

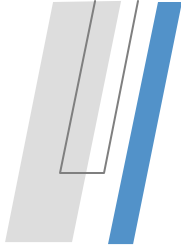



MiiCraft Builder

User Manual

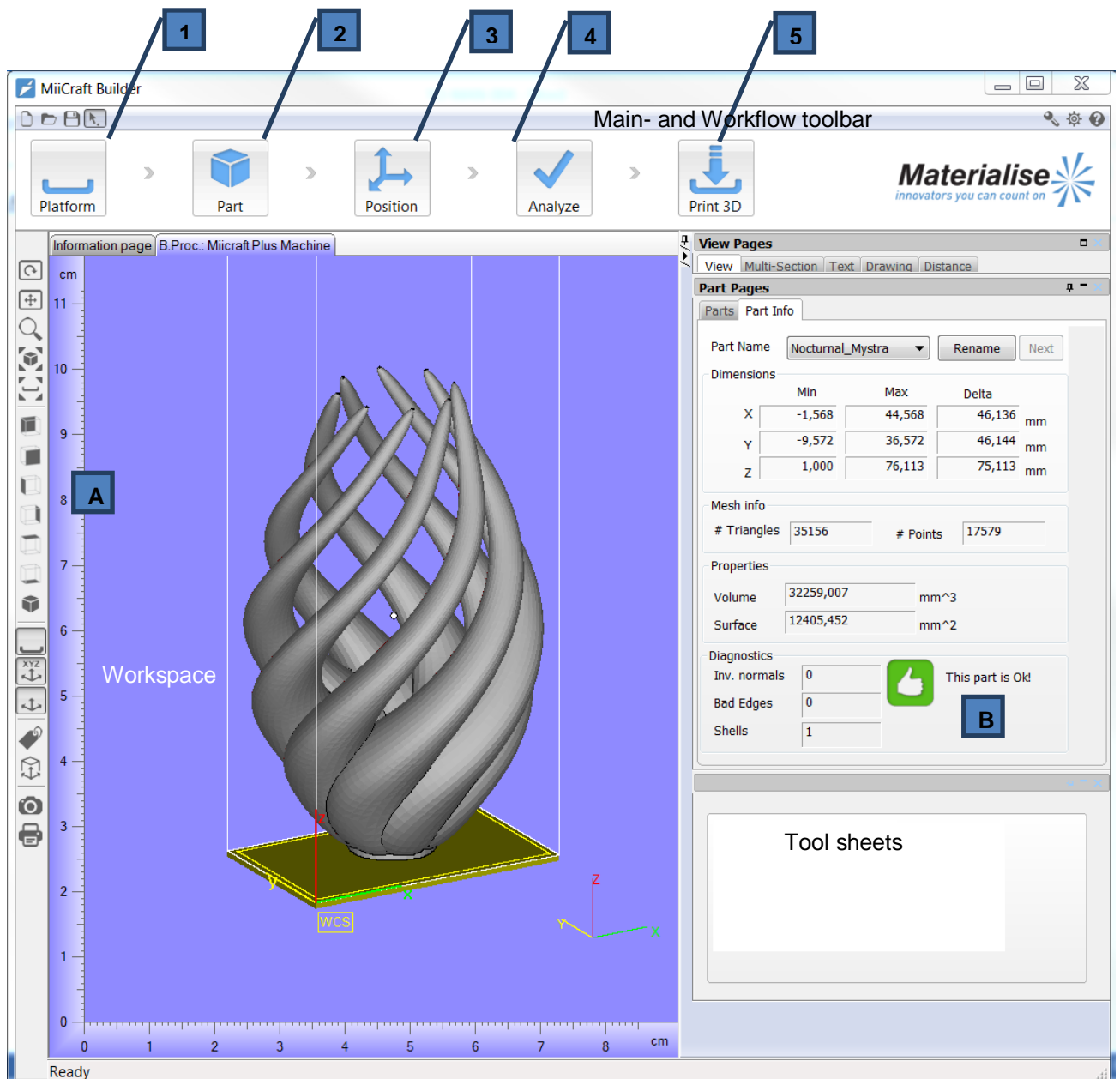
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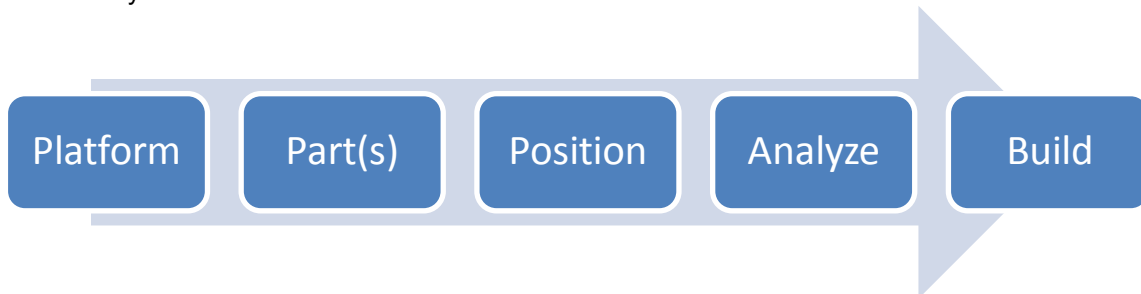
Quick start and Interface



When you launch MiiCraft Builder, you will arrive on the Information Page. To start working:

1. Click the **Platform** flow button and select *New* to choose your **3D-Printer**
 2. Click the **Part** flow button and choose *Import* to load your **STL-files**
 3. Click the **Position** flow button if you want to translate, rotate, rescale or duplicate your part(s)
 4. Click the **Analyze** button to check if your loaded parts are **buildable or not**
 5. Click the **Build Processor** button if you want to build your part(s) on your **3D-Printer**
- A. Use the functions on the **View** toolbar to visualize & inspect your STL-files
 B. You can find more advanced **visualization & communication** options on the **Tool sheets**

So be ready to 'Go with the Flow':



Main Toolbar



New Project |

This function will remove all parts and scenes from the current project and generates a new, empty project. The user is asked to save the current project (parts and scenes) before closing. If you want to work in two (or more) parallel MiiCraft Builder sessions, just open MiiCraft Builder a second time.

We refer to the *Platform menu* section if you want to create a new platform and load STL-files.

Load Project |

This function allows you to open an existing project in MiiCraft Builder. The MiiCraft Builder Project File (.miib) is a dedicated file format of Materialise and has the ability to save or load information other than STL data with a particular STL file or files (project). Due to the MiiCraft Builder Project File, you can save a whole project at once instead of saving all parts (STL-files) separately.

If you load a *.miib file in MiiCraft Builder, following information can be displayed (when present):

- STL-files
- Platforms and scenes
- Measurements and annotations

We refer to the *Parts menu* section if you want to import single parts (STL files).

Save Project |

Saving STL-files in a project (*.miib) has the advantage of compressing the file and saving any other information such as platforms, scenes, measurements and annotations. The 'Save' function will ask you to re-name your project while preserving the original project.



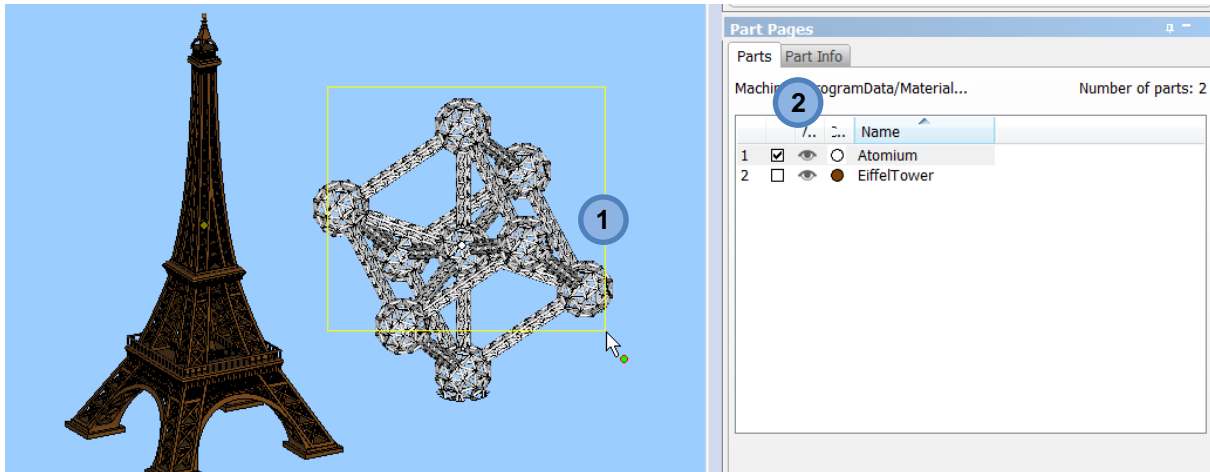
*Use the *.miib file format if you want to continue your work another time. It will save everything as it is when you save and close MiiCraft Builder.*

Select Part(s) mode |

Use the **Select Parts** function to select parts individually or in groups (while in the mean viewing your workspace). To select a single part, first activate the **Select Parts** function. Then, click on the part or click and drag a window around the grey selection tag of the desired part (1). After releasing the

button, the little dot of that part will become white. A white dot means that the part is selected; a grey dot means that it is not selected.

To select multiple parts, either drag a single window around the desired tags, or depress and hold the shift key while clicking on several parts (or dragging multiple windows around the desired tags).



The Select Part(s) mode is the default mouse mode in MiiCraft Builder. By performing a function e.g. a measurement, you can arrive in another mouse mode e.g. the measure mouse mode. Press ESC or the Select Part(s) button to return to the default mouse mode.

In addition to the *Select Part(s)* function, you can also select parts by checking them directly in the Part List (2).

We refer to the *Parts menu* section if you want to import parts (STL files) in *MiiCraft Builder*.

Licenses |

Materialise Software is key protected. You need key-files to activate and register your *MiiCraft Builder* software. When you start *MiiCraft Builder* for the first time, the License Wizard will automatically start up to assist you in registering. You can also open the Registration Wizard by clicking on the Licenses button in the Main Toolbar of *MiiCraft Builder*. A detailed description of Licensing is given at the end of the manual.

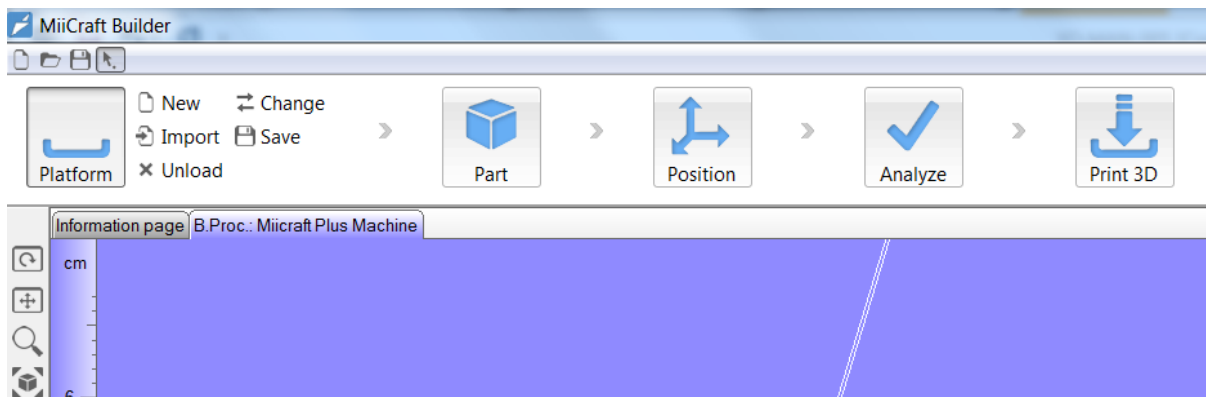
Settings |

This button will open the Settings dialog of *MiiCraft Builder*. A detailed overview of the Settings is also given at the end of the manual.

Help |

Click this button to open the PDF manual you are reading right now.

Platform

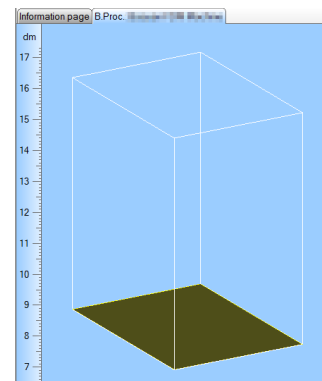


To start working in *MiiCraft Builder*, you should create a Platform or load an existing one. Once you have a Platform, you can start importing parts (second menu in the Flow Toolbar).

New | New

The *New* button in the Platform's menu will open a dialog where you can choose your 3D-Printer from the dropdown list (each 3D-printer will have a prefix B.Proc which is the abbreviation of Build Processor). After pressing OK, the platform and build-envelope of your selected 3D-Printer will be shown on the screen.

It is possible to create multiple Platforms and work on different Platforms in parallel. Each Platform will appear as a new tab in the workspace (named B.Proc. 'Your printer'). Note that the *Information page* will always remain as first tab. You can toggle between different Platforms by clicking on the tab with the corresponding Platform or Scene name.



Remark: If you create a New Platform without choosing a machine (no machine), the newly created tab will be named Scene and the Workspace will be empty (no machine platform visible). It is not possible to print parts from an empty Scene, you should always select your 3D-Printer from the dropdown list.

Import | Import

This operation allows you to import an existing Platform (i.e. *.miib). The imported Platform (usually with parts) will be active and shown on your screen. Each imported Platform or Scene will appear as a separate tab in the workspace. If there are multiple Platforms inside the file, they will all open as a separate tab.

Unload | Unload

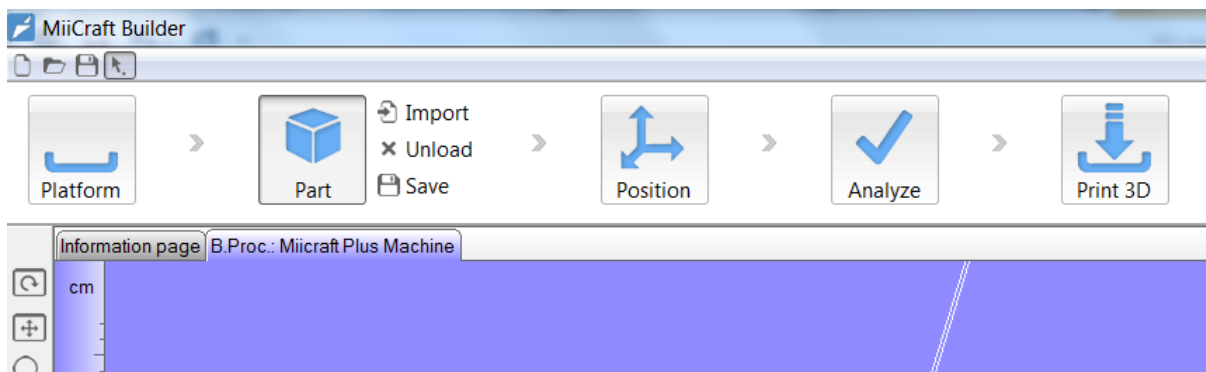
With this operation you can unload your active Platform or Scene (including all parts). A dialog will ask if you really wish to delete, press No if you want to save your Platform first.

Save | Save

This operation pops up a 'Save As' dialog. You can save your current Platform into a *.miib file.

This operation will only save the active Platform, use the Save Project function (Main toolbar) to save multiple Platforms and/or Scenes inside a *.miib file.

Part



MiiCraft Builder is based on the STL-file format which is the 3D-Printing Industry's standard data format. An STL file is a triangular representation of a 3D object: it will describe surfaces as a collection of triangles, which makes them ideal for use in Rapid Prototyping or any environment that requires a triangulated file.

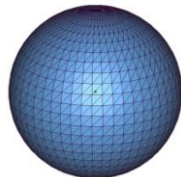
Unlike CAD, STL uses triangles and not entities to describe an object. Each triangle is uniquely defined by its normal and three points that represent its vertices.

Digital CAD



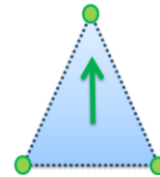
- 2 entities
- Center point
 - Radius

STL-file



- Triangle 1
Triangle 2
Triangle 3
Triangle 4
...
Triangle 1500

Single Triangle



- 1 Triangle
=
3 vertices
&
1 normal

Import | Import

Use this button to Import parts on your Platform. You can choose to import *.stl, or *.miib files.

