



# ZEdit™ Software Manual

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## **ACKNOWLEDGEMENTS**

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# ZEdit™ Software Manual

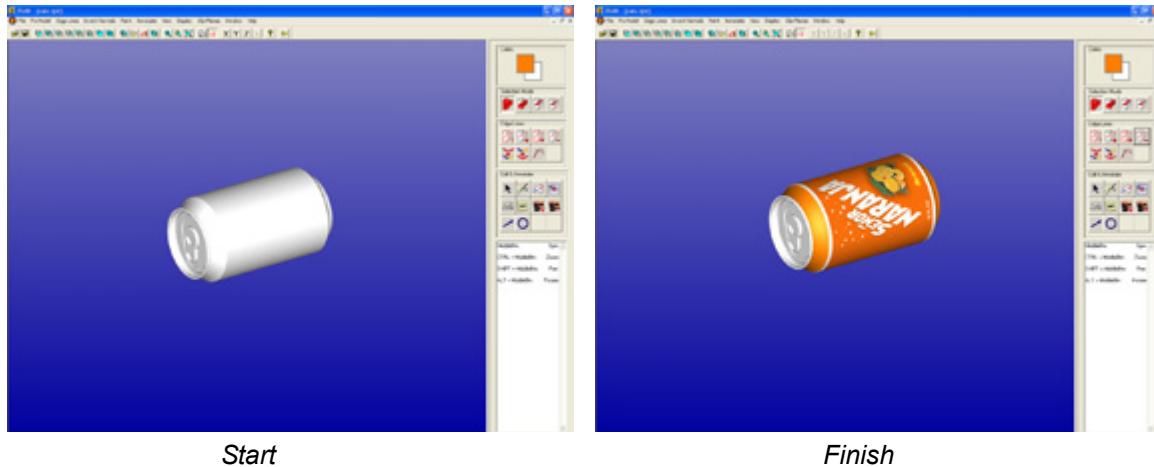
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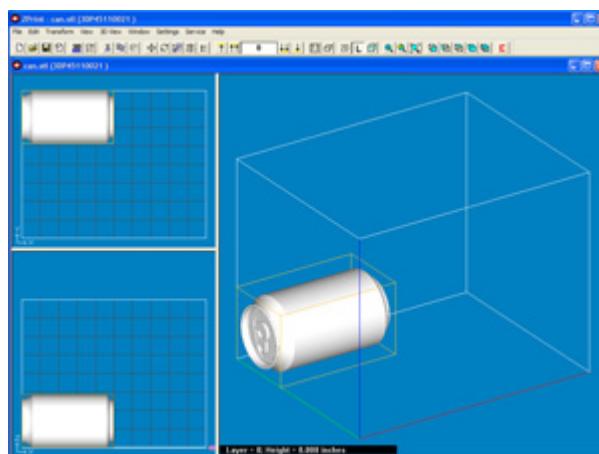
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# 1 Quick Start Guide

This chapter will take you through the steps of changing a monochrome soda can into a soda can with color, design elements, and a company logo, as shown below. See [Chapter 3 - ZEdit Basics](#) for a complete description of the ZEdit Main Window and the Toolbar.

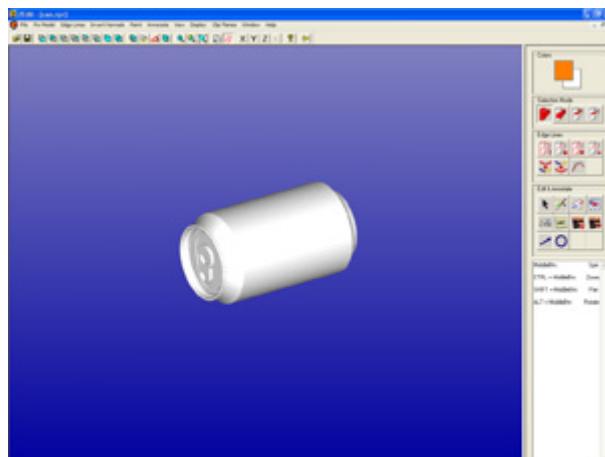


1. Load the soda can file (*can.stl*) from the *Samples* directory into ZPrint. After loading, point the mouse on the soda can and left-click to select it. A yellow wire frame is drawn around the soda can.



2. Click the **Start ZEdit** icon to launch the ZEdit application. The selected soda can opens in the ZEdit main window.

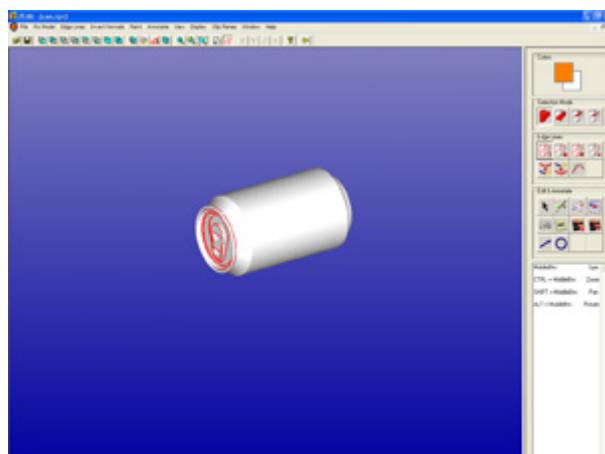




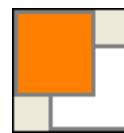
3. Create Edge Lines on the soda can by selecting the **Make Edge Lines** Tool.



- ZEdit quickly separates the part surfaces and outlines them in color.



4. Select a color to paint the soda can using the **Color** palette. Left-click on the Foreground **Color Selection Box** and choose a color from the palette. Click **OK** to close the palette and to update the Foreground color.



5. To paint the surface, select the **Surface Selection Mode** and then select the **Paint Tool**.

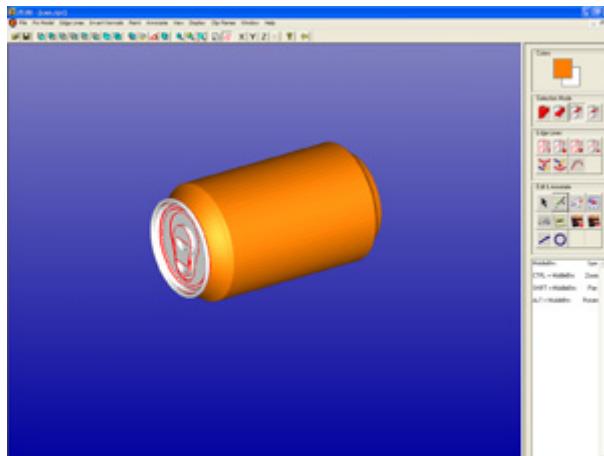


Surface Selection Mode



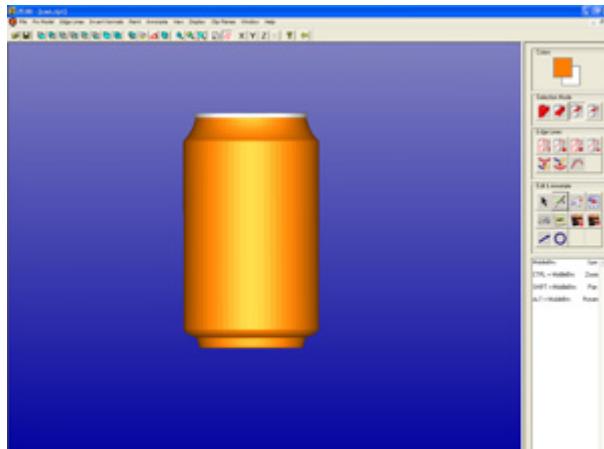
Paint Tool

6. Left-click the mouse on the soda can surface. Right-click to save your changes and to exit the **Paint Tool**.



7. Orient the part so that the soda can is standing vertically, as shown below. Choose from the **View** icons on the Toolbar to orient your part.

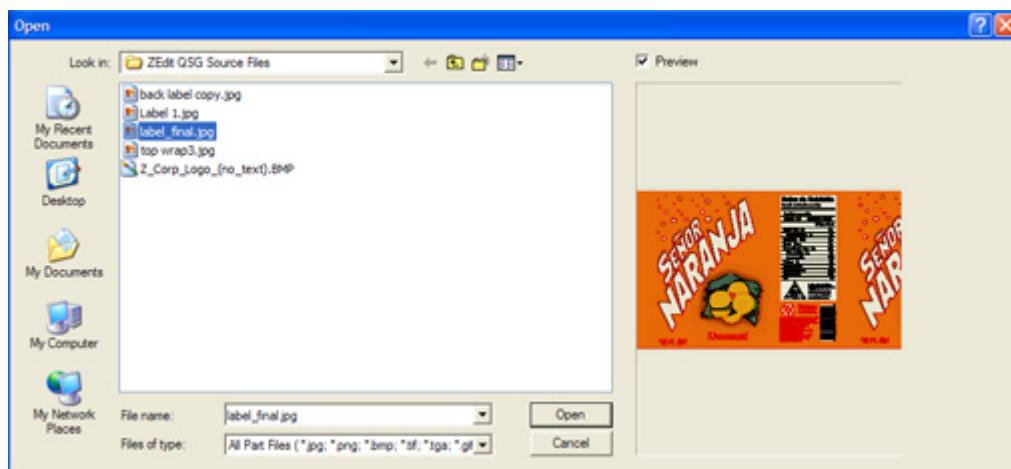
**NOTE:** Depending on the type of 3D printer you are using, you may need to rotate the soda can so it is standing vertically. To rotate the can, select either the **Rotate 90 Degrees** icon on the Toolbar, or press the **Alt** key and the mouse wheel to manually rotate.



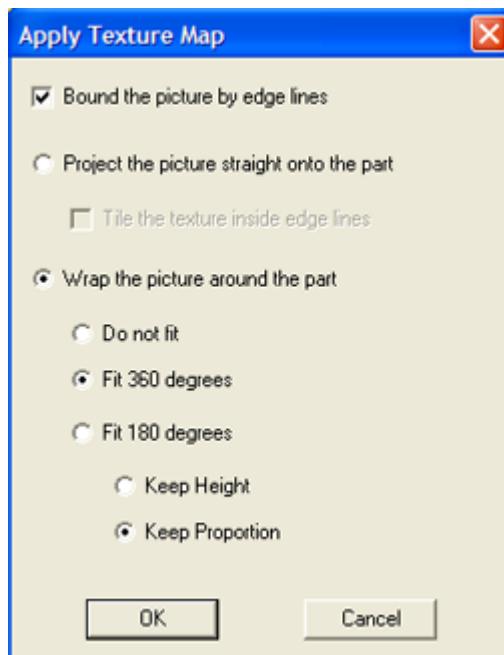
8. Click the **Add Texture Map** Tool.



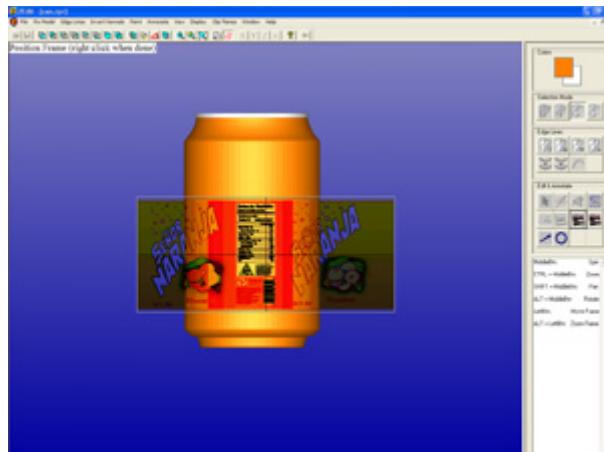
9. In the **Open** dialog, select the *label\_final.jpg* file and click **Open**.



10. When the **Apply Texture Map** dialog opens, check the **Bound the picture by Edge Lines** checkbox, select the **Wrap the picture around the part** option, and then select the **Fit 360 degrees** and the **Keep Proportion** options. Click **OK**.

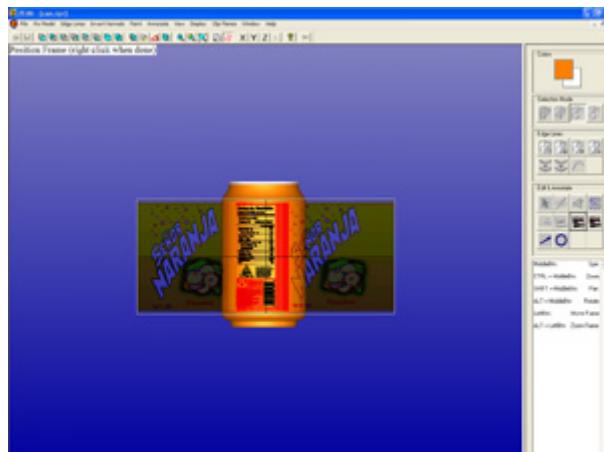


- The Texture Map is projected onto the soda can, but we would like the Texture Map to fit the length of the can. To resize the soda can, do the following:

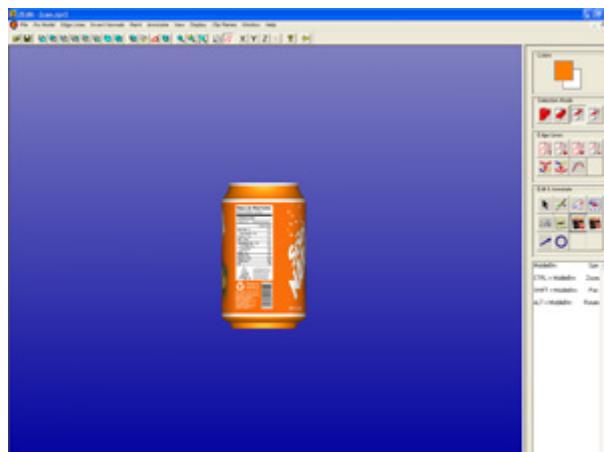


**Resize** - Turn the Mouse wheel to resize the soda can.

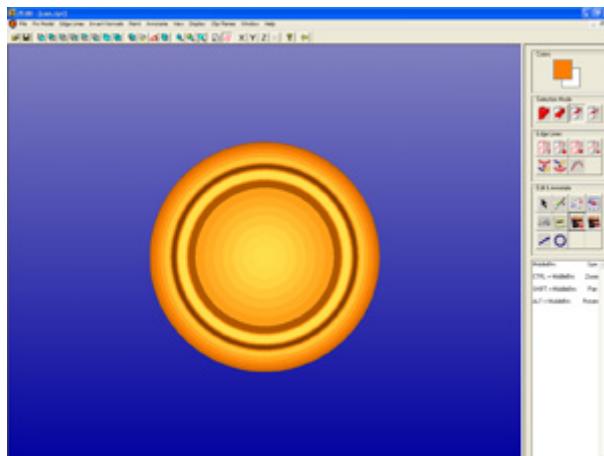
**Move** - Press the **Shift** key and the mouse wheel. Drag the mouse to move the soda can.



11. Right-click to apply the Texture Map to the part. A preview appears. If you are satisfied with the result, right-click to confirm the placement of the Texture Map. If not, press the **Esc** key to start over.



12. Orient the part so that the bottom of the soda can is facing the screen, as shown below.

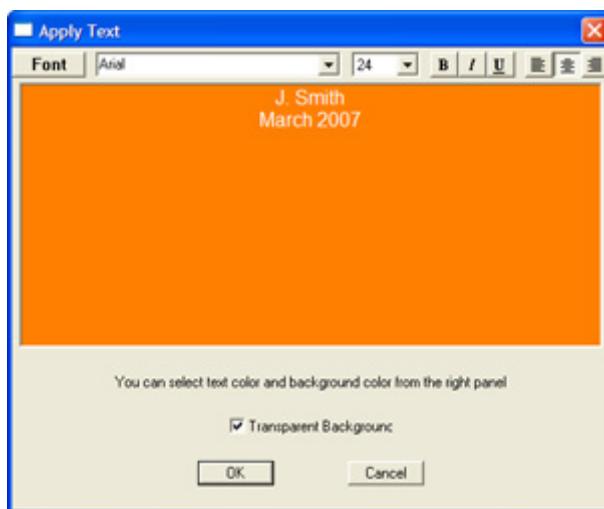


13. Select the **Apply Text** Tool.

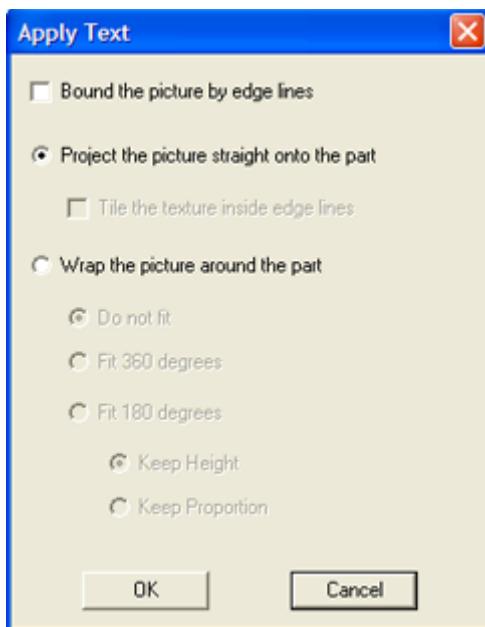


14. Type in your name and the date. Click **OK**.

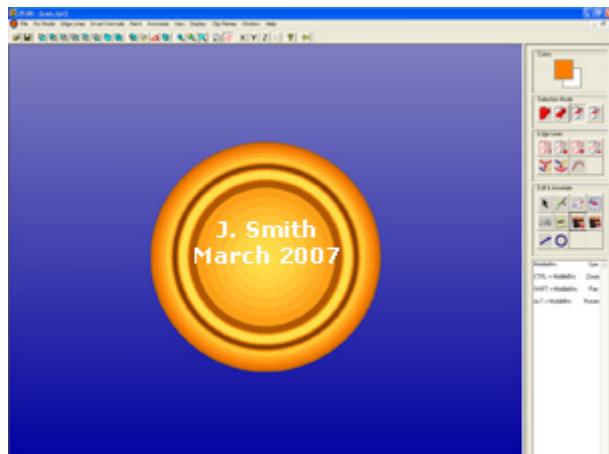
- Check the **Transparent Background** checkbox if you want to project the text onto the can using the color of the can as the background color for the text.
- To select colors for the text and/or the background, click the Foreground/Background **Color Selection Boxes** on the right-side panel and choose your text and background colors from the **Color** palette.



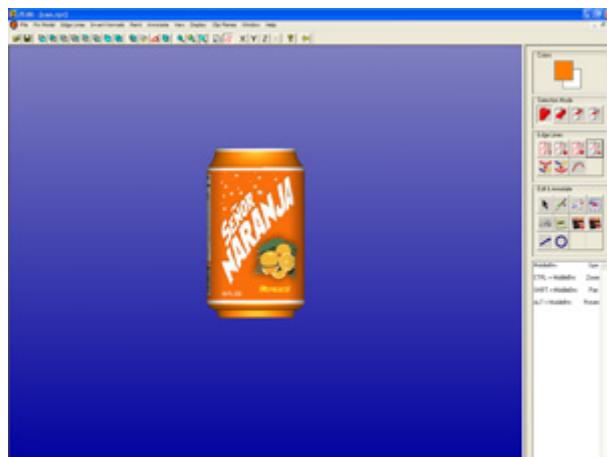
15. When the **Apply Text** dialog box opens, select the **Project image straight onto the part** option and click **OK**.



