ZPrint™ Software Manual

Version 7.10
Part Number 09598 Rev B

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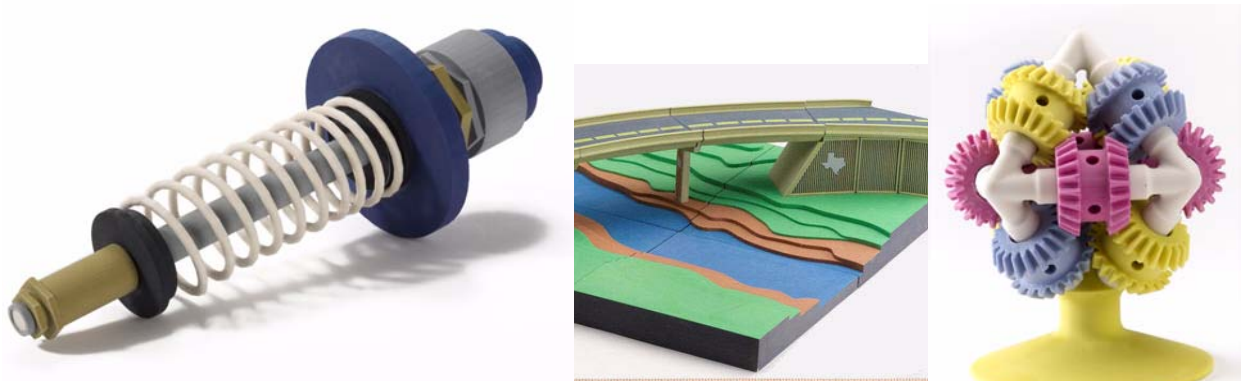

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6,036,777	6,989,115	7435368	7,037,382	7,291,002	7,387,359
7,087,109	7,332,537	11/335,282	11/860,087	60/558,940	12/118,899
11/000,100	11/606,960	60/808,721	11/807,325	11/807,329	11/807,175
11/807,237	09/706,350	09/835,292	11/453,695	60/472,221	60/499,220
11/732,490	60/879,703	11/952,727	12/035,743	6,610,429	7,550,518
10/848,831	10/926,172	(60/789,758)	60/873,730	10/999,847	60/741,573
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WARRANTY PERIOD: In the U.S., warranty is for 90 days and covers service, parts and training material. In the EU, warranty is for 1 year and covers service, parts and training material.

Symbols

The following symbols are used on the ZPrinter and in this manual.

	General Caution: User should use care to avoid possible damage to equipment.
	Hot Surface: User should use care when working near or on the labelled item.
	High Voltage: User should use appropriate electrical safety precautions.

Change History

Rev. A 10/9/2009

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ZPrint™ Software Manual

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1 Overview

ZPrint is a Windows-based software program designed to easily and quickly manipulate, annotate, and preview 3D modeling data before printing it on a Z Corporation 3D Printer. ZPrint includes the latest version of ZEdit - an easy-to-use tool designed to optimize color output when applying texture maps, templates, text, or paint to a part. ZEdit also includes several diagnostic tools for isolating and correcting simple file problems prior to printing a job.

This Overview covers the following topics:

- Section 1.1 “New In ZPrint 7.10”
- Section 1.2 “File Formats You Can Import And Print With ZPrint”
- Section 1.3 “Computer System Requirements”
- Section 1.4 “ZPrint/ZEdit Installation”
- Section 1.5 “Choose The Default Printer”
- Section 1.6 “Choose The Default Printer Settings”
- Section 1.7 “Check The Default Powder Type Settings”

1.1 New In ZPrint 7.10

ZPrint 7.10 includes a number of improvements, many of which were directly requested by users. And while some of the improvements are in the background to improve performance, there are several you will notice as you use ZPrint 7.10:

- Support for zp 150 on the ZPrinter 310/310 Plus and Spectrum Z510

  The latest release of ZPrint 7.10 (7.10.3) adds support for using the new zp 150 powder on both the ZPrinter 310/310Plus and the Spectrum Z510 3D printers. Note that both printers will need a new revision of firmware installed before using zp 150 powder.

- Support for the new ZPrinter 350

  ZPrint 7.10 is the version of ZPrint that is included with a new ZPrinter 350 shipment. ZPrint 7.10 includes all the menu changes, powder settings, etc. needed to run the ZPrinter 350.

- New Purge Block for whitest monochrome builds

  ZPrint 7.10 now offers a “Purge Block” that can be run when changing the print head on a ZPrinter 350. The Purge Block is a small test pattern that is automatically printed under the part when you start the first monochrome build after changing a print head. The Purge Block helps flush the last remnants of black ink out of the new HP 11 printhead, ensuring you the cleanest, whitest parts. The Purge Block can be disabled if desired, or can be run manually from the ZPrint **Service** menu.

- Speed and reliability improvements

  ZPrint 7.10 includes many “behind the scenes” improvements that help it run faster and make it more resistant to problems even when reading damaged data files. There are also improvements to how ZPrint handles international characters when creating labels, and how it manages the 3-pane “split screen” display.

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1.2 File Formats You Can Import And Print With ZPrint

NOTE: The quality of data read through each of these file types is highly variable due to the way the source programs treat their data.

Current file types supported:

- *.zbd* files are build files created by the ZPrint Software.
- *.zpr* files are part files created by ZEdit Software, and by a number of software packages from other companies. ZPrint supports versions 1, 2, and 3.
- *.stl* files are monochrome 3D model files exported by several 3D CAD packages.
- *.wrl (also known as VRML)* files are color files that are exported by many 3D CAD packages.
- *.ply* files are 3D color model files exported by several 3D CAD packages.
- *.3ds* files are color files created in Autodesk 3D Studio Max.
- *.gis* files are Geographic Information System files.
- *.sfx* files are 3D color model files exported by SolidView Pro.

Legacy file types supported:

- .zcp
- .zec
- .bld

1.3 Computer System Requirements

Each Printer Type listed requires the Recommended System to run ZPrint advanced operations such as part labelling and Fixture generation. *Laptops are not supported.* These system configurations may require a higher performance computer based on file size and type. For more information, please contact your local Reseller, or visit our Web site at zcentral.zcorp.com.

1.3.1 ZPrinter 350

Required:

- ZPrint 7.10

Recommended System:

- Operating Systems Supported:
  - Windows 7 32-bit
  - Windows Vista 32-bit or 64-bit, Business, Ultimate or Enterprise
  - Windows XP Professional
- Processor: Intel Core2 Duo Desktop Processor E8200 2 Ghz or better
- Video: 512MB Video card (recommend nVidia Quadro FX1700)
- Memory: 4 GB or better
- Hard Drive: 1 GB of free space
- Ethernet 10/100 Base T

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1.3.2 ZPrinter 650

Recommended System:

- ZPrint 7.10.3 or later
- Operating Systems Supported:
  - Windows 7 32-bit
  - Windows Vista 32-bit or 64-bit, Business, Ultimate or Enterprise
  - Windows XP Professional
- Processor: Intel Core2 Duo Desktop Processor E8200 2.66Ghz or better
- Memory: 4GB or better
- Video: 512MB Video card (recommend nVidia Quadro series or better)
- Hard Drive: 1 GB free space
- Network: Ethernet 10/100 Base T

1.3.3 ZPrinter 450

Recommended System:

- ZPrint 7.10.3 or later
- Operating Systems Supported:
  - Windows 7 32-bit
  - Windows Vista 32-bit or 64-bit, Business, Ultimate or Enterprise
  - Windows XP Professional
- Processor: 3.2GHz processor or better
- Memory: 2GB RAM or better (strongly recommended)
- Video: True Color Graphics, 16-bit, 64 MB Video Card or better with graphics card accelerated for OpenGL
- Display: 1024 X 768 pixels, or better
- Hard Drive: 1GB free space
- Network: Ethernet 10/100 Base T

1.3.4 Z Printer 310 / ZPrinter 310 Plus / DESIGNmate Mx (310/Mx)

Recommended System:

- ZPrint 7.10.3 or later
- Microsoft Windows 2000 Professional or Windows XP Professional
- 2.0 Ghz Pentium III chip or higher
- 1GB of RAM or more
- 16-bit color, or better
- 64 MB Video Card, or better
- 1024 x 768 pixels or better screen display

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- Graphics card accelerated for OpenGL
- 1GB of free hard drive space after OS and utilities are loaded
- Ethernet port (10/100 Base T)

1.3.5 Spectrum Z510 / DESIGNmate Cx (Z510/Cx)

Recommended System:

- ZPrint 7.10.3 or later
- Windows 2000 Professional or Windows XP Professional operating system
- 3.2GHZ or better (recommended)
- 2GB or better (strongly recommended)
- True Color Graphics
- 64 MB Video Card, or better
- 1024 X 768 pixels, or better
- 16 bit or better with OpenGL acceleration
- 1GB free space
- Ethernet 10/100 Base T

1.3.6 Z406

Required:

- ZPrint 7.6

Recommended System:

- Microsoft Windows NT 4.0, Windows 2000 Professional or Windows XP Professional operating system
- 850 MHz Pentium III chip, AMD Athlon, or better
- 512 MB of RAM or more
- True Color Graphics
- 64 MB Video Card, or better
- 1024 X 768 pixels, or better
- Graphics card accelerated for OpenGL

1.3.7 Z810

Required:

- ZPrint 7.6

Minimum System:

- Microsoft Windows NT 4.0, Windows 2000 Professional or XP Professional operating system
- 1 GHz Pentium chip or higher
- 1 GB of RAM
- True Color Graphics
- 64 MB Video Card, or better

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- 1024 X 768 pixels, or better
- Graphics card accelerated for OpenGL

1.4 ZPrint/ZEdit Installation

IMPORTANT: *To avoid problems that may occur during printing, ensure that all screen savers and your power management software are turned off on the computer driving your 3D Printer. Most screen savers and power management software can be turned off in the main Windows screen settings. For additional instructions on how to disable your hardware and software power management, please consult your computer hardware Owner's Manual.*

NOTE: You must have Administrator rights to install ZPrint correctly.

If you encounter any problems during ZPrint installation, please contact your local Reseller, or visit the support section of our Web site:
zcentral.zcorp.com.

1. Close all running applications and insert the ZPrint CD into your CD-ROM drive.
2. If the installer does not automatically start, double-click on your CD-ROM drive icon. Double-click on the *Setup.exe* icon. This starts the ZPrint installation.
3. After *Setup.exe* is launched, you have the option to install the ZPrint and/or the ZEdit applications.
4. Read the licensing agreement carefully.
5. Select the destination directory. The Setup program prompts you for a selection and will suggest *C:\Program Files\ZPrint Software* as the default directory.
6. It takes several minutes for ZPrint to install and then you are returned to the desktop.
   - If this is your first time using ZPrint, proceed with the remainder of this chapter to setup ZPrint defaults for the printer type and printer settings, and to check the powder type.
   - If your local Reseller has already setup ZPrint for you, you can skip the remainder of this chapter and proceed with *Chapter 2 ZPrint Main Window*.

1.5 Choose The Default Printer

When you run ZPrint for the first time, the **Default Printer Type** dialog opens where you select the printer that is connected to the computer running ZPrint, as the default printer.

- Check each printer that is accessible through your network (can be one or more). Each printer you check will appear in the **Powder Settings** dialog where you can view the powder settings for that printer.
- Click the radio button beside the printer you want to designate as the default. Only one printer can be the default, but you can change the default at any time by reopening this dialog in ZPrint (**Settings > Printer Type Settings**).
- In the following example, we checked four printers that are available through our network. The **ZPrinter 350 3D Printer** is selected as the default.

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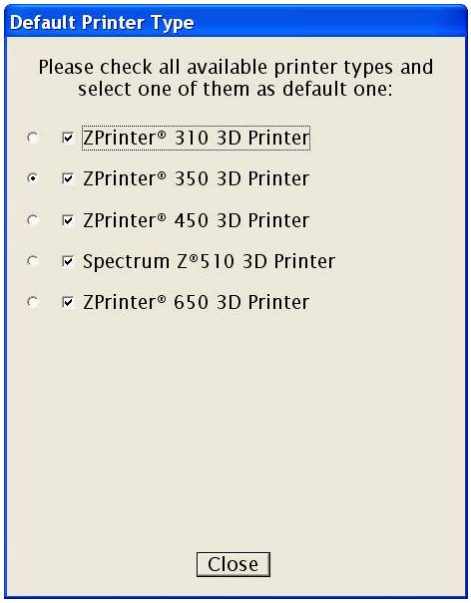
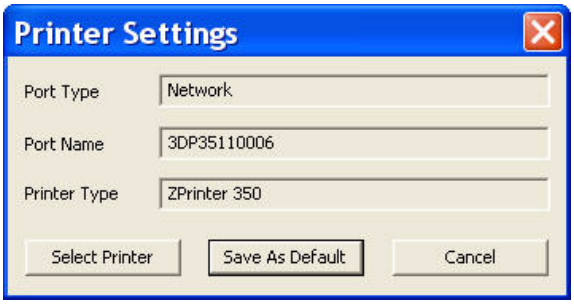


- Click **Close** when finished. The ZPrint Splash screen appears. This screen will close on its own after a moment, or you can click **OK** to close it immediately.
- Next, the **Open** dialog appears where you select a file to load in ZPrint. Browse to the directory on your system where your files are located. The next time access the **Open** dialog, it will show the path you last browsed to for selecting files.
- Select a file and click **Open**. The file opens in the ZPrint main window. Continue with the next section to choose settings for your default printer.

1.6 Choose The Default Printer Settings

1. In ZPrint, select **Settings > Printer Settings** to display the **Default Printer Settings** dialog.



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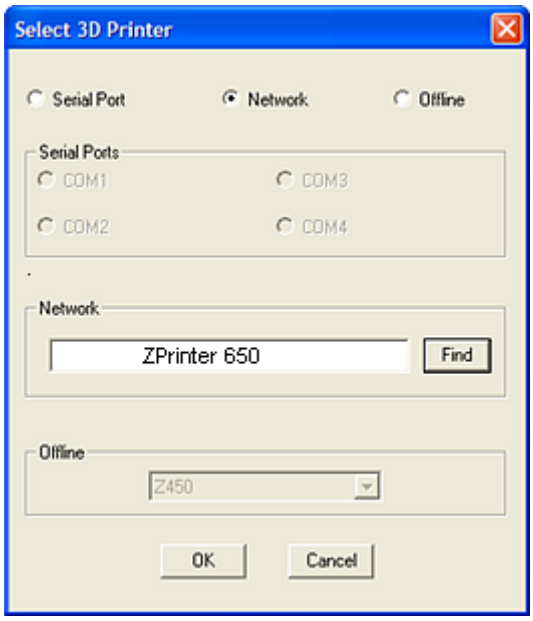
2. The **Port Type** field should display **Network**. To select a different printer, choose **Select Printer** and follow the steps below.

3. When **Select 3D Printer** dialog opens, choose either **Serial Port** or **Network**. The printer your computer is connected to will show up as an option. Select your 3D Printer and click **OK**.
   - If connecting to a printer on a network, click the **Find** button and select the printer from the **Network Printers** drop-down list. Choose an Online printer and click **OK**.

   NOTE: ZPrinter 350, 450 and 650 machines are accessed only through a Network connection.

4. Click **OK** on the **Select 3D Printer** dialog.



5. When the **Select 3D Printer** dialog closes, the **Default Printer Settings** dialog reopens for you to save your settings. Click the **Save As Default** button.

   - The printer listed in the **Port Name** field is saved as the default printer and the **Port Type** field shows either **Network** or **Serial**.

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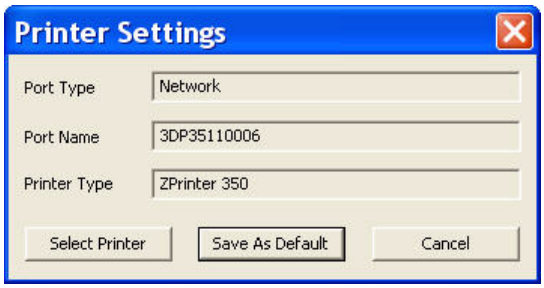

NOTE: If you experience difficulty locating your printer through ZPrint, please contact your local Reseller, or visit the support section of our Web site: zcentral.zcorp.com.

1.7 Check The Default Powder Type Settings

1. In ZPrint, select **Settings > Powder Settings**.

   - The **Powder Settings** dialog opens and lists each printer previously selected in the **Default Printer Type** dialog.
   - The default printer is **bolded** and expanded to show the materials available for use with the printer.
   - The default powder type is also shown in **BOLD** and its settings populate the right side of the **Power Settings** dialog.

2. Select a powder type to view its settings.

   Important: Powder settings cannot be changed unless you create a custom powder type (see Section 8.1 “Create Custom Powder Types”), however, you can override the **Layer Thickness, Bleed Compensation**, **Anisotropic Scaling,** and the **Fixture Clearance** settings for an individual build. We do not recommend changing these, but should you need to:

   - Select **File > 3D Print Setup** to check/uncheck the **Bleed Compensation** option, or to choose a different **Layer Thickness**.
   - Select **Transform** > **Anisotropic Scaling** to change the **X, Y,** and **Z** settings.
   - Select **Edit > Make Fixture** to change the **Fixture Clearance** value.

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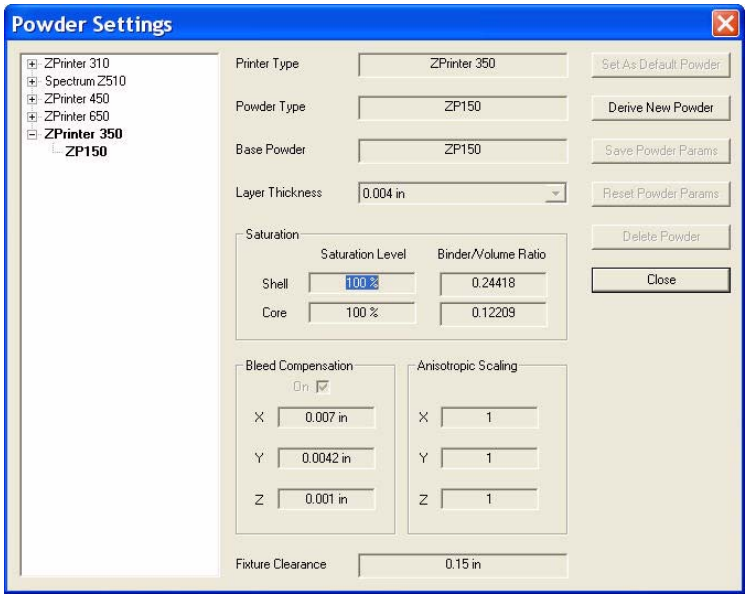
3. When finished, click **Close**.



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2 ZPrint Main Window

The ZPrint Main Window has two viewing modes - 3D and 2D (Cross-Sectional). Explore the features of the Main Window in the sections below.

Section 2.1 “The 3D View”

Section 2.2 “The ZPrint Toolbar”

Section 2.3 “The ZPrint Toolbar Descriptions”

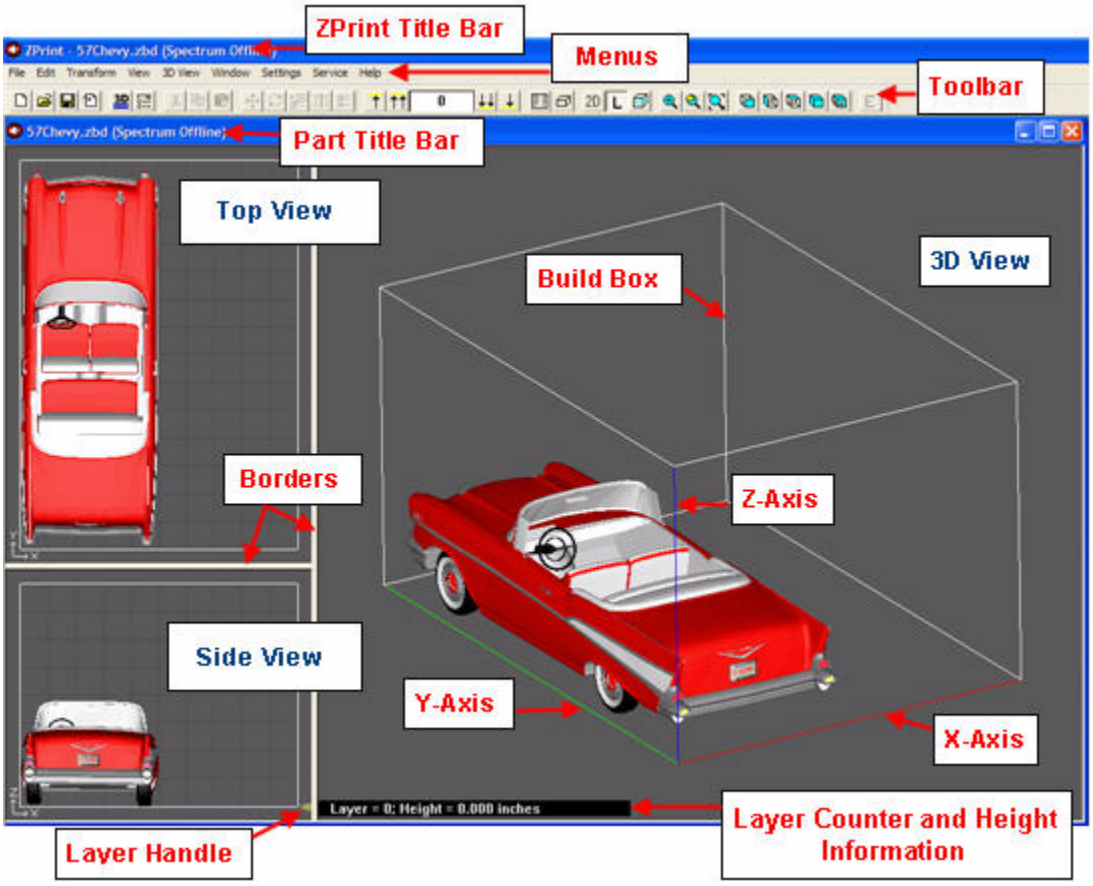
Section 2.4 “Keyboard/Mouse Shortcuts”

Section 2.5 “3D View Menu Display Options”

Section 2.6 “The 2D (Cross-Sectional) View”

2.1 The 3D View

When a file is opened in ZPrint, it is loaded into the main window and its contents are visible in the **3D**, **Top**, and **Side Views** of the Build Bed.



The ZPrint main window showing the Top, Side, and 3D Views.

- The **Top View** is a 2D representation of the Build Bed in the Y-X plane.

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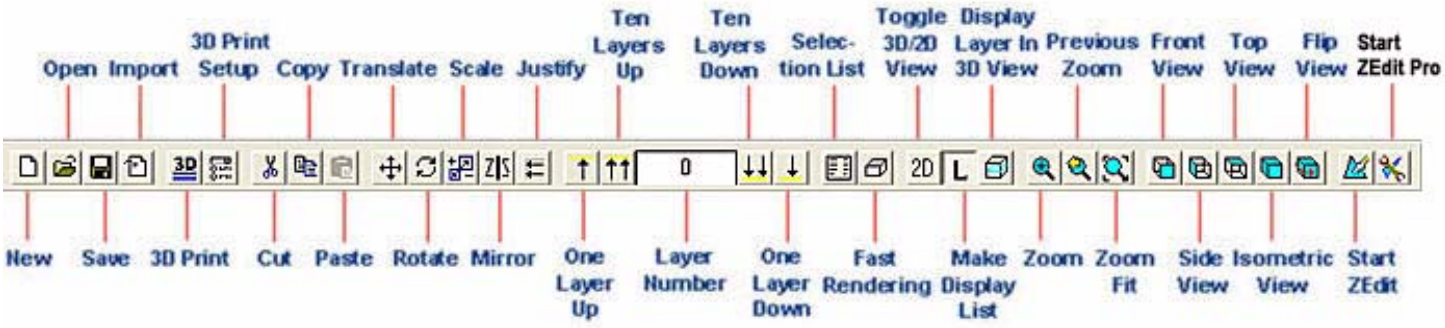
- The **Side View** is a 2D representation of the Build Bed in the Z-X plane.

- The **3D View** is an interactive representation of the Build Bed where you can quickly change the angle from which the part is viewed using one of the **View** icons. A description of each View icon can be found in Section 2.3 “The ZPrint Toolbar Descriptions”.

- To resize any view, point the cursor on the vertical or the horizontal borders. When you see the cursor change to the Resize tool (two small arrows pointing away from each other), left-click on the border and drag to resize.

2.2 The ZPrint Toolbar

In ZPrint, point the cursor on any Toolbar icon to view a text description of the icon.



2.3 The ZPrint Toolbar Descriptions

	New: Opens a new, blank ZPrint main window. **Open:** Displays the **Open** dialog where you select files to load into ZPrint. **Save:** Saves the current ZPrint session and any changes to a file. **Import:** Displays the **Import** dialog for importing one or more files into ZPrint.

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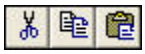
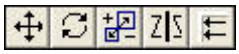
	3D Print: Displays the **Printer Status** dialog (ZPrinter 450) or the **Printing Options** dialog (all other Printers). **3D Print Setup:** Displays the **3D Print Setup** dialog where you check or change your **Printer**, **Powder Type**, **Layer Thickness**, or **Bleed Compensation** settings for the current build.
	**Cut:** Select a part and use **Cut** to remove the part from the view without deleting it. **Copy:** Select a part and choose **Copy** to copy the part. **Paste:** Select **Paste** to place a cut or copied part into the ZPrint main window.
	**Translate:** Displays the **Translate** dialog. Choose to move a part a specified distance on the **X-**, **Y-**, or **Z-**Axis, or a combination of the three. The default coordinate position (0,0,0) is the lower-left corner of the Build Bed. **Rotate:** Displays the **Rotate** dialog. Choose to rotate a part in the **XY**, **XZ**, or **YZ** planes by a specified amount. **Scale:** Displays the **Scale** dialog. Enter the percentage by which to scale a part and then choose to fit the part relative to the **X-**, **Y-**, or **Z-**Axis. (The range of values you can scale a part is between 0.0001 and 10,000.) **Mirror:** Displays the **Mirror** dialog. Choose to mirror a part in the **X-**, **Y-**, or **Z-**Axis direction. **Justify:** Displays the **Justify** dialog. Choose to align the part to sides of the Build Bed by selecting options for **Left** or **Right**, **Front** or **Back**, or **Bottom** alignment.

