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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.exe](image)

2. Select the language you want to use and click OK to proceed:
   ![Magics Print Metal 21.3 Setup](image)

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.

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)
Std 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:
<table>
<thead>
<tr>
<th>File Type</th>
<th>Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magics Project files</td>
<td>(*.magics)</td>
</tr>
<tr>
<td>Materialise AM Exchange files</td>
<td>(*.MatAMX)</td>
</tr>
<tr>
<td>3MF files</td>
<td>(*.3mf)</td>
</tr>
<tr>
<td>3-matic project files</td>
<td>(*.mxp)</td>
</tr>
<tr>
<td>STL files</td>
<td>(*.stl)</td>
</tr>
<tr>
<td>STL Zip files</td>
<td>(*.mgx)</td>
</tr>
<tr>
<td>Magics Connect Project file</td>
<td>(*.mproject)</td>
</tr>
<tr>
<td>Magics Connect Part file</td>
<td>(*.mpart)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Memory State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>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)</td>
</tr>
<tr>
<td>Compact</td>
<td>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.</td>
</tr>
<tr>
<td>On Disk</td>
<td>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.</td>
</tr>
<tr>
<td>As Saved</td>
<td>The Project will be loaded as previously saved.</td>
</tr>
</tbody>
</table>

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

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)

Aside Of Others

Parts are loaded one after the other while the original Y-position is maintained. If a line is full, a new line is started.

Automatic Placement

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.).
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:

<table>
<thead>
<tr>
<th>Memory State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>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).</td>
</tr>
<tr>
<td>Compact</td>
<td>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.</td>
</tr>
<tr>
<td>On Disk</td>
<td>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.</td>
</tr>
</tbody>
</table>

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.
<table>
<thead>
<tr>
<th><strong>Rescaled bounding box</strong></th>
<th>Represents the parts bounding box after the rescale take place</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Add rescale factor to part’s name</strong></td>
<td>The used rescale factor will be added to the part name</td>
</tr>
<tr>
<td><strong>Apply to next oversized parts</strong></td>
<td>The same rescale factor will be used for other upcoming oversized parts</td>
</tr>
<tr>
<td><strong>Rescale</strong></td>
<td>The actual rescale is performed</td>
</tr>
<tr>
<td><strong>Don’t import</strong></td>
<td>The part isn’t rescaled and will not be imported</td>
</tr>
</tbody>
</table>

### 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

<table>
<thead>
<tr>
<th>Name</th>
<th>Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connect part files</td>
<td>*.mPart</td>
</tr>
</tbody>
</table>

7.4.4 Save scene

Save the active scene.
7.5 Machines

Machines

- Change Machine
- Machine Properties
- Build Processor Manager

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

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”
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.

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

<table>
<thead>
<tr>
<th>Part Interval</th>
<th>The minimum distance between two parts.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platform Margin</td>
<td>The minimum distance between (the bounding box of) a part and the edge of the platform</td>
</tr>
<tr>
<td>Parts to Nest</td>
<td>Nest All Parts</td>
</tr>
<tr>
<td></td>
<td>Selected Parts</td>
</tr>
<tr>
<td>Z-height &amp; support</td>
<td>Move parts to default Z-height</td>
</tr>
<tr>
<td></td>
<td>Keep supports</td>
</tr>
<tr>
<td>Enable Multi-Platform Nester</td>
<td>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.</td>
</tr>
</tbody>
</table>

8.5.2.1 Geometry

Placement solution

<table>
<thead>
<tr>
<th>First possible solution</th>
<th>With this option, Magics offers the first placement it finds for which all parts are nested on the platform.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimal surface area</td>
<td>The total surface area of all the loaded parts is minimized.</td>
</tr>
<tr>
<td>Minimal X-dimension</td>
<td>The delta-X of the total surface area of the loaded parts is minimized.</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------------------------------------------------</td>
</tr>
<tr>
<td>Minimal Y-dimension</td>
<td>The delta-Y of the total surface area of the loaded parts is minimized.</td>
</tr>
<tr>
<td>Platform center</td>
<td>Parts are nested around the center of the platform. A circular shape is created.</td>
</tr>
<tr>
<td>Custom Part Placement</td>
<td>With this option, you can add a grayscale image to assign priority or penalty zones for Autoplacement.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part placement</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Translate and Rotate parts</td>
<td>Rotate will give Magics Print the liberty to rotate the parts by 90°. This will result is more efficient and faster nesting.</td>
</tr>
<tr>
<td>Only Translate</td>
<td>The parts will not be rotated, strictly translated.</td>
</tr>
<tr>
<td>Automatic Placement</td>
<td>This indicates the progress of the parts being placed on the building platform</td>
</tr>
</tbody>
</table>
If the automatic nesting isn’t able to nest all parts following message is shown:

YES: New platforms will be created with parts on it
NO: The parts that didn’t fit can be found beside the platform

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.

<table>
<thead>
<tr>
<th>First Possible Solution</th>
<th>With this option, Magics offers the first placement he finds for which all parts are nested on the platform.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimal Surface Area</td>
<td>The total surface area of all the loaded parts is minimized.</td>
</tr>
<tr>
<td>Minimal X-Dimension</td>
<td>The delta-X of the total surface area of the loaded parts is minimized.</td>
</tr>
<tr>
<td>Minimal Y-Dimension</td>
<td>The delta-Y of the total surface area of the loaded parts is minimized.</td>
</tr>
<tr>
<td>Platform center</td>
<td>Parts are nested around the center of the platform. A circular shape is created.</td>
</tr>
</tbody>
</table>
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.

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

<table>
<thead>
<tr>
<th>Resulting coordinates</th>
<th>Use the resulting coordinates fields if you want to move a part to a specific location.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative translation</td>
<td>Use the relative translation fields if you want to move the part a specific distance away from the current position.</td>
</tr>
<tr>
<td>Enable snapping</td>
<td>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.</td>
</tr>
<tr>
<td>Size</td>
<td>The snapping value used.</td>
</tr>
</tbody>
</table>

Translate Portal

- **Resulting coordinates**
  - X: 7,493 mm
  - Y: 5,001 mm
  - Z: 10,000 mm

- **Relative translation**
  - X: 0 mm
  - Y: 0 mm
  - Z: 0 mm

- **Enable snapping**
  - Size: 1,000 mm

- **Translate along line**

- **Make copy**

- **Show preview**

**Translation origin**

- **Min**, **Middle**, **Max**, **User**
  - X: 0 mm
  - Y: 0 mm
  - Z: 0 mm

**Indicate Point**

**To default position**

**To default Z**

**Apply**

**Ok**

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

<table>
<thead>
<tr>
<th>Rotation Angles</th>
<th>Fill in the desired rotation angles in the X, Y and Z fields. The positive rotation sense is counter clockwise (CCK).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enable snapping</td>
<td>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.</td>
</tr>
<tr>
<td>Size</td>
<td>The snapping value used.</td>
</tr>
<tr>
<td>Rotate around line</td>
<td>After enabling, select a line (part/triangle edge) around which you want to rotate. You can then rotate interactively or by inputting a value.</td>
</tr>
</tbody>
</table>
## Remark: With this function it is fairly easy to create living hinges

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keep original Z position</td>
<td>When enabled, the part's minimal Z-position will stay the same while rotating.</td>
</tr>
<tr>
<td>Make copy</td>
<td>Magics will create a copy on the desired place and keep the original part on his place.</td>
</tr>
<tr>
<td>Show preview</td>
<td>When enabled, a preview will appear to show the result of the inputted values.</td>
</tr>
</tbody>
</table>
| Rotation Center                 | There are 3 options available:  
  - Center of selection: If multiple parts are selected, they will all rotate around the center of the selection, moving their position.  
  - Individual part center: Each part will rotate around its own center, so their position won't change, only the orientation.  
  - Custom rotation center: 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:
Advanced

8.5.5.1 Advanced

Indicate Plane

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.