- *.stl = 3D-Printing Industry's standard data format, contains a single part
- *.miib = Dedicated data format of Materialise, can contain multiple parts. All parts are imported on the active Platform or Scene.

MiiCraft Builder has several **demo files** available for use after installation. They can be accessed using the following path: C:\Program Files\Materialise\MiiCraft Builder\demo_files.

Unload | Unload

This operation will unload all selected parts.

Save / Save

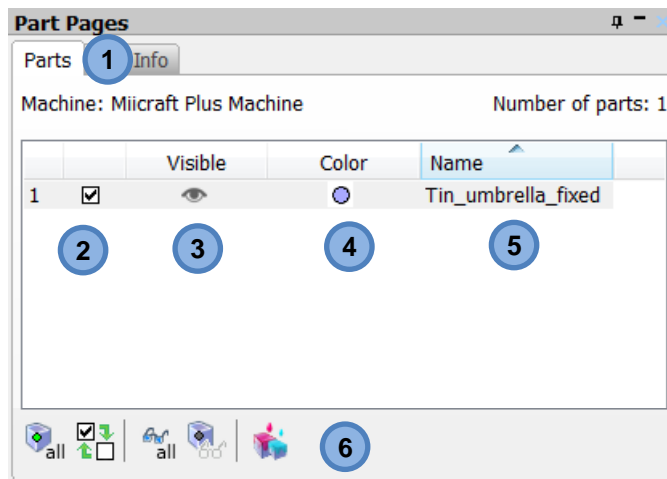
The *Save Part(s) As* dialog contains all different file formats that MiiCraft Builder is capable of producing. You can specify your format in the *Save as type* dropdown box. By default, all parts are saved in a separate *.stl file. Choose for the *.miib if you want to save all parts in a single file.

Parts tool sheet

As soon as one part is loaded, the Tool sheets will expand.

The Parts tab (1) can be a very useful and versatile tool for managing loaded parts. All parts currently loaded will be displayed in the list.

Select (or unselect) a single part via the checkboxes (2). Select multiple parts in the list by clicking on a part name to highlight the part and then using the Shift or Ctrl key and clicking on the names of the other desired parts (and then select/unselect one of the checkboxes).



You can also Hide (3) parts by clicking on the glasses or change their Color (4). All actions performed on the tool sheet are activated immediately. If you double click on a part's Name (5), a pop-up dialog will appear where you can easily change the name. The buttons at the bottom (6) will facilitate your work with operations like: Select All, Invert Selection, Show All, Hide Unselected and Auto color.

Part Info tool sheet

The Part Info tab (1) will display all physical data of your part:

- Dimensions in X, Y and Z
- Mesh info: triangles and points
- Properties: surface and volume

It also allows you to easily diagnose your part for errors.

Errors in STL-files can cause problems during slicing and building. Therefore you need watertight (and error-free) files. A good file contains one single Shell and zero Inverted Normals (Inv.) or Bad Edges.

MiiCraft Builder will show a green thumb up (2) when your part is ok and a red thumb down (3) when your part contains errors (and needs fixing).

The 'How to Fix my Part?' button (4) will display additional fixing information on the built-in information webpage (internet connection required). Fixing itself is not included in MiiCraft Builder.

Click the drop down arrow to choose another part (5) or click next (6).

Part Pages

Parts Part Info **1**

Part Name: PartA **5** Rename Next **6**

Dimensions

	Min	Max	Delta	
X	10,000	113,500	103,500	mm
Y	10,000	133,300	123,300	mm
Z	10,000	159,000	149,000	mm

Mesh info

Triangles: 9998 # Points: 4939

Properties

Volume: 205313,648 mm³
Surface: 171675,553 mm²

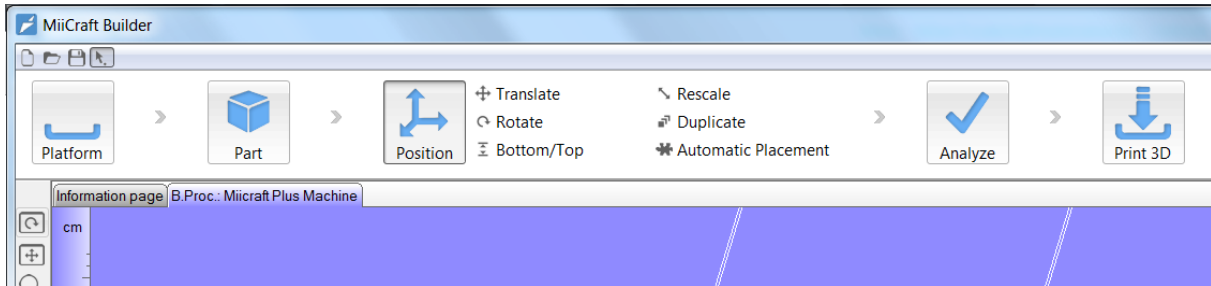
Diagnostics

Inv. normals: 0 **2** This part is Ok!
Bad Edges: 0
Shells: 1

Diagnostics

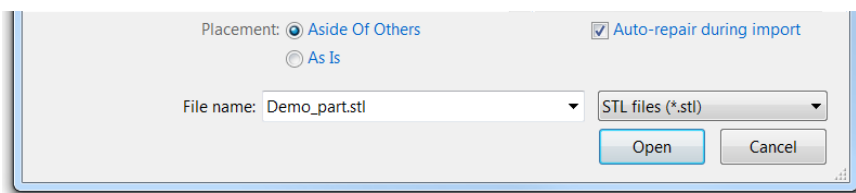
Inv. normals: 26 **3** The part contains errors!
Bad Edges: 289
Shells: 19 **4** How to fix my part?

Position



The **Position** tools allow you to translate, rotate, rescale or duplicate your part(s).

During import, you already have the ability to automatically place the imported parts *Aside Of Others* (default option). To import parts without changing their position (i.e. to not change their coordinates), you should select *As Is*.

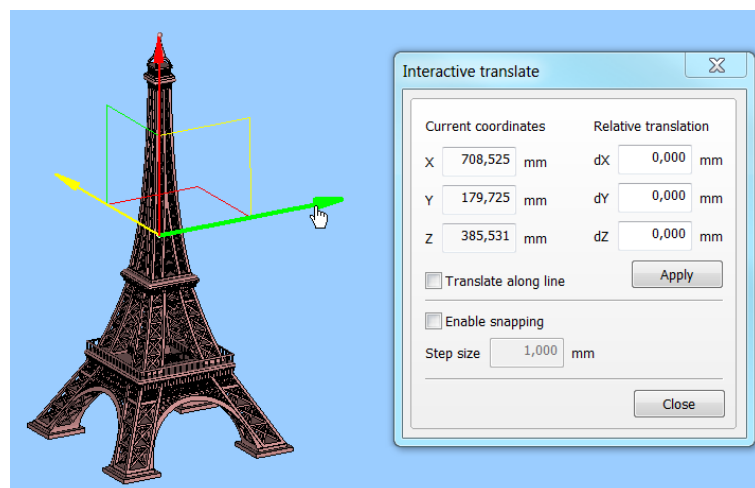


Translate | Translate

The translate operation allows you to interactively move a part (or a group of selected parts) to another position.

Grab an Axis or Cardinal Plane to move the selected part(s) in one or two dimensions while visualizing in 3D view.

You can change your selection during operation, just switch between parts (click another) or drag a window to select multiple parts at once.



Use the *Enable Snapping* checkbox to move parts in defined increments. You can specify the step size yourself. With the *Interactive Translate along line*, you can use any line on any part as translation reference.

In addition, you can specify a *Relative Translation*, fill in your desired values and press *Apply* to translate your part.

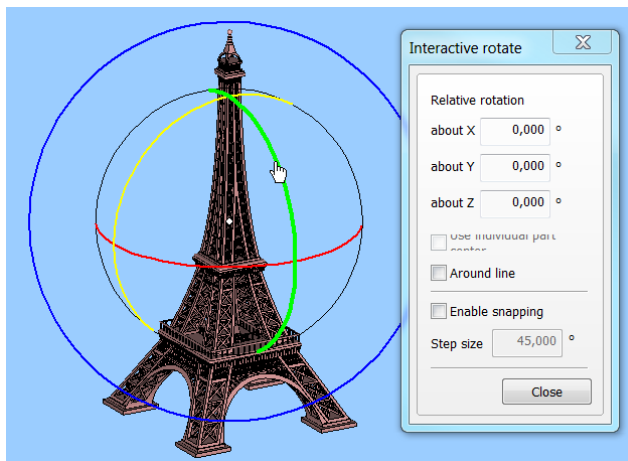
Tip: You can easily access the Translate & Rotate via the Right Mouse button Shortcut menu

Rotate | Rotate

As with Translate, grab one of the circles to interactively rotate about the chosen axis. Grab the blue circle to rotate about an axis perpendicular to the active viewpoint. You can also change your part selection during operation.

Use the *Enable Snapping* checkbox to move parts in defined increments. You can specify the step size yourself.

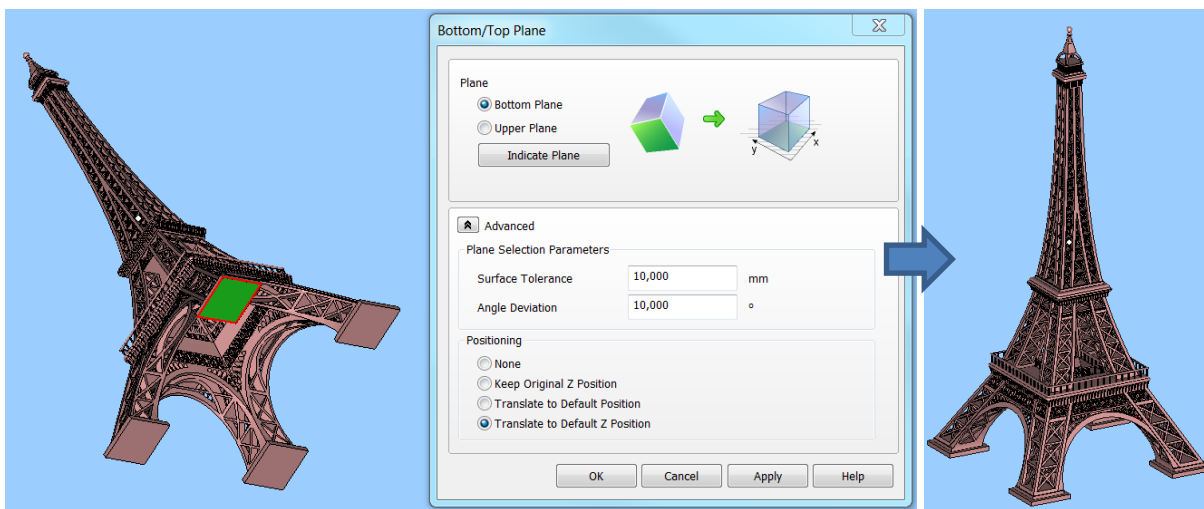
With the Interactive *Rotate around line*, you can specify any line on any part as rotation center



Tip: You can easily access the Translate & Rotate via the Right Mouse button Shortcut menu.

Bottom/Top | Bottom/Top

The Bottom/Top function allows easy orientation of the selected part by indicating a plane as the bottom/top plane. This plane will automatically be oriented parallel to the platform (i.e. the XY-plane).



Indicate Plane

Click the Indicate Plane button to select your reference plane (the selected plane is indicated in green). The selected plane will be oriented parallel to the platform facing the upper or bottom (depending on your selection).

Plane Selection Parameters

Surface Tolerance	Indicates the maximum deviation (in mm or inches) that triangle may have to be part of the same plane (that contains the selected triangle).
Angle Deviation	Indicates the maximum angle in degrees between the normals of a related triangle and the selected triangle, in order to be part of the same plane.

Positioning (after orientating the plane parallel to the platform)

None	No translation is performed.
Keep Original Z Position	After orientation, the part is translated along Z so that the original minimum Z position of the part remains the same.
Translate to Default Position	After orientation, the part is translated to the default part position.
Translate to Default Z position	After orientation, the part is translated along Z to the default Z position.

Rescale | Rescale

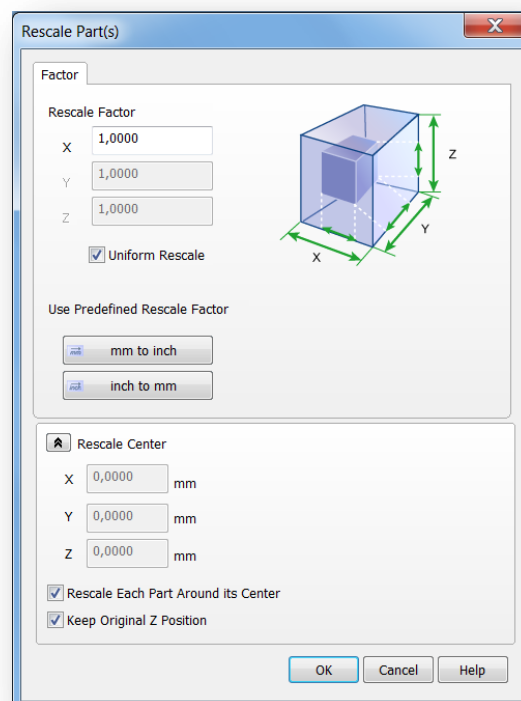
The Rescale function gives you the ability to change the dimensions of a part as a whole or in only certain specified dimensions.

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

Enable *Uniform Rescale* when you want to use an identical factor in all directions. Disable this option if you want to specify a different value in X, Y and Z.

With the predefined rescale factors you can easily scale parts from mm to inches and back.

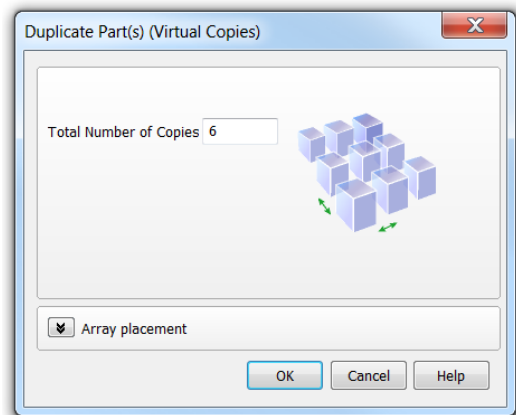
By default, rescaling is performed around the center of each part individually. *Rescale Center* allows you to define a rescale center different than the center of the WCS and enter the desired coordinates. Each part will now be rescaled around this new center. The original Z-position can be maintained.



Duplicate | Duplicate

This command automatically duplicates the selected parts. The *Total Number of Copies* you specify includes your original part.

You can also specify the *Array Placement* of the copies i.e. the *Number of Copies* you would like to have in the indicated directions and the *Spacing* or distance between each Copy.

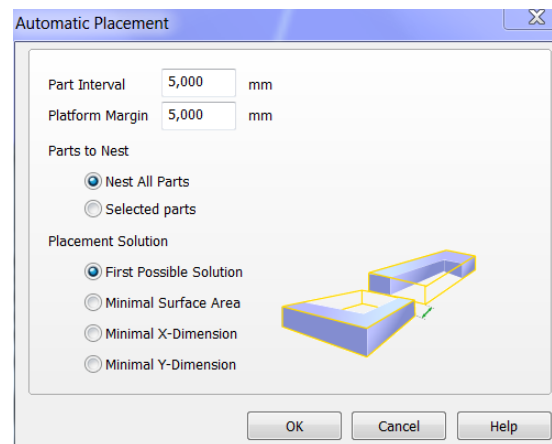


Automatic Placement | * Automatic Placement

This command will automatically place parts on the build platform. Activating this function will open a dialog where the automatic placement can be setup. The part interval will define the space between the parts when placing the parts automatically. The platform margin will indicate how far the parts need to be placed from the borders of the platform.

The parts to nest selection will give the user the possibility to select all parts or just the selected ones.