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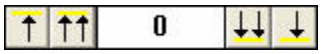	**Layer Selection and Number:** Use the single and double Up and Down arrows in 2D view to view cross-sectional layers. Single arrows represent moving up/down one layer at a time; double arrows represent moving up/down ten layers at a time. The **Layer Number** field displays the current layer you are viewing. You can also enter a number and press **Enter** to view the specified layer.
	Selection List: Displays the **Entity Selection** dialog and lists each part that is currently opened in ZPrint. The currently selected part is highlighted in the **Entity Selection** dialog. **Fast Rendering:** Fast Rendering creates a point-cloud rendering of the part, which speeds up processing during transformations.
	3D/2D View: Toggle between 3D and 2D views. **Make Display List:** Manually builds the Display List, (which enables smooth rotating, zooming, and panning). **Display Layer in 3D View:** Turns layering on so you can view a cross-section of the part. ZPrint highlights the specified layer.
	Zoom: Changes the cursor to a plus sign for drawing a box around the area of a part that you wish to zoom. In this mode, hold down the left mouse button and drag the mouse to draw a box. When you release the mouse button, the contents of the box fills the 3D View. **Previous Zoom:** Returns you to the previous view. **Zoom Fit:** Maximizes the entire part in 3D View.

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	Front View: View the part in 3D View from the front. **Side View:** View the part in 3D View from the side. **Top View:** View the part in 3D View from the top. **Isometric (3D) View:** View the part in 3D View as 3D (Isometric). **Flip View:** Flips a part in 3D View to its opposite side.
	Start ZEdit: Opens a selected part in ZEdit with the same orientation it has in ZPrint. Use ZEdit to add annotations, engineering templates, labels, paint, and texture maps to a part.
	Start ZEdit Pro: Opens a selected part in ZEdit Pro (available separately). Use ZEdit Pro for advanced editing such as fixing the 3D model, and hollowing, splitting or adding material to the part.

2.4 Keyboard/Mouse Shortcuts

Press This Key/Button:	To Do This:
A	To move up one layer
Z	To move down one layer
Shift A	To move up ten layers
Shift Z	To move down ten layers
Left Mouse Button	Drag the mouse to rotate the Build Bed in 3D View, or to move a part in the Side or Top Views.
Turn the Mouse Wheel	Zoom the Build Bed in 3D View, or scale the part in Side or Top Views.
Shift + Left Mouse Button	Pan the Build Bed in 3D View.

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Ctrl + Left Mouse Button	Select a part without moving it in Side or Top View. Drag the mouse to Zoom the Build Bed in 3D View.
Ctrl + Z	Undo last action
Ctrl + Y	Redo last action

2.5 3D View Menu Display Options

Display Layer in 3D View: Check to highlight the currently selected layer in 3D View.

Display Build Box: Check to toggle the display of the wire frame that represents the printer Build Box in the 3D View. The Build Box is also called the Build Bed.

Background Color: Select to change the ZPrint main window background color.

Gloss: Check to give parts with color a greater 3D visual effect.

Build Display List: The **Build Display List** command is a mostly hidden function that enables smooth rotation, zooming, and movement of a part when working in ZPrint. By default, ZPrint enables this feature for parts that are smaller than 300,000 facets. When parts that are larger than 300,000 facets are opened in ZPrint, the software will not build a Display List, and the rotation, zooming, and movement of the part will take longer to execute.

When you need to work on a file that is larger than the default facet value, you have these options:

- Change the default facet value to a larger number on the **Setting > General Preferences > Rendering Tab**. Open the file in ZPrint and the Display List is generated. See Section 8.5.2 “Rendering Tab” for additional information about changing the default facet value.
- Open the file in ZPrint and build the Display List by checking the **Build Display List** command on the **3D View** menu, or by clicking the **Build Display List** icon on the Toolbar .
- When you only want to print a large file, there is no need to build a Display List.

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2.6 The 2D (Cross-Sectional) View

2D View displays a part as a cross-sectional layer and has all the operations that are available in 3D View such as zooming and moving a part. Click the **2D** icon on the Toolbar to switch the view from 3D to 2D. Use the arrows on the Toolbar to move through the part layers one or ten layers at a time, or drag the Layer Handle (in the Side View) up and down to view layers.

To do this:	Toolbar	**Menu**	Keyboard Shortcuts
Move up one layer		**View > One Layer Up**	A
Move down one layer		View > One Layer Down	Z
Move up ten layers		**View > Ten Layers Up**	Shift A
Move down ten layers		**View > Ten Layers Down**	Shift Z

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3 EZ Print For ZPrinter 310 Plus/DESIGNmate Mx

EZ Print will print a single part using the settings for your default materials. It's the quickest and simplest way to get printing.

EZ Print mode can **only** be used with the **ZPrinter 310 Plus/DESIGNmate Mx** printer.

- Ensure the Firmware is version 10.138 or higher. Please visit the Printers section of our Web site and click on the link for your printer type for more information regarding Firmware: zcentral.zcorp.com

3.1 Using EZ Print

EZ Print is useful for users who may need assistance in building a part. **EZ Print** automates some functions and eliminates the need for the user to manually setup the part prior to printing. Check the **EZ Print** checkbox when you select a file from the **Open** dialog box, or select **EZ Print** mode at anytime from the **Settings > General Preferences > General** tab dialog.

1. Select **File > Open** to display the **Open** dialog.
2. Select a file and check the **EZ Print** checkbox to continue in **EZ Print** mode. Click **Open**.
   - If you are opening a *.zbd* file, the software will omit generating a Fixture and show the **Ready to Print** dialog, (shown in *Step 7*).

- If you are opening a *.zbd* file and the default powder is not the material associated with your printer type, the software will give you the option to either:
  - Proceed with the current powder settings
  - Proceed with the default powder settings
  - Cancel out of **EZ Print** mode

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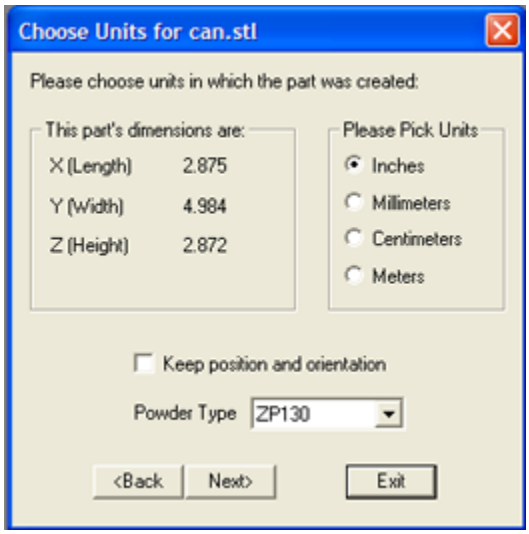
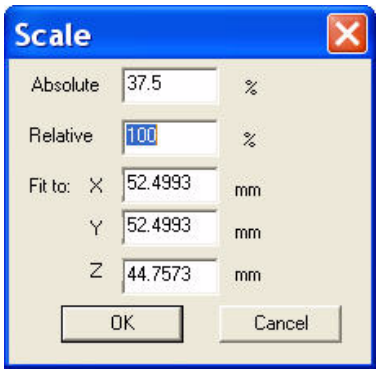
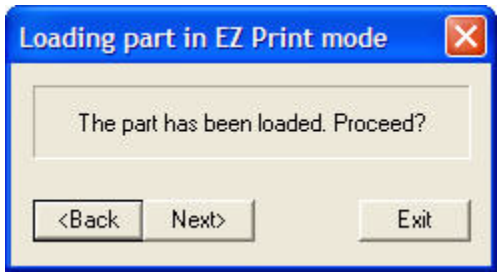
3. Select the display units for viewing the part in ZPrint and click **Next**. If you need to go back to the previous step and start again, click the **Back** button.



4. If the part is too big to fit in the Build Bed, ZPrint will prompt you to change the scale.



5. Once the part is loaded, ZPrint will ask if you want to proceed. Select **Next** to continue, or **Back** to return to the previous dialog.



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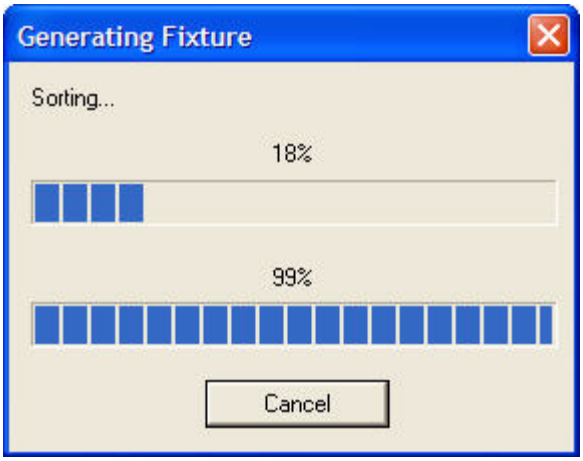
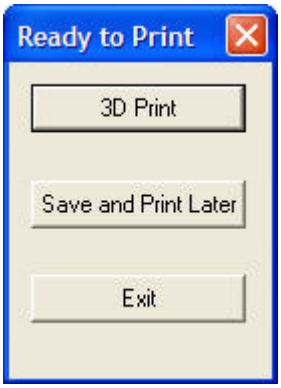
6. When **Next** is selected, the software creates a Fixture. It will perform Collision Detection to make sure the Fixture and the part are not touching. If any collisions are found, ZPrint will regenerate the Fixture with a higher accuracy level.



7. After the Fixture is created, the **Ready To Print** dialog appears. Click **3D Print**.



NOTE: The printer must be a **310/Mx Printer** and it must be connected through a serial port or a network connection. Selecting a printer other than a 310/Mx, or an Offline printer, will not allow you to continue in **EZ Print** mode.

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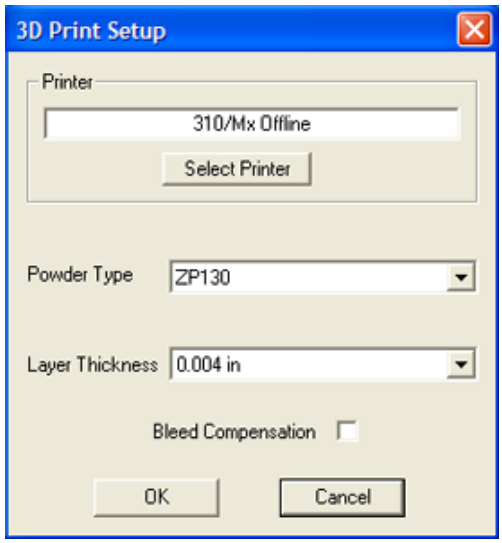
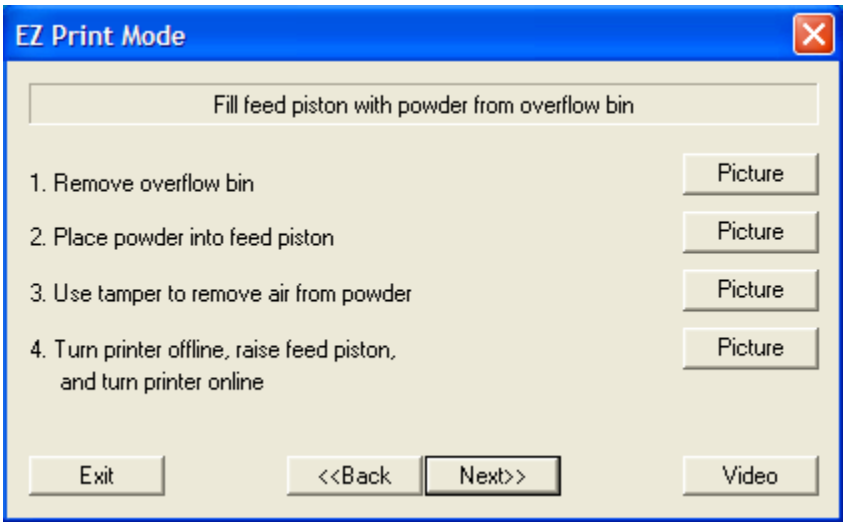


8. The software will take you through several steps to prepare the printer. Complete the steps in each dialog that appears. If you need help, or do not understand a step, click the **Picture** or **Video** buttons.

    a. Fill feed piston with powder from the overflow bin.



    b. Fill feed piston with fresh powder.

    If you still do not have enough powder to complete your build after recycling powder from the overflow bin, the software will prompt you and then drop the feed piston to the level required to complete the build. It will not drop the feed piston completely to the bottom.

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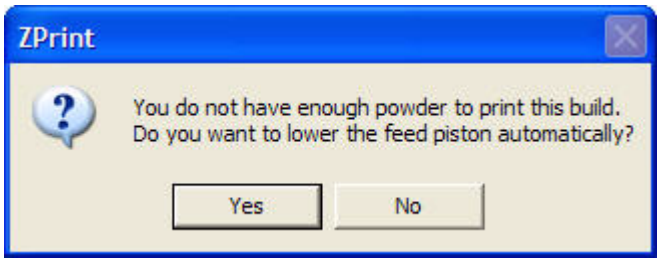
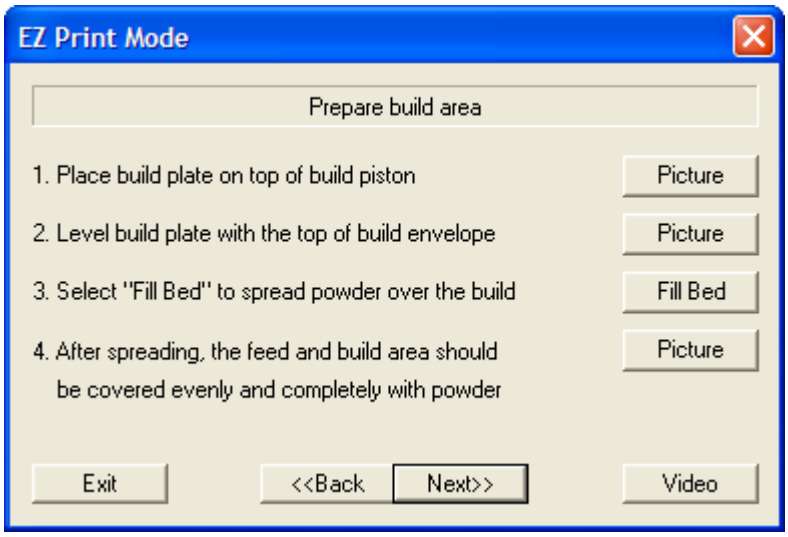


c. Prepare build area. Complete the steps and then click **Next**.



d. Clean service station. Complete the steps and then click **Next**.

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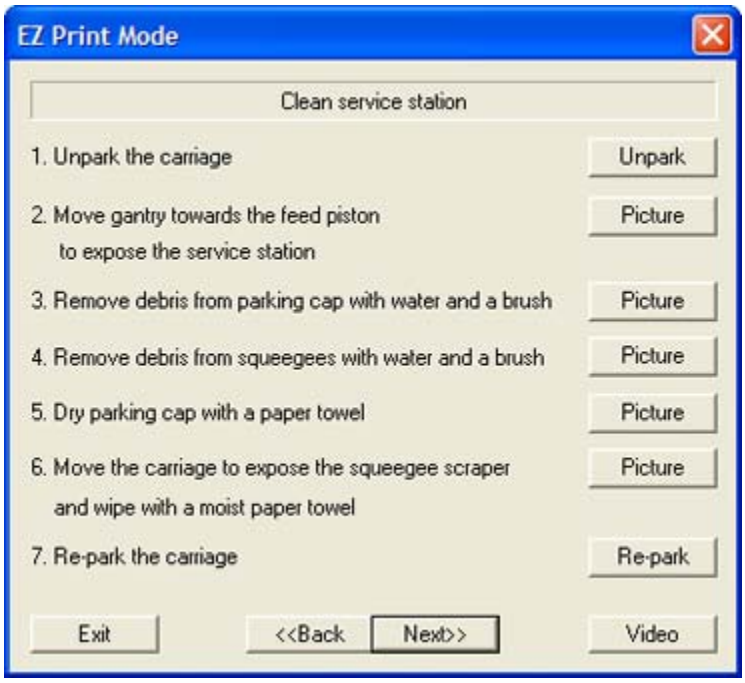

e. Check fluid containers

9. When all the steps to setup the printer are complete, the software will start printing your part. ZPrint saves your *.zbd* file prior to printing.

10. When the print job is completed, ZPrint begins a drying cycle and starts to countdown the time before you can remove the part from the Build Bed.

11. When the part is ready to remove, ZPrint displays the dialog shown below. This dialog contains links to video clips about how to remove, depowder, and infiltrate a part. Remove and post-process the part.

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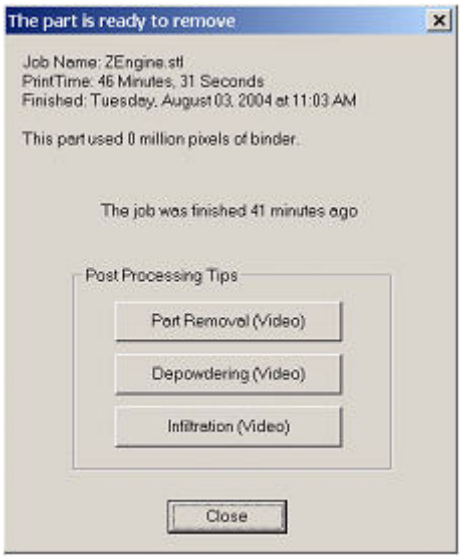

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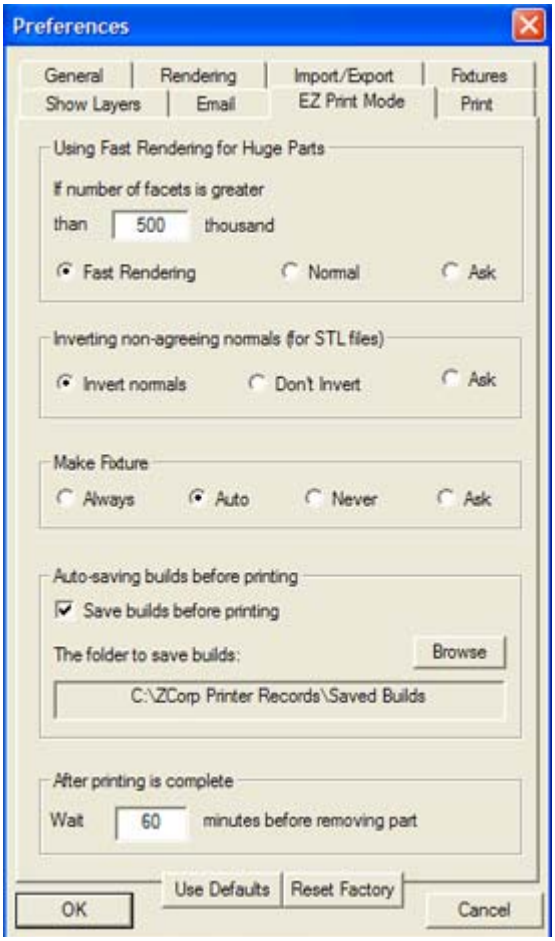
3.2 Change The Default EZ Print Settings

Select the **General Preferences > Settings > EZ Print** tab to change the default settings for **EZ Print** mode. See Section 8.5.7 “EZ Print Mode Tab” for complete information about changing the **EZ Print** preferences.



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4 ZEdit

ZEdit™ Software was developed by a team of software developers and application engineers as a tool to help those who use HD3DP™ (high-definition 3D printing) to optimize the color output of their models. ZEdit works in conjunction with ZPrint. Use ZEdit to apply color to a part with a texture map, engineering template, text, or paint. ZEdit also has several diagnostic tools for locating and correcting simple file problems before you start the print job.

ZEdit is compatible with *.3ds*, Lightwave, Wavefront, AutoCAD, *.stl*, and *.zbd* files. For more information, please refer to the **ZEdit™ Software Manual.**

4.1 Loading Your Part Into ZEdit

There are two ways to load your part into ZEdit:

- Select a part in ZPrint and then press the ZEdit icon.

- Select a part in ZPrint and then select **Edit >Start ZEdit**.

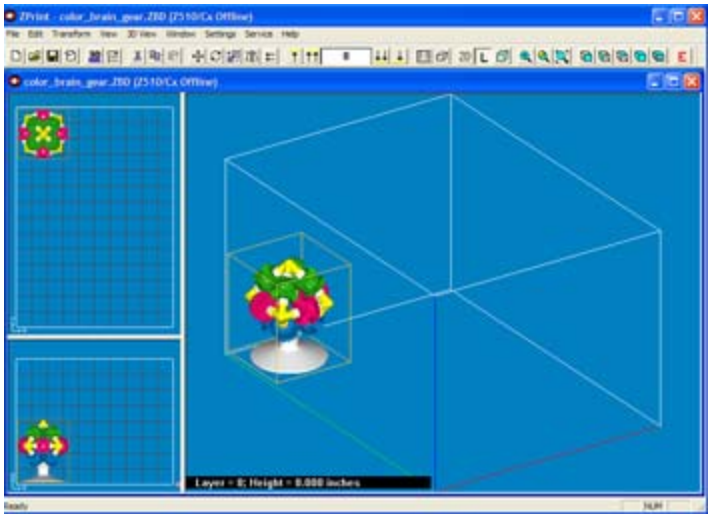
If you have purchased ZEdit Pro, you will also have the option of loading your part into ZEdit Pro:

- Select a part in ZPrint and then press the ZEdit Pro icon.

- Select a part in ZPrint and then select **Edit >Start ZEdit Pro**.

When your part opens in ZEdit, it has the same orientation it had in ZPrint. The advantage of loading a part into ZPrint first is that you can scale the model, and then bring it into ZEdit to label or paint. When you exit ZEdit, choose whether to update the part in ZPrint with the changes made in ZEdit. For more information, please refer to the **ZEdit™ Software Manual**.

ZPrint



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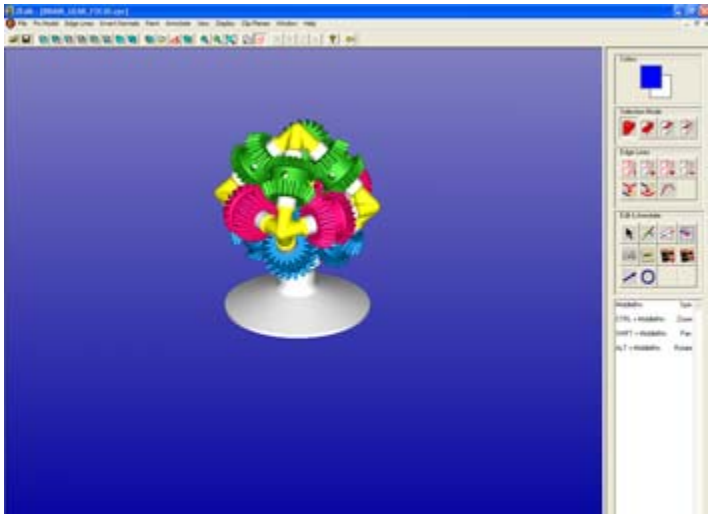
ZEdit



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5 Setup The Build

The first part of this section will introduce you to the file types ZPrint handles, and the basics of opening a file.

- Section 5.1 “Overview Of Part And Build Files”
- Section 5.2 “Part Orientation”
- Section 5.3 “Opening and Selecting Files”
- Section 5.4 “The Right-Button Pop-Up, Edit, And Transform Menus”

The next section will show you how to perform the most frequently-used functions, such as scaling and translating the part.

- Section 5.5 “Transform The Part”
- Section 5.6 “Align Parts in Build”
- Section 5.7 “Translate (Position) Parts”
- Section 5.8 “Rotate Parts”
- Section 5.9 “Scale Parts”
- Section 5.10 “Mirror Parts”
- Section 5.11 “Justify Parts”

ZPrint also equips you to perform advanced functions such as detecting collisions between layers and adding color, labels and a witness part.

- Section 5.12 “Collision Detection”
- Section 5.13 “Apply Color To Monochrome Parts”
- Section 5.14 “Anisotropic Scaling”
- Section 5.15 “Make Label”
- Section 5.16 “Make Solid”
- Section 5.17 “Make Fixture”
- Section 5.18 “Witness Part”

Finally, it’s very important that you save your work!

- Section 5.19 “Save Your Work”

5.1 Overview Of Part And Build Files

A **Part file** is a file that is created in a 3D modeling software package. Some examples of Part files are files that have an *.stl*, *.zpr*, *.wrl*, *.ply*, *.3ds,* or *.zec* extension. **Build files** (which are also called Part or Document files) have a *.zbd* or *.bld* extension and are unique to ZPrint. Build Files include the set of Part files oriented in the Build Bed.

You can open a single Build file, or multiple Part files, into the ZPrint main window. When you save changes, or exit ZPrint, ZPrint prompts you to save the Part file(s) as a *.zbd* file (a Build file). Save a Part

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file as a Build file to keep all of the modifications that you have made to the part(s), along with the printer/powder settings you have selected for that build.

You cannot open a combination of Build files and Part files into the ZPrint main window. Only one Build file at a time can be loaded into the main window. If you try to open more than one *.zbd* file into the same window, ZPrint will ask you to select a single document (Build) file, or several Part files.

5.2 Part Orientation

5.2.1 Overview - Part Orientation

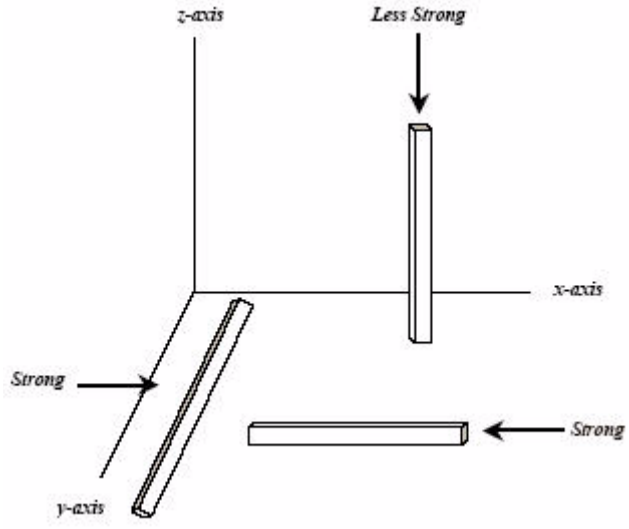
Parts that lie in the X-Y plane will be stronger than those aligned on the Z-Axis. If a part has a particularly delicate feature, especially one shaped like a thin rod, align that feature in the X-Y plane for the greatest strength. If a part has particularly delicate features that are supported only by unprinted powder, build a Fixture for the part to reduce the chances of breaking the feature during powder removal.

Do not tightly pack multiple parts into the Build Bed. If multiple parts are tightly packed, it may be difficult to lift them out of the Build Bed with proper support. If a delicate part is being built with other more solid parts, add a Fixture to the delicate part to protect it during powder removal.

5.2.2 Speed, Strength and Accuracy

The orientation of a part in the Build Bed impacts printing speed, finished part strength, and finished part accuracy.