16. The text is positioned on the bottom of the can. To move the text, point the mouse on the text and press the left mouse button. Drag the mouse to move the text. Make sure the label is completely on the part and does not fall onto the background.



17. When you are satisfied with the text position, right-click to finish applying the text.
18. To inspect the finished product, choose a **View** icon to orient the part so that it is standing up. To rotate the can, press the **Alt** key and the mouse wheel, and then drag the mouse to rotate.

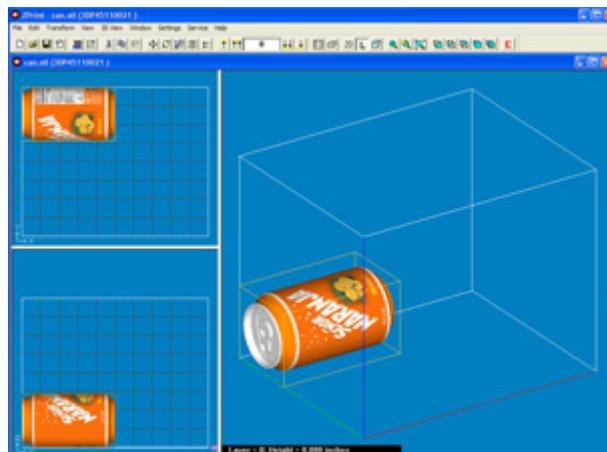


19. Return to ZPrint by selecting the **Return to ZPrint** icon.



20. ZEdit will ask you if you want to update the file in ZPrint:

- Choose **Yes** to save your changes and return to ZPrint.
- Choose **No** to return to ZPrint without saving.



*Updated Soda Can loaded back into ZPrint and ready to print*

## 2 Introduction

### 2.1 What's New In ZEdit™

- Create text, arrows, and circles with transparent backgrounds and apply them to your parts.
- Replace Texture Maps feature. Edit or replace applied text, Texture Maps, and Templates directly on the part with the same aspect ratio and size as the existing Texture Map.
- Mix font styles, size, and types within the same text note.
- Full .zpr file support (versions 1, 2, and 3). .zpr saving options are available for compressing Texture Maps, saving Texture Maps as external files, and saving Texture Maps as .png files.
- Clip Planes. A diagnostic tool for isolating a problem inside a part or model before you print. Set Clip Planes in the X, Y, or Z direction for looking inside a part.
- X-Ray. A diagnostic tool for evaluating whether a part has good normals throughout before printing. Run the X-Ray Tool to evaluate the entire part, or a user-specified area.

### 2.2 Overview

ZEdit was developed by a team of Z Corporation software developers and application engineers as a Tool to help those who use HD3DP™ (High-Definition 3D Printing) to optimize their parts and models with color or annotations such as a logo, text, or a Template. ZEdit works in conjunction with ZPrint™, which is required for printing files on your 3D printer. To run ZEdit, you will need to meet the following system requirements.

### 2.3 Computer Requirements

#### **Recommended System:**

Windows® 2000 Professional or Windows XP® Professional; Windows Vista™ 32-bit Operating Systems  
3.2GHZ or better  
2GB or better  
True Color Graphics  
64 MB Video Card or better  
1024 X 768 pixels, or better  
16-bit or better with graphics card accelerated for OpenGL  
1 GB of free hard drive space after OS and utilities are loaded plus room for data files

#### **Minimum System:**

Windows® 2000 Professional or Windows XP® Professional; Windows Vista™ 32-bit Operating Systems  
Personal computer using a 1.2GHz Pentium II chip or higher  
512 MB of RAM or more  
16-bit color or better  
1024 X 768 pixels or better  
Graphics card accelerated for OpenGL  
1 GB of free hard drive space after OS and utilities are loaded plus room for data files

## 2.4 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.

To install the ZPrint/ZEdit Software:

1. Before installing, check to see that you have Administrator rights to the computer. You must have Administrator rights in order to install the software.
2. Close all open applications on your computer. Turn off all Windows Power Management software. Ensure either the Windows® 2000 Professional; the Windows XP®; or the Windows Vista™ 32-bit Operating System is running.
3. Insert the ZPrint Software CD into your CD-ROM drive.
  - If the installer does not start automatically, double-click on your CD-ROM drive and then double-click on the *Setup.exe* icon. This launches the installation.
4. You have the option to install both the ZPrint and/or the ZEdit applications.
  - a. Read the licensing agreement carefully.
  - b. Select the destination directory. The program will prompt you for a selection and will suggest *C:\Program Files\ZPrint Software* as the default directory.
  - c. It takes a moment for the program to install. When complete, you are returned to the main window.
5. If you encounter any problems during installation, please contact your local Service Provider, or visit our Website at [www.3dpuser.com](http://www.3dpuser.com).

## 2.5 File Format Compatibility

ZEdit is compatible with the following file formats. These file types are in the form of a triangulated mesh.

- *.3ds*
- *.zpr* files - These are files created and saved in ZEdit that provide the interchange between ZEdit and ZPrint. A detailed description of the *.zpr* file format is available in the Appendix and on our Website at [www.3dpuser.com](http://www.3dpuser.com).
- *.stl* files - These are monochrome 3D model files that can be imported into ZEdit and exported to a number of 3D CAD software programs.

## 2.6 ZEdit Help

Help is available in ZEdit.

- Look at the upper left-hand corner of the ZEdit main window for guidance during a procedure. View a brief description in the lower right-hand corner when you move the mouse over a Tool or icon.
- To access the online Help system, open the **Help** menu and choose from the menu items available.
- To view the *ZEdit™ Software Manual* in .pdf format, click the **Help** icon. 

## 2.7 Contact Information

If you have any questions about ZEdit, or your Z Corporation/Contex 3D printer, please contact us directly by:

**Phone (In the U.S.):** 877-88-ZCORP (877-889-2677)

**Phone (Outside the U.S.):** 1-781-852-5050

**Fax:** 1-781-852-5100 (ATTN: Customer Service)

**Email:** service@zcorp.com

**Web:** [www.zcorp-users.com](http://www.zcorp-users.com) or [www.3dpuser.com](http://www.3dpuser.com)

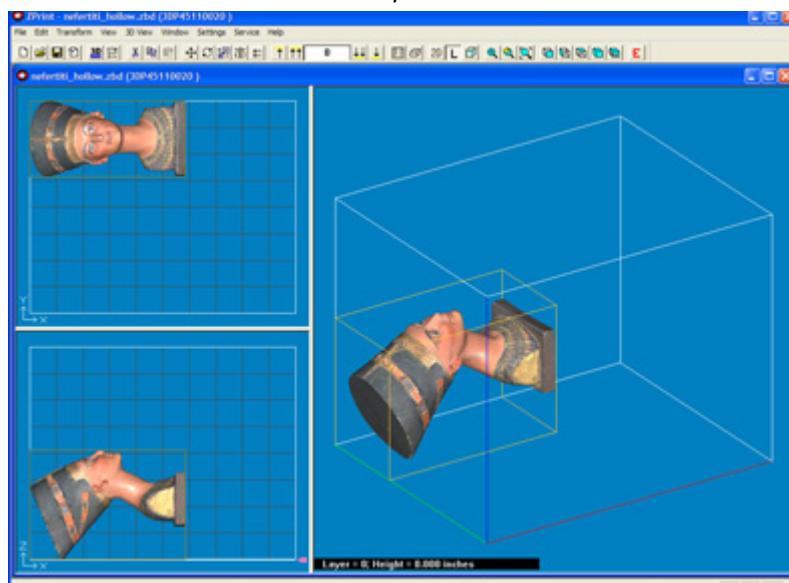
## 3 ZEdit Basics

### 3.1 Open A File In ZEdit

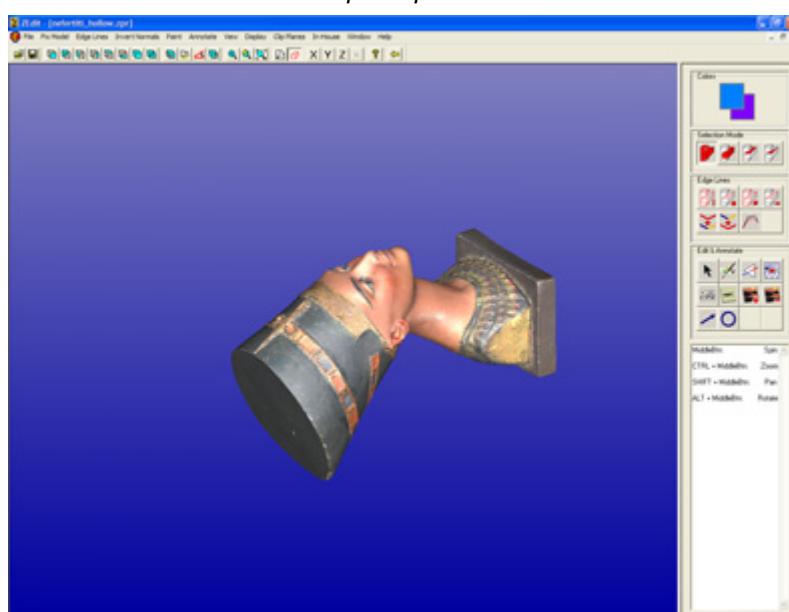
Any file type you can open in ZPrint can also be opened/imported and viewed in ZEdit. For additional information on .zpr files, see the [Appendix](#). There are two ways to open a file in ZEdit:

- The first way is to open the part in ZPrint, select the part and then press the **Start ZEdit** icon  (or select **Edit > Start ZEdit**). The advantage of loading the file into ZPrint first is that you can scale the model, bring it into ZEdit, modify the file, and then update the file in ZPrint when you exit ZEdit.

*A selected part in ZPrint*

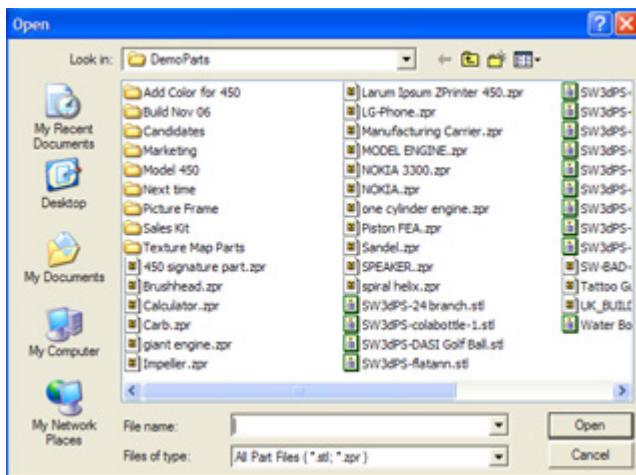


*The same part opened in ZEdit*



**NOTE:** The part orientation in ZPrint is the same orientation in ZEdit.

- The second way is to open the file directly in ZEdit. After launching the ZEdit executable, select **File > Open** and choose a file.



## 3.2 Mouse And Keyboard Functions

Use a combination of the Mouse and Keyboard to orient a part in ZEdit.

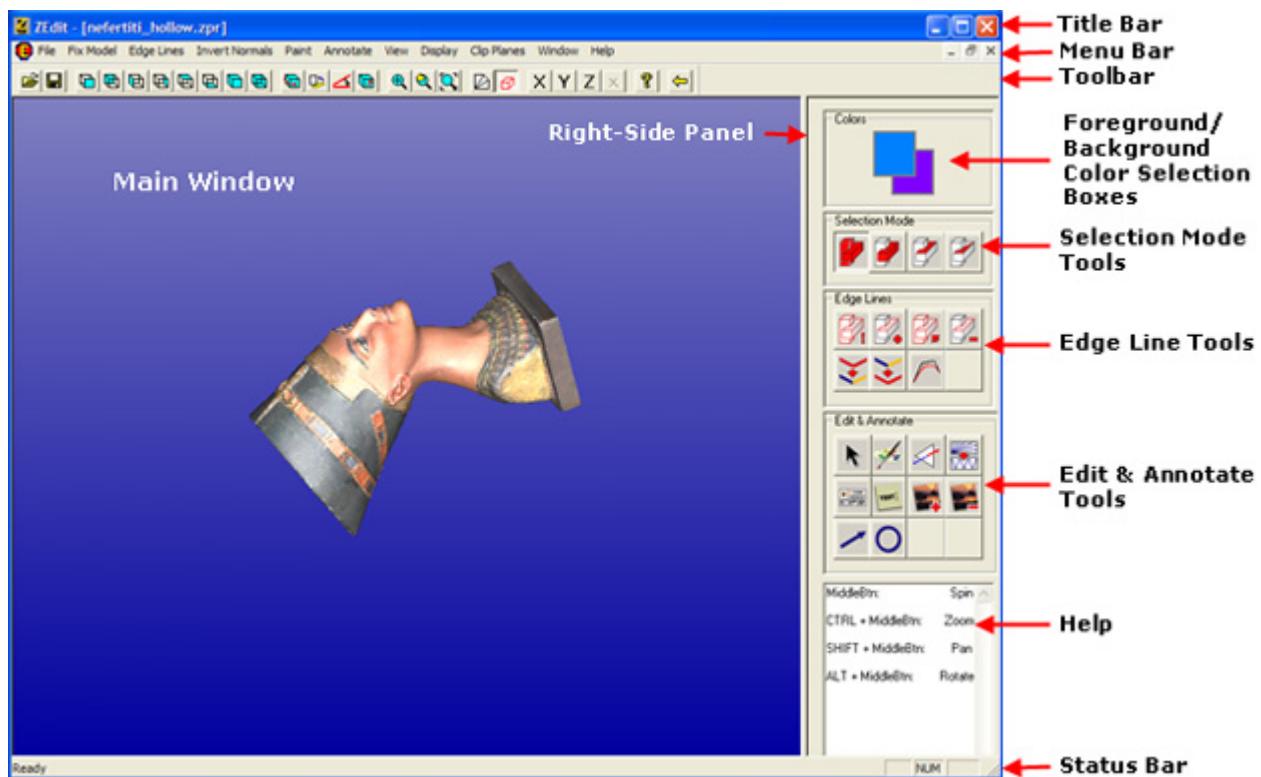
To confirm and accept changes made - Click the Right Mouse Button  
To undo your last action - Press the **Esc** key

Zoom In/Out - Press the Middle Mouse Button (or Wheel)  
Rotate - Press the Middle Mouse Button (or Wheel)

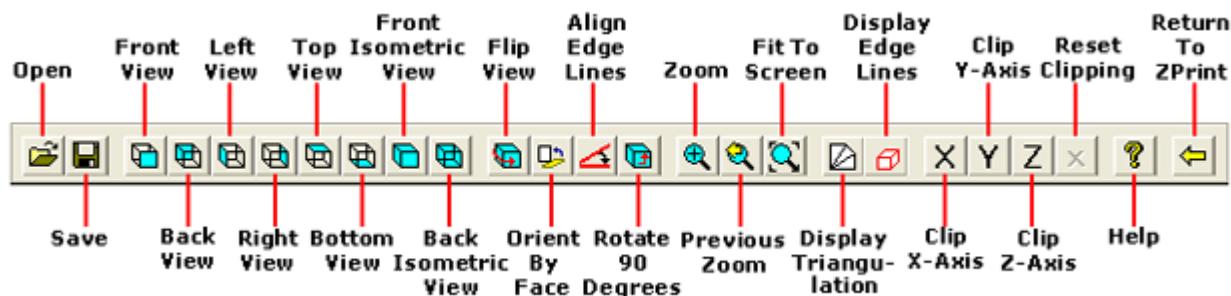
Zoom - Press **Ctrl + Middle Mouse Button**  
Move - Press **Shift + Middle Mouse Button**  
Rotate - Press **Alt + Middle Mouse Button**



### 3.3 The ZEdit Main Window



### 3.4 The ZEdit Toolbar



### 3.5 Toolbar Descriptions

Use the Toolbar to quickly orient your part in the ZEdit main window. Following is a description of each operation available on the Toolbar.

	<b>Open File</b> - Opens an existing file.
--	--

	<b>Save</b> - Saves the current file.
---	---------------------------------------

	<b>Front View</b>
	<b>Back View</b>
	<b>Left View</b>
	<b>Right View</b>
	<b>Top View</b>
	<b>Bottom View</b>
	<b>Front and Rear Isometric Views</b>

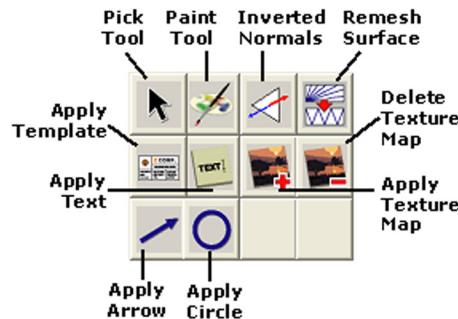
	<b>Flip View</b> - Turns the part in any view 180° in order to see the opposite side.
	<b>Orient By Face</b> - Orient the part so that the selected surface is parallel with the screen.
	<b>Align Edge Line</b> - Orient the part in the plane of the screen such that the selected Edge Line becomes horizontal or vertical.
	<b>Rotate 90°</b> - Rotates the part counter-clockwise 90° to the plane of the screen.

	<b>Zoom</b> - Changes the cursor to a plus sign for drawing a box to zoom in on a detail.  Press the left mouse button and drag to draw a box over any area of the part. Release the button. The zoomed area is enlarged in the main window.
	<b>Previous Zoom</b> - Returns you to the previous view.
	<b>Fit To Screen</b> - Maximizes the part to fit in the main window.

	<b>Display Triangulation</b> - Toggles the part with a triangulation mesh. Display a part with Triangulation to quickly and easily create Edge Lines, apply color, or diagnose Inverted Normals.
	<b>Display Edge Lines</b> - Toggles the part Edge Lines on and off.
	<b>Clip Along X-Axis</b> - Toggles the display of the X-Axis Clip control.
	<b>Clip Along Y-Axis</b> - Toggles the display of the Y-Axis Clip control.
	<b>Clip Along Z-Axis</b> - Toggles the display of the Z-Axis Clip control.
	<b>Reset Clipping</b> - Returns a clipped part to its original unclipped state.
	<b>Help</b> - Access online Help and the <i>ZEdit™ Software Manual</i> in .pdf format.
	<p><b>Return To ZPrint</b> - Exits the ZEdit application and returns to ZPrint. ZEdit prompts you to save changes made to the part, before closing. Choose <b>Yes</b> to save, or <b>No</b> if you do not want to save changes.</p> <p>You may also select <b>File &gt; Save</b>, or click the <b>Save</b> icon on the ZEdit Toolbar to save while working in ZEdit.</p>

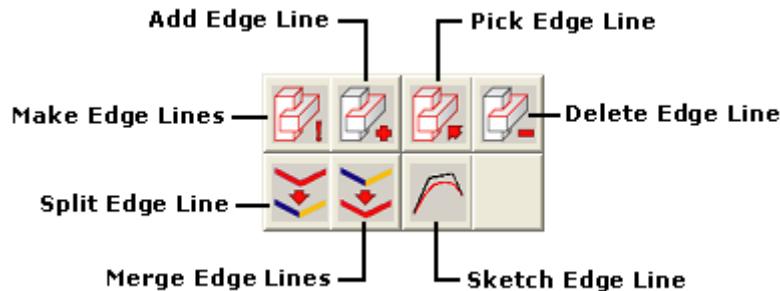
### 3.6 Edit & Annotate Tools

The **Edit & Annotate** Tools are for applying highlighting, color, images, or text to a part. For more information, please refer to *Chapters 6, 7, 8, and 9*.



