortcut textbox by clicking in it and push your desired shortcut. Click on the **Add** button, the shortcut is added to the Shortcut List. Click **OK**. You can now use your newly created shortcut.

14.1.1.2 “Flip Mouse Wheel Input for Zooming” checkbox

Allows the user to change the direction of the zooming behavior by the use of the mouse wheel.

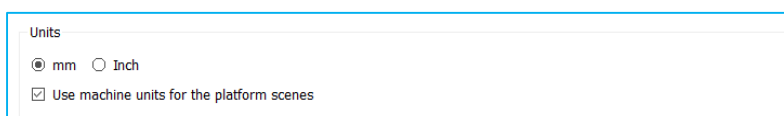
14.1.1.3 “Show rotation circle” checkbox

Allows the user to decide whether or not to show the rotation circle on screen during rotation of the view. The size of the rotation circle can be adjusted to fit the user needs.

14.1.2 General

14.1.2.1 Unit Size

14.1.2.1.1 Units



You can choose between mm and inches. You will have to select the units before you load the STL file. If the STL file was originally in millimeters, you have to choose mm. If the file is in inches, you will have to choose Inch. If several parts are loaded, some in millimeters and some in inches, the Unit Conversion has to be used otherwise parts are out of proportion. The program always remembers the last used unit and takes this as default the next time you start up the program.

14.1.2.1.2 Automatic Unit Conversion

Automatic Unit Conversion

☒ inch -> mm if maximum size < mm

☒ mm -> inch if maximum size > inch

The automatic unit conversion is used to avoid mistakes due to the units you work in. It may be that you are working in millimeters, and that you load a part whose dimensions are expressed in inches. A part of 2inch*2inch*2inch, will then become a part of 2mm*2mm*2mm. The size of the part is not correct anymore.

Because 1inch is 25.4mm, the dimensions of the part expressed in millimeters are bigger than those when the part is expressed in inches. A part of 2inch*2inch*2inch, is as big as a part of 50.8mm*50.8mm* 50.8mm.

When you are working in millimeters and you load a part and the dimensions are very small (you can define 'very small' in the options –see the figure above), it may be that the part you loaded was originally expressed in inches. Magics will then multiply the dimensions with 25.4 (inch to mm conversion), so the part will now be expressed in millimeters. When you are working in inches and you load a part and the dimensions are very big (you can define 'very big' in the settings – see figure above), it may be that the part you loaded was originally expressed in millimeters. Magics will then divide the dimensions with 25.4, so the part will now be expressed in inches.

14.1.2.2 User process flow improvement

I like to participate in user experience feedback for future improvements


☒ Yes
 ☐ No

Magics Print Metal will collect user experience feedback to ensure future improvements and best software quality.

14.1.2.3 Languages

Change Preferred Language

You must restart Magics to apply language changes



You can change the language of you Magics Print Metal installation. The language change is only applied after restarting Magics Print Metal.

14.1.2.4 Warnings

Show the 'Never ask again' message for	
Change memory state of parts	<input checked="" type="checkbox"/>
Cut on bad edges	<input checked="" type="checkbox"/>
Delete bounding box measurements	<input checked="" type="checkbox"/>
Delete Build Risk Analysis profile	<input checked="" type="checkbox"/>
Delete SG profile	<input checked="" type="checkbox"/>
Refine and smooth texture shift	<input checked="" type="checkbox"/>
Exit SG mode	<input checked="" type="checkbox"/>
Switch part in SG	<input checked="" type="checkbox"/>

Turn warning messages on/ off for particular functions/ actions to complete.

14.1.3 Modules


14.1.3.1 Support Generation

Will allow you to set the support mode (Manual – Automatic) when switching to the support module (SG)

Switch part in SG mode	
<input type="radio"/> Generate support	
<input type="radio"/> Manual support	
<input checked="" type="radio"/> Always give the option in a dialog (where user can choose which mode to use)	

14.1.3.2 3MF convertor

Will allow you to define the location folder of the 3MF convertor.

Locate 3MF Converter
<input type="text" value="cs Print DLP 21.2 Beta\3MFConverter\3MFConverter.exe"/> 

14.1.4 File I/O

14.1.4.1 Working folders

14.1.4.1.1 Logging

Application logging will allow you to specify where you will store the log file and if log file size will be limited and with how much

Application Logging

C:\ProgramData\Materialise\Magics\Logs

Advanced Options

☒ Limit Log Folder Size Max Size: 1 MB

14.1.4.1.2 Support library folder

Allows you to specify the supports library folder

Supports Library Folder

C:\ProgramData\Materialise\Magics\SupportsLibrary

14.1.4.2 Import

14.1.4.2.1 Import

☒ As Is

☐ Default Position

☐ Aside Of Others

☐ Automatic Placement

☐ Autofix during import (in Standard mode)

☐ Never ask again while drag&drop

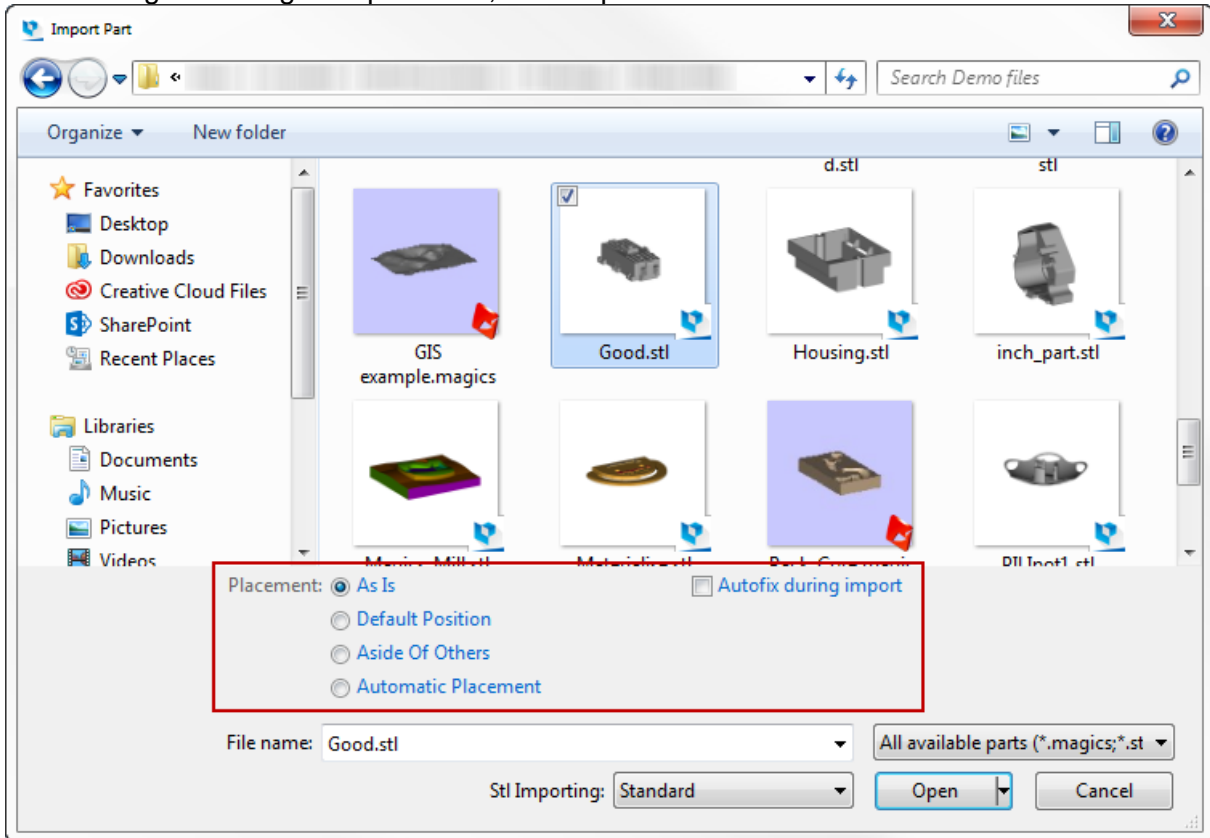
☒ Unzoom at import

Within this window you can define which placement option you want to use as the default one, and whether you want to automatically fix your part upon importing.