- **Printing Speed**. The ZPrint Software automatically positions parts in the Build Bed for maximum build speed by placing parts with the smallest dimension in the Z-Axis.
- **Strength**. The ultimate strength of an uninfiltrated part will be somewhat affected by its orientation within the Build Bed. The part will be strongest along the X-Axis and Y-Axis and less strong along the Z-Axis. This is because the cross sections are printed in continuous strips along the Y or the “fast” axis (the print head’s direction of travel); in bands across the X or the “slow” axis (the fast axis direction of travel); and in laminated layers along the Z-Axis. Once a part is infiltrated, it uniformly takes on the strength characteristics of the infiltrating product.



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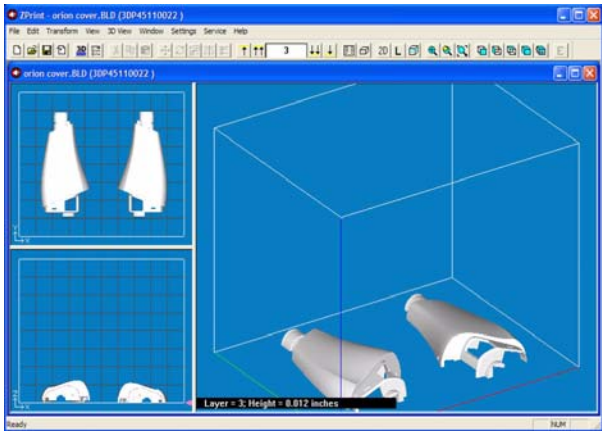
- **Accuracy**. The accuracy of your part depends on how clean the printer is, your printer/powder settings, and the materials you choose for post-processing. You can also employ ZPrint features like Anisotropic Scaling to adjust for expected shrinkage and bring your parts into true scale.

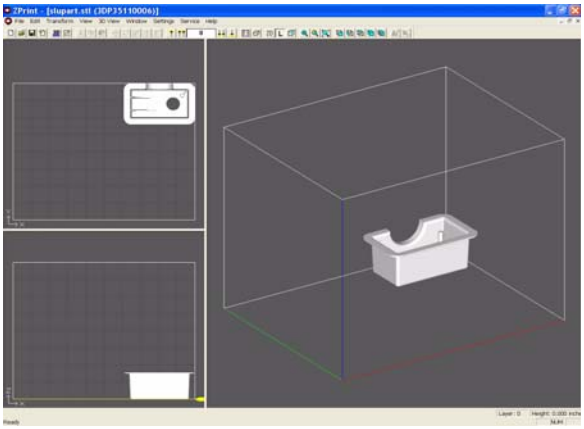
5.2.3 Parts Containing an Opening or Hollow Area

Automated vs. Manual Depowdering

- If you are using a ZPrinter 450 or 650 with Automated Gross Depowdering, place the hollow side of a part facing down in the Build Bed to allow powder to evacuate during automated powder removal.
- If you are using a ZPrinter 310 Plus, 510, or 350 with Manual Gross Depowdering, place the hollow side of a part facing up in the Build Bed to allow easier access during manual powder removal.

Depending on how the part is imported into ZPrint, you may need to use the **Rotate** feature to correctly orient the part. If the part is delicate, create a Fixture to give it extra support and additional protection during powder removal.





5.2.4 Parts Containing Overhangs

For delicate parts and parts with overhangs, create a Fixture, or create a Fixture for the area of the part that needs support. Unsupported overhangs are placed on the rear-most side of the Build Bed, as close to the bottom of the Build Bed as possible.

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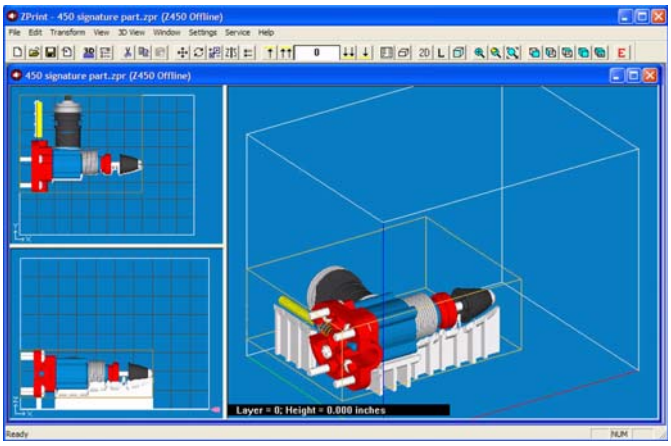
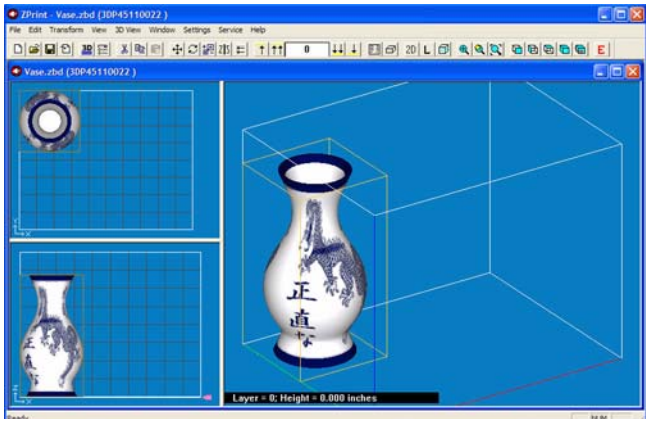


An example of a part with two Fixtures to support the overhangs

5.2.5 Parts Containing Cylindrical Features

Cylindrical features will be more accurate when the cylindrical axis is parallel to the Z-Axis.



5.3 Opening and Selecting Files

5.3.1 Open Files In ZPrint

When you launch ZPrint, the **Open** dialog displays for you select a file to print. Use the **Open** dialog to load a single Build file (*.zbd*, *.bld*), or one or more Part files, (*.3ds*, *.wrl*, *.stl*, *.ply*, *.zpr*, *.gis*, etc.), into ZPrint.

By default, when a file is opened or imported, ZPrint will:

- **Warn you if any piece of the part falls out of Build Bed bounds.** To change this option, see Section 8.5.1 “General Tab”.
- **Orient imported parts for the fastest print times.** To change this option, see Section 8.5.3 “Import/Export Tab”.

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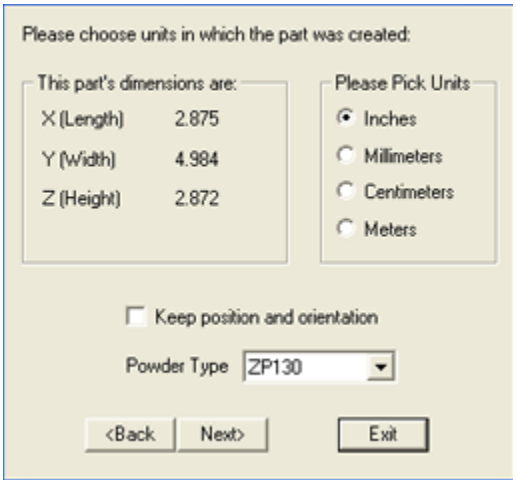
- **Fast Render parts larger than 300 thousand facets.** To change this option, see Section 8.5.2 “Rendering Tab”.

If a Part file is created with dimensions that are too large for display in ZPrint, ZPrint evaluates the file and determines the largest units that can be used for displaying the part. Choose to change the units in the **Choose Units** dialog, or keep the selection that ZPrint chooses and click **Next** to proceed. Changing the Display Units does not change the part dimensions, or the units the part was created with.

Important: *.wrl (vrml) files will always import in meters*. After importing a *.wrl* file, if you cannot see the model, or see only a part of it, close the window and reopen the file. Change the Display Units to millimeters or centimeters when the **Choose Units** dialog appears.



5.3.2 Add Parts To An Existing Build

You can add multiple part files to an existing build. Select **File > Import**. In the **Open** dialog, hold down the **Ctrl** key and click on multiple files to select them. When finished, click **Open**. ZPrint positions each subsequent part in the Build Bed for the fastest print times.

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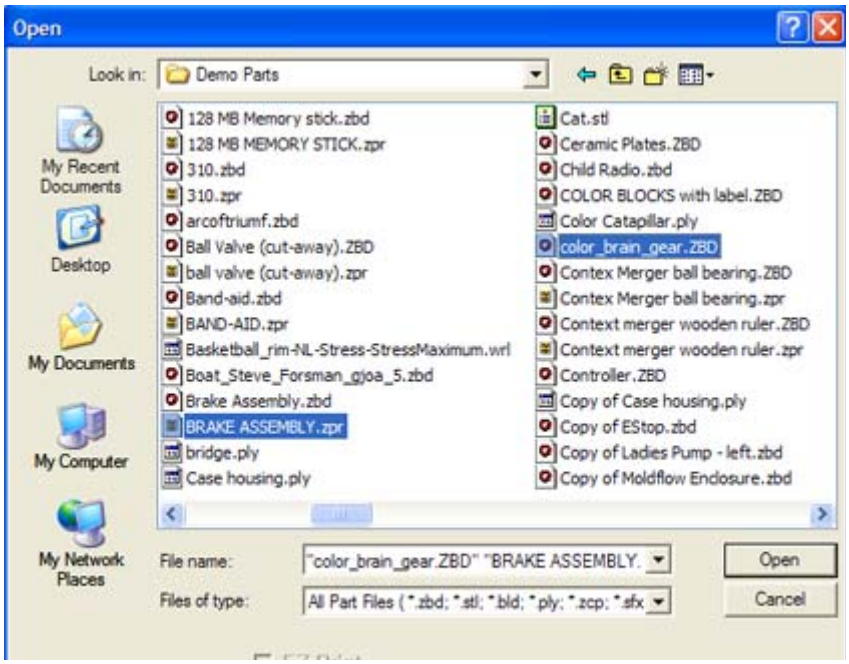
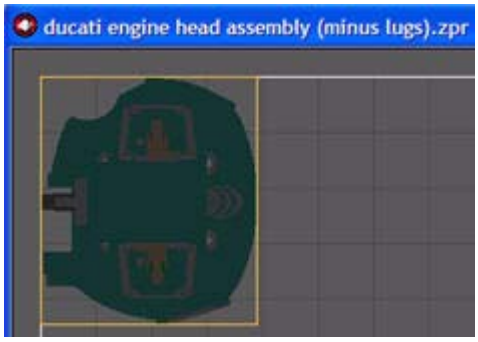
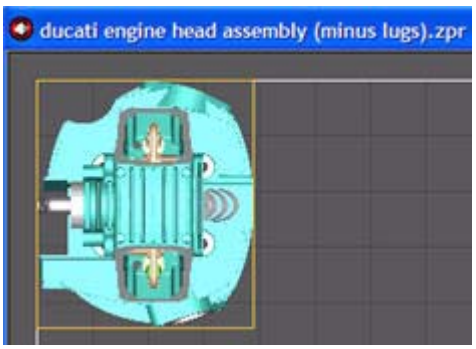


If a Part file opened in ZPrint is rendered dark and the slices are not visible in the cross-sectional (2D) view, it often means the back facets of the file are showing. If this is the case, the part will not print properly. To correct the file in ZPrint, select the part (see next section) and then select **Edit > Normals > Invert All Normals**.



Normals Inverted



Normals Corrected

5.3.3 Part Selection

- To select a single part in any view of the ZPrint main window, left-click directly on the part with the mouse. A yellow wire frame appears around the part indicating that part that has the current focus.
- To select multiple parts, hold down the **Shift** key and left-click on each part. All selections have the current focus when any operation is performed.
- To select all the parts in your build at the same time, choose **Edit > Select All**.

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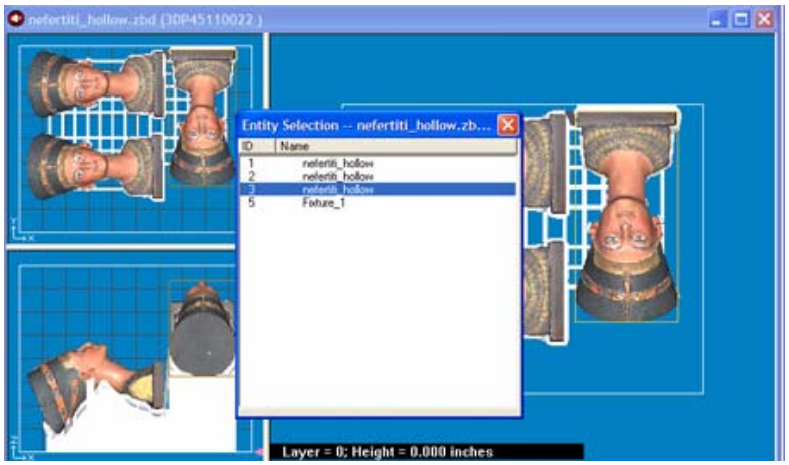
- To de-select a single part, left-click once on any area in the Build Bed that does not contain the part. When multiple parts are selected, hold down the **Shift** key and click directly on a part to de-select.
- To de-select multiple parts at the same time, click once on any area in the Build Bed that does not contain a part.

5.3.4 Selection List

Another way to select a part is by using the Selection List, which is accessed on the ZPrint Toolbar. The Selection List will list each part that is open in an active ZPrint window.

Click the icon on the Toolbar to display the **Entity Selection** dialog. Click on a part to select it. To select multiple parts, press the **Ctrl** button and click on multiple parts.



5.4 The Right-Button Pop-Up, Edit, And Transform Menus

After a Part file is loaded into ZPrint, it can be copied, translated, rotated, scaled, mirrored, justified, and - if the file is a monochrome part - the entire part can be painted. These tools are available on the **Right-Button Popup**, the **Edit**, and the **Transform** menus.

- For information about using the **Make Label**, **Make Solid**, and **Make Fixture** commands, please refer to those sections later in this chapter.

5.4.1 The Right-Button Pop-Up Menu

The Right-Button Pop-Up Menu is accessed by clicking the right mouse button. It is also called the Right-click Menu.Depending on whether a part is selected or not, different choices in the menu will be active.

- The **Right Button Popup** Menu is a quick-access menu of commands that are a combination of the **Edit** and **Transform** menu commands, plus the **Export *.ply*** command, which is also on the **File** menu.

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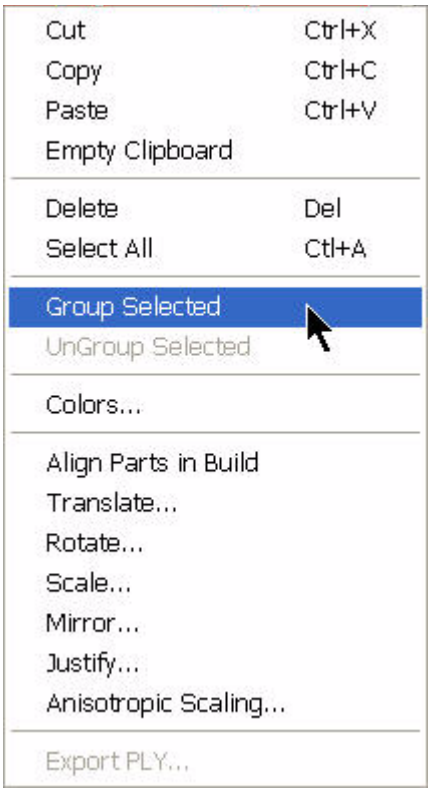

5.4.2 Edit Menu

- To make additional copies of your part in ZPrint, select the part, then choose **Edit > Copy**, or press **Ctrl-C** on your keyboard. Paste the file by choosing **Edit > Paste**, or by pressing **Ctrl-V** on your keyboard. You may copy and paste between different open windows within the same ZPrint session.
- Any copied part is kept on the clipboard until the clipboard is emptied. If you have copied and stored a large part, or several parts on the clipboard, empty the clipboard by selecting **Edit > Empty Clipboard**. Emptying the clipboard will reduce the amount of memory used.
- To delete a part, select the part and choose **Edit > Delete**, or press the **Delete** key on your keyboard.
- Any action that has been applied to a part can be undone. Choose **Edit > Undo,** or press **Ctrl Z** on your keyboard, to cancel the last action applied to the part.

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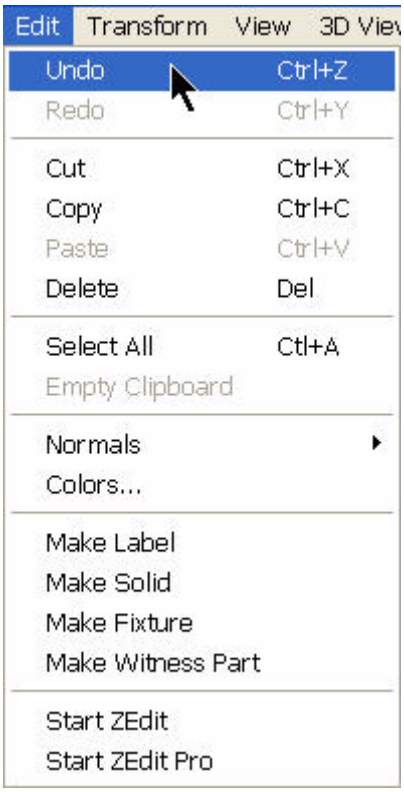

5.5 Transform The Part

ZPrint allows you to transform an individual part, or a group of parts. When transformed individually, the center of transformation is located in the middle of the part. When a group of parts is transformed, the center of transformation is located in the middle of the group. Following is an illustration to help clarify the differences between individual and group transformations.

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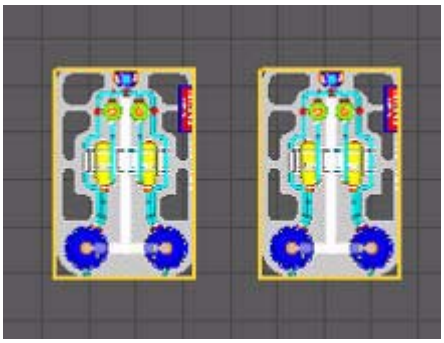
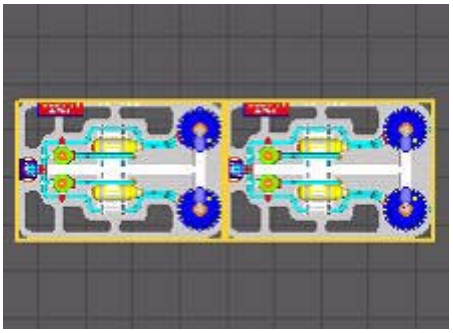
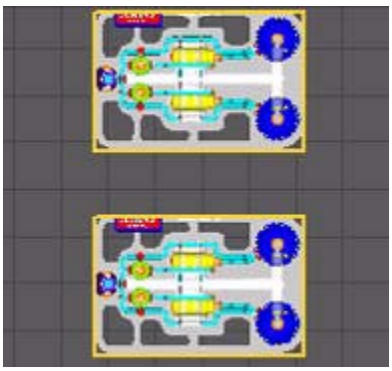
- Here, two parts are shown in the 3D View.



- When both parts are selected and **Transform > Rotate** is chosen, the parts will rotate and reorient relative to their individual centers.



- When both parts are selected, and **Transform > Rotate** is chosen, the parts will rotate and reorient themselves relative to the center of the group, as shown below.



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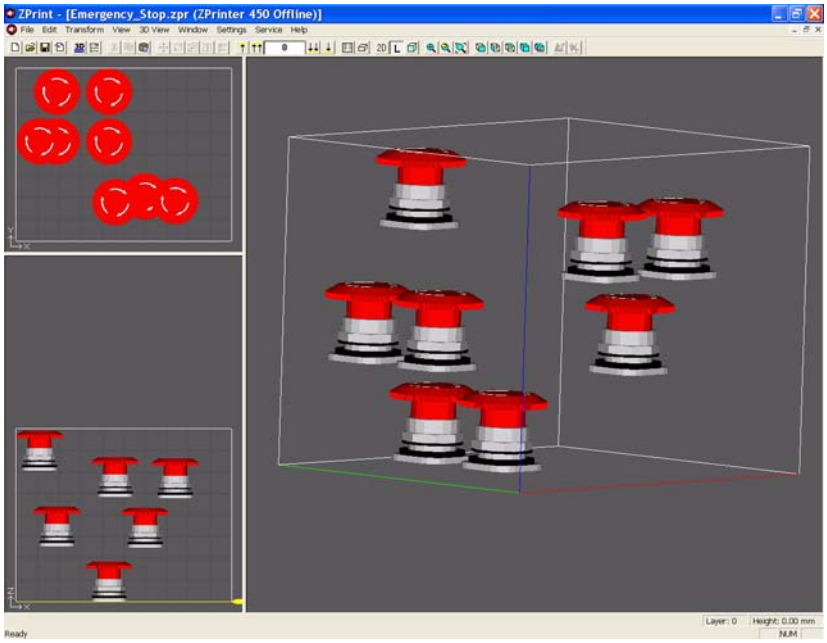
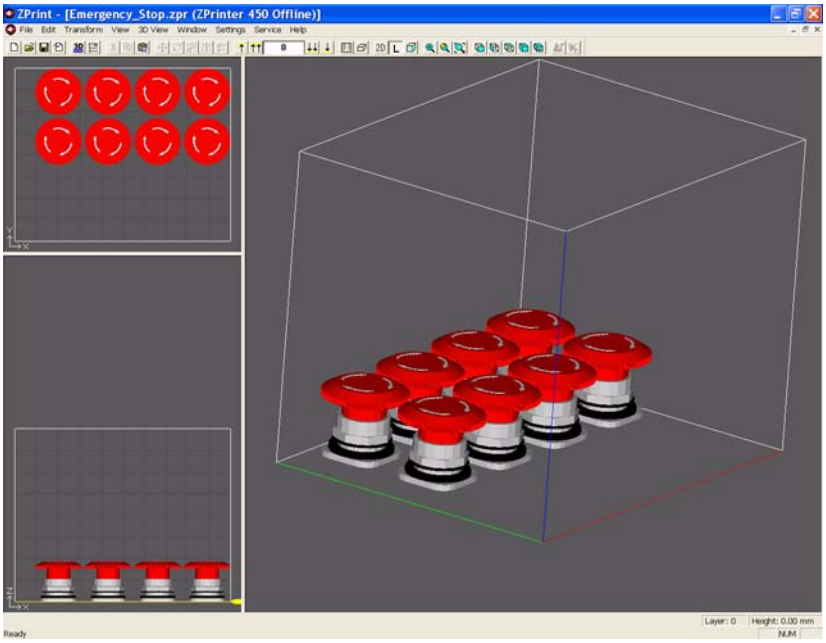
5.6 Align Parts in Build

Aligning the parts in the build volume places them in the most efficient location for printing.

For example, assume the original constellation of parts looked like the screenshot below.



Selecting **Transform > Align Parts in Build** will line up the parts for the fastest printing, as shown below.



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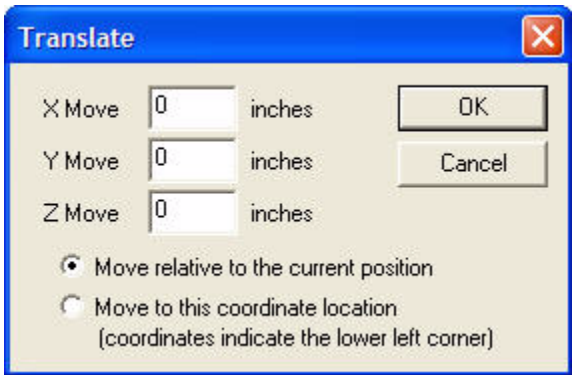
5.7 Translate (Position) Parts

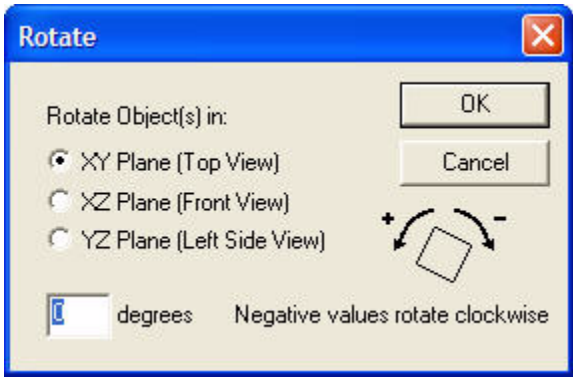
You can translate (or position) a part manually using the mouse, or you can use the **Translate** dialog.

- **Manual:** Select the part(s) in the ZPrint **Top** or **Side** Views. Press the left mouse button and drag the mouse to reposition the part.
- **Translate Dialog:** Select **Transform > Translate** and enter the distance to move the part in the **X**, **Y**, and **Z** fields. The default values of 0,0,0 represents the lower-left corner of the Build Bed.
- **Move relative to the current position**: Enter the distance to move the part in the **X**, **Y**, and **Z** fields, and click **OK**. The part moves to the specified location.
- **Move to this coordinate location**: Select the **Move to this coordinate location** option. The current location of the part populates the **X**, **Y**, and **Z Move** fields. Enter a new value in one or more of these fields and click **OK**. The part moves to the specified location.



5.8 Rotate Parts

- To rotate a part, select the part and choose **Transform > Rotate**. In the **Rotate** dialog, specify the plane and degree of rotation, and click **OK**.
- To keep a group of parts in the same relative orientation, rotate the parts as a group. Select each part and then choose **Transform > Rotate**.



5.8.1 Rotate in Active View

Select **Transform > Rotate in Active View** to rotate a part in a specified view.

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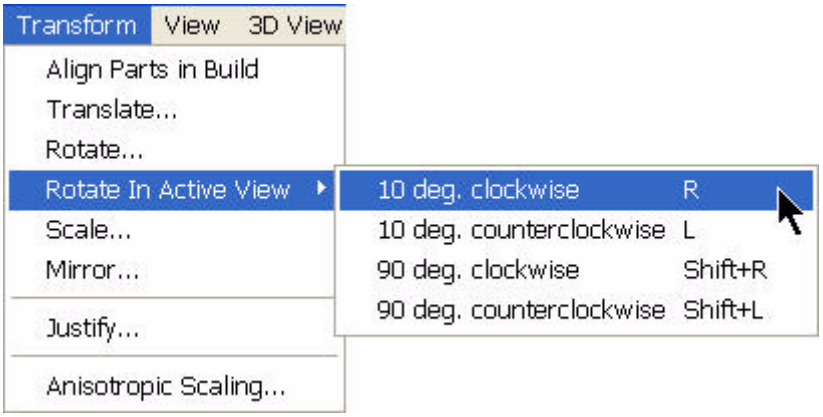
- Select one or more parts in the **Top** or **Side** Views.
- Choose an option on the **Transform > Rotate in Active View** submenu.