![Diagram showing bottom plane selection](image)

### Plane Selection Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Tolerance</td>
<td>10,000 mm</td>
</tr>
<tr>
<td>Angle Deviation</td>
<td>10,000 °</td>
</tr>
</tbody>
</table>

### Positioning

- None
- Keep Original Z Position
- Translate to Default Position
- Translate to Default Z Position
### Plane Selection Parameters

<table>
<thead>
<tr>
<th>Surface Tolerance</th>
<th>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</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angle Deviation</td>
<td>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.</td>
</tr>
</tbody>
</table>

#### Positioning

<table>
<thead>
<tr>
<th>None</th>
<th>No translation is done.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keep Original Z Position</td>
<td>The part first will be rotated and next will be translated in such a way that the original minimum Z position remains the same.</td>
</tr>
<tr>
<td>Translate to Default Position</td>
<td>The part first will be rotated and next will be translated to the default part position.</td>
</tr>
<tr>
<td>Translate to Default Z position</td>
<td>The part will be translated to the default Z position.</td>
</tr>
</tbody>
</table>

### 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.

8.7 Build Check

8.7.1 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.

<table>
<thead>
<tr>
<th>Show result as</th>
<th>Gradient coloring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum thickness</td>
<td>0.500 mm</td>
</tr>
<tr>
<td>Maximum thickness</td>
<td>1.500 mm</td>
</tr>
<tr>
<td>Refine triangles</td>
<td></td>
</tr>
</tbody>
</table>

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 | 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.

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.

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

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

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

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall angle</td>
<td><strong>45,000°</strong> Defining a wall angle makes it possible to exclude certain areas/surfaces from the analysis.</td>
</tr>
<tr>
<td>Refine triangles parameters</td>
<td>(More information below)</td>
</tr>
<tr>
<td>Iterations</td>
<td><strong>3</strong> The value entered as the number of iterations places an upper limit on the number of iterations.</td>
</tr>
<tr>
<td>Max edge size</td>
<td><strong>2,000 mm</strong></td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Wall Angle = 50°</th>
<th>Wall angle = 70°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical gap angle = 180-(2*50)= 80°</td>
<td>Critical gap angle = 180-(2*70)= 40°</td>
</tr>
</tbody>
</table>

60° < 80°: the local thickness reduction is not taken into account  
60°>40°: 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.
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.

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

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>With clearance</strong></td>
<td>Define the spacing allowed between parts. If they are located within a distance smaller than this value, they will be identified as colliding parts.</td>
</tr>
<tr>
<td><strong>All parts</strong></td>
<td>Collision is detected between all loaded parts on the platform scene.</td>
</tr>
<tr>
<td><strong>Selected parts</strong></td>
<td>Collision is only detected between selected parts.</td>
</tr>
<tr>
<td><strong>Analyze No-Build-Zones</strong></td>
<td>Collision is detected between the part(s) and active ‘No-Build-Zones’</td>
</tr>
</tbody>
</table>

### Identification

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hide parts with no conflict</strong></td>
<td>Make parts where no collision is detected invisible after the analysis</td>
</tr>
<tr>
<td><strong>Color triangle</strong></td>
<td>Color triangles where collision is detected</td>
</tr>
</tbody>
</table>

### 8.8 Supports

#### 8.8.1 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

<table>
<thead>
<tr>
<th>Inverted normals</th>
<th>Near bad edges</th>
<th>Hole</th>
<th>Untrimmed triangles</th>
</tr>
</thead>
</table>

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 slice files 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.

Near Bad edge

After stitching

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:

<table>
<thead>
<tr>
<th>1 shell</th>
<th>2 shells</th>
<th>2 shells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every triangle is connected to each other.</td>
<td>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.</td>
<td>The part is hollow. The inner shell is not connected with the outer shell. This is normal with hollow parts.</td>
</tr>
</tbody>
</table>

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

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

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

9.3.2 Create Triangle

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

9.3.3 Create Bridge

Click to activate. You can now manually create bridges.

9.3.4 Delete Triangle

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

9.4 Enhance

9.4.1 Triangle reduction

Magics Print allows you to reduce the number of triangles in an STL file. This makes it easier to manipulate the file.
<table>
<thead>
<tr>
<th><strong>Smallest Detail</strong></th>
<th>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.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Max Angle</strong></td>
<td>The Max Angle value defines two limits: 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. 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.</td>
</tr>
<tr>
<td><strong>Number of Iterations</strong></td>
<td>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).</td>
</tr>
<tr>
<td><strong>Keep Textures Intact</strong></td>
<td>Textures on the part stay intact. Some triangles may not be filtered out due to texture that is kept.</td>
</tr>
<tr>
<td><strong>Keep Colors Intact</strong></td>
<td>Colors on the part stay intact. Some triangles may not be filtered out due to color that is kept.</td>
</tr>
</tbody>
</table>

**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

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.

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

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uniform Rescale</td>
<td>The rescale factor is identical in all directions</td>
</tr>
<tr>
<td>Show Preview</td>
<td>Checking this box will show a preview of the rescale</td>
</tr>
<tr>
<td>Make copy</td>
<td>Make a copy of the original part before resizing or rescaling</td>
</tr>
</tbody>
</table>

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.

Remark: 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 trough 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

When clicking ‘add’ the perforation is being drawn when you click on the part. The hole is not immediately being subtracted.

To have a better look where the cone will be placed a blue preview is shown.

The “Add” mode is enabled by default when opening the Perforator function.

Remove

Unwanted perforations can be deleted when pressing this button.

While in the “Add” mode, it is possible to hold down Shift to activate the “Remove” mode.

<table>
<thead>
<tr>
<th>Perforation size</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Radius outer wall (r2)</td>
<td>Here you determine the radius of the outer circle of the perforation.</td>
</tr>
<tr>
<td>Radius inner wall (r1)</td>
<td>Here you can determine the radius of the inner circle of the perforation.</td>
</tr>
<tr>
<td>Angle</td>
<td>Here you can determine the angle of the perforation.</td>
</tr>
</tbody>
</table>

Use notch

You can choose to add a small notch. The notch is defined by the parameters Angle, Width and Height.

| Width | Height |
### Angle

<table>
<thead>
<tr>
<th>Keep subtracted parts</th>
<th>When checked, the subtracted part(s) are kept. If not checked subtracted part(s) are unloaded automatically.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subtract</td>
<td>The perforation takes place.</td>
</tr>
<tr>
<td>Detect Unwanted Intersections</td>
<td>Collisions will be detected when a cone is added. Default on. (See remark)</td>
</tr>
</tbody>
</table>

### 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.

<table>
<thead>
<tr>
<th>Cancel</th>
<th>The flattened cone is not constructed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>The cone will be constructed with the intersection.</td>
</tr>
</tbody>
</table>
10.4 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:

<table>
<thead>
<tr>
<th>Total Clearance</th>
<th>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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inside</td>
<td><img src="image" alt="Clearance inside" /></td>
</tr>
<tr>
<td>Outside</td>
<td><img src="image" alt="Clearance outside" /></td>
</tr>
<tr>
<td>Both sides</td>
<td><img src="image" alt="Clearance/2" /></td>
</tr>
</tbody>
</table>
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.

![Figure showing cut visible triangles]

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.

