Composer 1.1 Handbook

Asiga

February 10, 2016

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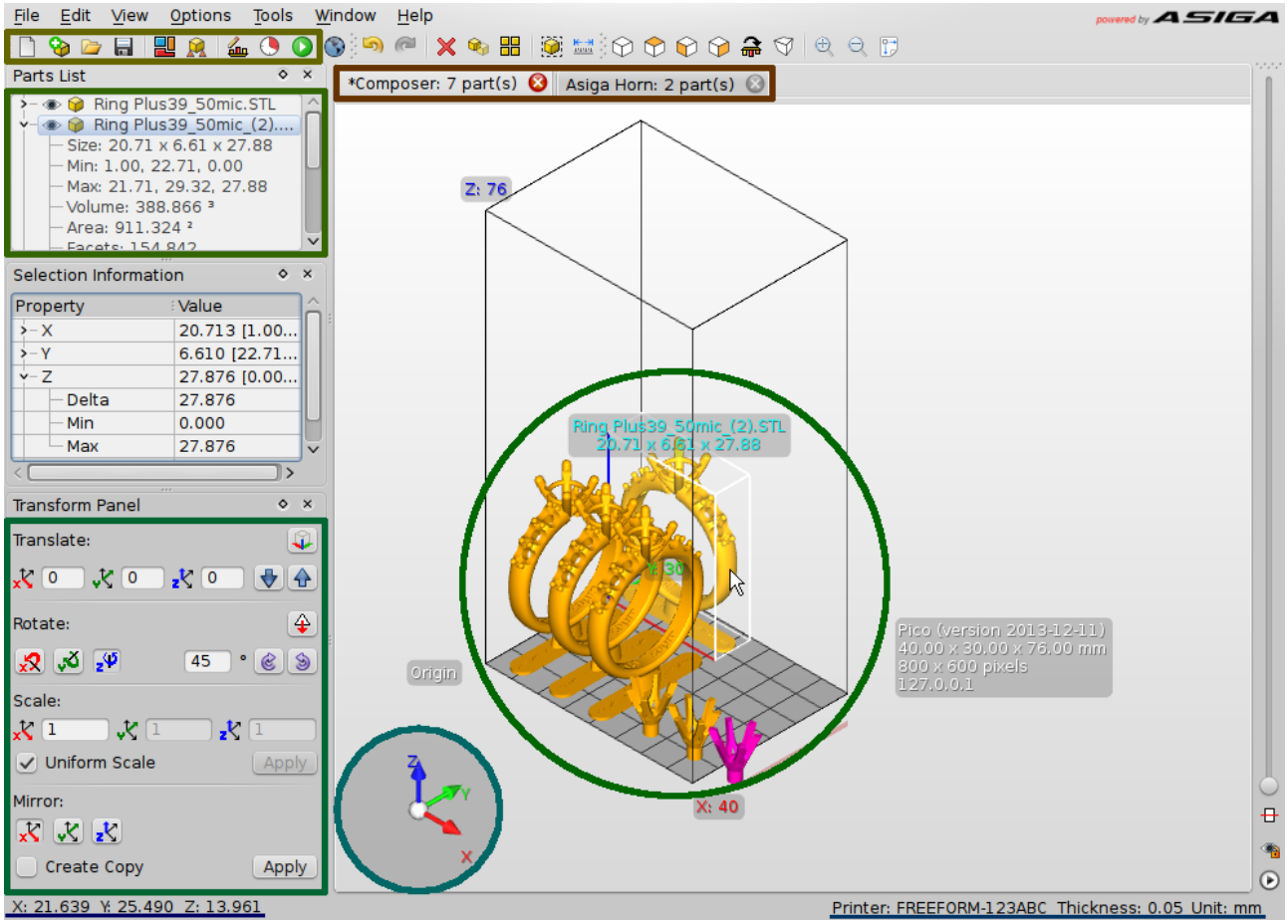
Chapter 1

Overview

Composer is your software to submit 3D models to your Asiga 3D printer. It enables users to prepare builds that consists of multiple parts. Each part should be positioned within the printable volume, oriented to preserve features and shallow slopes well supported. This overview will not cover the support structure topic, see the ‘Support Structures’ chapter.

The build preparation state in Composer is stored as a Project. Each project contains information about the 3D printer, 3D models and layout. The chosen printer and files can be changed so you may reuse an existing layout. Further details about Composer projects are available in the ‘Projects’ chapter.

The main interface of Composer is divided into the menubar, toolbars, panels, viewport and statusbar. The first screen when Composer starts does not display panels and viewport, the welcome screen is visible instead. Only the toolbars and panels can be freely repositioned around the main window.



1.1 Viewport

The 3D graphical interface that visualizes your parts layout and the 3D printable volume. The printable volume is represented as a wireframe box with the crucial platform table filled in. All models contained within the printable volume are painted in the same colour to easily distinguish from models that are out of bounds.

Camera navigation within the viewport requires a three-button mouse and mouse-drag gestures. Use the right-mouse-button to rotate the camera around the point where the button was pressed. Camera panning is done in opposite movement direction with the left-mouse-button. The middle-mouse-button zooms the camera towards a point, that can also be done using the mouse wheel.

The 3D axes x, y and z are colored red, green and blue respectively. You will find the camera world axes located on the bottom-left corner of the viewport. The status bar in the bottom left displays the 3D position of your mouse cursor within the Viewport.

The clipping bar along the right edge is explained in chapter 3.

1.2 Parts List

The parts list panel is located in the top left corner of the window. This is your primary panel that controls model selection and contextual actions for your models. Part selection can be modified by the <*Control*> key to select multiple parts in the list individually or the <*Shift*> key to select a range of parts in the list. The keyboard modifier buttons also applies to part selection within the 3D Viewport.

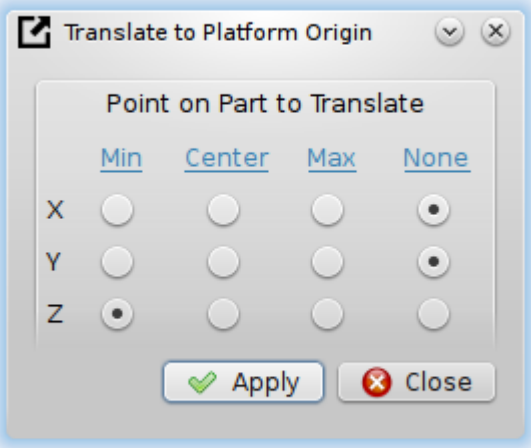
Parts are sorted in lexicographical order with distinct icons between the model and support structure. Support structures are always listed after the corresponding model, selecting a linked model or support will select both parts. Different icons will be shown should a model and support group's link be broken or active.

Several controls are available to the left of the part names. Part attributes may be shown or hidden by clicking on the expander button. Part visibility within the Viewport may be toggled by clicking on the eye icon. It may be beneficial to hide complex models once they have been positioned on the platform for faster Viewport drawing performance.

1.3 Transform Panel

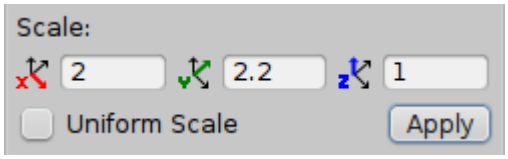
Most of the time it is sufficient to use the mouse within the Viewport to move and rotate parts. The transform panel provides incremental accurate positioning and orientation of your parts. Scaling and mirroring your parts is also possible within this panel. Some transformations in particular rotation around X or Y are unavailable for parts with support structure and SLC files.

Incrementally move selected parts along X, Y and Z axes using Translate. Specify the amounts to move by within the boxes and click on the up or down arrows. Should you wish to align selected parts to the world origin, click on ' Translate to Platform Origin', select the X, Y and Z edges then hit Apply.



Accurately rotate selected parts around X, Y or Z axis using Rotate. Activate the axis to rotate by clicking on an axis toolbutton, specify the rotation amount in degrees and click on the left turn or right turn arrows. ‘ Rotate Facet Downwards’ is a mouse selection mode when a facet of a selected STL part is clicked, all selected parts will be rotated such that the selected facet will be facing down.

Scale selected parts by specific X, Y and Z factors. You would generally scale your parts equally over all axes, however it is possible to uncheck ‘Uniform Scale’ and specify different factors. Parts are scaled towards the base of selection to keep the minimum Z bounds intact. Please beware that the scale factors will be reset to 1 after every scale application and that the ‘Apply’ button is disabled for scale factors of 1.



Selected parts can be mirrored along the X, Y or Z axis using Mirror. Activate the axis to mirror by clicking on an axis toolbutton and hit ‘Apply’. Check ‘Create Copy’ to keep the original parts while creating the mirrored copy.

1.4 Status Bar

The right half of the status bar denotes the printer settings and unit of measurement. You can right-click on the unit of measurement to quickly swap Inches with Millimeters.

The left half of the status bar displays information about menu items or what is under the mouse pointer. Moving the mouse over a model displays the 3D coordinate.

1.5 Undo History

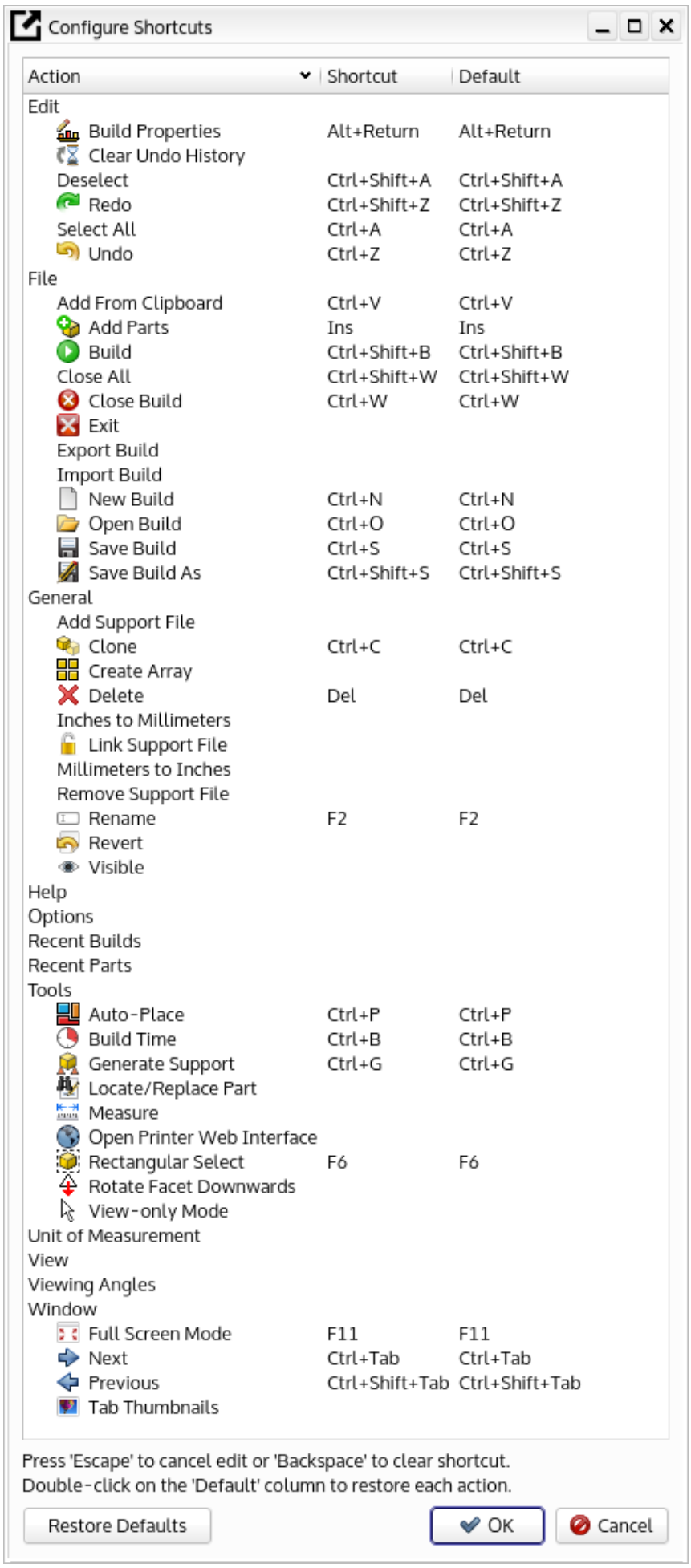
Composer remembers all actions applied to parts and projects. The history is stored in memory and may forever grow increasingly through common usage. You may clear the undo history by confirming *Edit → Clear Undo History…*

Undo <*Control* + *Z*>

Redo <*Control* + *Shift* + *Z*>

1.6 Shortcuts

Standard intuitive keyboard and mouse shortcuts are available by default. You will find shortcuts written near actions throughout this manual. Keyboard shortcuts can be configured from *Options → Configure Shortcuts…*


Configure Shortcuts
Action
Shortcut
Default
Edit
Build Properties Alt+Return Alt+Return
Clear Undo History
Deselect Ctrl+Shift+A Ctrl+Shift+A
Redo Ctrl+Shift+Z Ctrl+Shift+Z
Select All Ctrl+A Ctrl+A
Undo Ctrl+Z Ctrl+Z
File
Add From Clipboard Ctrl+V Ctrl+V
Add Parts Ins Ins
Build Ctrl+Shift+B Ctrl+Shift+B
Close All Ctrl+Shift+W Ctrl+Shift+W
Close Build Ctrl+W Ctrl+W
Exit
Export Build
Import Build
New Build Ctrl+N Ctrl+N
Open Build Ctrl+O Ctrl+O
Save Build Ctrl+S Ctrl+S
Save Build As Ctrl+Shift+S Ctrl+Shift+S
General
Add Support File
Clone Ctrl+C Ctrl+C
Create Array
Delete Del Del
Inches to Millimeters
Link Support File
Millimeters to Inches
Remove Support File
Rename F2 F2
Revert
Visible
Help
Options
Recent Builds
Recent Parts
Tools
Auto-Place Ctrl+P Ctrl+P
Build Time Ctrl+B Ctrl+B
Generate Support Ctrl+G Ctrl+G
Locate/Replace Part
Measure
Open Printer Web Interface
Rectangular Select F6 F6
Rotate Facet Downwards
View-only Mode
Unit of Measurement
View
Viewing Angles
Window
Full Screen Mode F11 F11
Next Ctrl+Tab Ctrl+Tab
Previous Ctrl+Shift+Tab Ctrl+Shift+Tab
Tab Thumbnails
Press 'Escape' to cancel edit or 'Backspace' to clear shortcut.
Double-click on the 'Default' column to restore each action.
Restore Defaults
OK
Cancel

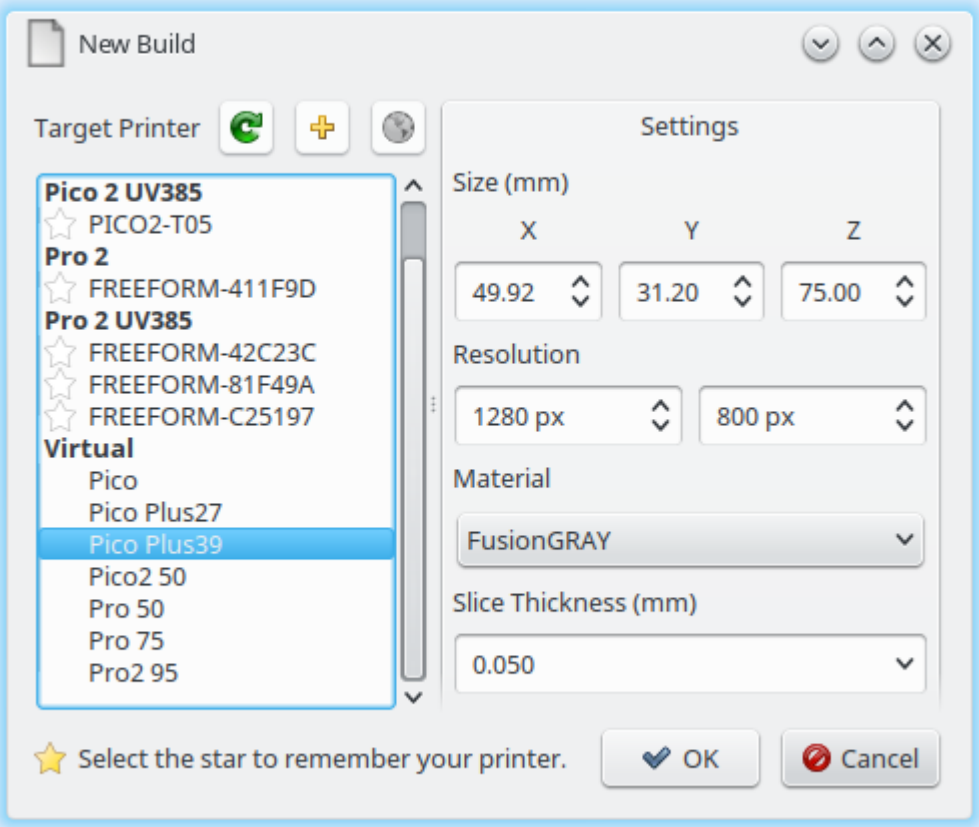
Chapter 2

Projects

A Composer project stores the build layout of your 3D models. It references files by relative and absolute path in order for Composer to reload the models at a later stage.

