

# **ScanMaster™ Designer 3D Extension User Guide Version 2.2**



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# 1

## About this document

The aim of this manual is to provide a brief description of the ScanMaster™ Designer software and its functions. This document will mainly focus on the 3D laser marking processes and the capabilities of ScanMaster™ Designer software to do surface marking and engraving processes. Furthermore this document will guide you through a three step process to achieve the final 3D laser marking. You will learn the options to create a 3D model, modify as desired and then to perform the process. The features of this application will be demonstrated using simple scenarios which will be helpful for you to understand the process more effectively. You will also find some main points that you should remember when managing a 3D laser marking project in ScanMaster™ Designer software.

**Note:** To understand this application and its features perfectly you are required to have a general knowledge about the ScanMaster™ Designer 2D application.

Inside this chapter:

- [Document Conventions](#)

## Document Conventions

This document uses the following typographical conventions to present command line syntax and data file formats.

Convention	Description
<b>Command, Object</b>	Words in bold formatting indicate commands, features or shortcut names appearing exactly as shown in the application.

# 2

## Introduction

Introducing the ScanMaster™ Designer software.

Inside this chapter:

- [What is 3D Laser Marking?](#)
- [Scan Controller Cards](#)

## What is 3D Laser Marking?

3D laser marking refers to the laser marking performed on a 3D workspace. 3D laser marking comprises a range of 3D related processes including all types of Surface Markings, Engraving, Sub Layer Laser Engraving and Prototyping. 3D laser marking technology is widely used by many industries such as packaging, automobile manufacturing, jewelry and etc.

ScanMaster™ Designer software allows you to create a digital 3D model and apply 2D images to a 3D surface. This application facilitates 3D marking with either projection or wrapping styles.

This application also enables you to do laser engravings by specifying different sections and layers. More detailed information about these features will be discussed in this document.

The marking procedure can be customized using the ScanScript language in which you can experience the advanced capabilities not available through the user interface.

**Note:** A detailed description about **Projection** and **Wrapping** styles and their differences will be discussed in the appendix of this document. Refer [Appendix A](#) of this document.

## Scan Controller Cards

There are four different Scan Control cards available which are supported by ScanMaster™ Designer software:

1. ScanMaster Controller - The SMC is a self-contained controller that provides advanced hardware and software control technology to drive laser scanning systems. The Ethernet-connected SMC board is designed to permit remote embedding and control of a scan-head and laser system. It is capable of controlling two scan-heads with up to three motion axes each with concurrent laser timing control. It also provides integrated synchronization I/O for connection to factory automation equipment.
2. EC1000 - The EC1000 is a self-contained controller that provides advanced hardware and software control technology to drive laser scanning systems. The EC1000 control board is specifically designed for remote embedding and control of a scan-head and laser system. It is capable of controlling two scan-heads with up to three motion axes each with concurrent laser timing control. It also provides integrated synchronization I/O for connection to factory automation equipment. The EC1000 controller card is the core of the SM1000 Controller Module.

# 3

## Getting Started

Use information in this section to install and start the ScanMaster™ Designer software. This section will also introduce the key features of the program as well as recommended tips for establishing a good workflow.

Inside this chapter:

- [System Requirements](#)
- [Starting ScanMaster™ Designer software](#)
- [Workspace Elements](#)
- [Recommended Workflow](#)


## System Requirements

The following software and hardware specifications are the minimum system requirements to install and run ScanMaster™ Designer software on your computer:

- Processor: 1GHz
- Memory: 1GB
- Hard Disk Space: 1GB
- Display: 1024 x 768 High Color (16-bit)
- Windows XP Professional SP3 / Windows Vista SP2 / Windows 7 SP1

## Starting ScanMaster™ Designer software

To open ScanMaster™ Designer:

1. Click **Start** on the taskbar.
2. Select **Programs** and locate the **CTI** folder and then the **ScanMaster™ Designer** sub-folder.
3. Click **the ScanMaster™ Designer**  icon.

The following window will appear:

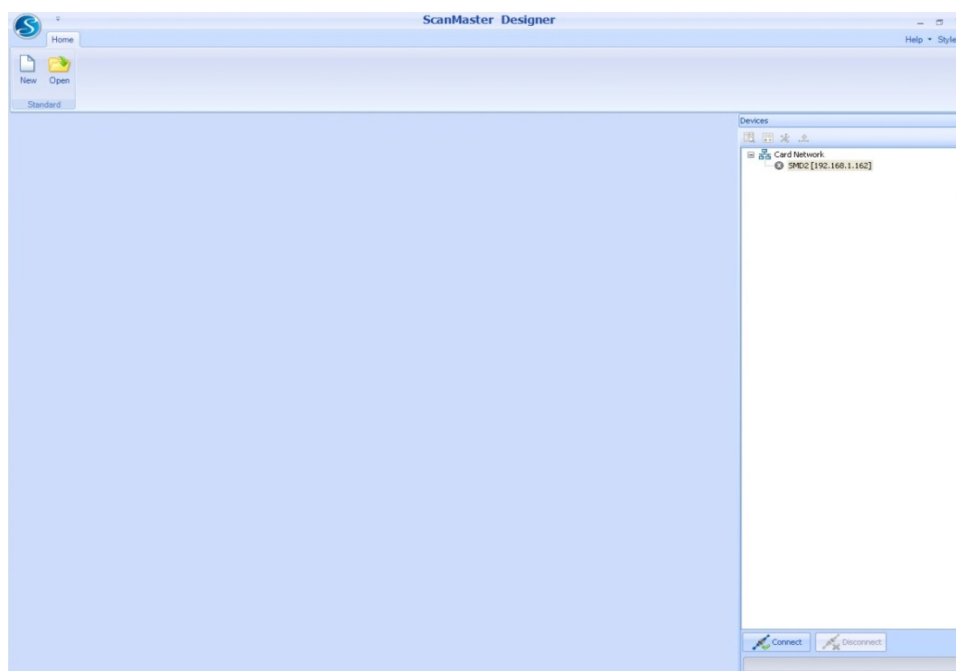



Figure 1: Start-up screen



To start a new project click **New**  from the **Home** tab.

A basic marking job is created by placing different basic shapes such as a box, sphere, cone, or a cylinder on the canvas. Each 3D shape has its own unique properties which can be modified. See [Managing Projects](#) in this document, for detail information about creating projects.

To exit ScanMaster™ Designer, click the **Close** button on the top right of the screen or select **Exit** from the **ScanMaster™ Designer** button.

## Workspace Elements

Before you can begin using the software you need to be familiar with the ScanMaster™ Designer user interface. Let's start by taking a look at the main application window and how it's laid out.

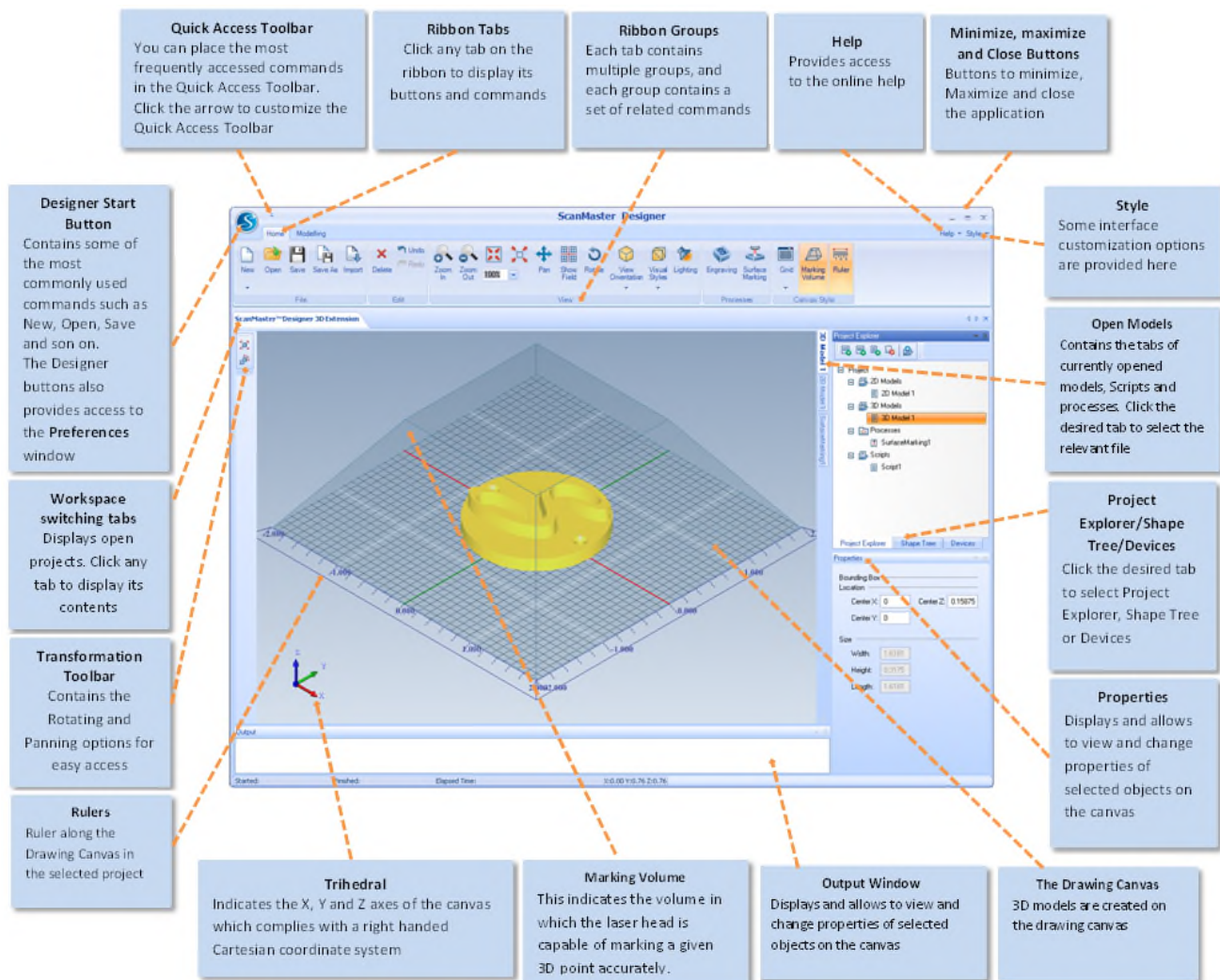


Figure 2: Workspace Elements

## Recommended Workflow

The figure below shows the recommended workflow for ScanMaster™ Designer projects.

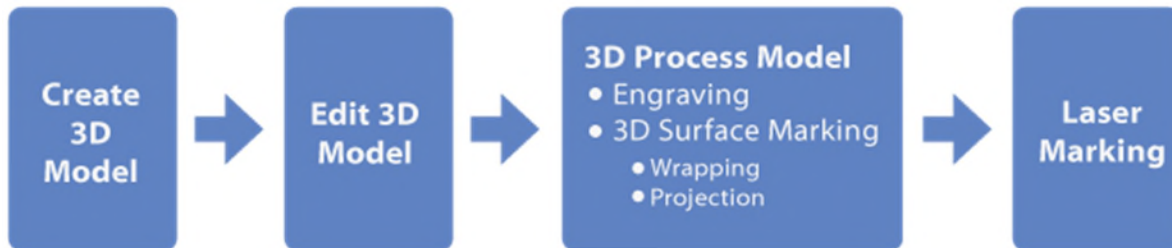


Figure 3: Recommended Workflow

### 1. Create a 3D Model

A “Job” is a simple program that contains Models, Processes and Scripts that are executed in the prescribed order. You might want to create a job to make a **Surface Marking** process or an **Engraving** process. The options in ScanMaster™ Designer software, allows you to do these tasks easily.

Insert basic shapes to the drawing canvas by selecting any desired basic 3D shape from the **Basic** panel of the **Modeling** tab. You can insert many shapes to create one 3D model.

**Note:** Refer [Creating 3D Models](#) to check detailed information on creating 3D models in a 3D project

### 2. Edit the 3D Model

After you have inserted shapes you can edit them as preferred. ScanMaster™ Designer software is equipped with a rich collection of editing tools which you can use to edit your 3D models. The options in the **Modeling** tab of the **Ribbon** will enable you to modify the 3D shapes according to your requirements.

**Note:** Refer [Modifying 3D Models](#) to check detailed information on how to modify 3D models

### 3. Preparation of the 3D Process

To prepare a 3D model to be processed on the laser marking, the commands in the **Engraving** tab and **Surface Marking** will enable you to set the specifications thereby preparing the model to be processed in order to achieve the output according to your requirements.

**Note:** Refer [Preparation of 3D process](#) to check detailed information on preparing the 3D model to be processed



# 4

## ScanMaster™ Designer Interface

Across the top of the window is the **Ribbon**. All the application's functions can be accessed from here and it's the first place you should look if you're new to the software and want to get an idea of what you can do with it. As your mouse passes over the menu, tool tips will be displayed.

Each item is described in further detail in the following sections of this chapter.

In this chapter:

- [The Ribbon](#)
- [Layout of 3D Canvas](#)
- [Project Explorer](#)
- [Shape Tree](#)

# The Ribbon

The **Ribbon** provides easy access to the ScanMaster™ Designer tools that can be used to create and edit 3D models. Tools are logically grouped into a collection of **Tabs**. Each tab contains multiple **Groups**, and each group contains a set of related commands. The **Ribbon** is docked on top of the ScanMaster™ Designer drawing canvas.

## Home

The **Home** tab on the **Ribbon** contains the **File**, **Edit**, **View**, **Processes** and **Canvas Style** groups.