![Figure showing cut selected contours]

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)*

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. |

![Image of extrusion options](image_url)
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

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.
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.
### Labeling Options

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

### Advanced options

- Flip
- Mirror
- Label through
- Automatically update prenew
- 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

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

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
<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No outer shell</td>
<td>The part will be fully replaced by a lattice and will not have an outer shell.</td>
</tr>
<tr>
<td>Outer shell</td>
<td>The part will receive a shell.</td>
</tr>
<tr>
<td>Thickness</td>
<td>This value displays the distance over which the triangles of the original shell get an offset in order to generate a hollow part.</td>
</tr>
<tr>
<td>Detail Size</td>
<td>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. <em>Remark:</em> If the smallest detail is chosen too high, it is possible that the internal wall intersects with the external wall.</td>
</tr>
<tr>
<td>Direction</td>
<td>Here you determine if you want to create a new shell at the interior or at the exterior of the existing shell.</td>
</tr>
<tr>
<td>Memory requirements</td>
<td>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.</td>
</tr>
<tr>
<td>Reduce triangles of Core</td>
<td>Because the hollow function creates a lot of triangles, you have the possibility to reduce these at once.</td>
</tr>
<tr>
<td>Tolerance</td>
<td>Triangle Reduction</td>
</tr>
<tr>
<td>Angle</td>
<td>Number of Iterations</td>
</tr>
<tr>
<td>Smoothen Core</td>
<td>By checking this option a smoothing will be performed on the created core.</td>
</tr>
</tbody>
</table>
1.3.3. 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

<table>
<thead>
<tr>
<th>Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>A spacing will be given between the bounding boxes of the unit structure</td>
</tr>
</tbody>
</table>

#### Spacing

- **Spacing**
- **dX**: 0.000 mm
- **dY**: 0.000 mm
- **dZ**: 0.000 mm

#### Start position

- **Start position**
- **dX**: 0.000 mm
- **dY**: 0.000 mm
- **dZ**: 0.000 mm

#### Angled Growth

- **Angled Growth**
- The whole lattice will be generated under specified angle

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)
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

![Diagram showing parts scene and platform scenes with copy of parts]

**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:

<table>
<thead>
<tr>
<th>Yes</th>
<th>Magics proposes to save all parts in a project file before unloading the scene. After saving all parts/copies are unloaded.</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>The scene is unloaded without saving any parts/copiers</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Machine Name</th>
<th>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).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material name</td>
<td>The material of the selected machine.</td>
</tr>
<tr>
<td>Comment</td>
<td>Comment on the selected machine.</td>
</tr>
</tbody>
</table>

11.2.1.2 Platform properties
11.2.1.2.1 Default part position

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

11.2.1.2.2 Automatic placement

Enable multi-Platform Nester: Allows the automatic placement on multiple platforms.

Automatic Placement

- Bounding Box
- Geometry Based

Part Interval: 10 mm
Platform Margin: 10 mm

Placement Solution

- First Possible Solution
- Minimal Surface Area
- Minimal X-Dimension
- Minimal Y-Dimension
- Platform Center

Part interval: The interval between parts
Platform Margin: The margin of the platform
<table>
<thead>
<tr>
<th>Placement Solution</th>
<th>The placement solution that will be applied: First Possible Solution Minimal Surface Area Minimal X-Dimension Minimal Y-Dimension Platform Center</th>
</tr>
</thead>
</table>
| Geometry Based      | Automatic Placement:  
  - Bounding Box  
  - Geometry Based  |
| Part Interval       | 5 mm |
| Platform Margin     | 5 mm |
| Placement Solution  |  
  - First Possible Solution  
  - Minimal Surface Area  
  - Minimal X-Dimension  
  - Minimal Y-Dimension  
  - Platform Center  
  - Custom Part Placement  |
| Part Placement      |  
  - Translate and Rotate Parts  
  - Only Translate  |
| 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 |
Load an image that can be shown on the platform. The darker areas indicate higher priority, while the lighter areas indicate lower priority. Export the Platform image to get an image with the correct platform dimensions, that you can immediately edit.

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.

### 11.2.1.2.3 Fields

<table>
<thead>
<tr>
<th>Overlap 1</th>
<th>Position</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0,000 mm</td>
<td>0,000 mm</td>
</tr>
</tbody>
</table>

### 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

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
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

<table>
<thead>
<tr>
<th>Surface Angle</th>
<th>Adjust the surface angle and see immediately on your part how the surfaces that need support change.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colors</td>
<td>Change the colors to visualize the areas which need support</td>
</tr>
<tr>
<td>Mark highlighted</td>
<td>Marks the highlighted areas.</td>
</tr>
</tbody>
</table>
12.2.5 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.

<table>
<thead>
<tr>
<th>Create new profile</th>
<th>Create a new support profile for the selected machine.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copy profile</td>
<td>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’.</td>
</tr>
<tr>
<td>Load profile</td>
<td>Load an already existing profile into your instance of Magics Print. Profiles generated on other systems can also be loaded.</td>
</tr>
<tr>
<td>Rename profile</td>
<td>Add a new name for the profile</td>
</tr>
</tbody>
</table>
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.

- **Solid supports**:
  - Keep as stl on exit
  - Merge with part on exit

- **Non-solid supports**:
  - Keep as stl on exit
  - Merge with part on exit

- Thickness: 0.000 mm

- Apply stitch
- Apply triangle reduction
- Apply unify (will be done before merging the solid supports)
12.3.2.2 *Surface Selection*

### Surface Angle

<table>
<thead>
<tr>
<th>Selection Angle</th>
<th>30°</th>
</tr>
</thead>
</table>

This angle determines which surfaces will be selected for support generation. If the angle is below this value, supports are generated; above this value the surface is considered to be self-supporting and supports are not required.

### 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

- 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

- Sharp edges shorter than indicated value won’t be supported.

Maximum height

Surfaces higher than defined height won’t be supported.

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
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:

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
value is 0, all sharp edges will be supported. Typically you can set this parameter at the same value as the slice distance.

<table>
<thead>
<tr>
<th>Maximum height</th>
<th>Surfaces higher than the maximum height will not be supported.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto merge surfaces</td>
<td>Surfaces with small sharp triangles can be automerged.</td>
</tr>
</tbody>
</table>

12.3.2.3 Type Selection

<table>
<thead>
<tr>
<th>Support types</th>
<th>The user can define which types of support are generated automatically.</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Non-solid</td>
<td></td>
</tr>
<tr>
<td>- Point</td>
<td></td>
</tr>
<tr>
<td>- Point*</td>
<td></td>
</tr>
<tr>
<td>- Line</td>
<td></td>
</tr>
<tr>
<td>- Line*</td>
<td></td>
</tr>
<tr>
<td>- Block</td>
<td></td>
</tr>
<tr>
<td>Cones</td>
<td></td>
</tr>
<tr>
<td>- Cones</td>
<td></td>
</tr>
<tr>
<td>- Cones*</td>
<td></td>
</tr>
<tr>
<td>Trees</td>
<td></td>
</tr>
<tr>
<td>- Trees</td>
<td></td>
</tr>
<tr>
<td>- Trees*</td>
<td></td>
</tr>
</tbody>
</table>

Point supports

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

Maximum area: 10 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

50

\( (= \text{Contour}^2 / \text{Surface}) \)

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

12 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 than 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 1 mm + 2 x 11 mm = 24 mm
Surface area = 11 mm x 1 mm = 11 mm²
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 specialized type of line support designed to support down facing edges instead of surfaces.

- **Point threshold**
  - 2 mm
  - A point support will be created when the edge is shorter than the indicated value.

- **No support threshold**
  - 0.5 mm
  - Use this parameter to choose when there should be no supports generated if the edge is shorter than the indicated value.