2.1 New Project

New Build <*Control* + *N*> Opens the ‘New Build’ dialog for a selection of available printers on your network, material options and slice thicknesses. Composer will query your selected 3D printer to determine available slice thicknesses for the selected material.



Virtual printers Choose when your printer is not available on the network, allows you to edit the build size and projector resolution.

Refresh Listing Updates the printer listing using network autodetection and reloads virtual printers.

Add IP Address The IP address of the printer is accessible via the printer front panel menu.

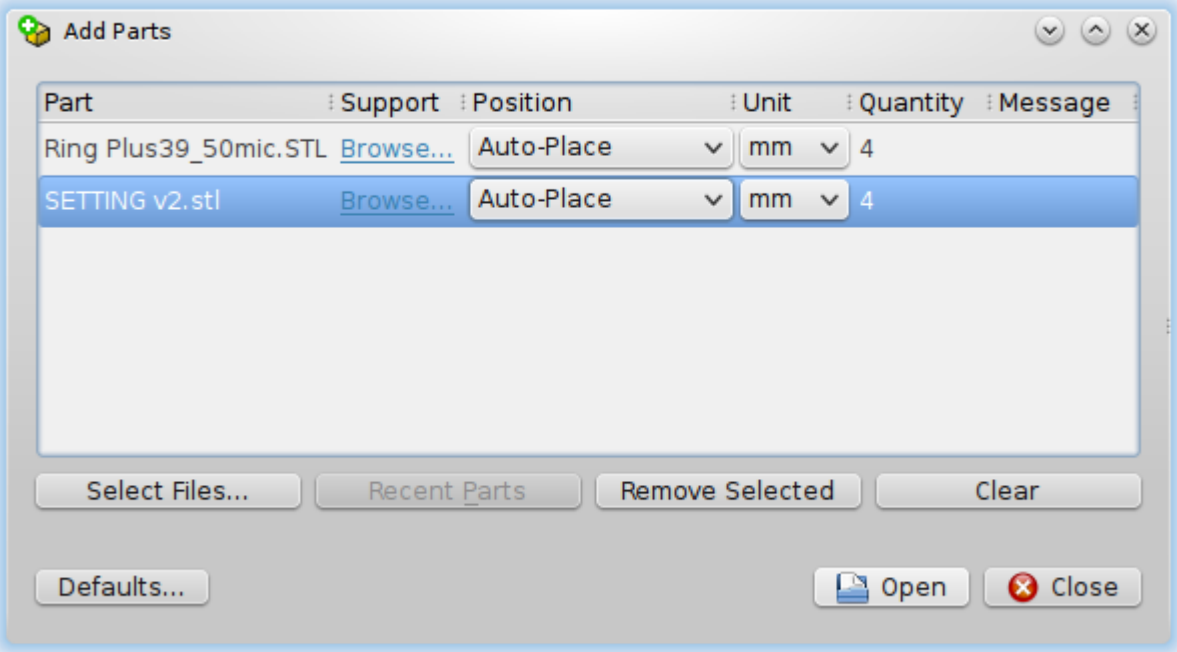
Open Webpage Available under *Tools* → *Open Printer Web Interface…*

Favorite Remember printers even when you cannot connect to it within the local network.

Build Properties <*Alternate* + *Return*> Change the target printer, material and slice thickness of the current project.

2.2 Adding Parts

Add Parts *<Insert>* Compile the list of parts to be loaded onto Composer. Click on 'Select Files…' to open the file browser to select STL, SLC or STM files. You may load an existing support structure file with your part by clicking 'Browse…' next to the part file name.

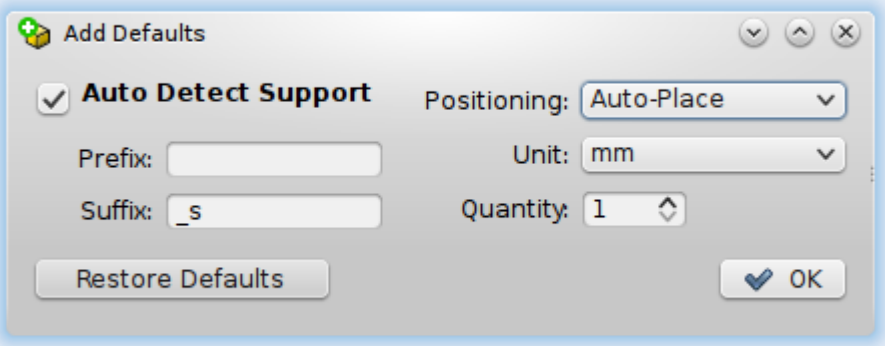


See chapter 4 for further explanations.

Recent Parts is accessible from the File menu, Parts List context menu and within the Add Parts dialog.

2.2.1 Add Defaults

The 'Defaults…' button opens default configuration how newly chosen parts should be loaded. The fields shown in this dialog are shown as the table columns within the 'Add Parts' dialog. For example, should you wish to load five copies of all new parts, then set the 'Quantity' field to 5, click OK and select your files.



2.2.2 Positioning

For each part, the ‘Position’ option controls where it will be located once loaded. There are four options in the combobox described as follows:

As File Positions the part as defined in the file.

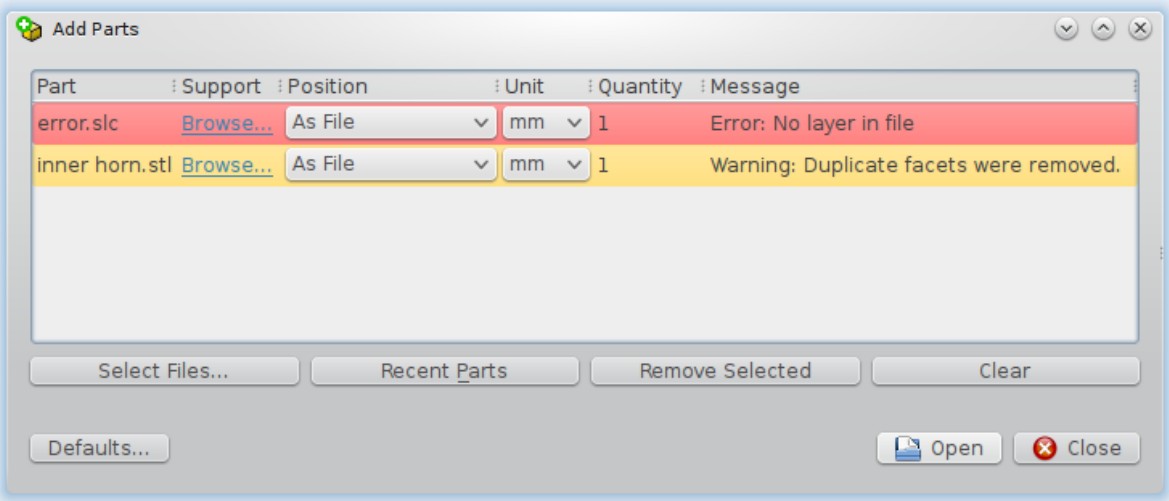
Origin Aligns the minimum X, Y and Z extents to zero.

Platform Center Aligns the X and Y center of the part with the platform center.

Auto-Place Arrange affected parts using the settings defined in the Autoplace dialog.

2.2.3 Messages

File errors that are detected during reading are shown under the ‘Message’ column. Parts with warnings are painted with a yellow background, while parts with errors are painted with a red background. Parts with warnings are allowed to be loaded into the Project, but please refer to the message for the problem and correct the file when possible.



2.2.4 Alternative Methods

The standard paste shortcut <*Control* + *V*> forwards the files that were previously copied onto the clipboard into the 'Add Parts' dialog. Composer handles drag and drop event of files by opening the 'Add Parts' dialog. The files table will be populated with the files that you have dropped into Composer.

2.3 Opened Projects

Composer represents projects as tabs located above the viewport. Projects are also enumerated under the 'Window' menu.

Activate a specific Project by selecting it from the tabs or the window menu. Switching to an adjacent tab can be done by pressing <*Control* + *Tab*> or <*Control* + *Shift* + *Tab*> for previous or next respectively.

Allow time for Composer when switching projects that contains complex parts. Composer tries to minimize memory usage by freeing up resources from inactive tabs. 3D models of an activated project may need to be reanalyzed for optimized rendering.

2.3.1 Tab Thumbnails

Enable *Window* → *Tab Thumbnails* to ease tab identification and picking when many projects are opened. The thumbnail of each projects are shown as you hover the mouse over each tab, with the exception of the currently active project.

Thumbnail image frames are captured at full resolution allowing zoom and panning. Use the mouse scrollwheel to zooming within the thumbnail. Hold down <*Control*> while dragging with the left-mouse-button for panning.

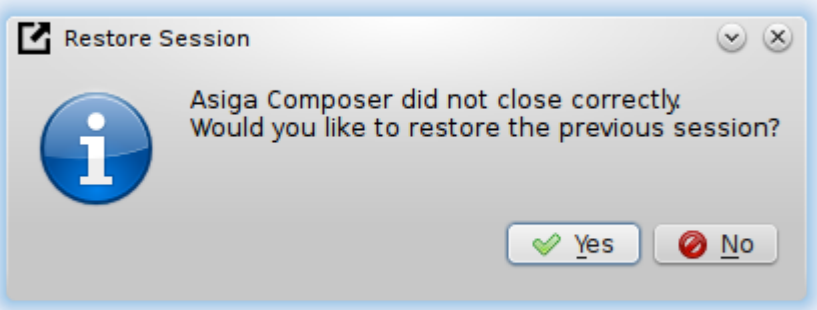
2.3.2 Closing Projects

Projects can be closed from the tab bar, Window menu and File menu. Standard keyboard shortcuts <*Control* + *W*> and <*Control* + *Shift* + *W*> will close current Project and close all Projects respectively.

Changed projects are marked with asterik (*) prepended to the project name. Composer will confirm to save or discard the changed Project.

2.3.3 Crash Recovery

Composer keeps a program session state each time a change is done on any of your opened projects. Should Composer or your computer crash abruptly, you will be prompted to restore the last session in the recovery dialog the next time you start Composer.



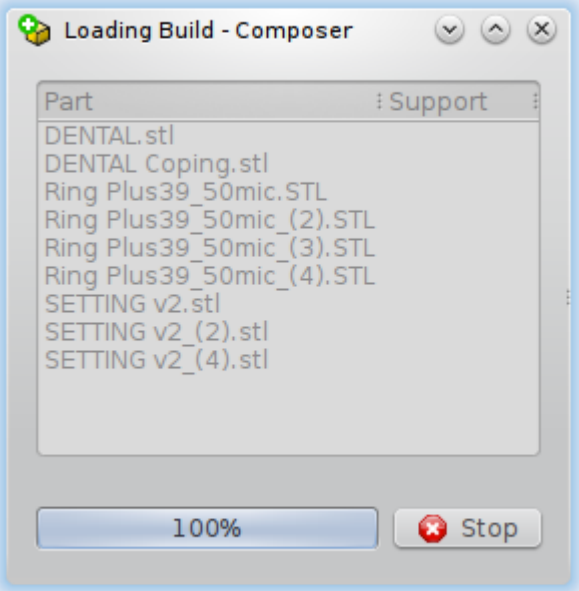
2.4 Saved Projects

Save Build <*Control* + *S*> Stores the project into disk, overwriting the previous project file. A file save dialog will be shown should you use this function on an new project.

Save Build As <*Control* + *Shift* + *S*> A file save dialog will always be shown to allow you to choose the directory and the name of the Project.

Open Build <*Control* + *O*> Choose a previously saved Project to be opened in a new tab. Composer may fail to open a build that was saved using a later version of Composer.

Recent Builds is accessible from the File menu, remembers up to ten latest projects.



2.4.1 File Verification

The unique identifier of files are saved in a Project to be verified when the files are reopened at another time. Composer will warn you when it detects that the file had changed.

Any missing files while opening a Project will prompt the user for a replacement. By referencing files using its absolute path and relative path to the project, Composer can handle most cases of file movements. It is best to export the Project should you wish to transfer between computer systems (see chapter 2).

2.5 Exported Projects

A full project export is required when transferring a project to be opened on another computer or network. An exported project is simply a compressed ZIP archive containing a copy of every file referenced within the Project.

2.5.1 Project Export

Firstly ensure that all changes on the Project is saved to disk. Once done, simply click on *File → Export Build* to open a file dialog to name the exported file.

2.5.2 Project Import

Composer is required to correctly extract the ZIP archive. Select the ZIP file from *File* → *Import Build* and then appoint a local folder to extract the archive.