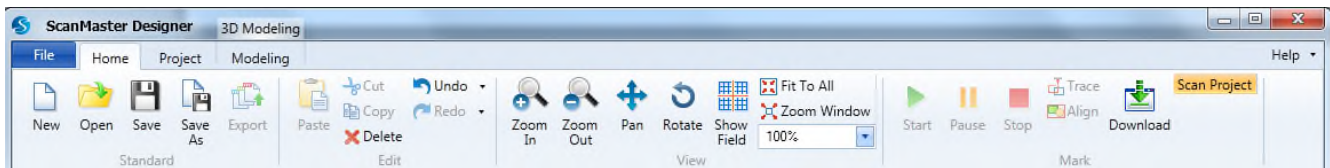


Figure 4: Home Tab

## File

The **File** panel allows you to create new, open, save or import 3D and 2D files into the workspace.

Icon	Command	Description
	New	Opens a new project
	Open	Opens a saved project
	Save	Saves the current project
	Save As	Saves a new project or an existing project which is already opened, in a different name
	Export	Disabled for 3D







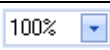

## Edit

The commands in this panel are designed to help you to delete, undo or redo the changes you make to the shapes inserted into the models.







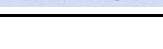
Icon	Command	Description
	Paste	Disabled for 3D
	Cut	Disabled for 3D
	Copy	Disabled for 3D
	Delete	Deletes all selected objects
	Undo	Reverse the last action performed. You may also undo the last few actions that were performed by clicking the arrow next to Undo
	Redo	Re-apply the actions that you undid last

## View

The options in this panel enable you to view the drawing canvas in different ways according to your requirement.

Icon	Command	Description
	Zoom In	Enlarges the display size of the workspace on the screen
	Zoom Out	Reduce the display size of the workspace on the screen
	Fit to All	Adjust the zoom level to fit the entire contents of the drawing in to the current view
	Zoom Window	Zoom Window offers a quick way to zoom a certain area of the drawing canvas
	Pan	Panning allows you to quickly move around the canvas at the same magnification you have currently set
	Show Field	Resets the drawing canvas to the default viewing configurations
	Zoom Factor	The Zoom Factor allows you to zoom in or out by the specified zoom factor
	Rotate	Rotates the drawing canvas

## Mark

Icon	Command	Description
	Start	Start marking
	Pause	Pause marking
	Stop	Stop marking
	Trace	Trace the outer line of the drawing
	Align	Trace the bounding box of the current job
	Download	Download scanning jobs to a flash memory in the card or to a USB memory
	Scan Project	Scans the whole project including execution of the script

## Project

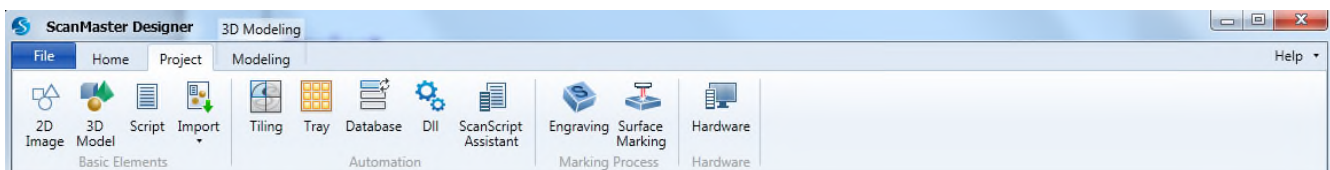






Figure 5 : Project tab

## Basic Elements



Add new elements to the project.

Icon	Command	Description
	2D Image	Add new 2D Image to the project

	3D Model	Add new 3D model to the project
	Script	Add new script to the project
	Import	Allows you to import 2D image, 3D model or script from file

## Marking Processes

The **Marking Processes** panel gives you the options of the start of the 3D marking processes.

Icon	Command	Description
	Surface Marking	Creates a new surface marking process on the project
	Engraving	Creates a new engraving process on the project

## Modeling

The **Modeling** tab on the **Ribbon** enables you with many attractive options to modify the 3D shapes to create complex 3D models easily

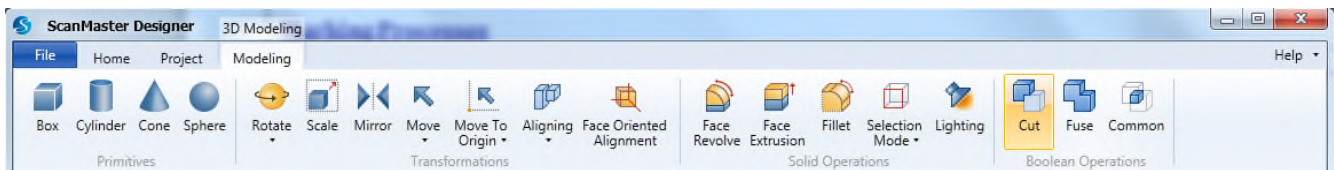






Figure 6: Modeling tab

## Basic








The **Basic** panel displays, the four basic 3D shapes to insert into the workspace which then you can modify them using the other options in the **Modeling** tab.

Icon	Command	Description
	Box	Inserts a three-dimensional cube on the drawing canvas according to the given width, height and length.
	Cylinder	Creates a cylindrical shape according to the given radius and height.
	Cone	Inserts a cone shape according to the specified base and top radius and the height.
	Sphere	Inserts a sphere on the drawing canvas according to the defined radius

## Transformations






The **Transformations** panel guides you on transforming the 3D shapes as required.

Icon	Command	Description
------	---------	-------------

	Rotate	Rotates a shape around a specified axis on the canvas
	Scale	Changes the size of any object drawn or loaded to the canvas
	Mirror	Creates a symmetrical mirror image of the selected shape according to the specified mirror axis
	Move	Moves a shape to a new position you specify related to the current position
	Move to Origin	Moves the selected shape(s) to the origin of the canvas
	Aligning	Aligns two or more objects' bounding boxes to any of the given alignments
	Face Oriented Alignment	Changes the alignment of a selected face so that it is oriented perpendicular to the given axis




## Solid Operations

The **Solid Operations** panel allows you to modify the 3D shapes in different ways.

Icon	Command	Description
	Face Revolve	Revolves the selected face of the object according to a specified x, y or z axis or arbitrary axis values.
	Face Extrusion	Changes the dimension of an object by extending a selected face according to a specified extrusion length.
	Fillet	Curves the shape of the selected mode, by a given radius
	Selection Mode	Selects the 3D shapes by faces, edges, vertices or neutral.
	Lighting	Changes the lighting effects from different directions.

## Boolean operations

This panel allows you to modify two selected 3D shapes in terms of **Cut**, **Fuse** and **Common**.

Icon	Command	Description
	Cut	This command gives you the option of cutting a particular overlapped section of the first selected 3D shape
	Fuse	The fuse command allows you to join two or more 3D objects together to make one particular 3D shapes
	Common	Extracts the common section of two selected 3D shapes

## Engraving

The **Engraving** tab on the **Ribbon** provides you the capability to make adjustments to the 3D model for engraving.

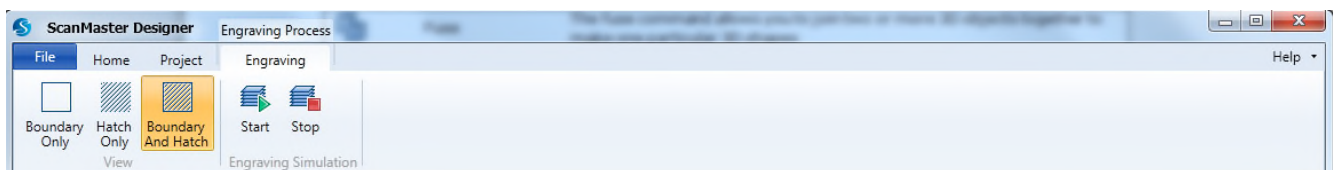





Figure 7: Engraving tab



## View

The options in this panel enable you to view engraved objects in different views.

Icon	Command	Description
	Boundary Only	Allows you to view only boundary of the engraving object
	Hatch Only	Allows you to view only the hatch of the engraving object
	Boundary and Hatch	Allows you to view both the boundary and hatch of the engraving object.

## Engraving Simulation

The options in this panel allow you to preview specified sections of your engraving process.

Icon	Command	Description
	Start	Starts the preview of the engraving process
	Stop	Stops the preview of the engraving process

## SurfaceMarking

The **SurfaceMarking** tab on the **Ribbon** provides the capability to adjust the 3D model for surface marking.

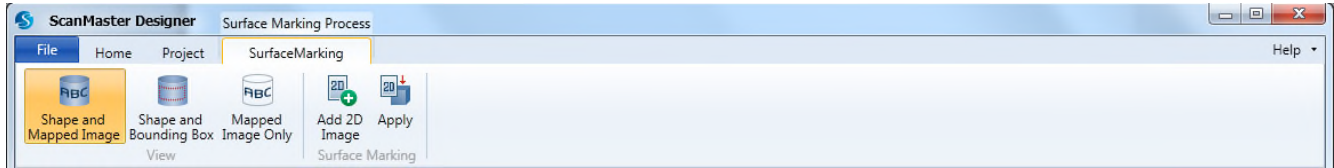


Figure 8: SurfaceMarking tab

### View

The options in the **Viewing Surface Marking Objects** panel, provides different ways to visualize the 3D model.

Icon	Command	Description
	Shape and Mapped image	Displays the 3D model and the mapped image
	Bounding Box and Shape	Displays the 3D model and the bounding box of the mapped image
	3D Image only	Displays only the mapped image

### Surface Marking

Adding and applying the 2D image is enabled by the options in this panel.

Icon	Command	Description
	Add 2D Image	This command allows you to add a 2D image to the canvas for processing
	Apply	The Apply command allows you to apply the 2D image to your 3D model that you have created

## Layout of 3D Canvas

### Drawing Canvas

The 3D drawing canvas is the 3D workspace which allows users to see the graphical representation of a 3D model and work with it.

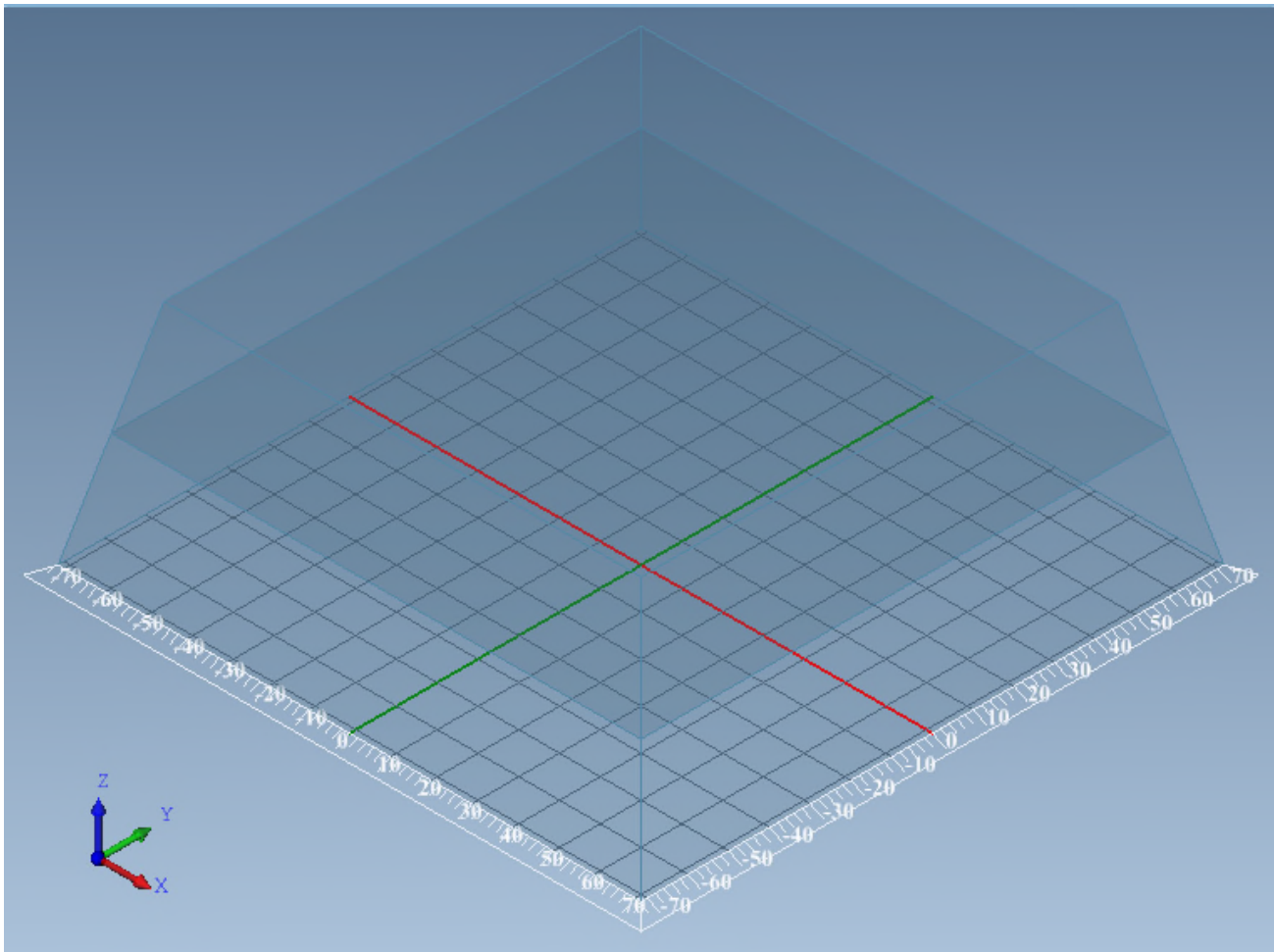



Figure 9: 3D drawing canvas

## Marking Volume

The marking volume is indicated by a transparent pyramid shape. This represents the volume in which the scan head is capable of marking a given 3D point accurately.

You can access the **Marking Volume**  button below the canvas. Click on the **Marking Volume** button to show/hide the marking volume. The following images show the appearance with and without Marking Volume.