### 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

<table>
<thead>
<tr>
<th>Z offsets</th>
<th>All the supports can have a certain offset into the part in order to ensure a better contact between part and support.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Z Offset</td>
<td>You can specify an offset in the supported surface.</td>
</tr>
<tr>
<td>Lower Z Offset</td>
<td>You can specify an offset in the supporting surface.</td>
</tr>
</tbody>
</table>

#### 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.

<table>
<thead>
<tr>
<th>No Support Offset</th>
<th>You can define the distance up till where the vertical wall is supporting.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Height Supporting Wall</td>
<td>You can define the minimum height of the wall to be a supporting wall.</td>
</tr>
</tbody>
</table>

12.3.3.4 Vertical wall offset

Vertical Wall Offset (a)

This feature ensures that supports don’t get placed on a vertical wall. A small gap allows the support to be easily removed.
| Vertical wall offset | 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. |

12.3.3.5  **Lowest line**

| 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. 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. |

| Minimum Length | Lowest Lines smaller than this length will be filtered out. |
12.3.3.6  *Thickness (PRO feature)*

<table>
<thead>
<tr>
<th>Thickness</th>
<th>Set the thickness for non-solid supports.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper teeth (a)</td>
<td>The thickness of the upper teeth in mm.</td>
</tr>
<tr>
<td>Wall (b)</td>
<td>The thickness of the wall in mm</td>
</tr>
<tr>
<td>Lower teeth</td>
<td>The thickness of the lower teeth in mm</td>
</tr>
<tr>
<td>Trim at surface</td>
<td>The trim Z offset in mm</td>
</tr>
</tbody>
</table>

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.
<table>
<thead>
<tr>
<th>Current selected profile</th>
<th>Use the drop-down to select a different profile. There is always at least one profile available.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create a new profile</td>
<td>Enter a new name in the pop-up window. The created profile is available in the drop-down list.</td>
</tr>
<tr>
<td>Copy Profile</td>
<td>Copy the current selected profile to create a new profile. Enter a new name in the pop-up window for the copy. The created copy is available in the drop-down list.</td>
</tr>
<tr>
<td><strong>Load an existing profile.</strong></td>
<td>You can load any profile from the available machines.</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td><img src="image" alt="Load Profile" /></td>
<td><img src="image" alt="Profile List" /></td>
</tr>
<tr>
<td><strong>Rename profile</strong></td>
<td>Enter a new name for the selected profile.</td>
</tr>
<tr>
<td><img src="image" alt="Rename Profile" /></td>
<td><img src="image" alt="Rename Dialog" /></td>
</tr>
<tr>
<td><strong>Delete profile</strong></td>
<td>Delete the selected profile.</td>
</tr>
<tr>
<td><img src="image" alt="Delete Profile" /></td>
<td><img src="image" alt="Delete Dialog" /></td>
</tr>
</tbody>
</table>

It is not possible to delete all profiles. At least one profile will remain available.
### 12.3.4.3 Contact length

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

#### Sunken ribs
Sunken ribs

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

- **Number**: 0
- **Distance**: 2 mm

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.

<table>
<thead>
<tr>
<th>Distance</th>
<th>The distance that a sunken rib will stop before the part.</th>
</tr>
</thead>
</table>

### 12.3.4.5 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.
- **Height**
- **Top Length**
- **Base Length**
### Base Interval

<table>
<thead>
<tr>
<th>Lower Teeth Same as Upper Teeth</th>
<th>The Lower Teeth have the same specifications as the Upper Teeth.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full teeth in ends</td>
<td>You can decide to half a full tooth at the end of a support, instead of half a tooth.</td>
</tr>
<tr>
<td>Copy current parameters to all teeth</td>
<td>Copy the teeth parameters from this support type to all types which are using teeth.</td>
</tr>
</tbody>
</table>

#### 12.3.4.6 Number of ribs

**Number of Ribs**

<table>
<thead>
<tr>
<th>Number of Ribs</th>
<th>Determine the number of the ribs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

### 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*

Here, you can enter the length of the crossing lines.

<table>
<thead>
<tr>
<th>Minimum Rib Length (a)</th>
<th>2 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Contact Length (b)</td>
<td>6 mm</td>
</tr>
</tbody>
</table>

- **Minimum Rib Length (a)**: 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)**: Maximum contact length limits the length of the contact between the support and the surface.

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

Here you can set the distance between two consecutive cross lines of a line support.

- **Synchronize**
  - Teeth Always Intersect: Cross line teeth and central support line teeth intersect each other in their middles.
  - Teeth Never Intersect: Cross line teeth and central line teeth never touch.

- **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

Sunken cross lines provide support only to the central line; they do not touch the part. By aiming the cross lines, they will lose contact with the supporting surface and only give support to the line support.

Distance: 0 mm

Define distance between the cross line and the surface

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

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:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beam</td>
<td>The beam thickness (1) defines the thickness of the beams.</td>
</tr>
<tr>
<td>Angle</td>
<td>The perforation angle (2) determines the angle of the perforations</td>
</tr>
<tr>
<td>Height</td>
<td>The height (3) of the vertical part is set with this parameter.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Solid Height</td>
<td>The separate parameter Solid Height (4) guarantees a good connection to the platform and the teeth.</td>
</tr>
<tr>
<td>Rectangular</td>
<td>The shape and the size of the perforations are user defined by setting four parameters:</td>
</tr>
<tr>
<td>Width</td>
<td>The width parameter (1) defines the width of the rectangular holes.</td>
</tr>
<tr>
<td>Height</td>
<td>The Height parameter (2) defines the height of the rectangular holes.</td>
</tr>
<tr>
<td>Solid Height</td>
<td>The Solid Height (3) parameter guarantees a good connection to the platform and the part.</td>
</tr>
<tr>
<td>Interval</td>
<td>The interval parameter (4) defines the interval between the holes.</td>
</tr>
<tr>
<td>Only Perforate...</td>
<td>The support will only be perforated for the given rows, starting from the bottom. This enables the drainage of resin and ensures stable supports.</td>
</tr>
<tr>
<td>rows</td>
<td></td>
</tr>
</tbody>
</table>
12.3.5.6 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. 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**
- The Lower Teeth have the same specifications as the Upper Teeth.

**Height**
- **Top Length**
- **Base Length**
- **Base Interval**

**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 up-facing surface. If support leans on a platform, no teeth are created.

12.3.5.7 Cross line teeth
### 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 Keys
- Height
- Top Length
- Base Length
- Base Interval

#### Lower 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

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.

X Hatching

Y Hatching

The distance between two X or Y hatchings. You can add 4 constraints to adjust the hatching distance depending on the surface dimensions.

Rotation Angle

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°.
12.3.6.3 *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.

<table>
<thead>
<tr>
<th>Hatching teeth</th>
<th>In order to remove the supports easily from the part, the hatchings are equipped with teeth profiles on the top and on the bottom.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Upper</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Height</strong></td>
<td>Height of the hatchings.</td>
</tr>
<tr>
<td><strong>Top Length</strong></td>
<td>Top length of the hatchings.</td>
</tr>
<tr>
<td><strong>Base Length</strong></td>
<td>Base length of the hatchings.</td>
</tr>
<tr>
<td><strong>Base Interval</strong></td>
<td>Base interval of the hatchings.</td>
</tr>
<tr>
<td><strong>Lower Teeth</strong></td>
<td>The Lower Teeth have the same specifications as the Upper Teeth.</td>
</tr>
<tr>
<td><strong>Same as Upper Teeth</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Full teeth in ends</strong></td>
<td>You can decide to have a full tooth at the end of a support, instead of half a tooth.</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Option</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Synchronization</td>
<td><img src="image" alt="No Synchronization" /></td>
</tr>
<tr>
<td>Teeth Intersections</td>
<td><img src="image" alt="Teeth Intersections" /></td>
</tr>
<tr>
<td>No Teeth Intersections</td>
<td><img src="image" alt="No Teeth Intersections" /></td>
</tr>
</tbody>
</table>

1.3.4.1. **Fragmentation**

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

<table>
<thead>
<tr>
<th>Fragmentation</th>
<th>X Interval</th>
<th>Y Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>60,000 mm</td>
<td>60,000 mm</td>
</tr>
</tbody>
</table>

Define length of fragments in X and Y directions. It will not be bigger than defined interval, and will be rounded to be multiple of hatching.

<table>
<thead>
<tr>
<th>Separation Width</th>
<th>0,200 mm</th>
</tr>
</thead>
</table>
### 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.

<table>
<thead>
<tr>
<th>Fragmentation</th>
<th>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.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>X Interval</th>
<th>The interval of the gaps according the X direction.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y Interval</td>
<td>The interval of the gaps according the X direction.</td>
</tr>
<tr>
<td>Separation Width</td>
<td>The width of the gaps in the hatching.</td>
</tr>
<tr>
<td>Fragmentate Borders</td>
<td>Check this option if you want the borders to be fragmentized too.</td>
</tr>
</tbody>
</table>

### 12.3.6.5 Hatch removal

Hatch removal

<table>
<thead>
<tr>
<th>Remove Hatches</th>
<th>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</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closer Than</td>
<td>mm</td>
</tr>
<tr>
<td>With an Angle</td>
<td>°</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Hatch Removal</th>
<th>In case a hatch would be placed too close to the border, problems during the removal of the support can arise.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closer Than</td>
<td>Closer Than defines the minimum distance hatching stays away from the border.</td>
</tr>
<tr>
<td>With an Angle</td>
<td>Angle defines the minimum angle a rib has to make with the border in order not to be withdrawn with the clearance distance.</td>
</tr>
</tbody>
</table>
1.3.4.2. Borders

The borders of the support will be reinforced with an additional contour wall.