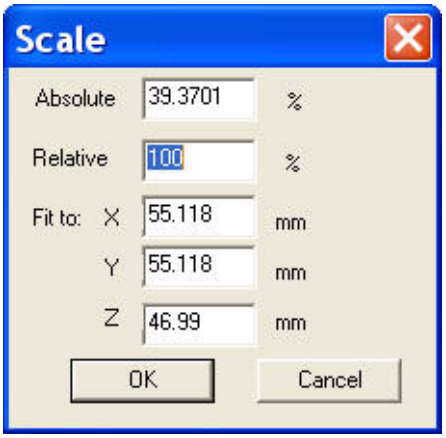


5.9 Scale Parts

Select the part and choose **Transform > Scale**. If you scale a part and it does not fit into the Build Bed, ZPrint prompts you with a warning telling you an object is extending beyond the Build Bed boundaries and draws a red wire frame around the part. See Section 5.11.1 “Parts Extending Outside The Build Bed Boundaries” for additional information.

In the **Scale** dialog box, you have several options:

- Scale the part as an **Absolute** percentage of its size when it was first brought into the build volume by entering a percentage in the **Absolute** field.
- Scale the part **Relative** to its current size by entering a percentage in the **Relative** field. Click the cursor in any of the **X**, **Y**, or **Z** fields to update those values. Click **OK**.
- Scale a part to a specific size by entering dimension values directly in the **X**, **Y**, and **Z** fields.



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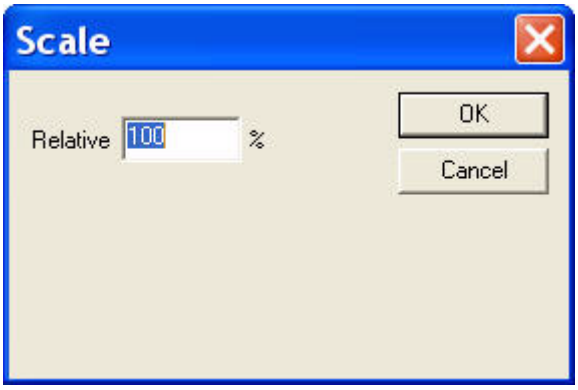
If you are working with more than one part (either Grouped or simply selected) The **Scale** dialog will only offer the Relative scaling option.

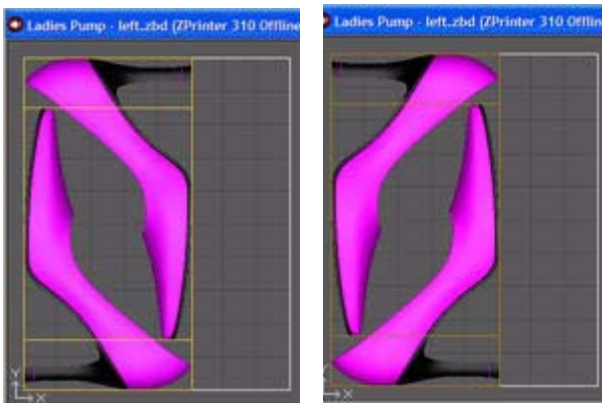
- Scale a group of parts by selecting the parts, then selecting **Transform > Scale**. Change the **Relative** value and click **OK**.



5.10 Mirror Parts

The Mirror feature will inverse the orientation of a part in the **X**, **Y**, or **Z** Axis. The software does this by placing a plane in the center of the part.

- Select a part and select **Transform > Mirror**. The software will not create a separate part. It will take the selected part and invert its orientation.
- Mirror a group of parts by selecting the parts and then choosing **Transform > Mirror**.



Original Orientation *Mirrored Orientation*

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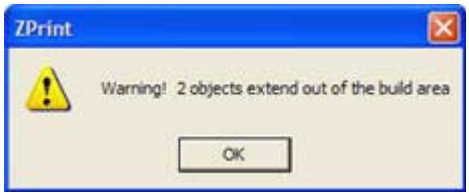
5.11 Justify Parts

The Justify feature will align a part to a specified location in the Build Bed. Select the part and choose **Transform > Justify**. You may justify the part to the center, left, right, front, back or bottom of the Build Bed. To justify a group of parts, first select the parts and then choose **Transform > Justify**.

5.11.1 Parts Extending Outside The Build Bed Boundaries

IMPORTANT: When changing the orientation of a part in the Build Bed, you may find that a part exceeds the boundaries of the Build Bed. When this happens, the part is highlighted in a red wire frame and a warning message appears.



To reorient the part, select the part and either move it with the mouse in the **Top** or **Side** Views, or use the **Justify** dialog or the **Align Parts in Build** dialog. You may need to scale the part if it does not fit in the Build Bed.

NOTE: If you do not want ZPrint to warn you when a part extends beyond the Build Bed, uncheck the **Warn if entity is out of Build Bed bounds** option in the **Settings > General Preferences > General** tab.

5.12 Collision Detection

Collision Detection is a function that you run prior to printing to see if parts are touching each other. It is important to run Collision Detection when you are printing multiple parts in the same build, or when using Fixtures.

Collision Detection checks each layer of each part (and Fixture) to ensure they are not touching or overlapping. Printing parts that are too close together in the Build Bed, or are touching, will result in the surfaces of the parts adhering to each other.

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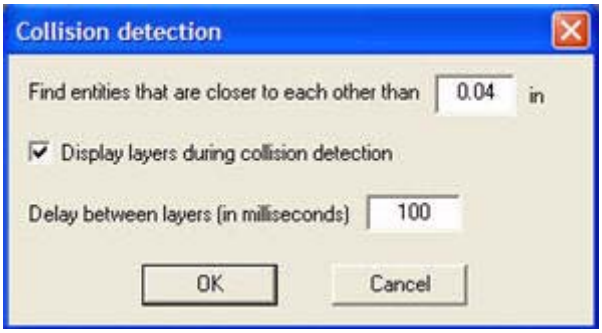
1. Select **View > Collision Detection**.
2. Check the **Display layers during collision detection** option and click **OK**. It takes the software a few minutes to analyze all the part layers.
3. If a collision is detected, a warning appears and identifies which layer the collision is detected on. Correct the collision by adjusting the part position, then run Collision Detection again. Continue in this manner until there are no collisions reported by ZPrint.
4. If no collision is detected, ZPrint returns a confirmation that no collision was found.
5. After correcting all collisions (by repositioning the parts in the Build Bed view), run Collision Detection again to ensure there are no more collisions.



5.13 Apply Color To Monochrome Parts

Select **Edit > Colors** to apply color to single or multiple monochrome part(s) (*.stl* files).

NOTE: It is recommended that you use ZEdit for painting parts. In ZEdit, you can apply multiple colors to part surfaces, shells, or triangles with full painting capability using the cursor.

1. Load an *.stl* file and select the part.
2. Choose **Edit > Colors**.
3. Choose a color on the **Color** palette and click **OK**. The color is applied to the selected part.

5.14 Anisotropic Scaling

Each combination of powder, binder and printer model has its own preset anisotropic scaling values. To override this setting and print a build using a different value, access the **Anisotropic Scaling** dialog and modify the current settings. See Section 8.1 “Create Custom Powder Types” and Section 8.3 “Anisotropic Scaling Overview” for additional information.

Changing the values in the **Anisotropic Scaling** dialog applies to the current build only. Most users will not need to change the default settings for Anisotropic Scaling.

1. Select the part and select **Transform > Anisotropic Scaling**.
2. Enter values for the **X**, **Y**, and **Z** Axis. (A range of 0.8 - 1.2 is the recommended scale for ZPrinter 450.)
3. Click **OK**. The Anisotropic Scaling settings are applied to the part for the current build only.

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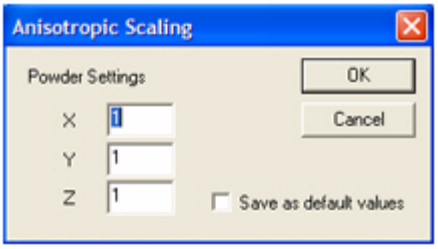
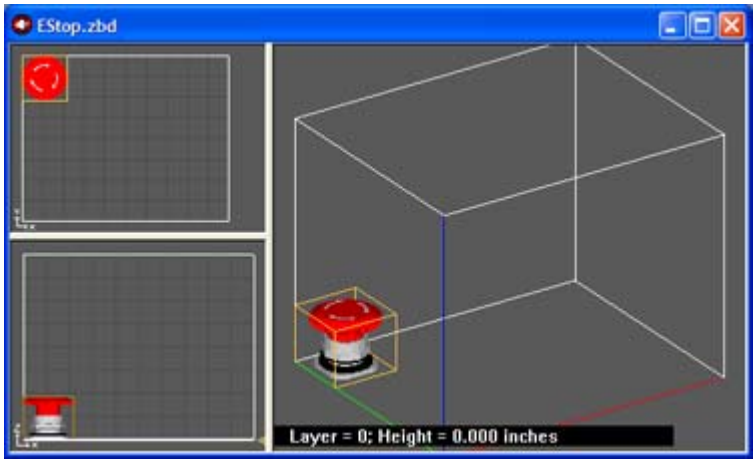


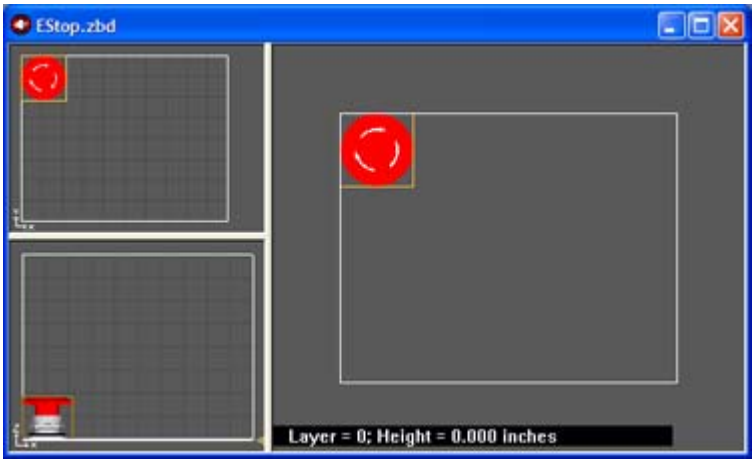
5.15 Make Label

ZPrint can make a label (raised or flat) on the surface of a part in a variety of fonts and colors. If the part is an *.stl* file (monochrome), the label will be the same color as the part, if color is applied.

1. In the ZPrint **3D View**, select the part you want to label.



2. Orient the view so the surface receiving the label is facing you.



3. Select **Edit > Make Label** to display the **Label** dialog.

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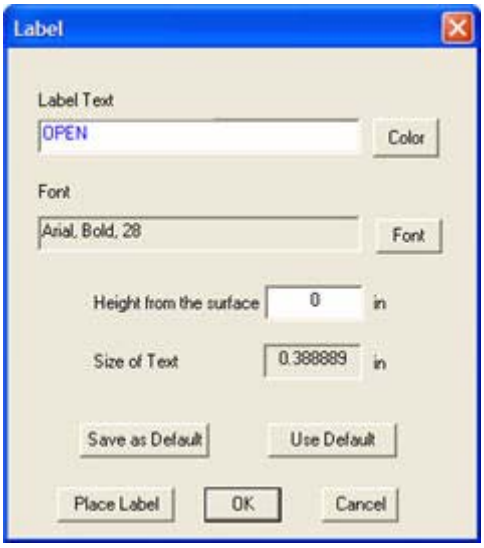
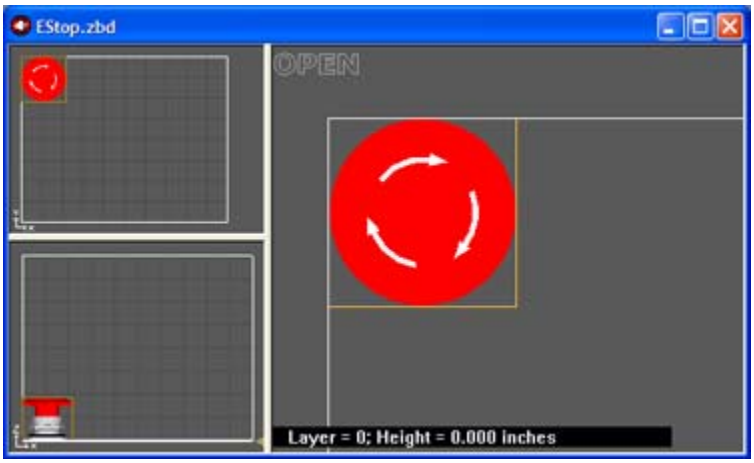
4. Type in the label text, choose a font color, size, and enter the height to raise the label from the surface of the part. (If you want a flat label, enter a zero (0) in the **Height from the surface** field.) The label text appears in the top, left corner of the 3D View.





5. Click **Place Label**.
6. In the 3D View, point the mouse on the label text and press the left mouse button. Drag the text to the area of the part you want the label to appear. The label will project straight down onto the surface. (Labels are trimmed to follow the surface they reside on, as long as the surface is solid.)

   IMPORTANT: If the label does not fit the part, click the **Place Label** button again and change the text font or size. When finished, click **Place Label** again and use your mouse to move the label to the part.

   NOTE: If you try to project a label onto an empty surface area, ZPrint will display an error message. You can correct this by changing the text font size to a size small enough to allow the label to fit onto the surface.

Most font types work well with labelling, but there are a few exotic fonts that may create bad edges on the part. If this is the case, ZPrint will prompt you to change the font.

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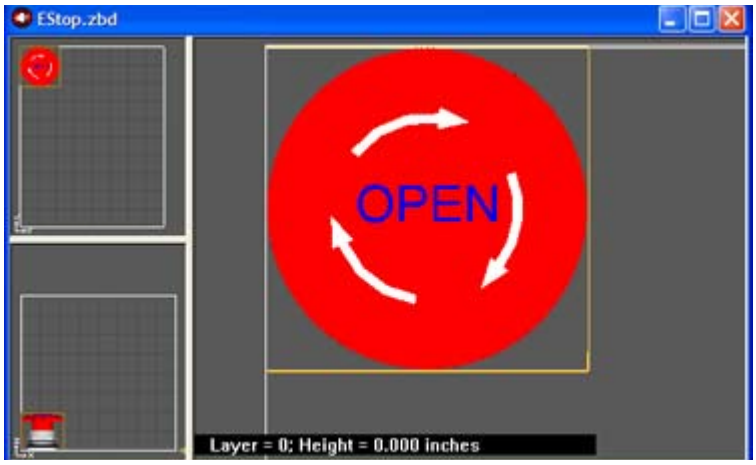
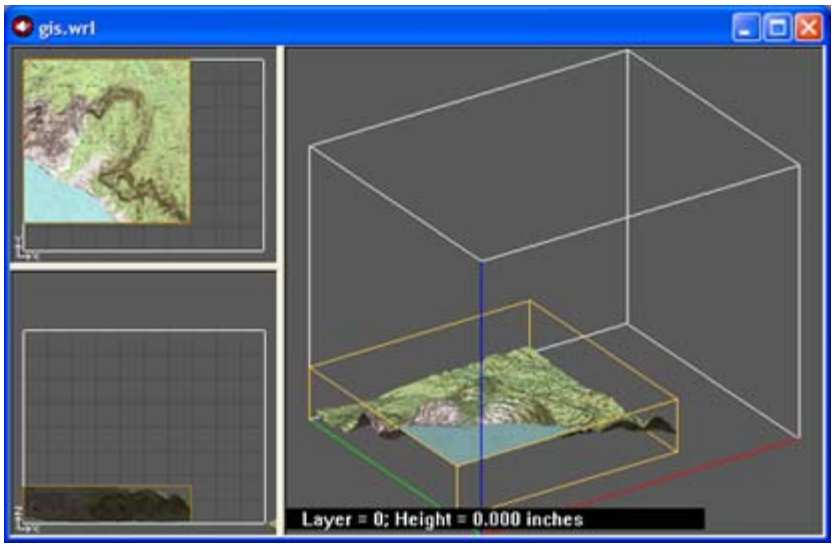


7. When you are satisfied with the label placement, click **OK** in the **Label** dialog. If you need to start over, select **Edit > Undo Label**.

5.16 Make Solid

Make Solid is a feature that generates a solid base for a single rectangular surface. We recommend generating a solid base when printing GIS (Geographical Information Systems) files.

1. Open a *.gis* file in ZPrint and select the part.



2. Select **Edit > Make Solid**.
3. In the **Base Thickness** dialog, enter a value for the base thickness and press **OK**.

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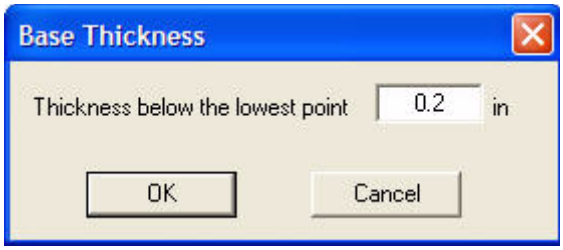
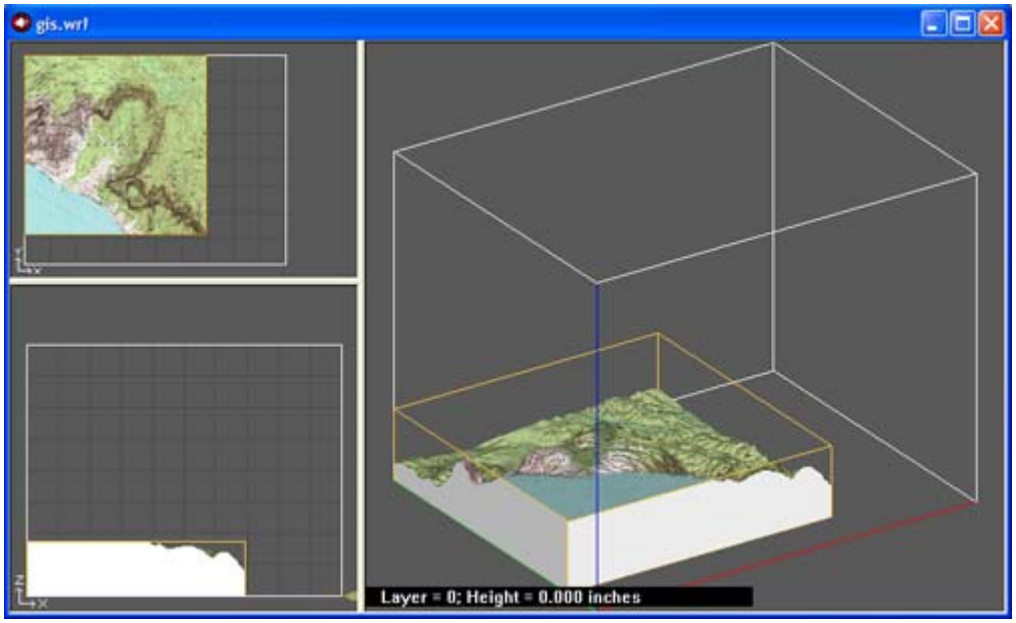


4. ZPrint generates the base. Because a solid base is heavy, it is recommended that you justify the part placement to the bottom of the Build Bed, so it is resting on the Build Bed platform and not on powder.



5.17 Make Fixture

5.17.1 Overview

A Fixture is a grid-shaped object with a top surface between the bottom-most surface of the part (without actually touching the part) and the bottom of the Build Bed. Generate a Fixture for an entire part, or for a portion of a part, that needs additional support.

ZPrint evaluates the part geometry and generates the smallest Fixture necessary, with minimum use of materials. Fixtures also provide these benefits:

- Supports parts during automatic powder removal cycle. (ZPrinter 650 and 450 only)
- Keeps multiple parts from bumping into each other, or into the Build Bed walls, during automatic powder removal (when used with the **Make Bumper** option). (ZPrinter 650 and 450 only)
- Supports delicate, thin parts for easy removal from the printer and handling during post-processing.
- An option for creating Fixtures with holes to allow powder that is trapped between the part and the Fixture to escape.
- Increases accuracy in the Z-Axis for parts with large overhangs.

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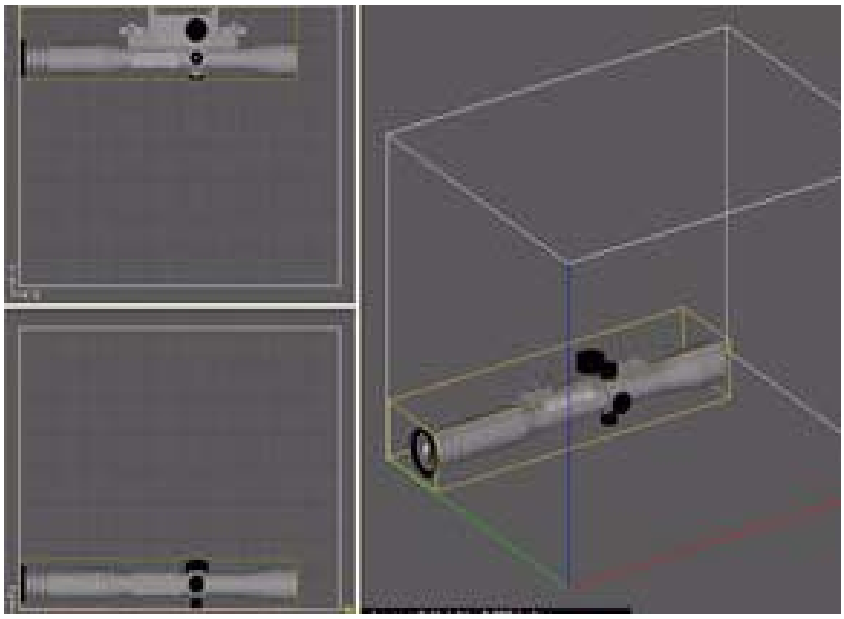
- Helps prevent “squash” effects for hollow cylindrical parts, or parts with overhangs.

NOTE: “Squash” effect results from an overhang being supported only with unprinted powder. For example, if a part is a hollow round cylinder, the weight of the powder above the cylinder will cause it to “squash” to something slightly less than round, if there is no support underneath.

5.17.2 Create a Fixture for an entire part

1. Select the part in ZPrint.
2. Select **Edit > Make Fixture**. ZPrint orients the part in the 3D View for building the Fixture.

   NOTE: The settings in the **Make Fixture** dialog are the **General Preference** settings that are preset in the software and the recommended settings for the printer. See Section 5.17.4 “Default Fixture Settings” for details.



3. There are two features you may choose to enable for a Fixture:
   - **Make Bumper**: To add a bumper to a fixture, check the Make Bumper check box. A bumper will be generated on the Fixture base.
   - **Holes between walls**: Powder may get trapped between the Fixture and the part. You can generate a Fixture with holes at the grid intersections to allow powder to escape during powder removal. A zero (0) in this field means no holes are generated on the Fixture. The higher the percentage, the larger the holes will be on the Fixture.

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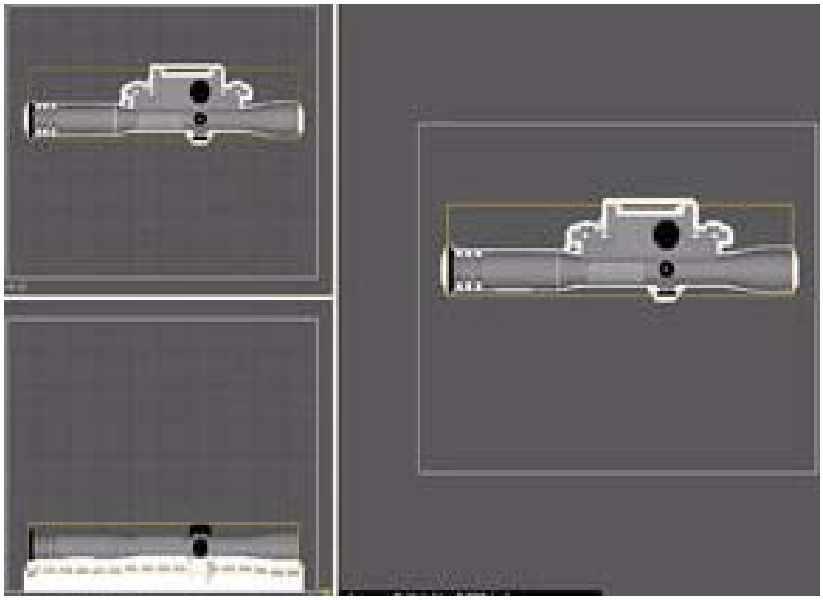
4. Click **OK**. The Fixture is generated.

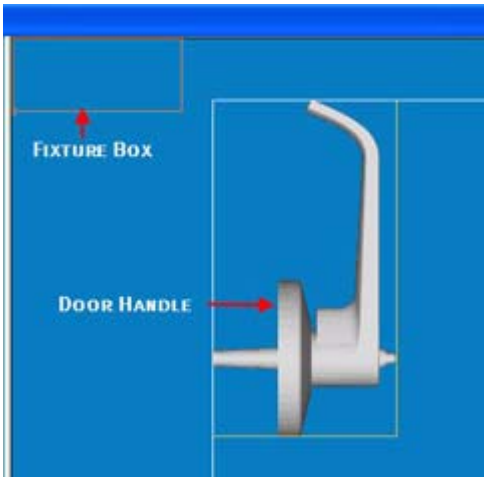
   The fixture is shown in white on the screen.



5. Select **View > Collision Detection** to ensure the Fixture is not touching the part. If the Fixture is touching the part, do the following:
   - Select the fixture and press **Delete** on your keyboard.
   - Open the **Make Fixture** dialog and increase the Accuracy Coefficient value by 1 (one).
   - Click **OK** to regenerate the Fixture.
   - Run Collision Detection again.

5.17.3 Create a Fixture for a portion of a part

1. Select the part in ZPrint. ZPrint orients the part in the 3D View for building the Fixture.
2. Select **Edit > Make Fixture**.
3. In the 3D View, click on the wire frame in the top, left corner, press **Shift** and drag the box to an area of the part that you want to support.



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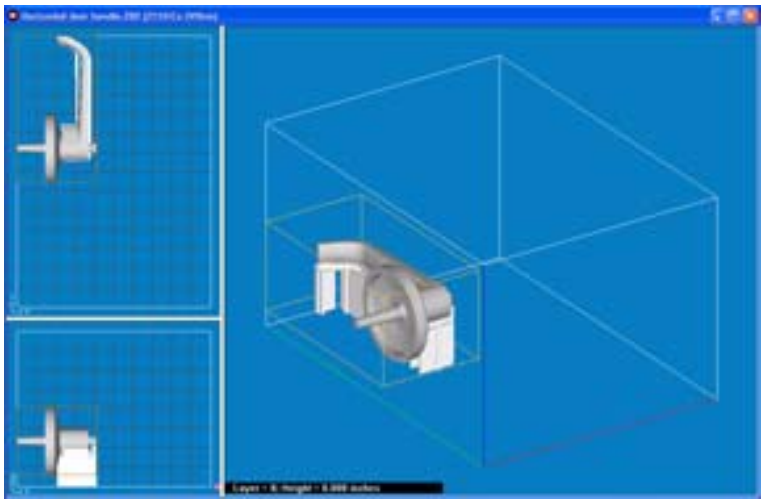
- To Resize: Click on the box and drag the mouse to resize the box.
- To Rotate: Click on the box, press **Ctrl** and drag the mouse to rotate the box.