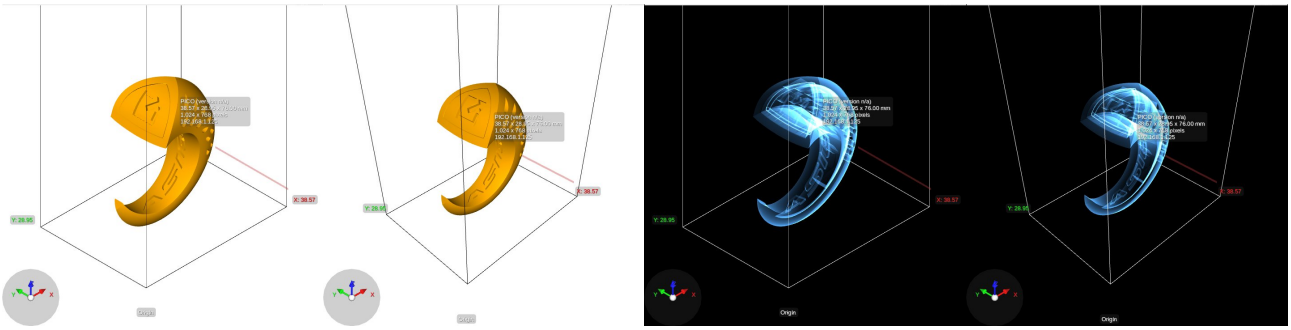
Chapter 3

Viewport Controls

Composer allows users to navigate the 3D world, transform parts and personalize rendering aspects. This chapter extends on the (Viewport) section in chapter 1.

3.1 Viewing Modes

The default viewing mode displays parts in diffuse color without any diminishing point for parallel lines. Composer supports ‘ Perspective Mode’ and ‘ X-Ray Mode’ both of which are not exclusive to each other. In other words, you can have X-Ray and Perspective enabled at the same time.



You may control the perspective angle of sight from *Options* → *Preferences…* → *OpenGL* → *Vertical field of view*. Field of view values closer to zero begins to emulate an orthographic view, whereas larger values increases overall viewing volume at the expense of greater distortion.

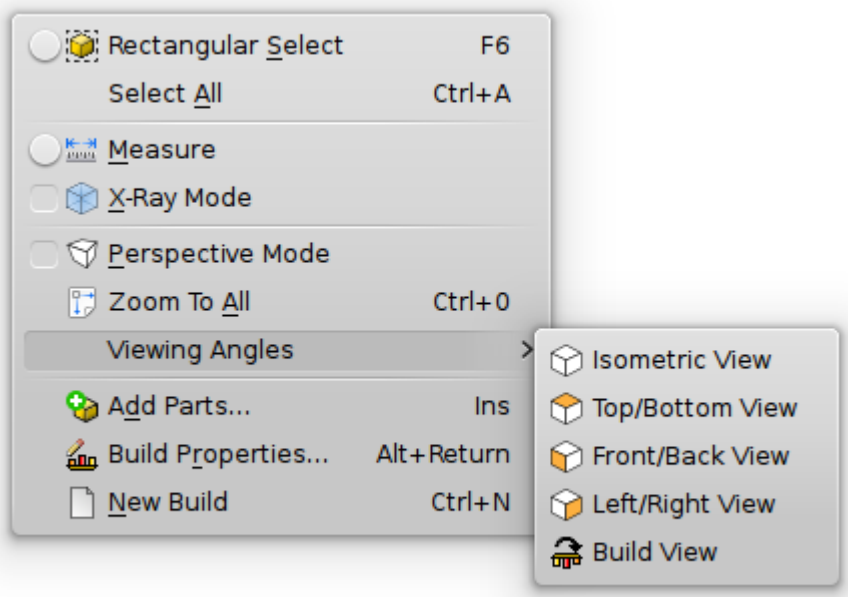
X-Ray mode requires ‘GLSL shaders’ support, which all modern display adaptors supports. Any failure to enable GLSL may suggest an incorrectly installed graphics drivers (see Troubleshooting).

Fullscreen Mode *<F11>*

Use for small screen displays to hide window decorations, panels and toolbars. You can still access the menubar, project tabs, statusbar and ‘Clip Slider’.

3.2 Viewing Angles

Preset camera angles are available on the toolbar and within the viewport context menu. You may bind keyboard shortcuts to activate each viewing angle (see Shortcuts).



Each viewing angles (except for the 'Build View') are overloaded with two presets, which can be achieved by activating the viewing angle menu again. For instance, when manually adding supports it is best to view parts from underneath, which can be achieved by activating the 'Top/Bottom View' menu one or more times.

3.3 Camera Control

Adjust the view by using your three-button-mouse inside the viewport.

Camera Panning Left mouse button

Camera Orbitting Right mouse button

Camera Zooming Middle mouse button

3.3.1 Modes

How the mouse actions within the viewport behaves relies on the current user activity. The normal mouse mode enables the user to travel within the 3D world and to manipulate parts.

Viewing Only Disables all part transformation by mouse (translate, rotate and scale).

Rectangular Select Pauses camera actions and only allow mouse drag to draw a rectangle.

Measurement Disables all part manipulation by mouse (selection, translate, rotate and scale) and enable ruler measurement points (see Tools → Measurement).

Surface Selections Composer may expect the user to click on the surface of a part for the following activities:

- Rotate Facet Downwards
- Add Support
- Adjust Flexible Support
- Remove Support

3.3.2 Lookaround

The default rotation mode by using the right-mouse-button orbits the camera around the initial mouse position. By holding down the <*Shift*> key while rotating the view, you can lookaround from the current camera position. This feature is best used when 'Perspective Mode' is enabled.

3.4 Zooming

The easiest way to zoom (or move fore/back in 'Perspective Mode') is to use the mouse scrollwheel. You may choose to reverse the zoom movement by enabling *Options → Preferences… → OpenGL → Invert mouse zoom*. Standard keyboard shortcuts for zooming are as follows.

Zoom in <*Control* + => Zoom into the center of the screen.

Zoom out <*Control* + ->

Zoom to all <*Control* + *0*> Calculates the best fitting zoom to show all parts in the viewport.

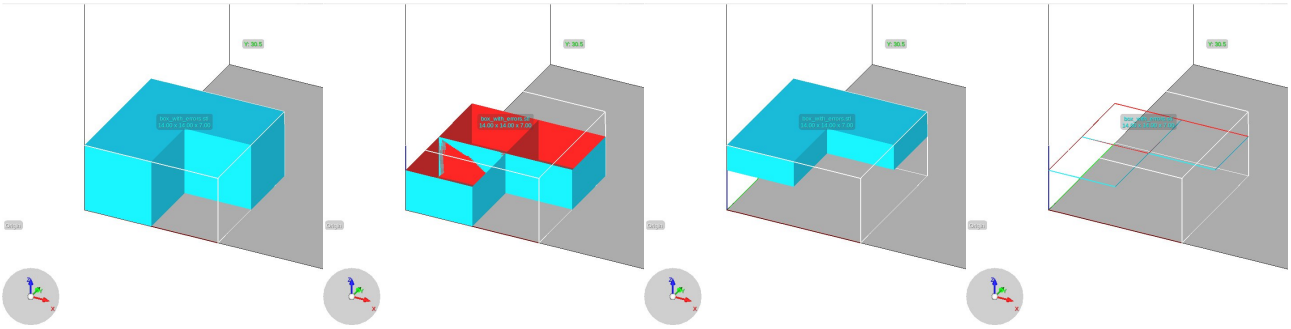
Rectangular Select <*F6*> Draw a rectangle with the middle-mouse-button to zoom into the box.

3.5 Tools

3.5.1 World Clipping

Composer supports clipping using a moveable horizontal plane. The clipping controls are located along the right edge of the window by default. The clipping button cycles through four modes of operation in sequence.

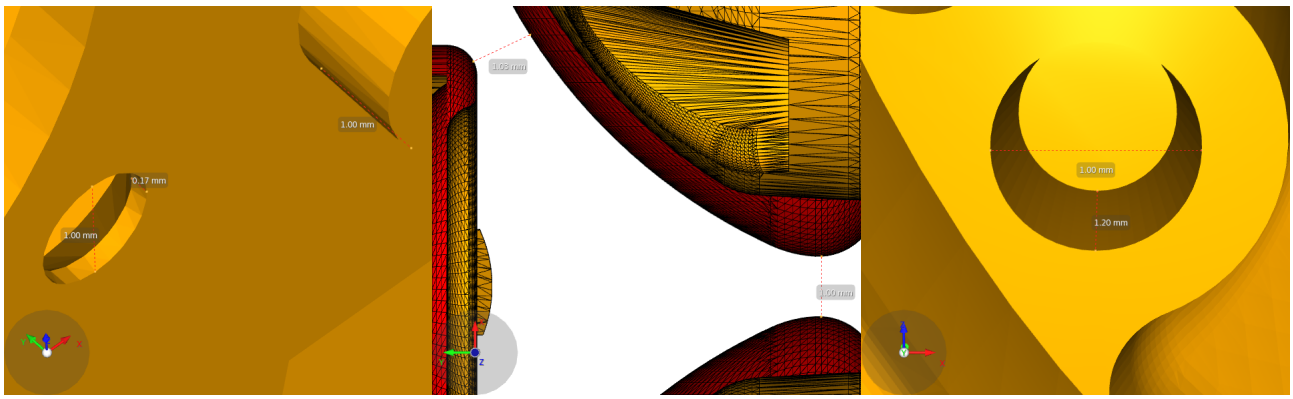
1. Clipping disabled, normal rendering
2. Clip top, render parts under the plane
3. Clip bottom, render parts over the plane
4. Clip both, render the slice at the plane



Whence clipping is active, you may slide the vertical slider between zero and the build platform's maximum Z. The camera can be locked with the movement of the vertical slider as it may aid in visually identifying changes throughout your models by focusing your eye on a constant point. Use your mouse scrollwheel and hold down <*Control*> to step a one layer or hold down <*Shift*> to step ten layers.

3.5.2 Measurement

Composer allows you to draw multiple measurements between points on the surface of your parts. Measurements should be done when attempting to closely pack parts together to avoid fusion and after scaling models to check wall thicknesses. We recommend gaps and walls to be around 1 mm when spanning over large areas. However, it is possible to work with around 100 µm features provided that the surrounding areas are sufficiently strong.



Add your measurement endpoints by clicking on the surface with the left-mouse-button. Use the right-mouse-button to undo new measurements or to relocate an endpoint.

3.6 Options

Open the ‘Options’ menu to customize your Composer usability experience.

Grid Interval Spacing between the lines drawn across the platform base. Specify 0 to disable grid.

Snap to Platform Align the bounds of selected parts to the inner-edges of the platform when moving parts with mouse.

Show Silhouette Projects the model onto the ground to aid in positioning and coordination.

3.6.1 STL Triangles

The STL solid surface is defined over many triangles and the simplest closed volume is preferred for processing. Composer can render the backfaces of triangles using a different color (red by default) by enabling ‘Show Flipped Facets’.

Enable ‘ Line Rendering’ to view triangle mesh. Line rendering will only affect STL models and only when X-Ray mode is inactive.

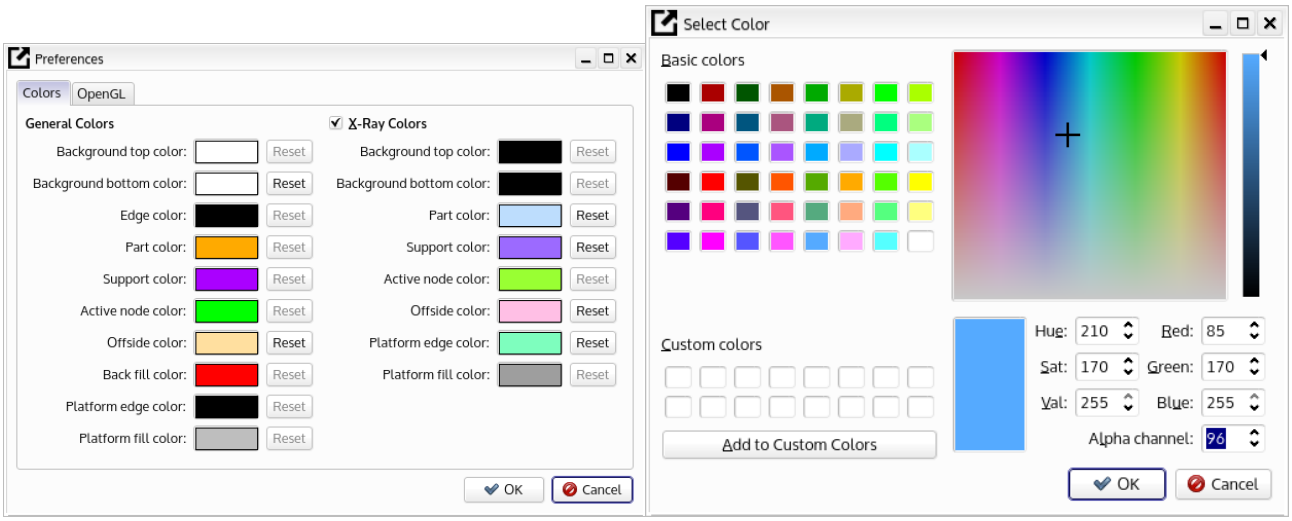
Line rendering is a prerequisite to ‘ Hidden Line Rendering’. Hidden line rendering will draw the edges of all triangles even on the other side of the model and within hollow models.

3.6.2 SLC Contours

The SLC lineworks is shaded horizontally to represent the external surface at the ‘ SLC Part Granularity’ thickness. Composer limits the layer density primarily to improve mouse cursor detection over the models. Lower the granularity for finer layers at the expense of rendering time and mouse manipulation chance as you will need to click on the finer lines.

3.6.3 Colors

Most colors within the viewport are customizable. The table of colors are accessible from *Options → Preferences…*



Transparency control are applicable for a selection of colors. Specify an ‘Alpha channel’ value between 0 and 255 to represent fully transparent and fully opaque respectively. Alpha channels for parts during X-ray mode controls the color depth instead of opacity.

Chapter 4

Part Manipulation

Parts can be moved about, orientated, scaled, copied and removed. Parts are represented in the Parts List as ' <*filename*>'.

4.1 Selection

Using the mouse, select a part within the viewport with left-click. The bounding box extents are shown for each selected part.

The default selection behavior is to replace the current selection. Hold down <*Control*> keyboard button to select multiple parts.

Rectangular Select <*F6*> Draw a rectangle with the left-mouse-button to select visible parts touched by the area within the viewport.

Select All <*Control* + *A*> Selects all parts including hidden and those that failed to load.

Deselect <*Control* + *Shift* + *A*> Clears current selection, which can also be triggered alternatively by pressing <*Escape*>.

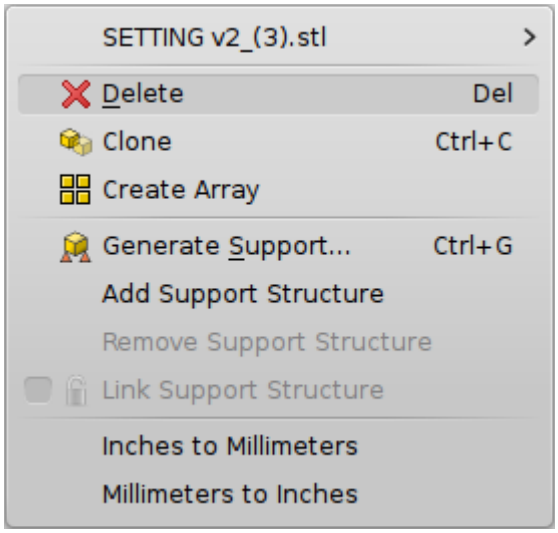
Select Clones <*Double-Click*>

Enable this feature by opening *Options* → *Preferences…* → *OpenGL* and ticking 'Double-click selects cloned parts'.