The placement solution selection allows the user to define a placement strategy



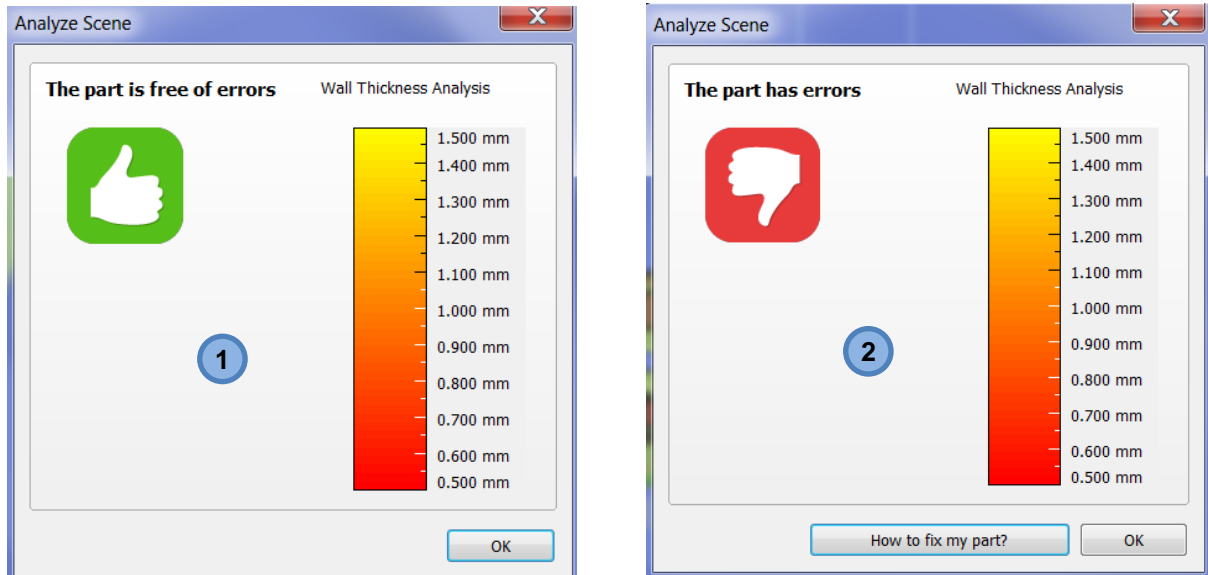
Analyze ✓



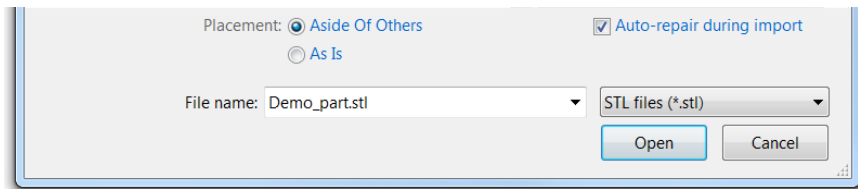
The *Analyze Scene* function allows you to easily diagnose all parts on the active scene for errors. This function will show a green thumb-up when all parts are ready to build (1) and a red thumb down when some of your parts contain errors and need fixing (2). It will also give the user information about the thickness of the walls in the parts on the build platform. The information is given with color codes that

indicate thicker or thinner walls by colors. The meaning of the color is indicated in a graph in the analyze window.

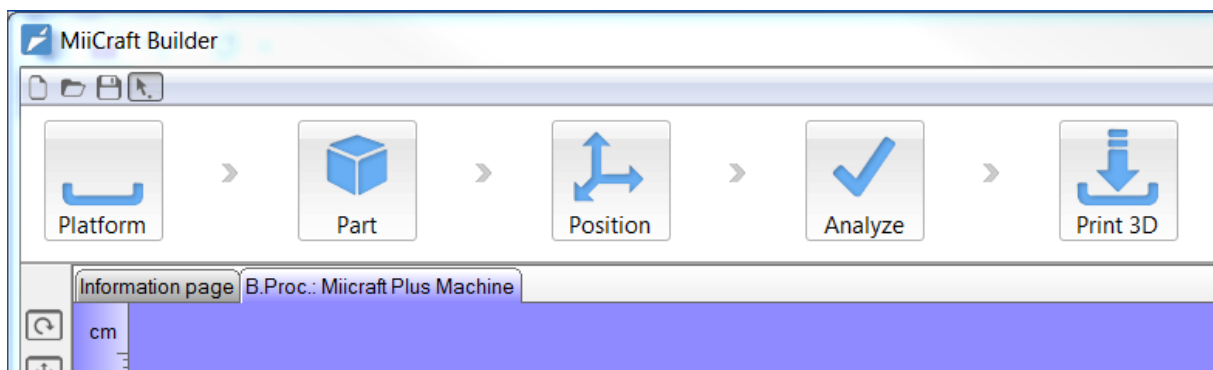
You can easily diagnose all parts at once with the *Analyze Scene function*, individual part diagnostics can be performed on the *Part Info tool sheet*.



During import, you have the ability to perform an *Auto-Repair* (enabled by default). This algorithm will automatically fix some very basic STL-errors (without changing the geometry).



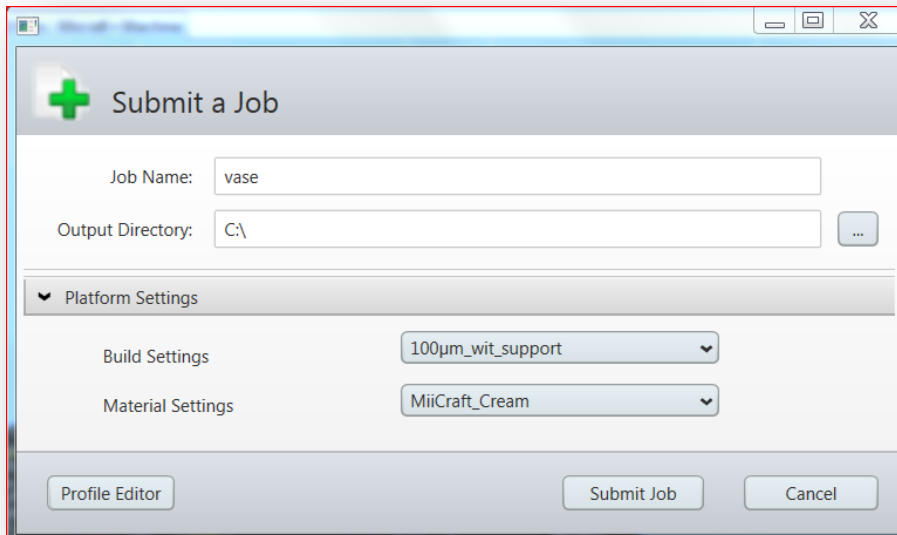
MiiCraft+ Build Processor



Click the Print 3D button if you want to print your parts. After clicking the button the submit job dialog will appear. This will enable you to setup the MiiCraft+ build processor and generate a build file.

Submit Job Dialog

This dialog enables you to setup the build processor to generate a buildable file (*.wrk)



Controls

Job Name Text box:

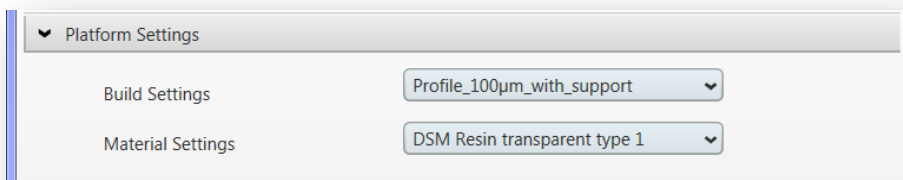
Here you can write the filename of the *.wrk build file that you want to save

Output Directory browser:

Here you can select the folder where the build file will be stored

Platform settings:

This is a collapsible pane allow you to select predefined profiles. There are 2 profile selections possible:



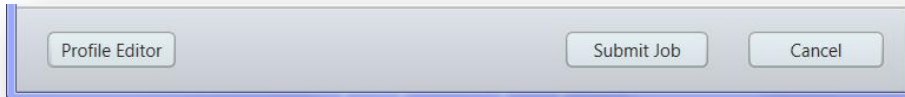
Build settings dropdown box:

This dropdown box will allow you to select predefined profiles indicating the slice thickness and the support generation.

Material settings dropdown box:

This dropdown box will allow the user to select predefined profiles indicating the curing time and shrinkage of the used resin.

Buttons:



Profile Editor Button:

This button will allow you to activate the profile editor in order to make or modify profiles that can be used in the submit job dialog dropdown boxes.

Submit Job Button:

This button will activate the build processor and will process a build file with the settings made in the platform settings

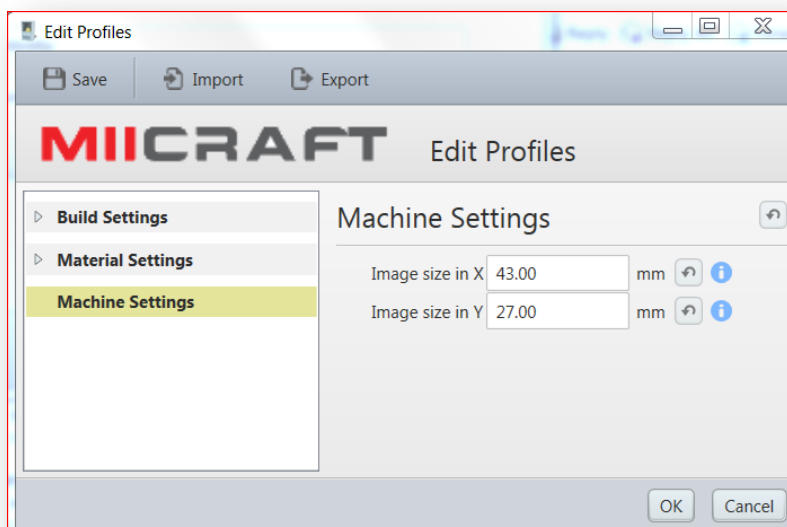
Cancel button:

This button will allow you to close the dialog without any action

Profile editor

The profile editor will allow you to modify or make build profiles that will be used in the submit job dialog. There are 3 different profile settings available in the profile editor:

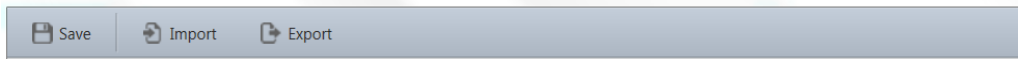
- 1) Build settings
- 2) Material settings
- 3) Machine settings



General behavior

Control buttons


On top of the dialog there are 5 control buttons enabling you to make some actions with the available profiles in the profiles editor:



- Save button : save all profiles in the profiles editor
- Import button: import profiles into the profile editor. The profiles need to have the bproff extension
- Export button: export profiles out of the profile editor.



- OK button: Save all changes and exit the profile editor
- Cancel button: exit the profile editor without any changes

Default value button 

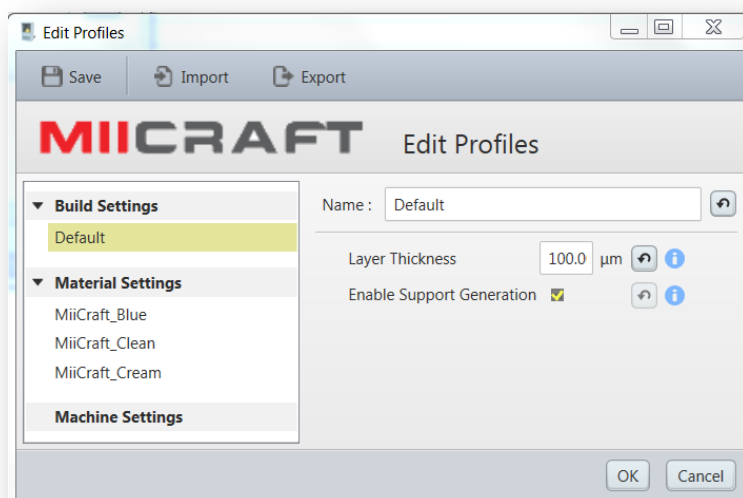
All parameters available in the profiles of the profile editor have the possibility to be reset to predefined values. This reset can be done with the default value button. Just click the button to reset the parameter to its default value.

Tooltip button 

All parameters available in the profiles of the profile editor have a tooltip function that explains the meaning of the parameter. Just hover over the icons to see the explanation.

Build Settings

The build settings section will allow you to make or modify build setting profiles.



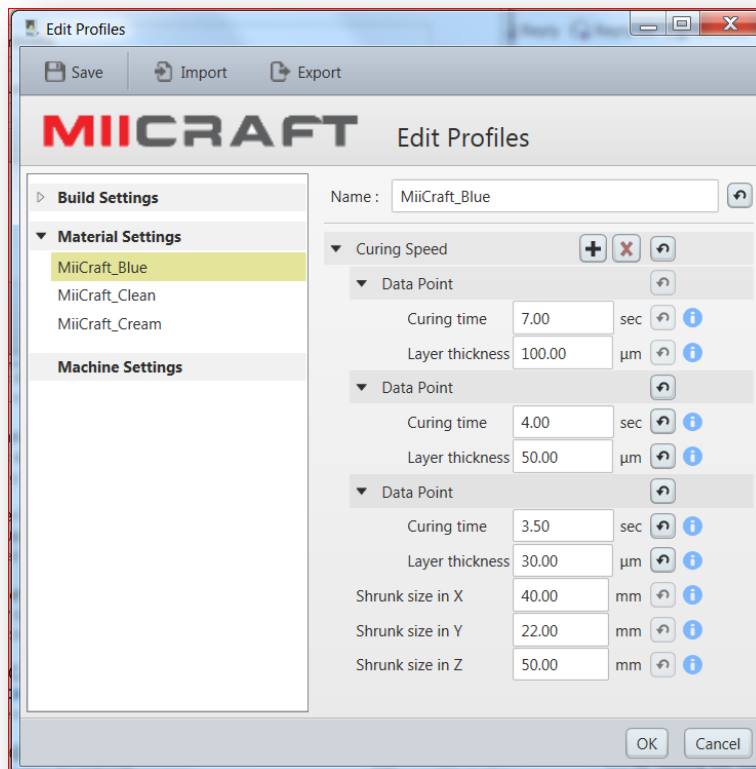
Profile content

The build setting profile will allow you to set specific process parameters that will influence the quality of the build:

- Layer thickness parameters: Here you can set the layer thickness used during the slice process in μm . The value can be between 1 and 200 μm .
- Enable support generation: here you can select if you want the build processor to generate supports for your part(s) or no

Material settings

The material settings section will allow you to make or modify material setting profiles.



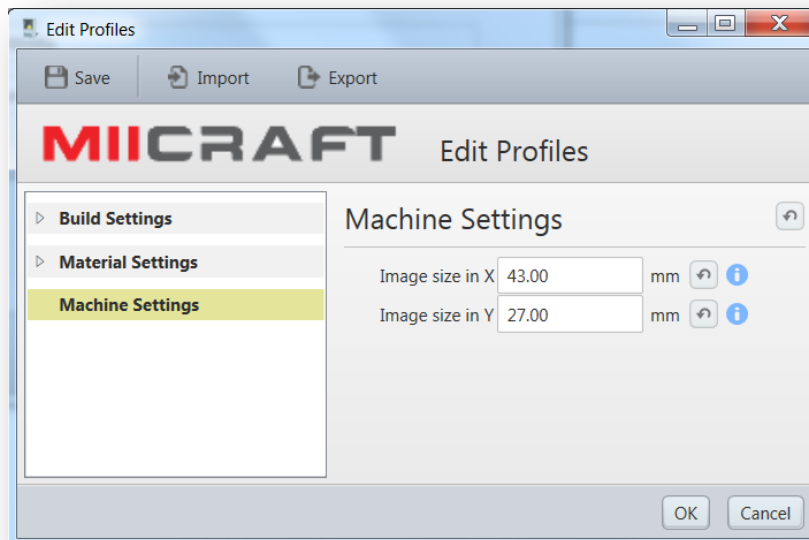
Profile content

The build setting profile will allow you to set specific material parameters that will influence the quality of the build due to material properties

- Curing speed curve: the curve is define by unlimited number of data points that can be set. Each data point indicates the curing time needed to cure a certain layer thickness. By adding additional data points the user can describe a nonlinear curve of curing times vs layer thickness.
- Shrunk size in X, Y, Z parameters: the size of a calibration part after curing with a certain resin. Consult the shrinkage compensation section to know which values need to be filled in in order to get good results during building with a certain resin)

Material settings

The machine setting section will allow you to modify the machine settings of the build processor.