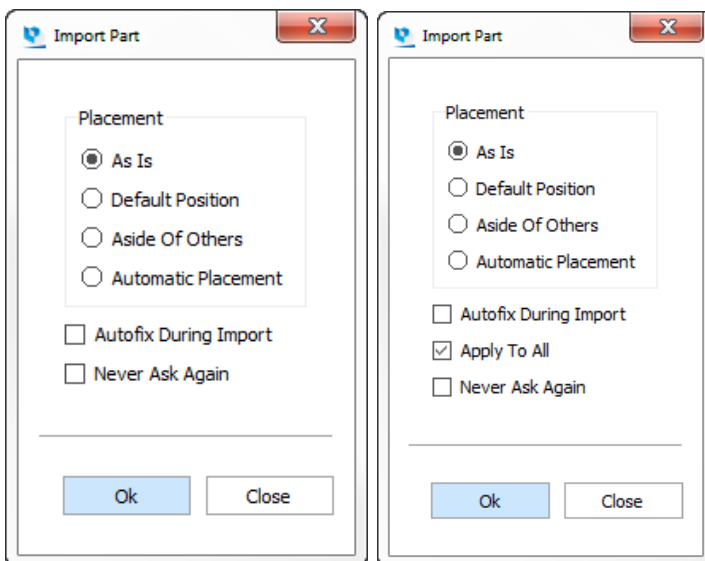
As Is	The part will be placed on the same position it was saved in.
Default Position	The part will be placed on the default (platform) position.
Aside of others	The part will be placed next to already loaded parts.
Automatic Placement	The part will be placed according to the Automatic Placement method defined in the machine file.
Autofix during import (in Standard mode)	The imported part will be fixed automatically if it is loaded in Standard Memory mode.
Never ask again while drag & drop	If disabled, a dialog will pop up when dropping a file into Magics, so the user can still define placement and fixing settings.

	If enabled, no dialog will be shown, and the defined settings will be used.
Unzoom at import	After importing the file, the view will change to focus on the part.

When using the dialog to import a file, these options can still be overruled here:



When dropping one or multiple files into Magics, the following dialog will appear:



When “Apply to all” is enabled, Magics will use the same settings for all parts that were dropped into Magics together. When disabled, a new window will appear for each imported part.

14.1.4.2.2 STL

14.1.4.2.2.1 Identical Triangles

Identical Triangles	Identical triangles have their normals in the same direction. You can choose to leave these triangles, leave one of the two triangles or remove them both.
Opposite Triangles	Opposite Triangles have their normals in opposite directions. You can choose to leave these triangles, leave one of the two triangles or remove them both.

14.1.4.2.2.2 STL Memory State

.magics Project Loading	You can define in which memory state you want to load a project. This memory state becomes the default when importing a project.	
	Standard	This is the standard memory state of a STL file. Magics knows the placement of the triangles and their mutual dependencies. The user is able to perform actions on STL level (E.g. deleting triangles).
	Compact	The STL resides in the memory as read-only, therefore it uses far less memory than the Standard memory state. Magics does not know the placement of the triangles nor their mutual dependencies. The user is not able to perform actions on STL level.

STL Importing	On Disk	The STL is saved on disk and unloaded from the memory. The STL will stay in the project but the user cannot perform any actions on it.
	As Saved	The Project will be loaded as previously saved.
	You can define in which memory state you want to load a project. This memory state becomes the default when importing a project.	
	Standard	This is the standard memory state of an STL file. Magics knows the placement of the triangles and their mutual dependencies. The user is able to perform actions on STL level (E.g. deleting triangles).
	Compact	The STL resides in the memory as read-only, therefore it uses far less memory than the Standard memory state. Magics does not know the placement of the triangles nor their mutual dependencies. The user is not able to perform actions on STL level.
Always load STL's on disk		An STL with more triangles than defined by the user, will always be loaded on disk.

14.1.4.2.2.3 STL Memory State

Show STL list when importing .magics file	Check this option when you want to see a list of the parts saved in the imported .magics file. In that list you can check the parts you want to be loaded.
---	--

14.1.4.2.3 Slices

Will allow you to define how you want to import SLC files – As a slice stack or as a STL

SLC

☒ Convert to STL
 ☐ Import as stack of slices

☒ Always ask

14.2 Licenses

14.2.1.1 Licenses



Licences

In the Registration dialog you can display your current license situation and contact information, request key files and register new modules.

Register

System information

System ID: ABC6CF08-D30E-0008-2C67BCF827DAF446

COKey: 9558-SECA-9FD2-D749

Register

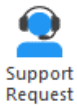
Key file:

Overview licenses

Module	Version	License	Days Left
Magics RP with all extra modules	17.0	No license	n/a
Magics Base with all extra module	17.0	No license	n/a
Magics RP	17.0	Local	4
Magics Base	17.0	Local	4
Magics Interactive Fix	17.0	Local	4
Magics AutoFix	17.0	Local	4
Magics Light	17.0	Local	4
Magics RP Demo	17.0	No license	n/a

14.3 Help

14.3.1 Support Request



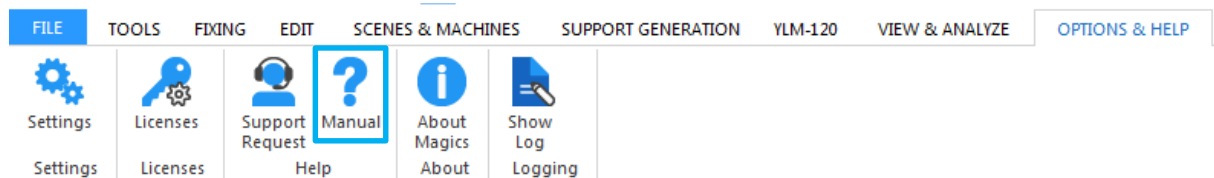
Magics Print Metal allows you to send a support request by email to the customer support team of your machine manufacturer. This can be done by filling out the request form and by selecting the type of additional information you want to add to the request. To make sure that our customer support team has enough information regarding the problem some additional information can be included. You can select to add additional information to your support request which will give the customer support team more information about your Magics Print Metal configuration. By sharing this information it is more likely that your support case will be solved more swiftly.

14.3.2 Manual



Manual

Magics Print Metal does not have a build in manual but instead links to your manufacturer's website to a webpage where all support documents including this user guide are placed for download.



14.4 About



About
Magics

Gives the version details of the Magics Print software, and the performance parameters of the computer the software is running on.

14.5 Logging



Show
Log

Shows the log of the last performed actions by the Magics Print Metal software.

15 Toolbars

15.1 Mark Toolbar



In order to fix a corrupted STL file, the user can mark triangles of a selected part. The part must first be selected before triangles can be marked! To indicate that a triangle is marked the triangle turns (default) green. The marked triangles and edges color can be defined in the Settings. When applying one of the options below, keep CTRL pressed to mark through your part, equally marking the triangles at the other side of your part.

15.1.1 Mark Triangle



Triangles can be marked one by one. Marked triangles can be unmarked by indicating them with the Mark Triangle cursor again.

15.1.2 Mark Plane



By clicking one triangle, a whole plane can be selected or unselected. The plane is not necessary perfectly flat. It can also have a complex shape depending on the plane selection parameters. These you can define in the Settings (Settings > General > Marking, see **Error! Reference source not found.**, page **Error! Bookmark not defined.**). The indicated triangle will be the reference to mark the plane. Triangles that differ too much from the reference, will not be marked anymore.

15.1.3 Mark Surface

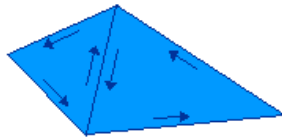


You have the possibility to mark a surface at once. A surface is surrounded by a wireframe (Settings > Visualization > Wireframe, see **Error! Reference source not found.**, page **Error! Bookmark not defined.**). The wireframe can be seen as the black lines on the parts, when the shade and wire or wire view is activated. These black lines indicate the zones where two adjacent triangle have an angle more than the active value. Using the Mark Surface option, you will thus mark a smooth surface which ends at the sharp edges.