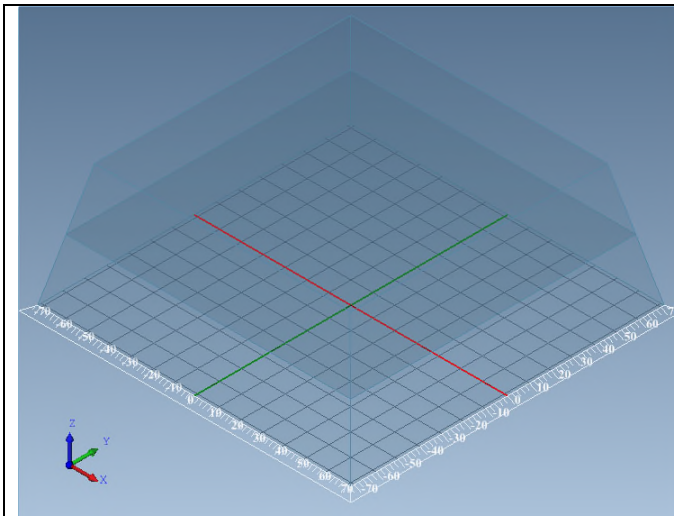


Figure 10: Canvas with Marking Volume

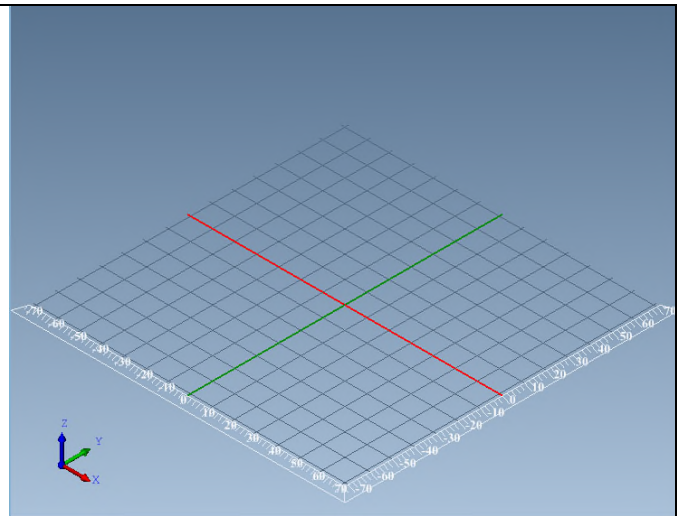



Figure 11: Canvas without Marking Volume

Any 3D models or sections of 3D models which are placed beyond the marking volume will not be marked by the scan head.

## Ruler

Click on the **Ruler**  button below the canvas to show/hide the ruler. The following images show the appearance with and without the ruler.

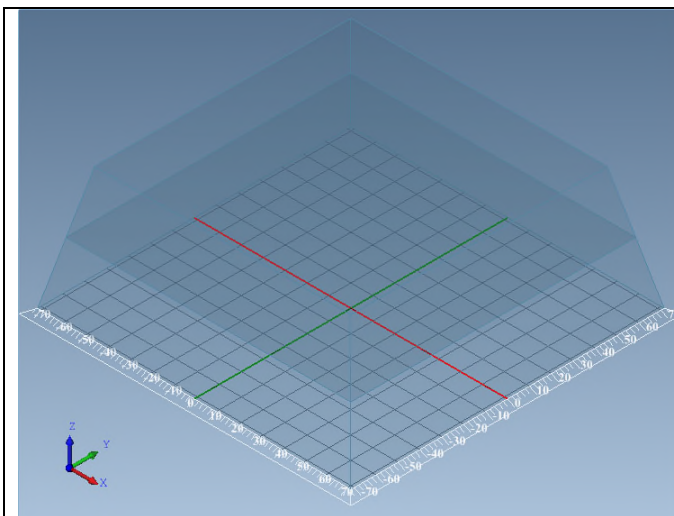


Figure 12: Canvas with Ruler

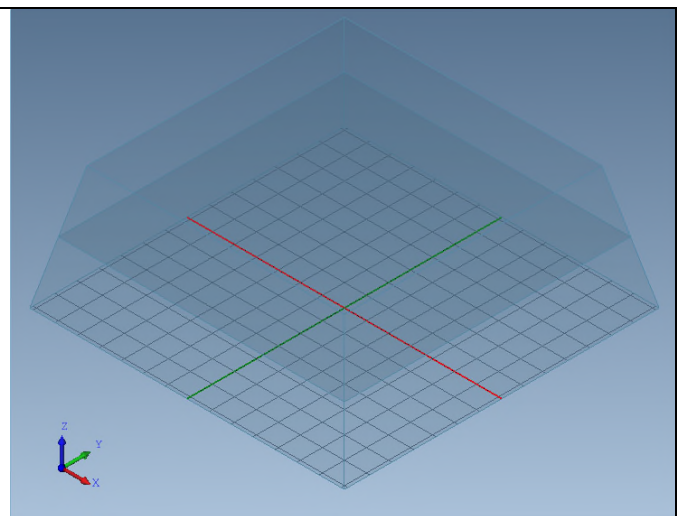



Figure 13: Canvas without Ruler

A ruler is displayed along the **X** and **Y** axis of the drawing canvas in order to help you adjust the position of the 3D model in the drawing canvas.

The position of the 3D model can be specified by defining the **X** and **Y** values in the **Properties** of the 3D model.

## Trihedral

The trihedral  at the bottom left corner of the canvas indicates **X**, **Y** and **Z** axes of the grid which complies with a right handed Cartesian coordinate system.

## Grid

The **Grid** options are accessible by clicking on the **Grid**  button below the canvas. This command helps you to perfectly align shapes and drawings along the grid lines and points.

ScanMaster™ Designer software allows you to choose from three different grid styles. Select the desired grid option from the drop-down menu accessible by clicking on the **Grid** button.

The following images show the appearance of the different grid styles.

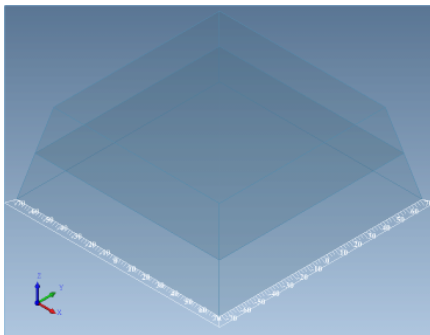


Figure 14: Blank Grid

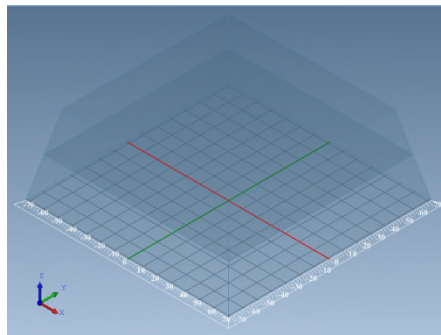


Figure 15: Line Grid

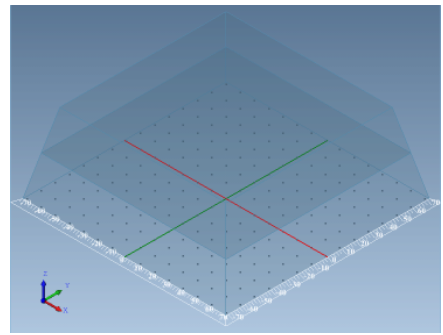



Figure 16: Dotted Grid

## View Orientation

The **View Orientation** options are accessible by clicking on the **View Orientation**  button below the canvas. This command helps you to change the view of the drawing canvas in different directions.

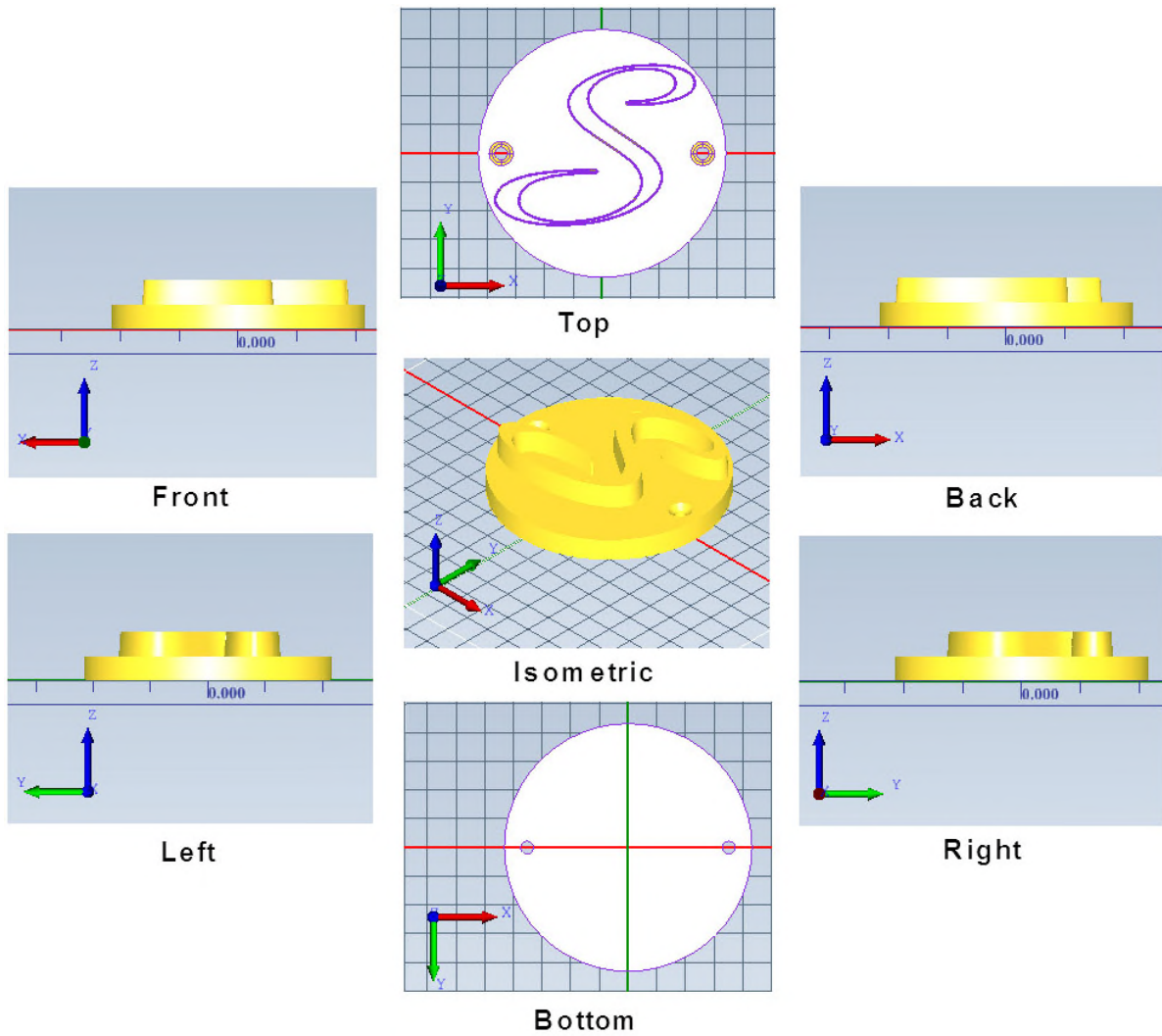



Figure 17: The Viewing Orientations

**Note:** The objects in the canvas will be displayed in the **Isometric** view by default

## Visual Styles

The **Shaded** and **Wire Frame** options are accessible by clicking on the **Visual Styles**  button below the canvas.

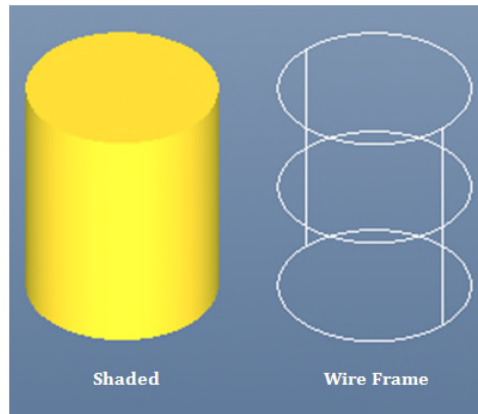


Figure 18: Visual Styles

## Project Explorer

A project can have several 3D models and 2D images, marking processes and scripts. Any 2D image, 3D model, project or script created in the ScanMaster™ Designer software is visible on the **Project Explorer** tab, in a hierarchical structure. The current project is visible in the top level with corresponding 2D images, 3D models, processes and the script files below it.

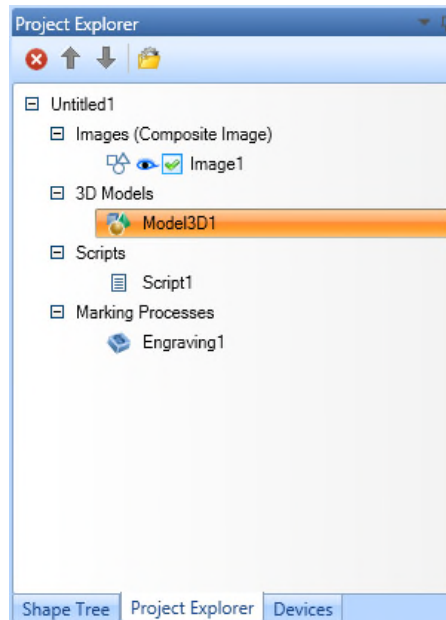






Figure 19: Project Explorer

To view the elements on the project explorer, click on the **Project Explorer** tab which is on the top-right corner of the application.

The following table describes the commands and icons displayed in the **Project Explorer** tab.



Icon	Command	Description
------	---------	-------------

	Delete	This command deletes any selected element in the project explorer
	Move Up	This command will move the selected item one step up in the current list
	Move Down	This command will move the selected item one step down in the current list
	Project Settings	This command allow you to customize the project settings

## Shape Tree

The **Shape Tree** displays all the shapes inserted on the current model or process. To access the shape tree, click on the **Shape Tree** tab which is on the top-right corner of the application.