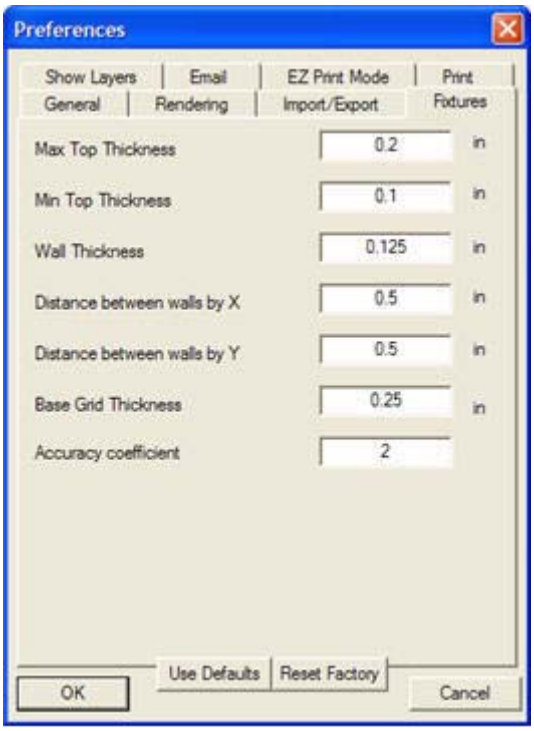
4. When you have positioned the box, click **OK** in the **Make Fixture** dialog. The Fixture is generated for the specified area.

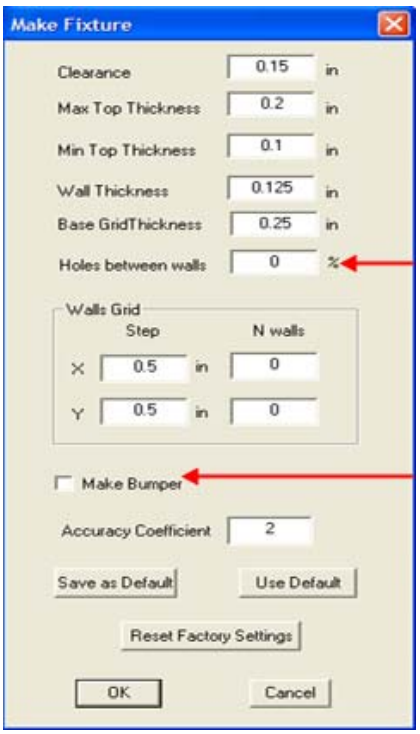
   The fixture is shown in white on the screen.



5.17.4 Default Fixture Settings

The default Fixture settings are located on the **Settings > General Preferences > Fixture** tab. These are the settings that populate the **Make Fixture** dialog, which is the dialog used to create a Fixture for a part. Most users will only need to utilize the **Holes between walls** and the **Make a Bumper** options when generating a Fixture and will not need to change the other settings.





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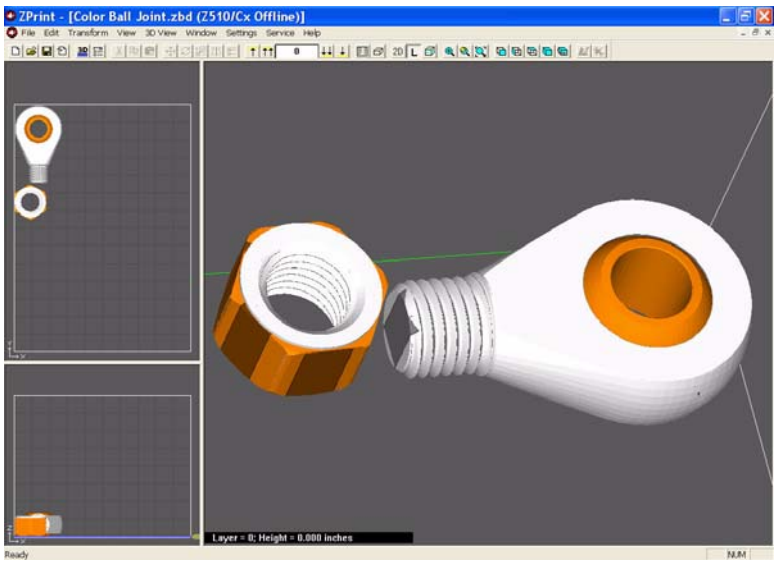
5.18 Witness Part

In situations where the color and surface quality must be the best possible, ZPrint gives you the ability to generate a “witness part”. A witness part is an additional thin shell of grey material that is created with a small offset from the actual part. It is situated along the surfaces of the part that the printhead first approaches as it is printing. Printing the witness part causes the printheads to fire just before they have to begin printing the part. This “primes” them so the colors on the part are crisp and true.

5.18.1 Create A Witness Part

1. Select your part in ZPrint.



2. Select **Edit > Make Witness Part**.

3. The Witness Part dialog appears.

4. Enter the values for Clearance and Thickness.

   NOTE: It is recommended that you use the default settings as they are configured for your printer powder type.

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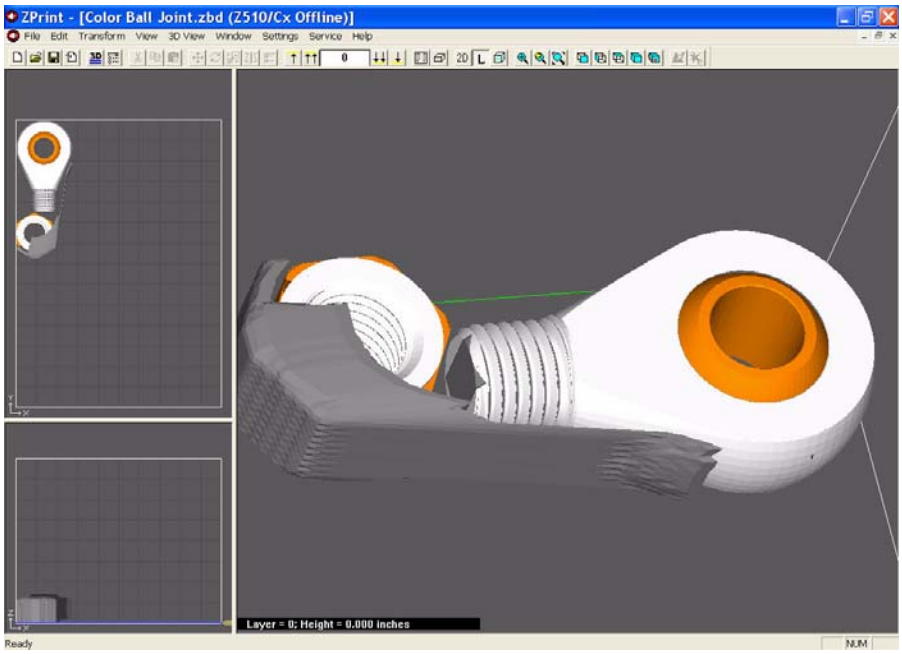
- Clearance is the spacing between the part and the witness part.
- Thickness is the thickness of the witness part

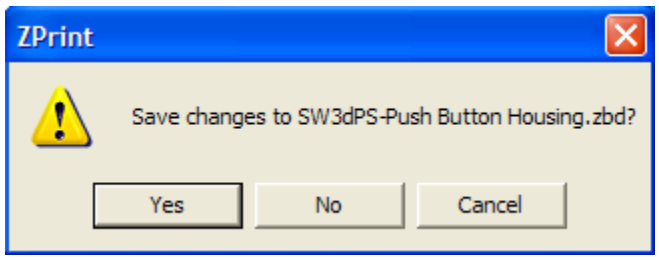
5. Click **OK**. The witness part is generated.



5.19 Save Your Work

When you work on a Part file and exit ZPrint, or make changes to a Part file and need to save, ZPrint will prompt you to save the file as a Build file (**.zbd*). A Build file contains all of the modifications that you made in ZPrint to the part(s) and the settings you selected for the build. The Part file remains unchanged and is saved with its original file data.

When working in ZEdit, there are several additional saving options for updating parts when exiting ZEdit and returning to ZPrint. See the ***ZEdit™ Software Manual*** for complete information.



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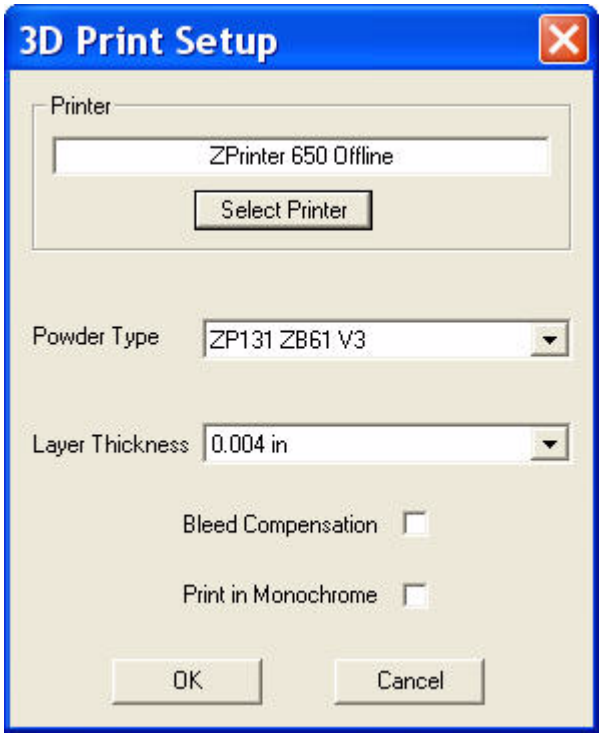
6 Print The Build

After you have finished working on your part in ZPrint, it is time to set up the printer and print your part as described in the following sections.

- Section 6.1 “3D Print Setup”
- Section 6.3 “3D Print With The ZPrinter 450 and 650”
- Section 6.4 “3D Print for Older Printers”
- Section 6.5 “Obtain Information About The Build”

6.1 3D Print Setup

The **3D Print Setup** dialog is where you confirm or change the printer and powder settings for the current build. Always check your settings in this dialog before starting a print job.



3D Print Setup Dialog

Select **File > 3D Print Setup** to open the **3D Print Setup** dialog. Most users will not need to change the settings in this dialog, but should you need to, do the following:

- To change Printers, choose **Select Printer**. Choose a connection option and then select the **Find** button to browse for the printer that is connected to your computer.
- To change the **Powder Type** and **Layer Thickness**, open the drop-down list for each. The powder types listed are those that are available for the printer displayed in the **Printer** field.
- Ensure the **Bleed Compensation** option is checked (available on ZPrinter 310, 510, 450, and 650). This option is checked by default for the ZPrinter 350, 450 and 650. See Section 8.4 “Bleed Compensation Overview” for additional information.

NOTE: Changes made in this dialog will not change your default settings in the **Powder Settings** dialog. To change the default powder settings, please see Section 8.1 “Create Custom Powder Types”.

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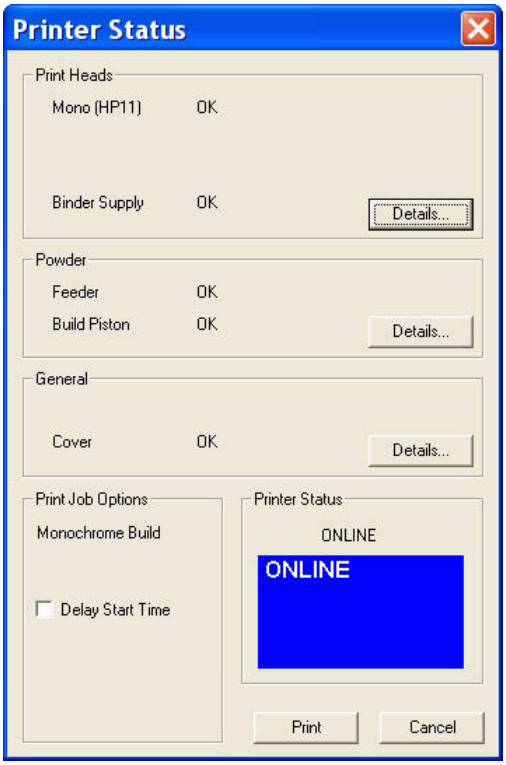
6.2 3D Print With The ZPrinter 350

The following instructions are for the ZPrinter 350 only. If you have a ZPrinter 450 or 650, see Section 6.3 “3D Print With The ZPrinter 450 and 650”. All other printer types are described in Section 6.4 “3D Print for Older Printers”.

1. After confirming the printer and powder settings for the current print job, select **File > 3D Print**, or select the icon on the Toolbar.

The **Printer Status** dialog opens.



2. ZPrint checks each item in the **Printer Status** dialog prior to printing to ensure there are enough materials to complete the current build. See Chapter 7 of this guide for instructions if you see a message to **Add Powder**, **Add Binder**, **Change Print Head**, **Raise Build Bed**, or **Close Cover**.
3. Click the **Details** button to view usage information specific to the print head, the binder, and the powder levels.
4. Check or uncheck your **Print Job Option** for the current build.
5. The **Print** button is enabled when each item displays **OK**. Click **Print** to start your build. After you click **Print**:
   - The printer will automatically fill the Build Bed with powder and spread a layer to ensure the top surface is smooth.
   - The printer will service the print head.

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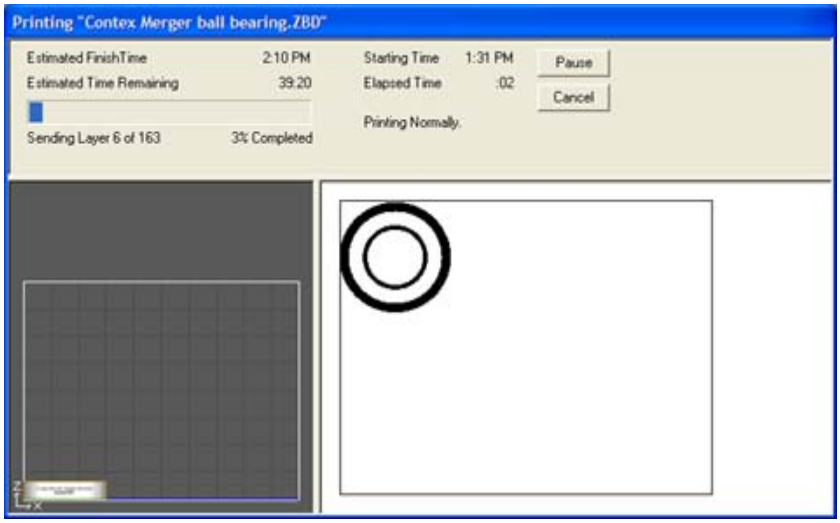
- If you changed the print head, the printer will perform an automatic purge on that head to prepare it for binder, then print a purge block to help flush any remaining black ink out of the HP11 print head.

6. The **Printing** dialog opens and reports the build status.

6.2.1 The Printing Dialog

The **Printing** dialog opens after the build is started. It reports the status of the print job for the duration of the build, including the Estimated Finish Time, Estimated Time Remaining, Starting Time, Elapsed Time, the Layer that is currently printing, and the % completed.



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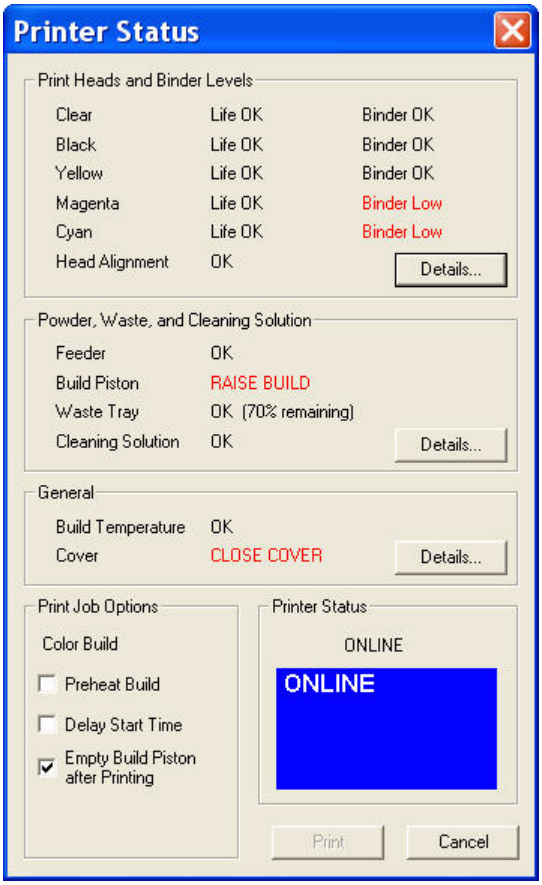
6.3 3D Print With The ZPrinter 450 and 650

The following instructions are for the *ZPrinter 450 and 650 only*. All other printer types should skip this section and go to Section 6.4 “3D Print for Older Printers”.

1. After confirming the printer and powder settings for the current print job, select **File > 3D Print**, or select the icon on the Toolbar.

The **Printer Status** dialog opens.



2. ZPrint checks each item in the **Printer Status** dialog prior to printing to ensure there are enough materials to complete the current build. See Chapter 7 of this guide for instructions if you see a message to add powder, to add binder, to change one or both print heads, to raise build, or to close the cover.
3. Click the **Details** button to view usage information specific to each print head, the binder, and the powder levels.
4. Check or uncheck your **Print Job Options** for the current build.

   Important: The **Empty Build Piston after Printing** option is checked by default. When checked, the printer automatically removes the bulk of the powder from the Build Bed after the part is printed and dried. If you are printing a part with especially delicate features, build the part with a Fixture, or uncheck this option.
5. The **Print** button is enabled when each item, (except the **Head Alignment** and the **Build Temperature** items) displays **OK**. Click **Print** to start your build. After you click **Print**:

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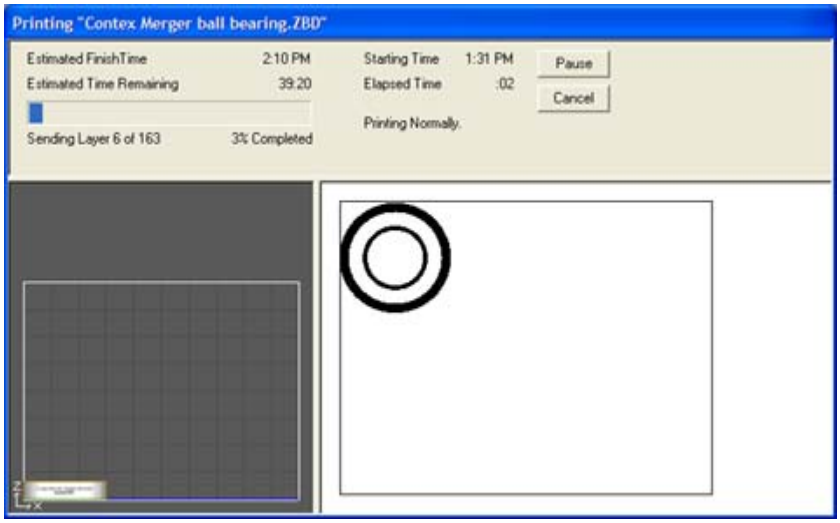
- The printer will automatically fill the Build Bed with powder and spread a layer to ensure the top surface is smooth.
- The printer will service the print heads. If you changed an HP11 print head, the printer will perform an automatic purge on that cartridge to prepare it for binder.
- The printer will run a print head alignment before the build if the text message **Will Be Performed** is shown in the **Printer Status** dialog. See Chapter 7 for more information.
- You can start the build while the printer is still warming up, however, the printer top cover must be closed.

6. The **Printing** dialog opens and reports the build status.

6.3.1 The Printing Dialog

The **Printing** dialog opens after the build is started. It reports the status of the print job for the duration of the build, including the Estimated Finish Time, Estimated Time Remaining, Starting Time, Elapsed Time, the Layer that is currently printing, and the % completed.



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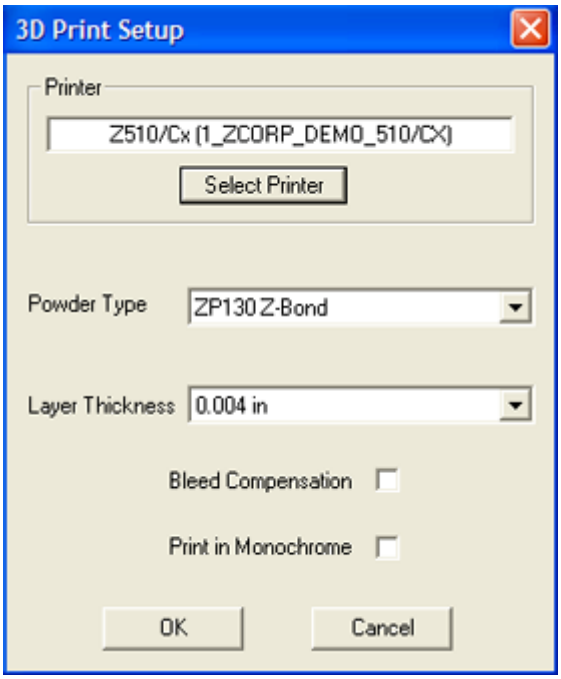
6.4 3D Print for Older Printers

This section applies to the Z406, ZPrinter 310 Plus/Mx, Spectrum Z510/Cx, and Z810 Printers.

The **3D Print Setup** dialog may show different options available depending on the type of printer you are using. Always check your settings in this dialog before starting a print job.



3D Print Setup Dialog for the Spectrum™ 510/Cx

1. Select **File > 3D Print Setup** to open the **3D Print Setup** dialog. Most users will not need to change the settings in this dialog, but if you need to, do the following:
   - To change Printers, choose **Select Printer**. Choose a connection option and then select the **Find** button to browse for the printer that is connected to your computer.
   - To change the **Powder Type** and **Layer Thickness**, open the drop down list for each. The powder types listed are those that are available for the printer displayed in the **Printer** field.
2. After confirming the settings for the current print job, select **File > 3D Print**, or click the **3D Print** icon.

3. The **Printing Options** dialog box displays.

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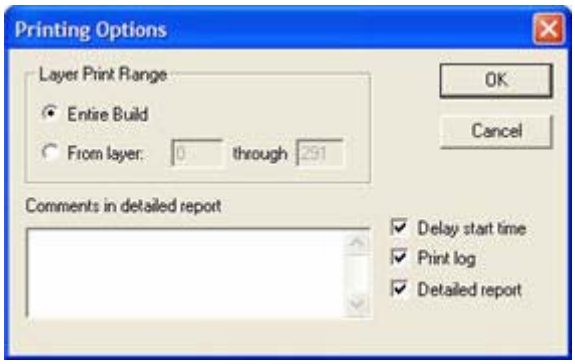
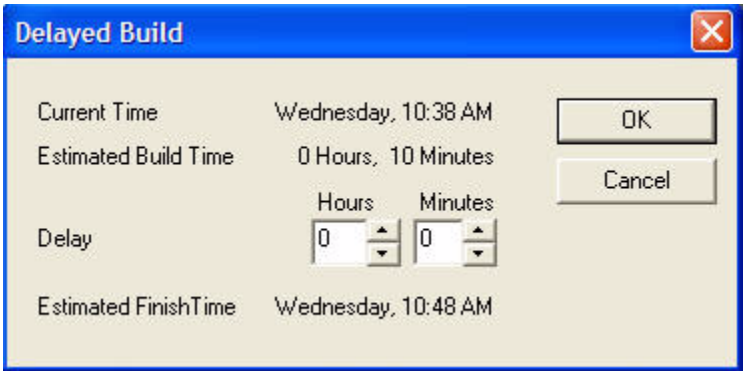


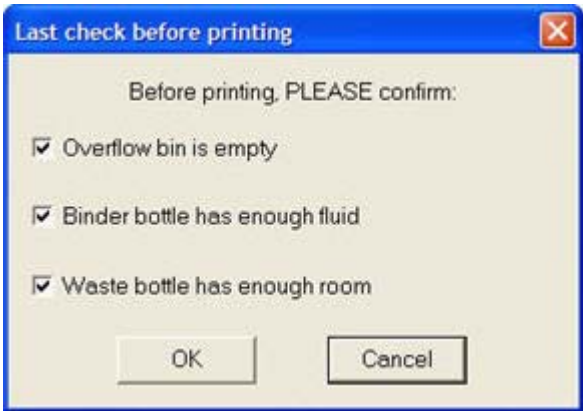
- **Layer Print Range:** Choose to print the entire build or a range of layers.
- **Delay start time:** If you check this option, the **Delayed Build** dialog displays *after* the **Printing Options** dialog closes. Input how many hours and minutes to delay your build, or use the up/down arrows to select the hours and minutes. The estimated finish time will change as you input values for the hours and minutes.



Print Time Delay Dialog Box

- **Print log:** Check this option to include the current build in the Print Log. We recommend enabling the print log for every build.
- **Detailed report:** Check this option to create a detailed report for the current build. The report details the specifics of each part in the build. For more information, please see Section 6.5.4 “View Detailed Report”.

4. After you have selected your printing options and clicked **OK,** the software will prompt you to check the following:



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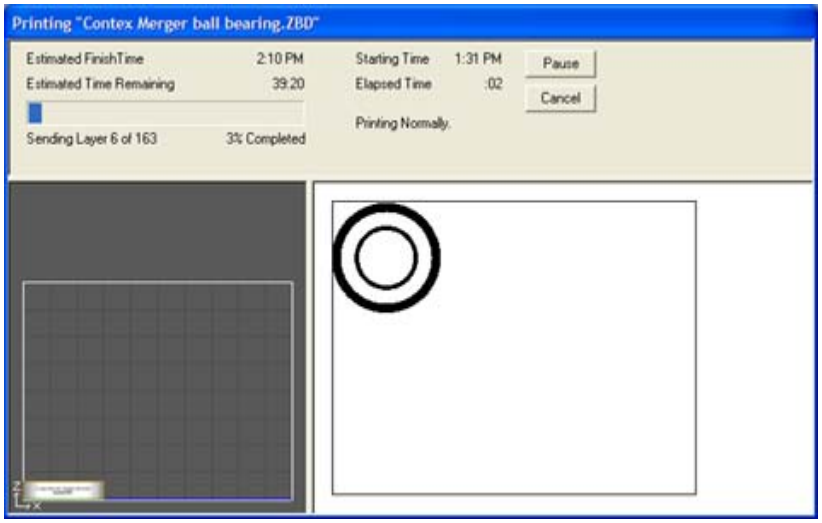
5. After each item is confirmed and checked, the **OK** button is enabled.
   - When the printer is ready to print, it runs a system status check. For example, with the Z406 and the Z810 3D Printers, if you are printing a color model but are in Monochrome mode, ZPrint displays a prompt explaining you are in Monochrome mode and asks you to confirm that you want to continue printing the part.
   - The **Activate Maintenance Reminder** option is enabled on the **Settings > General Preferences > General** tab by default. When enabled, this alerts you to refill the wash fluid (Z310 & Z450), lubricate the slow and fast axis, or grease the piston screws.