15.1.4 Mark Shell



A shell is defined as a limited collection of triangles correctly connected to each other. A triangle is part of a shell when the direction of rotation of the vectors of two adjacent triangles is opposite:



Direction of rotation of triangles in a shell

To unmark a marked shell, the mark shell cursor is used again.

15.1.5 Mark Window



With this tool, you can mark all triangles within a rectangular area. The conditions for a triangle to be in the selection are:

The triangles should be visualized with at least one pixel on the screen
At least a portion of the triangle should be situated in the rectangular area

Remark:

To unselect a portion use the Shift key in combination with a rectangular area.

To mark triangles from their backside too, use the Ctrl key in combination with a rectangular area.

15.1.6 Mark Freeform

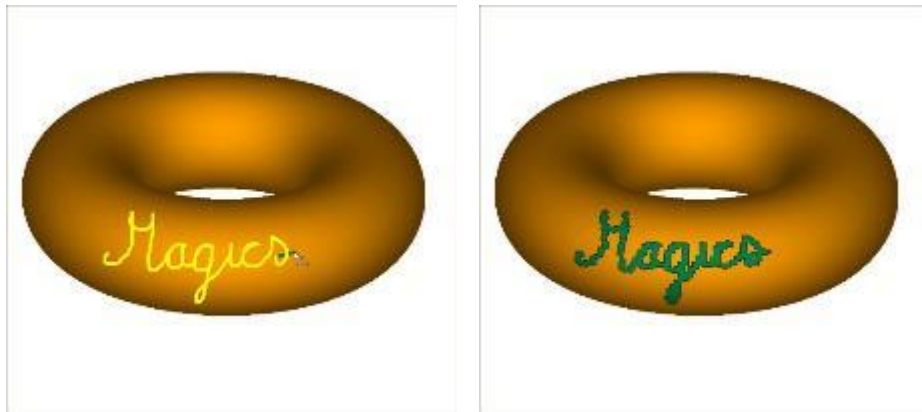


Freeform marking allows marking of triangles by drawing a freeform shape. As long as the left mouse button is pressed, you can draw the freeform shape. The shape is closed by connecting the begin and end point if there is no intersection. The triangles within the freeform shape **and** the triangles intersecting with the freeform shape are marked.

15.1.7 Mark Brush



Brush Marking allows marking triangles on an active part with a brush. Keep the left mouse button down and draw a polyline on a selected part. Every triangle that intersects with this polyline is marked. The left picture shows the polyline, the second the marking result.



The size of the brush can be defined in the options window Settings > Marking > Polyline Marking, or by pressing CTRL while using the mouse scroll button.

See

Brush Marking

Size of Brush	Brush Marking allows marking triangles on an active part by a brush. The user can define the size of the brush.
---------------	---

Vertical Marking

Angle deviation	Vertical Marking allows marking triangles on an active part vertically. The user can define the deviation.
-----------------	--

Horizontal Marking, page **Error! Bookmark not defined.**

15.1.8 Unmark All



All triangles will be unmarked.

15.1.9 Delete marked triangles

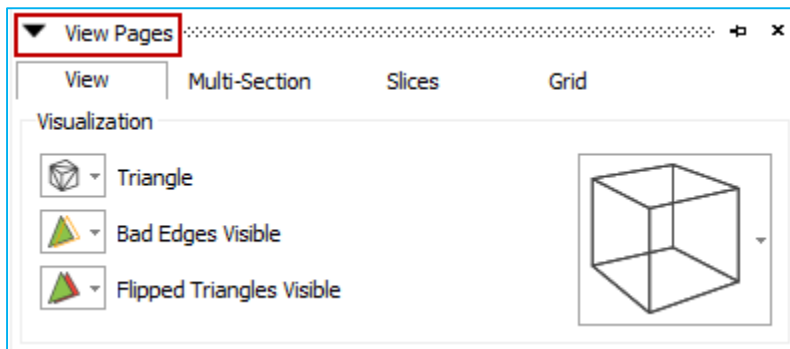


The marked triangles are deleted.

16 The Toolpages

Via the View menu it is possible to access different pages that each group a particular kind of functions: visualization of the STL files, fixing of the files, creating annotation scenes, measuring...

The pages are displayed on the right of the working space. The user has the ability to enlarge the working space by hiding the Toolpages. Toolpages can be hidden by using the arrow displayed on the left side of the Toolpages.



By default the pushpin is enabled, which means that the Toolpages are visible. Disabling the pushpin will hide the Toolpages.

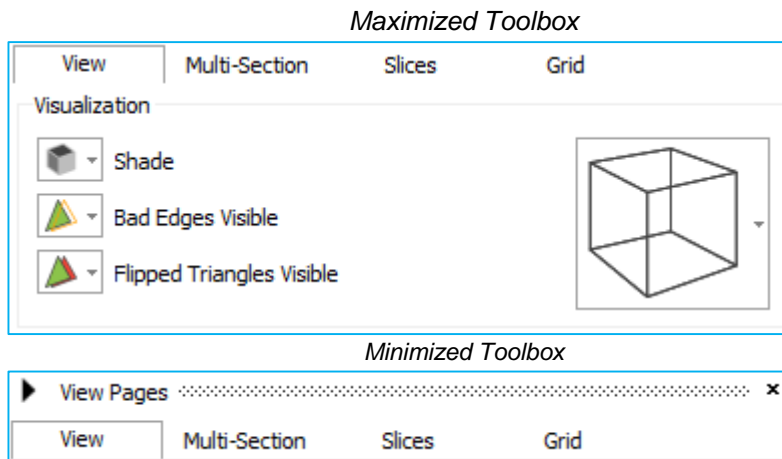
The customer can still make the Toolpages visible by hovering over the Toolpages. Moving the mouse pointer over the Toolpages will open them. As long as the mouse pointer stays above the opened Toolpage, it will be visible. Using the arrow will either open or close the Toolpage.

Notifications

The hover over possibility will not work when using the arrows if the pushpin is enabled.

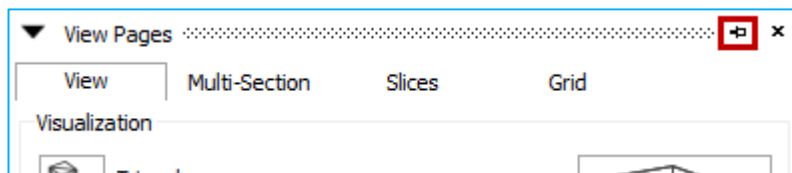
16.1 General

The Toolpages are grouped in toolboxes. These Toolboxes act as a container to group different sheets. A toolbox is docked at the right side of the workspace. One is able to minimize or maximize the docked toolbox.



A Maximized Toolbox can become minimized when:

- It's minimized with the minimize button
- When there's not enough vertical space
- This can happen when adding another toolbox or maximizing a minimized Toolbox
- The pushpin will prevent the minimizing of the Toolbox.



A minimized Toolbox will become maximized when:

- Clicking on the Minimized Toolbox
- When clicking on a Toolpage of a minimized Toolbox, the Toolbox maximizes showing the clicked Toolpage.
- On minimizing or closing another Toolbox so that there's enough space to maximize.

For some Toolboxes, Magics Print Metal determines the height automatically (E.g. Part list or surface list in the Support Generation module). This is dependent of:

- The space left over.
- The space needed.

The height is depending on:

- Minimum height: the height of the Toolpage in the Toolbox
- How many parts loaded in the Part List. The height of the Toolbox that contains the Part List will be adapted in a way that as much as possible parts are visualized.
- Auto sizing of the Toolbox will never automatically minimize other Toolboxes.

- When a user minimizes a Toolbox, the height will be recalculated.