### Hide/Show/Rename/Delete

The shape can be hidden, shown using the / icons and rename or delete the shapes using the right-click options in the **Shape Tree** tab.

1. Right-click on the particular shape from the **Shape Tree**
2. You will see the menu as shown in the figure below

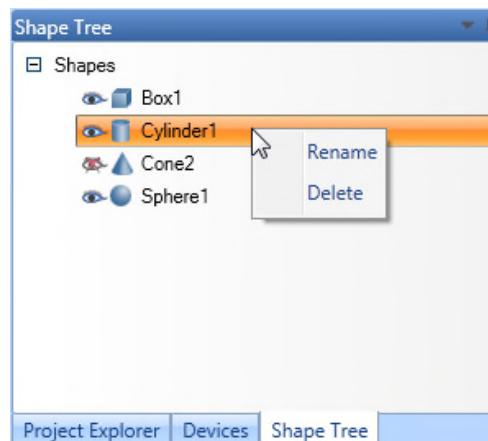


Figure 20: Shape Tree Right-Click Menu

3. Click the **Rename** command to change the default name of the selected shape of the shape tree
4. Click the **Delete** command to delete the selected shape from the project

# 5

## Managing Projects

A clear understanding of 3D project management in ScanMaster™ Designer will ensure an efficient work flow. This section guides you on certain basic areas which should be considered when managing a 3D project.

In this chapter:

- [Before you begin](#)
- [Preferences](#)
- [Creating a New Project](#)

## Before You Begin

Before you create a new 3D project, you need to understand and focus on certain areas to gain optimal results:

1. You should be familiar with the basics of ScanMaster™ Designer software interface. Refer [Starting ScanMaster™ Designer Software](#) and the [Workspace Elements](#) sections of this document to have a clear idea about the application.
2. Get familiar with the supportive 3D file formats, project structure and the project default settings.
3. You can import 3D models from **STEP**, **IGES** and **STL** formats.
4. Understand the concept of changing the measurement units of the projects. The measurement units of the 3D models that you insert into your canvas depend on the settings of the **Default Units** and **Grid Spacing** that you set in **Project Settings** therefore make sure that you have an idea about your measurement settings when you specify the parameters of any 3D models in your project.

**Note:** Please refer *chapter 5 Managing Projects* in the ScanMaster™ Designer 2D user manual to check more facts that you should consider before you begin a 2D project in ScanMaster™ Designer 3D Extension.

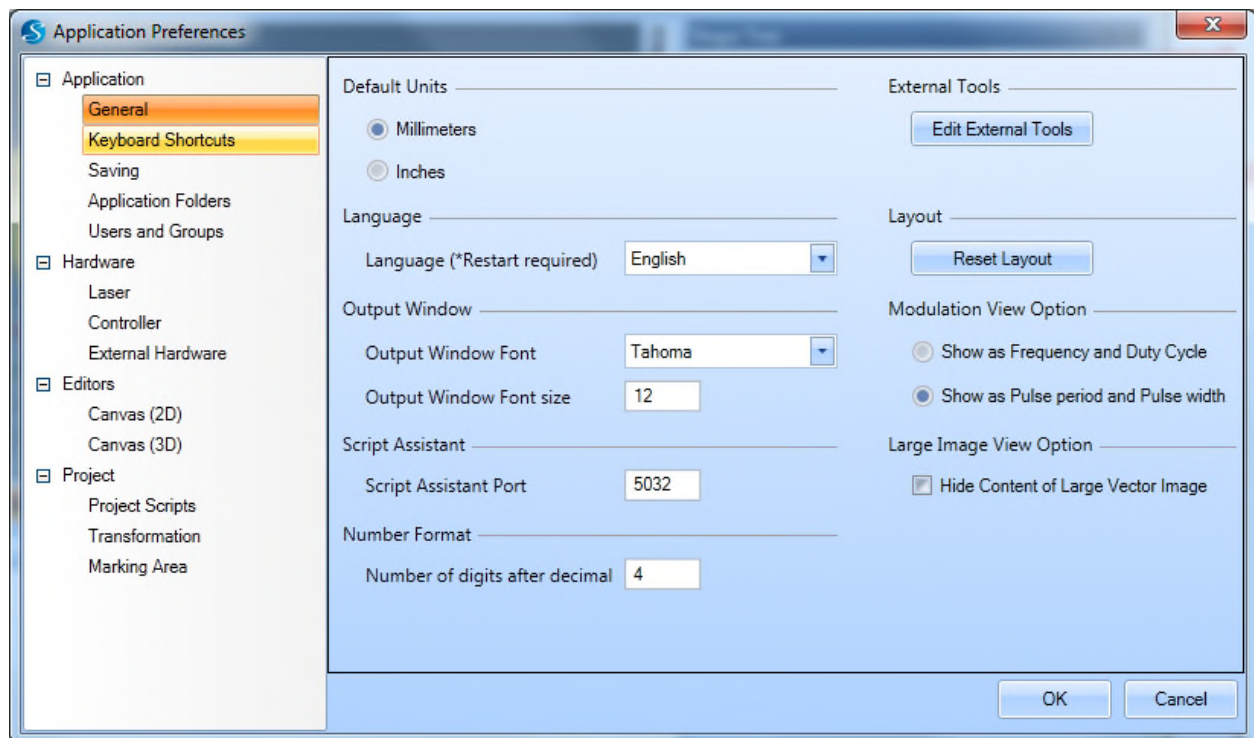


# Preferences

**Preferences** are the project default settings for any new project created in ScanMaster™ Designer software. They are organized as **General, Editors, 2D Scanning and 3D Scanning** tabs.

The **Preferences** window is accessed by clicking the **ScanMaster™ Designer**  button on the upper-left corner of the screen.

You will find the following **Application Preferences** window.



**Figure 21: Application Preferences**

## Editors (Canvas 3D)

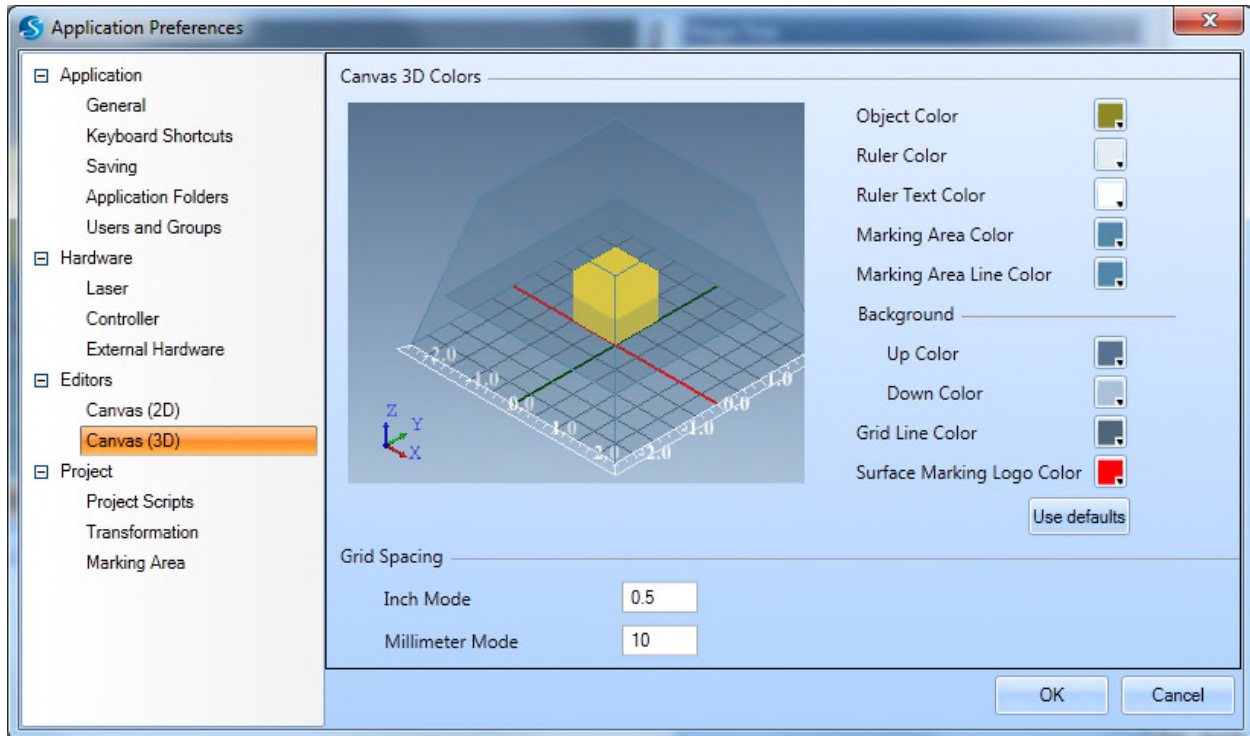



Figure 22 : Canvas 3D preferences

### Canvas 3D Colors

The **Designer Colors (3D)** tab allows adjustment of the colors of the 3D workspace. As seen in the figure below, the application allows you to customize the colors of the objects in the drawing canvas, the rulers, ruler text, marking area, marking area lines, upper and lower backgrounds, grid lines and the surface marking logo.

To change the color of an element, click the drop down color chart button  and select the required color from either the preset colors or by means of the **More Colors** option, where you could specify RGB values to match a specific color.

1. Click the **Use Defaults** button to reset the colors to their original state
2. Click on the **OK** button to save the changes you made to the colors of the layout and exit
3. Click **Cancel** if you want to exit without saving

## Grid Spacing

You can display the **Grid** as a rectangular pattern of lines or dots. The spacing between the grid lines is called "**Grid spacing**". Grid spacing can be measured in either millimeters or inches.

**Note:** Refer the Chapter 5 Managing Projects of the 2D user manual for details on **General, 2D Scanning and Editors | Designer Colors (2D)** tabs.

## Creating a New Project

### To create a new project

1. Choose **New** from the **Home** tab or press **Ctrl + N**. A new drawing canvas will be opened.

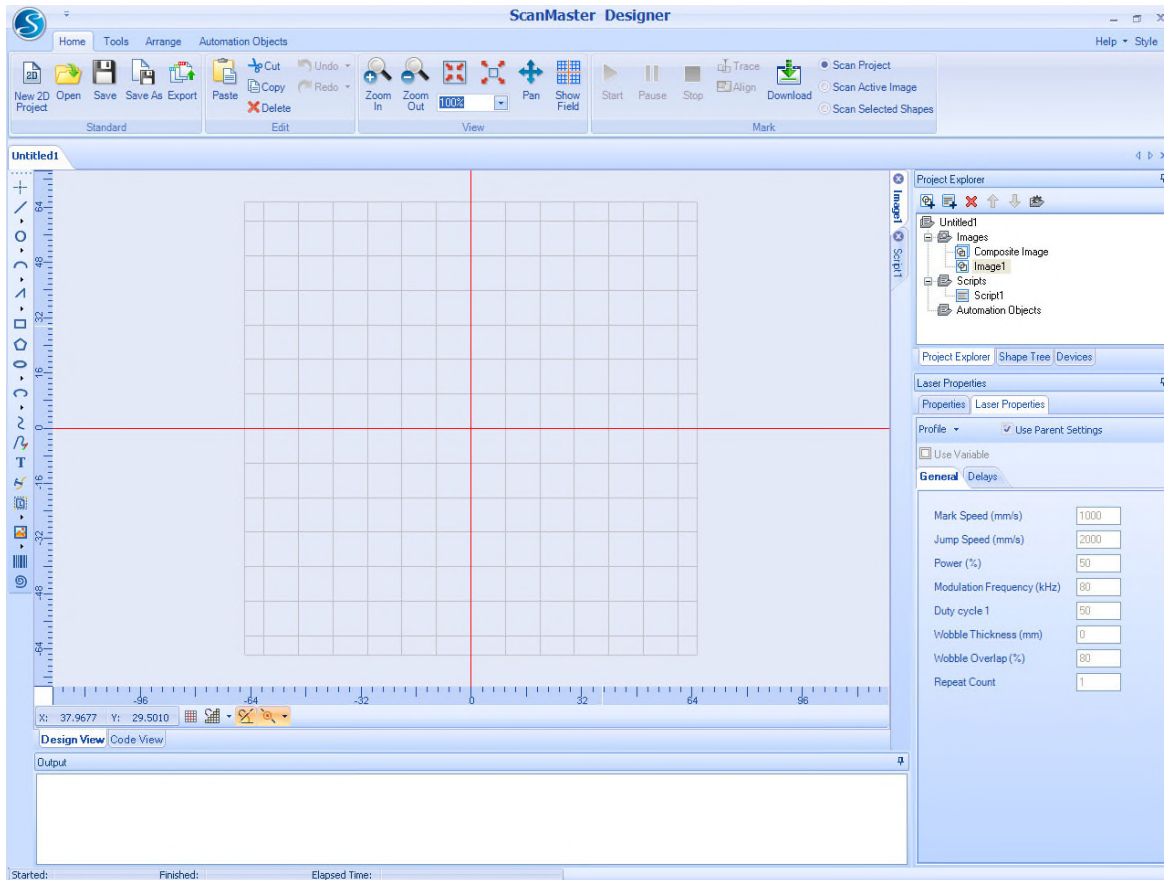


Figure 23: Main Screen

### To add 3D models to a project

You may create several 3D model per project.

1. Go to **Project Ribbon tab**.
2. Click the 3D model button from the Basic Elements group. A new 3D model will be added to the project and it will be visible on the Project Explorer window as well.

**Note:** Refer [Creating 3D Models](#) on this document to get more details on creating 3D models on your 3D project.

**Note:** Refer the Chapter 5 Managing Projects of the 2D user manual for details on Opening, Saving a project..

# 6

## Creating 3D Models


The first step in the 3D model marking process is creating a 3D model. The ScanMaster™ Designer software allows you to create 3D models according to your requirements in different ways. You can create a 3D model from the beginning or you can import an existing 3D model to your project.