Profile content

The machine setting will allow you to set specific machine parameters that can influence the quality of the build caused by machine tolerances.

- Calculated image size in X,Y:

This is the size of the complete projection field after calculating this size based on the X, Y measurements of a calibration projection.

Remark: The machine settings only has one set of parameters that can be modified but not can be removed nor duplicated.

Calibration methods

Image size deviation compensation

During the production of the 3D printer and his components it is possible that some parts don't have the exact dimensions wanted or that the parts are built together with some tolerances. Because of this it is possible that the image size of the projector can vary from machine to machine. When the image size changes this will have influence on the projection size of a slice of a part resulting in parts that vary in dimensions from machine to machine. To compensate for this the software provides a mechanism to calibrate the machine to the right image size by providing 2 parameters that allow you to fill in the exact size of the image by the project.

Calibration Method:

To eliminate any influence of shrinkage of the resin, image size calibration needs to be done as a dry process with a photosensitive film placed at the bottom of the resin tank. This procedure needs to be done with neutral material settings

- 1) Project the calibration image file called *image_calibration.wrk* on a photosensitive sheet. This is an image of 500 x 250 pixels
- 2) Measure up the illuminated section in X & Y
- 3) Fill in the measured values in the general settings section of the profile editor

Calculation:

Measured dimensions	Calculated dimensions
Measurement in X = 28 mm	Size in X = 43.008 mm
Measurement in Y = 14 mm	Size in Y = 26.880 mm

If we project an image of 500 x 250 pixels and measure up with a photosensitive paper the size of this projection than we can calculate what the size will be for an image of 768 x 480 pixels.

500 pixels = 28 mm → 768 pixels = 43.008 mm
 250 pixels = 14 mm → 480 pixels = 26.88 mm

By filling in the calculated values for an image size of 768 x 480 pixels the system is calibrated for the correct image size of the projector and will be able to generate dimension accurate parts.

Material shrinkage compensation

The photosensitive resin has the tendency to shrink during curing in the curing chamber. To compensate for this the build processor will have a method allowing to adjust for this shrinkage in X, Y and Z per used resin.

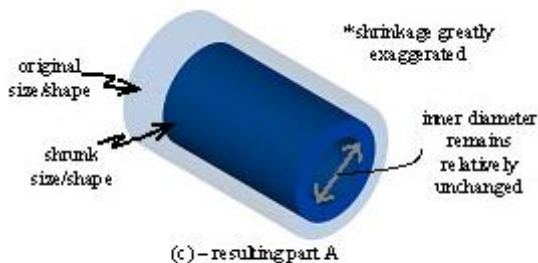


Figure 2 - Example of part shrinkage

Calibration method:

- 1) Print the calibration part called *shrinkage_calibration.wrk* on the printer. This part is a cube of 40 x 22 x 50 mm.
- 2) Measure up the part in X, Y and Z after printing and curing with a caliper
- 3) Fill in the measured values in the material section of the profile editor

Calculation:

Printed Part	STL part
Measurement in X = 40.3 mm	Size in X = 40 mm
Measurement in Y = 21.8 mm	Size in Y = 22 mm
Measurement in Z = 49.6 mm	Size in Z = 50 mm

When the size of the part in X is 40 mm but we measure 40.3 mm then the internal rescaling coefficient will be $40 \text{ mm} / 40.3 \text{ mm} = 0.9925$.

When the size of the part in Y is 22 mm but we measure 21.8 mm then the internal rescaling coefficient will be $22 \text{ mm} / 21.8 \text{ mm} = 1.0091$

When the size of the part in Y is 22 mm but we measure 21.8 mm then the internal rescaling coefficient will be $50 \text{ mm} / 49.6 \text{ mm} = 1.0080$

These coefficients will be used to rescale the part to compensate for the shrinkage on a part after curing.

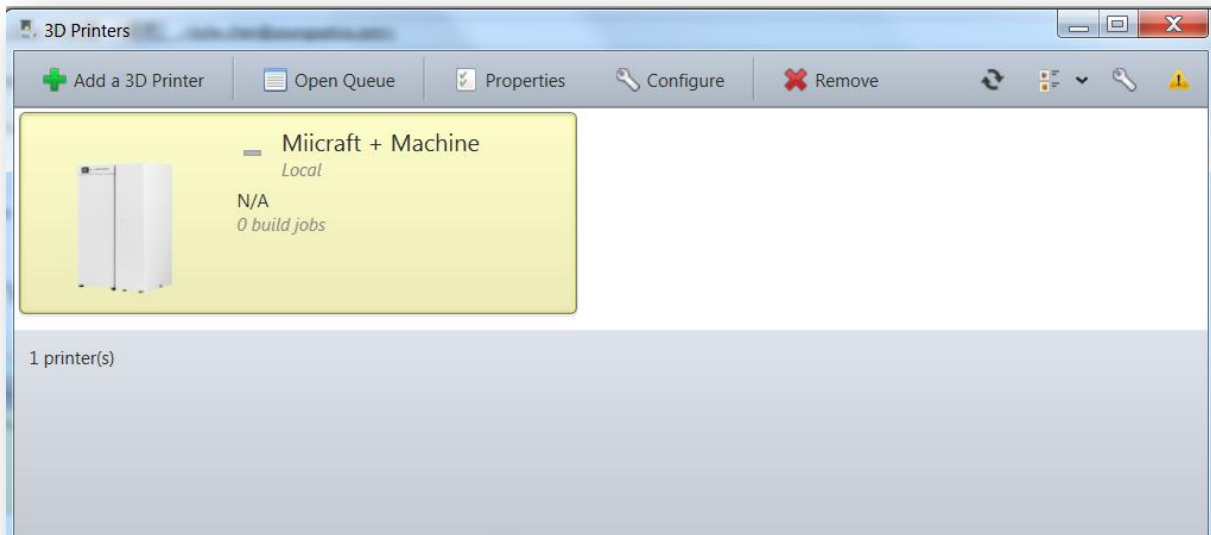
Build processor manager

The build processor manager can be found in the windows control panel and is a part of MiiCraft+ build processor. It provides 2 functionalities:

- manage the build processors on your system
- Give an overviews of the jobs preprocessed by a build processor or active on a build processor.

3D printer window

In the 3D printer window the user gets information on the available build processors on the system. Besides information the window gives the user the ability to add and remove build processors and request the properties of a build processor and to setup visualisation details.

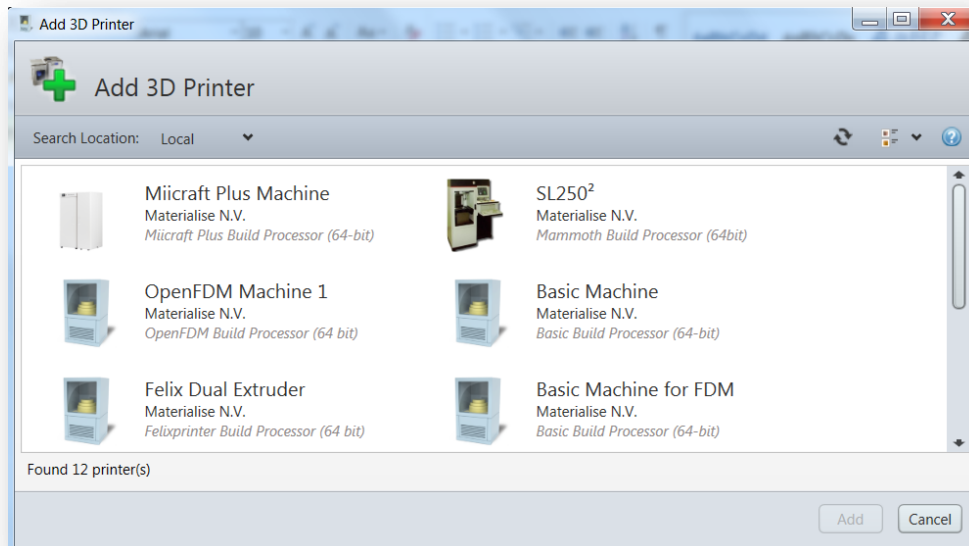


Behavior:

- Double clicking a build processor in the build processor list will open the build processor queue.
- Selecting a build processor together with the “**Open queue**” button will open the build processor queue
- The “**Add a 3D printer**” button will activate the “**add a build processor**” window.
- Selecting a build processor together with the “**remove**” button will remove the build processor from the system

Add a 3D printer window

The “add a 3D printer” window will allow the user to install one of the build processors present on his system or in the network.



Behavior:

- By selecting a build processor in the window together with the “**Add**” button the selected build processor will be added to the system and set as default.
- In the dropdown box “**Search location**” the user can select if the system will look for build processors locally or on the network.
- The “**Cancel**” button allows the user to exit the window with adding a build processor.

Build processor queue window:

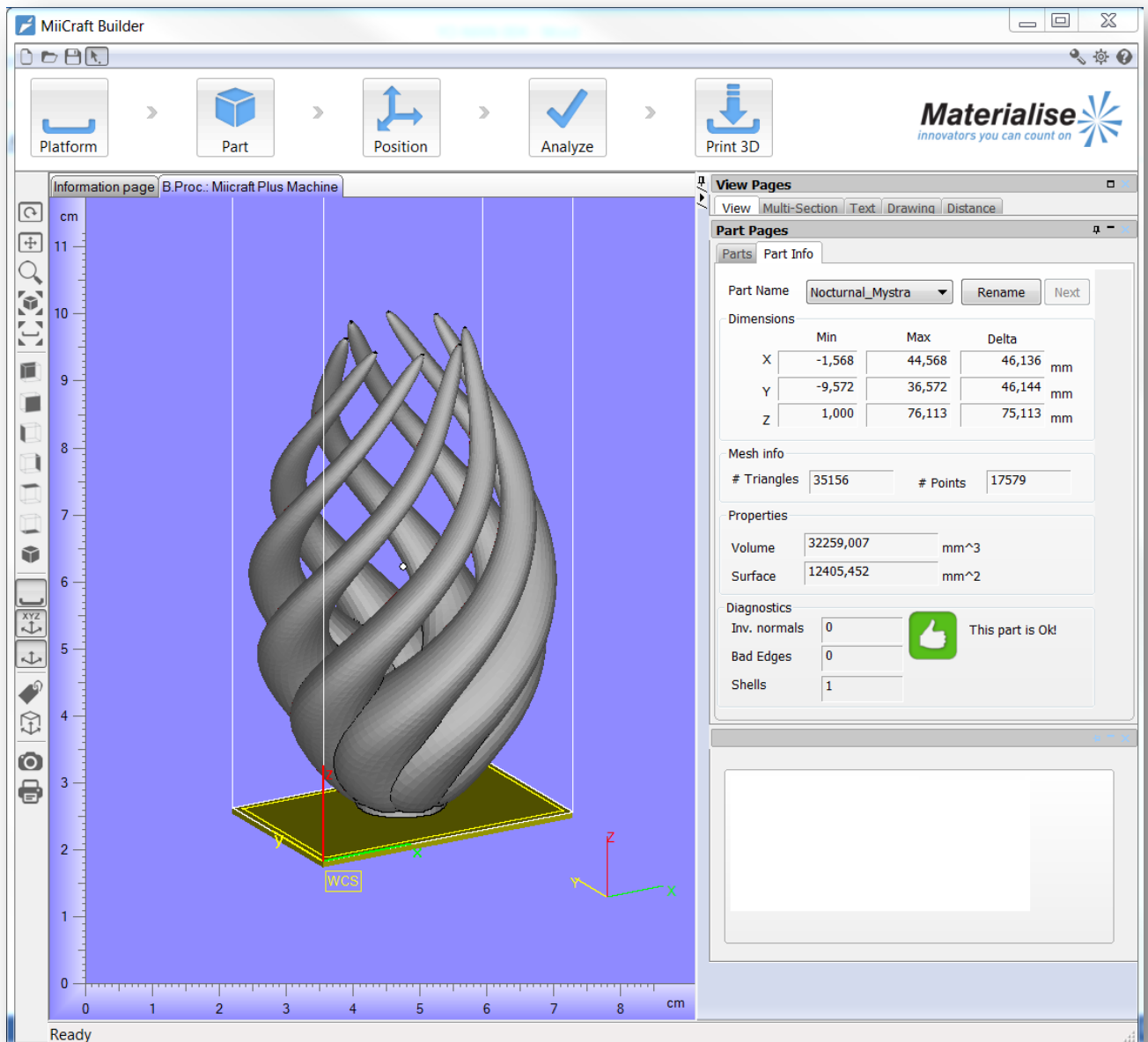
The build processor queue window gives an overview of the jobs that are processed by the build processor and the jobs that active in the build process. The windows give 2 queues:

- 1) Build jobs queue
- 2) Preprocess Jobs queue

The screenshot shows the 'MiiCraft + Machine' application window. At the top, there are tabs for 'Properties', 'Configure', and 'Purge Entire Queue'. Below the tabs, the main area displays the machine name 'MiiCraft + Machine' with a status of 'N/A 0'. A 'Build Jobs' section contains a table with columns for Name, Status, Progress, Preprocess End Time, and Upload Time. Below the table, a message states 'No jobs in queue. Use an external 3D editor (e.g. Materialise Magics) supporting the Build Processors to submit jobs.' and a summary shows '0 total, 0 running, 0 waiting, 0 failed, 0 finished'. A similar 'Preprocess Jobs' section is also present, with a message and a summary of '0 total, 0 running, 0 waiting, 0 failed, 0 finished'.

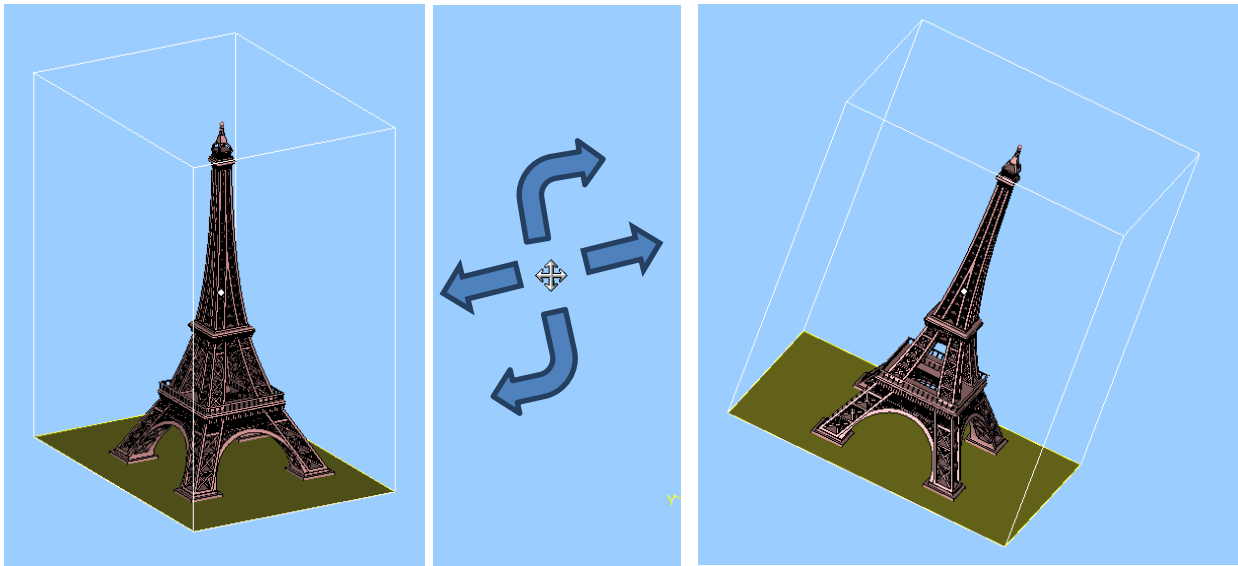
Visualize


[View toolbar and Tool sheets]



View Toolbar

Rotate and Pan



 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.