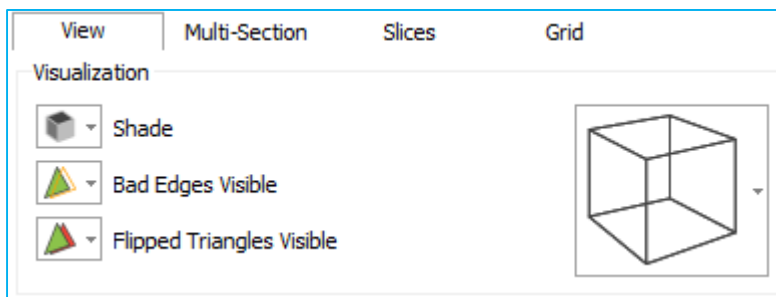
Upon a right mouse click on the Toolpage tabs, a dialog pops up. This dialog enables the user to select the Toolpages that he/she wants to visualize in the current toolbox.

16.2 View Pages

16.2.1 The View Toolpage









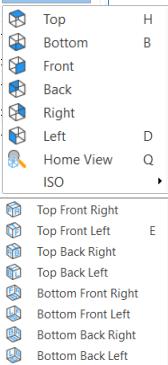
The View Toolpage split up into two parts:

- The Visualization modes
- The Cube



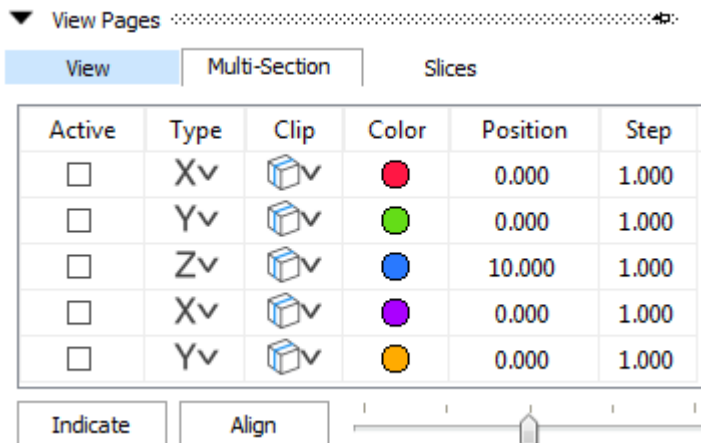
The functions of the View Toolpage are applied on all the parts in the workspace.

	Shade	Shade will display the part with shades according to the direction of the triangles.
	Wireframe	Wireframe shows the edges of the object. This representation is deduced from the STL file. This mode approaches the normal wireframe representation as good as possible, but due to the limited information, STL errors and noise in the STL file, abnormalities in this representation may show up. A line of wireframe is drawn when the angle between 2 triangles exceeds a certain value. You can change this value and so adapt the wireframe view.
	Shade & Wire	The parts are showed in a combination of the shade mode and the wireframe mode.
	Triangle	The triangles of the parts will be displayed upon the shaded part.
	Bounding Box	This mode will only show the bounding box of the part. This mode is quick in visualization.
	Transparency	The parts are shown transparent.
	Smooth Shading	The parts are shaded as in nature.
	No-Build zones	The No Build zones are shown on the platform scene.

Bad Edges  Bad Edges Visible  Bad Edges Invisible  Bad Edges Hidden Line  Highlight Bad Edges	Bad Edges Visible	Defects in the STL file can be detected graphically. All edges that are not shared by exactly 2 triangles will be displayed in yellow on the screen.
	Bad Edges Invisible	Makes the bad edges invisible.
	Bad Edges Hidden Line	The user can hide the indication of the bad edges that are situated behind or inside the part.
	Highlight Bad Edges	Bad edges are sometimes difficult to spot. The bad edges are drawn with thick lines so you can see them easily.
Flipped Triangles  Flipped Triangles Visible  Flipped Triangles Invisible  Flipped Triangles As Normal	Flipped Triangles Invisible	Makes the flipped triangles invisible.
	Flipped Triangles Visible	Defects in the STL file can be detected graphically. All triangles with a normal pointing into the screen are displayed in the Flipped Triangles color, which is by default red. Remaining red triangles in the shading indicate defects in the STL file (triangles with wrong-oriented normal, missing or overlapping triangles)
	Flipped Triangles As Normal	Shows the flipped triangles as normal triangles.
The Cube	 	Click on the cube to get the requested view. The view where you clicked will be highlighted till you change view: Select another view Rotate manually Clicking on one of the possibilities (it will highlight when the cursor passes over it) accesses these views. The dropdown shows all the possible views.
		The ISO views.

16.2.2 The Multi-Section Toolpage

The Multi-Section Toolpage allows the user to display 5 multiple sections. Magics Print Metal will always toggle between the Section and Multi-Section Toolpage, when one of them is active and the other is activated via the View menu. In other words, the Section and Multi-Section cannot be displayed at the same time.



Active (A)	By checking a row of this column you can make the section visible.	
Type	The user can define how he/she defines the section. Click on the icon to change the section type in the drop down dialog.	X
		Y
		Z
		3 Points
		Perpendicular on indicated line
		Coincident with indicated triangle
		Parallel with screen
Clip	Here you can select if you want to hide a side of the part. In this way, it is possible to look inside the solid part. The inside is colored in the Flipped Triangles color (default red).	
		Clicking this icon will switch the section view between Section on Part, Hide side towards origin and Hide side away from origin.
	The drop down menu, next to the icon, contains some extra options.	Section on Part
		Hide side towards origin
		Hide side away from origin
		Solid section
		Sections only
Color	You can assign a different color to each section.	
Position	This number indicates the position of the section along the axis perpendicular to it. The units used are the units you work in (inch or mm). You can also fill in a number and the section will move to this position.	
Step	Under the window you find a slider bar. If you click to the left or to the right from the slider on the slider bar, the section will move a distance indicated by the Step value. The same happens if you use the left and right arrow buttons on your keyboard.	
		With the Indicate-button, the position of the section can be pointed on the part. This position will be displayed in the Position box.
		When you push the align button, the view point of the part (and the section) will be rotated until the section is aligned with the screen.
Slider	You can move the section over the parts by sliding the slide. The section will be calculated and displayed in real-time while you change the position. The position of the section is displayed in the Position box. The slider will also slide when you use the arrow buttons on your keyboard.	

16.3 Part Pages

16.3.1 Working area

The **Rotate** function allows rotation of your part around all three axes of your screen. Click the Rotate button and use your left mouse button (press it in the workspace) to rotate your part.



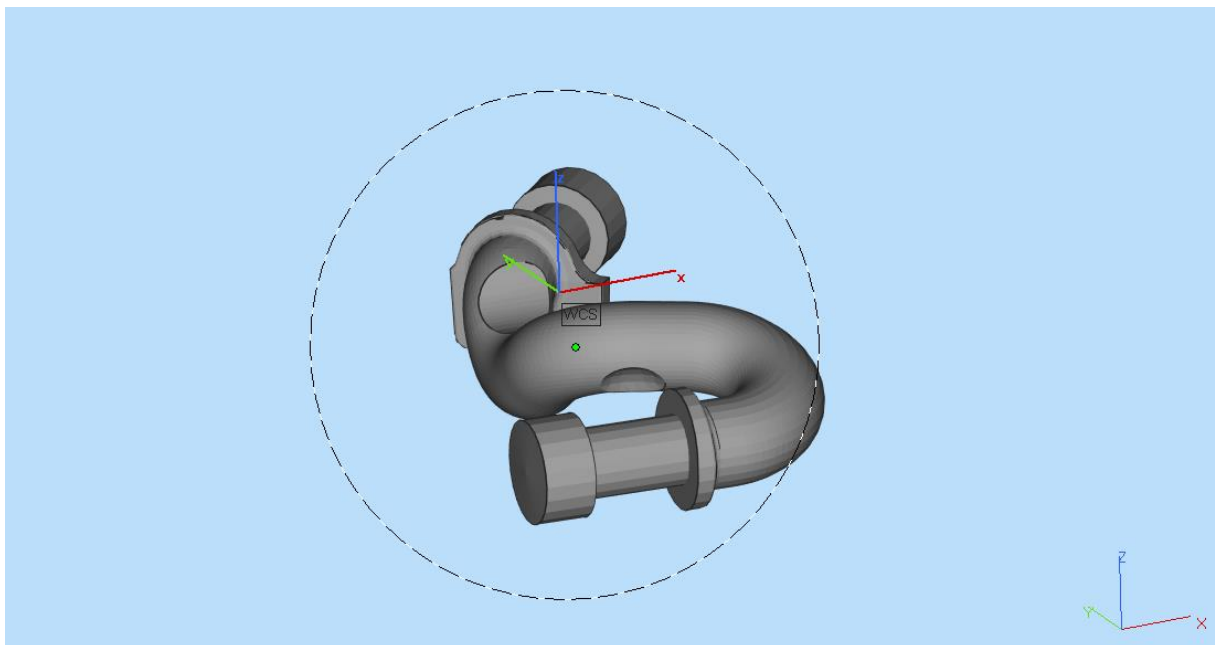
Quadruple arrow

The movement of the cursor is translated in a rotation around the three axes in the screen (3D movement).