In this chapter:

- [Creating a Blank 3D Model](#)
- [Creating a 3D Model from an Existing File](#)

## Creating a Blank 3D Model

To create a new 3D model of your own:


1. Go to **Project Ribbon tab**.
2. Click the 3D model  button on the Basic Elements group. A new 3D model will be added to the project and it will be visible on the Project Explorer window as well.

A 3D model can be a collection of many 3D shapes. ScanMaster™ Designer software allows you to create any kind of 3D models using the basic 3D shapes provided to you.

## Inserting Basic 3D Shapes

The ScanMaster™ Designer software comprises four basic 3D shapes including **Box**, **Cylinder**, **Cone** and **Sphere**. You can access these shapes in the **Basic** panel of the **Modeling** tab. Each shape can be inserted on to the drawing canvas by specifying the relevant geometrical parameters.

### Inserting a Box

To insert a 3D box shape, click on the **Box**  command on the **Basic** panel. The figure below shows the specifications of the parameters associated with the box shape and its output.

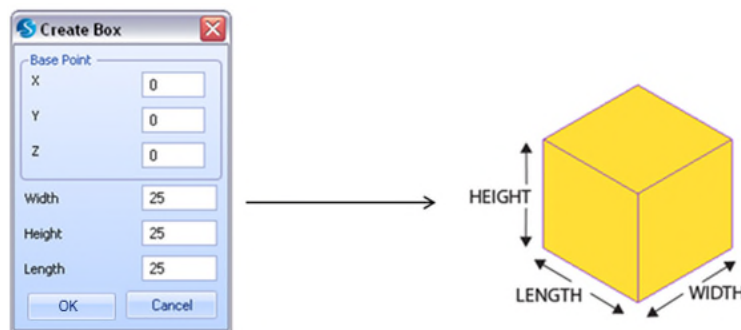



Figure 24: Create Box

1. The **Base Point** refers to the position of the **Box** on the drawing canvas. The base point is defined as the minimum **X**, **Y** and **Z** point of the box
2. The **Length** refers to the distance along the x axis
3. The **Width** refers to the distance along the y axis
4. The **Height** refers to the distance along the z axis
5. Click **OK** to confirm your specifications

## Inserting a Cylinder

To insert a cylindrical shape select the **Cylinder**  command on the **Basic** panel of the **Modeling** tab. The figure below shows the specifications of the parameters associated with the **Cylinder** shape and its output.

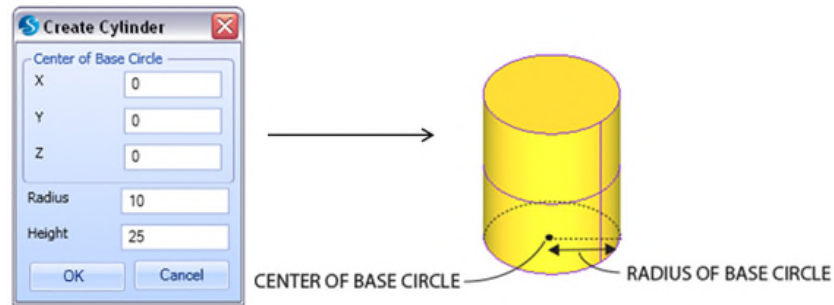



Figure 25: Insert Cylinder

1. The **Center of Base Circle** represented by the **X**, **Y** and **Z** coordinates refers to the center point of the base circle
2. The **Radius** refers to the radius of the base circle
3. The **Height** refers to the distance measured along the axis of the cylinder

## Inserting a Cone

To insert a cone shape to the drawing canvas, select the **Cone**  command from the **Basic** panel. The figure below shows the specifications of the parameters associated with the **Cone** shape and its output.

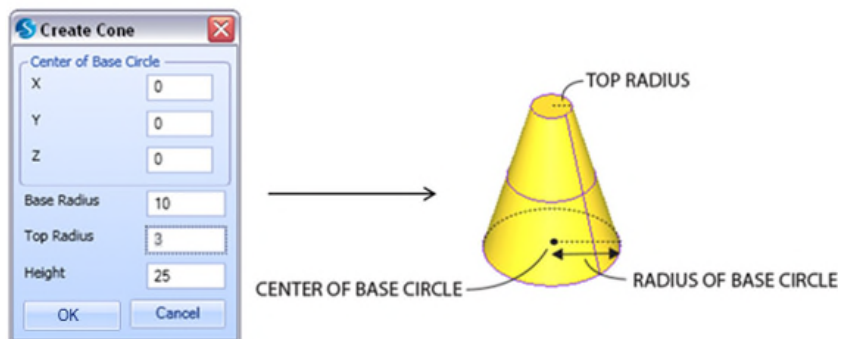



Figure 26: Insert Cone

1. The **Center of Base Circle** represented by the **X**, **Y** and **Z** coordinates refers to the center point of the base circle
2. The **Base Radius** refers to the radius of the base circle
3. The **Top Radius** refers to the radius of the top circle



## Inserting a Sphere

To insert a sphere shape on the drawing canvas, select the **Sphere**  command from the **Basic** panel. The figure below shows the specifications of the parameters associated with the **Sphere** and its output.

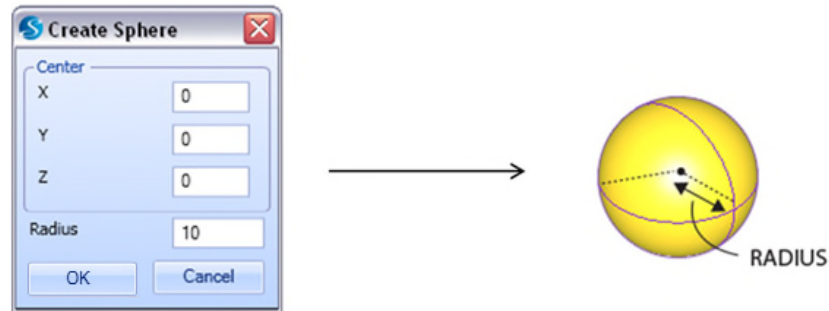


Figure 27: Insert Sphere

1. The **Center** represented by the **X**, **Y** and **Z** coordinates refers to the center point of the **Sphere** on the drawing canvas
2. The **Radius** refers to the radius of the **Sphere**

**Note:** You can create complex 3D models by inserting many 3D shapes and modifying them to make one whole 3D model. Refer [Modifying 3D Models](#) for more information on modifying 3D models.

## Create a 3D Model from an Existing File

ScanMaster™ Designer software allows you to import existing 3D models to your project.

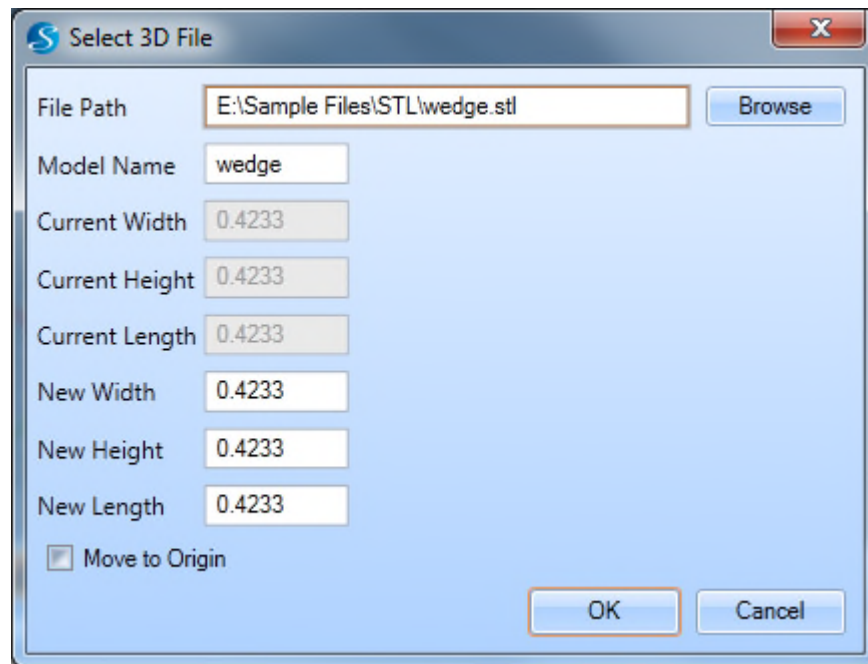


Figure 28: Select 3D File Dialog

1. Go to **Project Ribbon** tab.
2. Select the **3D model** button from the import drop down button.
3. The 3D file dialog will be opened.
4. Click **Browse** button to browse the existing 3D model file location. The **Open** dialog box will be displayed
5. Select the desired 3D model file and click **Open**. The location of the file will be identified and displayed in the **File Path**
6. The current width, height and length of the 3D model will be identified automatically by the system
7. If you want to change the width, height and length of the importing model, specify the values in the respective **New Width**, **Height** and **Length** fields
8. Check the **Move to Origin** check box to move the importing 3D model to the origin of the canvas
9. Click **OK**

## Supportive Files

ScanMaster™ Designer software supports the following file formats to be imported to the 3D projects.

1. Standard for the Exchange of Product data (STEP)
2. Initial Graphics Exchange Specification (IGES)
3. STereo Lithography (STL)

# 7

## Modifying 3D Models

Once the 3D model is created, the next step is to modify the created models in order to create more complex 3D models and thereby achieve the desired output. This chapter will guide you through various modification features provided by ScanMaster™ Designer software.

In this chapter:

- [Viewing Options](#)
- [Transformation](#)
- [Boolean Operations](#)
- [Solid Operations](#)

## Viewing Options

The **View** panel in the **Home** tab provides a rich set of view port oriented operations. You can change the view of the 3D canvas according to your requirements in order to help you navigate to each location of the model and observe it in detail.

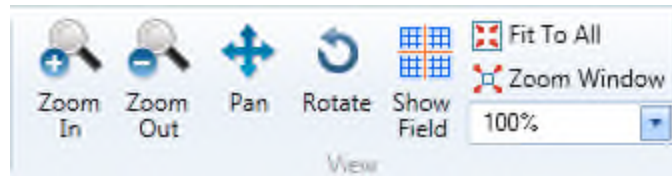




Figure 29: View Panel

### Zoom

The **Zoom** commands are available in the **Home | View** section. **Zoom** commands are very useful when having to go back and forth between editing small details at a magnified level and for checking the overall picture at a minimized level.


### To Zoom In/ Zoom Out

3. Go to the **Home | View** panel.
4. Click **Zoom In**  / **Zoom Out**  , or select a more exact zoom percentage in the **Zoom Factor** percentage menu.
5. **Zoom In**: Increases the magnification level of a drawing on the canvas.
6. **Zoom Out**: Reduces the magnification level of a drawing on the canvas.

**Note:** You can also use the mouse wheel to increase or reduce the magnification level of the canvas.

### Zoom Window

**Zoom Window** offers a quick way to view a certain area of the drawing.

1. Click **Zoom Window** 
2. Select a certain area of the drawing

### Zoom Factor

The **Zoom Factor** allows you to zoom in or out by the specified zoom factor. The default size is achieved by a 100% zoom factor.

In the **Zoom Factor** box  type or select a zoom factor.


## Fit to All

**Fit to All** allows resizing the drawing canvas width/height to display it in any screen size.

1. Click **Fit to All** 

## Pan

Panning allows you to quickly move around the canvas at the same magnification you have currently set.

1. Go to the **Home | View** panel
2. Click **Pan** 
3. Click on the drawing canvas and drag it away to the location you desire and release


Or

4. Click the middle mouse button
5. Drag the cursor on the canvas and release the mouse when the drawing is at the position you desire.

**Note:** The cursor image changes to a hand cursor when panning is activated.


## Show Field

The **Show Field** command in the **Home | View** panel resets the drawing canvas to the default viewing configurations.

1. Click on the **Show Field**  button to view the default viewing configurations of the drawing canvas.

## Rotate

The **Rotate** function allows you to rotate the drawing canvas according to your requirements.

1. Click on the **Rotate**  button on the **View** panel of the **Home** tab
2. Click and drag on the drawing canvas to rotate into the desired angle

## Transformations

Transformation options can be accessed from the **Transformations** panel of the **Modeling** tab. This panel provides basic transformation options including rotation, scaling, mirroring, moving to the origin, moving to a desired location and face oriented aligning.

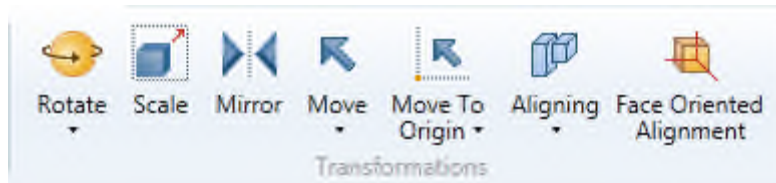



Figure 30: Transformations panel

### Rotate

You can use the **Rotate** command to rotate the 3D model around a specified **X**, **Y** and **Z** axis or an arbitrary axis and the angle.

To rotate a 3D model select the appropriate model and click on the **Rotate**  command on the **Transformations** panel.

You can either specify the **Standard Axis** parameters or else specify the **Arbitrary Axis** parameters to rotate a 3D model

### Standard Axis

1. To rotate a 3D model by specifying the standard axes select the desired axis and define an **Angle** to be rotated
2. Click **OK** to confirm



Figure 31: Standard Axis

## Arbitrary Axis

Rotation by an **Arbitrary Axis** can be done in two ways. You can either select to rotate by defining a point and a vector or by defining two points on the 3D workspace.