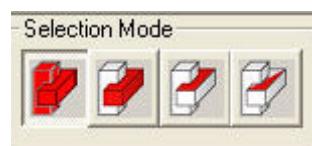
### 3.7 Edge Line Tools

The **Edge Line** Tools help you easily distinguish and outline part surfaces. These Tools will delineate any surface on a part. For more information, please refer to [Chapter 5 - Edge Lines](#).

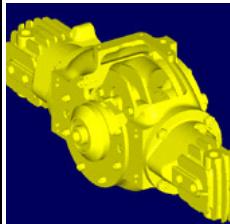


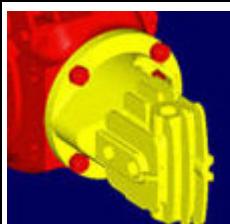
### 3.8 Selection Modes

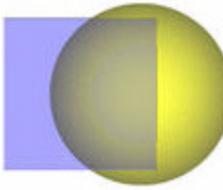
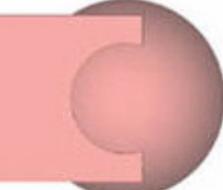
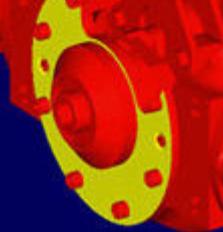
Choose a Selection Mode to isolate or emphasize different areas of a part with highlighting, or to apply color.



Choose a **Selection Mode** and then the **Pick Tool** to highlight a shell, surface, or triangle. When finished, right-click to quit the **Pick Tool** and turn off the highlighting.

 Part Selection	ZEdit does not change the cursor to a plus sign when this mode is selected. The part remains in its original color(s).	
---	--	---

 Shell Selection	When a part is made up of several geometries merged into one, choose the <b>Shell</b> Selection Mode and then the <b>Pick Tool</b> to select separate shells.	
--	---	---

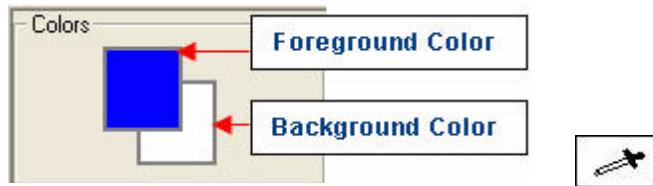
	A part can be made up of several shells if it is made up of several components that have not been merged. The figure on the right is one part, but both the cube and the sphere are also individual shells. Typically, a part in an assembly is represented by a shell. Shells can interpenetrate each other but should not have common faces, edges, or vertices.	
	When merged, the part becomes one shell.  <b>NOTE:</b> ZEdit cannot merge multiple shells.	
 Surface Selection	<p>A surface is defined by a group of triangles that are enclosed by Edge Lines. A surface is not necessarily a flat area.</p> <p><b>Important:</b> In order to select a surface, Edge Lines need to be created to delineate the surfaces. If no Edge Lines have been created, the surface coincides with its shell and the entire part will be highlighted.</p> <p>First click <b>Make Edge Lines</b>. Next choose the <b>Surface</b> Selection Mode and then the <b>Pick</b> Tool to highlight individual surfaces.</p> <p>Please see <a href="#">Chapter 5 - Edge Lines</a> for more information.</p>	

 Triangle Selection	<p>Choose <b>Triangle</b> Selection Mode and then the <b>Pick</b> Tool to highlight individual triangles.</p> <p>Toggle the display of the triangle lines by selecting the <b>Display Triangulation</b> icon .</p>	
---	---	---

Choose a **Selection Mode** and the **Paint** Tool to apply the color in the Foreground/Background **Color Selection Boxes**. See the next section for complete information.

### 3.9 Color Selection Boxes And The Eyedropper Tool

Apply Foreground and Background colors to a part, shell, surface, or triangle. Change the cursor to the Eyedropper Tool and choose a part color as the Foreground or Background color. To learn how to apply Foreground and Background colors to font and font backgrounds, see [Sections 8.5](#) and [8.6](#).



*The Color Selection Boxes and the Eyedropper Tool*

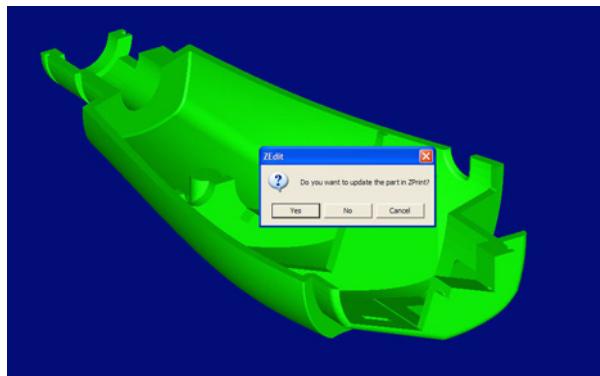
**Palette:** Left-click on a Color Selection Box to display the **Color** palette. Select a color on the palette and click **OK**. The Color Selection Box updates with the new color. Choose a **Selection Mode** and then the **Paint** Tool to apply the color to a part.

**Eyedropper Tool:** Right-click on a Color Selection Box to change the cursor to the Eyedropper Tool. Left-click the Eyedropper on the part color you wish to select as the new Foreground or Background color. The Color Selection Box updates with the color. Choose a **Selection Mode** and then the **Paint** Tool to apply the color.

### 3.10 Save/Update A File In ZEdit

Choose to save the file you are working on in ZEdit as a separate .zpr file, or update the file with your current changes and return to ZPrint. There are a couple of options for updating files that are changed in ZEdit:

- There is only one entity of the part that exists in ZPrint. Choose to update, or not to update, the file when you exit ZEdit and return to ZPrint.

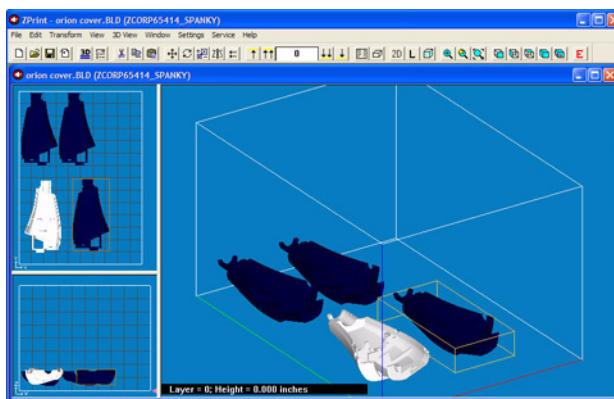


- More than one entity of the part exists in ZPrint within a single file. There are three options to choose from in the **Update Part** dialog when you are returned to ZPrint:

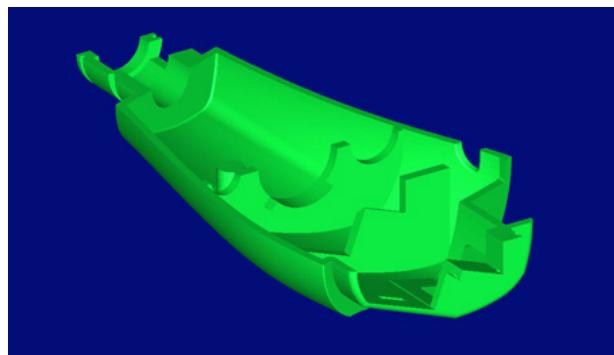


- **Update All Entities** - Choose this option to update all entities of the part that exist in the current ZPrint file.
- **Update Single Entity** - Choose this option to update only the one entity of the part that was changed in ZEdit, and leave all other entities of the part unchanged in ZPrint.
- **Do Not Update Anything** - Choose this option to discard any changes made to the part in ZEdit.

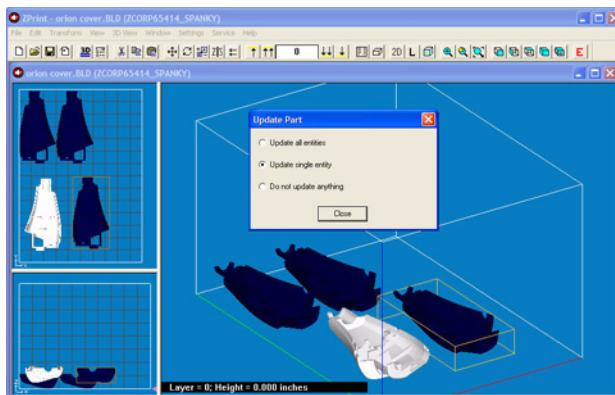
*Update Entity Example:*



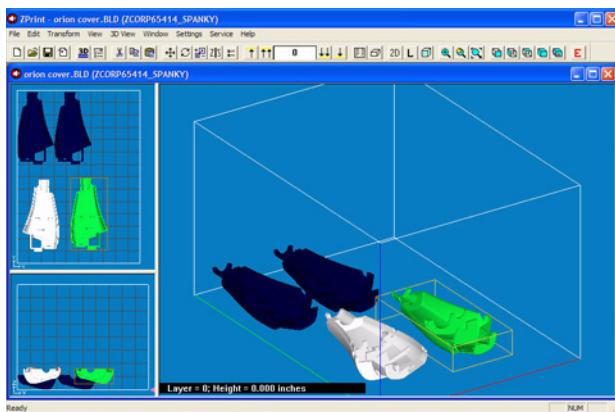
*One of three identical parts selected in ZPrint*



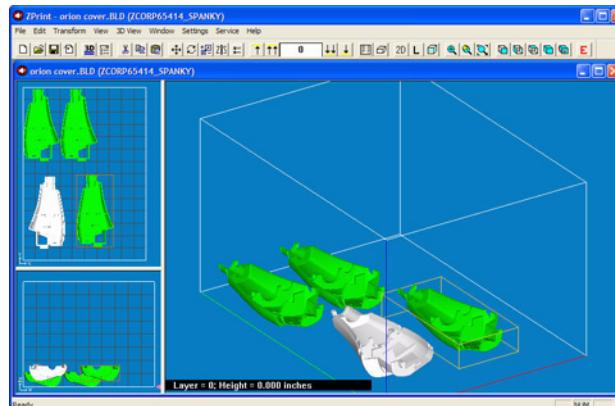
*The selected part loaded into ZEdit and changed to a new color*



After saving changes in ZEdit, ZPrint asks how to update the part. In this case we chose **Update Single Entity**



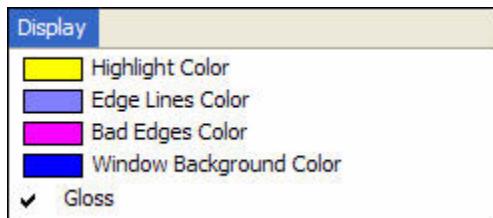
Only the single entity is updated in ZPrint



If we had chosen **Update All Entities**, the file would update like this in ZPrint

## 4 The Display Menu

Access the ZEdit **Display** menu to set the display colors for differentiating part surfaces. Choose colors for Highlighting, viewing Edge Lines, Bad Edges, and for the ZEdit main window Background Color.



- **Highlight Color** - The Highlight Color is the color that is applied to a selected part area. Select to open the **Color** palette and choose a color.

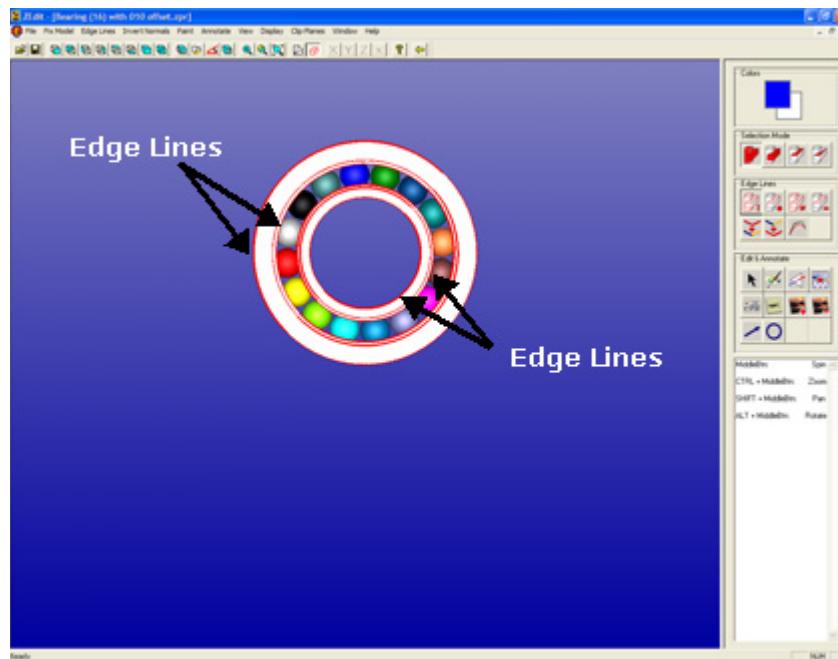
To highlight a part, choose one of the **Shell**, **Surface**, or **Triangle Selection Mode** Tools and then the **Pick** Tool. Left-click on an area of the part to highlight.

- **Edge Lines Color** - The color that ZEdit will use to outline Edge Lines on a part surface. Select to open the **Color** palette and choose a color.

To view Edge Lines on a part, choose the **Make Edge Lines** Tool to view the part Edge Lines in the selected color. The same color is applied when you select the **Add Edge Lines** Tool.

- **Bad Edges Color** - Choose a color for displaying bad Edges.
- **Window Background Color** - Sets the background colors for the ZEdit main window.
- Check **Gloss** to create a lighted appearance on parts you view in ZEdit for an even more realistic 3D look. Uncheck to turn **Gloss** off.

## 5 Edge Lines



Display Edge Lines on a part to differentiate the surfaces that make up the part. Edge Lines are especially useful when you need to apply paint, apply an image, or correct Inverted Normals on a part surface. ZEdit automatically creates Edge Lines for you, and also has functionality to assist you with sketching your own.

### 5.1 Make Edge Lines

ZEdit detects the edges of a part and outlines them in color.

1. Select the **Make Edge Lines** Tool.

- ZEdit first highlights all possible Edge Lines and then sorts through those and outlines the remaining Edge Lines in red, the default display color for viewing Edge Lines. To change the Edge Lines display color, see [Chapter 4 - Display Menu](#).



2. Click the **Display Edge Lines** icon to toggle the Edge Lines view On/Off after they are created.



## 5.2 Add Edge Line

Quickly create Edge Lines on the area of a part where none are detected.

1. Display a part with its Edge Lines visible.
  
2. Select the **Display Triangulation** icon. 
  
3. Select the **Add Edge Line Tool**.  The cursor changes to a plus sign.
  
4. Point the cursor on a triangle line and left-click to create an Edge Line.

## 5.3 Pick Edge Line

Use the **Pick Edge Line Tool** to highlight a single Edge Line on a part.

1. Display a part with its Edge Lines visible.
  
2. Click the **Pick Edge Line Tool**.  The cursor changes to a plus sign.
  
3. Click the cursor on an Edge Line to highlight it.

## 5.4 Delete Edge Line

In cases where there are multiple Edge Lines that are close to each other, you can delete the ones that are not needed.



*Multiple Edge Lines*



*Deleted Edge Lines*

1. Select the **Delete Edge Line Tool**.  The cursor changes to a plus sign.

2. Left-click on an Edge Line to delete. Repeat to continue deleting. Press the **Esc** key if you need to undo your selection.
3. Right-click to confirm and to exit the **Delete Edge Line Tool**.

## 5.5 Toggle Edge Lines View

Select **View > Display Edge Lines**, or click the **Display Edge Lines** icon on the Toolbar, to toggle the Edge Lines view On/Off.

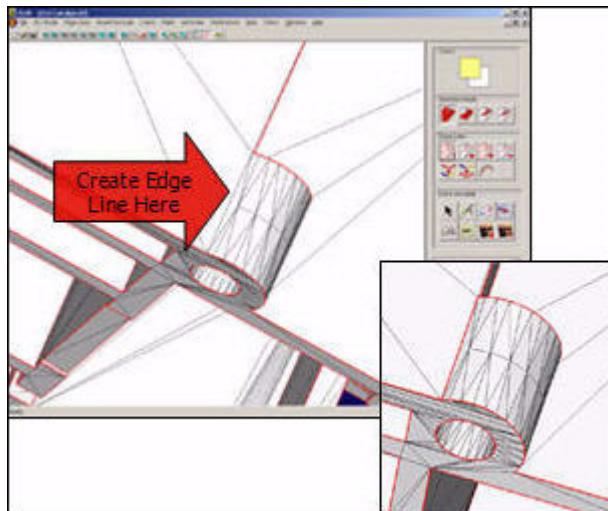


## 5.6 Manual Edge Line Creation

If a part region is not delineated (detected) by the **Make Edge Lines** function, you can still create your own Edge Lines and apply a Texture Map, or color, to that area. There are two ways to manually create Edge Lines. The first method involves using the edges defined by the triangulation of the part. The second method allows you to sketch an Edge Line using the cursor.

### 5.6.1 Create Edge Lines Using Triangulation

1. Select the **Display Triangulation** icon.
2. Use the Zoom tools to zoom into the area where you would like to create an Edge Line.



3. Select the **Add Edge Line Tool**.

4. When the cursor changes to a plus sign, lift-click the mouse on the edge of a triangle to select it. (When selecting a triangle edge, position the cursor inside the triangle close to the desired edge.) The Edge Line is highlighted. Right-click the mouse to confirm your action and to exit the **Add Edge Line Tool**.
5. Click **Previous Zoom**.
6. Click the **Display Triangulation** icon to turn Triangulation off.

### 5.6.2 Sketch Edge Lines Using The Cursor

The **Sketch Edge Line** Tool allows you to draw Edge Lines on surfaces that do not necessarily follow the triangulation of a part. In most cases, you will only need to access this Tool to create an enclosed contour.

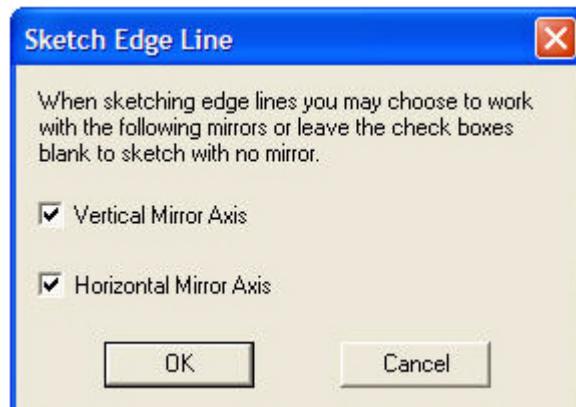
1. Orient the part so that the surface you want to sketch the Edge Line on is facing the screen.