4.2 Part Management

This section extends the Add Part section in chapter 2. You can add parts by activating the ' Add Parts' action, drag-dropping or copy-pasting files into Composer. Essential management

features are available inside the part context menu and main toolbar.



Delete Selected <*Delete*> Removes all selected parts from the Project, but not from the memory. See chapter 1 Undo History section.

4.2.1 Part Submenu

Access the submenu for the current focused part by following the context menu of selected parts. The focused part is the most recently selected part.The context menu is available from either the Parts List or the Viewport. Position the mouse cursor over the selection and then right-clicking or pressing the <*Menu*> key.

Rename <*F2*> Change the part name within Composer. You may also select and click the names in the Parts List to rename.

Visible Show or hide the part within the viewport. This feature is also available on the Parts List.

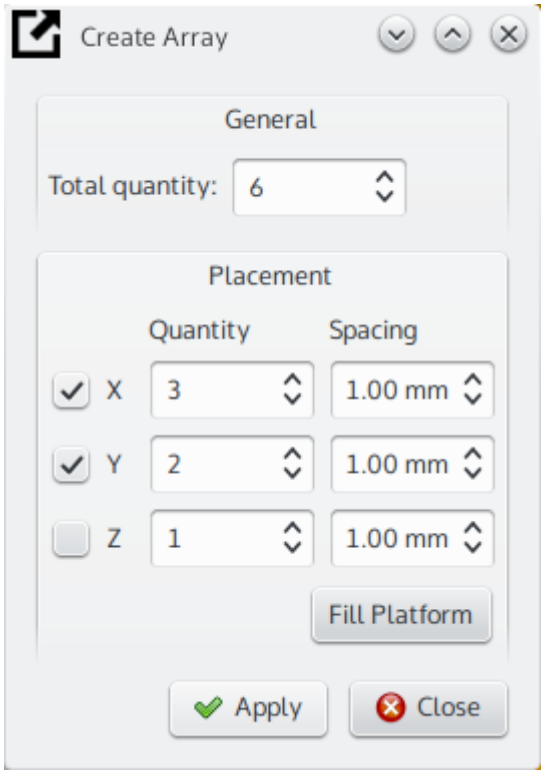
Revert Part Removes all transformations applied to the part, leaving it as the original model data.

Locate / Replace Part Open a file browser to choose a new 3D model inplace of the existing part. This action is also available in *Tools → Locate / Replace Part…*

4.2.2 Copies of Parts

Composer distinctively identifies different models by their overall file data. Any duplicated 3D model within the same project will be treated as clones and no additional memory will be used. How the models are finally displayed and built relies on transformations of the original model data. Please beware that the following features ignores model collision and it is up to you to move colliding models apart.

Clone Selected <*Control* + *C*> Creates a duplicate for each selected part with an offset along the X and Y axes. Hold down <*Shift*> to clone without offset.



Create Array Systematically duplicate each selected part along any axis. The Create Array dialog provides configurable spacing between parts and the number of copies to be added along the X, Y and Z axes. Click 'Fill Platform' to let Composer create as many parts as possible within the build platform.

4.3 Mouse Controls

Parts are manipulated using mouse-drag gestures over selected parts within the viewport. There is a time delay involved before part transformation is active, which can be customized in *Options* → *Preferences…* → *OpenGL* → *Transform delay*. Camera manipulation will apply should you have moved the mouse before the timeout.

The standard mouse transform maps pixel-accurate changes from the initial mouse pressed point. Users can hold down the <*Shift*> key to break the continuous transformation into discrete steps. Press the <*Escape*> key to cancel any mouse controlled part manipulation.

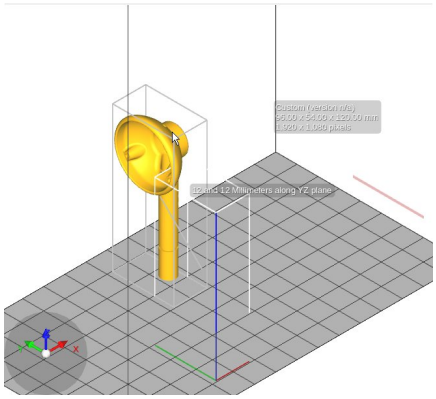
Composer intuitively determines the default translation plane (or axis for rotation) based on the camera and cursor positions. All transforms can be explicitly constrained to use a specific axis by holding down one of the <*X*>, <*Y*>, <*Z*> or <*C*> keys.

4.3.1 Instant Mouse Transform

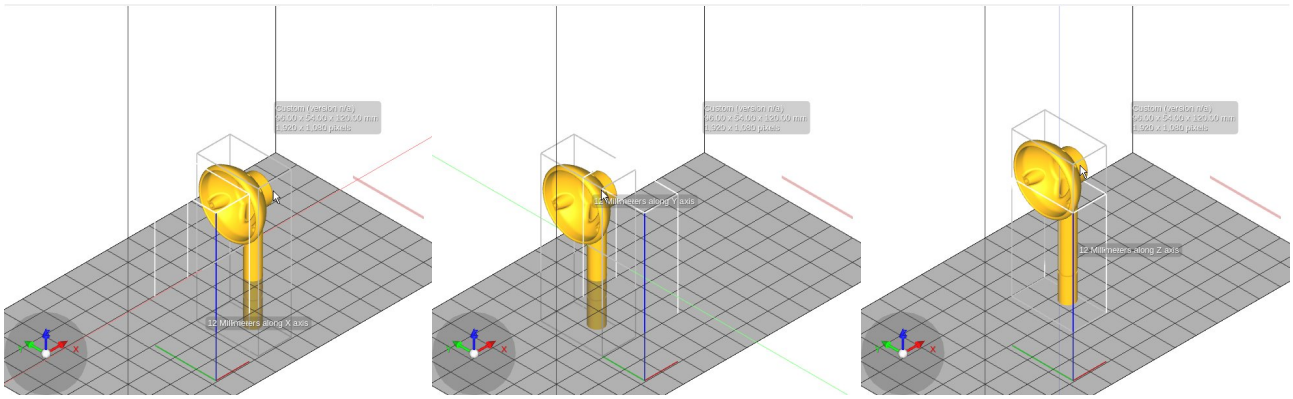
You can set the 'Transform delay' to zero to allow instant manipulation of selected parts. Hold down the <*Alternate*> key to suspend all manipulation of selected parts.

View-only Mode Disable mouse control over selected parts while this mode is active. This action is located in *Tools* → *View-only Mode*, which you can bind a keyboard shortcut to (see Section 1.6).

4.3.2 Translate (Move)

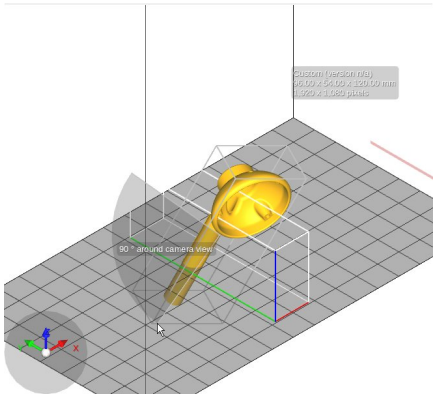


Use the left-mouse-button to drag selected parts.

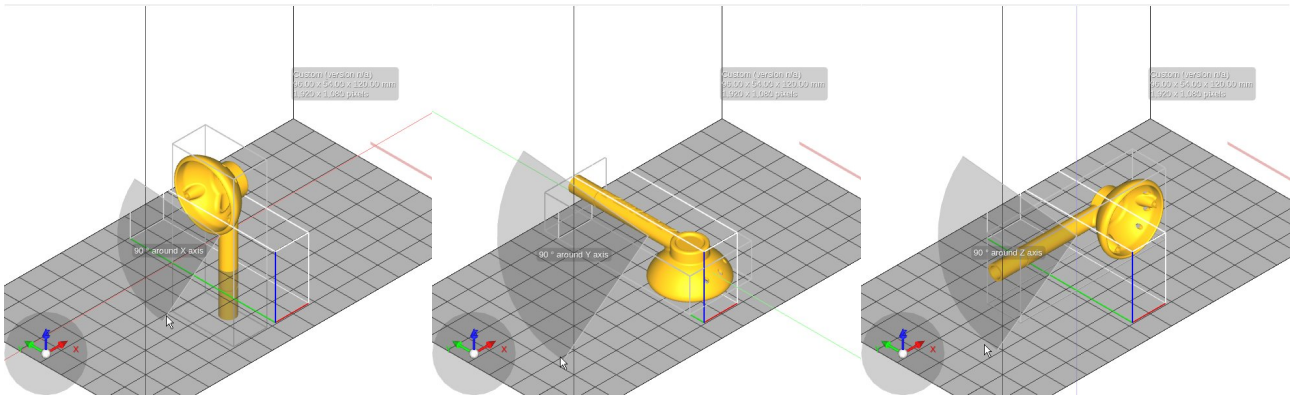


Lines are drawn to represent the offset. Enable snapping to bounds *Options* → *Snap to Platform*. The <*Shift*> key enforces snapping to platform edges and steps any movements in 'Grid interval' increments. The <*C*> key allows you to move parts over a virtual plane perpendicular to the camera view.

4.3.3 Rotate (Turn)

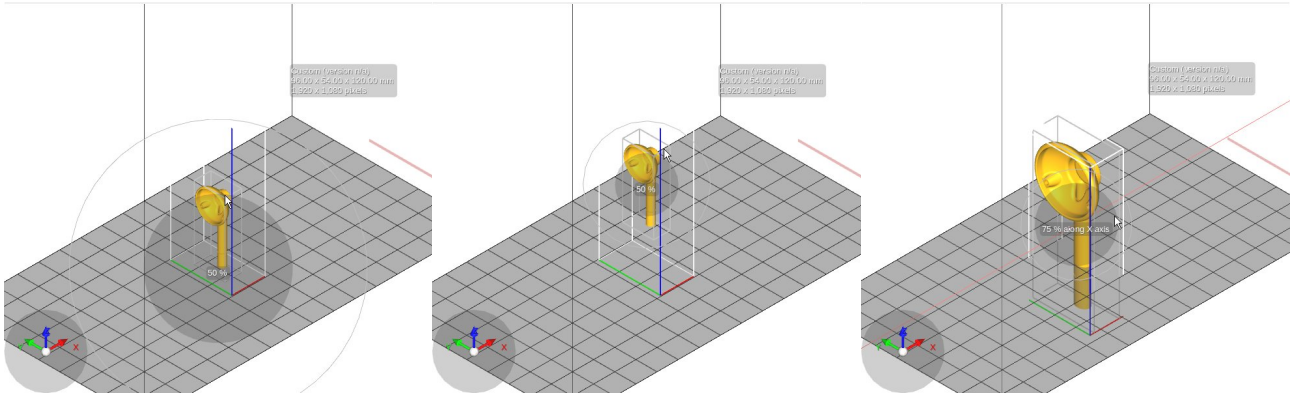


Use the right-mouse-button to orient selected parts.



A pie figure is drawn to represent the angle of rotation. The axis of rotation is the calculated from the average positions of parts. Move the mouse around the center of selection like a clock to express the turning angle. The <*Shift*> key steps the rotation in 15° increments. The <*C*> key will pivot parts around the line between the camera and the center of selection.

4.3.4 Scale (Shrink / Grow)



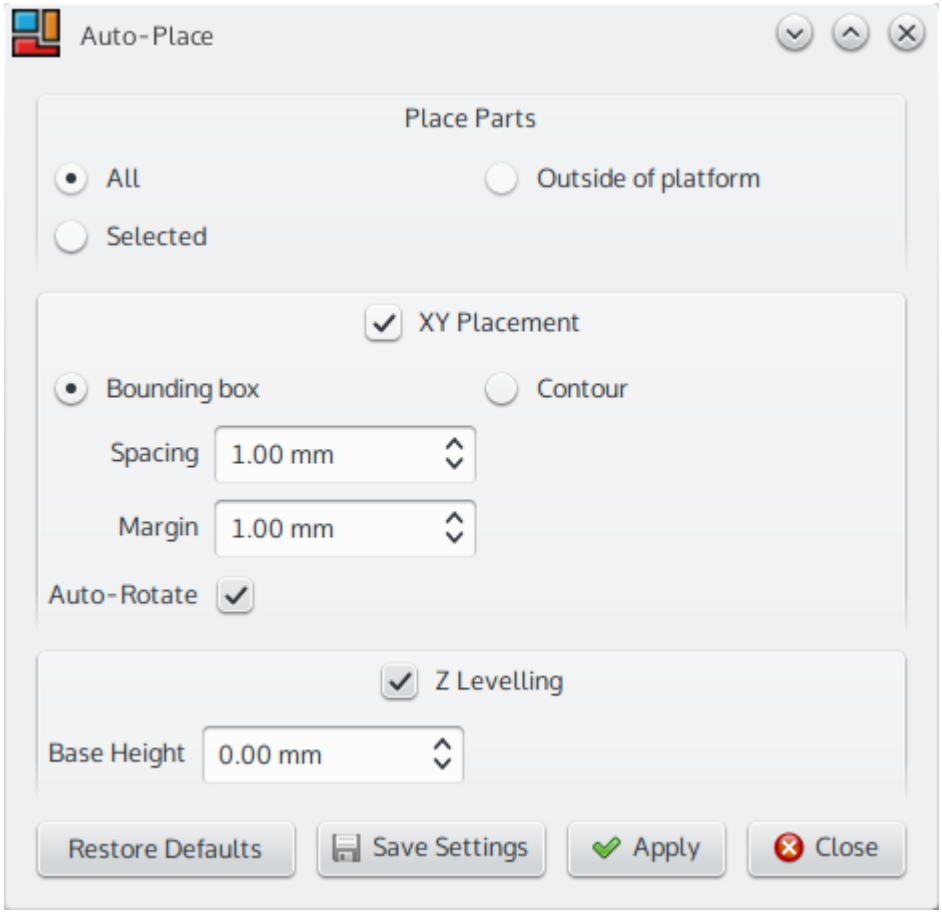
Use the middle-mouse-button (the scrollwheel) to scale selected parts. The circle outline represents the initial scale, whereas the filled in circle represents the target scale. Control the size of the target scale by adjusting the cursor distance from the center of the circle.

Scaling would typically require a higher control requirement than to set the position or orientation of your parts. The <*Shift*> key steps the factors in powers or fractions of 2 or 4. A

greater control of accuracy for scaling is available in the ‘Transform Panel’. The <*C*> key changes the center of the circle from the base of selection to the center of selection.

4.4 Automatic Placement

The ‘Auto-Place’ dialog is separated into groups named Place Parts, XY Placement and Z Leveling. The checkable groups XY Placement and Z Leveling provides flexibility to partially utilize the autoplacement feature.



Auto-Place <*Control* + *P*> Also available under *Tools* → *Auto-Place*…

Bounding Box Simple box packing method.

Contour Physics-based vibration packing method.

Spacing Minimum distance between each parts.

Margin Clearance from the edges of the build area.

Auto-Rotate Improves the ‘Bounding Box’ method to try 90° rotation while packing.

Base Height Clearance from the platform base. Optional should you use automated support generator.