Circular arrow

The movement of the cursor is translated in a rotation around the axis that is perpendicular to the screen (2D movement).



A circle in the center of your workspace is visualized to show which behavior to expect. When the cursor is inside the circle, it will have a quadruple arrow shape (3D movement). When it is outside the circle, it will have a circular arrow shape (2D movement).

The **mouse** also has a rotate option:

You can also access this function via your right mouse button shortcut (without clicking on the Rotate button). Press your RM and keep it down while moving your mouse, the part will rotate in accordance with your mouse movements.

16.3.2 Workspace context menu

The context menu in the workspace can be accessed through right-clicking and is as such a quick access point to frequently used function. The usage of the context menu can speed up the general workflow. Depending from where the menu is called, the functions can be different.



16.3.3 The Part List Toolpage

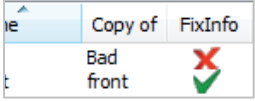
The Part List Toolpage keeps track of the parts in the Part Scene and of the virtual copies in the Platform Scenes.

Part Pages	
Part List	Part Info Part Fixing Info Scenes
Number of parts: 17	
#	...
1	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Horn_outer_1 n/a
2	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Horn_1_1 n/a
3	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Poussoir_1_R n/a
4	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Engineering_p n/a
5	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Engineering_p n/a
6	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Engineering_p n/a
7	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Clip_1_1 n/a
8	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Wheel_Rescal n/a
9	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Plug_1_1 n/a
10	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Drill_1_1 n/a
11	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Frame_1_1 n/a
12	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Bishop_1_1 n/a
13	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> King_1_1 n/a
14	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Queen_1_1 n/a
15	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Rook_1_1 n/a
16	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Knight_1_1 n/a
17	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Pawn_1_1 n/a
18	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Core_Base n/a
ID	Unique identifier for the part
Selected	When the checkbox of a part is checked, then the part is selected.
Visible (V)	The part is visible if the glasses are present.
Shading (S)	The user is able to define a separate visualization for every part. (Changing the visualization of a virtual copy on a Platform Scene will change the visualization of all virtual copies of the same mother part).
Import of parts	

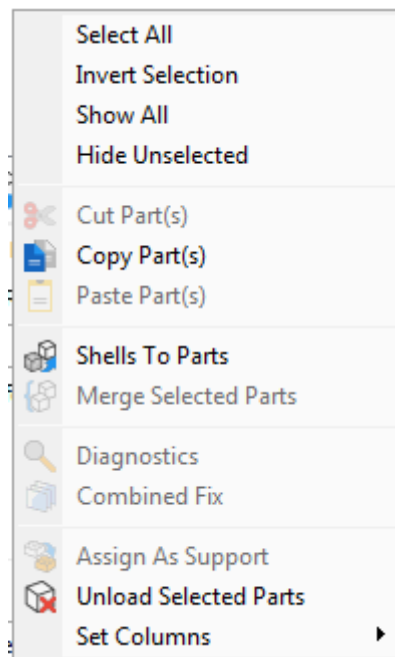


	Hide	Hide the respective part.
	Shade	Shade will display the respective part with shades according to the direction of the triangles.
	Wireframe	Wireframe shows the edges of the respective part.
	Shade&Wire	The respective part is showed in a combination of the shade mode and the wireframe mode.
	Triangle	The triangles of the respective parts will be displayed upon the shaded part.
	Bounding Box	This mode will only show the bounding box of the respective part.
	Transparent	This mode will show the respective part as transparent.
	<i>Import of slices</i>	
	Slices	
Color (C)	Bounding Box	This mode will only show the bounding box of the respective part.
	The color in the circle represents the color of the matching part. Clicking this circle leads you to the material editor dialog or to the color palette. (Changing the color of a virtual copy on a Platform Scene will change the color of all virtual copies of the same mother part).	
Memory State (M)	The user is able to define a separate memory state for every part. (Changing the memory state of a virtual copy on a Platform Scene will change the memory state of all virtual copies of the same mother part).	
	Compact	The STL resides in the memory as read-only; therefore it uses far less memory than the Standard memory state. Magics does not know the placement of the triangles nor the mutual dependencies of the triangles. The user is not able to perform actions on STL level.
	Normal	This is the standard memory state of a STL file. Magics knows the placement of the triangles and the mutual dependencies of the triangles. The user is able to perform actions on STL level (E.g. deleting triangles)
	On Disk	The STL is saved on disk and unloaded from the memory. The STL will stay in the project but the user can't perform any actions on it.



Part Name /Copy of	This column contains the names or the path of the loaded parts. In case of a Platform Scene, this column will show the name of the virtual copies. The name of a virtual copy is the same as the name of the mother part. If the name doesn't fit in the column a pop up, containing the full part name, will be shown when hovering over the name.
FixInfo	 <p>This column contains the fix status of the part. Double click on part show if there are errors or not. A Second double click performs an autofix on the part</p>
Extend with columns	Here you have the possibility to add or remove additional columns to the part list overview

Select All	Selects every part in the list.
Invert Selection	All selected parts are unselected and the unselected parts are selected. The Invert Selected functionality works on the Selected (S) column. Invisible parts will thus become visible.
Show All	All invisible parts are made visible.
Hide Unselected	Hides all unselected parts.
Unload Selected Parts	Unloads all selected parts.
Add Part to Scene	This function is only available when a scene is present. A dialog pops up, showing the parts loaded in the Modeler Scene. Check the parts, from which you want to create a virtual copy on the active scene.
New Scene	The Select Machine dialog will pop up, where you can select the machine of the newly created Platform.



Select All	Selects every part in the list.	
Invert Selection	All selected parts are unselected and the unselected parts are selected. The Invert Selected functionality works on the Selected (S) column. Invisible parts will thus become visible.	
Show All	Visualize all parts	
Hide Unselected	Hides all unselected parts.	
Cut Part(s)	Selected virtual copies of a platform can be cut to the clipboard.	
Copy Part(s)	The selected parts or virtual copies are copied to the clipboard.	
Paste Part(s)	Parts are pasted from the clipboard in the active scene.	
Shells to Parts	This function will split the selected parts, if they consist of more shells, into different parts. Now, each shell will represent one part.	
Merge Selected Parts	The selected parts are merged into one STL.	
Diagnostics	Runs Diagnostics	
Combined Fix	Executes the Combined Fix	
Unload Selected Parts	Deletes all the selected parts from the workspace.	
Set Columns	Pops up a sub menu where the user can define the visualized columns.	
	Show Part Name	Shows the part name of the parts.
	Show Path	Shows the path of the part in the Part Name column.
	# Triangles	Shows the amount of triangles used in the Part List.
	# Points	Shows the amount of points in the Part List.



	Surface	Shows the Surface of the parts in the Part List.
	Volume	Shows the Volume of the part in the Part List.
	# Invisible Triangles	Shows the amount of invisible triangles in the Part List.
	Preprocessed	Shows the Memory State of the part in the Part List.
	Shading	Shows the visualization of the part.
	Wireframe angle	Shows the wireframe angle.