Gaps in the border support will be generated

<table>
<thead>
<tr>
<th>Borders</th>
<th>The borders of the support will be reinforced with an additional contour wall.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fragmentate Borders</td>
<td>Gaps in the border support will be generated</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Separation Width (a)</th>
<th>Gaps width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interval (b)</td>
<td>Distance between the end of a gap and the starting of the next</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Separation Width (a)</th>
<th>Gaps width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interval (b)</td>
<td>Distance between the end of a gap and the starting of the next</td>
</tr>
</tbody>
</table>
12.3.6.6  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 Teeth**
- The Lower Teeth have the same specifications as the Upper Teeth.

<table>
<thead>
<tr>
<th>Border Teeth</th>
<th>In order to remove the supports easily from the part, the hatchings are equipped with teeth profiles on the top and on the bottom.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>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.</td>
</tr>
<tr>
<td>Top Length</td>
<td>The Lower Teeth have the same specifications as the Upper Teeth.</td>
</tr>
<tr>
<td>Base Length</td>
<td>Full teeth in ends</td>
</tr>
<tr>
<td>Base Interval</td>
<td>You can decide to have a full tooth at the end of a support, instead of half a tooth.</td>
</tr>
</tbody>
</table>

Lower teeth are created if supports lean on an up-facing surface. If support leans on a platform, no teeth are created.
Perforations

If this parameter is set, the support will be perforated. In Magics Print Metal, there is 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

<table>
<thead>
<tr>
<th>Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact part (R1) from 0.1 to 0.5 mm</td>
<td>Diameter of cone when contacting the part</td>
</tr>
<tr>
<td>Contact platform (R2) from 0.1 to 0.8 mm</td>
<td>Diameter of cone when contacting the platform</td>
</tr>
</tbody>
</table>

*Cones can be merged when overlapping*

<table>
<thead>
<tr>
<th>Spacing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Min distance between cones 1.5 mm</td>
<td>Min distance between cones in the spacing setup</td>
</tr>
<tr>
<td>(2) Min distance between rows 1.5 mm</td>
<td>Min distance between 2 rows of the spacing setup</td>
</tr>
<tr>
<td>Max distance between cones 3 mm</td>
<td>Max distance between cones in the spacing setup</td>
</tr>
</tbody>
</table>

*Cones will be placed based on surfaces shape*
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)**: 2.500 mm
  - **Minimum Length**: 0.500 mm
  - **Note**: The effects of this parameter are also found in the common parameters: lowest line.

---

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

---

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 at platform
12.3.8 Cones*

12.3.8.1 Size & Spacing

<table>
<thead>
<tr>
<th>Size</th>
<th>Contact part (R1)</th>
<th>Contact platform (R2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0,1 mm</td>
<td>0,1 mm</td>
</tr>
</tbody>
</table>

Here you can define the cones dimensions

<table>
<thead>
<tr>
<th>Contact part</th>
<th>Diameter of cone when contacting the part</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact</td>
<td>Platform</td>
</tr>
<tr>
<td>Platform</td>
<td>Diameter</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spacing</th>
<th>Max distance between cones</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0,1 mm</td>
</tr>
</tbody>
</table>

Here you can define the spacing of the cones

<table>
<thead>
<tr>
<th>Max distance between cones</th>
<th>Max distance between cones in the spacing setup</th>
</tr>
</thead>
</table>

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

Defines tree support trunk parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter top (d1)</td>
<td>0.500 mm</td>
</tr>
<tr>
<td>Diameter bottom (d2)</td>
<td>0.800 mm</td>
</tr>
<tr>
<td>Height (h)</td>
<td>10,000 mm</td>
</tr>
</tbody>
</table>

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

Defines tree support branch parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter top (d1)</td>
<td>0.300 mm</td>
</tr>
<tr>
<td>Diameter bottom (d2)</td>
<td>0.500 mm</td>
</tr>
</tbody>
</table>

Add break-off point

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter (d3)</td>
<td>0.400 mm</td>
</tr>
<tr>
<td>Distance from top (x)</td>
<td>5.000 mm</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td></td>
</tr>
<tr>
<td>Distance from top</td>
<td></td>
</tr>
<tr>
<td>Distance from contact point where the narrowing needs to be</td>
<td></td>
</tr>
</tbody>
</table>

Break-off point location
### 12.3.9.4 Branches per trunk

<table>
<thead>
<tr>
<th>Branches per trunk</th>
<th>Max branches per trunk</th>
<th>Note: only used in automatic tree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max branches per trunk</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Max branches per trunk</th>
<th>Max number of branches on trunk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
12.3.9.5  **Spacing**

**Spacing**

1. **Min distance between connection points**: 1,500 mm
2. **Min distance between rows**: 1,500 mm
3. **Max distance between connection points**: 3,000 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)**: 2,500 mm

**Minimum Length**: 0,500 mm

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min distance between connection points</td>
<td>Space between connection points</td>
</tr>
<tr>
<td>Min distance between rows</td>
<td>Space between rows of connection points</td>
</tr>
<tr>
<td>Max distance between connection points</td>
<td>The maximum space between connection points</td>
</tr>
<tr>
<td>Draw lowest line</td>
<td>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.</td>
</tr>
<tr>
<td>Minimal spacing</td>
<td>Defines the minimal spacing between the connection points along the lowest line.</td>
</tr>
<tr>
<td>Minimum length</td>
<td>Lowest lines smaller than this value (length) will be filtered out.</td>
</tr>
</tbody>
</table>

12.3.9.6  **Max height of trunk**

**Max height of trunk**: 5,000 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

12.4.1.3  *Regenerate support*

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

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

![Place Cone Support](image)
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 allows to start create a tree support interactively with the mouse. The tree is represented by wires.

12.4.2.2 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
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
Allows you to modify the position of the nodes in the tree structure.

12.4.2.5 Select tree elements
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
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.

<table>
<thead>
<tr>
<th>Trunk creation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Preview of trunk</td>
<td>Created trunk</td>
</tr>
<tr>
<td><img src="image1" alt="Preview of trunk" /></td>
<td><img src="image2" alt="Created trunk" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Branches created</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Preview of branches</td>
<td>Created branches</td>
</tr>
<tr>
<td><img src="image3" alt="Preview of branches" /></td>
<td><img src="image4" alt="Created branches" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Movement of node</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Preview of node movement</td>
<td>Creation of moved node</td>
</tr>
<tr>
<td><img src="image5" alt="Preview of node movement" /></td>
<td><img src="image6" alt="Creation of moved node" /></td>
</tr>
</tbody>
</table>
Example: Tree support on simple ring

12.4.3 Select & Delete

12.4.3.1 Go to surface

- Allows you to select support surfaces

12.4.3.2 Select Item

- Allows you to select a support item
12.4.3.3  Select Polyline

Allows you to select a polyline support item

12.4.3.4  Select support

Allows you to select a support item

12.4.3.5  Deselect All

Allows to undo all selections

12.4.3.6  Delete selected

Delete the selected support items

12.4.4  Surfaces

12.4.4.1  Create new surface

Allows you to transform the marked triangles into a support surface

12.4.4.2  Add to current surface

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

12.4.4.3  Remove from current surface

Allows you to remove the marked triangles from the selected support surface
12.4.4.4  *Merge surface*

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

12.4.5.5  *Change surface angle*

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

12.4.6.6  *Examples of surface operations*

<table>
<thead>
<tr>
<th>Add To Current Surface</th>
<th>The marked triangles will be added to the current surface. When you press Regenerate 2D &amp; 3D, Magics will also generate support for these triangles.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Begin situation</td>
<td>Triangles to be added are marked</td>
</tr>
<tr>
<td>Triangles are added to support</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Remove From Current Surface</th>
<th>The marked triangles will be removed from the current surface. When you click Regenerate 2D &amp; 3D, Magics won't generate supports anymore for the marked triangles.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Begin situation</td>
<td>Triangles to be removed are marked</td>
</tr>
<tr>
<td>Triangles are removed from surface</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Create New Surface</th>
<th>The marked triangles will become a new surface, which you can support.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Begin situation</td>
<td>Triangles to be added as new surface are marked</td>
</tr>
<tr>
<td>Triangles are added as new surface</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Merge Surfaces</th>
<th>Magics will merge the current surface with a given support.</th>
</tr>
</thead>
</table>
### 12.4.5 Imported supports

#### 12.4.5.1 Translate support

**Icon:**

A cube with arrows indicating movement.