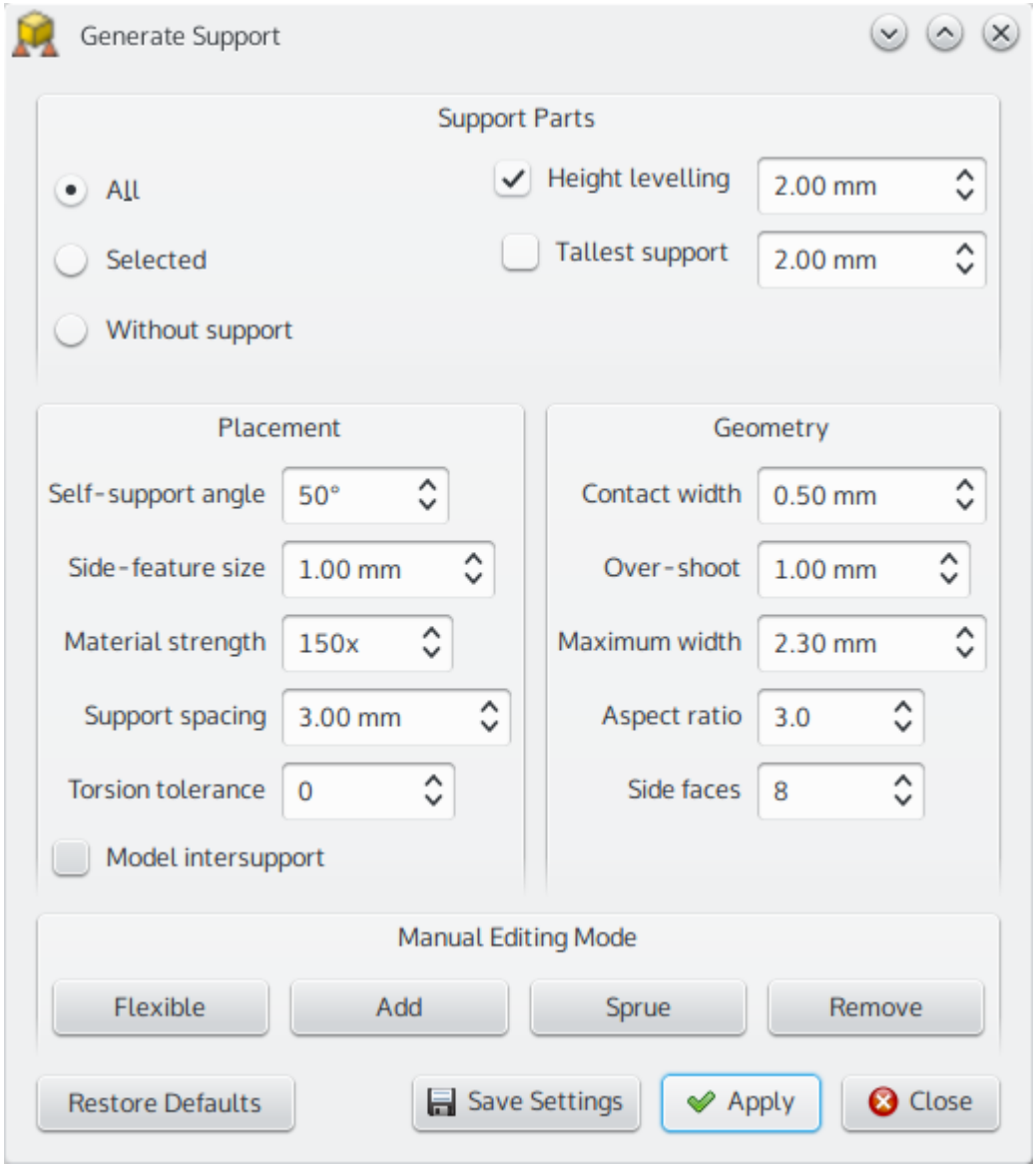
Chapter 5

Support Structures

The success of 3D printing a part depends on its geometry and all physical connections to the build platform. Support structures are required for downward-facing surfaces / points and for side-features details that protrude a certain distance from a surface. You can create and edit support structures within Composer.

5.1 Generate Support

The ‘Generate Support’ dialog is separated into groups named Support Parts, Placement, Geometry and Manual Editing Mode. All sections are utilized for the automatic support generation algorithm. Only the Geometry section is used for manually adding ‘Flexible’, ‘Add’ and ‘Sprue’ supports. No section is used for ‘Remove’ supports.



Generate Support… <*Control* + *G*> Opens the 'Generate Supports' dialog to manually edit supports or apply automatic supports. Accessible via *Tools* → *Generate Support*…

5.1.1 Support Parts

Support parts filters where the automatic support generation applies.

All Generate support for all parts and replaces existing.

Selected Generate support selection and replaces existing.

Without support Generate support for all parts without an existing support.

Height leveling Applies a Z-margin between the parts and the platform. This margin may be necessary to support low-hanging areas.

Tallest support Ignores any feature to support above the specified height. When you are confident that your parts are self-supporting above the height.

5.1.2 Placement

Self-support angle The angle in degrees at which layers will be self supporting.

Side-feature size The distance a detail can protrude from a surface without being supported.

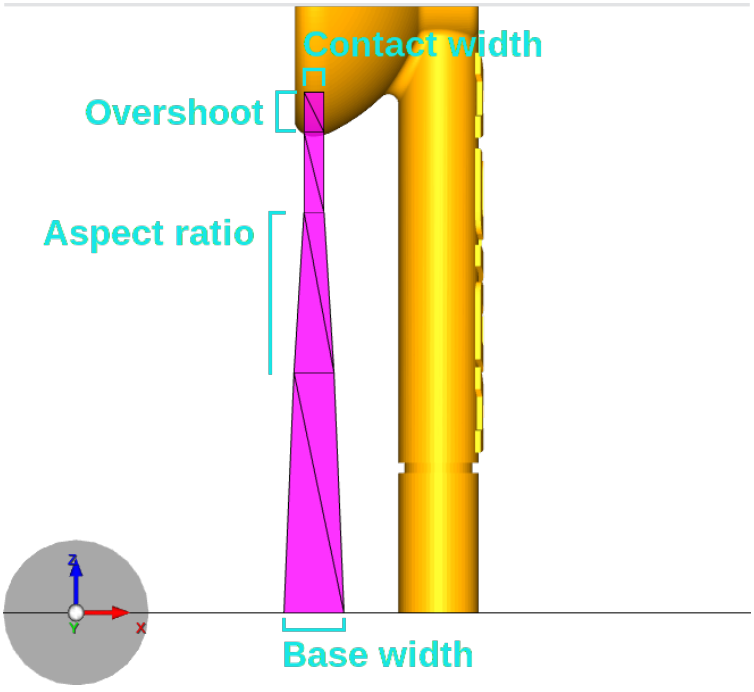
Material strength Controls the number of support points required. Higher values means fewer supports are required.

Support spacing Distance between support points at the same layer.

Torsion tolerance Angular moment in squared distance units.

Model intersupport Allow support columns that will reintersect and stand on the part. See Intersupport section.

5.1.3 Geometry



Contact width Width of support structure as it contacts the part. Morphs into ‘Diameter’ when adding sprue support.

Overshoot The injected distance where the support point enters the part.

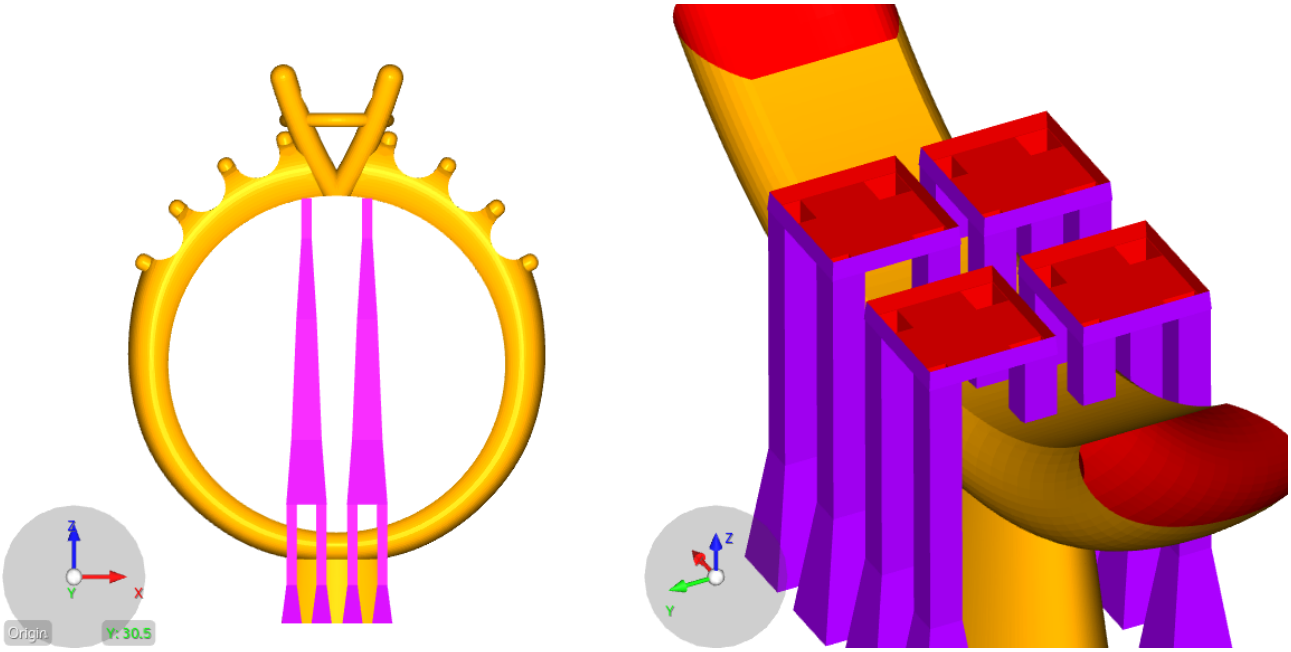
Maximum width Limits the width of support structures at the base. Morphs into 'Base width' when adding flexible support.

Aspect ratio Controls the widening rate of support structures.

Side faces Defines the number of side faces for new support structures.

5.2 Intersupport

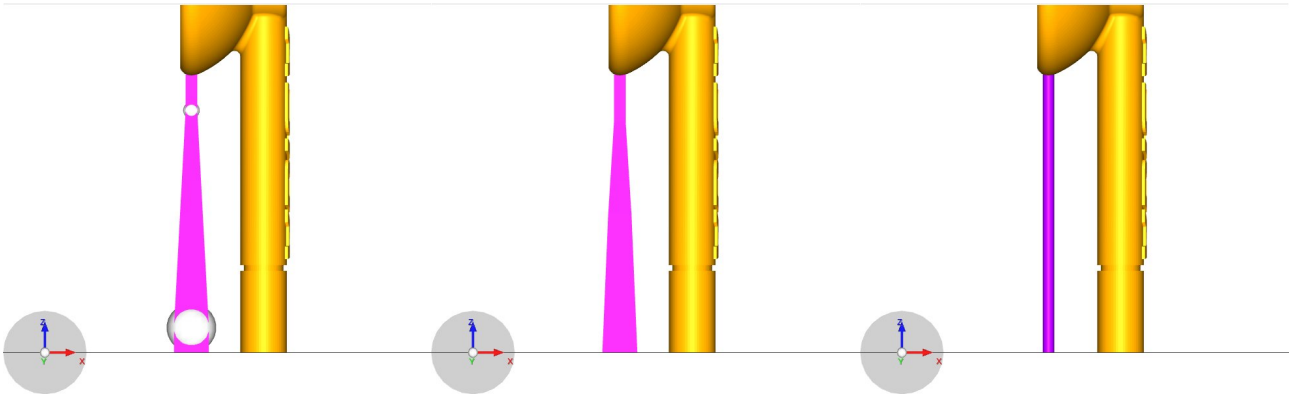
Parts with hollows or caves may cause your support structures to touch or intersect the model. The standard support structure will end its base at the intersection region creating a bridge for the same model. Composer will attempt to minimize the cross-sectional region at the base of these internal supports.



Partial intersections of supports may branch the column at the corner points. The 'Aspect ratio' setting affects the widening rate, which affects the chance of branching. The branched structure will widen again as if it was a normal support structure.

5.3 Manual Editing Mode

Composer can only edit support structures created within the program itself. Support structures are colored magenta by default, unless their bounding box exceeds the buildable area. Any externally created support files are not editable.



Flexible Double-jointed support. See Flexible Supports section.

Add Standard tapering structure that utilizes all parameters within Geometry.

Sprue Fixed diameter cylinder controlled by ‘Diameter’ and ‘Over-shoot’ only. Sprues are atypical requirement in metal casting and should have circular cross-section for optimal fluid movements.

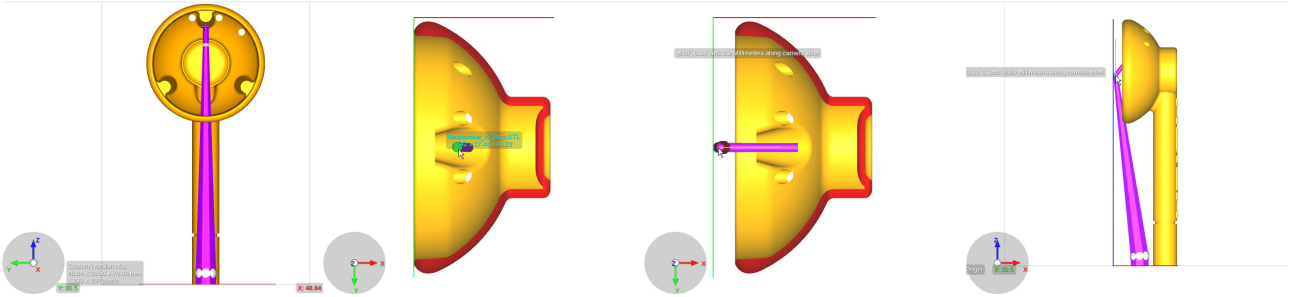
Remove Removes any support structures beit automatically generated or manually added.

In manual editing mode, support structures can be added or removed by clicking with the left-mouse-button. Part manipulation via the Viewport is disabled during editing, however you may still interact with selections using the Parts List.

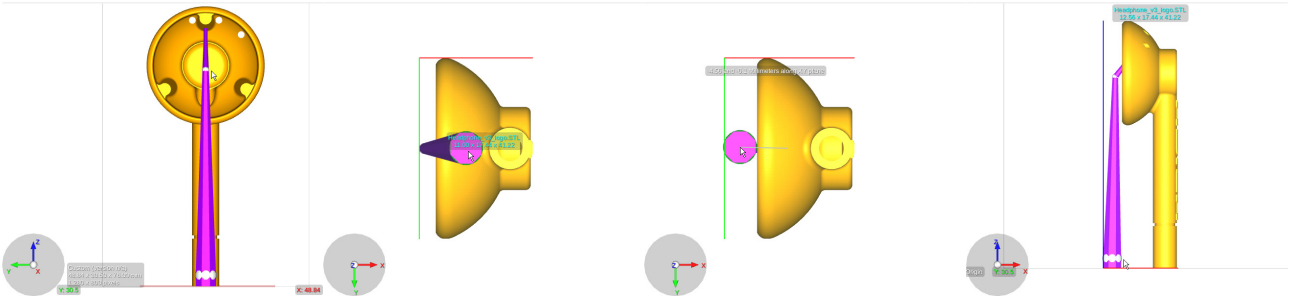
5.3.1 Flexible Supports

Added in Composer 1.1 the flexible supports introduces two joints / nodes between the support point and the platform. The spherical control points are rendered in different colors to the support structure based on selected state and self-supporting angle validation. Flexible supports are not added by the automatic support generator, you will need to add them manually.