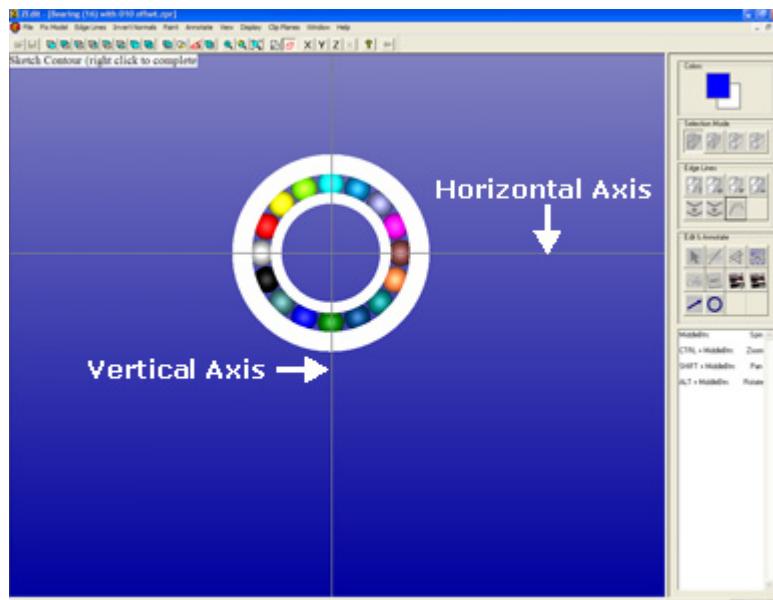


2. Select the **Sketch Edge Line** Tool.

3. The **Sketch Edge Line** dialog opens. Choose to select none, one, or both axes for mirroring the sketched Edge Line. Click **OK**.

**NOTE:** If you want to mirror the Edge Line and selected one or both of the axis options, you must first position each axis in the ZEdit main window. Point the cursor on an axis and hold down the left mouse button as you drag it to its new position. Right-click to confirm, or press the **Esc** key to start again.

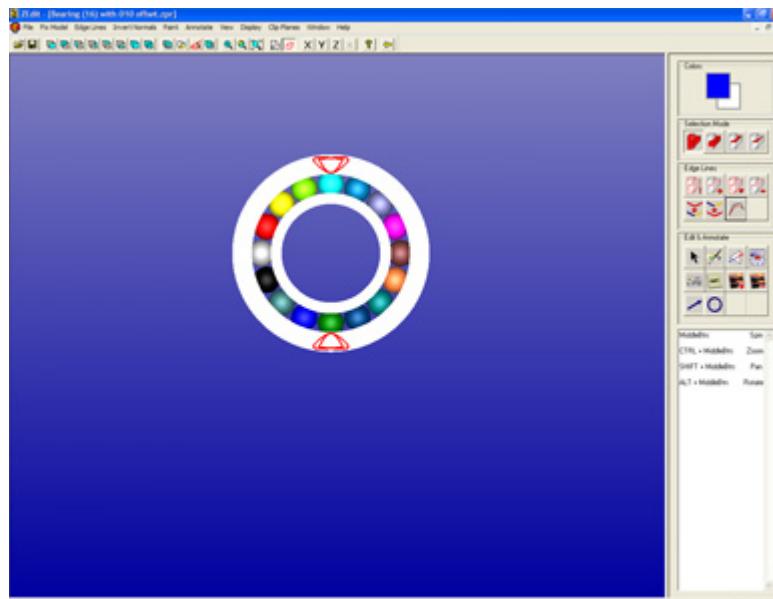




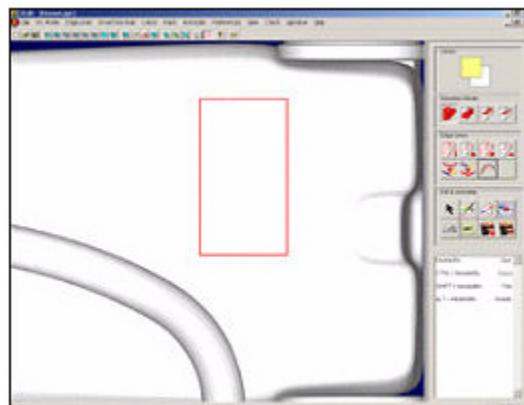
*Horizontal and Vertical Axes for mirroring Edge Lines*

4. Begin drawing the Edge Line. (If mirroring is on, begin by sketching directly on an axis.)

**TIP:** To create a sharp corner, **double-click** on the same position, then press the left mouse button and drag. Press the **Esc** key if you need to start again.

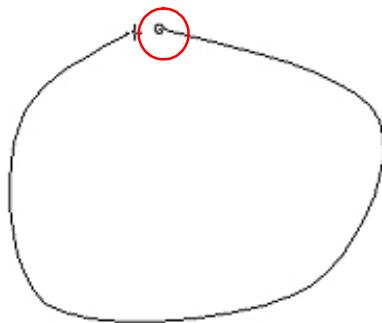


*An example of a hand-drawn Edge Line mirrored on a Vertical Axis*

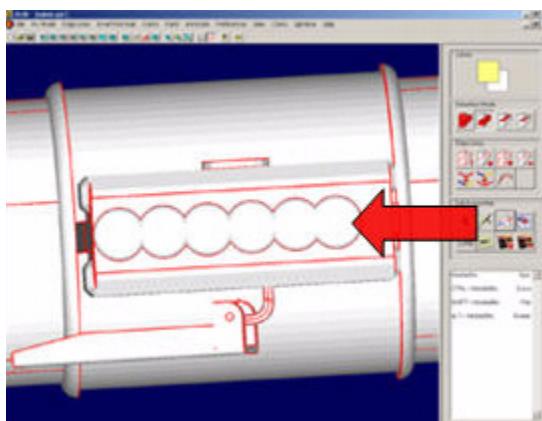


*An example of a hand-drawn square Edge Line*

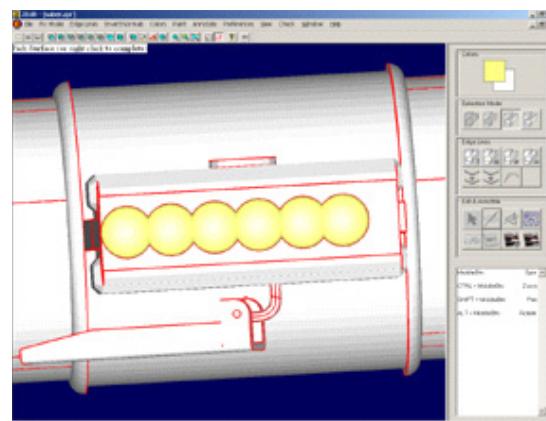
- To close an Edge Line, click on the circle marking the starting point. The cursor will snap to the start point. Left-click again to close the Edge Line. Right-click to confirm and exit the **Sketch Edge Line Tool**.



**NOTE:** You will need to close the Edge Line for it to differentiate that area from other surfaces. If the Edge Line is not a closed area, trimming by Edge Lines, or painting the area, will result in painting or applying the Texture Map to a point where a closed surface is detected.



*Area not separated by Edge Lines*

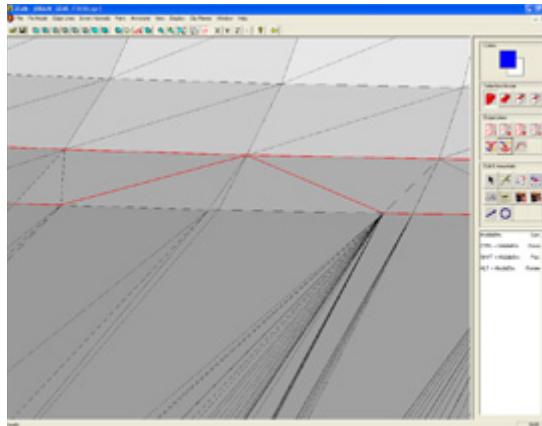


*Painting resulted in coloring the entire area*

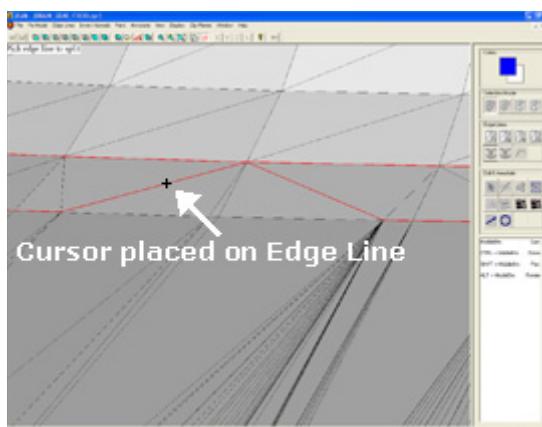
## 5.7 Split Edge Line

The **Split Edge Line** Tool will cut a single Edge Line into two Edge Lines. This feature is useful if you want to delete a portion of an existing Edge Line.

1. Select the **Make Edge Lines** Tool to delineate and view Edge Lines on the part.
2. Click the **Display Triangulation** icon on the Toolbar.
3. Zoom in on an area that has an Edge Line that you want to split.

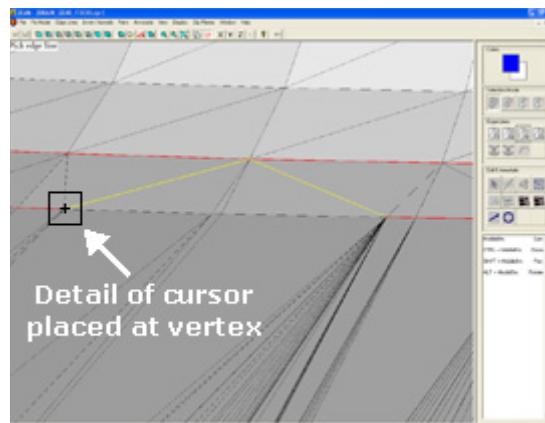


4. Select the **Split Edge Line** Tool. 
5. Click the cursor directly on a line to split. The Edge Line is highlighted.



6. Left-click on an existing vertex.

**NOTE:** The split point must be an existing vertex on the Edge Line. After indicating the split point, the Edge Line is displayed like all Edge Lines.



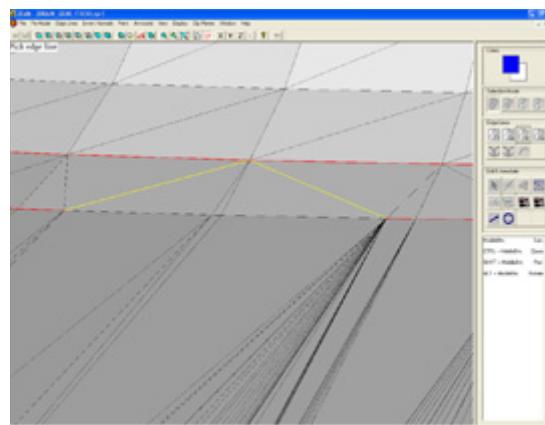
*Left-click on the vertex to split the Edge Line*

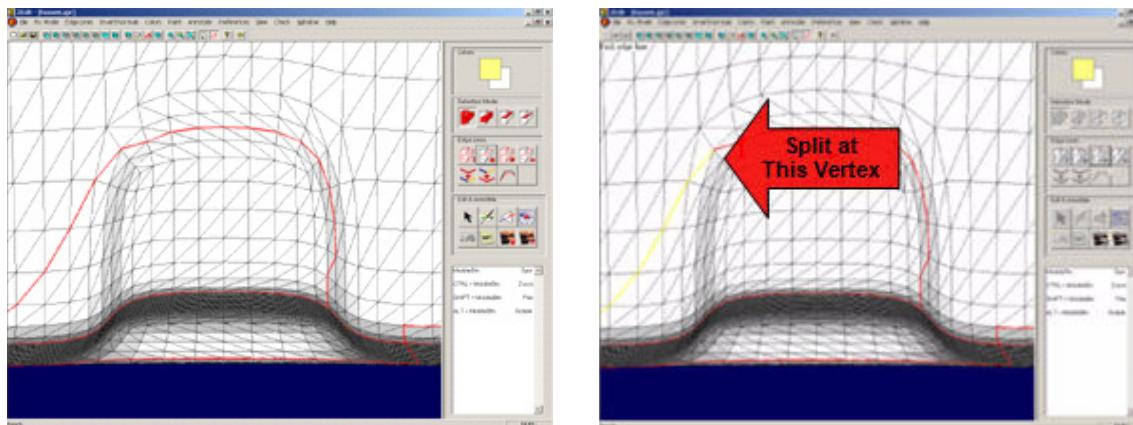
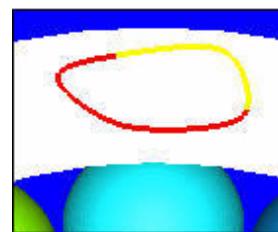
7. To see if the Edge Line is split, click on the **Pick Edge Line Tool**.



*The Pick Edge Line Tool*

8. Select one of the split Edge Lines. The split Edge Line is a different color where the Edge Line is split.

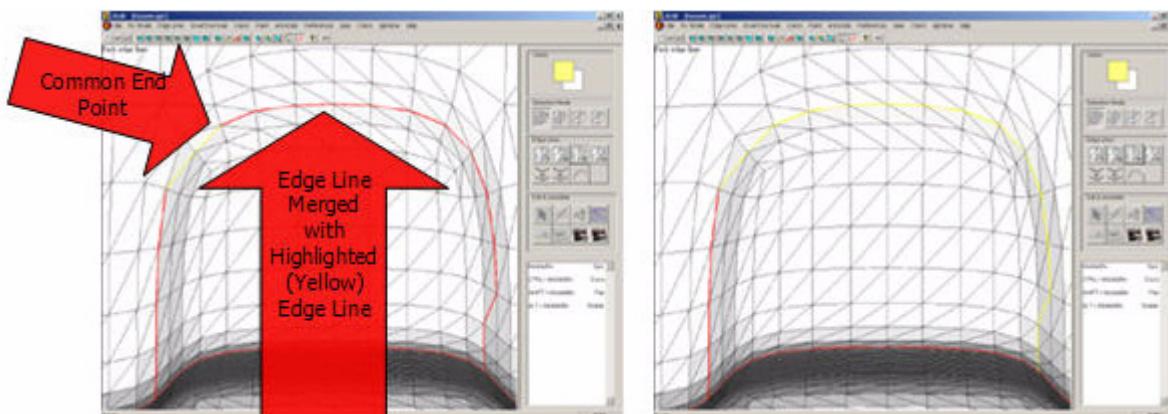


*Another example of a split Edge Line**Close-up of a sketched Edge Line that was split*

## 5.8 Merge Edge Lines

If two Edge Lines have a common endpoint, they can be joined (merged) into a single Edge Line.

1. Select the **Make Edge Lines** Tool to delineate and view Edge Lines on the part.
2. Click the **Display Triangulation** icon on the Toolbar.
3. Zoom in on an area that has an Edge Line you want to merge.
4. Select the **Merge Edge Line** Tool. 
5. Left-click to select the first Edge Line and then left-click on the second (both will be highlighted). *The Edge Lines must have the same endpoint.*
6. Right-click to confirm merging the two Edge Lines.
7. To see if the Edge Line has been merged, click the **Pick Edge Line** Tool.
8. Select the Edge Line. The merged Edge Line is highlighted.



## 6 Paint

The ZEdit Paint feature is used to apply a single color, or multiple colors, to a part. Access the **Paint** menu to apply color using the **Part**, **Shell**, **Surface**, **Triangle**, or **Paint By Color** commands, or choose a **Selection Mode** and the **Paint** Tool. Both methods apply the color that is selected in the Foreground/Background Color Selection Boxes. Use the **Eyedropper** Tool to select a Foreground or Background color directly from a part.

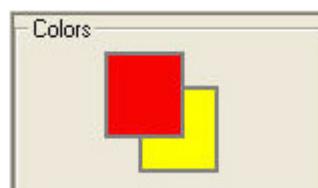


**NOTE:** If there is a Texture Map on the part your are painting, ZEdit displays a warning message stating that the color will not appear where the Texture Map is applied. A Texture Map is always applied to the top surface of a part. You will need to remove the Texture Map if you want to paint the area under the Texture Map.

The ZEdit Paint feature is different than the Color feature in ZPrint, which only allows for applying a single color to an entire part.

### 6.1 Foreground And Background Colors

The color selected in the Color Selection Boxes is the color that is applied when you paint using a **Paint** menu command, choose a **Selection Mode** and the **Paint** Tool to paint, and when you apply color to fonts and font backgrounds, (see [Section 8.6 - Apply Text Tool](#) for additional information about how to apply color to fonts). There are three ways to change the color in the Foreground/Background Color Selection Boxes.



*Foreground and Background Color Selection Boxes*

- Select **Paint > Foreground Color** (or **Background Color**). Choose a color on the **Color** palette and click **OK**. The corresponding Color Selection Box updates with the new color.
- Left-click the cursor directly on the Foreground or Background Color Selection Box. Choose a color on the **Color** palette and click **OK**.
- Use the **Eyedropper** Tool to select a color from a part and make it the Foreground or Background color. Right-click on a Color Selection Box. The cursor changes to the **Eyedropper** Tool. With the Eyedropper, left-click on a part color to update the selected Color Selection Box.

**NOTE:** Sometimes when you have a dark background with light-colored fonts and you change the background to transparent, remnant graphic artifacts remain visible around the edges of the font. To minimize this effect, use the **Eyedropper** Tool to first choose a Background color from the part and *then* apply the font. Now if you check the Transparent Background option for the font, the remnant artifacts will not be visible.



*Use the Eyedropper Tool to choose a color on a part as the Foreground/Background color*

## 6.2 The Paint Menu

Access the **Paint** menu to change the color in Foreground and Background Color Selection Boxes, and to access commands for painting a **Part**, **Shell**, **Surface**, or **Triangle**. Access the **Paint By Color** command to paint color facets with a color you choose from a displayed part. Paint cannot be applied to an area of a part that has a Texture Map.

### 6.2.1 Paint A Part, Shell, Surface, or Triangle

1. Display a part and select a command on the **Paint** menu.
2. Depending on your selection, left-click on the part, shell, surface, or triangle.
3. Press **Esc** to undo your last action, or right-click to confirm.

### 6.2.2 Paint By Color

Select **Paint by Color** to color part facets using a color selected directly from the part.

1. Select **Paint > Paint By Color**.
2. Click on a part surface that has color, but does not have a Texture Map applied to it.
3. Click the cursor on other areas of the part to apply the selected color.

## 6.3 The Paint Tool

The **Paint** Tool applies the color selected as the Foreground/Background color, to a part, shell, surface, or triangle.