### Point and a Vector

1. To rotate by a point and a vector select the **Point and Vector** option from the Arbitrary Axis tab.
2. Define the point by specifying the **X, Y** and **Z** values.
3. Define the direction vector by specifying the **I, J** and **K** values.
4. Define the rotation **Angle**
5. Click **OK**

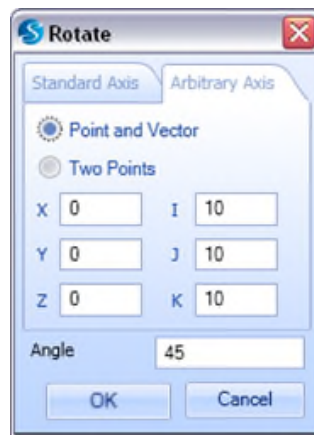


Figure 32: Point and Vector

### Two Points

You can rotate 3D models by defining two 3D points as shown in the figure below.

1. Define the first point by specifying the **X, Y** and **Z** values
2. Define the second point by specifying the **X2, Y2** and **Z2** values



Figure 33: Two Points

**Note:** Refer [Appendix B](#) for more details on specifying the arbitrary axes.

## Scale

This function allows you to change the size of any 3D model on the canvas. To access the **Scale** command, click the **Scale** button of the **Transformations** panel. You will see the following **Scale** dialog box.

1. To scale a 3D model, select a 3D shape that you want scale
2. Click the **Scale** button from the **Transformations** panel
3. Define scale factors for **X**, **Y** and **Z** directions in the appropriate text boxes
4. Check the **use same factors as in X** check box to use the same scale factor given for the x direction for the other two directions also
5. Select the **Base Point** as required. The selected base point will be kept fixed while scaling

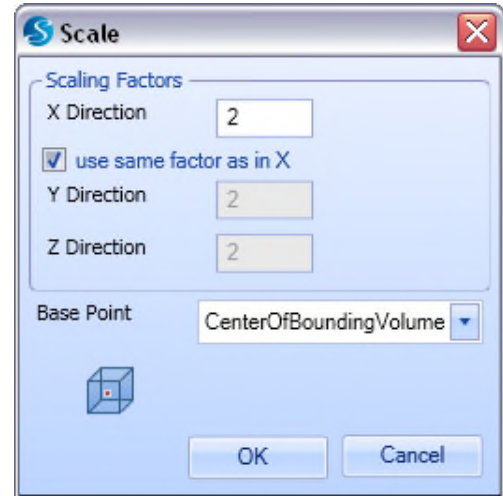


Figure 34: Scaling Factors

**Note:** The **Scaling Factors** should be greater than zero and if the value of the scale factor is 1 then there will be no change to the size of the object.

## Mirror

This option will create a symmetrical mirror image of the selected 3D model according to the specified values in the **Standard Axis** or **Arbitrary Axis** tabs. You can access the **Mirror** command from the **Transformations** tab.

1. Select the 3D model you want to mirror.
2. Click the **Mirror** command from the **Transformations** panel.
3. Define the **Standard Axis** values on the **Mirror** dialog box or select the **Arbitrary Axis** tab to mirror with respect to an arbitrary axis.
4. Select either **Point Vector** or **Two Points** options and define the respective values of the mirror axis.
5. If you check **Keep Original Object**, the original 3D model will remain on the drawing canvas.



Figure 35: Mirror



## Move

This function allows you to move a 3D model relatively to a specified direction. The **Move** command can be accessed from the **Transformations** panel.

1. To move a 3D shape select the 3D shape you want to move and click the **Move** command found on the **Transformations** panel
2. Specify the values of the **X**, **Y** and **Z** directions
3. Click **OK** to confirm

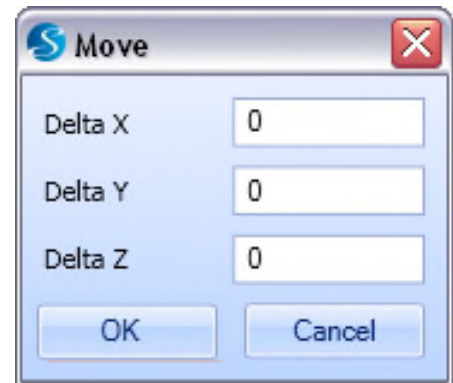


Figure 36: Move

The **Delta X**, **Delta Y** and **Delta Z** values represent the relative values of the move along the respective directions

## Move to Origin

This command in the **Transformations** panel allows you to move the reference point of the 3D object to the origin.

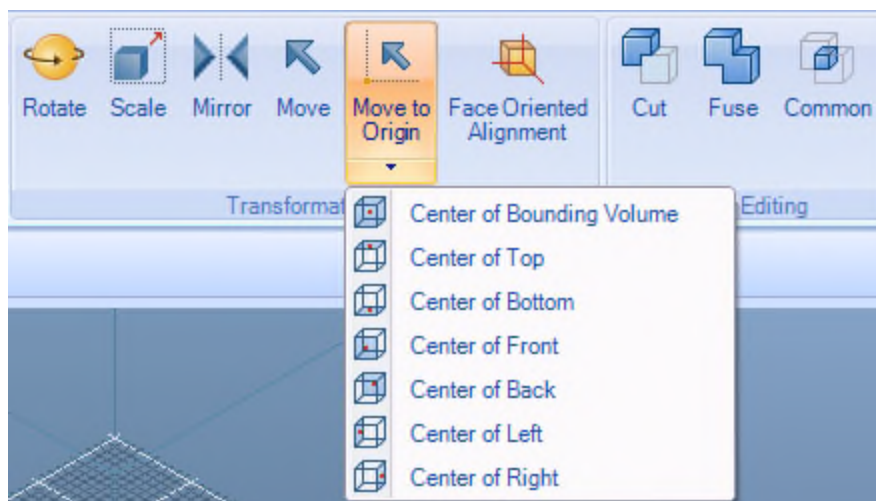


Figure 37: Move to Origin

## Aligning

This function allows you to align two or more objects by their bounding boxes according to any of the given alignments.

You can access the **Aligning** command from the **Transformations** panel of the **Modeling** tab.

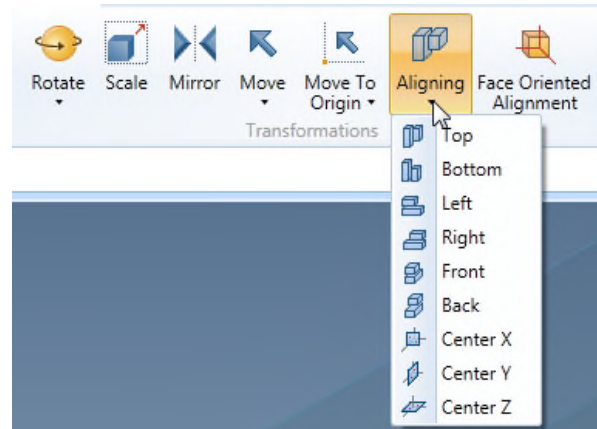


Figure 38: Aligning

To align the objects:

1. Select the desired 3D objects you want to align
2. Click on the drop-down arrow of the **Aligning** command to view the available alignment options
3. Select a suitable alignment option from the **Aligning** list

The **Center X Align** function will align the center of the bounding boxes of the two selected shapes to the center **X** value of the first selected shape.

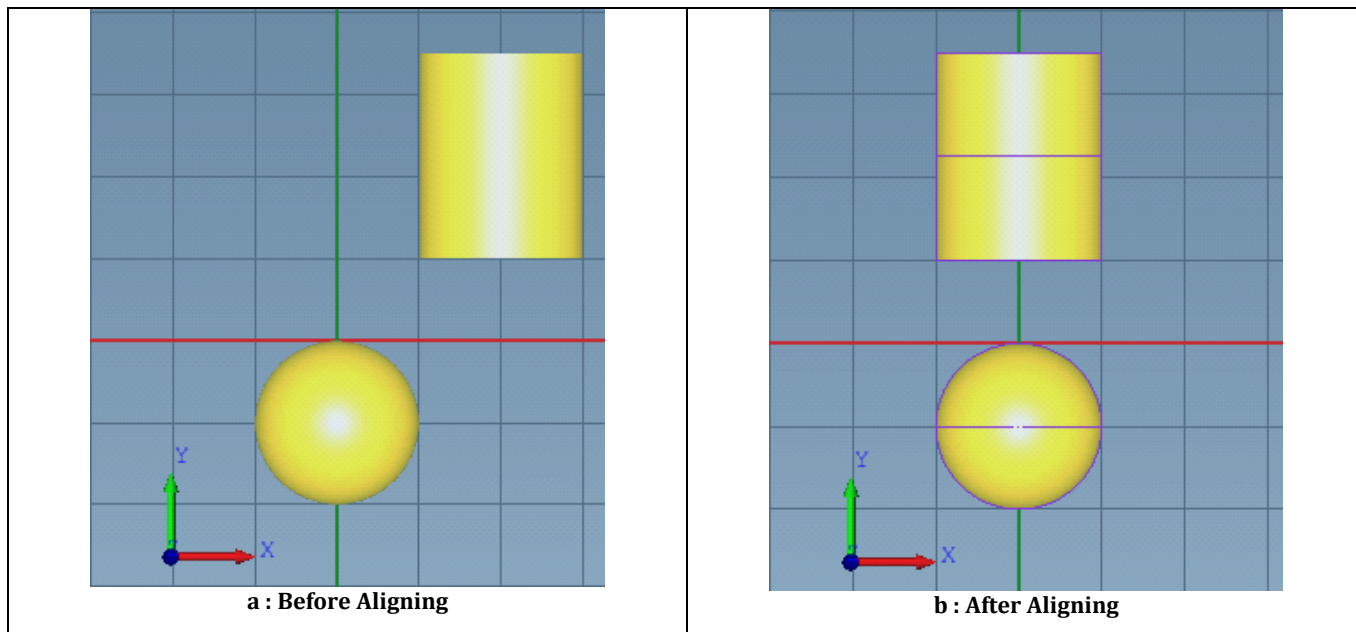


Figure 39: Center X Align

The **Center Y Align** function will align the center of the bounding boxes of the two selected shapes to the center **Y** value of the first selected shape.

The **Center Z Align** function will align the center of the bounding boxes of the two selected shapes to the center **Z** value of the first selected shape.

## Face Oriented Alignment

This function will change the orientation of the 3D shape in a way that the selected face will be turned to the specified direction.

To change the face oriented alignment of a selected object click the **Face Oriented Alignment** command from the **Transformations** panel

You will find the following window as you click on the **Face Oriented Alignment** command.

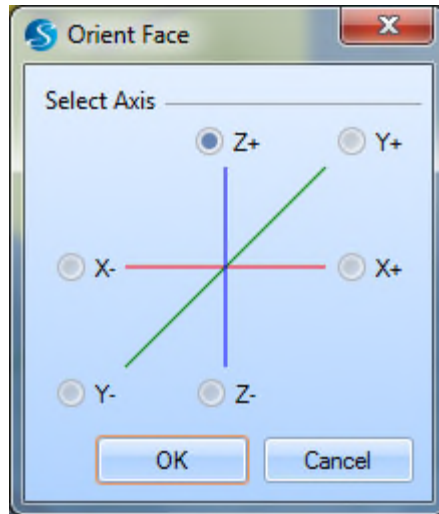


Figure 40: Orient Face

1. To change the face oriented alignment you have to first select the **Faces** command from the **Selection Mode** list on the **Solid Operations** panel
2. Select the 3D shape which you want change the face oriented alignment
3. Select any of the face oriented alignment options from the **Face Oriented Alignment** list

4. **Note:** For more details on **Solid Operations** panel refer the [Solid Operations](#) section in this document

## Boolean Operations

**Boolean Operations** allows you to modify the 3D objects by cutting, fusing and extracting common areas of the 3D objects.

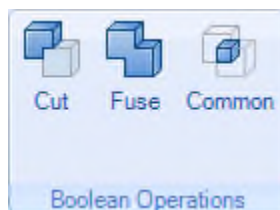


Figure 41: Boolean Operations

The following **Boolean Operations** were done by inserting a **Cylinder** with a **Height** of 25 and a **Radius** of 10 and a **Sphere** with a **Radius** of 10 and **Center Z** as 25

**Note:** When you perform any **Boolean Operation** the original shapes will become a single 3D object. The **Shape Tree** will display it as one shape as shown in the figure below.

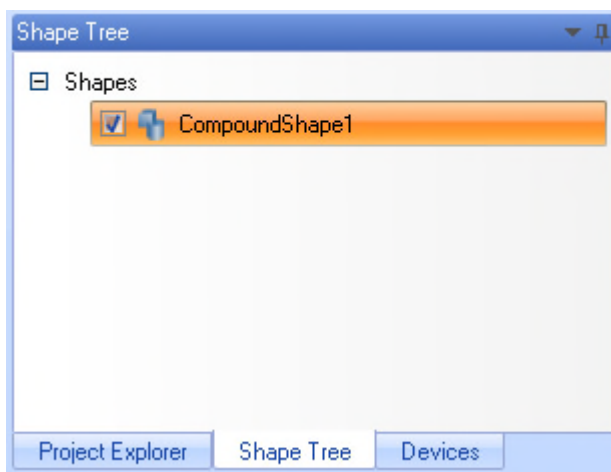



Figure 42: Compound Shape on Shape Tree

### Cut

The **Cut**  command gives you the option of cutting a particular overlapped section of the first selected 3D shape from the other selected 3D shape.

You can access this command from the **Boolean Operations** panel of the **Modeling** tab.