The Rotate function has two different cursor images that depend upon the cursor position on the screen: a quadruple arrow shape when the cursor is in the middle of the screen and a circular arrow shape when the cursor is at the edge of the screen.



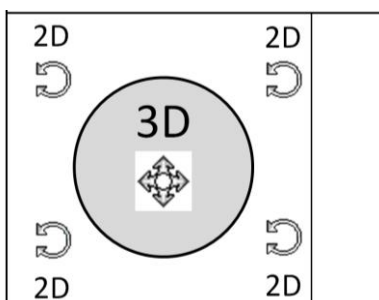
Quadruple arrow

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).



The easiest way to know which mouse mode will be used is to imagine a big disc in the center of your workspace (indicated with a grey disc).

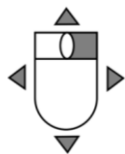
When your cursor is inside this imaginary disc, it will have a quadruple arrow shape (3D movement).

When it is outside this imaginary disc, it will have a circular arrow shape (2D movement).



It is important to notice that the position of your part in the workspace has no influence at all, only the position of the cursor in the workspace determines the type of rotation (2D or 3D movement).

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



Rotate

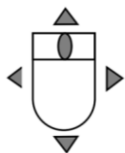
You can also access the rotate function via your right mouse button shortcut (without clicking on the Rotate button).

Press your right mouse button and keep it down while moving your mouse, the part will rotate in accordance with your mouse movements.



The **Panning** function allows you to pan your part in your workflow. Click the Panning button and use your left mouse button (press it in the workflow) to slide your part.

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



Pan 

- Panning with a three button mouse is easily accomplished by clicking and dragging with the scroll button (middle button).
- You can also pan with your right mouse button shortcut by holding the shift key down and then clicking and holding the right mouse button while moving the mouse

Zooming

The View toolbar has several zoom options:



Zoom [Alt + Z]

Allows zooming into a specific area of the part. This is accomplished by clicking the left mouse button and dragging a window around the region of the part where you want to zoom.



Unzoom [Alt + U]

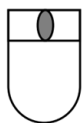
Unzoom will fill the screen with all visible parts. The fill is such that the entire part will be displayed even during any rotation.



Unzoom Platform

Unzoom Platform shows the parts and their placement on the machine platform.

The **mouse** also has zoom options:



Zoom 

- When using a mouse with a scroll button, roll the scroll button forward to zoom in and backward to zoom out.
- To use the right mouse button shortcuts to zoom, first hold down the control key, then press and hold the right mouse button. To zoom in, move the mouse cursor up the screen and to zoom out, move the mouse cursor down the screen.

ISO views

Buttons for changing the viewing angle are also located on the View toolbar:



There are six **Planar** ISO views: Back, Front, Left, Right, Top, Bottom and there is one **TopFrontRight** ISO view.

Show/Hide

With these buttons you can show or hide the following features:



Shows or hides the **World Coordinate System**.



Shows or hides the **Orientation Indicator**.



Shows or hides your **Part Names**.

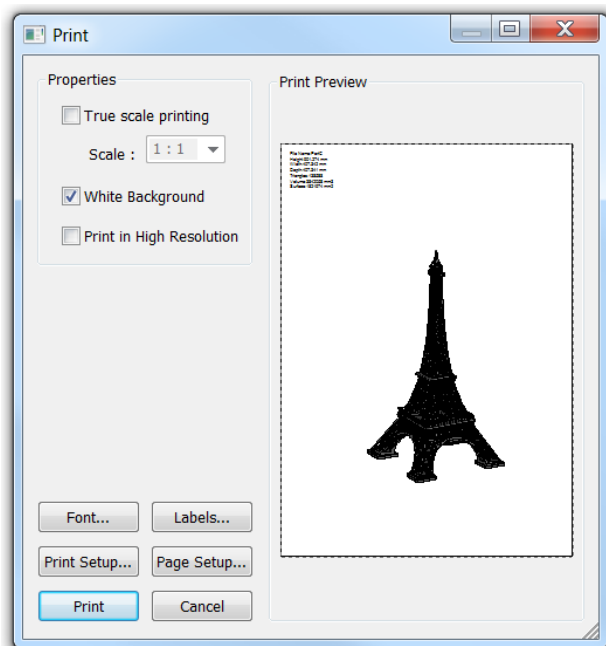
Copy to clipboard/Print2D

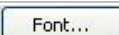

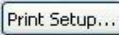
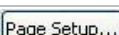


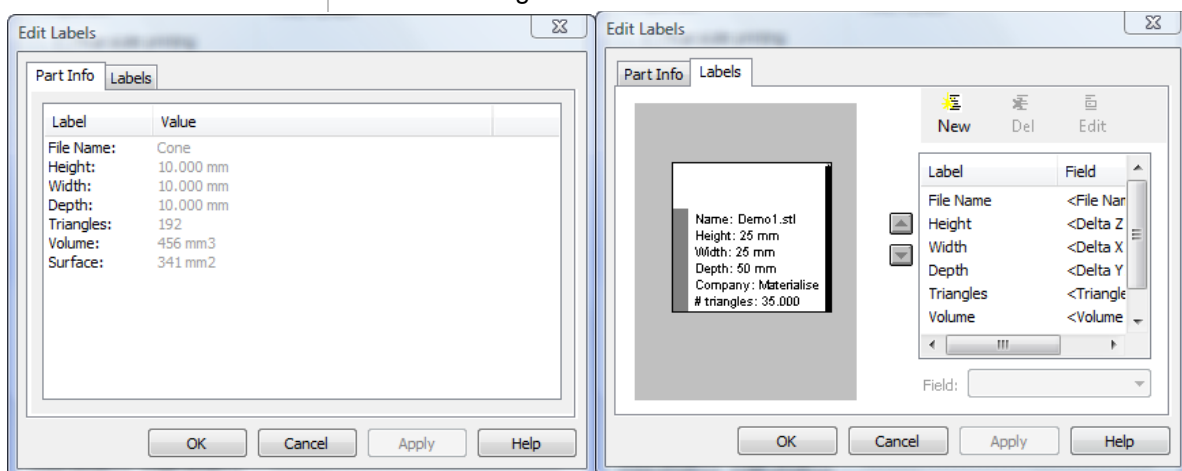
Use the **Copy to Clipboard** function to make a screenshot of your Workspace



The **Print2D** starts the print wizard that leads you to the *Page Setup* and the standard Windows *Print Setup* dialog box.



Print Preview	The right part of the print dialog box is the Print preview.
True Scale Printing	This feature allows you to print a scaled copy. This means that you can measure on the printed page. <i>Remark:</i> Be aware that perspective views never allow measuring
	This allows you to define the font of the labels
	Specify the part information that should be printed i.e. define labels
	Use this option to choose another printer, paper size or paper orientation using the standard Print Setup interface
	<i>Page Setup</i> allows you to define a print style. It's a standard Windows dialog box



Part Info

The Part Info tab gives an overview of the labels (part information) that will be printed on paper together with the part. Labels are only available when a single part is visible in the Workspace. You can define your labels by clicking on the Labels tab.

Labels

New	A New Label and Field are added at the bottom of the list. The user can immediately change the label and the field type.
Del	To delete a label and a field: Select the label, and press on the Delete button.
Edit	The user can edit a label by selecting one, and pressing the Edit button.
Rearrange Label	The order of the labels can be changed with the arrow buttons. Select a label, and use the arrow buttons to move it one place up, or one place down the list.
Field Types	Several Field Types are predefined.
Changing Field Types	Select a Label, and select another field type.

View Pages

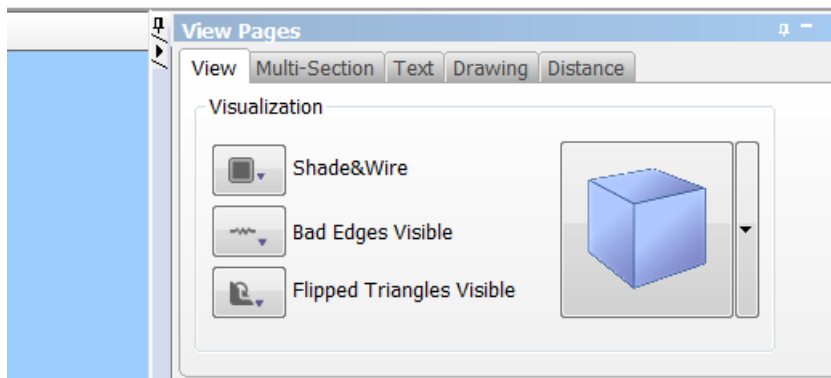
The View Pages Tool sheet contains following tabs which are explained in detail in this chapter:

1. View
2. Multi-Section
3. Text
4. Drawing
5. Distance.

The View tab allows you to change the visualization of your STL-files. You can also inspect your files by creating sections and performing measurements. Furthermore, the annotations (text and drawings) allow you to easily communicate with others.

Click the little black arrow to collapse/expand the Tool sheet.

If you click the little thumbnail, the Tool sheets will automatically collapse when you leave it with your mouse. To expand it again, you should touch the right side of your screen (with your mouse cursor).



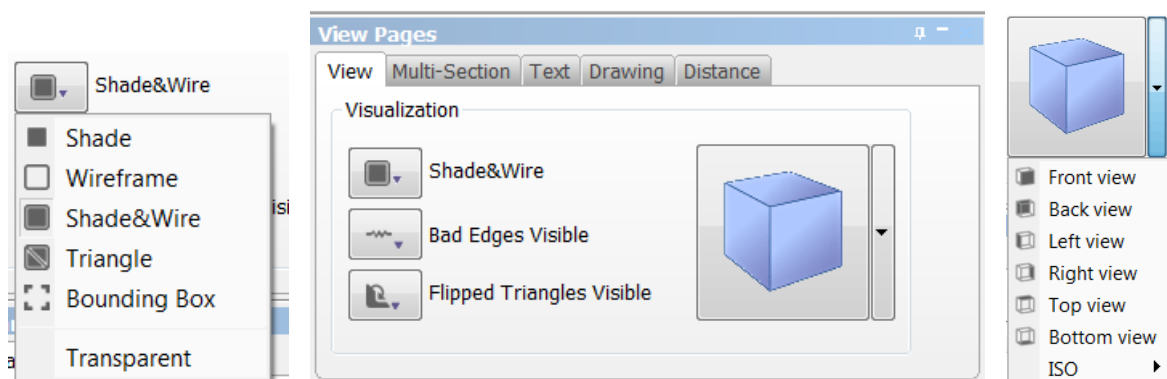
Expanded Tool sheet



Collapsed Tool sheet

View

The several Shade&Wire options and View angles are selectable through drop down menus.



The **Shade&Wire** options are the first functions you found on the View toolbar. These functions are used to change the way your part is displayed in the Workspace.

- Shade**
Displays the part with shades according to the direction of the triangles.



Wireframe

Shows edges of the object. The edges are defined by the angle of incidence between triangles. MiiCraft Builder defines a visible edge when the angle between two adjoining triangles exceeds the 'definition set' found in the MiiCraft builder



Shade & Wire

Displays a combination of shade and wireframe modes



Triangle

Shows the edges of all triangles. This view shows the native STL file format.



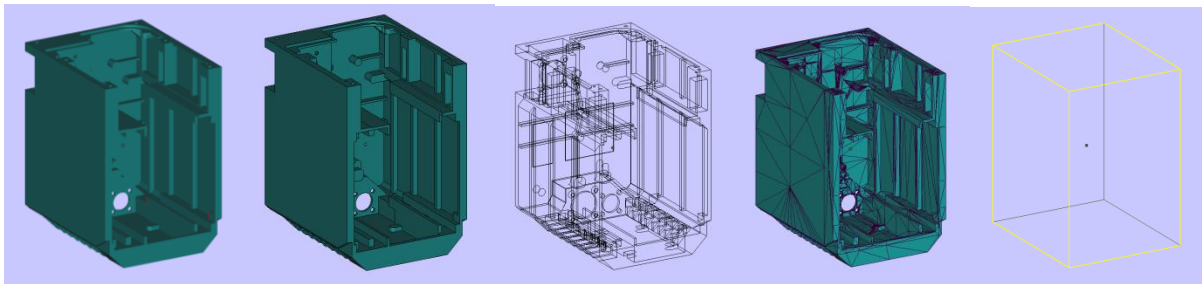
Bounding Box

Shows only the bounding box (X, Y and Z extents) of the part. This makes rotating parts with a large number of triangles easier (less memory usage). Also, very small bad edges (triangles which are not properly connected) are more evident in this mode because they remain visible (as yellow lines) while the rest of the part is not visible.



Transparent

This option makes your parts transparent.

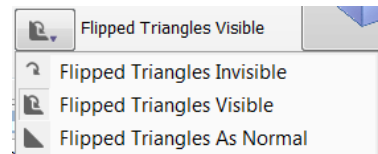
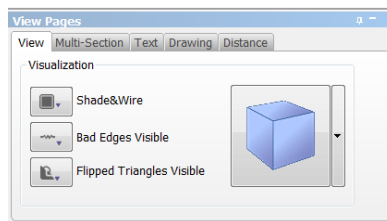


Different View modes (from left to right): Shade, Wireframe, Shade & Wire, Triangle and Bounding Box



The **View Cube** has a drop down menu that contains the different default views along with eight ISO views. You can also click on the View Cube itself. Clicking on a side will activate that particular view.

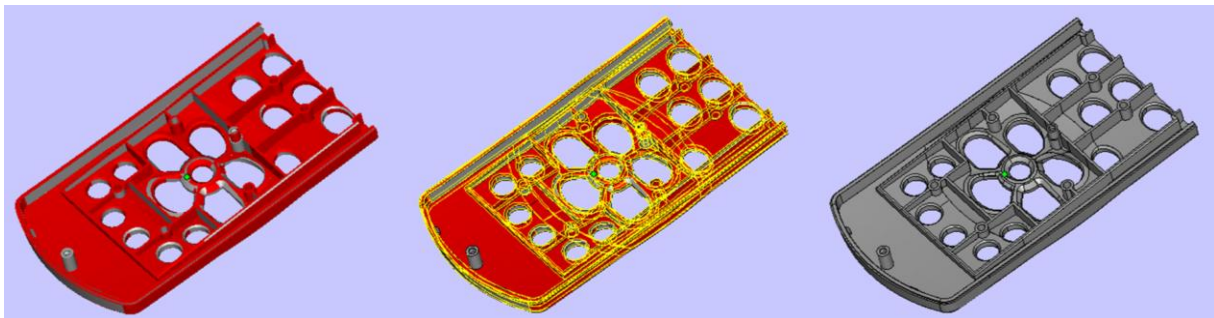
Sometimes, STL-files contain errors and need to be redesigned or fixed. These errors are visualized by default, but you can choose to hide or highlight them.



In the **Flipped Triangle** drop-down menu, you can choose how to display Flipped Triangles: Visible, Invisible or As Normal.

In the **Bad Edges** drop-down menu, you can choose how to display bad Edges: Visible, Invisible, Hidden Line or Highlight Bad Edges.

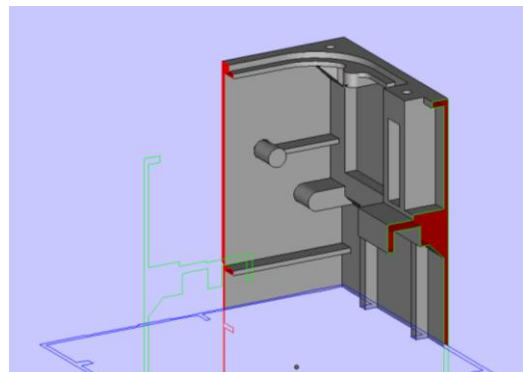
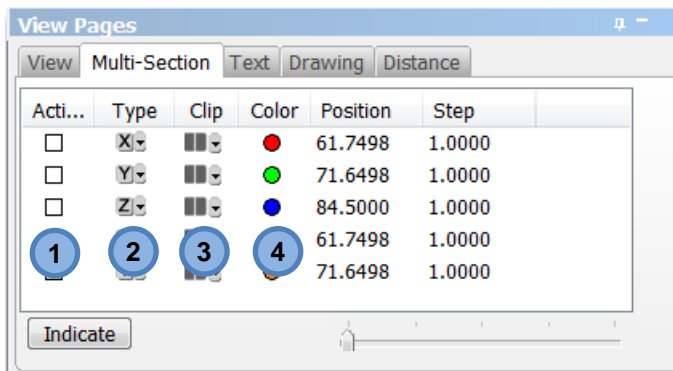
The figure below gives you an example of making errors visible. It is highly recommended to visualize Bad Edges and Flipped Triangles so you can see at a single glance if your part needs fixing or not.