16.3.4 The Part Info Toolpage

The properties of the parts in the Part List are displayed. All dimensions are displayed in the selected units.

▼ Part Pages
Part List | **Part Info** | Part Fixing Info

Part name: Core [v] [Rename] [Next]

Dimensions

	Min	Max	Delta	
X	-146,387	195,898	342,285	mm
Y	-296,646	335,155	631,801	mm
Z	-145,757	14,524	160,281	mm

Mesh info

# Triangles	11800	# Points	5902
# Marked	0	# Invisible	0


Properties

Volume	5630526,358	mm ³	[Update]
Surface	319523,675	mm ²	<input checked="" type="checkbox"/> Automatic

Status: Not changed Z Compensated: No

Part Name	This is a drop down list containing all the parts of the active Part or Platform Scene. The parts are sorted as in the Part List.
-----------	---



Rename	Renames the selected part, a dialog pops up to enter a new name. (The part can also be renamed by double clicking the part name in the part list.)
Next	The next button allows the user to see the part information of the next part in the workspace.
Dimensions	The dimensions of the part. The minimum and maximum coordinates (X, Y, Z) of the part. The delta value is the difference between the minimum and maximum.
# Triangles	The amount of triangles of the part.
# Points	The amount of points of the part.
# Marked	The amount of marked triangles of the part.
# Invisible	The amount of invisible triangles of the part.
	Updates all the information, by default the Volume and Surface information has to be updated.
Automatic	If checked, the Volume and Surface will be updated automatically.
Volume	The volume of the part.
Surface	The surface of the part.
Status	The status of the STL-part. If no modifications are made to the loaded part, the status is Not Changed. In the other case, the status is Changed.
Z compensate	Indicates if the part is z-compensated or not.

16.3.5 The Part Fixing Info Toolpage

The Part Fixing Information Toolpage is a guideline through the manual fixing process. By updating this Toolpage you can always determine what is wrong with the STL file.



▼ Part Pages ⇄ ✕

Part List Part Info **Part Fixing Info** Scenes

Part name:

☒ Inverted normals

☒ Bad edges

 Bad contours

☒ Near bad edges

☒ Planar holes

☒ Shells

 Noise shells


Advanced

☐ Overlapping triangles

☐ Intersecting triangles

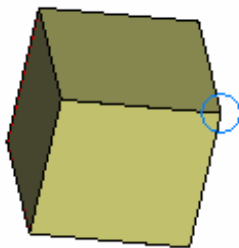
☐ Automatic

Part Name	This is a drop down list containing all the loaded parts. The parts are sorted as in the Part List.
Next	The next button allows the user to see the part information of the next part in the workspace.
Inverted Normals	Shows the amount of Inverted Normals. In the STL format, a normal is indicating the outside of a triangle. When the normal is pointing at the wrong direction (the inside) we call the triangle a flipped triangle.
Bad Edges	Shows the amount of Bad Edges. To have a correct STL file, all edges of each triangle should be connected properly to a neighbor. If an edge is not connected properly, the edge is called a bad edge and is indicated with a yellow line.
Bad Contours	Shows the amount of Bad Contours. A group of bad edges that are connected to each other is a bad contour
Near Bad Edges	Shows the amount of Near Bad Edges. Near bad edges are bad edges that are near other bad edges. These are mainly caused by 2 surfaces that are not well connected. You can recognize them as long yellow lines on the part. You can solve them very easy with stitching.
Planar Holes	Shows the amount of Planar Holes. A hole is where triangles are missing. Use fill hole to fill it up with triangles.
Shells	Shows the amount of shells. A shell is a collection of triangles that are connected to each other. Normally a part has only one shell because every triangle of the part is (indirectly) connected to every other triangle.

Noise Shells	Shows the amount of Noise Shells. Some shells have no geometrical meaning and are considered as noise (waste) that we can throw away. It is however recommended to first have a look at these shells before removing them. Even a shell of a few triangles can be important.
Overlapping Triangles	Shows the amount of Overlapping Triangles. Two triangles are considered as overlapping when: The distance between 2 triangles is smaller than the given tolerance. The angle between the normals of the triangles is smaller than the given angle.
Intersecting Triangles	Shows the amount of Intersecting Triangles. Intersecting triangles are triangles cutting each other.
	Updates all the information, by default the Volume and Surface information is updated.
Automatic	Check this option if you want the Part Fixing Information to be updated automatically. This is not recommended for big files.
Fix	The user can click fix to automatically fix the specified problem.

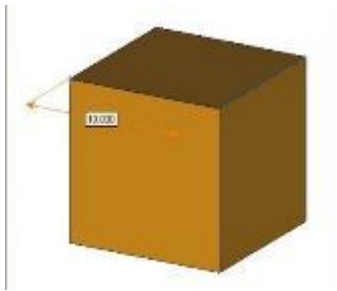
16.4 Measurements pages


Magics Print Metal recognizes different features: a point, a line, a plane, a circle, a cylinder and a sphere. You select a feature by moving the pointer of the mouse. Magics will snap (the feature will be marked when you move over it) to all features of the type you selected. For example points - see figure - are marked with a round. In the Settings you can choose which features Magics should recognize. You may for example determine that you only want to snap to points that are in a section, or on a wireframe...

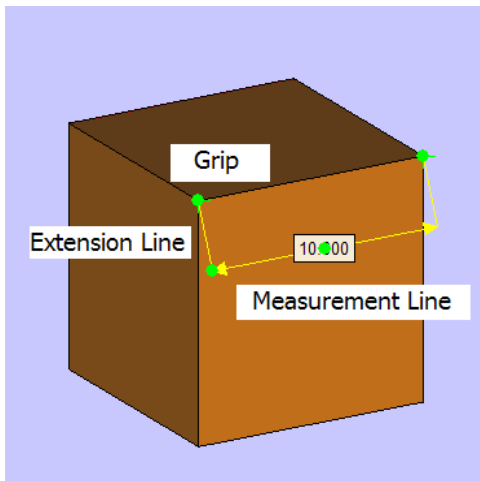


By clicking the left mouse button, you will select the marked feature. When all features of the measurement are selected, they will be marked if the draw feature in the measurement part of the settings is checked.

For example a point is indicated with a cross (see figure), a line with a line (see figure), and a sphere with 3 circumpolar circles. When the draw feature in the measurement part of the settings window is not on, the feature may be selected but is not indicated in a special way.



To select a measurement, you click on the icon 'select parts' in the main toolbar () or in the measurement Toolpage. The mouse pointer gets a green round to show you are in the selection mode. Click on the measurement value to select the measurement. When the measurement is selected some grips will appear. In the figure, the measurement with value 10 is selected. There is a grip in the middle of the measurement line and on one of the intersections of the extension line with the measurement line.



It is possible to adapt a measurement by dragging one of the feature indicators to a same feature positioned elsewhere on the part. This way you get a new measurement. To do so you first have to select a measurement.

In the Settings window, you can indicate how you would like to display the measurement (with or without arrows and extension lines, the size of the grips....).

If you are not satisfied with the position of the measurement value on the screen, you can change this position. First, select a measurement with the mouse. If you select the grips at the cross points of the extension lines, you can turn the measurement indication line around the axis that connects the selected features. When you select the grip in the middle of the measurement line, you can make the extension lines longer or shorter.

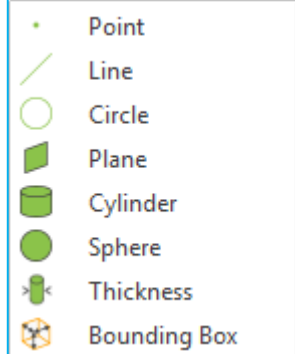
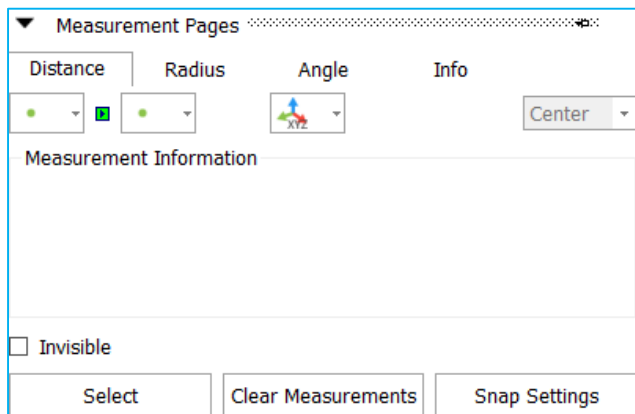
Selected measurements can be deleted with the Delete button on the keyboard. To delete one or more measurements (but not all), one has to follow these two steps:

- Select the dimensions you want to delete (keep the shift button down to select several dimensions)
- Hit the Delete button on the keyboard.