     ZPrint will also warn you if you do not have enough materials to complete your build, or if your print heads have reached a designated number of milliliters. This is controlled by the “Warn if binder usage has exceeded XXXX ml” option.

   NOTE: The ZPrinter 650, ZPrinter 450, Z406 and Z810 3D Printers will warn you if you do not have enough powder, binder, and wash fluid. The Spectrum™ Z510/DESIGNmate™ Cx will warn you if you do not have enough powder.
6. The **Printing** dialog opens after the build is started. It reports the status of the print job for the duration of the build, including the Estimated Finish Time, Estimated Time Remaining, Starting Time, Elapsed Time, the Layer that is currently printing, and the % completed.



6.5 Obtain Information About The Build

In addition to the **Printing** dialog, ZPrint has several reporting features that provide useful information about each print job you execute. They include the Print Time Estimator, Part Statistics, View Log File, View Detailed Report, and Print 3D Image. Following is a description of each.

6.5.1 Print Time Estimator

- Select **File > Print Time Estimator** to view information related to the build before you send it to print. The **Time Estimation Report** will estimate how long the part will take to print in color or monochrome, estimate the binder usage, and detail other information related to the build including the date, build file name, printer and powder type, build height, layer thickness, number of layers, and the part volume, area, and surface to volume ratio.
- To save a text file of the **Time Estimation Report**, choose one of the **Report** buttons and browse to a directory for saving the file. The **Brief Report** contains everything you see in the **Time Esti-**

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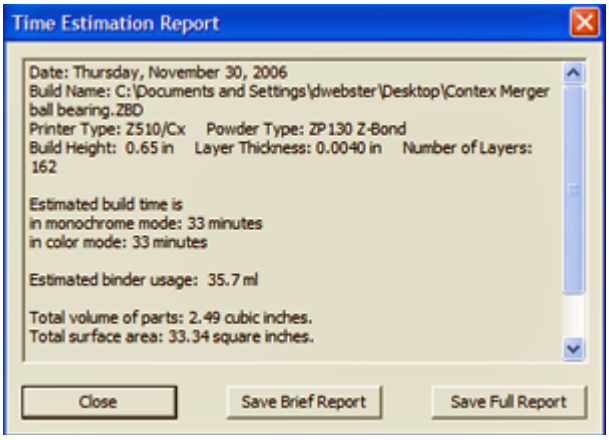
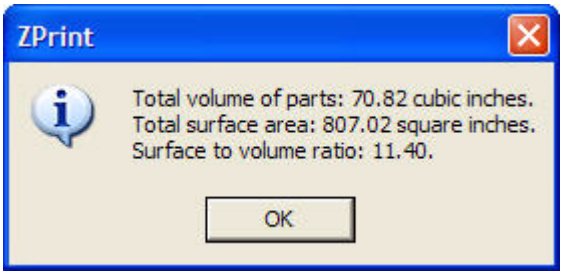
mation Report. The **Full Report** includes everything in the **Brief Report** plus the part file name, width, depth, height, volume, and area dimensions.



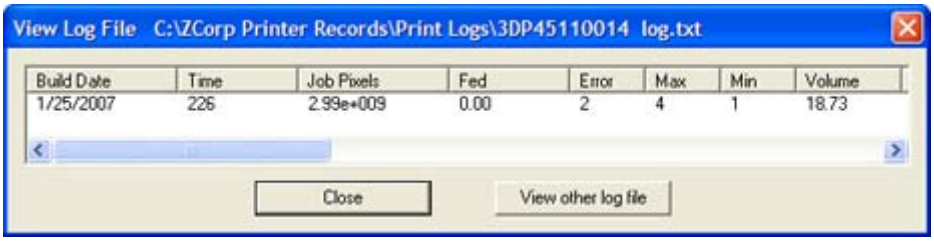
6.5.2 Calculate Part Statistics

Select **View > Calculate Part Statistics** to view the surface area and volume of a build, prior to printing.



6.5.3 View Log File

The Log File is a record ZPrint maintains of each print job run on your printer. Select **View > View Job Log** to view a log of each build printed on the printer in chronological order by date. Click the **View Other Log File** button to select text files of job logs stored in the *C:\ZCorp Printer Records\Print Logs* directory.



View Log File Dialog

6.5.4 View Detailed Report

ZPrint writes a Detailed Report of every build printed on your printer and saves it as a text file in the *C:\ZCorp Printer Records\Detailed Reports* directory, (unless you choose to save the file to a different directory). The name of the text file consists of the name of the build and a file version. If the same print job

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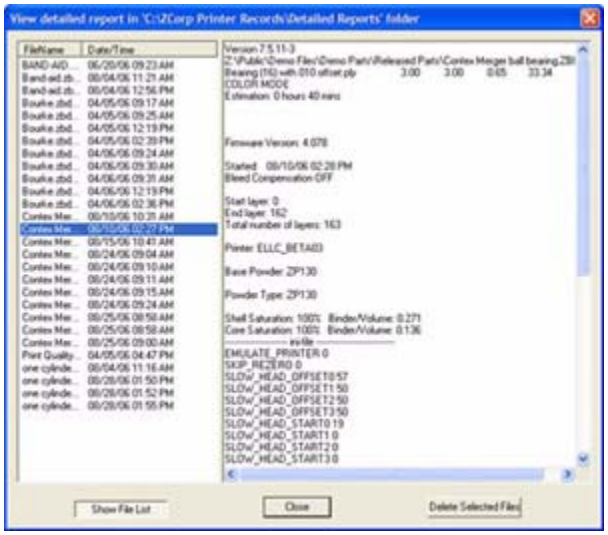
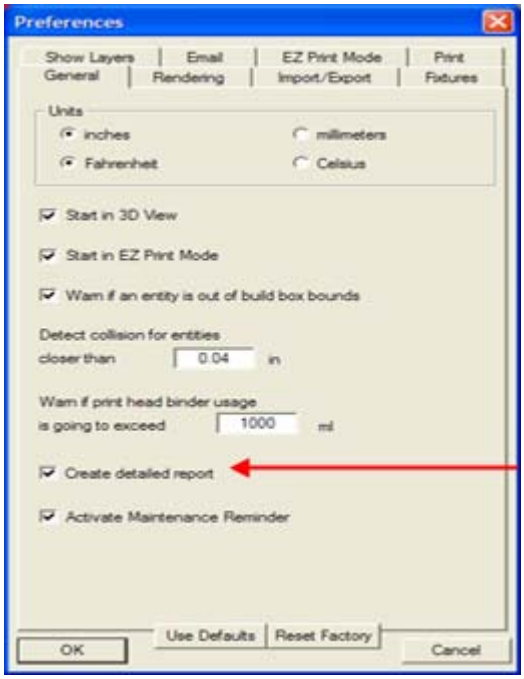
is printed several times, a new text file is written for each print job, and the files are distinguished by number.



The **View Detailed Report** dialog acts as a simple file manager for each report generated. It allows you to view the list of files, to sort them by File Name or Date/Time, to view the contents of each file, and to delete files.

ZPrint will generate a Detailed Report for every build. If you do not want to generate a Detailed Report for every build, uncheck the **Create Detailed Report** option in the **Settings > General Preferences > General** tab.



6.5.5 Print 3D Image

The **Print 3D Image** feature is for creating a printout of your build information along with an image of the part being printed.

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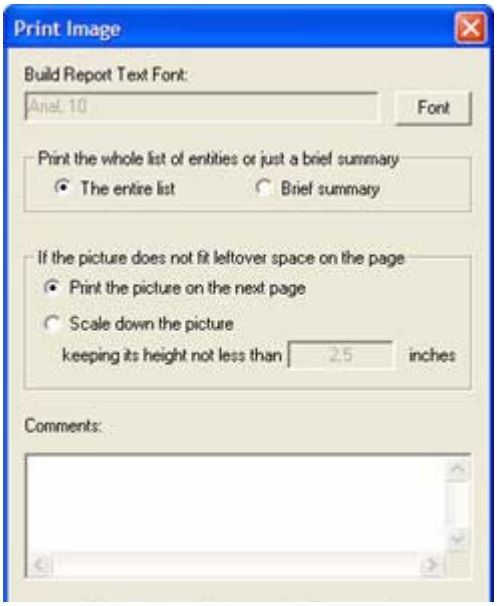
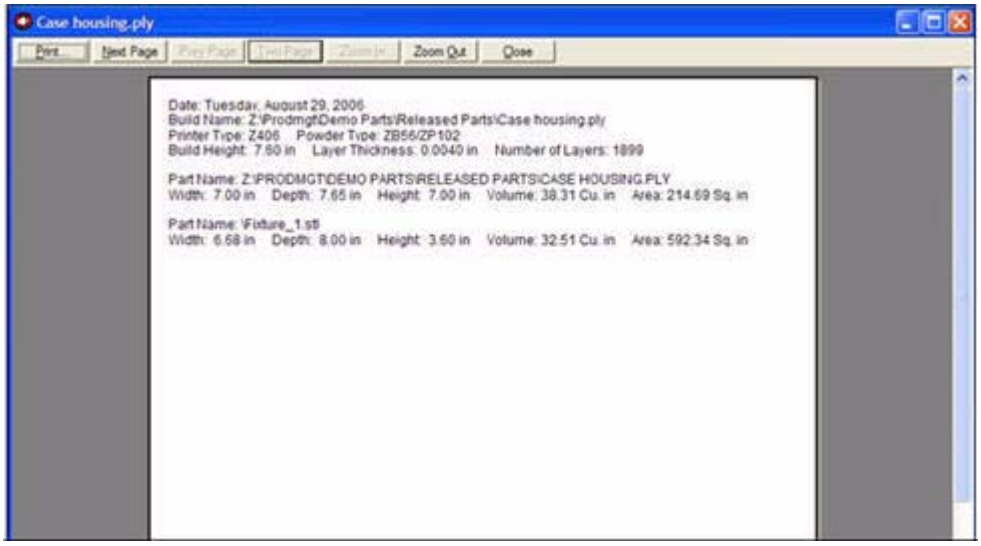
1. Select **File > Print 3D Image Preview** to display the **Print Image** dialog. Choose options for printing your build report, such as font type and size, a list of parts in the build or a summary, print image options, and any comments or notes you wish to add to the printout.



2. When you click **OK**, a print preview window similar to the following screen shot opens.



3. To see an image of the current build, click the **Two Page** button on the print preview window. The window divides into two pages, as shown below.

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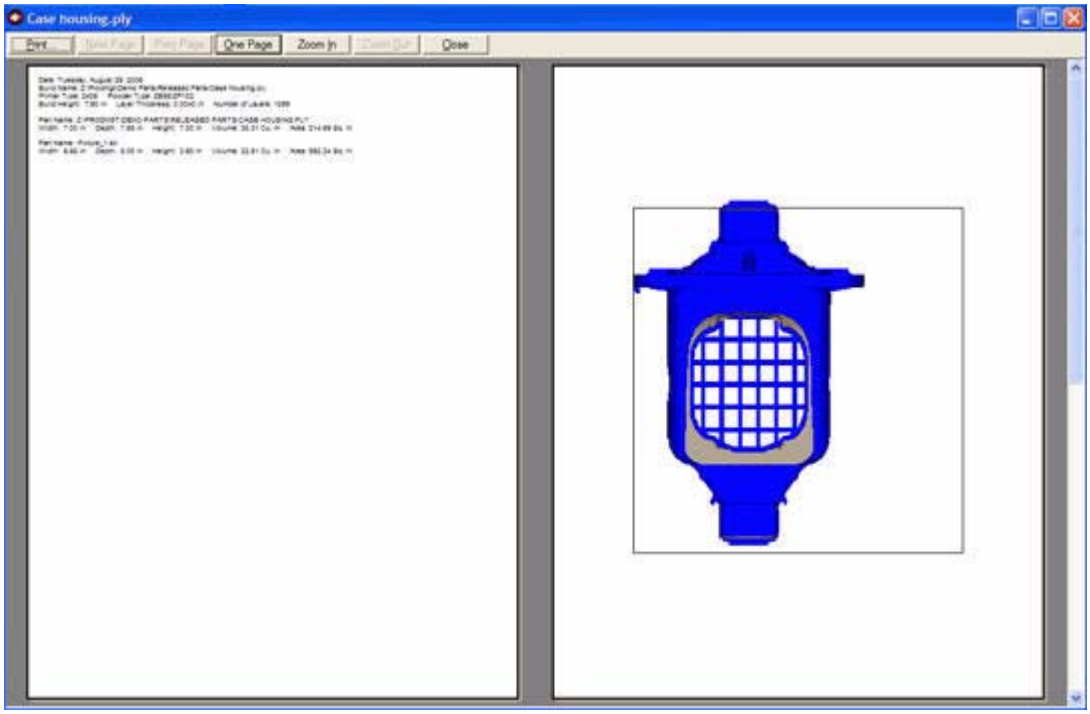

The Print 3D Image window showing the two-page layout

4. Select **File > Print 3D Image** to skip opening the print preview window and print only the build information.

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7 The Printer Status Dialog (ZPrinter 350/450/650 Only)

The printer status dialog provides valuable information about what's happening with your printer, including the amount of binder and powder available, and whether or not there is enough of each to complete your build.

This status dialog is only available with the ZPrinter 350, ZPrinter 450 and the ZPrinter 650. The status dialog is described in the sections that follow.

Section 7.1 "About the Status Dialog"

Section 7.2 "The Details Button"

Section 7.3 "Change Print Heads"

Section 7.4 "Add Binder"

Section 7.5 "Add Powder To The Feeder"

Section 7.6 "Build Piston (Build Bed)"

Section 7.7 "Cover"

7.1 About the Status Dialog

When you click **3D** to start a print job, ZPrint checks the printer to ensure there are enough materials to complete the job and that the printer is properly prepared for printing. If the printer does not have enough powder, binder, or print head life to complete the job, a message appears in the **Printer Status** dialog telling you what you need to do to get the printer ready to print.

Important: *Do not add powder or binder to the printer, or change a print head, unless you see a message telling you to in the Printer Status dialog.*

NOTE - 450 only:

When calculating the ink usage for a build, if the ink used for any individual color is greater than 5.5ml, ZPrint will reduce the color shell thickness from .025" (the default) to .015" and inform you via a message box. Click **OK** to continue printing using the reduced color shell thickness.

An alternative to printing with the adjusted color shell thickness is to click **Cancel** in the message box shown above and replace the HP57 printhead with a brand new cartridge. After replacing the printhead, click the **3D** icon and see if you get the color shell thickness message. It should be noted that extreme, or particularly complex builds may require an adjusted color shell thickness for printing anyway.

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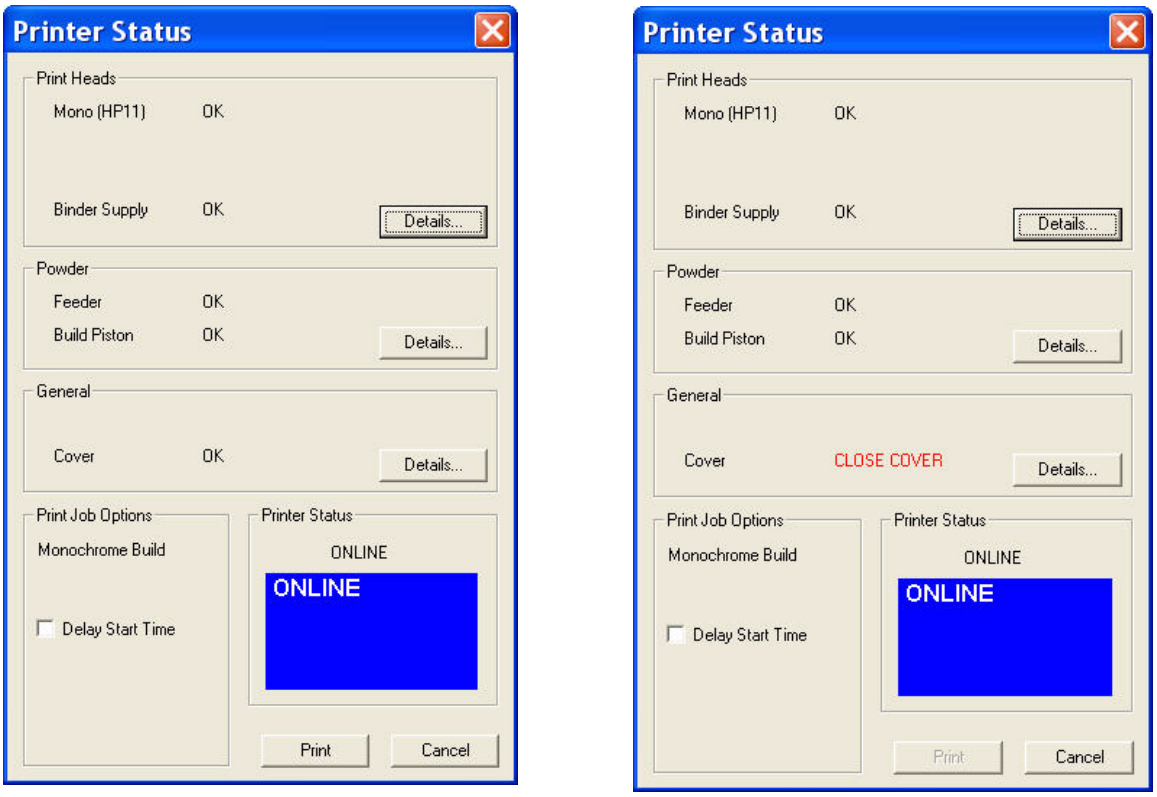
7.1.1 Status Dialog - ZPrinter 350 Only



In the example above, the **Printer Status** dialog on the left is ready for printing. Notice that each item shows **OK** and the **Print** button is enabled. From here you would choose your Print Job Options and click **Print** to start the job. Before the printer starts printing your file, it will first:

- fill the Build Bed with powder
- print a Purge Block (if the print head is new)
- spread a layer to ensure the Build Bed surface is smooth
- service the print head

If there are not enough materials to complete the job, or the printer is not properly prepared, messages appear similar to the example on the right above. When any **one** of these messages appears, the **Print** button is disabled. The remainder of this chapter describes how to clear a message in the **Printer Status** dialog and start the build.

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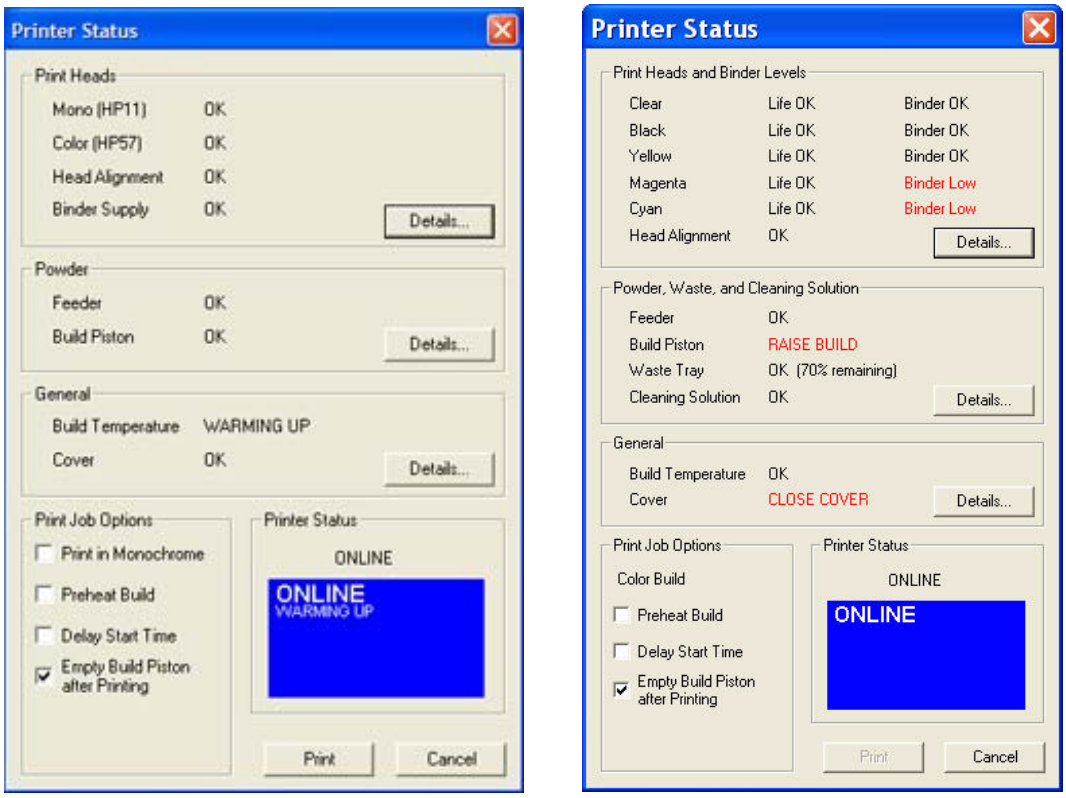
7.1.2 Status Dialog - ZPrinter 450 and 650



In the example above, the **Printer Status** dialog on the left (a ZPrinter 450) is ready for printing. Notice that each item shows **OK**, (except for the Build Temperature), and the **Print** button is enabled. From here you would choose your printing options and click **Print** to start the job. Before the printer starts printing your file, it will first:

- fill the Build Bed with powder
- spread a layer to ensure the Build Bed surface is smooth
- service the print heads
- run an alignment pattern if a print head was replaced or removed for cleaning

If there are not enough materials to complete the job, or the printer is not properly prepared, messages appear similar to the example on the right above (a ZPrinter 650). When any **one** of these messages appears, with the exception of Head Alignment and Build Temperature, the **Print** button is disabled. The remainder of this chapter describes how to clear a message in the **Printer Status** dialog and start the build.

ZPrint allows you to continue and print if:

- The printer build temperature is still warming up.
- A Head Alignment will be performed. This is run before the part begins to print.

7.2 The Details Button

Click **Details** to view the usage status for Printheads, Powder, and Binder. The **Details** dialog shows the amount of materials remaining and the amount required for the build (both in ml).

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7.3 Change Print Heads

ZPrint checks the status of the print head(s) before every build. If a print head needs to be changed, ZPrint displays CHANGE PRINT HEAD in the **Printer Status** dialog. You will not be able to start the build until you have changed the appropriate print head.

- Do not change the print head(s) unless prompted to in the **Printer Status** dialog.
- When the HP11 print head is changed, the printer runs an automatic purge cycle to clear the print head of its black ink and prepare it for clear binder.
- When a color print head is replaced, or removed from its slot for cleaning, the printer will run the Auto-Alignment pattern to properly align the print heads before the next build is started.

NOTE: The instructions below are a general summary of the actual steps required. The steps will vary somewhat depending on the printer you are using. Refer to the ***Hardware Manual*** for your printer.

1. Select **PRINT HEAD > CHANGE PRINT HEAD** on the printer LCD menu. The Fast Axis moves to the service position.
2. Open the printer top cover and then open the carriage cover.
3. Lift the print head out of its slot and properly dispose of any empty cartridge(s).
4. Open an alcohol swab (included with your Startup Kit), and squeeze the tube to saturate the swab.
5. Wipe off the pogo pins (inside the carriage) with the alcohol swab.

6. Wet a paper towel with distilled water and clean the underneath of the carriage, as specifically appropriate for your printer. When finished, press **CONTINUE** on the LCD.

   Important: Clean the underneath of the carriage every time you change a print head, and no less than every 3-6 weeks depending on your machine usage. Residue buildup on the underside of the carriage could result in print head errors (such as 40006, or 2303:1).

7. Remove all new cartridge packaging. Be sure to pull the tape tab off of the new cartridge.

8. Insert each new cartridge. Press down firmly on the side of the cartridge nearest the pogo pins to securely fit the cartridge into its slot.
9. Close the carriage cover by pressing down until you hear the cover click shut.
10. Close the printer top cover and then press **Continue > Exit** on the LCD.

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- The gantry reparks and the printer goes Online. Color printers will run an auto-alignment pattern before starting the next print job to properly align the print heads.

7.4 Add Binder

ZPrint evaluates the geometry of a part and determines if there is enough binder to complete the job. If not, ZPrint displays ADD BINDER in the **Printer Status** dialog. You cannot start the build until you add binder to the printer.

NOTE: The instructions below are a general summary of the actual steps required. The steps will vary somewhat depending on the printer you are using. Refer to the ***Hardware Manual*** for your printer.

1. Pull the old binder cartridge out of its housing on the printer and dispose of the cartridge according to the label instructions.
2. Get a new binder cartridge and check the cartridge label for the expiration date and orientation.
3. Insert the new cartridge into its housing. Ensure the cartridge is pushed all the way in. You should feel it gently snap into place.
   - If the cartridge does not snap into place, *do not force it*. Check the orientation on the label and try again. Also ensure that it is the correct color and type.

ZPrinter 350/450

ZPrinter 650

7.5 Add Powder To The Feeder

ZPrint evaluates the geometry of the part to determine if there is enough powder in the Feeder to complete the build. If not, ZPrint displays ADD POWDER in the **Printer Status** dialog. You cannot start the build until you add powder to the Feeder.

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Do not add powder unless all of the powder in the Build Bed, Overflow (front and rear), and Deck has already been returned to the Feeder, via a vacuuming operation.

NOTE: The instructions below are a general summary of the actual steps required. The steps will vary somewhat depending on the printer you are using. Refer to the ***Hardware Manual*** for your printer.

1. At the printer, ensure that the Build Bed platform is raised to the top of the Build Bed. Select **Prep Build Chamber** on the LCD menu to properly position the platform at the top of the Build Bed.
2. Turn the powder cartridge upside down and shake to loosen the powder before unsealing the cap.
3. Place the powder cartridge in the Fine Powder Removal chamber (or PPU) and remove the round cap from the cover.

4. Plug the vacuum hose into the fitting on top of the cartridge.
5. Select **VACUUM** (or **VACUUM AND DEPOWDER)** on the LCD menu. The vacuum automatically shuts off when the Feeder is full.
6. Return the vacuum hose to its stand, reinsert the fitting cap if there is powder left in the cartridge, and remove the cartridge.
7. Select **Build Chamber > Spread Layer** to ensure the surface of the Build Bed is completely smooth.

7.6 Build Piston (Build Bed)

The Build Bed platform must be in its proper position at the top of the Build Bed in order for the printer to fill the bed and spread a layer of powder before starting a print job. If you see RAISE BUILD, go to the printer and select **Prep Build Chamber > Continue** to raise the platform to its proper position.

7.7 Cover

The printer cannot start a print job when the top cover is open. If the top cover is open, go to the printer and close it.