1. Choose a **Selection Mode**.



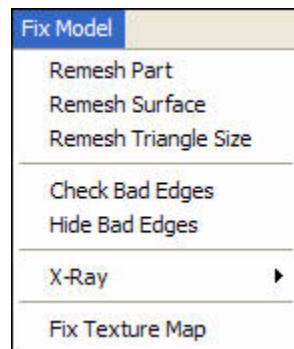
- To paint the entire part one color, choose **Part** Selection Mode. Click the **Paint** Tool icon to paint the part.
- To paint a surface or shell, first display Edge Lines so there is a surface area to select. Next, choose the **Surface** or **Shell** Selection Mode and then the **Paint** Tool. Left-click on an area to paint. Refer to [Chapter 5 - Edge Lines](#), for more information.
- To paint triangles, first select the **Display Triangulation** icon. Choose the **Triangle** Selection Mode. Select the **Paint** Tool and left-click on triangles you wish to paint.

**NOTE:** You will not be able to change the **Selection** mode while painting unless you quit the **Paint** Tool by right-clicking the mouse.

2. Right-click to confirm and save the painted area, or press the **Esc** key to undo your action.

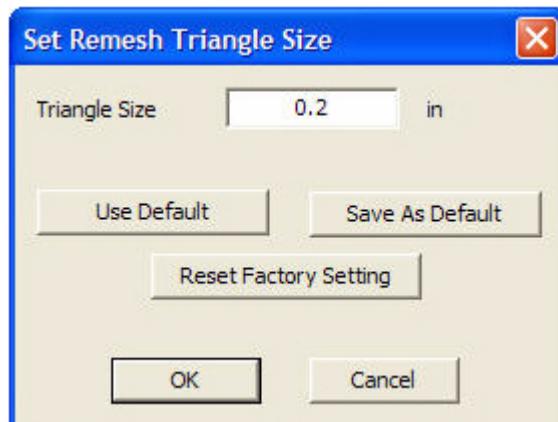
## 7 Remesh A Part, Surface, Or Triangle Size

There are times when a part will need to be remeshed before you can annotate the surface. Remeshing optimizes the underlying mesh for the placement of a Texture Map, Template, or text. Remeshing creates symmetrical triangles while removing thin, narrow triangles. The **Fix Model** menu has commands for remeshing a part, a surface, or the triangle size.

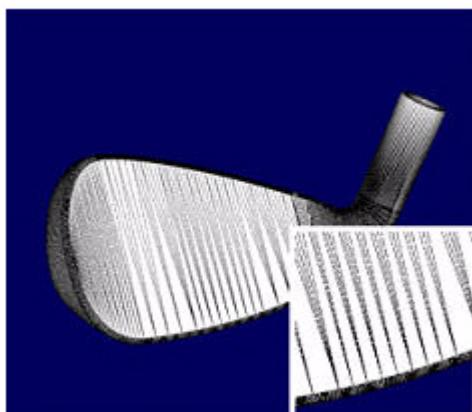


### 7.1 Remesh Triangle Size

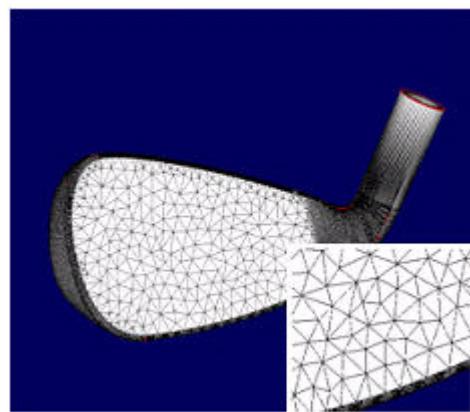
1. Select **Fix Model > Remesh Triangle Size** to display the **Set Remesh Triangle Size** dialog.
2. Enter a value for the triangle size in the text field. Click **OK** to use the new value for the current build, or click **Save As Default** to save it as the default triangle size for all of your builds going forward.



**NOTE:** Remeshing is time and memory intensive. Consider remeshing only the surface that you are annotating. Remember that to select a surface, you will need to first create Edge Lines. See [Chapter 5 - Edge Lines](#) for more information.



*Before Remeshing*



*After Remeshing*

## 8 Texture Maps And Annotations

### 8.1 Introduction

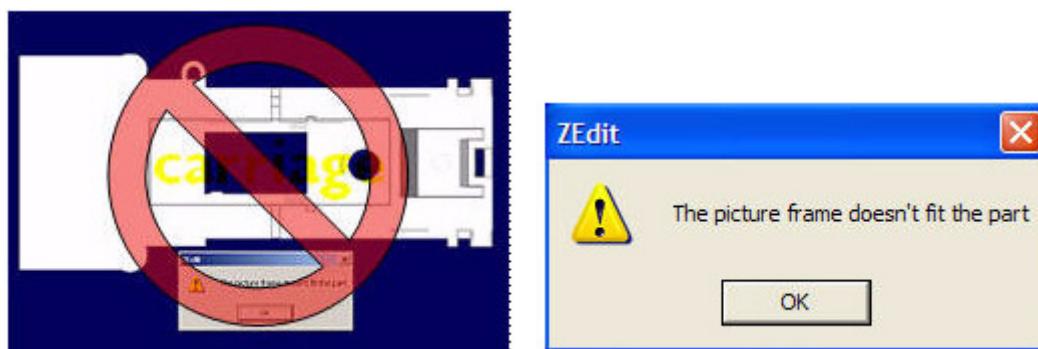
Texture Maps are Graphic Image (Picture) files that can be applied and printed on a part for evaluation and identification purposes. ZEdit supports Texture Maps in *.bmp*, *.jpg*, *.png*, *.tif*, *.tga*, and *.gif* file formats.

Texture Maps also include Text, Templates, Arrows, and Circles, that you can create and apply in ZEdit, and then print on a part.

In ZEdit, you can replace a Texture Map directly on the part after it has been applied. When you replace a Texture Map, ZEdit maintains the same aspect ratio and size.

**NOTE:** All Texture Maps must be applied to a completely solid area of the part where there are no holes or gaps. If you try to apply a Texture Map to an area that is not completely solid, ZEdit displays a message and you must reposition and/or zoom the part so that the Texture Map fits onto a solid area.

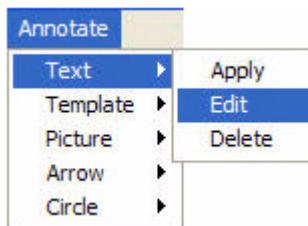
Texture Maps cannot overlap each other. If you are deleting a Texture Map that is on top of another one, the top Texture Map is deleted and the Texture Map underneath is left blank where the top Texture Map resided. The mesh will not change back and will remain altered. See *Section 8.16 - Overlapping Texture Maps* for complete information.



### 8.2 The Annotate Menu

Access the **Annotate** menu to annotate any solid part surface with Text, Templates, Pictures, Arrows, or Circles. Once applied, annotations can be edited, replaced, or deleted directly on the part.

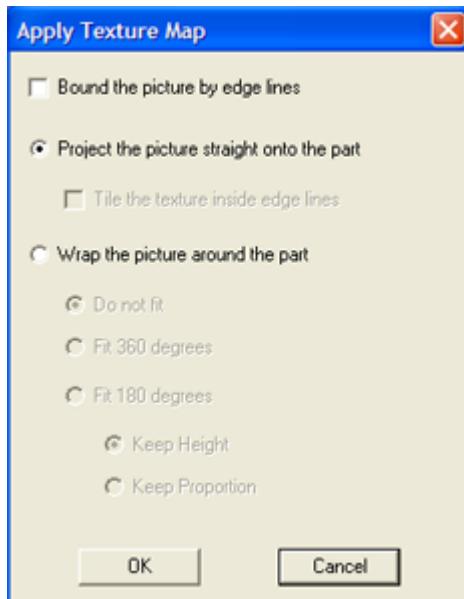
**NOTE:** Because annotations are Texture Maps, they cannot be applied to a surface that already has a Texture Map applied to it. See *Section 8.16* for more information.



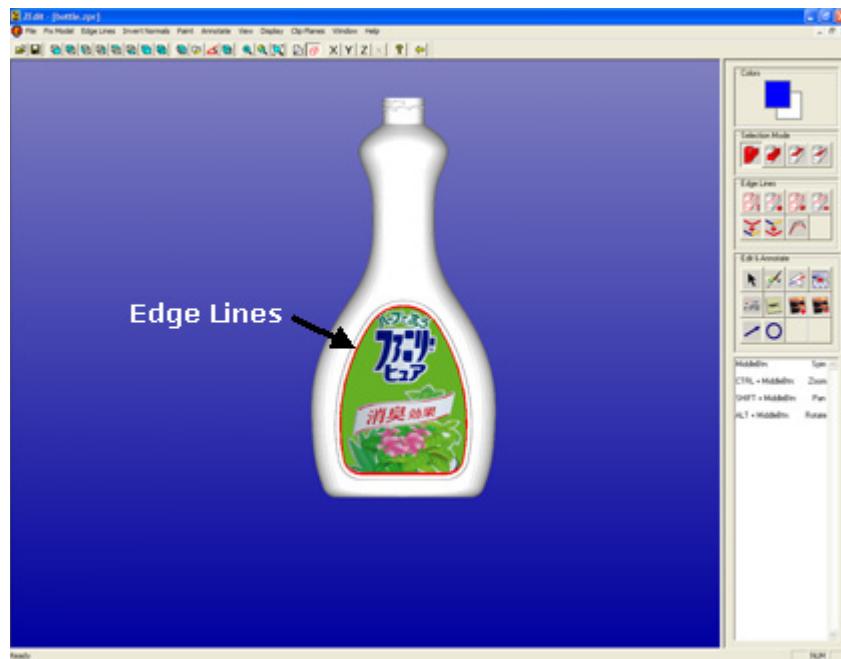
*The Annotate Menu with the Text submenu expanded*

### 8.3 The Apply Texture Map Dialog

After you access the **Annotate** menu and choose to apply a Texture Map, the **Apply Texture Map** dialog opens for you to specify options regarding the placement and fit of the Texture Map to the part. This section describes each option available in this dialog.



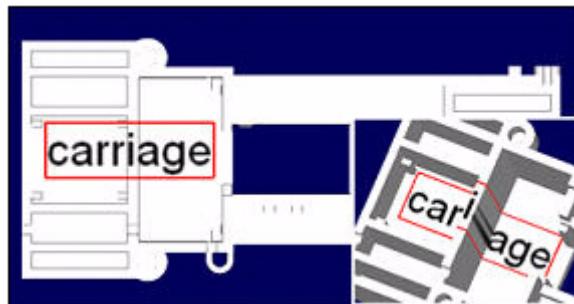
- **Bound the picture by Edge Lines.** Check to apply a Texture Map to an area bound by Edge Lines. The Texture Map does not have to overlay the part. You can zoom in on the part so that only a specific section of the Texture Map is applied to its surface.



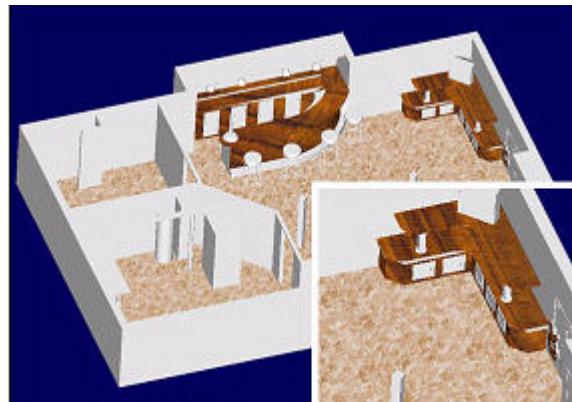
*An example of a graphic applied to an area bound by Edge Lines*

- **Project the picture straight onto the part.** Choose to apply a Texture Map directly onto a flat surface. This option is suitable when the surface you are applying the Texture Map to is flat or only slightly curved. For curved surfaces (such as a cylinder), use the **Wrap** option.

**NOTE:** The Texture Map will be distorted if it is not projected onto a contiguous surface, as shown in the example below, in the lower right-hand corner.



**Tile the texture inside Edge Lines.** Check to tile a Texture Map until it reaches the boundary of an Edge Line.



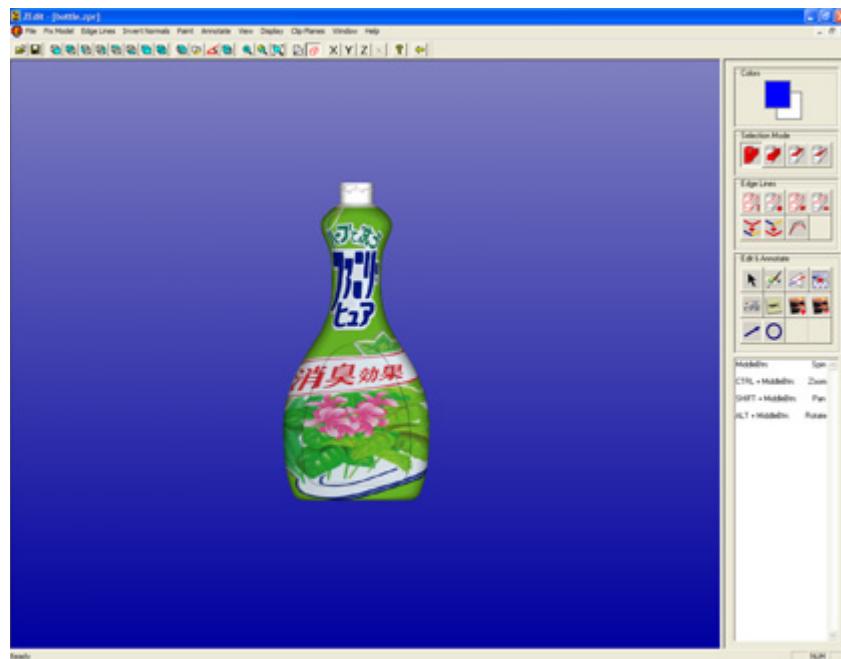
- **Wrap the picture around the part.** This option works for any cylindrical geometry such as pipes or soda cans.



When projecting a Texture Map, it should overlay the part from the top to the bottom, but the left and right sides of the image can extend outside of the part.



Wrapping an image around a part is similar to bending a rectangular piece of paper around a cylinder. The effects of wrapping an image around a non-cylindrical surface could result in some distortion, as in the example below.



Following is a description of the remaining options for wrapping an Texture Map around a part.

- **Do not fit.** Wrap the Texture Map around the part without resizing the Texture Map's width or height.
- **Fit 360 degrees.** The Texture Map is resized to wrap it around the part 360 degrees. To use this feature the part or model must be a perfect cylinder.



- **Fit 180 degrees.** The Texture Map is resized to wrap around the part 180 degrees. To use this feature the part or model must be a perfect cylinder.



- **Keep Height.** This option maintains the height of the Texture Map but may distort the *width* of the Texture Map when applied to the part. The original Texture Map is shown below on the left. On the right, the Texture Map's width was stretched to keep its height.



- **Keep Proportion.** This option maintains the proper proportion of the Texture Map when wrapping it around a part.



## 8.4 Position Texture Maps And Confirm Placement

After you select your Texture Map options and click **OK** in the **Apply Texture Map** dialog, the Texture Map is displayed in a semi-transparent mode and overlays the part. You can adjust the part to fit the Texture Map by doing the following:

- Press **Ctrl** + Middle Mouse Button (wheel) - Drag to zoom the part
- Press **Shift** + Middle Mouse Button (wheel) - Drag to move the part
- Press **Alt** + Middle Mouse Button (wheel) - Drag to rotate the part



An example of a jpg Texture Map projected onto an object

When you are satisfied with the position, right-click to apply the Texture Map to the part. The cursor turns into a question mark and ZEdit prompts you to confirm the placement by right-clicking a second time, or you can press the **Esc** key to return to the placement step.

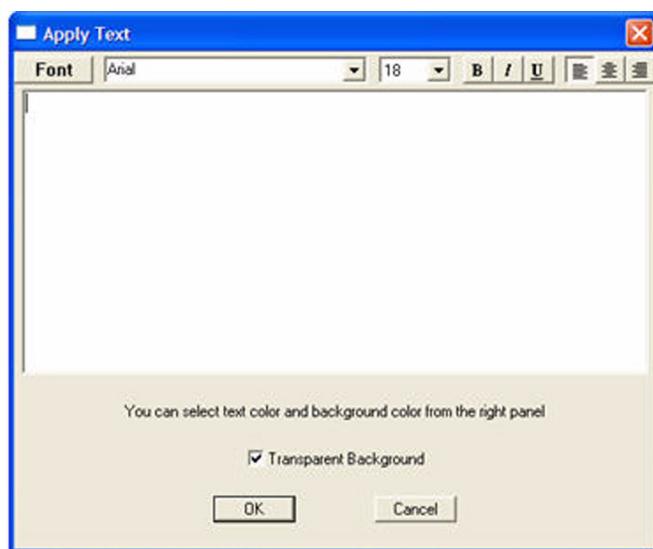


The remainder of this chapter describes the procedures and Tools for applying, editing, deleting, replacing and fixing Texture Maps. There is also a section describing what happens when two Texture Maps overlap each other.

## 8.5 Apply Text

Mix Font sizes, styles, alignments, colors, and types within the same text note. Use the Color Selection Boxes to apply color to font, or to select a font Background color. See the next Section for how to apply text using the **Apply Text Tool**.

- Select **Annotate > Text > Apply** to apply text directly on a part. When the **Apply Text** dialog opens, choose the Font type, size, style, and alignment settings.
- To use the color of the part as the Background color, check the **Transparent Background** option in the **Apply Text** dialog.
- You can copy, cut, and paste text from a MS Word document into the **Apply Text** dialog and apply it to a part.
- Choose the **Text > Edit** or **Text > Delete** commands to edit or delete text already applied to a part.



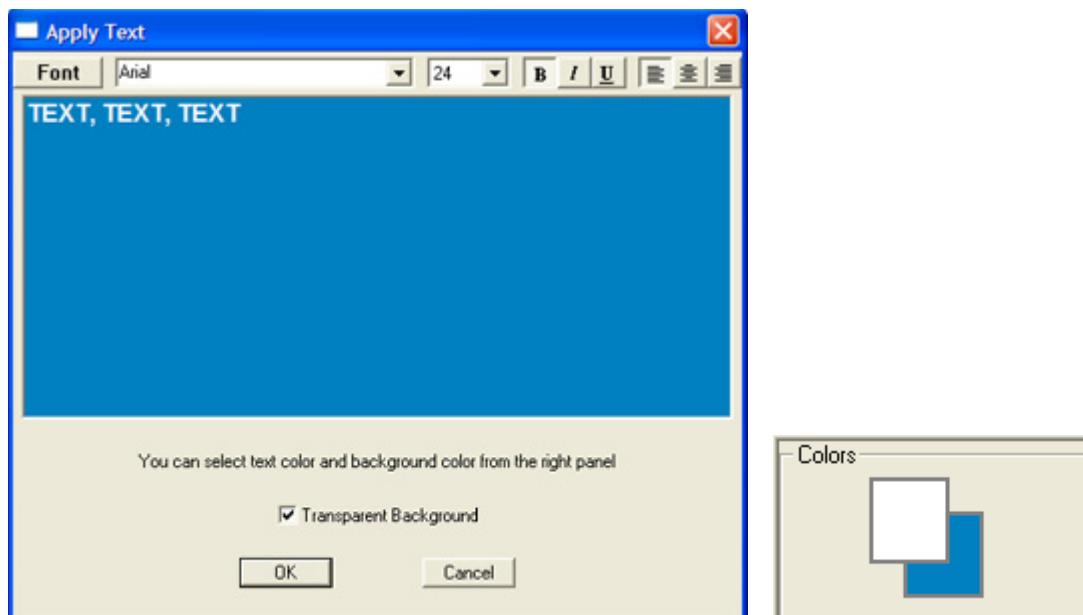
## 8.6 The Apply Text Tool

Quickly and easily apply text to annotate your parts. In ZEdit, text is applied like any other Texture Map, flat onto the part. You can mix font sizes, colors, styles, and alignment within the same text note. Most any language and font supported by Windows can be applied to a part.