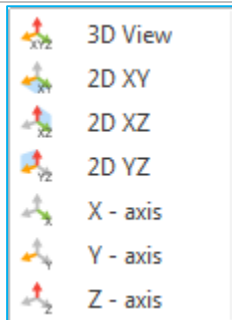
All measurements can be deleted at once by clicking the Clear Measurements button in the respective Toolpage.

16.4.1 The Distance Toolpage

The Distance Toolpage allows you to measure the distance between several features.



Feature	Measurement Description
Point	The length from the second feature to the point.
Line	The length of the perpendicular through the second feature on the line.
Circle	The length of the perpendicular through the second feature on the line.
Plane	The length of the perpendicular through the second feature on the plane. If you select a plane, Magics will snap to a triangle in that plane.
Cylinder	The length of the perpendicular through the second feature on the middle line of the cylinder.
Sphere	The length from the second feature to the center of the sphere.
Thickness	Measuring thickness is a special way of measuring: you do not have to select a second entity. When clicking on the part, Magics will measure the distance perpendicular on the triangles surface through the inside till it reaches another triangle (=the other side of the part). When measuring thickness, the snapping on the STL-surface is switched on automatically.
Bounding box	Measures the bounding box of the indicated part.

Snapping restrictions

3D View	The measurement is allowed in 3D	
2D XY	The measurement is restricted to the 2D XY plane.	
2D XZ	The measurement is restricted to the 2D XZ plane.	
2D YZ	The measurement is restricted to the 2D YZ plane.	
X-axis	The measurement is restricted to the 1D X axis.	
Y-axis	The measurement is restricted to the 1D Y axis.	
Z-axis	The measurement is restricted to the 1D Z axis.	
Circle options	Center	The center of the circle is used as a starting/ ending point of the measurement.
	Inside	The inside of the circle is used as a starting/ ending point of the measurement
	Outside	The outside of the circle is used as a starting/ ending point of the measurement.

☐ Invisible

Select

Clear Measurements

Snap Settings

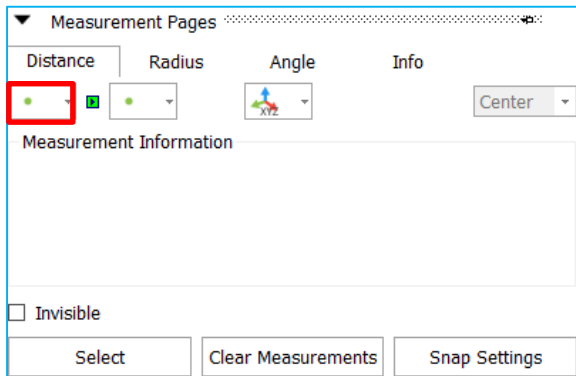
Invisible	When checked, the made measurements are hidden. Uncheck to see the measurements.
Select	Measurements can be selected now. A measurement is selected when on the label green dots are visible. When active the measurement or label position can be changed.
Clear Measurements	Deletes all measurements.
Snap Settings	Brings you to the Settings window. You can indicate how you would like to display the measurement.

Notifications

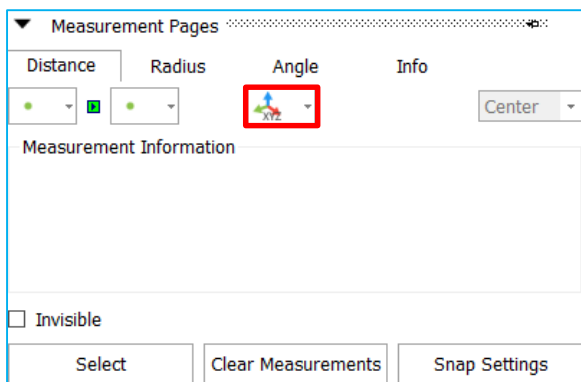
The measurement is dynamic: When you have selected the first feature, Magics will look for the second feature as you move your mouse over the part. The measurement value will change as you snap to features at different positions.

16.4.1.1 Advised Way of Working

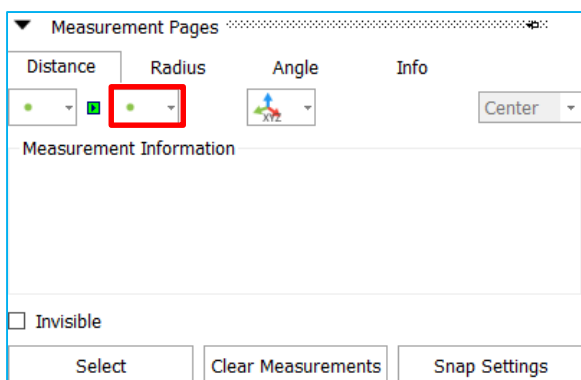
Choose the first feature in the menu (by clicking on it), snap the feature on the part and click on it to select it.

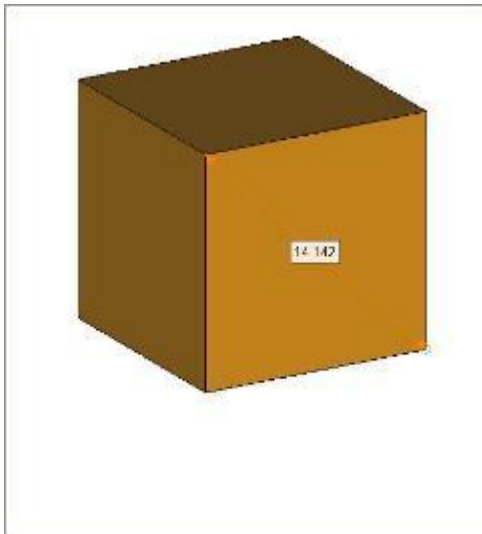


Choose the restriction of the measurement. This is possible in 1, 2 or 3 dimensions.

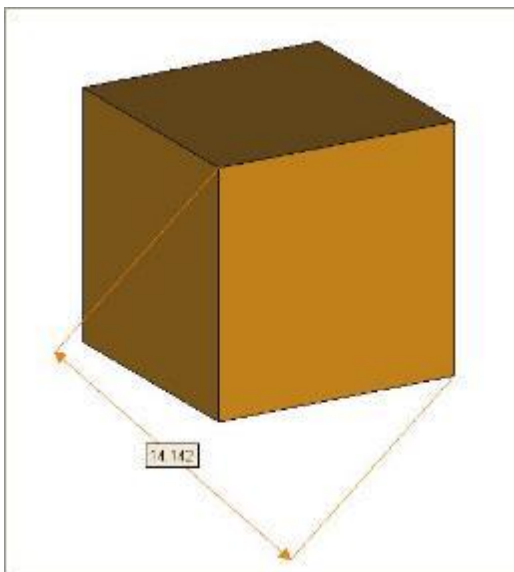


Choose the second feature in the second menu (by clicking on it) and snap to the feature on the part and then click on it to select it.



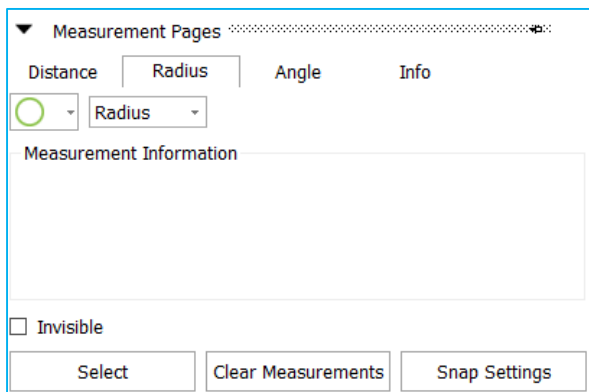





Choose where you want to display the measurement on the screen, by dragging the extension lines of the measurement.