To cut an overlapped section of an object:

1. Place the 3D shapes such that one shape overlaps the other
2. Select the 3D shape that you want to modify. (Select the Cylinder)
3. Select the other 3D shape that you use to cut. (Ctrl + click the object)
4. After you have selected the two 3D shapes, click the **Cut** button on the **Boolean Operations** panel

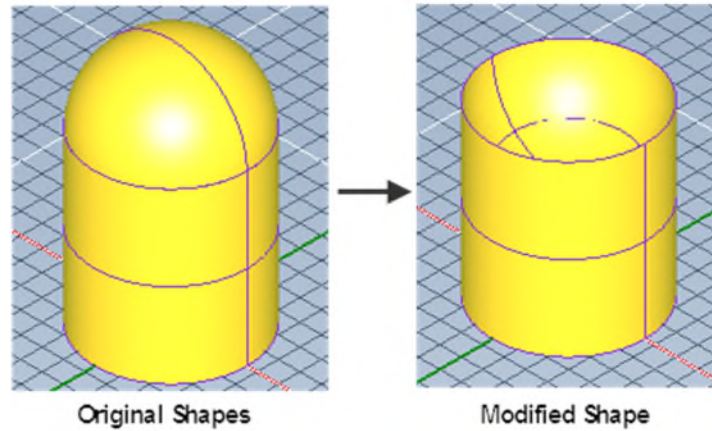



Figure 43: Cut Shape

## Fuse

The **Fuse**  command gives you the option of joining two 3D objects together to make a single 3D shape.

You can access the **Fuse** command from the **Boolean Operations** panel of the **Modeling** tab.

To fuse two 3D objects:

1. Select the two 3D objects you want to fuse
2. Click on the **Fuse** button on the **Boolean Operations** panel

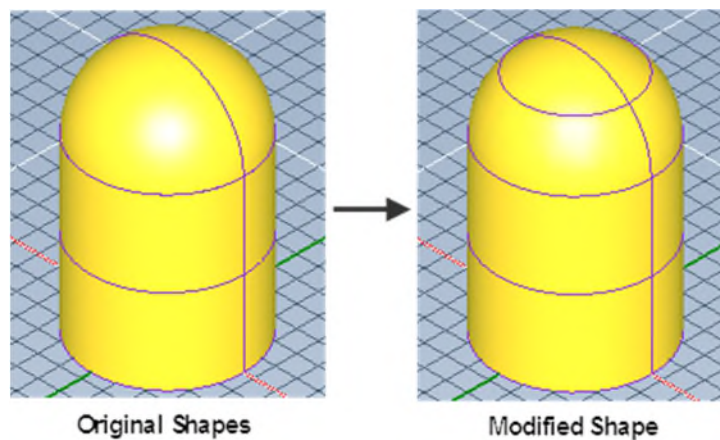



Figure 44: Fuse Shape

## Common

The **Common**  command gives you the option to extract the common section of two selected 3D shapes.

You can access the **Common** command from the **Boolean Operations** panel.

To extract the common section using the **Common** operation:

1. Select the two 3D shapes
2. Click the **Common** button on the **Boolean Operations** panel

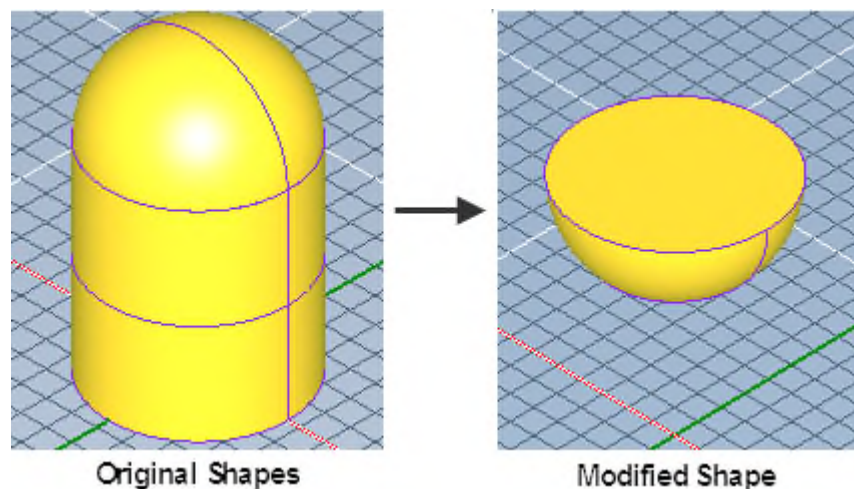


Figure 45: Extracting the Common part of the two 3D shapes

**Note:** ScanMaster™ Designer software allows you to select only two shapes at a time to make a **Boolean Operation**.

## Solid Operations

You can do certain modifications to the basic 3D models using the options in **Shape Operations** panel in the **Modeling** tab.

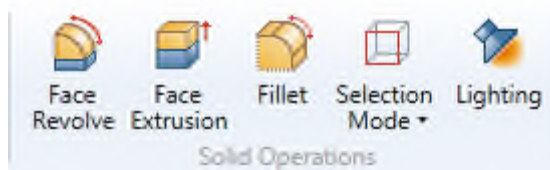



Figure 46: Solid Operations

**Note:** These functions will form compound shapes in the **Shape Tree** same like in **Boolean Operations**


### Face Revolve

Face revolving function allows you to revolve a face of a 3D object over an axis. The revolving axis can be defined by specifying the values on the **Standard Axis** or an **Arbitrary axis** tabs.

To revolve a face of an object:

1. Select the desired 3D object
2. To change the **Selection Mode** to **Faces** selection mode to, click the **Faces** option from the **Selection Mode**  list of the **Shape Operations** panel
3. Select the particular face you want to revolve
4. Click on the preferred face of the 3D object



5. Click the **Face Revolve**  command on the **Shape Operations** panel
6. You will find the **Revolve** dialog box as you see in the figure below
7. Define the axis that you want revolve on the **Standard Axis** tab or select the **Arbitrary Axis** to revolve with respect to an arbitrary axis

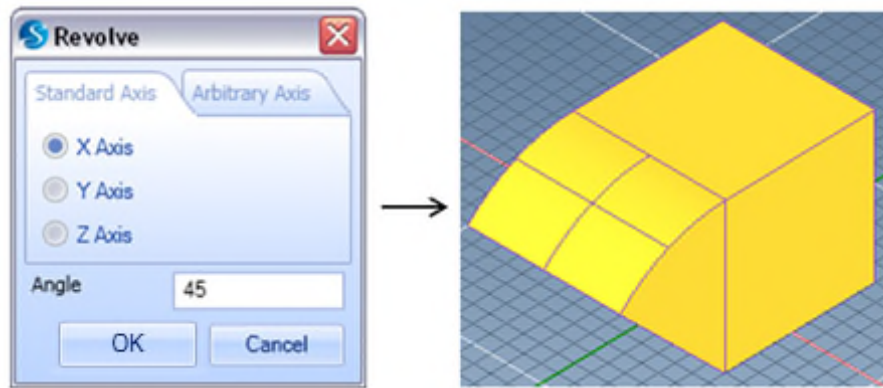


Figure 47: Face Revolved by a Standard Axis


1. Select either **Point and Vector** or **Two Points** options and define the respective values of the revolving axis
2. Define the revolving angle in the **Angle** text box
3. Click **OK**

## Face Extrusion

This function allows you to change the dimensions of an object by extending a selected face according to a specified extrusion length.

You can access the **Face Extrusion**  command from the **Shape Operations** panel on the **Modeling** tab.

To extrude a selected face of an object:

1. First change the **Selection Mode** to **Faces** selection mode. Click the **Faces** option from the **Selection Mode**  list of the **Shape Operations** panel
2. Select the particular face you want to extrude
3. Click the **Face Extrusion** button on the **Shape Operations** panel
4. Click on the particular face of the object and specify the length to be extruded on the given text box as shown in the figure
5. You can also click and drag the mouse pointer on the selected face until you reach the desired length that you need to extrude as you see in the next figure. Click on the canvas after you reach the desired length

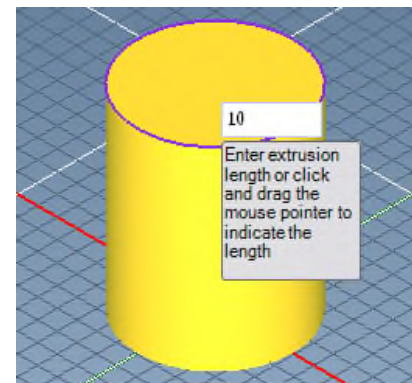


Figure 48: Define the Extrusion length



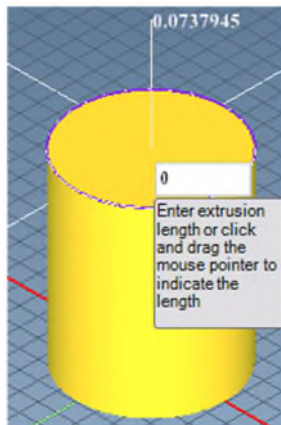


Figure 49: Drag to the desired extrusion length

## Fillet

This function allows you to modify the edges of a selected 3D object.

To fillet a 3D object:


1. Change the **Selection Mode** according to your requirements
2. Select the 3D object on which you want to perform the filleting operation
3. Click the **Fillet**  command
4. Specify the fillet **Radius** on the **Fillet** dialog box



Figure 50: Fillet

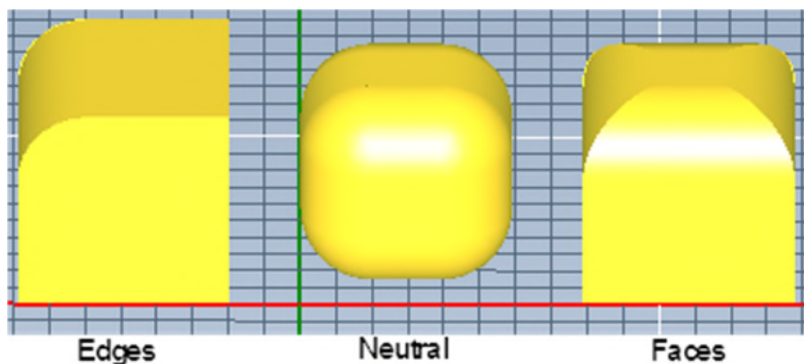


Figure 51: Fillets on different selection modes

The above figure shows how a **Box** with the dimensions of 12, 12, 12 will be modified according to its different selection modes when the **Fillet** command was used with a **Radius** of 5

**Note:** The **Fillet** function will not be applicable to the **Vertices** selection mode.

## Selection Mode

This command in the **Solid Operations** panel allows you to specify the selection mode.

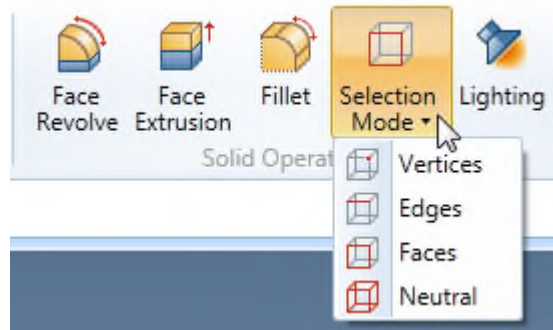


Figure 52: Selection Mode

**Note:** Neutral mode is the default selection mode which enables the selection of whole 3D shapes.

## Lighting

The **Lighting** command allows you to change the lighting effects of the 3D object on the 3D drawing canvas.

Click on the **Lighting**  button on the **View** panel of the **Home** tab. The following window will be displayed.

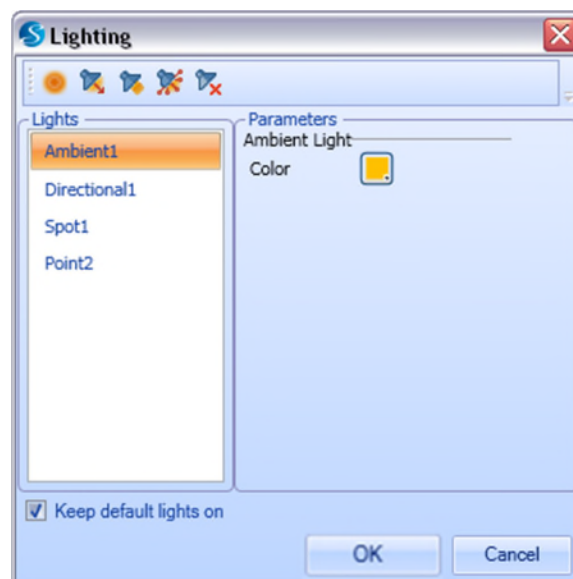


Figure 53: Lighting Window

## Ambient Light

**Ambient Light** ■ effect illuminates uniform light rays around the object from every direction.

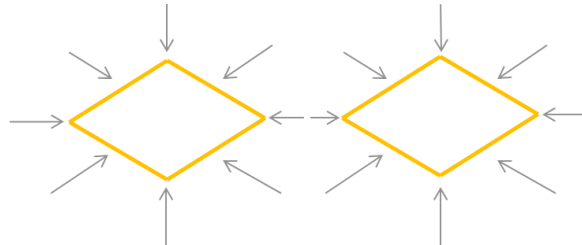


Figure 54: Illustration of Ambient Light

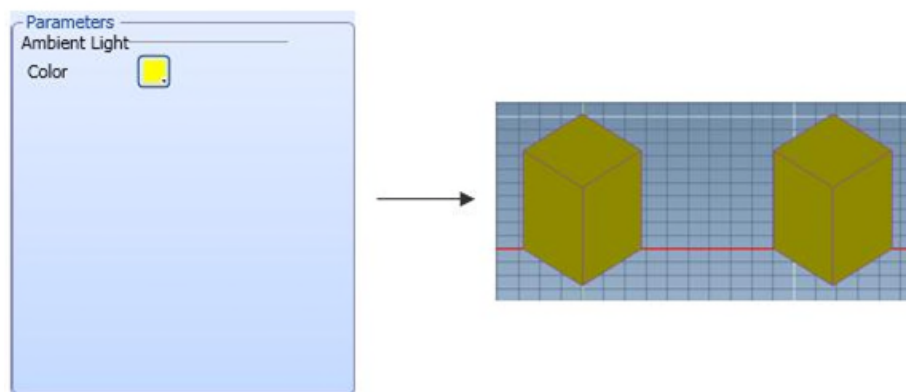


Figure 55: Ambient Light

**Note:** You can select any color of the light from the **Color** option in the **Parameters** Panel.

## Directional Light

**Directional Light** ■ emits light rays from a particular defined direction.

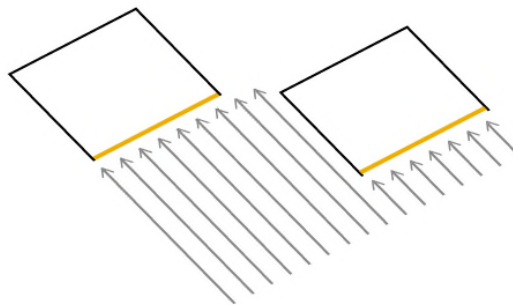


Figure 56: Illustration of Directional Light

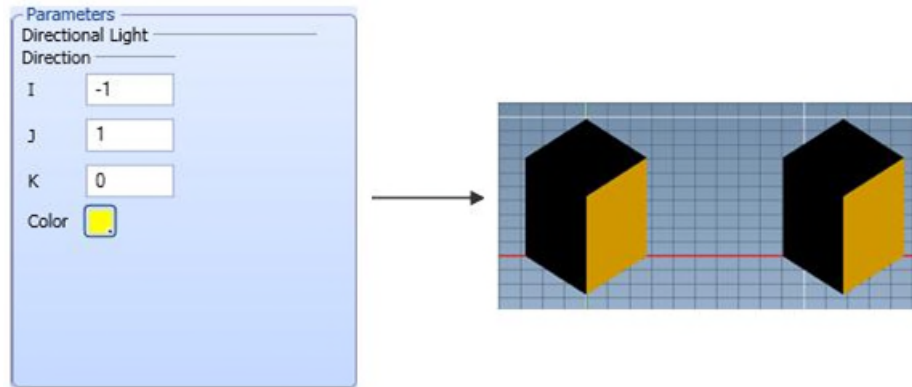


Figure 57: Directional Light

## Spot Light

The **Spot Light** effect spots the light ray on to a particular specified position on the canvas.