1. Select the **Text Tool**.
2. The **Apply Text** dialog opens. Type in the text you want to label the part with.

**NOTE:** The size of the font does not determine the size of the text when applied to the part. It actually defines the quality. The bigger the font, the better the resolution of the text. On the other hand, a big font is limited by the number of characters that fit into the text field.

3. Choose your font settings in the **Apply Text** dialog, or click the **Font** button to choose your settings.
  - Use the Foreground/Background Color Selection Boxes to apply color to the font and the background.
  - Check **Transparent Background** to use the part surface as the background color when the text is applied.



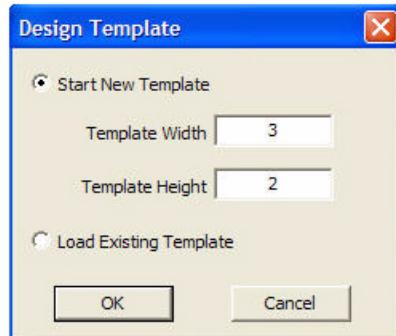
*Font and background colors applied using the Color Selection Boxes*

4. Press **OK** to save and close the **Apply Text** dialog.
5. A second **Apply Text** dialog opens. Choose your options and click **OK**. The text is placed on the part according to the options you chose. Use your cursor to position the text frame exactly where you want the text to appear on the part.
6. Right-click to confirm the text placement. ZEdit updates the part with the text and the cursor changes to a question mark. If you are satisfied with the placement, right-click a second time to save. If you are not satisfied with the placement, press **Esc** and reposition the text again.

## 8.7 Apply Template

Design a Template with text and/or Texture Maps and apply it to a part, or choose to open an existing Template to apply to a part. See the next Section for additional information on designing and applying a Template using the **Apply Template Tool**.

- **Design a New Template** - Select **Annotate > Template > Apply** to open the **Design Template** dialog. Choose to start a new Template, and change or accept the Width and Height values to open a Template with those proportions. Click **OK**.



1. In the Template window, first set the cell lines on the blank Template by drawing them with the cursor.
  - To draw a vertical/horizontal line, left-click on the border where you want the line to start and drag the cursor to the opposite border. Click again to set the line.
  - Repeat as often as necessary.
2. Click on a cell to select it and type in text, or choose the **Date**, **Logo**, or **Load** buttons to populate the cell.
  - To add a logo or a Texture Map, click the **Logo** and **Load** buttons and browse to a file.
  - To add a date, click the **Date** button. To change the Date format, click the **Options** button.
3. When ready to apply the Template to a part, click the **Apply** button. Choose options for applying the Template in the **Apply Template** dialog and click **OK**.
  - You may need to reorient and/or zoom in on the part in order to fit the Template. See [Section 3.2](#) for instructions on how to position, resize, and zoom a part in ZEdit.
  - **Open an Existing Template** - Select **Annotate > Template > Apply** to open the **Design Template** dialog. Choose the **Load Existing Template** option. Click **OK** and browse to a Template that is stored on your system.
  - **Edit or Delete a Template** - Choose the **Template > Edit or Template > Delete** commands to edit or delete Templates.

## 8.8 The Apply Template Tool

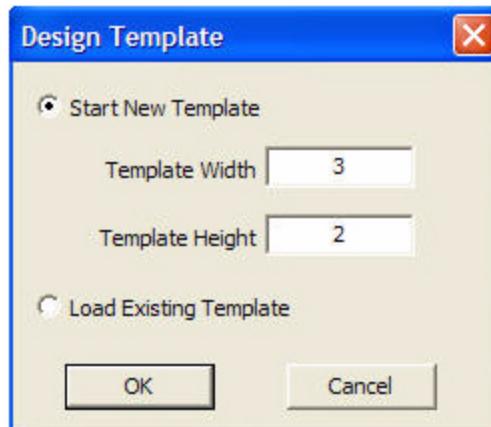
An Engineering Template is a rectangular frame that can be divided into vertical and horizontal cells specified by the user. Each cell can contain text, an image, or a Texture Map. After a Template is created, it can be saved and accessed later for editing and/or applying to a different part.

1. Select the **Apply Template** Tool.

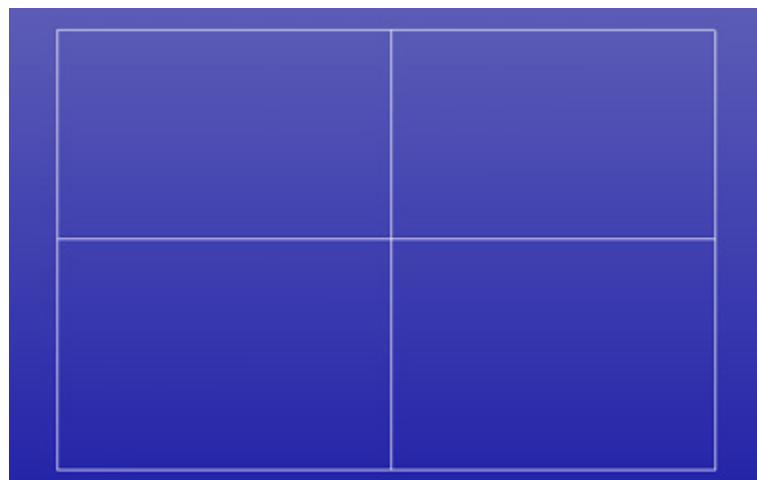


2. The **Design Template** dialog opens. Choose to start a new Template or to open an existing Template.

- When starting a new Template, enter the proportions for the Template frame in the **Template Width** and **Template Height** fields. Click **OK**.
- If you are loading an existing Template, skip to *Section 8.10*.



3. When the **Design Template** dialog closes, ZEdit launches the Template window which contains a blank Template. Draw lines to create cells for the Template.
  - When the cursor changes to an **X**, click the cursor once on the left-hand border and then click the cursor once on the right-hand border to draw a horizontal line.
  - Continue to draw as many horizontal and vertical lines as you need to complete your Template design.



*A blank Template with four cells drawn*

4. After the cell borders are positioned, you can choose to fill each cell with a logo, date, graphic or text. Left-click on a cell to select it and choose from the following options:

**Date** - Places the date in a selected cell.

**Logo** - Browse to select a file for placement in a selected cell.

**Align** - Opens the **Horizontal Alignment** dialog. Select **Left**, **Centered**, or **Right** alignment for the selected cell.

**Delete** - Deletes the contents of the selected cell.

**Options** - Opens the **Engineering Template Options** dialog where you can choose to:

- enter new dimensions for the Template frame
- select a font size and name
- set a directory path to logo files you access often
- choose a date format to apply to your Template

**Load** - Browse to an existing Template file to load into the ZEdit Template window.

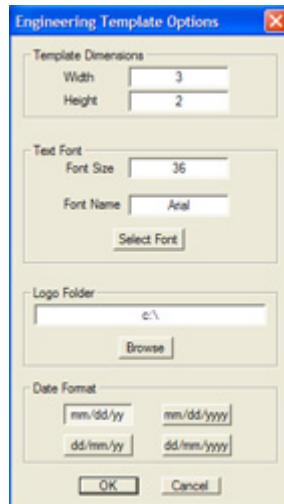
**Save** - Saves the Template as a .ztp file. Saving allows you to keep the Template design to access and apply to future parts. If you want to keep the Template, click **Save** before you click **Apply**.

**Apply** - Opens the **Apply Template** dialog where you choose your options for positioning the Template on the part.

**Quit** - Closes the Template window. Your changes will **not** be saved unless you click **Save** before selecting **Quit**.

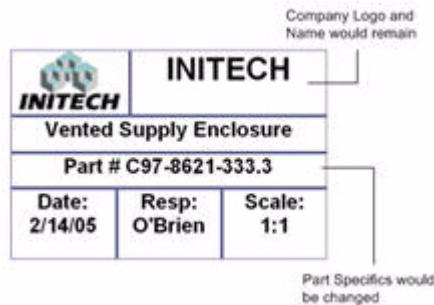
## 8.9 The Engineering Template Options Dialog

The **Engineering Template Options** dialog is where you can create some default settings when designing Templates to apply to your parts. Enter default values for the Template **Width** and **Height**, choose a default Text **Font Size** and **Name**, enter the search path to your Logo files, and choose a Date Format.



## 8.10 Load An Existing Template

Using a pre-designed Template keeps the look of the Template consistent for all parts as well as saving time, as most fields on the Template remain the same for each part it is applied to.



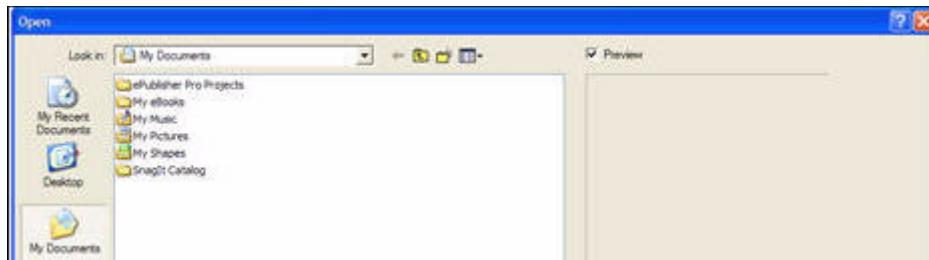
1. Select the **Apply Template** Tool.
2. When the **Design Template** dialog opens choose the **Load Existing Template** option and click **OK**.
3. The **Open** dialog displays. Select a **.ztp** file and click **Open**.
4. The predefined Template appears in the Template window.
5. Click on a cell to select it and then update it with your information. If you want to keep your changes and reuse the Template later, click the **Save** button.
6. When finished, select **Apply**.
7. The **Apply Template** dialog opens. Choose settings for applying the Template to your part.

8. Right-click to confirm applying the Template, or press the **Esc** key to go back and make a different selection in the **Apply Template** dialog.

## 8.11 Apply Picture

Apply graphic images (pictures) to a part. ZEdit can apply graphic images that are saved in *.bmp*, *.jpg*, *.tiff*, *.png*, *.tga*, and *.gif* file formats. See *Section 8.14* for additional information about replacing a Texture Map.

1. Select **Picture > Apply** and browse to an image when the **Open** dialog displays.



2. Select a file and click **Open**.
3. In the **Apply Texture Map** dialog, choose an option for projecting the image onto the part.
4. Resize and/or reposition the part to fit the image. When satisfied with the image placement, right-click the mouse to save.

## 8.12 Add Texture Map Tool

Applying a Texture Map is an excellent way to label your part with your company logo, or an image.



1. Select the **Add Texture Map Tool**.
2. The **Open** dialog displays. Select a file and click **Open**.
3. The **Apply Texture Map** dialog opens. Select options for applying the Texture Map to your part and click **OK**.
  - ZEdit places the Texture Map on the part according to your selections. If you want to move the text frame from its current position, use your cursor to drag the frame to another location on the part. Right-click to anchor the text. The cursor changes to a question mark.
4. If you are satisfied with the placement, right-click again to confirm, or press the **Esc** key to go back and reposition the Texture Map. See *Section 8.3* for a description of the options available in the **Apply Texture Map** dialog.

## 8.13 Delete Texture Map Tool

In some cases, it may be necessary to remove text, a Template, or a Texture Map after it was applied to a part.

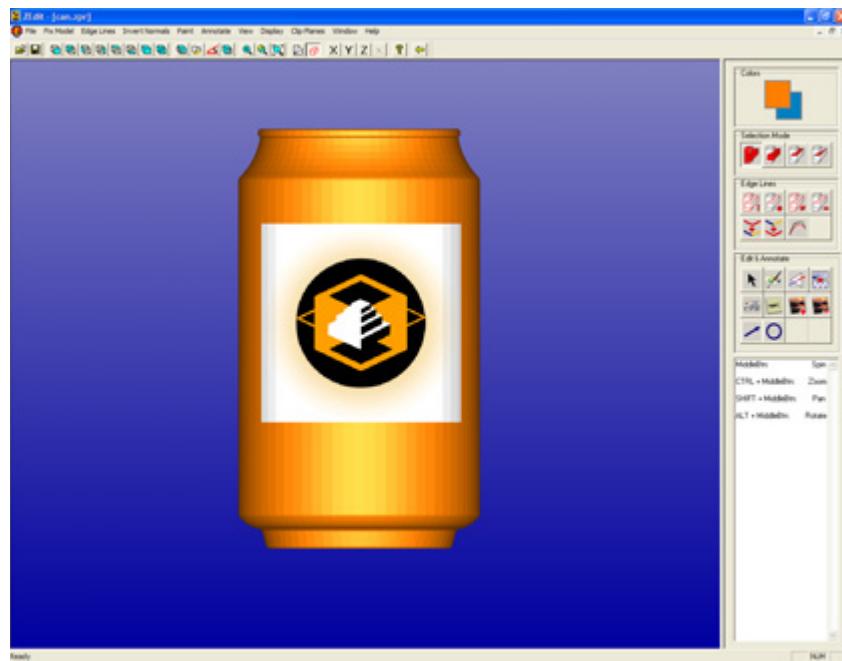
1. Select the **Delete Texture Map Tool**. 
2. Select the Texture Map you want to remove. ZEdit outlines the selection in red and the cursor changes to a question mark.
3. Right-click to confirm deleting, or press the **Esc** key to undo your action(s).

**NOTE:** Multiple Texture Maps cannot be applied to the same spot. If you are deleting a Texture Map that is on top of another one, the outline of the top Texture Map will be deleted. This will leave the bottom Texture Map incomplete. The mesh will not change back and will remain altered.

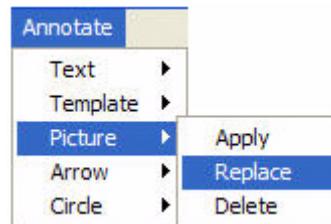


## 8.14 Replace A Texture Map

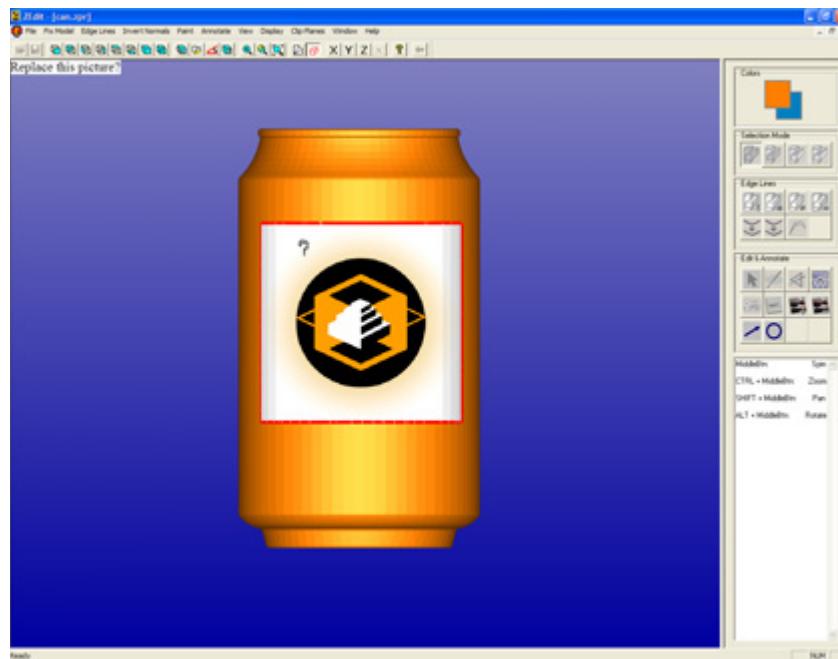
1. Open a part in ZEdit that contains a Texture Map you want to replace.



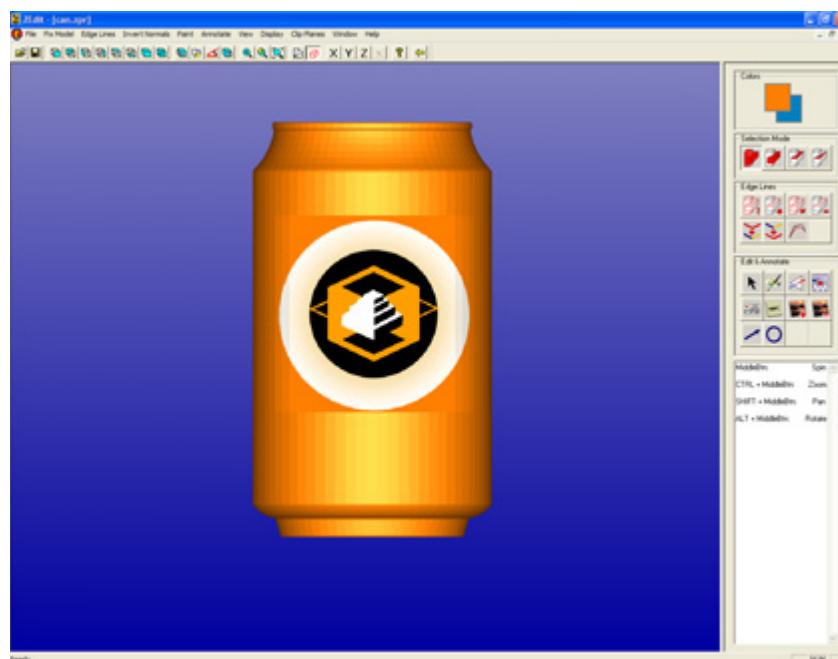
2. Select **Annotate > Picture > Replace**.



3. Left-click with the cursor to select the Texture Map you want to replace. The selected Texture Map is outlined in red and the cursor changes to a question mark.
4. Right-click to confirm.



5. The **Open** dialog displays for you to select a new Texture Map to replace the current one. Select a file and click **Open**. ZEdit replaces the Texture Map and maintains the same aspect ratio.