**Description:**

Allows you to translate imported STL supports with the translate dialog.

#### 12.4.5.2 Rotate support

**Icon:**

A cube with arrows indicating rotation.

**Description:**

Allows you to rotate imported STL supports with the rotate dialog.

#### 12.4.5.3 Rescale supports

**Icon:**

A cube with scaling icons.

**Description:**

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

#### 12.4.5.4 Pick and place support

**Icon:**

A cube with a hand icon.

**Description:**

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

12.4.6.2 Supported Area Preview
Show with a heat map the support surfaces

12.4.6.3 Part Projection
Show the projection of the parts on the platform

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.

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:

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

A right mouse click in the surface list will pop up the following:
### Options & Help

<table>
<thead>
<tr>
<th>Invert Selection</th>
<th>The unselected surfaces will become selected and the selected surfaces will not be selected anymore.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select All</td>
<td>All surfaces will be selected.</td>
</tr>
<tr>
<td>Select None</td>
<td>All surfaces will be deselected.</td>
</tr>
<tr>
<td>Delete Surface</td>
<td>All selected surfaces will be removed from the surface list.</td>
</tr>
<tr>
<td>Duplicate Surfaces</td>
<td>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)</td>
</tr>
</tbody>
</table>

**Copy Parameters From**

Copy the support type and all parameters from the given support number to the selected support numbers.

**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.

---

### 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.
- `1` Window showing surface number.
- `>>` Go to the next surface.
- `>1` 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**

<table>
<thead>
<tr>
<th>Support Pages</th>
<th>Surface Info</th>
<th>Part Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support List</td>
<td>Min</td>
<td>Max</td>
</tr>
<tr>
<td></td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>Dimensions</td>
<td>Min X Y Z</td>
<td>Max X Y Z</td>
</tr>
<tr>
<td>Contour Length</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thinness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Browsing buttons</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Dimensions**

- Min X Y Z
- 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**

<table>
<thead>
<tr>
<th>Support Pages</th>
<th>Surface Info</th>
<th>Part Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support List</td>
<td>Min</td>
<td>Max</td>
</tr>
<tr>
<td></td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>Dimensions</td>
<td>Min</td>
<td>Max</td>
</tr>
<tr>
<td></td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>Mesh Info</td>
<td># Triangles</td>
<td># Points</td>
</tr>
<tr>
<td>Properties</td>
<td>Volume</td>
<td>Surface</td>
</tr>
</tbody>
</table>

**Dimensions**

- Min X Y Z
- Max X Y Z
- Delta X Y Z

**Mesh Info**

- # Triangles: 134820
- # Points: 67332

**Properties**

- Volume: 299,489 mm²
- Surface: 1007,436 mm²

**Status**

- Changed
- Z Compensated: 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.

- **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.
Cross line length: Enter the length of the crossing lines.

Cross line interval: 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 kinds of perforations possible.

Teeth: 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.

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.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shade</td>
<td>This visualization mode will display the part with shades according to the direction of the triangles.</td>
</tr>
<tr>
<td>Triangle</td>
<td>In Triangle mode the triangles will be displayed upon the shaded part.</td>
</tr>
<tr>
<td>Shade&amp;Wire</td>
<td>This mode will show a combination of the Shade mode and the Wireframe mode.</td>
</tr>
<tr>
<td>Wireframe</td>
<td>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</td>
</tr>
</tbody>
</table>
value and so adapt the wireframe view (Settings > Visualization > Wireframe).

<table>
<thead>
<tr>
<th>Bounding Box</th>
<th>This mode will only show the bounding box of the part. This mode is quick in visualization.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transparency</td>
<td>All parts are shown in a transparent mode.</td>
</tr>
</tbody>
</table>

13.1.2 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” 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

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

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-build Zones</td>
<td>Toggle to show the No-build zones, if present.</td>
</tr>
<tr>
<td>Field Overlaps</td>
<td>Toggle to show Field overlaps, if present.</td>
</tr>
<tr>
<td>Platform Visibility</td>
<td>Toggle the Platform Visibility. (F11)</td>
</tr>
</tbody>
</table>
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

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

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.

14.1.2  "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.

14.1.3  "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

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

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

14.1.2.3 Languages

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

<table>
<thead>
<tr>
<th>Warning</th>
<th>On/Off</th>
</tr>
</thead>
<tbody>
<tr>
<td>Show the 'Never ask again' message for</td>
<td></td>
</tr>
<tr>
<td>Change memory state of parts</td>
<td></td>
</tr>
<tr>
<td>Cut on bad edges</td>
<td></td>
</tr>
<tr>
<td>Delete bounding box measurements</td>
<td></td>
</tr>
<tr>
<td>Delete Build Risk Analysis profile</td>
<td></td>
</tr>
<tr>
<td>Delete SG profile</td>
<td></td>
</tr>
<tr>
<td>Refine and smooth texture shift</td>
<td></td>
</tr>
<tr>
<td>Exit SG mode</td>
<td></td>
</tr>
<tr>
<td>Switch part in SG</td>
<td></td>
</tr>
</tbody>
</table>

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)

#### 14.1.3.2 3MF convertor

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

### 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](image)

**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](image)

14.1.4.2 Import

14.1.4.2.1 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.

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

You can define in which memory state you want to load a project. This memory state becomes the default when importing a project.

<table>
<thead>
<tr>
<th>.magics Project Loading</th>
<th>You can define in which memory state you want to load a project. This memory state becomes the default when importing a project.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>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).</td>
</tr>
<tr>
<td>Compact</td>
<td>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.</td>
</tr>
<tr>
<td>STL Importing</td>
<td>Description</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------</td>
</tr>
<tr>
<td>On Disk</td>
<td>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.</td>
</tr>
<tr>
<td>As Saved</td>
<td>The Project will be loaded as previously saved.</td>
</tr>
</tbody>
</table>

**STL Importing**

You can define in which memory state you want to load a project. This memory state becomes the default when importing a project.

<table>
<thead>
<tr>
<th>Memory State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
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</tr>
<tr>
<td>Compact</td>
<td>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.</td>
</tr>
<tr>
<td>On Disk</td>
<td>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.</td>
</tr>
</tbody>
</table>

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

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

14.4 About

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

14.5 Logging

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](image)

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

<table>
<thead>
<tr>
<th>Size of Brush</th>
<th>Brush Marking allows marking triangles on an active part by a brush. The user can define the size of the brush.</th>
</tr>
</thead>
</table>

Vertical Marking

<table>
<thead>
<tr>
<th>Angle deviation</th>
<th>Vertical Marking allows marking triangles on an active part vertically. The user can define the deviation.</th>
</tr>
</thead>
</table>

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.