Add a Flexible support by clicking on the model surface with the left-mouse-button. Composer will orient newly added Flexible supports away from the contact point and you should ensure that the structure is well cleared from all parts. You are allowed to add Flexible supports on a completely vertical face, but beware that you should adjust the joints to form a buildable slope.



Handle the control nodes (joints) by pressing the left-mouse-button and hold it pressed as you move the mouse around the viewport. The upper joint will naturally move about on a plane, perpendicular to the camera viewing direction. It is also possible to constraint the movement axis by pressing down the <*X*>, <*Y*> or <*Z*> keys.



Control the lower joint to move the base along the platform. You may raise the lower joint higher by holding down the <*Z*> key to constraint it.

5.3.2 Flexible Node Colors

The following colors are the standard set defaults, but they can be customized in *Options* → *Preferences…*

White Normal inactive node.

Green Active node that is currently being moved about.

Red Node that forms a lower gradient than the specified Self-Support Angle.

5.4 Support Management

Managing support structures for any selected parts are available from the context menu and under the ‘Edit’ menu.

Add Support File Choose an existing file to be the support structure. This option is useful should you choose to CAD the supports externally.

Remove Support File

Unlink Support File Allows selecting one from the pair to adjust their relative positioning.

Link Support File

5.4.1 Parts List Representation

All supports in the parts list are paired with its related model. The paired items are typically linked together so they share selected state and will move together. The icons shown next to the name denotes the state of the paired items:

- Linked Model
- Linked Support
- Unlinked Model
- Unlinked Support

5.4.2 Transform Limitations

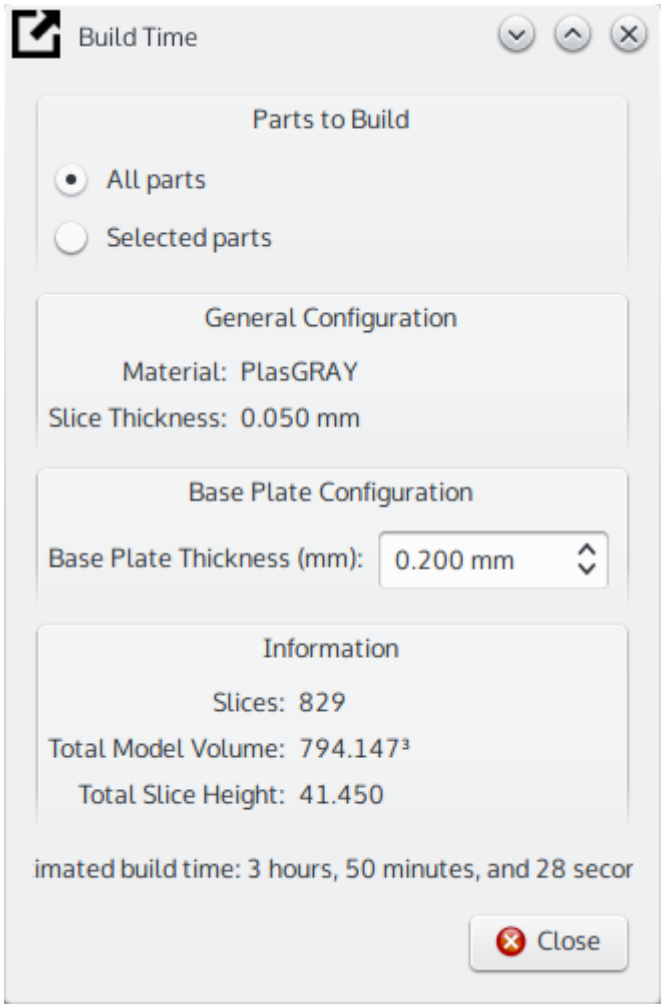
Linked items are not allowed to be transformed in any way that may change its base. You are only allowed to move horizontally over the platform, rotate around the Z axis or scale towards the base.

Chapter 6

Build Compilation

6.1 Build Time

Build Time <*Control* + *B*> Calculates the build time and material usage.

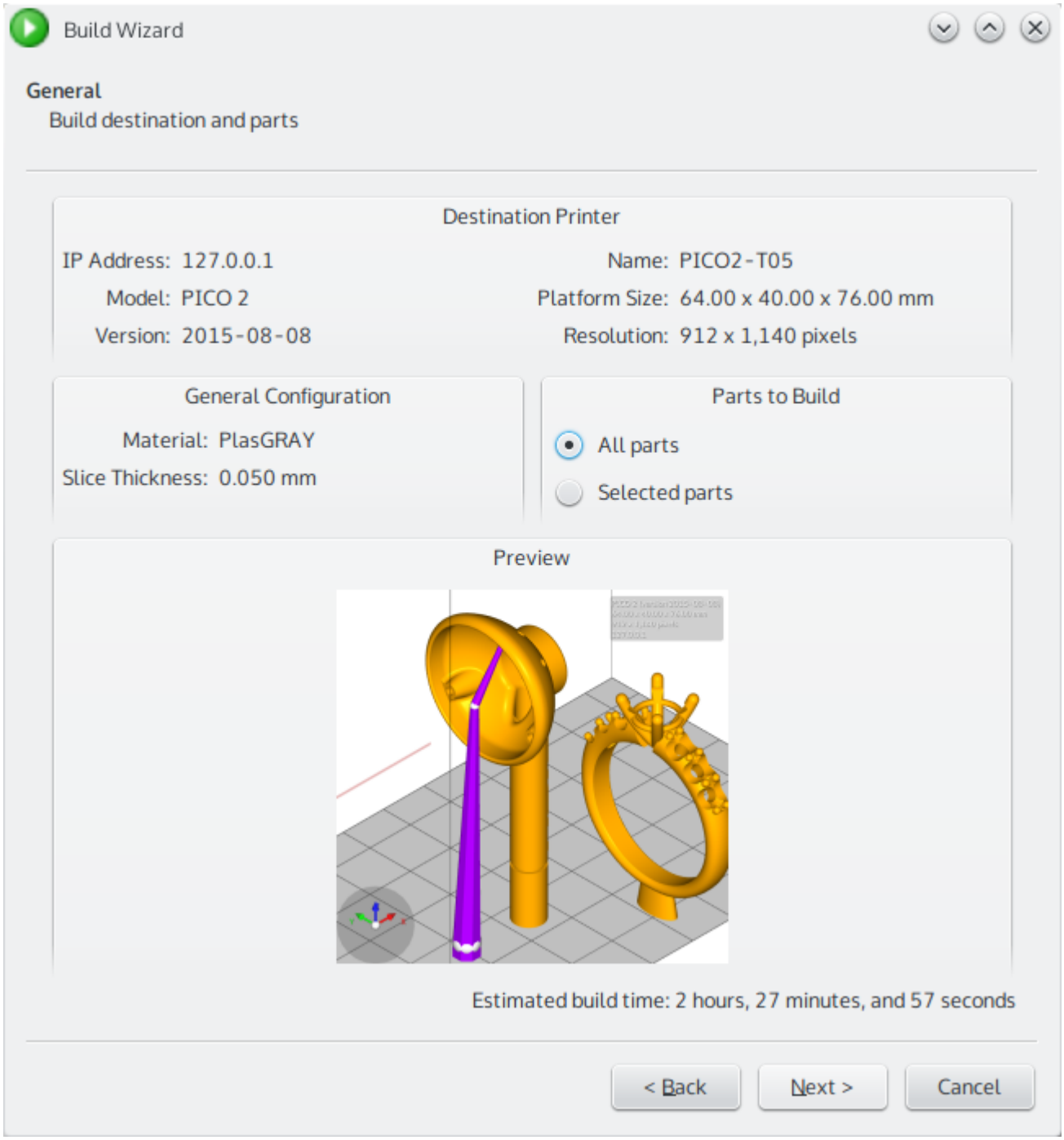


6.2 Build

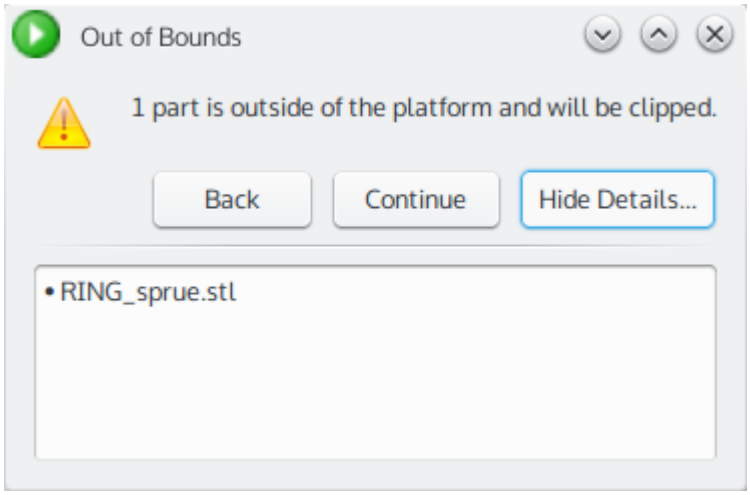
All your final build parameters will be specified in the wizard. Parts can be preselected to be built before launching the build wizard.

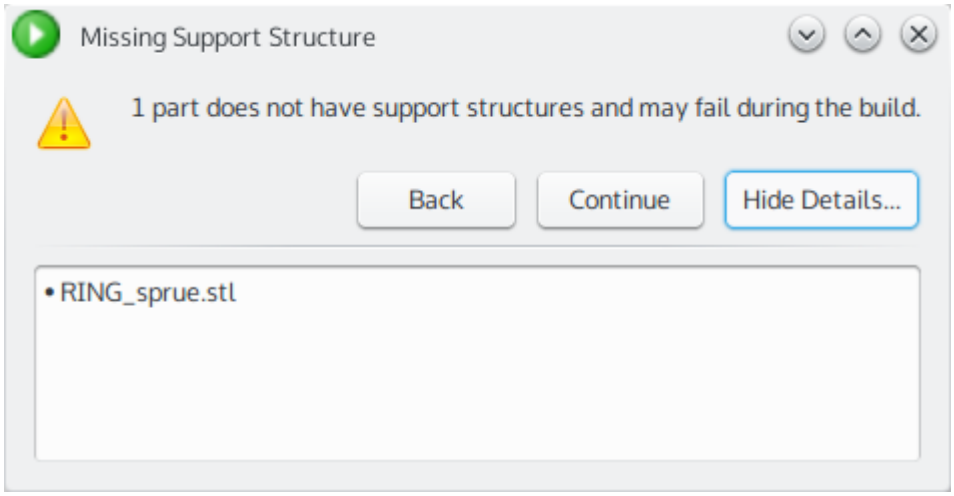
Build Wizard <Control + Shift + B> Start the build wizard.

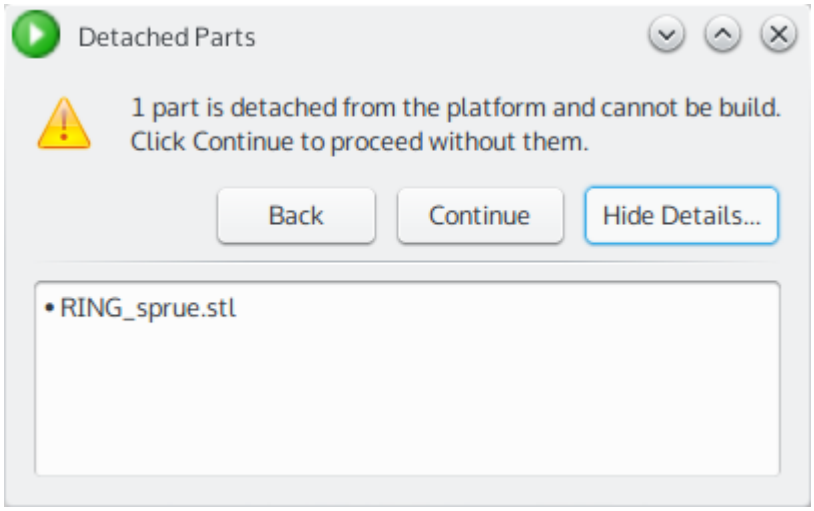
6.3 General



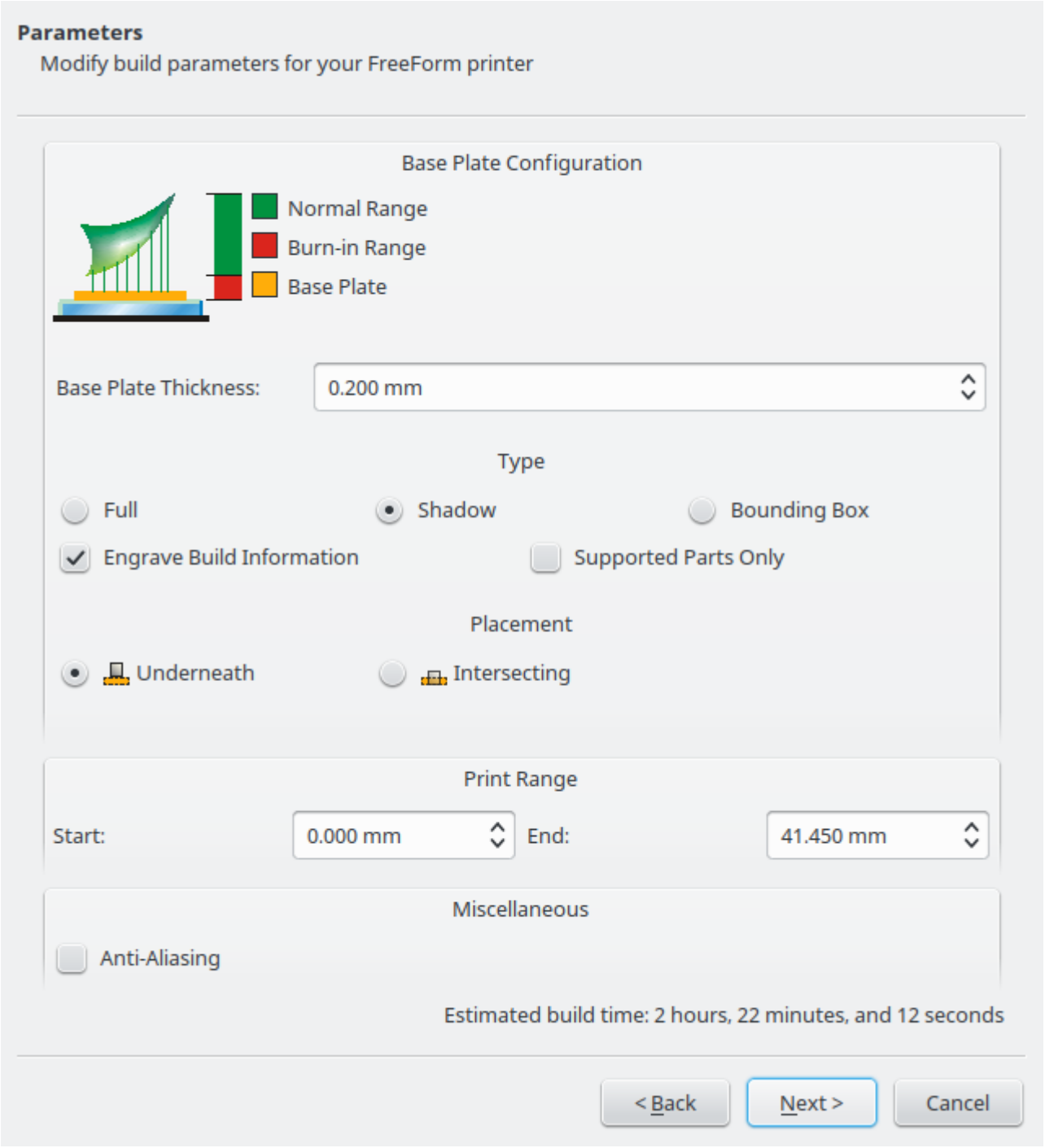
The first page confirms the destination printer information and the set of parts to build. Clicking ‘Next’ will validate the parts to build and warn you of any potential problems. Composer will simply reject parts that are not standing on the platform or its support.