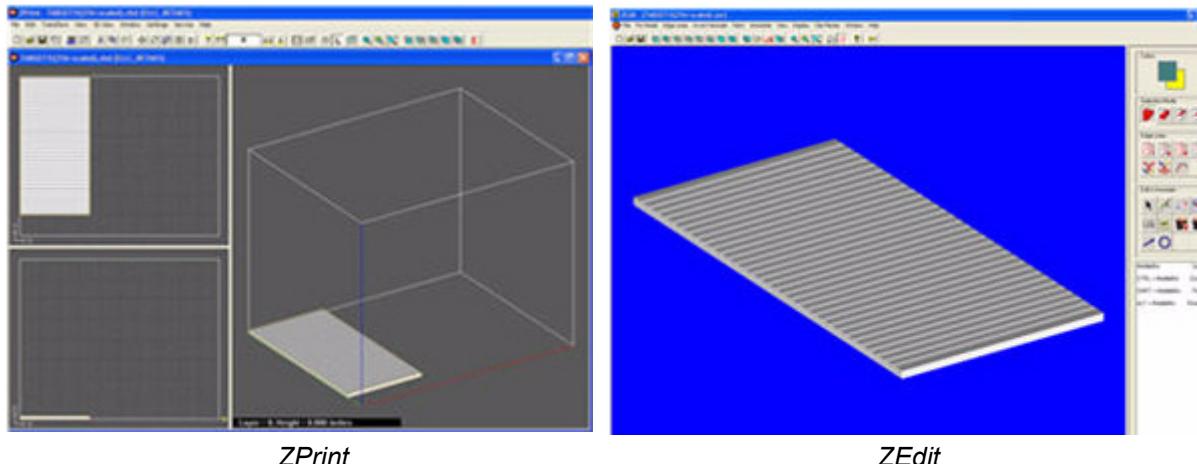


## 8.15 Fix Texture Map

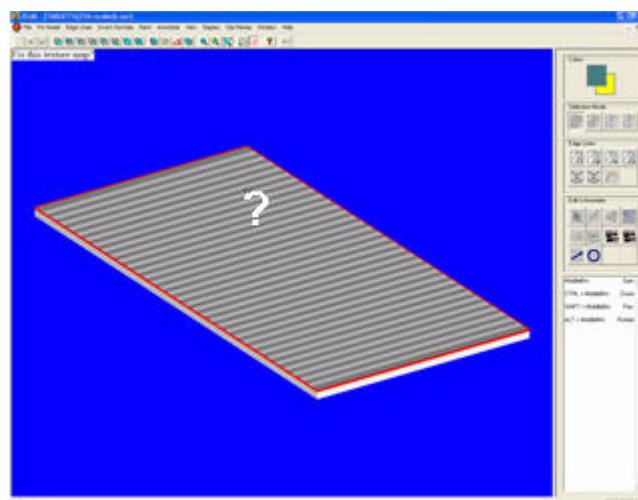
There may be times when a part or model you open in ZPrint/ZEdit does not look the way it should. For example, you have opened a part in a previous version of ZPrint/ZEdit and it looked fine, but

when you open it in this version, it looks different - i.e. the Texture Map is missing, or a Texture Map appears distorted. This is easily fixed in ZEdit using the **Fix Texture Map** command on the **Fix Model** menu.

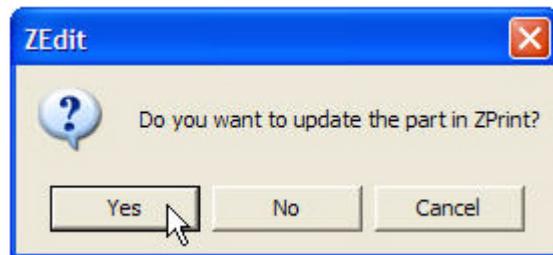
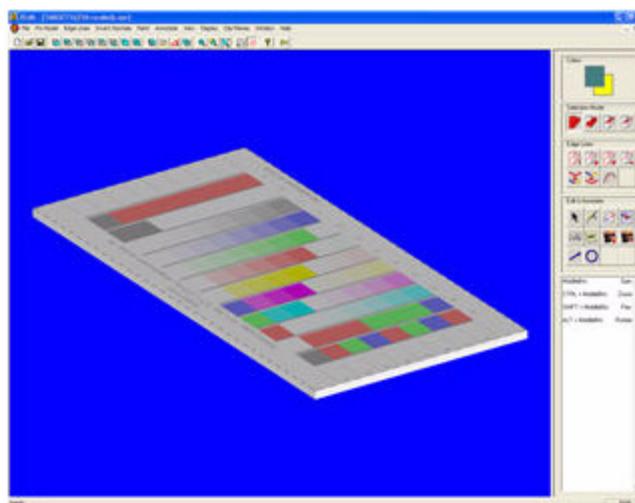
1. Select the part in ZPrint and click the ZEdit icon to display the part in ZEdit.



2. In ZEdit, select **Fix Model > Fix Texture Map**.
3. The cursor changes to a question mark. Left-click on the Texture Map you want to fix. ZEdit outlines the selected area in red.

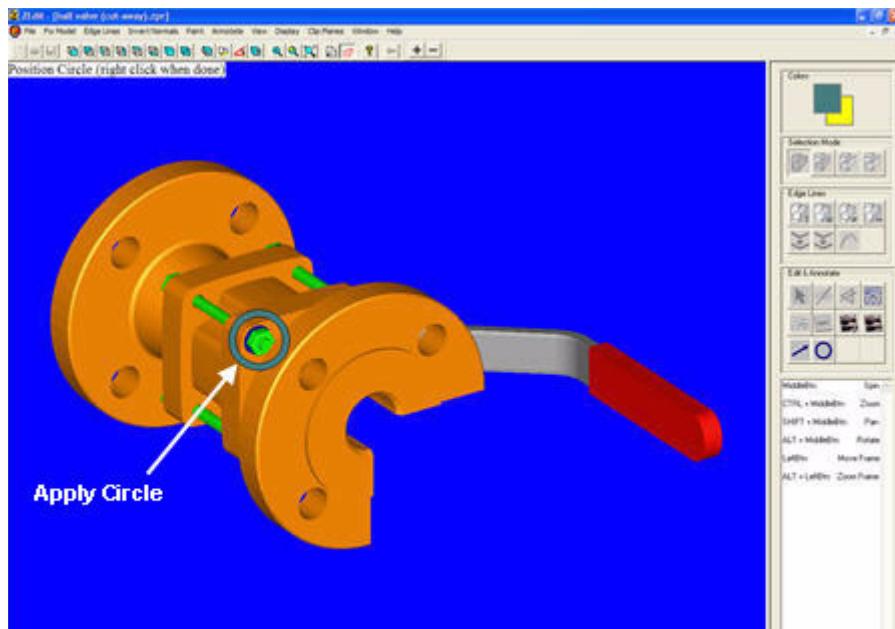


4. Right-click to confirm your selection.
5. The Texture Map for the part is corrected. Be sure to save when you exit ZEdit so that the next time you open the part in ZPrint or ZEdit, it displays correctly.

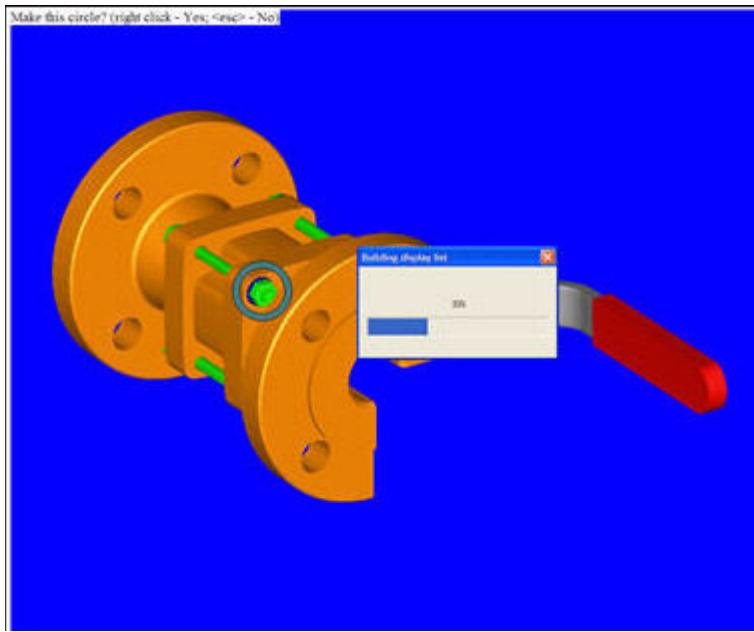


## 8.16 Overlapping Texture Maps

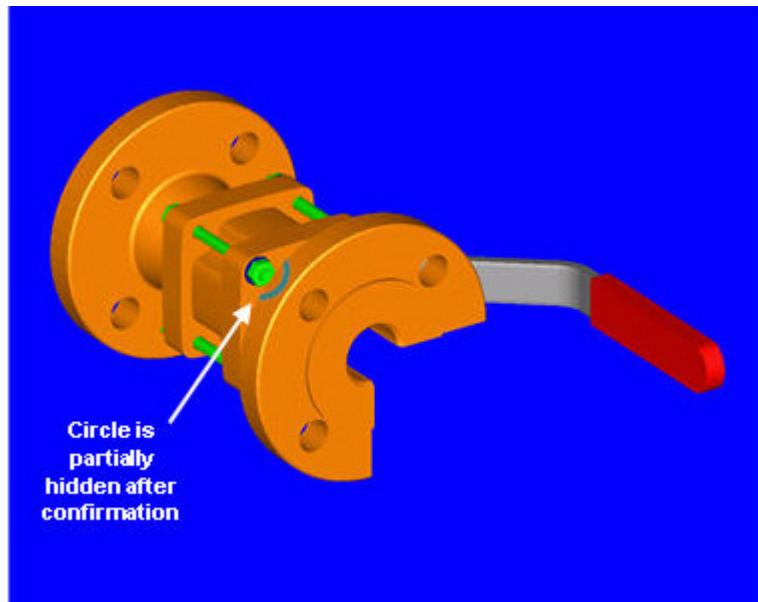
The following example details how overlapping Texture Maps - even with transparency enabled - will hide what is underneath them. *Texture Maps are not transparent to each other.* This applies to all types of Texture Maps including Text, Templates, Pictures (Graphic Images), Arrows, and Circles.



A circle is applied to the part, but its placement has not yet been confirmed, so the entire circle is visible.



Here we are confirming the placement of the circle by right-clicking.



Because the part already has a Texture Map applied to its surface, when we confirm the placement, part of the circle is obstructed from view.



*As a second example, here is the same part with a close-up of two overlapping circles. The placement of the second circle (overlapping the first circle) has not been confirmed.*



*The first circle is partially obstructed by the second circle after its placement is confirmed.*

## 8.17 Apply Arrow

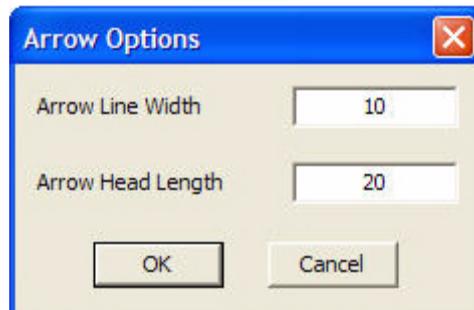
Draw arrows directly on your parts to better communicate your ideas or to draw attention to an important part detail. There are two ways to apply arrows to a part:

- Select the **Arrow** Tool from the right-side panel. Point the cursor on the part where you want to draw an arrow. Press the left mouse button to set the start point and drag the mouse to draw the arrow.
- Select **Annotate > Arrow > Apply**. Press the left mouse button to set the arrow starting point. Drag the mouse to draw the arrow.

Use the **Annotate** menu to edit or delete an arrow after it is applied.

To change the arrow width and head length, select **Annotate > Arrow > Options** to display the **Arrow Options** dialog. Enter new values in the **Width** and **Length** fields and click **OK**.

**TIP:** To create a straight line, set the **Arrow Head Length** to zero (0). Apply the line in the same way as an arrow.



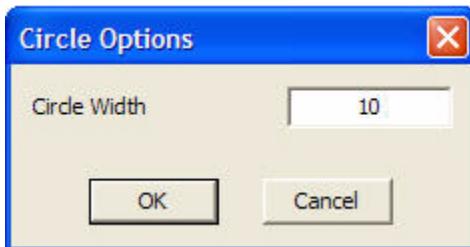
## 8.18 Apply Circle

Draw circles directly on your parts to emphasize an important aspect or factor regarding the part. There are two ways to apply circles to a part:

- Select the **Circle** Tool from the right-side panel. Point the cursor on the circle border and press the left mouse button. Drag the circle to the area of the part you want to annotate. To resize the circle, turn the mouse wheel. Right-click the mouse to confirm your position.
- Select **Annotate > Circle > Apply**. Point the cursor on the circle border and press the left mouse button. Drag the circle to the area of the part you want to annotate. To resize the circle, turn the mouse wheel. Right-click the mouse to confirm your position.

Use the **Annotate** menu to edit or delete a circle after it is applied.

To change the circle border width, select **Annotate > Arrow > Options** to display the **Circle Options** dialog. Change the value in the **Circle Width** field and click **OK**.



*The Circle Options dialog showing the Circle Width set to 10.*

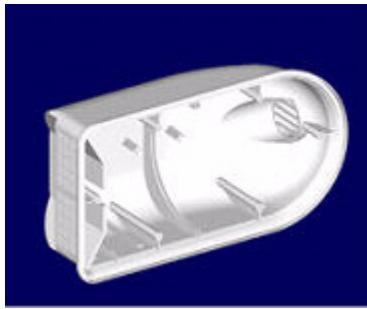
## 9 Inverted Normals

Use ZEdit to diagnose and fix Inverted Normals. The Normals for every visible surface should point towards you, such that you can see the surface in ZEdit. If you cannot, then the surface is inverted and needs to be corrected.

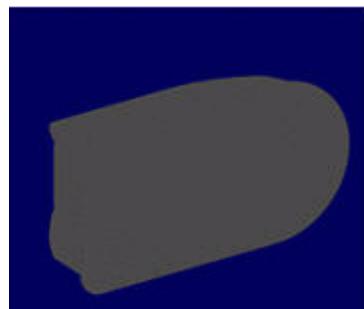
### 9.1 Fixing Inverted Normals

Correcting inverted normals on a whole Part, Shell, Surface or Triangle is easy.

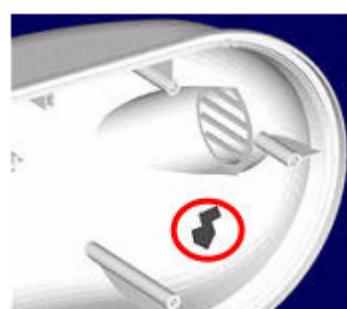
1. Detect which Normals are inverted. Inverted Normals display darker than the surface color.



*Ex. of a Part with correct Normals*



*Ex. of the entire Part inverted*



*Ex. of an inverted area on the Part*

2. Choose a **Selection Mode**.

**NOTE:** If you select the **Surface Selection** Mode, you need to first create Edge Lines before a Surface can be selected. Refer to [Chapter Five - Edge Lines](#), for more information.

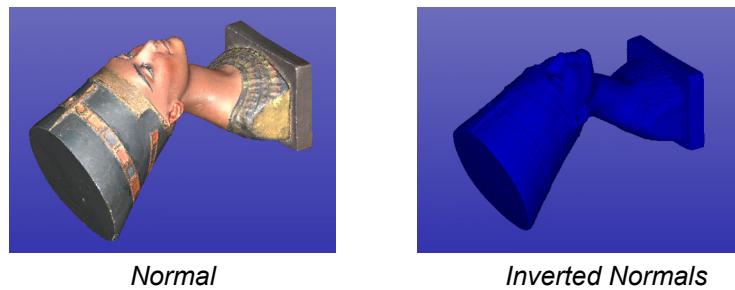


3. Select the **Invert Normals** Tool.

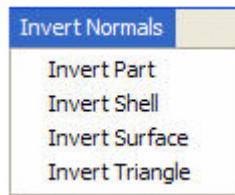
4. Select the area to invert and then right-click to confirm. If you make a mistake, or want to undo your inversion, select the **Invert Normals** Tool again and click on an area that you just inverted.

### 9.2 Toggle Inverted Normals Display

1. Display a part in ZEdit and select the **Invert Normals** Tool. ZEdit inverts the Normals for the entire part.
2. To undo, select the **Invert Normals** Tool. ZEdit returns the part to its original state.



### 9.3 The Inverted Normals Menu



You can access the **Inverted Normals** menu to invert Normals for a part, shell, surface, or a triangle.

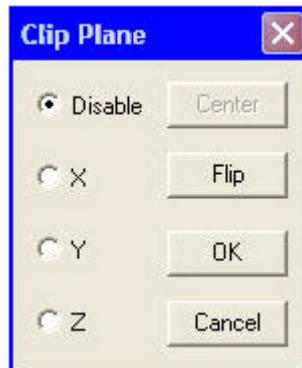
1. Open a part in ZEdit.
2. Select the appropriate command on the **Inverted Normals** menu.
3. Point the cursor on an area (depending on your menu selection) and left-click. The selected area turns dark to indicate that the Normals are inverted.
4. Right-click to confirm your action. To undo, re-select the command on the **Inverted Normals** menu, click on the inverted area, and then right-click to confirm.

# 10 Clip Planes, X-Ray, And Check Edges

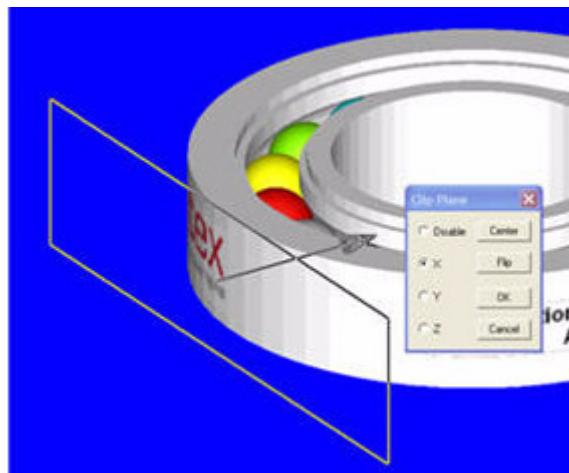
## 10.1 Clip Planes

Clipping Planes are a way to look inside a part or model to determine if there is a problem before printing. Define up to six different clipping planes to check the inside a part along the X, Y, or Z-Axes, or a combination of the three. Specify to flip, center, or disable a clipping plane on any axis.

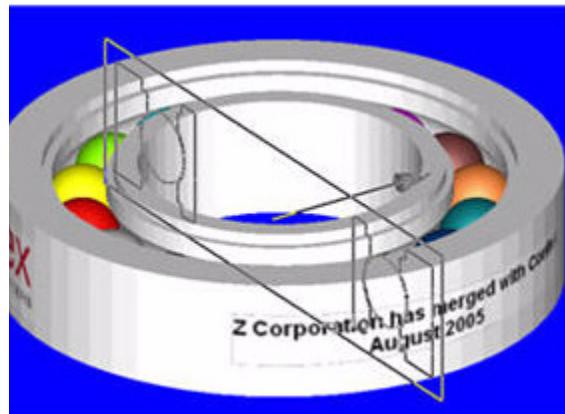
1. With a part opened in ZEdit, open the **Clip Planes** menu and select a clipping plane to setup in the **Clip Plane** dialog.



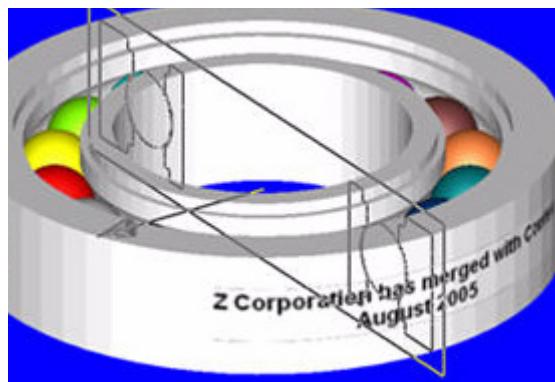
2. Choose an axis in the **Clip Plane** dialog. In this example, the **X**-Axis was selected. You can view the plane as is or you can choose to center the plane on the part, or flip the direction of the plane on the selected axis.