Left: Flipped Triangles visible, Middle: Flipped Triangles and Bad Edges visible, Right: Flipped Triangles and Bad Edges invisible

Multi-Section

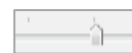
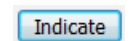
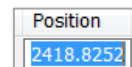
Sections are useful to measure, check for errors and look inside the part. With sections you can hide certain parts of your object. They are perpendicular to the X, Y or Z axis. You can define your sections in the **Multi-Section** tab of the View Pages Tool sheet.



- Click on the **Active** checkboxes to toggle the sections on or off (so you can define which sections are displayed). You can activate up to five sections at the same time.
- With **Type** you can define how the section is created. You can choose between X, Y or Z to set the section perpendicular to the corresponding axis.
- The **Clip** function allows viewing inside the part. You can define the portion of the part that will be hidden. With a first click, the portion of the part towards the coordinate system will be hidden. A second click will hide the portion away from the coordinate system. A third click will show the section on your entire part. Use the displayed drop down menu to choose how to display clipping planes.
- You can change the **Color** of each section by clicking on that section's Color button.

The position of the section can be determined in four ways:

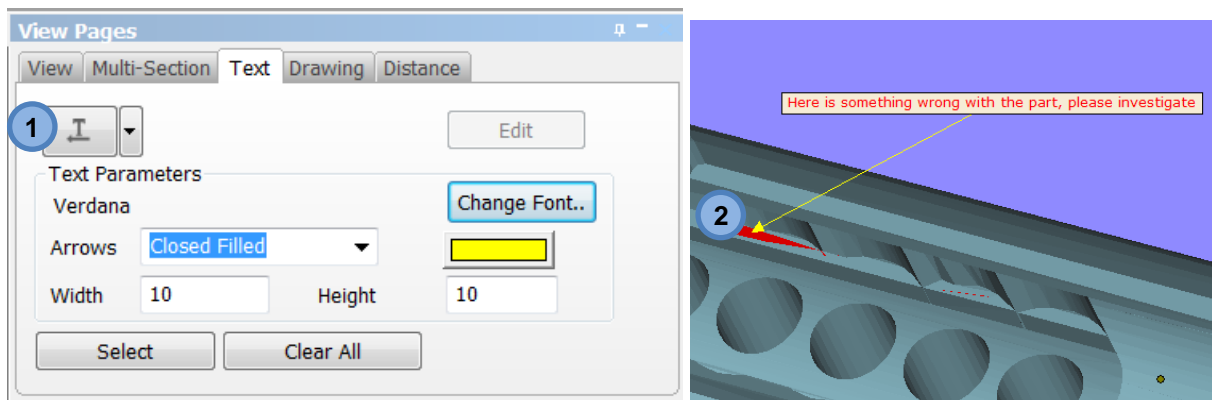
1. The **Position** box allows you to enter an absolute X, Y or Z coordinate value to place the section in the desired location.
2. The **Step** box allows you to enter an absolute step value. When using the left and right arrows on the keyboard, the section will move according to this value.
3. The **Indicate** button allows positioning of the section by clicking anywhere on the part (with your left mouse button).
4. The **Slider** alters the position of the section in a continuous manner. The section will be calculated and displayed in real-time. The position of the section is displayed in the Position box.




Sections are only displayed when active (checkbox is flagged). Sometimes it can happen that you cannot find a certain part. The reason is often that one of your sections is still active and that the part is located in the hidden area of the section.

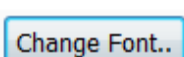
Text

Adding extra information to your project has never been so easy. You can easily add text to your part and keep a well-organized overview of your project. The text is connected to your part and saved in your Magics project file (*.magics).



1.  Go to the Text tab of the View Pages Toolsheet and click the Text and Arrow option. Use the displayed drop down menu to choose Text only.
2. Indicate a point on your part where you want to attach the label and click a second time to define the position of the label itself. Afterwards, type your message in the text dialog.


Under Text Parameters, you can change the look and feel of the text and arrows:




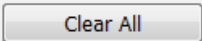
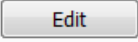
This button allows changing font, font style, size and color.

Arrows

The style of the arrows can be adapted. You can choose between Open, Closed Filled, Closed or None

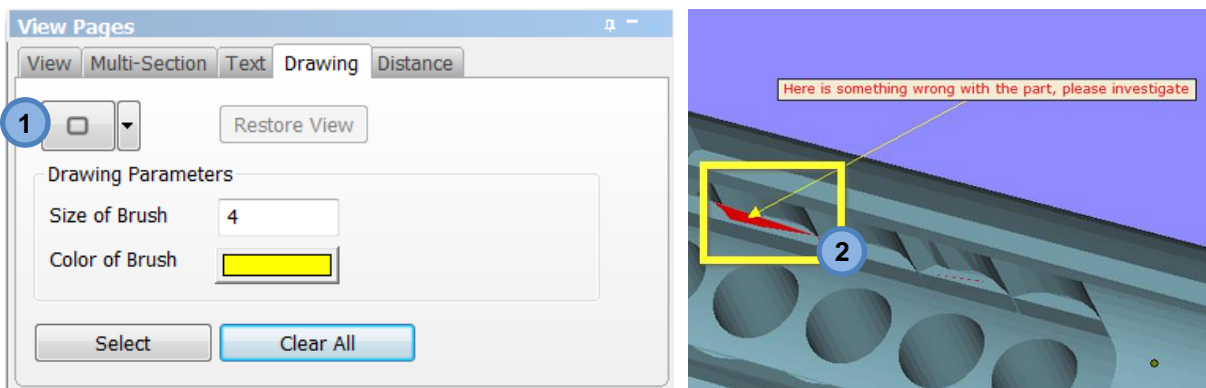
	This button allows changing the color of the arrows
Width	Here you can change the width of the arrows
Height	Here you can change the height of the arrows


Furthermore you have buttons to change the settings and to select, edit or clear your text annotations:

	This button allows selecting an existing text annotation. If you afterwards press the delete button of your keyboard, you can delete the selected annotation.
	This button allows to clear all annotations (text and drawings) in a single click
	If you have selected an existing annotation, you can use this button to modify the text


Drawing

You can highlight certain areas by adding drawings to your project. The drawings are projected on the screen and saved in your Magics project file (*.magics).



-  Go to the Drawing tab of the View Pages Toolsheet and click the Rectangle option. Use the displayed drop down menu to choose Ellipse or Freehand.
- Go to the area you want to highlight and make your drawing

Under Drawing Parameters, you can change the size and color of the brush:

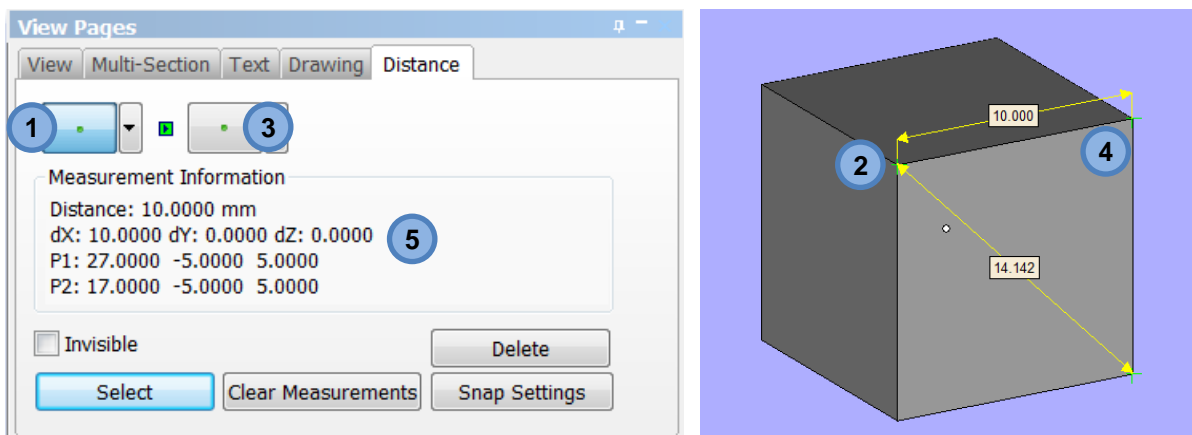
Size	Here you can change the thickness of the brush
	This button allows changing the color of the brush



Furthermore you have buttons to change the settings and to select, clear or restore the view of your drawings:

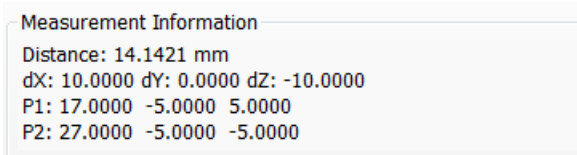
<p>Select</p>	<p>This button allows selecting an existing drawing. If you afterwards press the delete button of your keyboard, you can delete the selected drawing.</p>
<p>Clear All</p>	<p>This button allows to clear all annotations (text and drawings) in a single click</p>
<p>Restore View</p>	<p>A drawing is not fixed to the part but a projection on the screen. If you rotate or pan the part view, the drawing will not move simultaneously. You can restore a certain view point by selecting the relevant drawing and clicking Restore View.</p>

Distance

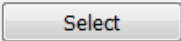

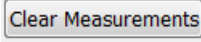

MiiCraft Builder allows you to measure distances on your parts. All measurements are performed on the wireframe. Therefore, measuring is best performed in the 'Shade and Wireframe' or 'Triangle' viewing mode to minimize interpretation errors during measurement.



1.  Go to the Distance tab of the View Pages Toolsheet and click the Point option
2. Click on the first point of your part which you want to measure from
3.  MiiCraft Builder allows you to immediately select a next Point
4. Now, click on the second point of your part which you want to measure to. The measurement will now be active but not yet finished. At this point, dragging the cursor will move the measurement tag. Click the mouse one more time to set the measurement tag in place.
5. On the Distance tab, you will find all information regarding your measurement



Furthermore you have buttons to change the settings and to select, clear or hide your measurements:

	This button allows selecting an existing measurement
	This button allows to delete a single measurement just by clicking on the measurement tag
	This button allows to clear all measurements in a single click
	This button allows changing how the Point will snap on the part
<input type="checkbox"/> Invisible	This checkbox allows to hide all measurements

Licenses and Settings

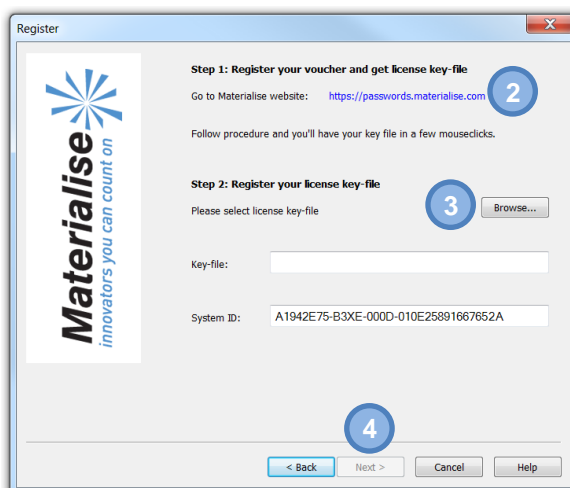
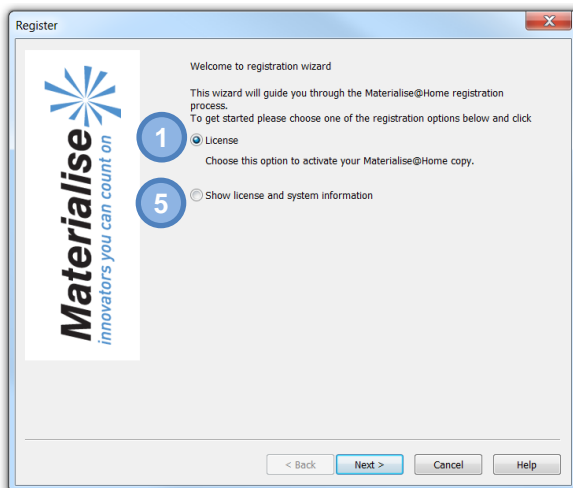
[Main Toolbar]

Licenses /

Materialise Software is key protected (you need a key-file to register the software). MiiCraft Builder is not sold separately but bundled together with your 3D-Printer. So together with your 3D-Printer, you also received a voucher code. You should use this voucher code to generate a key-file on our website. Afterwards, this key-file will allow you to register and activate your MiiCraft Builder copy.

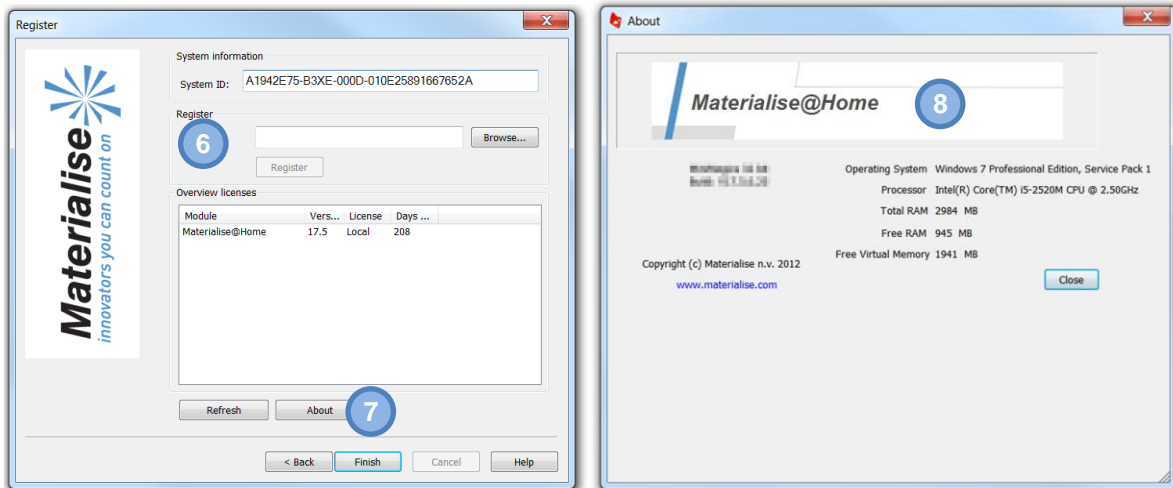
When you start MiiCraft Builder for the first time, the License Wizard will automatically start up to assist you in registering. You can also open the Registration Wizard by clicking on the Licenses button in the Main Toolbar.