Maximized Toolbox

Minimized 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

![Visualization modes](image)

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

<table>
<thead>
<tr>
<th>Visualization mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shade</td>
<td>Shade will display the part with shades according to the direction of the triangles.</td>
</tr>
<tr>
<td>Wireframe</td>
<td>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.</td>
</tr>
<tr>
<td>Shade &amp; Wire</td>
<td>The parts are showed in a combination of the shade mode and the wireframe mode.</td>
</tr>
<tr>
<td>Triangle</td>
<td>The triangles of the parts will be displayed upon the shaded part.</td>
</tr>
<tr>
<td>Bounding Box</td>
<td>This mode will only show the bounding box of the part. This mode is quick in visualization.</td>
</tr>
<tr>
<td>Transparency</td>
<td>The parts are shown transparent.</td>
</tr>
<tr>
<td>Smooth Shading</td>
<td>The parts are shaded as in nature.</td>
</tr>
<tr>
<td>No-Build zones</td>
<td>The No Build zones are shown on the platform scene.</td>
</tr>
<tr>
<td>Feature</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Bad Edges</td>
<td>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.</td>
</tr>
<tr>
<td>Bad Edges Visible</td>
<td>Makes the bad edges invisible.</td>
</tr>
<tr>
<td>Bad Edges Invisible</td>
<td>The user can hide the indication of the bad edges that are situated behind or inside the part.</td>
</tr>
<tr>
<td>Bad Edges Hidden Line</td>
<td>Bad edges are sometimes difficult to spot. The bad edges are drawn with thick lines so you can see them easily.</td>
</tr>
<tr>
<td>Highlight Bad Edges</td>
<td>Makes the bad edges invisible.</td>
</tr>
<tr>
<td>Flipped Triangles</td>
<td>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)</td>
</tr>
<tr>
<td>Flipped Triangles Invisible</td>
<td>Makes the flipped triangles invisible.</td>
</tr>
<tr>
<td>Flipped Triangles Visible</td>
<td>Shows the flipped triangles as normal triangles.</td>
</tr>
<tr>
<td>Flipped Triangles As Normal</td>
<td>Shows the flipped triangles as normal triangles.</td>
</tr>
<tr>
<td>The Cube</td>
<td>Click on the cube to get the requested view. The view where you clicked will be highlighted till you change view:</td>
</tr>
<tr>
<td></td>
<td>Select another view</td>
</tr>
<tr>
<td></td>
<td>Rotate manually</td>
</tr>
<tr>
<td></td>
<td>Clicking on one of the possibilities (it will highlight when the cursor passes over it) accesses these views.</td>
</tr>
<tr>
<td></td>
<td>The dropdown shows all the possible views.</td>
</tr>
<tr>
<td></td>
<td>The ISO views.</td>
</tr>
</tbody>
</table>

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).

![Clip Icon]

The drop down menu, next to the icon, contains some extra options.
- Clicking this icon will switch the section view between Section on Part, Hide side towards origin and Hide side away from origin.

#### 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.

![Indicate Button]

With the Indicate-button, the position of the section can be pointed on the part. This position will be displayed in the Position box.

![Align Button]

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 functions. The usage of the context menu can speed up the general workflow. Depending on 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.

<table>
<thead>
<tr>
<th>ID</th>
<th>Unique identifier for the part</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selected</td>
<td>When the checkbox of a part is checked, then the part is selected.</td>
</tr>
<tr>
<td>Visible (V)</td>
<td>The part is visible if the glasses are present.</td>
</tr>
<tr>
<td>Shading (S)</td>
<td>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).</td>
</tr>
</tbody>
</table>

Import of parts
<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hide</td>
<td>Hide the respective part.</td>
</tr>
<tr>
<td>Shade</td>
<td>Shade will display the respective part with shades according to the direction of the triangles.</td>
</tr>
<tr>
<td>Wireframe</td>
<td>Wireframe shows the edges of the respective part.</td>
</tr>
<tr>
<td>Shade&amp;Wire</td>
<td>The respective part is showed in a combination of the shade mode and the wireframe mode.</td>
</tr>
<tr>
<td>Triangle</td>
<td>The triangles of the respective parts will be displayed upon the shaded part.</td>
</tr>
<tr>
<td>Bounding Box</td>
<td>This mode will only show the bounding box of the respective part.</td>
</tr>
<tr>
<td>Transparent</td>
<td>This mode will show the respective part as transparent.</td>
</tr>
<tr>
<td>Import of slices</td>
<td>- Slices</td>
</tr>
<tr>
<td></td>
<td>This mode will only show the bounding box of the respective part.</td>
</tr>
<tr>
<td>Color (C)</td>
<td>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).</td>
</tr>
<tr>
<td>Memory State (M)</td>
<td>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).</td>
</tr>
<tr>
<td>Compact</td>
<td>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.</td>
</tr>
<tr>
<td>Normal</td>
<td>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)</td>
</tr>
<tr>
<td>On Disk</td>
<td>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.</td>
</tr>
</tbody>
</table>
**Part Name**

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**

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.

**Extend with columns**

Here you have the possibility to add or remove additional columns to the part list overview.

<table>
<thead>
<tr>
<th>Select All</th>
<th>Selects every part in the list.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invert Selection</td>
<td>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.</td>
</tr>
<tr>
<td>Show All</td>
<td>All invisible parts are made visible.</td>
</tr>
<tr>
<td>Hide Unselected</td>
<td>Hides all unselected parts.</td>
</tr>
<tr>
<td>Unload Selected Parts</td>
<td>Unloads all selected parts.</td>
</tr>
<tr>
<td>Add Part to Scene</td>
<td>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.</td>
</tr>
<tr>
<td>New Scene</td>
<td>The Select Machine dialog will pop up, where you can select the machine of the newly created Platform.</td>
</tr>
</tbody>
</table>
## Recommended System Requirements

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select All</td>
<td>Selects every part in the list.</td>
</tr>
<tr>
<td>Invert Selection</td>
<td>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.</td>
</tr>
<tr>
<td>Show All</td>
<td>Visualize all parts</td>
</tr>
<tr>
<td>Hide Unselected</td>
<td>Hides all unselected parts.</td>
</tr>
<tr>
<td>Cut Part(s)</td>
<td>Selected virtual copies of a platform can be cut to the clipboard.</td>
</tr>
<tr>
<td>Copy Part(s)</td>
<td>The selected parts or virtual copies are copied to the clipboard.</td>
</tr>
<tr>
<td>Paste Part(s)</td>
<td>Parts are pasted from the clipboard in the active scene.</td>
</tr>
<tr>
<td>Shells to Parts</td>
<td>This function will split the selected parts, if they consist of more shells, into different parts. Now, each shell will represent one part.</td>
</tr>
<tr>
<td>Merge Selected Parts</td>
<td>The selected parts are merged into one STL.</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>Runs Diagnostics</td>
</tr>
<tr>
<td>Combined Fix</td>
<td>Executes the Combined Fix</td>
</tr>
<tr>
<td>Unload Selected Parts</td>
<td>Deletes all the selected parts from the workspace.</td>
</tr>
<tr>
<td>Set Columns</td>
<td>Pops up a sub menu where the user can define the visualized columns.</td>
</tr>
<tr>
<td>Show Part Name</td>
<td>Shows the part name of the parts.</td>
</tr>
<tr>
<td>Show Path</td>
<td>Shows the path of the part in the Part Name column.</td>
</tr>
<tr>
<td># Triangles</td>
<td>Shows the amount of triangles used in the Part List.</td>
</tr>
<tr>
<td># Points</td>
<td>Shows the amount of points in the Part List.</td>
</tr>
<tr>
<td>Surface</td>
<td>Shows the Surface of the parts in the Part List.</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Volume</td>
<td>Shows the Volume of the part in the Part List.</td>
</tr>
<tr>
<td># Invisible Triangles</td>
<td>Shows the amount of invisible triangles in the Part List.</td>
</tr>
<tr>
<td>Preprocessed</td>
<td>Shows the Memory State of the part in the Part List.</td>
</tr>
<tr>
<td>Shading</td>
<td>Shows the visualization of the part.</td>
</tr>
<tr>
<td>Wireframe angle</td>
<td>Shows the wireframe angle.</td>
</tr>
</tbody>
</table>

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.
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.