When you click a last time, the measurement will be fixed.

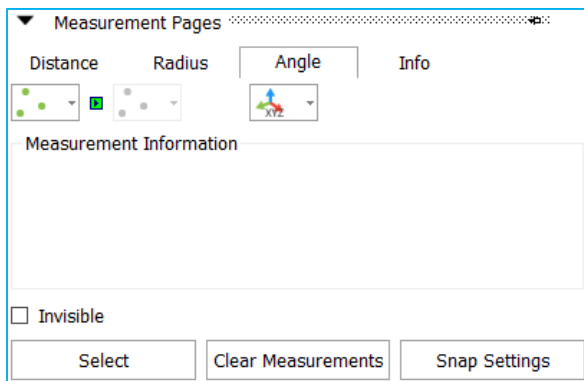
16.4.2 The Circle Toolpage

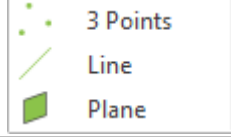


 Circle  3 Points  Sphere	
Feature	Measurement description
Circle	Select an arc. The radius (or diameter) of the arc will be displayed.
3-Points	Select three points. The radius (or diameters) of the circle defined by these three points will be displayed. Be aware that it is possible to indicate three random points. This can result in a non-existing arc! It is advised to use the radius of an arc measure function when possible. Use this function only when the arc is not recognized by Magics as a feature.
Sphere	Select a sphere. The radius (or diameter) of the sphere will be displayed.
Radius or Diameter	You can choose whether you want to measure the radius or the diameter.

Snapping restrictions		
 3D View  2D XY  2D XZ  2D YZ  X - axis  Y - axis  Z - axis	XYZ	The measurement is allowed in 3D
	XY	The measurement is restricted to the 2D XY plane.
	XZ	The measurement is restricted to the 2D XZ plane.
	YZ	The measurement is restricted to the 2D YZ plane.
	X	The measurement is restricted to the 1D X axis.
	Y	The measurement is restricted to the 1D Y axis.
	Z	The measurement is restricted to the 1D Z axis.
Invisible	When checked, the made measurements are hidden. Uncheck to see the measurements.	
Select	Measurements can be selected now. A measurement is selected when on the label green dots are visible. When active the measurement or label position can be changed.	
Clear Measurements	Deletes all measurements.	
Snap Settings	Brings you to the settings window. You can indicate how you would like to display the measurement.	

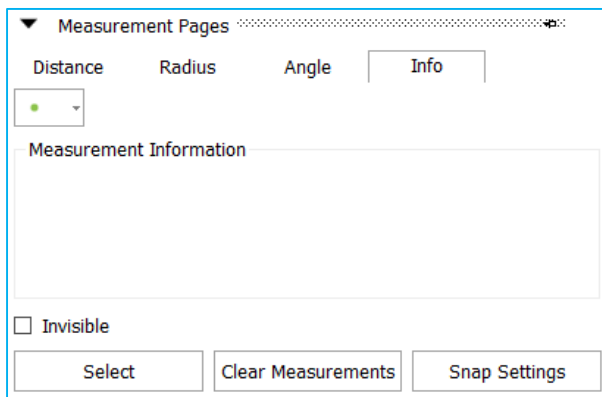
16.4.3 The Angle Toolpage



	
Feature	Measurement Description
3 points	Select three points. Two imaginary lines will be drawn between those points: between points 1 and 2, and between points 2 and 3. The resulting angle is the angle between those two lines defined by the three points. (You only have to use the 'from side'). Remark: It is advised to measure the angle between two line features when possible. Only use this function when the lines can't be recognized by Magics as features.
Line	Select the two intersecting lines. Both lines will be highlighted, and the intersection point will be drawn. The resulting angle is the angle between those two lines.
Plane	Select two planes.
Defaults	You can also measure the angle between a line or plane and an axis or plane of the coordinate center.

Invisible	When checked, the made measurements are hidden. Uncheck to see the measurements.
Select	Measurements can be selected now. A measurement is selected when on the label green dots are visible. When active the measurement or label position can be changed.
Clear Measurements	Deletes all measurements.
Snap Settings	Brings you to the settings window. You can indicate how you would like to display the measurement.

16.4.4 The Info Toolpage



When you snap to a feature, or you select it, some coordinate information of the features is given. This information allows you to draw exactly the same feature on the same point in space.

Point	The X, Y and Z coordinate of the point will be displayed.
Line	The X, Y and Z coordinate of the beginning and end points will be displayed, together with the length of the line.
Circle	The X, Y and Z coordinate of the center of the circle is given, together with its radius.
Triangle	The X, Y, Z coordinates of the corner points and the direction coefficient of the normal will be displayed.
Cylinder	The X, Y and Z coordinate of the middle point of the bounding discs is given, together with the radius.
Sphere	The X, Y and Z coordinate of the middle point of the sphere is given, together with its radius.

Invisible	When checked, the made measurements are hidden. Uncheck to see the measurements.
Select	Measurements can be selected now. A measurement is selected when on the label green dots are visible. When active the measurement or label position can be changed.
Clear Measurements	Deletes all measurements.
Snap Settings	Brings you to the settings window. You can indicate how you would like to display the measurement.

16.5 Fixing Pages

16.5.1 The AutoFix Toolpage

▼ Autofix

Automatic Combined Fixing

Manual Combined Fixing

☒ Normal Fixing ☒ Unify

☒ Stitching ☒ Filter Sharp Triangles

☐ Remove Noise Shells

☒ Hole Filling ☐ Conditional

☒ Planar

☐ Freeform Grid: 1,000 mm

Perform

Automatic Combined Fixing	A predefined list of actions is performed. Some actions are conditional, this means that the action will only be performed when the Magics is sure that the result will be ok.	
Manual Combined Fixing	Normal Fixing	Magics will reorient the normal of the triangles automatically.
	Filter Sharp triangles	Sharp triangles will be removed to improve surface quality.
	Stitching	Magics will do a stitching to solve the near bad edges.
	Remove Noise Shells	The automatic removal of detected noise shells, these noise shells make no geometrical sense.
	Hole Filling	Magics will only fill a contour when he recognizes it as a hole. Some contours are not holes.
		Conditional Magics will only fill a contour when he recognizes it as a hole. Some contours are not holes.
		Planar The hole will be filled as a planar hole
		Freeform Complex shaped contours are better filled using the freeform algorithm. Grid: The triangle size of the surface that is used to fill the contour
	Unify	This will remove all internal geometry and intersecting triangles. This operation will only be done if the geometry allows it.



17 Recommended System Requirements

17.1 Hardware

CPU

Intel® Core i7/AMD Athlon™ (Phenom II X4 / X6) multi-core processors
3.0 GHz or higher with SSE2 technology

Memory

16 GB RAM or higher

Free Disk Space

Win 64-bit system
2GB of free disk space for Windows 64-bit (.NET Framework 4.5)

Display

1920 x 1080 resolution or higher
32-bit color depth (True color)

Video Card

GPU chip: NVIDIA GeForce GTX 1060, AMD Radeon RX 480 or better
DirectX 11 compatible video card
1 GB of memory (more is recommended)
Memory interface width of 192-bit (256-bit is recommended)

17.2 Operating Systems

Magics 21 **runs only on:**

Windows Vista SP2 (64 bit)
Windows 7 (64bit)
Windows 8 / 8.1 (64bit)
Windows 10 (64bit)

Magics 21 **is not supported** on following systems:

Windows 98
Windows 2000
Windows XP Home
Windows XP Pro SP3 (32bit/ 64bit)
Windows Server Editions



Magics does **not** run natively on **Mac OS X**.

Magics does **not** run natively on **Linux**, or **any other operating system** not listed above.

Virtualization systems such as VMWare are not recommended.



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