1. Choose License to activate your MiiCraft Builder software
2. Register your voucher code and get your (license) key-file
Go to on our Materialise web password site <<https://passwords.materialise.com>> and follow the procedure to get your key-file (download and save the key-file on your computer).
3. Click Browse to select the key-file you generated in step 2
4. Click Next to register the selected key-file



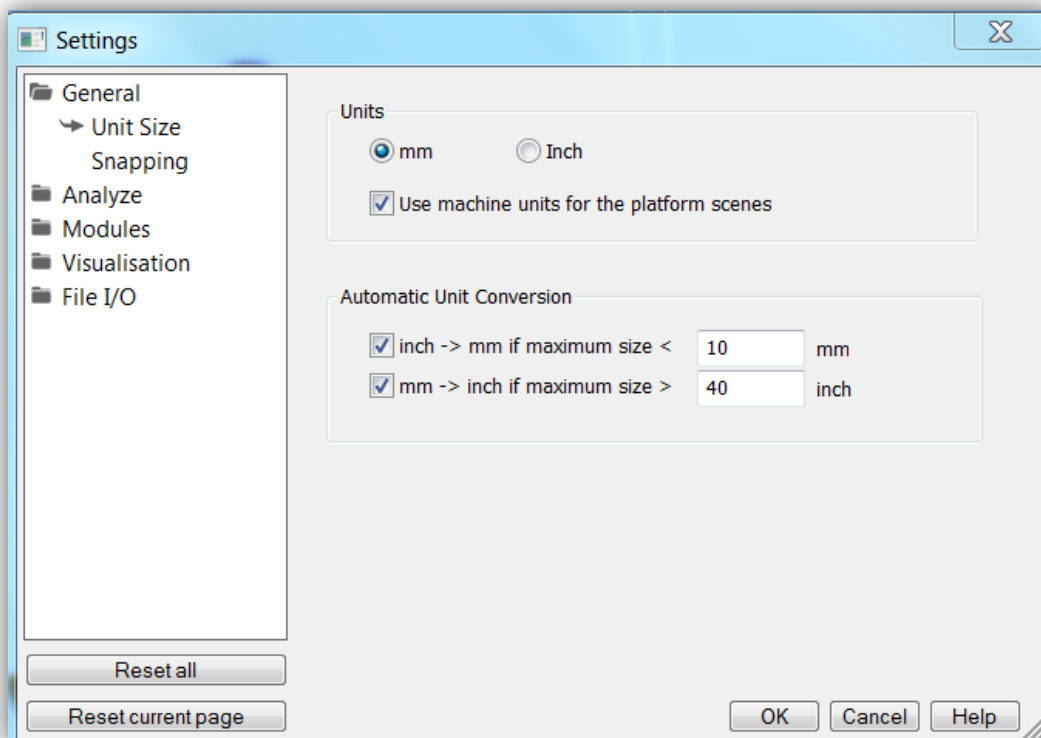
Use the option *Show license and system information* (5) on the first page of the Registration Wizard to get your System-ID (6) and an overview of your active license (and how many days you have left before the license is set to expire). Your *System-ID* is a unique identifier for your PC. This ID is dependent on your hardware and we need this ID to generate a key-file.

Click the *About* button (7) to open the MiiCraft Builder *About* dialog (8) which displays the exact MiiCraft Builder version together with some system specific information.



Settings |

General > Unit Size



Units

You can choose between mm and inches. You will have to select the units before

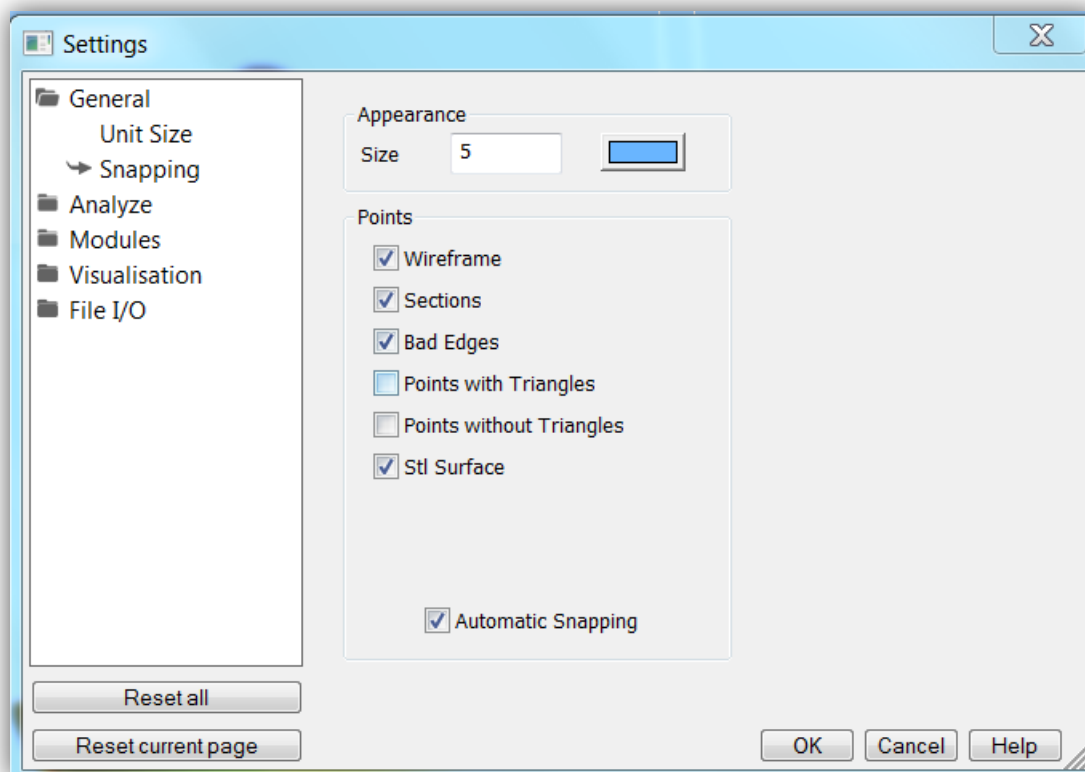
you load STL files. If the STL file was originally in millimeters, you have to choose mm. If the file is in inches, you will have to choose Inch. If several parts are loaded, some in millimeters and some in inches, the Unit Conversion has to be used otherwise parts are out of proportion. MiiCraft Builder always remembers the last used unit and takes this as default the next time you start.

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 millimetres, 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 millimetres 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' i.e. when 'maximum size is smaller than X mm' in the options – see 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' i.e. when 'maximum size is greater than X inch' 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.

General > Snapping



Appearance

Some features in MiiCraft Builder (for example measurements and text annotations) require that you snap to a point on the part. When you snap to a point, it will be marked with a colored circle with a radius as set in the size box. The little circle will get the color marked in the color box.

Points

You can decide which points you can snap to: points on a wireframe, sections, bad edges, corner points of a triangle, free points (points that are not a corner point of a triangle) and/or points on the STL surface.

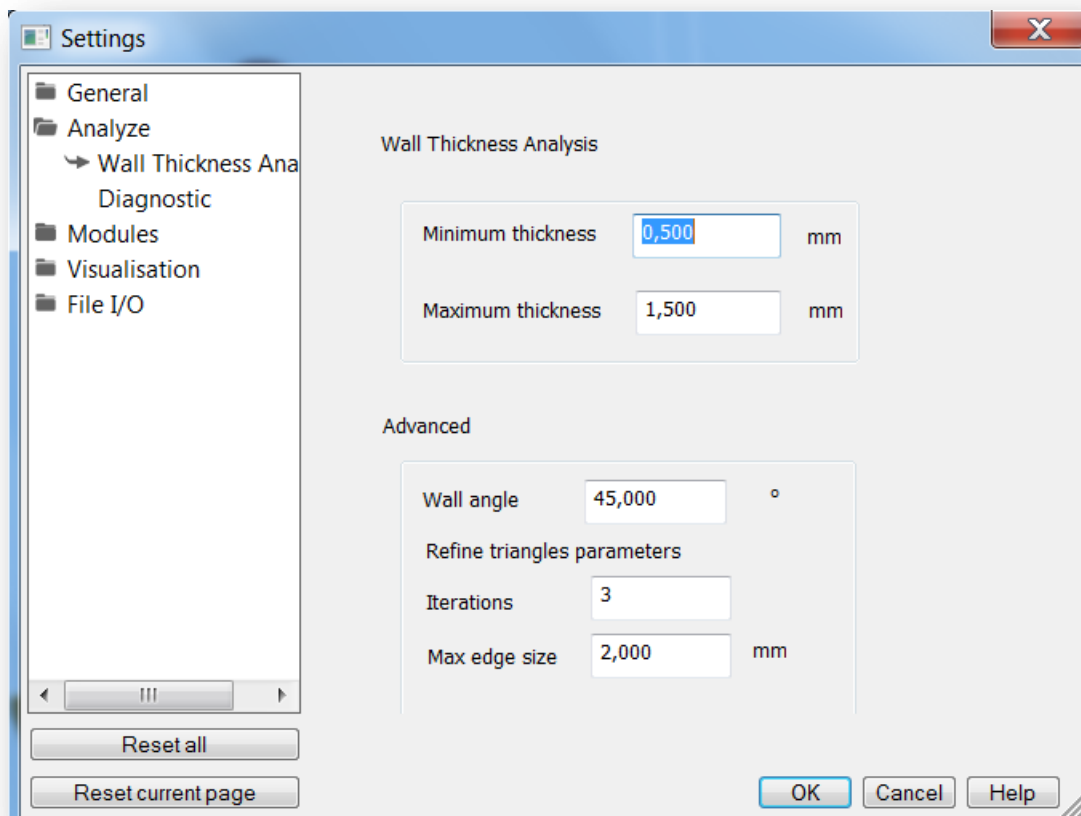
When you for example unselect wireframe, you will not be able to snap a point that is lying on the wireframe.

Automatic snapping

ON: When this option is marked, MiiCraft Builder actively searches for points when you move the mouse over the part. MiiCraft Builder will highlight these points. To select a point, click on it.

OFF: MiiCraft Builder will only search for a point when you have clicked with the mouse. This option is faster.

Analyze > Wall tickness analyses



Wall thickness analysis

Minimum thickness: to set the lower limit of the wall thickness analysis tool

Maximum thickness: to set the higher limit of the wall thickness analysis tool

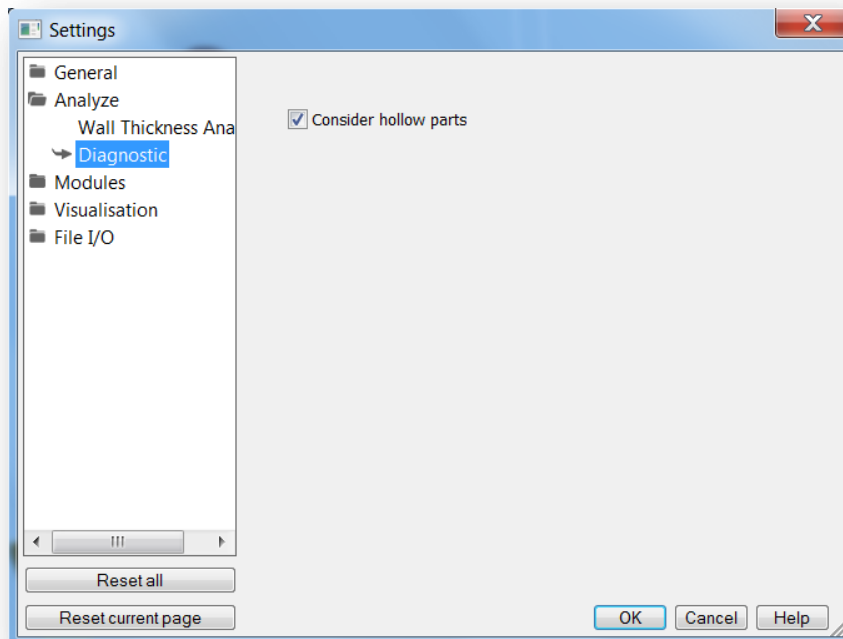
Advanced

Wall angle: The angle the analyze function uses to determine the thickness of a wall

Iterations: how much iteration the analyze function runs when performing wall thickness analysis

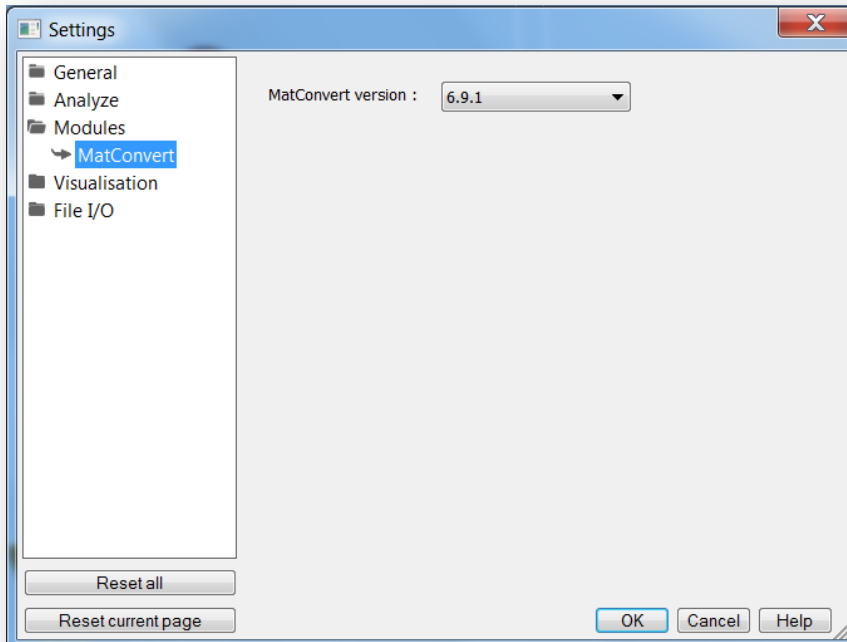
Max edge size: the maximum dimension of an edge region that is treated as an edge.

Analyze > Diagnostic



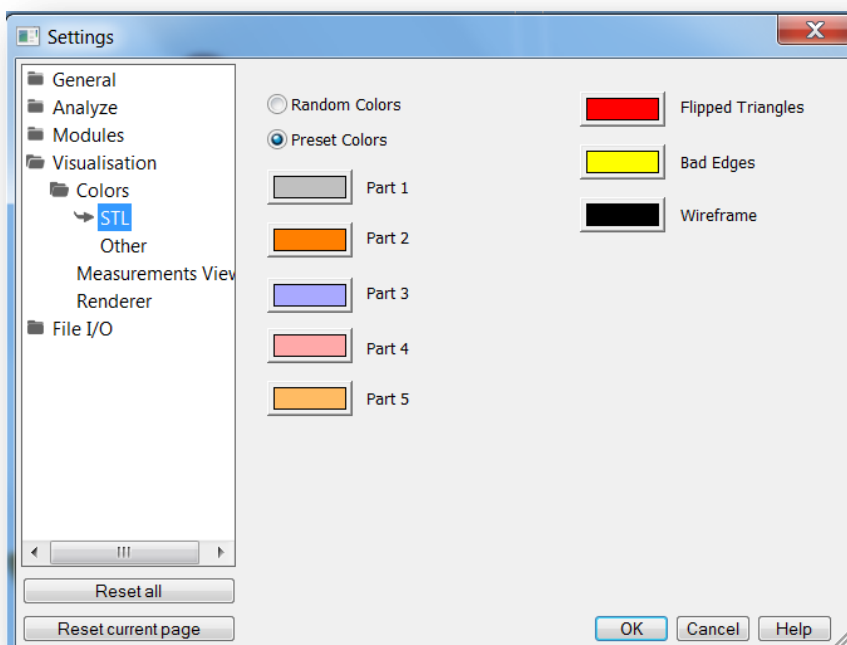
Consider hollow parts checkbox will set the analysis tool to take into account that parts can be hollow.

Modules > Matconvert



The Mat convert version drop down box will allow to select which version of the conversion tool will be used. This to allow the user to upgrade to newer versions without a new install.

Visualisation > STL Colors

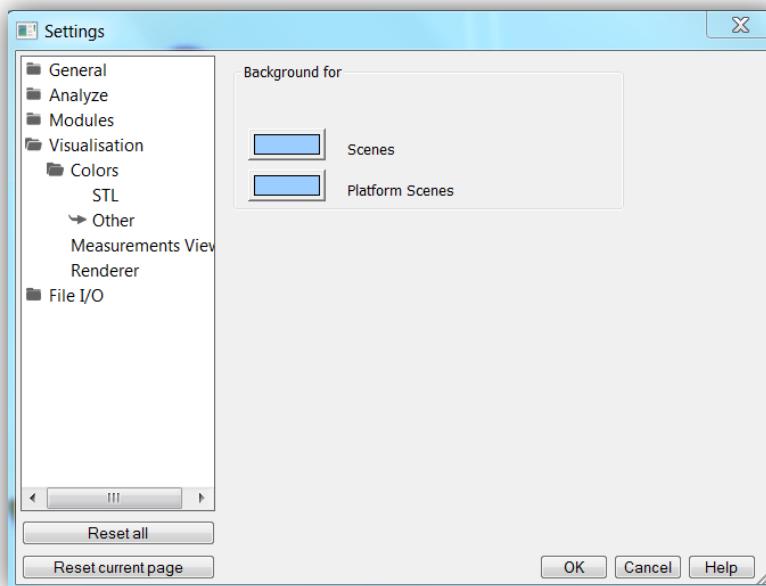


Random Colors

When you select random colors, random colors are used for the different parts you import.