<table>
<thead>
<tr>
<th>Rename</th>
<th>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.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Next</td>
<td>The next button allows the user to see the part information of the next part in the workspace.</td>
</tr>
<tr>
<td>Dimensions</td>
<td>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.</td>
</tr>
<tr>
<td># Triangles</td>
<td>The amount of triangles of the part.</td>
</tr>
<tr>
<td># Points</td>
<td>The amount of points of the part.</td>
</tr>
<tr>
<td># Marked</td>
<td>The amount of marked triangles of the part.</td>
</tr>
<tr>
<td># Invisible</td>
<td>The amount of invisible triangles of the part.</td>
</tr>
<tr>
<td>Update</td>
<td>Updates all the information, by default the Volume and Surface information has to be updated.</td>
</tr>
<tr>
<td>Automatic</td>
<td>If checked, the Volume and Surface will be updated automatically.</td>
</tr>
<tr>
<td>Volume</td>
<td>The volume of the part.</td>
</tr>
<tr>
<td>Surface</td>
<td>The surface of the part.</td>
</tr>
<tr>
<td>Status</td>
<td>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.</td>
</tr>
<tr>
<td>Z compensate</td>
<td>Indicates if the part is z-compensated or not.</td>
</tr>
<tr>
<td><strong>Part Name</strong></td>
<td>This is a drop down list containing all the loaded parts. The parts are sorted as in the Part List.</td>
</tr>
<tr>
<td>---------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Next</strong></td>
<td>The next button allows the user to see the part information of the next part in the workspace.</td>
</tr>
<tr>
<td><strong>Inverted Normals</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Bad Edges</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Bad Contours</strong></td>
<td>Shows the amount of Bad Contours. A group of bad edges that are connected to each other is a bad contour</td>
</tr>
<tr>
<td><strong>Near Bad Edges</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Planar Holes</strong></td>
<td>Shows the amount of Planar Holes. A hole is where triangles are missing. Use fill hole to fill it up with triangles.</td>
</tr>
<tr>
<td><strong>Shells</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Noise Shells</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Overlapping Triangles</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Intersecting Triangles</strong></td>
<td>Shows the amount of Intersecting Triangles. Intersecting triangles are triangles cutting each other.</td>
</tr>
<tr>
<td><strong>Update</strong></td>
<td>Updates all the information, by default the Volume and Surface information is updated.</td>
</tr>
<tr>
<td><strong>Automatic</strong></td>
<td>Check this option if you want the Part Fixing Information to be updated automatically. This is not recommended for big files.</td>
</tr>
<tr>
<td><strong>Fix</strong></td>
<td>The user can click fix to automatically fix the specified problem.</td>
</tr>
</tbody>
</table>

### 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.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Measurement Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point</td>
<td>The length from the second feature to the point.</td>
</tr>
<tr>
<td>Line</td>
<td>The length of the perpendicular through the second feature on the line.</td>
</tr>
<tr>
<td>Circle</td>
<td>The length of the perpendicular through the second feature on the line.</td>
</tr>
<tr>
<td>Plane</td>
<td>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.</td>
</tr>
<tr>
<td>Cylinder</td>
<td>The length of the perpendicular through the second feature on the middle line of the cylinder.</td>
</tr>
<tr>
<td>Sphere</td>
<td>The length from the second feature to the center of the sphere.</td>
</tr>
<tr>
<td>Thickness</td>
<td>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.</td>
</tr>
<tr>
<td>Bounding box</td>
<td>Measures the bounding box of the indicated part.</td>
</tr>
</tbody>
</table>
Snapping restrictions

<table>
<thead>
<tr>
<th>3D View</th>
<th>The measurement is allowed in 3D</th>
</tr>
</thead>
<tbody>
<tr>
<td>2D XY</td>
<td>The measurement is restricted to the 2D XY plane.</td>
</tr>
<tr>
<td>2D XZ</td>
<td>The measurement is restricted to the 2D XZ plane.</td>
</tr>
<tr>
<td>2D YZ</td>
<td>The measurement is restricted to the 2D YZ plane.</td>
</tr>
<tr>
<td>X-axis</td>
<td>The measurement is restricted to the 1D X axis.</td>
</tr>
<tr>
<td>Y-axis</td>
<td>The measurement is restricted to the 1D Y axis.</td>
</tr>
<tr>
<td>Z-axis</td>
<td>The measurement is restricted to the 1D Z axis.</td>
</tr>
</tbody>
</table>

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
- 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
Recommended System Requirements

Materialise nv
Technologielaan 15
3001 Leuven
Belgium
info@materialise.com
materialise.com

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

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3 View</td>
<td>XYZ</td>
</tr>
<tr>
<td>2D XY</td>
<td>XY</td>
</tr>
<tr>
<td>2D XZ</td>
<td>XZ</td>
</tr>
<tr>
<td>2D YZ</td>
<td>YZ</td>
</tr>
<tr>
<td>X - axis</td>
<td>X</td>
</tr>
<tr>
<td>Y - axis</td>
<td>Y</td>
</tr>
<tr>
<td>Z - axis</td>
<td>Z</td>
</tr>
</tbody>
</table>

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 Tool
### 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.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point</td>
<td>The X, Y and Z coordinate of the point will be displayed.</td>
</tr>
<tr>
<td>Line</td>
<td>The X, Y and Z coordinate of the beginning and end points will be displayed, together with the length of the line.</td>
</tr>
<tr>
<td>Circle</td>
<td>The X, Y and Z coordinate of the center of the circle is given, together with its radius.</td>
</tr>
<tr>
<td>Triangle</td>
<td>The X, Y, Z coordinates of the corner points and the direction coefficient of the normal will be displayed.</td>
</tr>
<tr>
<td>Cylinder</td>
<td>The X, Y and Z coordinate of the middle point of the bounding discs is given, together with the radius.</td>
</tr>
<tr>
<td>Sphere</td>
<td>The X, Y and Z coordinate of the middle point of the sphere is given, together with its radius.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invisible</td>
<td>When checked, the made measurements are hidden. Uncheck to see the measurements.</td>
</tr>
<tr>
<td>Select</td>
<td>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.</td>
</tr>
<tr>
<td>Clear Measurements</td>
<td>Deletes all measurements.</td>
</tr>
<tr>
<td>Snap Settings</td>
<td>Brings you to the settings window. You can indicate how you would like to display the measurement.</td>
</tr>
</tbody>
</table>

16.5 Fixing Pages

16.5.1 The AutoFix Toolpage
### 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

<table>
<thead>
<tr>
<th>Action</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Fixing</td>
<td>Magics will reorient the normal of the triangles automatically.</td>
</tr>
<tr>
<td>Filter Sharp Triangles</td>
<td>Sharp triangles will be removed to improve surface quality.</td>
</tr>
<tr>
<td>Stitching</td>
<td>Magics will do a stitching to solve the near bad edges.</td>
</tr>
<tr>
<td>Remove Noise Shells</td>
<td>The automatic removal of detected noise shells, these noise shells make no geometrical sense.</td>
</tr>
<tr>
<td>Hole Filling</td>
<td>Magics will only fill a contour when he recognizes it as a hole. Some contours are not holes.</td>
</tr>
<tr>
<td>Conditional</td>
<td>Magics will only fill a contour when he recognizes it as a hole. Some contours are not holes.</td>
</tr>
<tr>
<td>Planar</td>
<td>The hole will be filled as a planar hole</td>
</tr>
<tr>
<td>Freeform</td>
<td>Complex shaped contours are better filled using the freeform algorithm.</td>
</tr>
<tr>
<td>Grid: 1,000 mm</td>
<td>Grid: The triangle size of the surface that is used to fill the contour</td>
</tr>
<tr>
<td>Unify</td>
<td>This will remove all internal geometry and intersecting triangles.</td>
</tr>
<tr>
<td></td>
<td>This operation will only be done if the geometry allows it.</td>
</tr>
</tbody>
</table>

This table lists the different combined fixing options available in Magics, along with a brief description of each action.
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.
18 Contact Info

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