6.4 Parameters



A 'base plate' is an area to be printed directly on the platform. This is required when building parts with support structures as it helps bond the supports to the build plate. The base plate can also ease the task to remove the build from the platform after the printing is finished.

6.4.1 Base Plate Depth

Base Plate Thickness Determines the height of the base plate in mm. Set to zero to disable this feature.

Placement Underneath Shifts all affected parts and supports to be completely above the base plate.

Placement Intersecting The base plate and models will be composed together.

6.4.2 Base Plate Shape

Full Cover the whole platform with a base plate. Easy to remove the whole build off the platform, but uses more material than required.

Shadow Minimal base plate for regions directly covered by the models. Can be difficult to remove individual parts off the platform.

Bounding Box Rectangular cover over each part's bounding box.

6.4.3 Base Plate Options

Engrave Build Information Write the build name and XYZ resolution in µm onto the base plate.

Supported Parts Only Excludes parts without supports to have base plate.

6.4.4 Print Range

Available for printer firmware versions newer than *2015-07-14*.

Start Z height of the first layer.

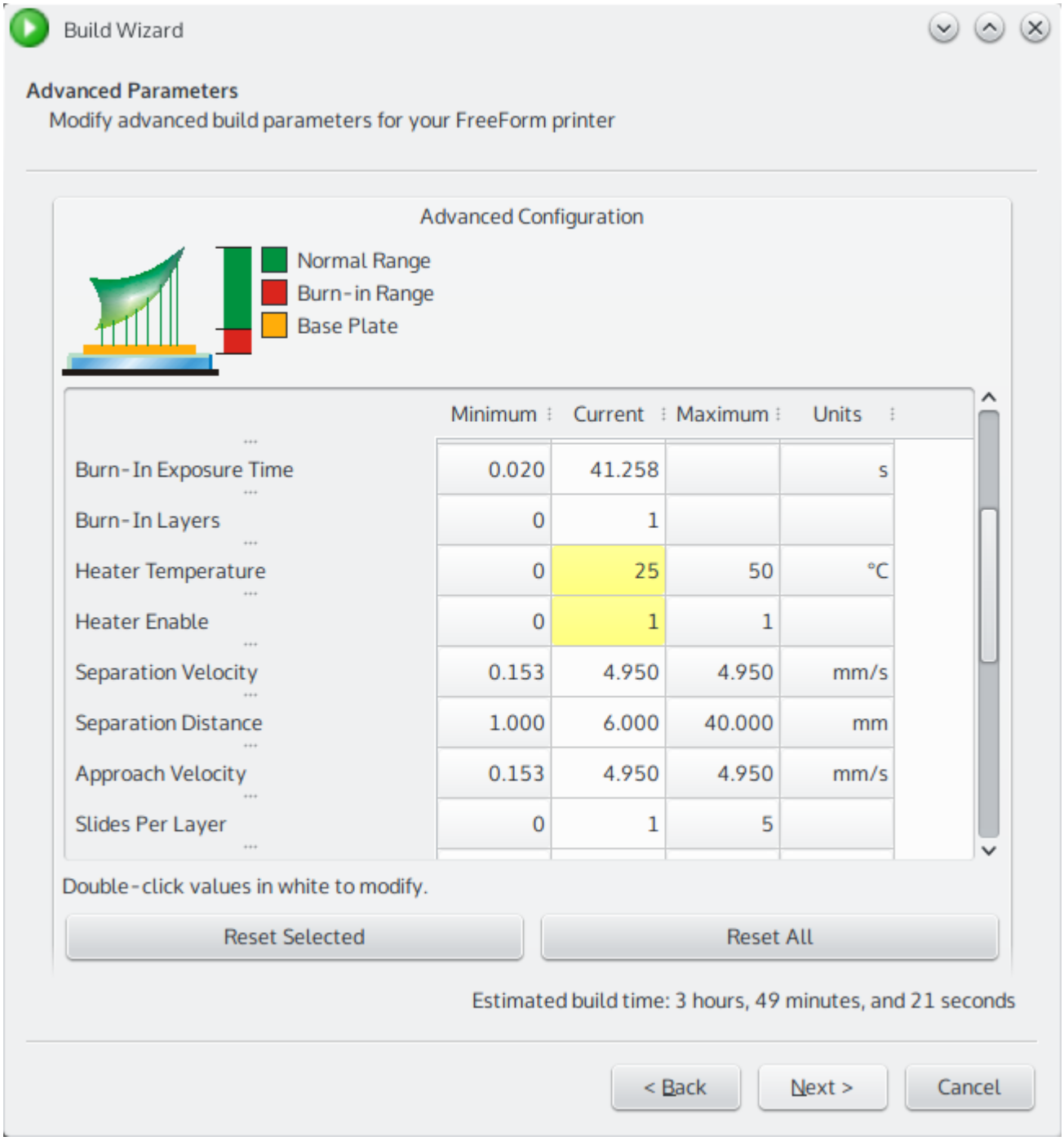
End Z height of the last layer.

6.4.5 Miscellaneous

Antialiasing Reduces jagged edges around the contour to produce a smoother surface.

6.5 Advanced Parameters

The parameters table is defined and documented differently for each printer model. Advanced users may adjust the parameters that affects build time, part quality and success rate. This manual covers the current parameter information in depth inside the Appendix chapter.

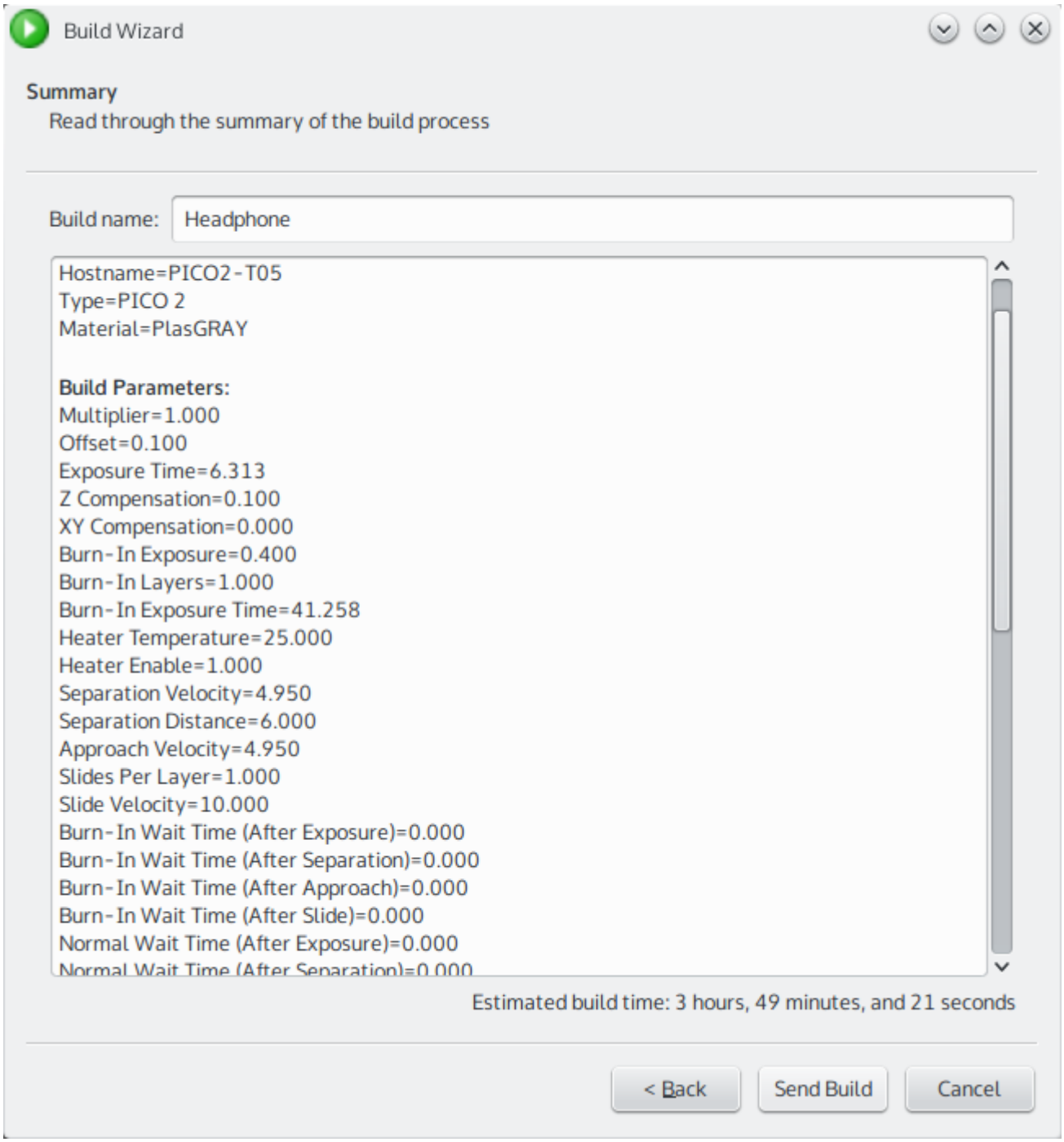


6.5.1 Editing Values

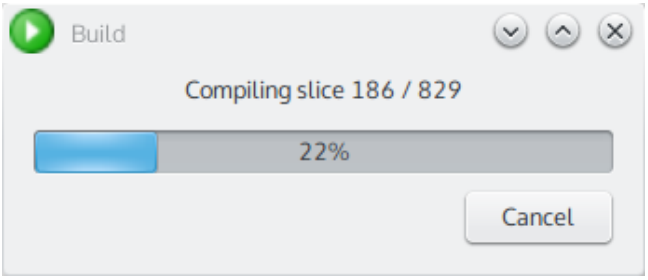
Activate the parameter editor by double-clicking on the cell under the ‘Current’ column. The editor will restrict the values that you enter to be between ‘Minimum’ and ‘Maximum’ inclusive. Changed values are highlighted in yellow and can be reset back to default by clicking ‘Reset Selected’.

6.6 Summary and Submission

The following page in the wizard allows you to specify the name of the print job and review the summary before pressing ‘Send Build’.

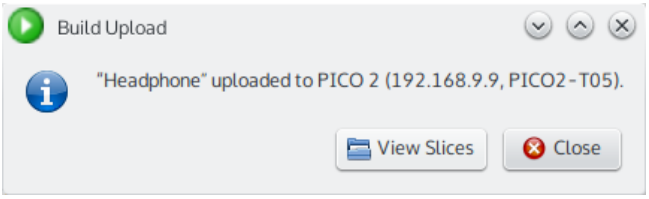


Your build will be compiled and uploaded to the printer over the network. You will be warned should Composer had detected any faults while processing your models.

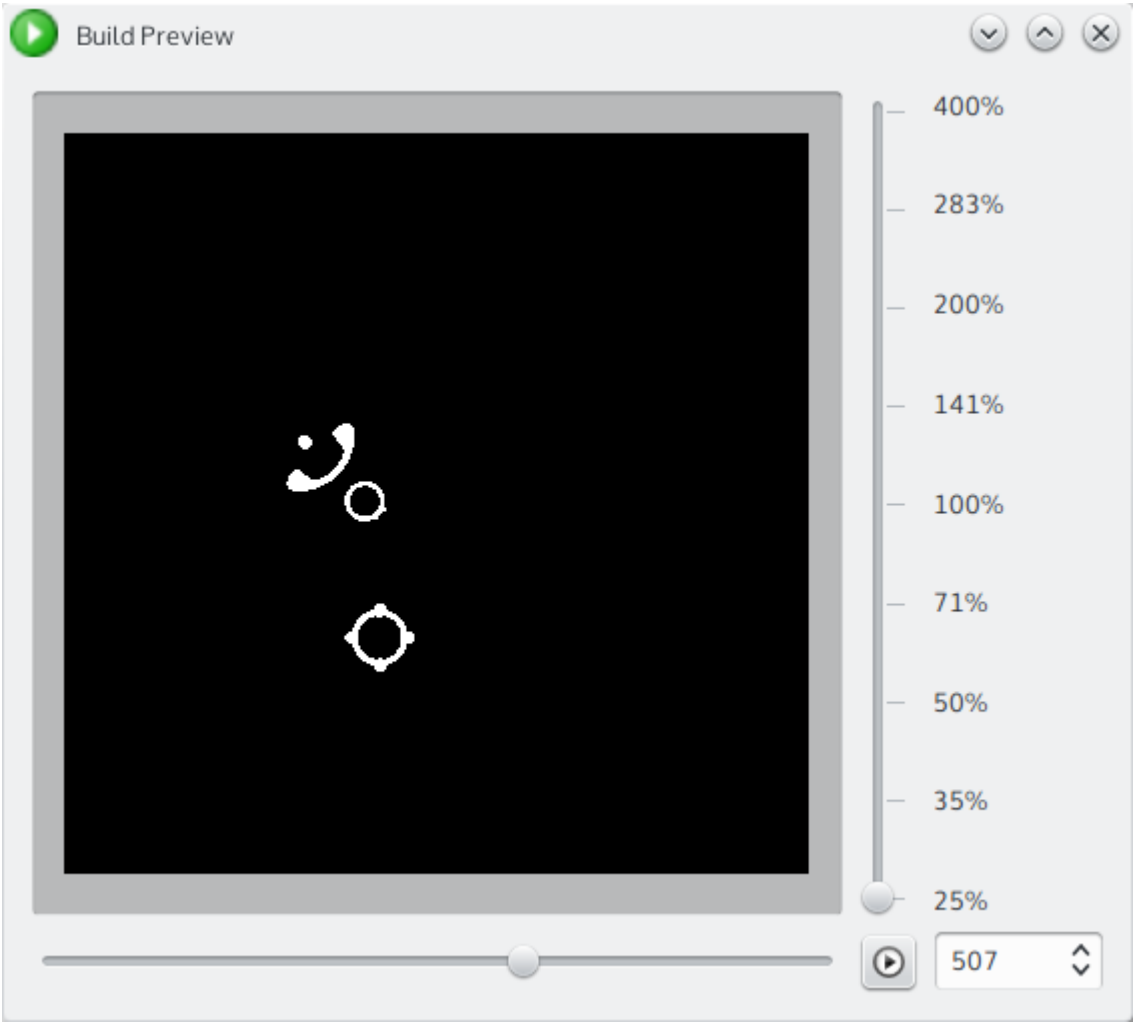


6.7 Submitted Build

The following final confirmation dialog will be shown when the build is uploaded onto your 3D printer.