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8 Advanced Settings

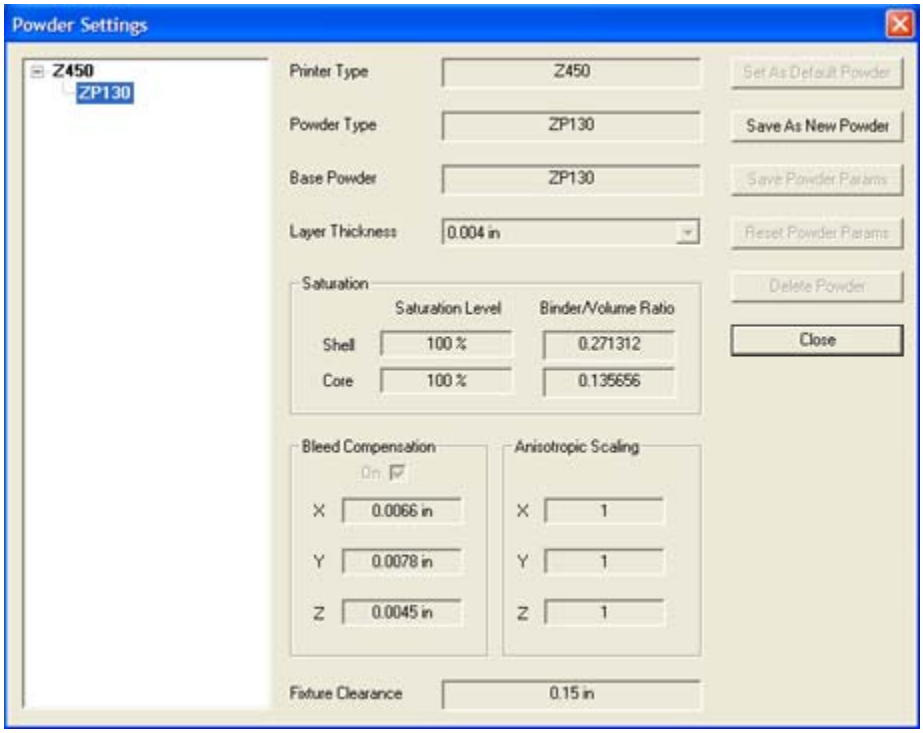
This section explains more advanced functions of ZPrint, such as creating custom Powder Types and exporting files.

Section 8.1 “Create Custom Powder Types”
Section 8.2 “Saturation Values Overview”
Section 8.3 “Anisotropic Scaling Overview”
Section 8.4 “Bleed Compensation Overview”
Section 8.5 “General Preferences Settings”
Section 8.6 “Export .ZPR, .ZPR2, .PLY, or .STL Files”

8.1 Create Custom Powder Types

There may be occasions when you need to fine-tune your powder settings. To do so, follow the steps below. The examples show a ZPrinter 450 as the target printer, but the same general steps apply for all printers.

1. Select **Settings > Powder Settings** to display the **Powder Settings** dialog. Select the Powder Type for your printer type from the left panel. This becomes the *Base Powder* of your custom powder type.



2. Select **Save As New Powder**. Type in a unique name for the new powder. You cannot duplicate powder names.

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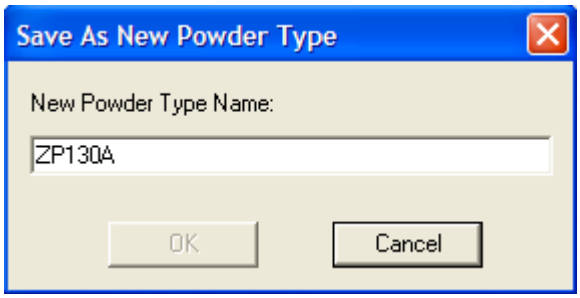
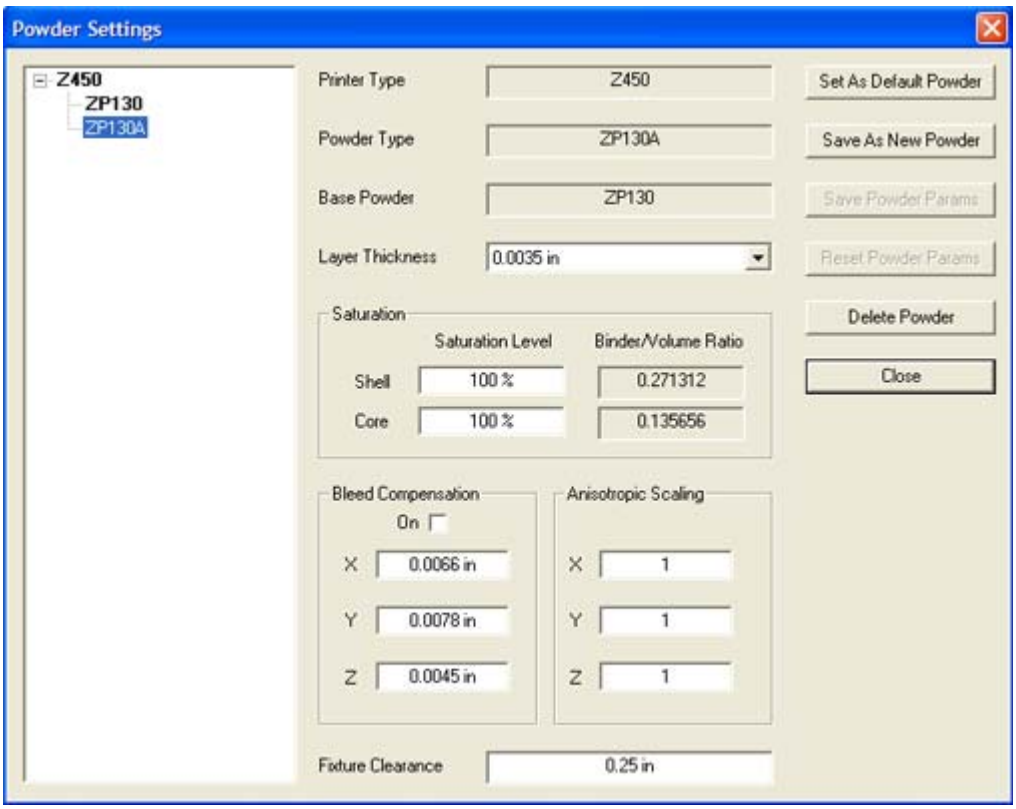


3. Enter new values for the **Layer Thickness**, **Shell** and **Core Saturation Level**, **Bleed Compensation**, and the **Fixture Clearance**.
   - If you need to discard the new settings and return to the original settings, click the **Reset Powder Params** button *before* you save your changes. After you click the **Save Powder Params** button, the **Reset Powder Params.** button is disabled.



The example above shows the new settings for the custom powder type - ZP130A

4. To make the new powder type your default powder for all of your builds, click the **Set As Default Powder** button. The default powder is highlighted in bold and these setting are applied to each build unless you set a different powder type as the default.

   NOTE: Custom powder type settings are saved on the local directory of your computer. If the build is setup on a different computer, you will not have access to those powder types.

5. To delete a new custom powder, highlight the powder type and select the **Delete Powder** button. Confirm your action in the following prompt:

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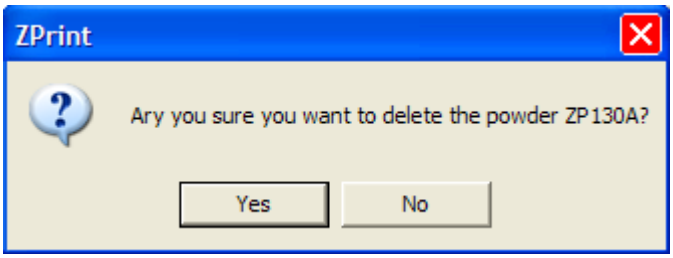


8.2 Saturation Values Overview

- In general, the saturation settings for high performance powders are constant for all parts. The default saturation values, suggested by ZPrint, are designed to successfully print a majority of parts.
- In general, bulkier parts will print more successfully with a lower saturation setting and delicate parts will print better with a higher saturation setting.
- Default values are defined in terms of percentage. The recommended saturation values are always 100%.
- Saturation values may be changed by percentage. When changing any value corresponding to shell saturation, the relative core saturation is also changed. The saturation values displayed are a percentage of the recommended saturation value.
- You may manually override the core percentage, if needed.

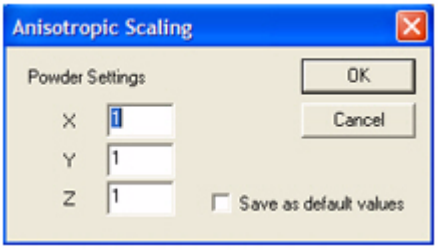
8.3 Anisotropic Scaling Overview

Anisotropic Scaling is mainly used with zp®14 (Investment Casting) and zp®15e (Elastomeric) powders, and operates as a simple multiplier. If you have experienced part shrinkage or expansion, it may be the result of humidity and temperature variations between operating environments. ZPrint sets the default powder settings for Anisotropic Scaling based on the powder type being used with your printer. These settings tell the printer how much to compensate for these part shrinkage or expansion differences.

> **NOTE:** When Anisotropic Scaling is applied to a part, the physical part increases or decreases in size. The part rendered in ZPrint changes in appearance when Anisotropic Scaling is applied, but the dimensional values do not change and remain the same. It may be necessary to rescale and/or justify the part after applying Anisotropic Scaling.

Anisotropic Scaling values in the **Powder Settings** dialog are the default settings and cannot be changed. To apply different a Anisotropic setting to an individual part, select the part and then select **Transform > Anisotropic Scaling** and enter new values in the **Powder Settings** fields. The settings are applied to the current build only.

To keep the new settings as the default in the **Anisotropic Scaling** dialog, check the **Save as default values** option. The **Anisotropic Scaling** dialog updates with the new settings.



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8.4 Bleed Compensation Overview

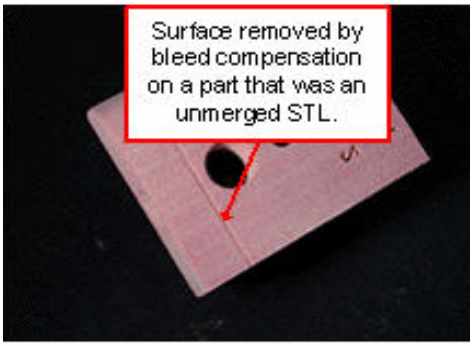
Binder printed on powder has a tendency to spread slightly, causing surfaces of a part to migrate outwards. This is known as “bleeding” and to compensate for this, it is necessary to determine the Bleed Compensation value to apply to a part. Once that value is determined, a small amount of thickness is shaved off of all surfaces during the printing process to keep the part in true perspective.

For printers with more than one print head, the Bleed Compensation is also affected by the quality of the print head alignment. *Proper print head alignment is very important in minimizing shrinkage and expansion effects during printing.*

Bleed Compensation values will differ according to the printer and powder type used. The recommended Bleed Compensation values for the powder type used with your printer have been preset in ZPrint. For most users, these values will never need to be changed.

- ZPrint will recommend values for the X-, Y-, and Z-Axis when using a Base Powder. You may override these values when you create a custom powder type. See Section 8.1 “Create Custom Powder Types” for more information.
- *ZPrinter 350, 450 and 650 only* - ZPrint keeps Bleed Compensation checked (On) by default. Uncheck **Bleed Compensation** in the **3D Print Setup** dialog to turn off Bleed Compensation for the current build.

WARNING: *A part may be contained in one file but may consist of several parts. If the parts are not merged together, bleed compensation will remove a shell from each separate part. This may cause the part to be separated into several pieces. Applying Bleed Compensation may leave a stripe (shown below) on parts that are not merged.*



8.5 General Preferences Settings

To view ZPrint preferences, select **Settings > General Preferences**. The **Preferences** dialog consists of eight tabs. Click on a tab to view default settings used in ZPrint. In most instances, (such as when using Collision Detection, the Make Solid, or the Make Fixture operations), you can override these default settings and input different values or options for the current build using other dialogs.

Each tab contains four buttons, which are described below. Following is a reference section for the options on each **General Preferences** tab:

- **OK** - Click **OK** to save changes and to update ZPrint with the current settings.
- **Use Defaults** - Click **Use Defaults** to save the current settings as new default settings in ZPrint.
- **Reset Factory** - Click **Reset Factory** to clear the current settings and reset the original default settings that were shipped with ZPrint.
- **Cancel** - Click **Cancel** to close the **Preferences** dialog without saving changes.

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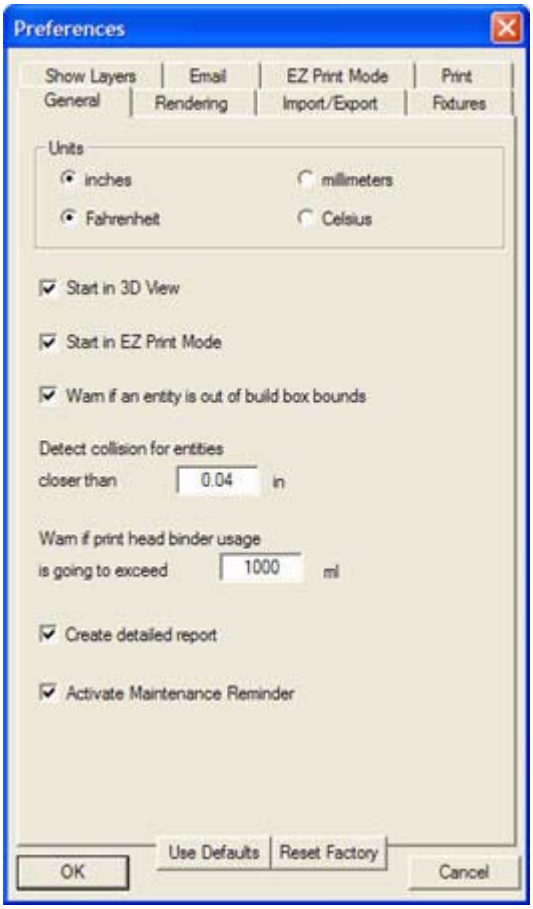
8.5.1 General Tab



Preferences – General Tab

Units: Inches and Fahrenheit are the defaults. The Unit settings tell ZPrint the way that part dimensions and layer thicknesses are displayed in the software, but they do not change the underlying dimensions for the part.

Start in 3D View: Checked by default. Opens your files in ZPrint in 3D view. At times, parts may take a long time to load and open due to facet size. Importing the file in 2D view reduces the time it takes to open a model in 3D view.

Start in EZ Print Mode: ***310/DESIGNmate Mx ONLY.*** Checked by default. Runs the EZPrint Wizard that guides you through each step of the printing process. Choose to disable EZPrint or selected parts in the **Open** dialog by unchecking the **EZ Print** checkbox. For more information, see *EZ Print*.

Warn if an entity is out of build box bounds: Checked by default. Enables ZPrint to display a warning message when your part, or a piece of it, is outside the Build Bed. ZPrint encloses the object with a red wire frame if it is residing outside of the Build Bed.

Detect collision for entities closer than: ZPrint offers a default collision value for the printer and powder type. Any value entered into this field as a new default will only be in effect when using this combination of printer and material system.

Warn if print head binder usage is going to exceed: Tells ZPrint to check before printing, whether you will exceed the binder usage value shown in this field. A warning message appears informing you that the print head might not complete the build. You may choose to change the print head, or close the warning and take no action.

Create detailed report: Checked by default. Logs the details of each print job. To view the report details, select **View > View Detailed Report**.

Activate Maintenance Reminder: Checked by default. Alerts you when it is time to refill the wash fluid, grease the slow and fast axis, or grease the piston screws.

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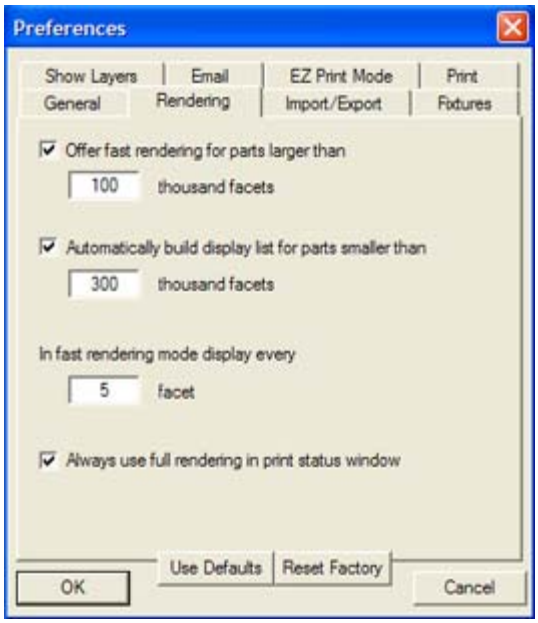
8.5.2 Rendering Tab



Preferences – Rendering Tab

Offer fast rendering for parts larger than: Check this option to have ZPrint prompt you to use fast rendering before drawing a part with more than the designated number of facets entered in the **Thousand Facets** field.

You may override these setting for an individual build by selecting **Fast Rendering** on the **View** menu.

NOTE: If you have a very fast computer video display, set the facets threshold higher, or uncheck this option. If your computer is slow to draw and refresh the screen, set the facets threshold lower. The recommended threshold is 100,000 facets.

Automatically build display list for parts smaller than: Check this option to view the build list for parts that are smaller that the designated amount of facets entered in the **Thousand Facets** field.

Building the display list pre-compiles facets in OpenGL. This makes rotating, zooming, and panning in 3D smoother. This operation varies in processing time depending on the file size. If the part will not be viewed in 3D, it is not necessary to build the display list. To prevent the software from automatically building the display list, set the threshold to a higher value. You may manually build the display list after you have opened or imported a file by choosing the **Make Display List** icon on the Tool-bar.

In fast rendering mode display every: Enter a value in this field to accelerate displaying large files in ZPrint during fast rendering. The default value is to display every fifth facet. In cases where a file contains a large amount of facets, even fast rendering can be slow. To decrease the time it takes to render, change the facet value to a higher number in order to decrease the number of facets rendered. For example, if the facet value was 500, the software would render every 500th facet.

Always use full rendering in print status window: In most cases, full rendering can be used in the Printing dialog during printing. For large files, displaying the status of a print job is delayed due to rendering updates. In these situations, uncheck this option and use full rendering. When this option is unchecked, the Printing dialog uses the same rendering mode as the main window.

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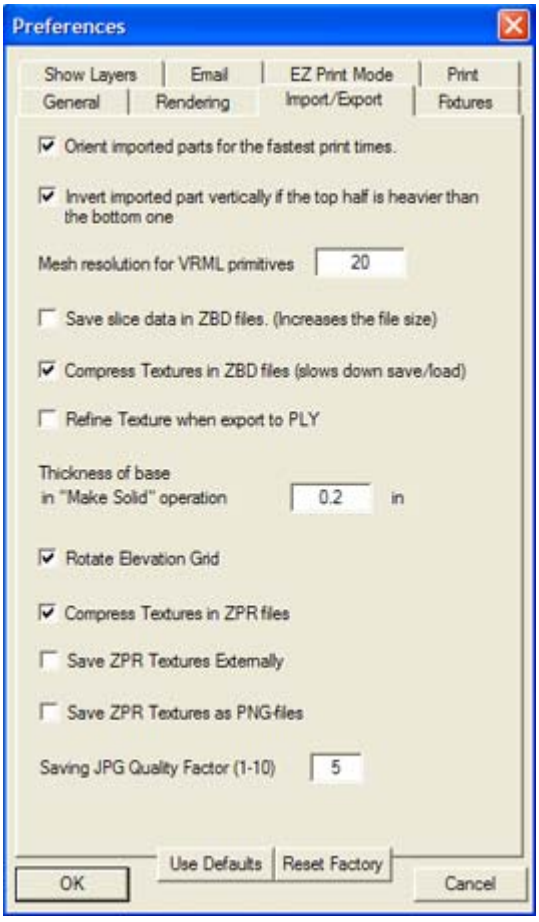
8.5.3 Import/Export Tab



Preferences – Import/Export Tab

Orient imported parts for the fastest print times: Checked by default. Orients a part with the smallest dimension printing in the Z-axis for the fastest print times. Uncheck this option if you do not want ZPrint to automatically orient the part.

Invert imported part vertically if the top half is heavier than the bottom one: Checked by default. Orients a part so that the heavier half is at the bottom of the build bed. Printing the part with the lighter side towards the top prevents the weight of the heavier half from damaging the part during powder removal.

Mesh resolution for VRML primitives: The default setting is **20**. Set the number higher to increase the number of facets and make your file larger. Set a lower number to reduce the facets.

Save slice data in *.zbd* files: Unchecked by default. When checked, saves the slice data of a part. Normally, when you save a build file (*.zbd*), the slice information is discarded and the part is resliced when the file is opened. This is generally the best strategy for saving files as file size is significantly smaller and will take less time to open. However, once the file is opened, you will have to wait while the file slices the data.

Compress Textures in *.zbd* files (slows down save/load): Checked by default. Saves texture maps with compression. Compress texture maps if you have limited computer resources. The trade-off is compressed files take longer to open and save.

Refine texture when export to *.PLY*: Unchecked by default. Applies to *.wrl* texture map files and increases the number of facets by four times in texture mapped parts, which significantly increases the fidelity of the rendering. The export option is for exporting a *.PLY* file into third-party software for manipulation, if needed.

Thickness of base in "Make Solid" operation: Creates a solid base for surfaces that are rectangular. The height of the base is determined by the value entered in this field.

Rotate Elevation Grid: Checked by default. Orients the part in the **XY** plane. Most *GIS VRML* files contain an *Elevation Grid* where the main landscape plane is oriented parallel to the **XZ** plane (not the **XY** plane), meaning you have to manually rotate the model.

Compress textures in *.zpr* files: Check to save texture maps with compression. Compression saves computer resources, but compressed files take longer to open and save.

Save *.zpr* textures externally: Check if you want to save texture maps separately from a *.zpr* file. In most cases, the texture maps are saved as *.png* files.

Save *.zpr* Textures as .png files: Unchecked by default. When checked, saves *.zpr* texture maps as *.png* files, which do not loose detail when compressed and then uncompressed.

Saving .jpg Quality Factor (1-10): Relates to exporting *.zpr* files. On a scale of 1-10, 1 means no loss of quality, 10 is the greatest loss of quality.

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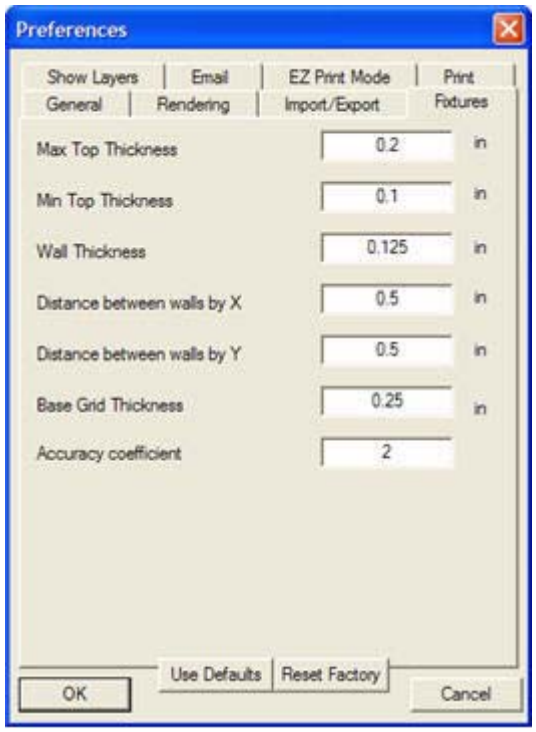
8.5.4 Fixtures Tab



Preferences – Fixtures Tab

These are the default settings for generating Fixtures. See Section 5.22 “Default Fixture Settings” for more information.

Max Top Thickness: The maximum thickness of the top surface.

Min Top Thickness: The minimum thickness of the top surface. The lower this value is, the better the fixture will cradle the part.

Wall Thickness: Sets the thickness of the Fixture wall.

Distance between walls by X: The distance between the Fixture walls in the **X** direction.

Distance between walls by Y: The distance between the Fixture walls in the **Y** direction.

Base Grid Thickness: Determines how high the part is moved from the bottom of the build box to accommodate the fixture base.

Accuracy coefficient: Set the value for separating the part and the fixture for parts that have vertical, or nearly vertical, walls. The smaller the degree of separation, the better the fixture will follow the shape of the part. Run Collision Detection to see if the fixture is touching the part. If it is, increase the Accuracy Coefficient by a small amount and rerun Collision Detection.

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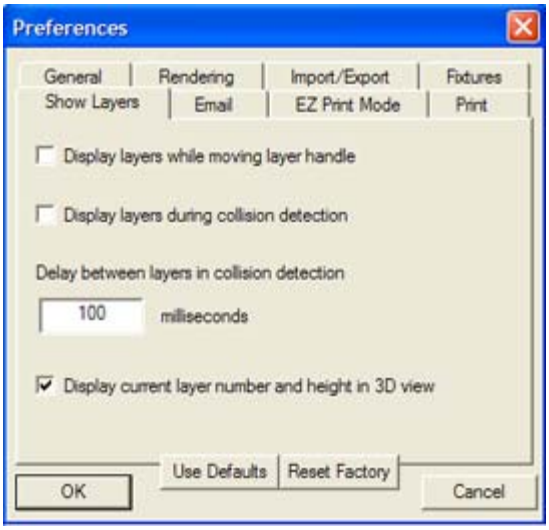
8.5.5 Show Layers Tab



Preferences - Show Layers Tab

Display layers while moving layer handle: Check this option to view layers in real time while moving the layer handle up or down in the front view of the main window in either 2D or 3D view.

Display layers during collision detection: Check this option to display layers while running collision detection.

Delay between layers in collision detection: Input a value for displaying layers while running collision detection. A higher number will display at a slower rate than a lower number.

Display current layer number and height in 3D view: Check this option to display the number and height of a selected layer while in 3D view.