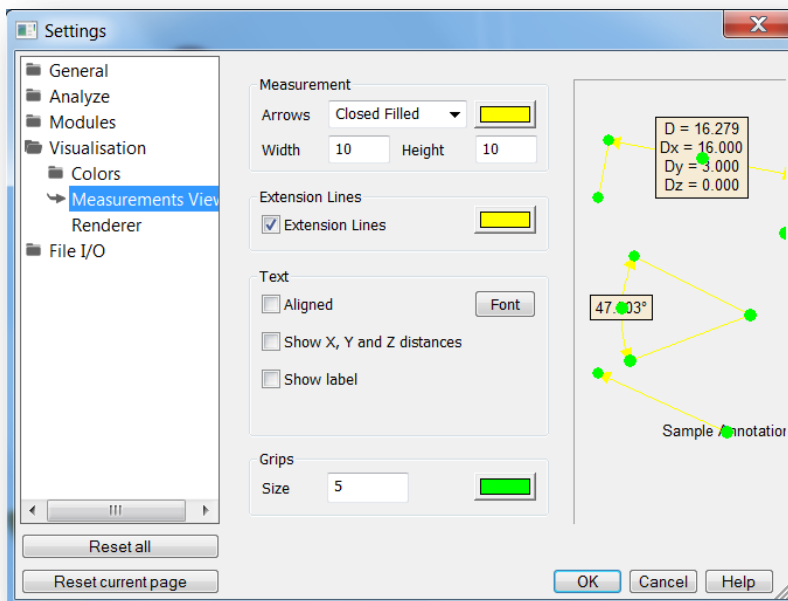
Preset Colors	When you select Preset colors, the colors of this window are used.
Part 1 to Part 5	These five buttons represent the five colors as they will be assigned to the loaded parts. The first part you load will get the first color. The second part will get the second color and so on.
Flipped Triangles	The color of the flipped (inverted) triangles
Bad Edges	The color of the bad edges
Triangle Border	The color of the triangle borders
Wireframe	The color of the wireframe

Visualization > Other



Here you can select the background colors for scenes and platforms.

Visualization > Measurements View



Measurement

Arrows Arrows can be placed at the end of the line that indicates the distance between two features. An open, a closed, or a closed filled arrow can be chosen



The color of the arrows can be adapted

Width The width of the arrow-head can be adapted

Height The height of the arrow-head can be adapted

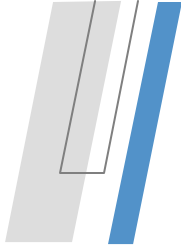
Extension Lines

Extension Lines You can choose to draw extension lines or not. These extension lines appear when you drag your measurement tag away from the part. Extension lines don't have arrow-heads



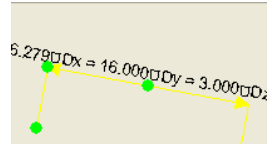
You can adapt the color of the extension lines

Text

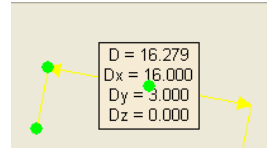


Aligned

Checked



Not Checked

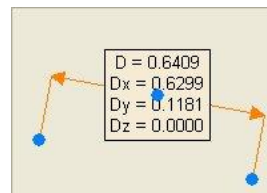


Font

You can adapt the font of the text

Show X, Y and Z distances

Checked, the measurement value is not aligned.



Grips

When you select a measurement, some grips (dots) will appear on the measurements lines. They allow changing the position of the measurement entities; the measurement value will be updated.

Size

You can define the size of the grip



You can define the color of the grip

Features

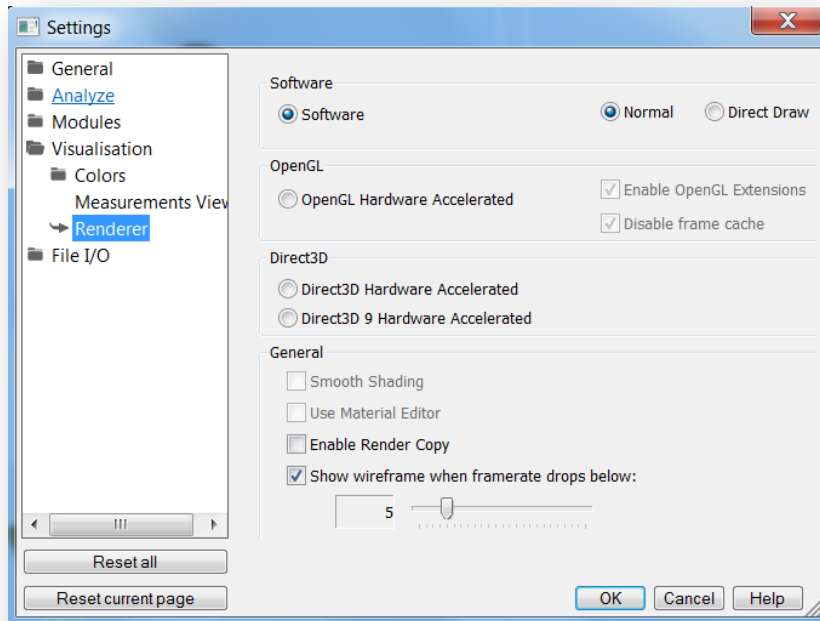
Draw Features

A detected point is indicated with a cross



You can define the color of the features

Visualization > Renderer



Modern video cards have specialized hardware to make rendering faster. MiiCraft Builder can use OpenGL and Direct3D. These video cards will make rendering much faster.

The principle is that your computer sends the triangles to the memory of the video card and the card will do the rendering of the part, following the instructions of MiiCraft Builder. This has two consequences:

- To have optimal results, the memory on the video card must be large enough (1 MB STL needs approx. 1,5MB ram on the 3D-card).
- Each time the part has been changed, the whole list of triangles must be send again to the video card. This can cause delays depending of the size of the part. When you have a huge amount of triangles (millions of triangles), delays can be avoided by switching back to software rendering. Each 3D-card has a limit.

Remark: We recommend trying each mode and comparing the results. Not only the hardware is important, but also the drivers. If you're having problems, try again with other (more recent) drivers.

Software This renderer is the default renderer of MiiCraft Builder, written by Materialise. The rendering is a part of the program and is done by the CPU. If you do not have a special 3D-videocard or good drivers, we recommend you to use this setting.

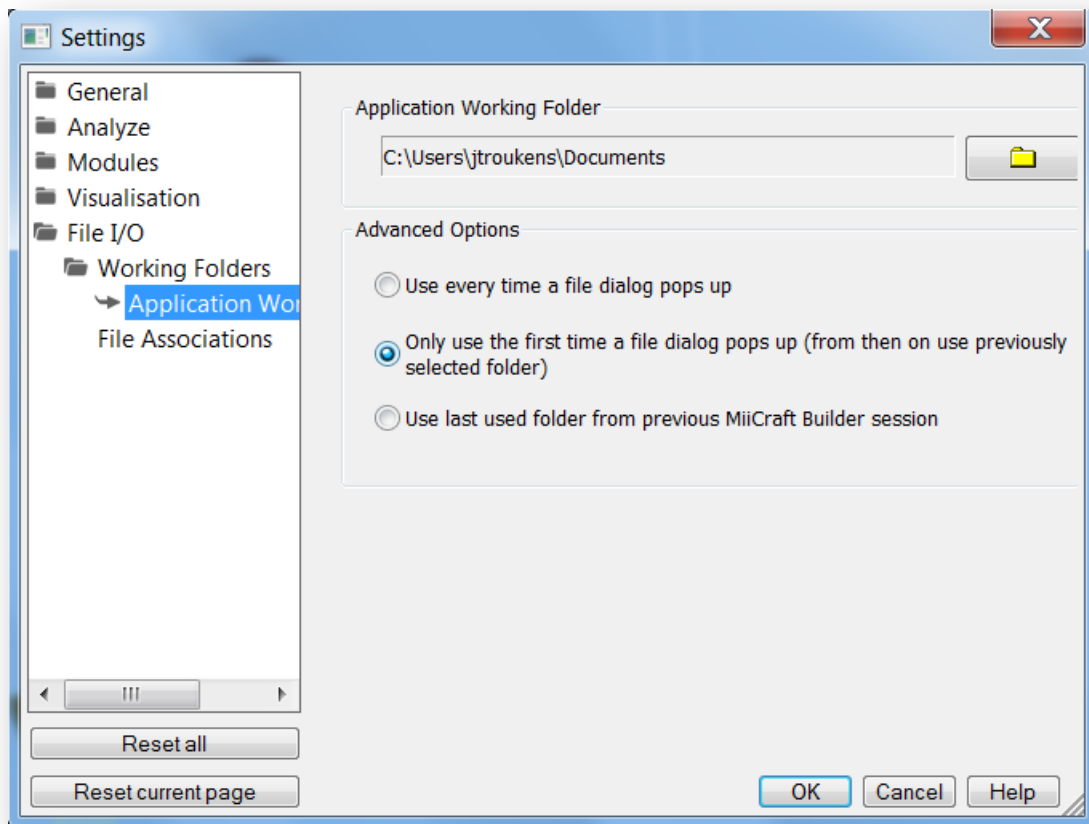
Normal The whole rendering process is done by MiiCraft Builder.

Direct Draw Some instructions of Microsoft DirectDraw are used to speed up the rendering.


OpenGL OpenGL was developed for CAD purposes and using the HW-acceleration present on the card. If a certain feature is not supported by your 3D-card, the OpenGL-driver will perform that specific instruction via software rendering (software fallback).

Enable OpenGL Extensions	This flag enables advanced OpenGL extensions. When the driver implements these correctly you should see a dramatic improvement in speed. If after enabling this flag you encounter random crashes or don't see a performance increase, it's advised to either update your graphics card driver or disable this flag.
Disable frame cache	Select this setting when you experience problems on high-end OpenGL-cards.
Direct3D Hardware Accelerated	Direct3D is a part of Microsoft's Direct X. Direct X was originally developed for 3D games but Direct3D is also useful for us. When a feature is not implemented on the 3D-card, the Direct3D can't fall back on software rendering, so the instruction won't be done. Direct3D is NOT supported in Win NT.
Smooth Shading	In the Open-GL or Direct3D render mode, the part can be visualized using smooth shading. The variations in color will now be shown more gradually and no longer as separate triangles. Note that only the visualization of the part changes, the number of triangles and the accuracy of the STL are not changed.
Use Material Editor	OFF: When you click on the coloured circle in the Part List tool sheet, a color palette appears. ON: When you click on the colored circle in the Part List tool sheet, the material editor dialog appears. Besides the color, you can also select the material properties. The colors can be described in 2 ways: RGB (red, green, Blue) and HLS (Hue, Lightness, Saturation).
Enable Renderer Copy	By Enabling this flag you tell the application that it's ok to keep a copy of the triangles in graphics card memory. This will speed up the rendering a lot on most systems. If your system doesn't have a lot of graphics memory or you work with very large files it's best to disable this feature.
Show Wireframe when frame rate drops below	This flag allows the application to only render wireframes or points of parts when rotating the view thus interaction speeds up in the 3D-views.

File I/O > Application Working Folders



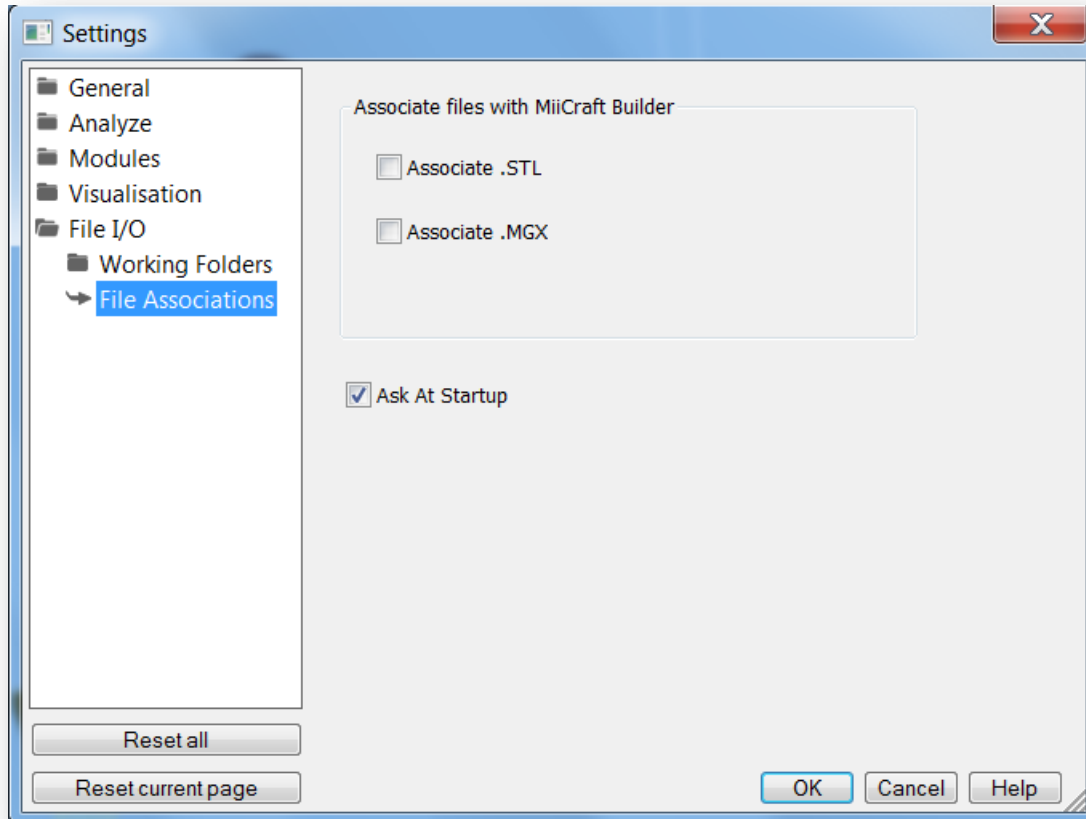
Application Working Folders

You can browse by clicking on the folder icon  and set a folder as default folder.

Advanced Options

- Option 1 MiiCraft Builder always proposes this folder when a part needs to be loaded or saved.
- Option 2 MiiCraft Builder only proposes the chosen folder the first time a file dialog pops up. The succeeding times a file dialog pops up, the previously selected folder is used.
- Option 3 MiiCraft Builder proposes this folder the first time when a part needs to be loaded or saved. The next time, he proposes the last selected folder.

File I/O > File Associations



Associate STL files with MiiCraft Builder

Associate .STL Offers you to associate STL files to MiiCraft Builder

Associate .MGX Offers you to associate MGX files to MiiCraft Builder

Ask at Startup You can check this association each time MiiCraft Builder started. When the association is not there anymore, the user will be prompted.

System requirements

Minimal hardware requirements

CPU

- Pentium IV 3 GHz or higher

Memory

- 2 GB RAM

Free Disk Space

- 200 MB

Display

- 1280 x 1024 resolution or higher
- 32-bit color depth (True color)

Video Card

- 'NVidia GeForce' or 'ATI/AMD Radeon'
- DirectX 9 compatible video card
- At least 256 MB of memory
- At least a memory interface width of 256-bit

- 'NVidia Quadro', 'ATI/AMD FireGL' or any 'Intel' gpu chipset are **not** recommended

Operating Systems

- MiiCraft Builder **runs** only **on**:
 - Windows 7/8 SP1 (32bit/ 64bit)
- MiiCraft Builder **will not run** on:
 - Windows 98
 - Windows XP SP3 (32bit), SP2 (64bit)
 - Windows Vista SP1 or later (32bit/ 64bit)
 - Windows 2000
 - Windows Server Editions
- MiiCraft Builder does **not** run natively on **Mac OS X**.
- MiiCraft Builder does **not** run natively on **Linux**, or **any other operating system** not listed above.
- Virtualization systems such as VMWare are not recommended.

Supported Browsers for built-in Information Page

- The built-in Information page will use Internet Explorer (IE) to connect to the internet. We support IE10, IE9, IE8 and IE7. Versions older than IE7 are not supported.

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