Click on 'View Slices' to preview the build in Composer. The build preview displays the submitted images for printing and it is useful to verify your expectations.



Chapter 7

Troubleshooting

Run Composer from a command-line interface to read any warning or error messages.

7.1 Filesystem Access

Composer requires write access to the following standard paths.

7.1.1 Temporary Directory

The temporary directory is accessed differently depending on your operating system:

Windows Open Explorer path *%TEMP%*

MacOS X Open Terminal and enter *open $TMPDIR*

Linux Open file browser path */tmp/*

7.1.2 Cache Directory

Composer saves computed data within the application cache directory:

Windows Open Explorer path *%LOCALAPPDATA%\Asiga\Composer*

MacOS X Open Finder path *~/Library/Caches/Asiga/Composer*

Linux Open file browser path *~/.cache/Asiga/Composer*

7.2 Software Errors

Composer requires SSE2 support on the CPU, which means at least Intel Pentium 4 or AMD Athlon 64.

7.2.1 Library Errors

Reinstall Composer for 32-bit or 64-bit systems correctly. In a Windows install directory and MacOS application, Composer is bundled with and expects the following:

- GNU-CC SJLJ and standard C++
- OpenSSL eay32
- Qt4 libraries including Network, OpenGL, SQL, SVG, WebKit, XML
- Qt4 extensions PropertyBrowser, SingleApplication, QuaZip
- Qt4 plugins imageformats/qsvg4, sqldrivers/qsqlite4

Linux releases will use the systemwide libraries.

7.2.2 Material Loading

Composer requires valid printer and material definitions from the executable directory. Ensure that you have compatible printer and material definitions installed in Printers and Materials subdirectories respectively. Please read the Appendix chapter about Legacy Printer INI Definitions to use INI files from another version.

7.2.3 Slicing Errors

Composer will merge error slices with the nearest valid slice. To alleviate this problem, you will need to replace the model with a clean and booleaned STL file.

7.2.4 Software Exits when Starting Composer

Only one instance of Composer can be running for each user at any one time. Please check your taskbars and/or other monitors for any currently running Composer window. Should the problem persists, you may try deleting the single-instance lock file *qtsingleapp-AsigaC-…-lockfile* from your temporary directory.

7.3 Printer Errors

7.3.1 Autodetection Fails

Composer uses UDP broadcast on port 42511, ensure your firewall is configured to allow.

7.3.2 Insufficient Light Intensity

All Asiga projector systems uses LED light source for its projector. The printer periodically tests the power output to be working above the minimum specifications. Please consult with our online support system to resolve this issue. From version 1.1.8 Composer will use the user entered ‘LED sensor value’ if the ‘LED sensor status’ is disabled.

7.3.3 Could Not Connect

Composer requires to communicate with the printer over the network and had encountered a connection error. Reselect the target printer by pressing <*Alt* + *Enter*> and double-click on the printer entry.

7.3.4 Build Upload Failed

Composer uses TCP connection to port 42512 on the printer to upload builds, ensure your firewall is configured to allow. This error may falsely occur when uploading to a Pico 2 machine over wireless and you should double check the print queue before resending build.

7.4 Graphics Errors

Computers and laptops with multiple video cards must beware to ensure the system does not switch between different hardware while Composer is running.

7.4.1 Dull STL Model

Triangles that are defined more than once in the STL file will be drawn dull within Composer. You will be warned of the multiple facet definition whenever Composer is required to process such parts.

7.4.2 Opaque Platform Ground

You can disable the transluscent fill for the build platform by opening *Options* → *Preferences* → *Platform fill color*. Set ‘Alpha channel’ to 0 and click ‘Ok’ on both dialogs.

7.4.3 Model Drawn as Box

There was an issue with the 3D graphics driver attempt to draw the model. It may be due to the model data size or incorrectly installed graphics driver. Try running Composer using fixed-function rendering mode in *Options* → *Preferences* → *OpenGL* → *Fixed-function*.

7.4.4 Software Crash when Creating or Opening a Project

Your 3D graphics driver may have failed when preparing ‘GLSL shaders’. Try running Composer using fixed-function rendering mode in *Options* → *Preferences* → *OpenGL* → *Fixed-function*. Older versions of Composer would still have crashed as the shaders were always prepared even when disabled.

Chapter 8

Appendix

8.1 Printers INI Definitions

Beginning with Composer 1.1.2, the build parameters for Asiga printers are defined outside of the software. The printer definitions were isolated to provide flexibility in future changes to printer features and/or firmware changes. The INI files are located in *<Composer Directory>/Printers*.

8.1.1 General

Information about what this INI file applies to.

Class Defines the name of this printer class, which will be matched with Material INI 'General/Printer Classes'.

Models List of printer models that can be handled by this class.

8.1.2 Parameters

Definitions of printer build parameters for the Build Wizard in Composer. A printer parameter is defined with the '@' key and the siblings of the group defines the attributes of the parameter.

@ Defines the default value for the printer parameter. You may specify 'nan' if the value is unknown.

Alias Specify for backwards-compatibility with older printer firmwares.

Minimum Lowest allowed value, which is zero by default. Specify '-inf' to disable constraint.

Maximum Highest allowed value, which is 'inf' by default (no constraint).

Units The parameter units shown in the Build Wizard, which is an integer parameter by default.

C Temperature in Celsius

s Time in seconds

mA Current in milliamperes

mm Distance in millimeters

mm/s Speed in millimeters per second

- Hidden parameter from the Build Wizard

As an example, the following lines defines a parameter ‘Thermostat’ in Celsius with aliases ‘Temperature’ and ‘Temp’. The example parameter range is between -5 and 50 with a default value of 25.

```
[Parameters]
Thermostat/@=25
[Parameters/Thermostat]
Alias=Temperature
Alias=Temp
Units=C
Minimum=-5
Maximum=50
```

8.1.3 Build Estimation

Composer combines the current build information, material parameters and progressively evaluates all the formulae under ‘Build Estimation’. Formula values are calculated through an array of numbers and operators. The evaluated result of each formula can be referenced for later use.

```
[Parameters/Build]
Slice Count=<calculated internally>
Model Volume=<calculated internally as millimeter cube>
Support Volume=<calculated internally as millimeter cube>
Total Volume=['Model Volume', +, 'Support Volume']
```

All build parameters are accessible within the formulae including keys defined within the material INI. A value of ‘nan’ (not a number) will be used for unknown parameters.

```
[Build Estimation]
Normal Layer Count=['Build/Slice Count', -, 'Curing/Burn-In Layers']
```

Arrays of numbers without any operator in between will be tested for validity. The first finite number will be returned.

```
V=[-inf, nan, 7, inf, 4]
V=7
```

Mathematical operators (+, -, *, /, ^) are not evaluated in order or precedence. Use sub-arrays to isolate calculations.

```
Y=[1, -, 3, /, 4]
Y=-0.5
Y=[1, -, [3, /, 4] ]
Y=0.25
```

In addition to the mathematical operator characters, Composer also supports ‘max’ and ‘min’ when placed between two numbers.

```
M=[3, max, 2]
M=3
M=[-5, min, 0]
M=-5
```

Composer requires the result to be saved under an ‘@’ group.

```
Build Estimation/@/Normal=<seconds>
Build Estimation/@/Burn-In=<seconds>
```

8.2 Materials INI Definitions

Material definitions files exists since Composer 1.0 in <*Composer Directory>/Materials*. Composer will try to load older versions defined under printer classed subdirectory (Pico or PRO).

8.2.1 General

Name Material name.

Printer Classes Array of printer classes that can print using this material.

Heater Temperature Nominal air temperature during printing in Celsius.

Heater Enable Turn heating on or off without the need to overwrite ‘Heater Temperature’.

8.2.2 Curing

Material curing properties for a successful build. The *XY* and *Z* multivalue definitions are selectively processed by Composer to ensure positive correlation and validated against negative energy values. The *Z* multivalue definition is additionally validated against negative cured values.

Z Multivalued tabular data that maps energy (mW/cm²·s) to cured layer thickness (mm).

Multiplier Curing thickness coefficient when looking up the Z table.

Offset Curing thickness offset when looking up the Z table.

XY Multivalued tabular data that maps energy (mW/cm²·s) to edge widening radius (mm).

Burn-In Layers Opaque materials may require additional layers.

Burn-In Exposure Depth of exposure (mm) to be mapped in the Z table. Composer would simply replace the build layer thickness.

8.2.3 Mechanics and Delays

Some keys defined in the Material INI may overwrite the default parameters inside Printer INI Definitions. The keys can be any those had been predefined under the *[Parameters]* section.

For example, the following lines are inside Printer INI.

```
[Parameters]
Mechanics/Slide Velocity/@=5
```

Then inside Material INI, you can overwrite the value.

```
[Mechanics]
Slide Velocity=8
```

8.2.4 Support

Material-specific default values shown in the ‘Generate Support’ dialog.

Slope Self supporting angle in degrees between 1° and 50°.

Strength Multiplies supported surface area, eg. when contact width is 0.5 mm and strength is 40, each support point can manage the force over ½ × ½ × 40 = 10 mm².

Torsion Enables additional computation to load balance support structures.

Contact Width in millimeters between 0.2 mm and 25 mm.

Overshoot Distance in millimeters up to 5 mm.

AspectRatio Height over width factor between 1.5 and 25.

MaximumWidth Limits expansion by aspect ratio between 0.5 mm and 25 mm.

Spacing Between support points in millimeters between 1 mm and 25 mm.

8.3 Legacy Materials INI Definitions

There were several material INI changes between Composer 1.0 and Composer 1.1. Composer 1.0 will not load material INI written for Composer 1.1 due to the INI changes. Composer 1.1 supports reading older material INI format from Composer 1.0 provided that they are located within a subdirectory named by a printer class.

8.3.1 Array Values

In Composer 1.0, arrays values are ambiguously defined to be optionally surrounded by square brackets *[ ]*. Some definitions can be read differently by Composer based on the array length. This subsection examplifies the arrays of different length and how they were treated.

1, mm Defines current value *1* and optional units *mm*.

1, 2, mm Defines current value *1*, factory default *2* and optional units *mm*.

1, 2, 4, 3, mm Defines minimum constraint *1*, current value *2*, maximum constraint *4*, factory default *3* and optional units *mm*.

[1, 2] Defines a pair of values *1* and *2*.

In Composer 1.1, all arrays are to be surrounded by square brackets *[ ]* with permission to add any white spaces (including new lines) around each value. The definitions of minimum and maximum constraints as well as units were moved to the printers INI.

8.3.2 Removed Keys

Many definitions of Composer 1.0 material INI are specifically related to machine control and has no effect when curing different materials. However, you may still override the printer defaults within the material INI of Composer 1.1.

```
[General]
Slice Thickness
Separation Distance
Separation Velocity
Approach Velocity
Slide Velocity
Slides per Layer

[Burn-in]
Exposure Time
Wait Time (After Slide)
Wait Time (After Exposure)
Wait Time (After Separation)
Wait Time (After Approach)

[Normal]
Exposure Time
Wait Time (After Slide)
Wait Time (After Exposure)
Wait Time (After Separation)
Wait Time (After Approach)
```

8.3.3 Changed Keys

In Composer 1.0:

```
[General]
Presets=0.01,0.025,0.05,0.075,0.1,0.15,mm
Temperature=0,degrees,maximum,default,C
Burn-In Layers=count,default

[Curing]
Burn-In Thickness=depth
Thickness=[cured0,energy0]
```

```
Thickness=[cured1,energy1]
Thickness Multiplier=coefficient
Thickness Offset=curethrough
```

General/Burn-in Thickness does not actually cause the printer to print each burn-in layer at the specified thickness. The thickness value is only used to calculate the exposure time while curing a layer at the build's slice thickness.

In Composer 1.1:

```
[General]
Presets=[0.01, 0.025, 0.05, 0.075, 0.1, 0.15]
Heater Temperature=degrees

[Curing]
Burn-in Layers=count
Burn-in Exposure=depth
Z=[cured0, energy0]
Z=[cured1, energy1]
Multiplier=coefficient
Offset=curethrough
```

General/Presets is an optional definition with the default list shown above.

8.3.4 Added Keys

```
[General]
Printer Classes=[Pico, PRO]
Heater Enable=false

[Curing]
XY=[radius0, energy0]
XY=[radius1, energy1]
```

8.4 Build Parameters

Light Intensity Latest light sensor value on the printer, affects Exposure Time.

Slice Thickness Step size in Z for all layers.

Exposure Time Standard duration per layer, affects Z and XY Compensation.

Z Compensation Omits voxels until the specified depth is reached.

XY Compensation Boundary offset adjustment to compensate for shrinkage and growth.

Burn-In Layers Number of overexposed layers, see Burn-in Parameters subsection below.

Separation Velocity The speed at which the machine separates each layer from the curing surface. Reduce for large cross-sections.

Separation Distance The distance the build platform moves out after exposure.

Approach Velocity The speed the build platform moves into position for the next layer. Reduce for large cross-sections.

Slides Per Layer Number of slides per layer for aligning the curing surface, see 'Motor Parameters' subsection below.

Slide Velocity The speed of the alignment slider.

Normal Wait Time (After Exposure) Increase for materials that require time to solidify.

Normal Wait Time (After Separation) Increase for viscous materials and large cross-sections to allow material inflow.

Normal Wait Time (After Approach) Increase for viscous materials and large cross-sections to allow material outflow.

Normal Wait Time (After Slide) Enable for large cross-sections in PRO to allow material outflow.

8.4.1 Burn-in Parameters

The following parameters are used for each burn-in layer, which is enabled by setting 'Burn-In Layers' to a positive value.

Burn-In Exposure Time Extended duration per burn-in layer.

Burn-In Wait Time (After Exposure) Increase for materials that require time to solidify.

Burn-In Wait Time (After Separation) Increase for viscous materials and large cross-sections to allow material inflow.

Burn-In Wait Time (After Approach) Increase for viscous materials and large cross-sections to allow material outflow.

Burn-In Wait Time (After Slide) Enable for large cross-sections in PRO to allow material outflow.

8.4.2 Motor Parameters

The following parameters are used only for PRO2 sliderless mode, which is activated by setting ‘Slides Per Layer’ to 0. In sliderless mode, the current to the **vertical axis** motor is monitored to determine when the vertical axis has settled at the target position.

Motor Current Limit The maximum current to the vertical axis motor during approach and separation.

Motor Settling Current Target current level during approach.

Motor Timeout Number of seconds allowed for the vertical axis motor to settle. The machine will pause the build when the timeout is triggered.

8.5 Language Translations

Change displayed text translations via *Help* → *Switch application language…* Once the language is selected you should restart Composer to ensure all texts are initialized properly. At the time of writing Composer is bundled with French and Polish languages.

You can expand Composer language translations online at https://www.asiga.com/translate/projects/asiga/composer/ or any of our other projects at https://www.asiga.com/translate/. Credits for any translations done are visible online at the same website. Language translations should be at least 95% complete before they are included in any release.