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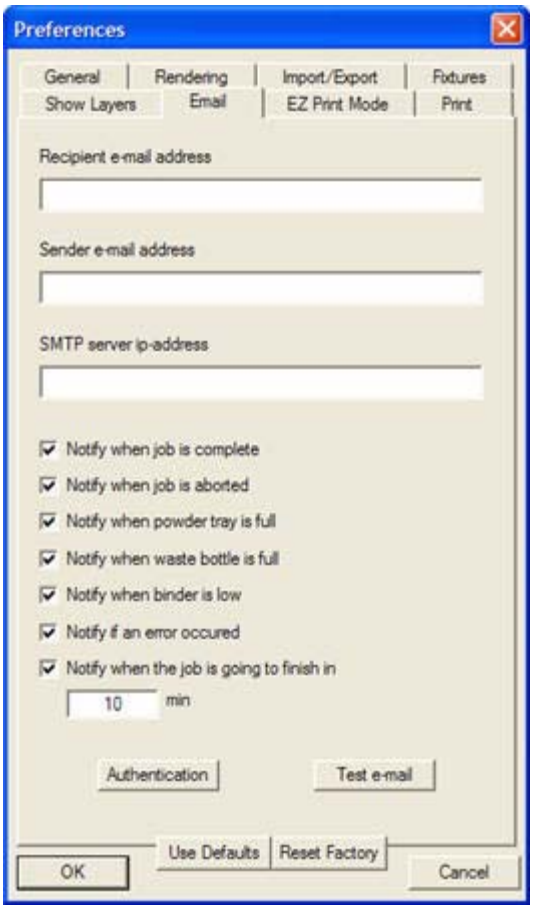
8.5.6 Email Tab



Preferences - Email Tab

Recipient e-mail address: Enter the email address of the person who will receive notification about the current build. Email notification is activated *only* when an email address is entered in this field. You may enter multiple recipients addresses if they are separated by a space and/or a semi-colon.

Sender e-mail address: Enter the email address of the sender or printer. The address cannot contain any separators (i.e. spaces, commas, colons, semi-colons, or tabs). Some SMTP servers require the **Sender** field to be a valid email address. Check the validity of the Sender email address by clicking the **Test e-mail** button.

If the name of your printer is not recognized as a valid Sender address, enter an email address for the computer that controls the printer, or leave the **Sender** field blank. In the latter case, the recipient email address will be used as the Sender.

SMTP server IP-address: This field should be left blank unless email notification is not working properly. Consult your system administrator and enter an IP address of your company's SMTP server. We recommend entering a numerical IP address (not a domain name).

Notify when job is complete: Notifies you when your print job is complete.

Notify when job is aborted: Notifies you when your print job is aborted.

Notify when powder tray is full: Notifies you when your powder tray is full.

Notify when waste bottle is full: Notifies you when the waste bottle is full.

Notify when binder is low: Notifies you when the binder is low.

Notify if an error occurred: Notifies you when an error has occurred.

Notify when the job is going to finish in: Notifies you when your print job will finish at the time specified in the minutes field.

Authentication: In some cases, when entering an SMTP address, the server will ask for login information. Authentication allows you to input a user name and password to use when connecting to a server.

Test E-Mail: Make sure that your combination of Recipient/Sender email addresses works with your system. Click the **Test E-Mail** button to open a dialog for entering the subject and text of the testing message.

Test that your message was sent, but more importantly, received. If you have problems with sending email, we recommended leaving the **Sender e-mail address** field blank.

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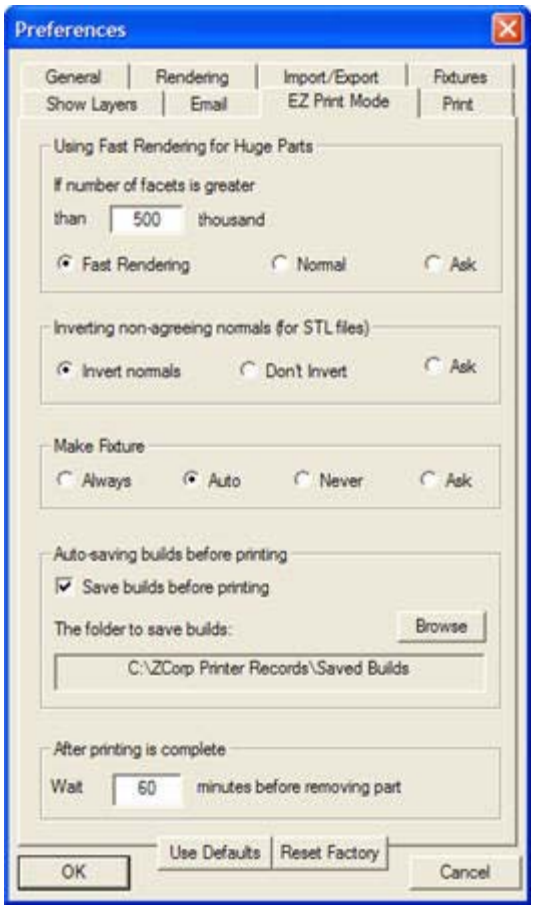
8.5.7 EZ Print Mode Tab



Preferences - EZ Print Mode Tab

In **EZ Print** Mode, the process of printing a part is streamlined. Setup the **EZ Print Mode** tab and choose the options you want to have ZPrint prompt you with before you start a print. Be sure to check the **EZ Print** checkbox on the **Open** dialog, to activate **EZ Print Mode** in ZPrint.

Using Fast Rendering for Huge Parts: Choose to automatically use fast rendering, normal rendering, or to prompt you before rendering for the specified number of facets. By default, the **Fast Rendering** option is selected.

Inverting Non-Agreeing Normals (for *.stl* files): Choose whether to automatically invert normals, to not invert normals, or to be prompted before inverting normals for *.stl* files. By default, the **Invert Normals** option is selected.

Make Fixture: Choose whether to always create a fixture, to automatically create a fixture (which is determined when the base of a part is not a flat surface), to never build a fixture, or to prompt you before building a fixture. By default, the **Auto** option is selected.

Auto-saving Builds Before Printing: Check Save builds before printing to have ZPrint automatically save the build files to the specified directory, prior to printing. This option is checked by default and the default folder specified resides in your local directory.

After Printing is Complete: Enter a time for your parts to remain in the Build Bed after printing. There is a countdown timer after the part is printed that will tell you how many minutes have lapsed since the print job finished and when your part will be ready for removal. The default is **60** minutes.

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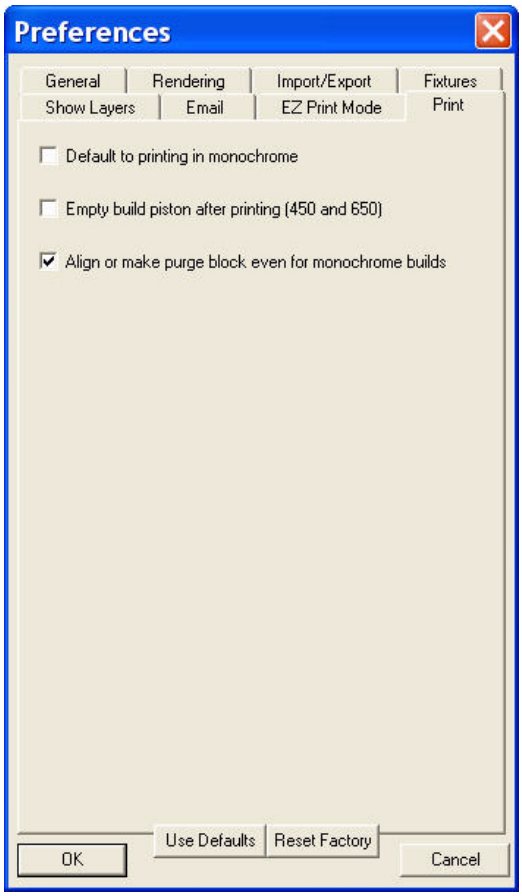
8.5.8 Print Tab



Preferences - Print Tab

Default to printing in monochrome: Check this option to print all builds in monochrome.

Spectrum Z510 show pictures and videos: Check this option to view pictures and videos for setting up your Z510 printer. The tutorials begin after you press **3D Print**.

Empty build piston after printing: On printers equipped with automated gross powder removal (ZPrinter 450 and 650), this runs a depowdering cycle after the build is complete and has finished its drying cycle.

Align or make purge block even for monochrome builds: The printer will run an alignment pattern (for color printers) or print a purge block (for monochrome printers) even when the build is monochrome.

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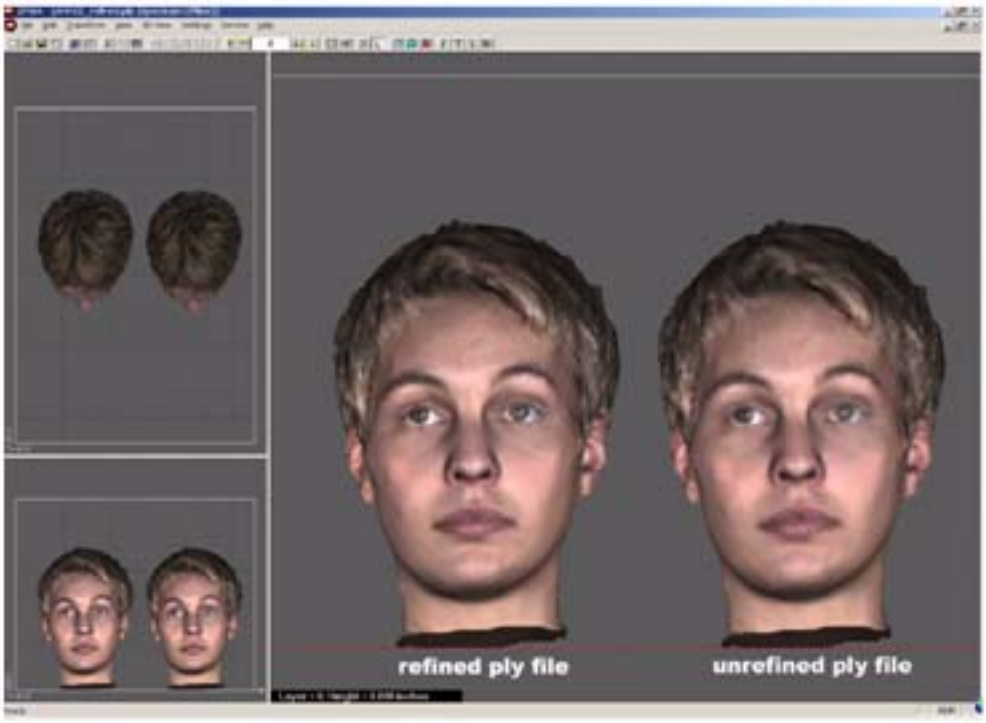
8.6 Export *.ZPR, .ZPR2, .PLY,* or *.STL* Files

ZPrint has file export capability for *.zpr, .zpr2, .ply* and *.stl* files when you need to export a part from the build and alter it. You can only export one *.ply*, *.zpr*, or *.zpr2* file at a time. You can export multiple *.stl* parts and keep them relative to each other when they are imported into a third-party software application.

To export a part as a *.ply* file or a *.zpr* file:

1. Select the part. (Only one *.ply* or *.zpr* file can be exported at a time.)
2. Choose **File > Export PLY** (or **Export ZPR**, or **Export ZPR2**). The part exports with the same scale and orientation. When exported, all parts (except texture maps) retain their texture and color quality.
   - For texture maps, the software will triangulate the part and then assign a color to each triangle. The color and texture of the part may need to be refined. To refine the color and texture, go to **Settings > General Preferences > Import/Export** tab. Check the **Refine texture when export to PLY** option.



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9 Service Menu

The Service Menu is where you will find everything you need to maintain and update your printer.

ZPrint communicates with the printer during routine service procedures. You can also view status information directly at your 3D Printer, and activate several service functions, should there be a need.

The **ZPrinter 350/450/650 Service Menu** is described below. If you own a ZPrinter 310/Mx Plus; a Spectrum Z510/DESIGNmate/Cx; or a Z406 Printer, you can use the **ZPrinter 350/450/650 Service Menu** as a reference. Everything on the 310 Plus/510/406 Service menus is defined below on the **ZPrinter 350/450/650 Service Menu.**

Z810 Printer owners should reference Section 9.2 “Z810 Service Menu” for a description of the **Z810 Service menu**.

9.1 ZPrinter 350/450/650 Service Menu

The following **Service** Menu is available for the ZPrinter 350, 450, 650, 310 Plus, Z510, and Z406.

NOTE: Some details of the menu will vary depending on the printer. Refer to your printer’s ***Hardware Manual*** for details.

ZPrinter 450 and 650

ZPrinter 350

Service Menu items are as follows:

Unpark. Unparks the Fast Axis and carriage for cleaning or servicing.

Change Print Head. Prepares the system to change a print head.

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Auto Alignment. Aligns the print heads after they have been changed (color printers).

Purge Print Heads. Select after changing a print head and before running the alignment test. This runs binder through the print head, replacing the HP ink with binder.

Print Purge Block. Prints a small flat block under the part to help flush the last remnants of black ink out of the HP 11 print head (monochrome printers).

Check Powder Level. Select to have the system check whether there is enough powder in the Feeder and if there is enough room in the Build Bed to complete the current print job.

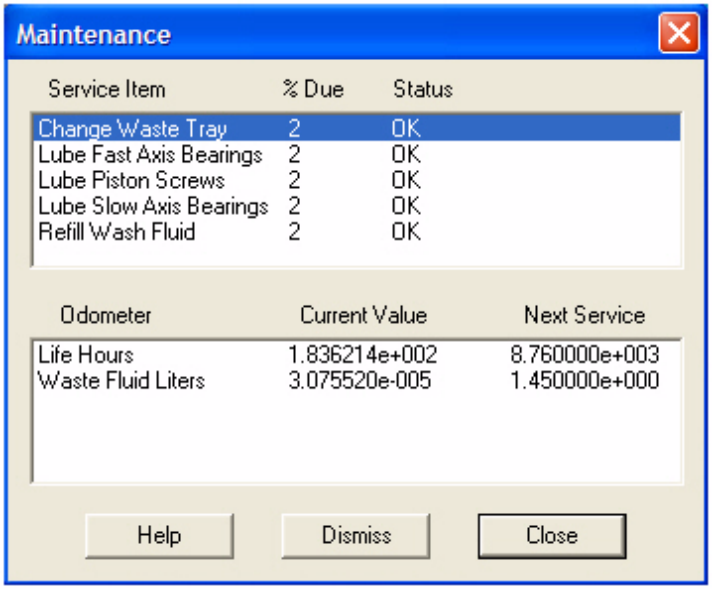
Drop Feed Piston. Lowers the feed piston automatically. This is the same as selecting the **Feed Down** button (310 Plus/510/406), or the **`BUILD CHAMBER > LOWER PLATFORM`** command on the ZPrinter 350, 450 or 650 LCD Panel.

Fill Bed. Prepares the build to print by filling the Build Bed with powder. This is the equivalent of selecting the **Fill Bed** command on the Control Panel.

Preheat Printer. Heats the printer to the proper temperature before printing. This may add some time to your overall print time.

Maintenance. Select to view the status of the Fast Axis Bearings, the Slow Axis Bearings, the Piston Screw, the Wash Fluid, and the Waste Tray service items. ZPrint will automatically prompt you when it is time to perform maintenance on any of these items.

Highlight a Service Item in the **Maintenance** dialog and click the **Help** button to view the procedure for the selected Service Item.



An example of the Maintenance dialog (ZPrinter 450).

Bleed Air. Select to remove air from the fluid system. Use this feature only under the guidance of the Service Department, or an authorized Service Provider.

NOTE: Spectrum Z510/DESIGNmate Cx - Air bubbles that are smaller than .5” are normal and will not affect the print head life or the binder flow.

Service Print Heads. (Shortcut Key: **F3**) Select to service the print head if it is not printing well.

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Prime Wash Line. Select to push wash fluid through the fluid lines when you first start up your Printer or when you have run out of wash fluid.

Stripe Test. Select to print a stripe test to check the functionality of the print heads.

Toggle Roller On/Off. (Shortcut Key: **F4**) Select to activate the roller independently for easy cleaning.

Check Status. (Shortcut Key: **F1**) Checks how much powder is in the Feed Piston, the remaining room in the Build Bed, and the ZPrint Firmware version.

Print Head Report. Select to view a report of the number of mL printed, temperature levels, and flow rates for the current print heads.

View Printer Log. Select to view the printer log that records historical printer performance.

Upload New Firmware. Select to upgrade the Firmware for your 3D Printer. Contact your local service provider, who will provide you with any required upgrades and instructions for installing. Or, check for updates on the Support section of our Web site: zcentral.zcorp.com.

Upload New Printer Configuration. Select to replace the entire *.ini* file in the printer. Please only use under the instruction of the Z Corporation Service Department, or an authorized Service Representative.

Edit .INI File, Send File and Receive File. These features are used during diagnosis. They should only be modified under the instruction of the Z Corporation Service Department, or an authorized Service Representative.

9.2 Z810 Service Menu

Only those items not referenced above are described for the Z810 Service menu.

Alignment. Select to align the print heads after changing them. For additional details, see the Z810 Hardware Manual.

Change Binder Supply. Select to change between color and monochrome binder systems.

Flush Binder. This feature allows you to cycle fluid through the plumbing system, which is useful in changing the binder color or binder type, as described in detail in the Z810 Hardware Manual.

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Empty Overflow. Select to empty the overflow bin before each build.

Lube Fast Axis. Select to have the system position the gantry so the fast axis bearings can be lubricated. It also moves the gantry back and forth to lubricate the entire fast axis rail. (**NOTE:** *This feature is only available for Z810 3D Printers with serial numbers of 80050 and up.*)

Lube Slow Axis. Select to have the system position the gantry so the slow axis bearings can be lubricated. It also moves the gantry, thereby spreading the grease onto the slow axis rails. (**NOTE:** *This feature is only available for Z810 printers with serial numbers of 80050 and up.*)

Spit on Deck. Select to test the print quality of your print heads. This feature is used after changing print heads and can also be used when your print heads have reached a high pixel count.

Report Capabilities. Select to view a report of the build size and print modes.

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10 Troubleshooting

If you should experience any problems using your ZPrint software, look through the topics here for solutions. If you still have trouble, contact your local service provider. Online, you can find our Knowledge Base in the Support section of our Web site at zcentral.zcorp.com.

The Troubleshooting topics covered in this sectio9n are as follows:

- Section 10.1 “The ZPrint Software Crashes”
- Section 10.2 “Black Area on Screen”
- Section 10.3 “Errors with E-mail Notification”
- Section 10.4 “Errors When Printing”

10.1The ZPrint Software Crashes

Review the following sections if you experience a software crash or problems rendering in these situations:

- When opening or importing a part
- During a **Make Label**, **Make Fixture**, or **Make Solid** operation

10.1.1 Artifacts with Rendering or Labeling

These problems may be due to heavy use of Open GL drivers or there may be some interference with the Open GL driver. To correct these problems, try the following steps:

- **Update Drivers**
  Make sure you have the latest drivers installed for your graphics hardware. Check the hardware manufacturer’s Web site for details.
- **Set Hardware Acceleration**
  Do not change the hardware acceleration setting for your graphics hardware. Leave the setting at either the factory default, or at the highest acceleratiion level.
- **Downsample Textures**
  This is found under **Settings > General Preferences**, on the **Rendering** tab. This allows you to specify the level at which very large, detailed textures will be downsampled (simplified). If you have large textures applied to your parts, this can speed up your display performance.
  Note that this applies only to the part as it is displayed on the screen, and does **not** affect how the part actually prints.
- **Set Fast Rendering**
  Set ZPrint to use Fast Rendering for what’s currently displayed by selecting **View > Fast Rendering**. You may also want to change the default Fast Rendering settings to reduce the number of facets being displayed. These are found under **Settings > General Preferences**, on the **Rendering** tab.

If the above steps do not solve the problem, please contact your local Reseller, or visit the Support section of our Web site at zcentral.zcorp.com.

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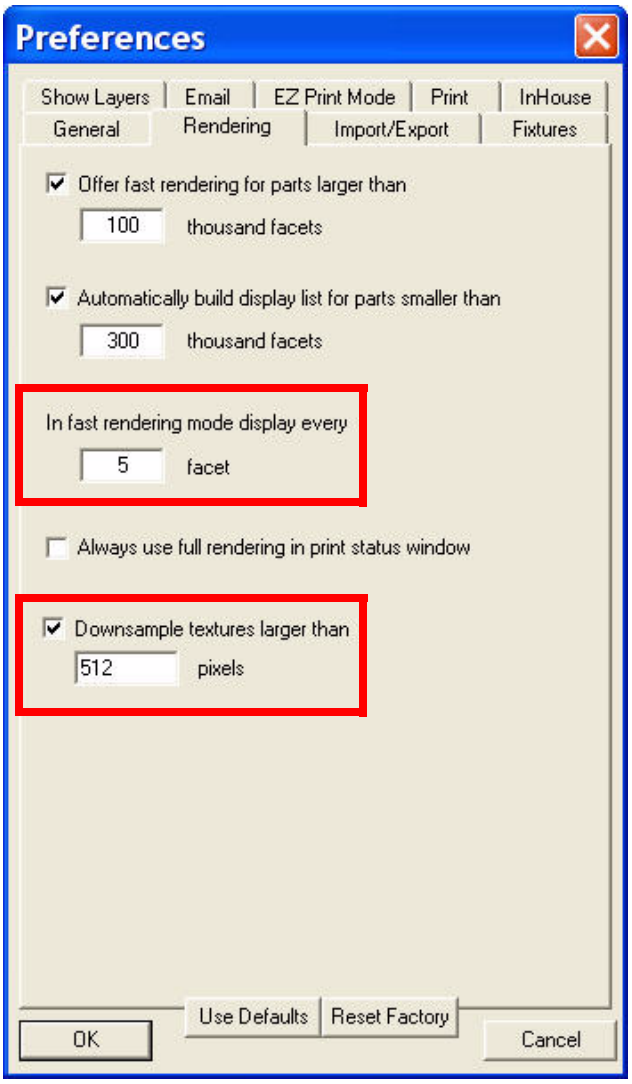

10.2Black Area on Screen

If a new window is created while all or part of it is off-screen, the area that is off-screen will not be drawn and may not refresh when the window is moved back onto the screen. To fix this rendering issue, force a refresh by maximizing and then restoring the window, or select **Refresh** on the **View** menu.

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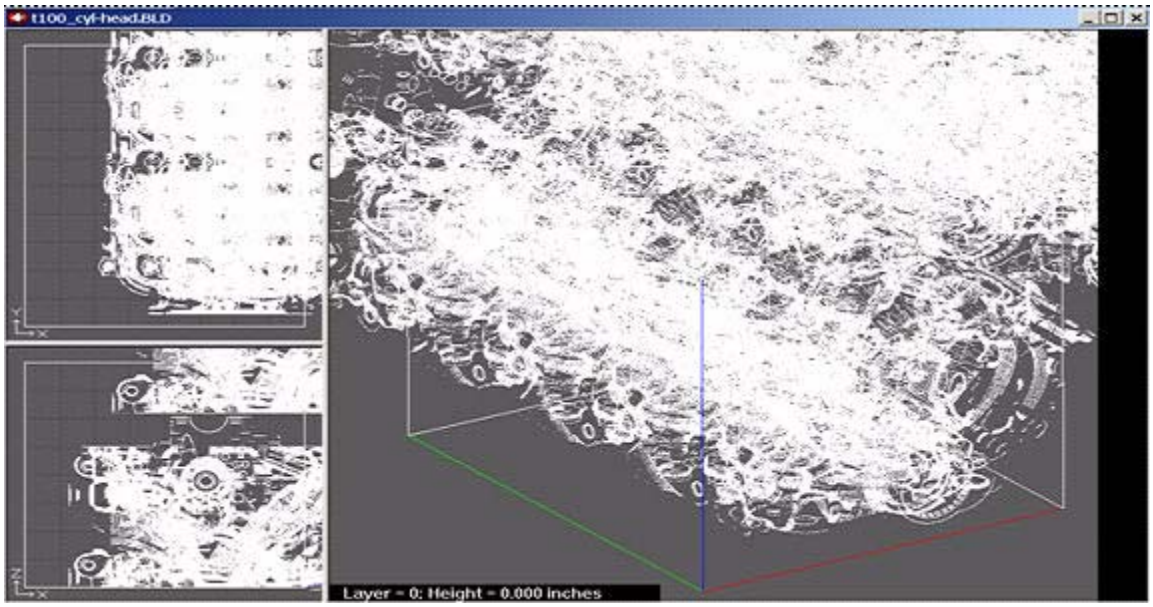

10.3Errors with E-mail Notification

10.3.1 Error with DNS Lookup

When the computer does not detect an Internet provider, the following dialog box appears. Check your Internet connection and try again. If you continue to experience problems, please contact your network administrator or your local service provider.

10.3.2 No Permission to Send E-mail

When the computer does not have permission to send E-mail due to firewall settings or administrator rights, the following dialog box appears. See with your network administrator for permissions.

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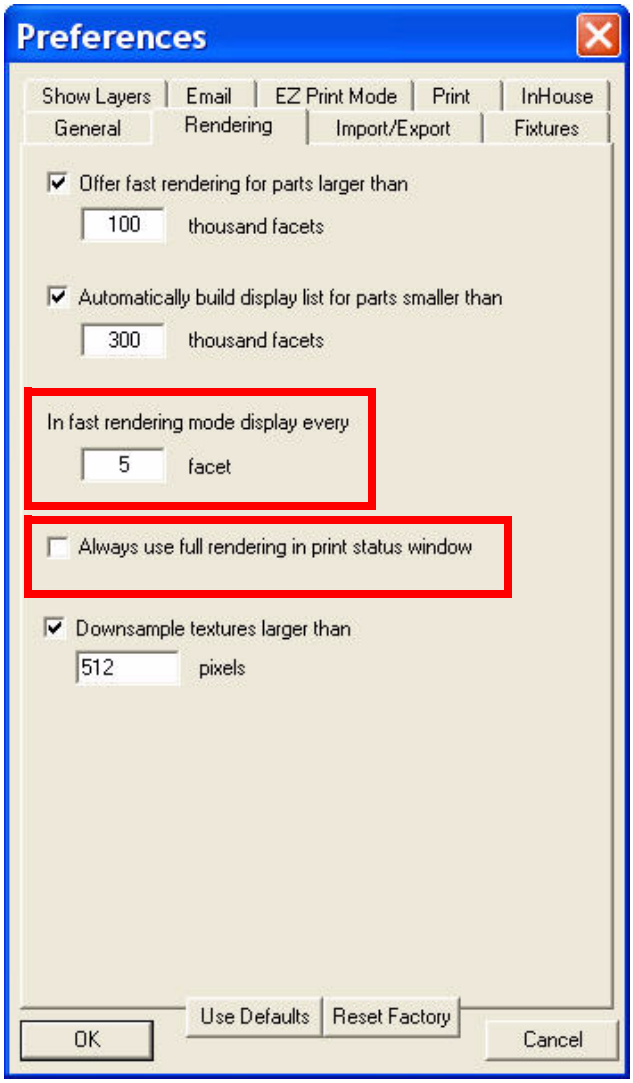
10.4Errors When Printing

If the computer freezes during printing or displays a ‘low memory’ or ‘out of memory’ error, uncheck (deselect) the box for “Always use full rendering” (go to the **Settings > General Preferences > Rendering** tab).

You can also try reducing the detail for rendering. Change the fast rendering mode to display every 150 facets. Continue to increase this number if you find that it takes too long to render at this setting.



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