A Clipping Plane defined for the X-Axis

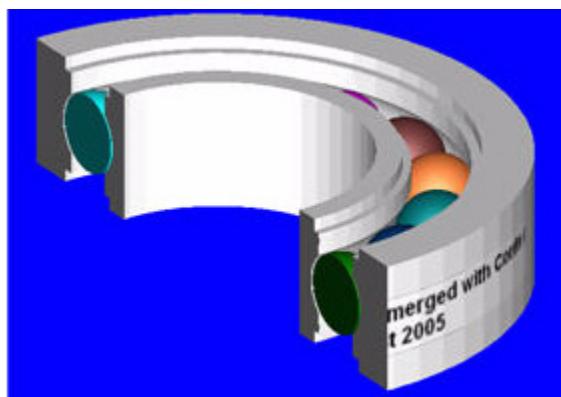


A Clipping Plane defined for the X-Axis and centered

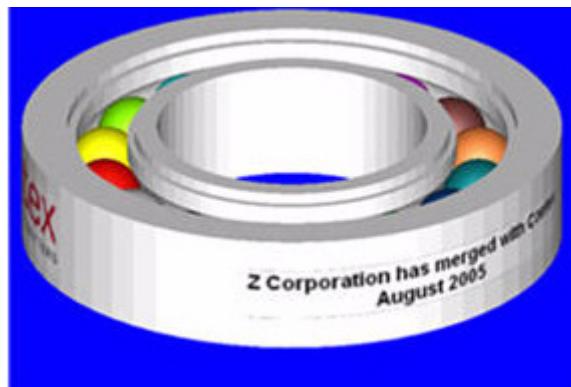


A Clipping Plane defined for the X-Axis and flipped

3. After the Clipping Plane is setup, click **OK** on the **Clip Plane** dialog. ZEdit clips the part on the defined plane so you can see the inside.



4. To undo, select the defined clipping plane from the **Clip Planes** menu (which will have a check beside it). Select **Disable** and click **OK**. The part is put back together.



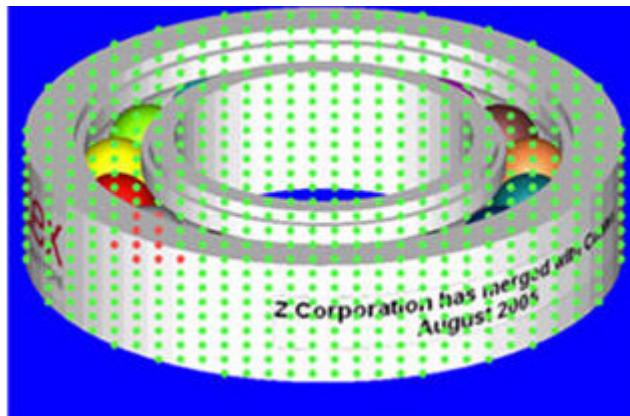
## 10.2 X-Ray

X-Ray traces a part to check if the part is a set of closed shells with correct normals orientation. In other words, X-Ray is an automated function to help you identify bad or questionable models before you print. Select **Fix Model > X-Ray** and choose **Trace Model** and **Trace in Window** on the sub-menu.

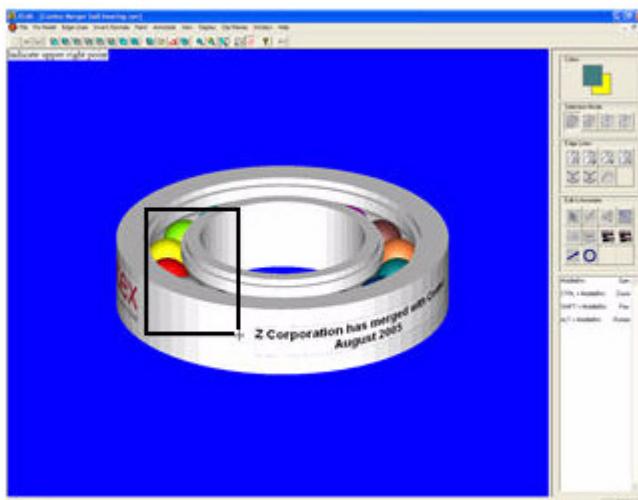
**NOTE:** For all .3ds files, it is strongly recommended that you run the X-Ray Tool prior to printing the part.

**Trace Model** will x-ray the entire model. Choose **Trace in Window** to draw a box around a specific area of the part that you want to x-ray.

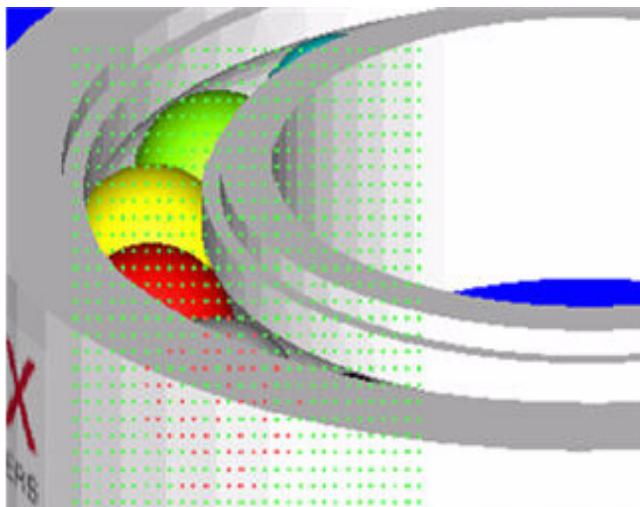
After a part is traced, many points appear over it. Green points mean the part is probably fine in those areas. A point is green when every x-ray entry point has an exactly matching exit point. Red points are definitely bad and should be investigated before printing. In most cases, red points usually mean that there are inverted normals or duplicated surfaces.



*An example of Trace Model - The entire part is x-rayed*



*Trace in Window - First draw a box around the area you want to x-ray*



*Trace in Window - Only the area inside the box is x-rayed*

### 10.3 Check/Hide Bad Edges

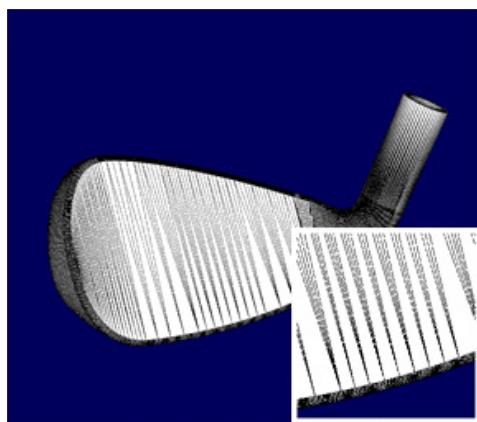
Before printing a part, you can check the file to see if there are any edges that are not correct. Choose **Fix Model > Check Bad Edges**. ZEdit checks the part and gives you a status box after it completes the operation.

# 11 Troubleshooting

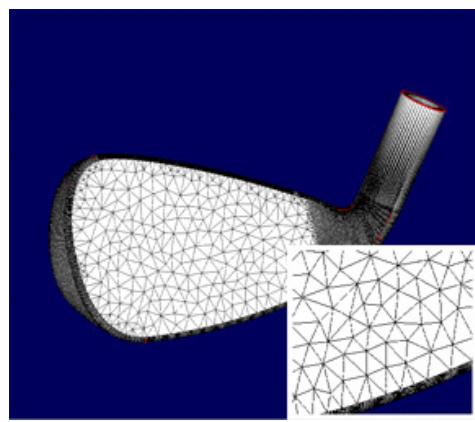
## 11.1 The Image I Applied To My Part Is Distorted

In some cases, the part will need to be “remeshed” to allow you to annotate the surface. There are two remeshing options – part or surface. Remeshing optimizes the underlying mesh to assist with the placement of a Texture Map, template, or text. Remeshing creates symmetrical triangles removing thin, narrow triangles.

**PLEASE NOTE:** Remeshing is time and memory intensive. Consider remeshing only the surface that you are annotating. Remember that to select a surface, you will need to create Edge Lines.



Before Remeshing



After Remeshing

## 11.2 The Area Being Painted Is Not The Area I Selected

Depending on the active Selection Mode, there may be different causes for the error.

### 11.2.1 Check the Selection Mode

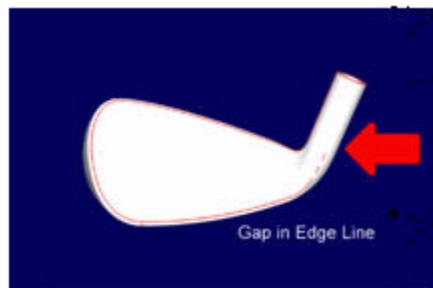
Is the correct Selection Mode selected? If not, the area being painted will differ from what was intended.

### 11.2.2 Check to see how the areas of the part are divided

Follow the instructions in [Sections 3.8](#) and [5.1](#). The shells of a part do not necessarily follow separate assembly components.

### 11.2.3 Check to see if Edge Lines are fully closed

Any gap bordering a surface, will cause the color to “leak” onto the adjacent surface.



### 11.3 What To Do If You Receive An "Invalid Argument Error"

An invalid argument error prevents the software from crashing. When receiving this error, save the file and continue working on the file. If you continue to receive the error, save the file, close the ZEdit application, then relaunch the application and load the saved file.

### 11.4 I Get An "Invalid Argument Error" When Sketching Edge Lines

#### 11.4.1 Check to see if the area you are sketching on is contiguous

An Edge Line can only be created when the surface is connected. There is no way to "bridge" the Edge Line if the area is multi-leveled or has gaps.

#### 11.4.2 Check to see if there are holes along the sketch line

If the sketch line is being drawn over a hole, ZEdit can not create a continuous line.

#### 11.4.3 Remesh the surface you are sketching on

The error could be caused by thin triangles. Try to remesh the surface and then resketch the Edge Line.

## 12 Appendix

### 12.1 .ZPR File Format

.ZPR files are a native format for ZEdit. It is also an open format, intended for data transfer between Z Corporation and its customers.

.ZPR files contain data for one single part in a binary form. It is in some sense an extension of the .PLY format; it has vertices (given by coordinates) and facets (given by indices in the array of vertices). The main difference from .PLY files is .ZPR files can have Texture Maps.

.ZPR files consist of a header followed by a number of data blocks.

Header		
Field Name	Size	Value
ZPR-Format Code	1	0xAA
Format Version	1	Currently 1
Comment length (n)	4	<= 512
Comment text	n	Any text (can be "Created by ZEdit 1.0")
Color Mode	1	0 - Mono; 1 - Facet; 2 – Vertex, 3 - ZEdit
Texture Mode	1	0 - None; 1 - Vertex; 2 - Facet

Color mode indicates if colors are assigned to facets or to vertices. ZEdit color mode assigns colors to vertices of facets as opposed to vertices of the whole model. It means the same vertex can have different colors in different facets.

Only one color mode is allowed for the whole file.

Texture mode indicates if texture coordinates are assigned to facets or to vertices. .ZPR files can contain a few Texture Maps, but texture mode should be the same for all of them.

#### 12.1.1 Data Blocks

.ZPR files can have any number of data blocks, but there are six predefined blocks. They are Scale, Vertices, Facets, Texture Maps, Tex Vertices, Tex Facets. The two of them - Vertices and Facets - should be included in any .ZPR file. All other blocks are optional.

A customer can include his own block type, which will be ignored by ZEdit or ZPrint application.

Each block starts with block header:

Block Type	1	< 100 reserved for Z Corporation
Block Size	4	size in bytes including block header

Block body contains real block data and followed block header.

Block body structure depends on block type.

### 12.1.2 Scale Block

Scale block gives a scale coefficient or transformation matrix. If present, it should go before Vertices block. If the scale block is omitted, no scale or transformation will be applied to the vertices coordinates.

Z Corporation recognizes three types of the scale block:

- **Scale Coefficient (block type == 60).**

Block body consists of a single float scale coefficient:

Scale Coef      4      Scale coefficient

Block size is 5 + 4.

Each vertex coordinates will be multiplied by this coefficient.

If ZEdit reads a .ZPR file with scale coefficient block, then it saves the .ZPR file in the same format.

- **Scale Matrix (block type == 61).**

Block body consists of a 12 float numbers:

Scale Matrix    12 \* 4    Scale matrix

Block size is 5 + 12 \* 4.

Scale matrix is a transformation matrix[3][4], that will be applied to each vertex coordinates.

If ZEdit reads a .ZPR file with scale matrix block, then it saves the .ZPR file in the same format.

- **Scale Transformation (block type == 62).**

This is the type of scale block exported by ZPrint Software. It consists of two transformations, each defined by a rotation matrix[3][3], shift vector[3], anisotropic scale[3], and a rotation flag bRotation.

#### Part Transformation:

Matrix	9 * 4	Rotation matrix
Shift	3 * 4	Translation vector
Scale	3 * 4	Anisotropic scaling
bRotation	4	Rotation flag (0 means no rotation)

**Anisotropic Transformation:**

Matrix	9 * 4	Rotation matrix
Shift	3 * 4	Translation vector
Scale	3 * 4	Anisotropic scaling
bRotation	4	Rotation flag (0 means no rotation)

Block size is  $5 + 2 * 4 * (9 + 3 + 3 + 1)$ .

If rotation flag is equal to 0, then the transformation is defined by anisotropic scaling and translation vector.

If rotation flag is equal to 1, then the transformation is defined by rotation matrix and translation vector.

**12.1.3 Vertices Block**

Block Type = 10.

Vertices block is an array of vertices. Each vertex is a structure:

x	4	x-coordinate
y	4	y-coordinate
z	4	z-coordinate
color	3	rgb
index	4	ref to tex coord array

The number of vertices should be in compliance with the block size.

Block size is  $5 + n\text{Vertices} * (12 + 3 + 4)$ .

The color is given by unsigned char rgb[3]. White is (255, 255, 255). Color is only accounted if color mode is set to 2 (vertex color mode).

Index is a reference (index in the array) to tex vertices array.

May be given if texture mode is set to 1 (tex mode vertex).

If not given, should be -1.

**12.1.4 Mono Facets Block**

Block Type = 20.

Facets block is an array of facets. Only triangles are accepted as facets.

Each facet is a structure:

iv0	4	Index of first vertex
iv1	4	Index of second vertex
iv2	4	Index of third vertex
color	3	rgb
index	4	ref to tex facet array

The number of facets should be in compliance with the block size.

Block size is  $5 + n\text{Facets} * (12 + 3 + 4)$ .

The order of vertices defines the direction of external normal.

The color is given by `unsigned char rgb[3]`. White is (255, 255, 255). Color is only accounted if color mode is set to 2 (facet color mode).

Index is a reference (index in the array) to tex facets array.  
May be given if texture mode is set to 2 (tex mode facet).  
If not given, should be -1.

### 12.1.5 Color Facets Block

Block Type = 21.

Facets block is an array of facets. Only triangles are accepted as facets.

Each facet is a structure:

iv0	4	Index of first vertex
iv1	4	Index of second vertex
iv2	4	Index of third vertex
color0	3	rgb of first vertex
color1	3	rgb of second vertex
color2	3	rgb of third vertex
index	4	ref to tex facet array

The number of facets should be in compliance with the block size.

Block size is  $5 + n\text{Facets} * (12 + 9 + 4)$ .

The order of vertices defines the direction of external normal.

The color is given by `unsigned char rgb[3]`. White is (255, 255, 255). Color is only accounted if color mode is set to 3 (ZEdit color mode).

Index is a reference (index in the array) to tex facets array.  
May be given if texture mode is set to 2 (tex mode facet).  
If not given, should be -1.

### 12.1.6 Texture Maps Block

Block Type = 30.

Textures block is an array of Texture Maps, used in the model.

Each Texture Map is completely contained in this block  
(not a reference to an external picture file).

A Texture Map is a following structure:

Name Size (n)	4	The length of Texture Map name
---------------	---	--------------------------------

Name	n	Texture Map name
nx	4	number of pixels in x-direction
ny	4	number of pixels in y-direction
RepeatX	1	wrap flag in x direction
RepeatY	1	wrap flag in y direction
Image	3 * nx * ny	an array of rgb

Block Size is  $5 + n\text{Textures} * (4 + n + 2 * 4 + 2 + 3 * nx * ny)$ .

Of course, n can be different for different Texture Maps.

An image is stored as a  $\text{rgb}[ny][nx]$  matrix in the following order:

$\text{rgb}[0][0], \text{rgb}[0][1], \dots, \text{rgb}[0][nx-1], \text{rgb}[1][0], \text{rgb}[1][1], \dots, \text{rgb}[1][nx-1], \dots$   
 $\text{rgb}[ny-1][0], \text{rgb}[ny-1][1], \dots, \text{rgb}[ny-1][nx-1]$ .

RepeatX and RepeatY flags are set to 1 to indicate that text coordinates will be replaced by their fraction parts if out of range [ 0.0; 1.0 ]; otherwise they will be truncated by 0.0 or 1.0.

### 12.1.7 Tex Vertices Block

Block Type = 40.

Tex Vertices Block is an array of tex coordinates assigned to vertices. Tex coordinates from different Texture Maps go in the same single array.

Each Tex Vertex is a following structure:

idxTexture	4	Index of a Texture Map in texture array.
s	4	tex coord in x direction (float in [0;1] rangle)
t	4	tex coord in y direction (float in [0;1] rangle)

Block Size is  $5 + n\text{TexVertices} * 3 * 4$ .

### 12.1.8 Tex Facets Block

Block Type = 50.

Tex Facets Block is an array of tex coordinates, assigned to facets. Tex coordinates from different Texture Maps go in the same single array.

Each Tex Facet is a following structure:

idxTexture	4	Index of a Texture Map in texture array.
s0	4	x tex coord assigned to first vertex of a facet
s1	4	x tex coord assigned to second vertex of a facet
s2	4	x tex coord assigned to third vertex of a facet
t0	4	y tex coord assigned to first vertex of a facet
t1	4	y tex coord assigned to second vertex of a facet
t2	4	y tex coord assigned to third vertex of a facet

Block Size is  $5 + n\text{TexFacets} * 7 * 4$ .

### 12.1.9 Edge Lines Block

Block Type = 70

Edge Lines Block is an array of “Edge Lines”. Each Edge Line is a chain of vertices. Edge Lines are used in ZEdit to bound the surfaces.

nEdgeLines	4	Number of Edge Lines
For each Edge Line:		
Type	4	0 – closed; 1 – open
Status	4	0
Bound Type	4	2
Color	3	RGB
Normal 0	12	Normal to left surface (if constant)
Normal 1	12	Normal to right surface (if constant)
nEdges	4	Number of edges (number of vertices – 1)
V0	4	First vertex
V1	4	Second vertex
.....		
Vn	4	Last vertex

Block Size is  $9 + \text{Sum of Edge Lines Sizes}$

Edge Line Size is  $43 + 4 * (\text{nEdges} + 1)$

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