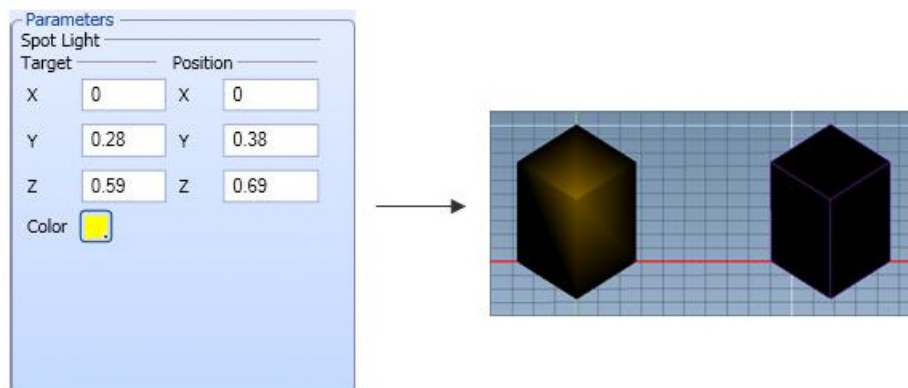



Figure 58: Spot Light

1. **Target** : Specifies the targeting position
2. **Position** : Specifies the position of the light

## Point Light

The **Point Light**  command enables you to spread light rays towards the drawing canvas from a specified position of the light.

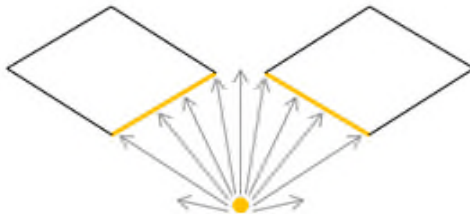


Figure 59: Illustration of Point Light

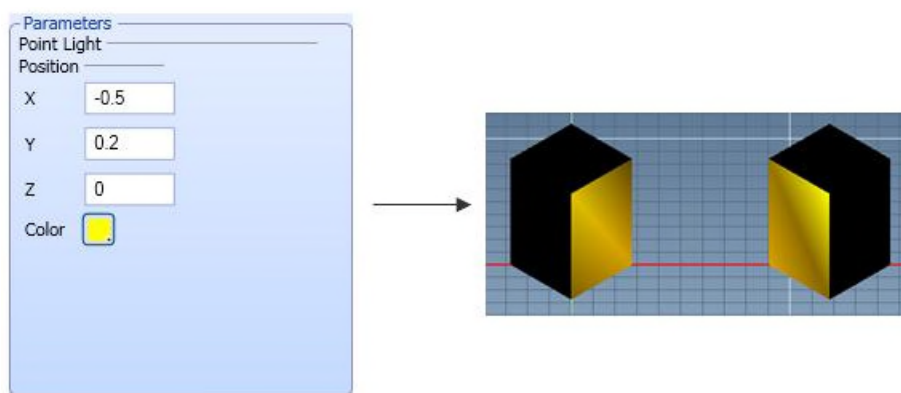



Figure 60: Point Light

## Deleting the Light Effects

To delete any inserted light effect on the drawing canvas:

1. Select the light effect you want to delete from the **Lighting** Window
2. Click on the **Delete Light**  button

**Note:** Select the Keep default light on check box on the bottom-left of the window to reset the light effects to the default settings.

Shapes in the ScanMaster™ Designer 2D user manual for more on editing 2D shapes

# 8

## 3D Process Preparation

The final step before you mark your 3D model is the preparation of the 3D process. This chapter guides you on the process of preparing the 3D model for your laser marking.

In this chapter:

- [Surface Marking Process](#)
- [Engraving Process](#)

## Surface Marking Process

After you have created the 2D and 3D models you can start working on your 3D marking process. The surface marking options in ScanMaster™ Designer software are designed to mark 2D models on a non-uniform 3D surface. This software enables you to project or wrap a 2D model on to the 3D model.

**Note:** Refer [Appendix A](#) for more details about the differences between the **Projection** and **Wrapping** features in 3D surface marking.

1. To start a surface marking process, select the 3D model from the **Project Explorer** which you want to process


2. Click on the **Surface Marking**  button on the Marking **Processes** panel of the **Project** tab



Figure 61: Surface Marking

3. You will find the new surface marking process element on the **Project Explorer** once you create a surface marking process

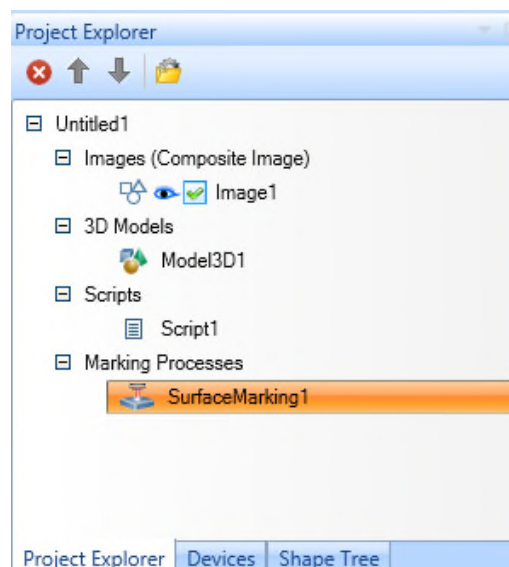


Figure 62: Surface Marking Process

4. If you click on the **Surface Marking** button before selecting the particular 3D model you will find the following **Properties** tab which will direct you to select the desired 3D model

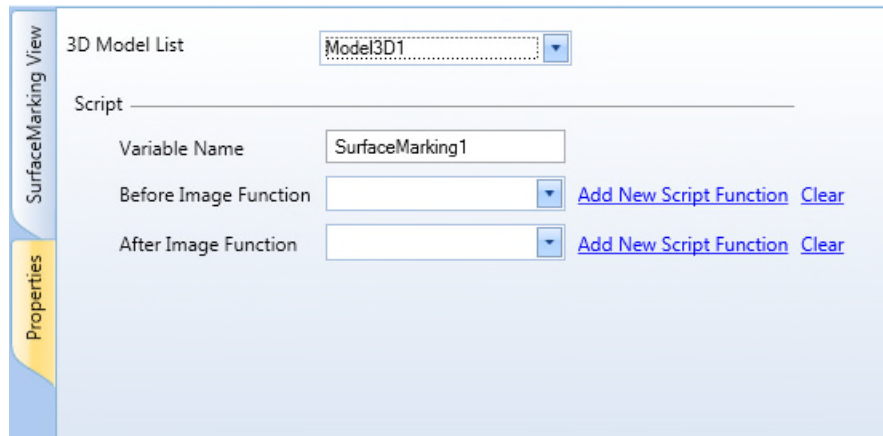


Figure 63: Surface Marking Properties tab

5. The **Properties** tab allows you to select the appropriate 3D model from the given **3D Model List**
6. Click on the **3D Model List** drop-down arrow to select the 3D model you want to process
7. Move to the **Model** tab to proceed. Then you will see the surface marking 3D model that you selected.

## Adding a 2D image

To add the 2D image to the 3D model on the surface marking process:

1. Click on the **Add 2D Image**  button on the **Surface Marking** panel of the **SurfaceMarking** tab



Figure 64: Add 2D Image button

2. You will find the following **Add 2D Image** dialog box

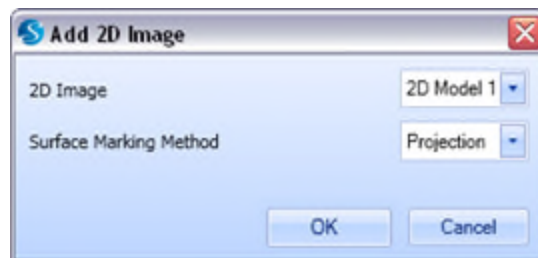


Figure 65: Add 2D Image

3. Select the appropriate 2D model from the **2D Image** drop-down list
4. Select the method you want to map the 2D model from the **Surface Marking Method** drop-down list
5. Select either **Projection** or **Wrapping** and click **OK** to confirm and proceed



## Generate 3D Surface Marking Model

### Placement of 2D Image

You can apply transformations to the 2D image before you do the marking to obtain the correct position and scaling of the 2D image. ScanMaster™ Designer software allows you to **Move**, **Scale** and **Rotate** the 2D model to adjust and fix it to the 3D model according to your requirements.


1. Click on the **Shape Tree** tab
2. Select the desired 2D model

You will be able to find the **Properties** panel in the right-bottom of the window

### Moving 2D Images

You can use the options in the **Move** section of the **Properties** panel to move the 2D image into the desired place.

The arrows as shown in the figure above, allow you to move the 2D image along the **X** and **Y** directions of the 2D image.

You can use the **Move 2D Image**  command to move the 2D. Click and drag the mouse on the 2D image. **Move 2D Image** command functions only before you apply the 2D image to your 3D model.

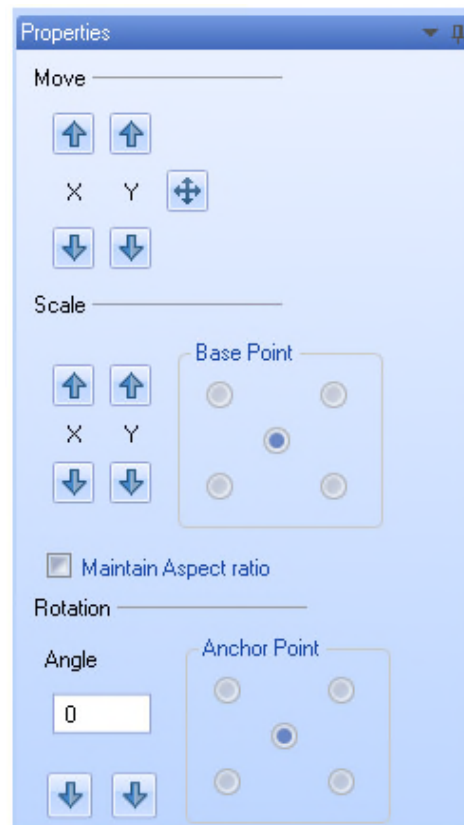


Figure 66: Properties of 2D Image

**Note:** The amount of units in which the 2D image moves at each click of the arrows will be as configured in the **Moving Step** option in the [Miscellaneous 3D](#) page of the **Application Preferences** wizard.

### Scaling 2D Images

You can use the options in the **Scale** section of the **Properties** panel to scale the 2D image according to your requirements.

The arrows shown in the figure of the **Properties** tab in the previous page allow you to scale the 2D image along the **X** and **Y** directions of the 2D image.

The options in the **Base Point** panel allow you to select a desired base point. The selected base point will be kept fixed while you scale the 2D image.

Check the **Maintain Aspect Ratio** option to keep the **X** and **Y** scale factors both similar.

**Note:** the amount of units in which the 2D image scales at each click of the arrows will be as configured in the **Scaling Percentage** option in the [Miscellaneous 3D](#) page of the **Application Preferences** wizard.

## Rotating 2D Images

You can use the options in the **Rotation** section of the **Properties** panel to rotate the 2D image to the desired angle.

Specify the angle to be rotated on the **Angle** text box and select the desired anchor point from the **Anchor Point** panel. The object will be rotated around the selected anchor point.

You can use the **Rotate clockwise** and **Rotate Anticlockwise** buttons to rotate to the 2D image in the desired direction.

## Viewing Surface Marking Objects

ScanMaster™ Designer software provides you various viewing options of the surface marking objects.

You can find these options in the **View** panel of the **SurfaceMarking** tab.

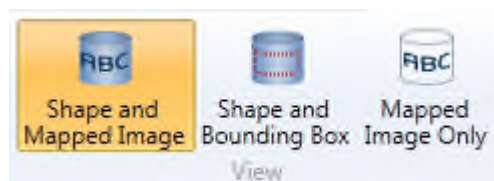



Figure 67: Viewing Surface Marking Objects

### Shape and Mapped Image

The **Shape and Mapped Image**  function allows you to view the 3D model and the mapped 2D image both on the drawing canvas.

You will find this viewing option by default in a surface marking process.

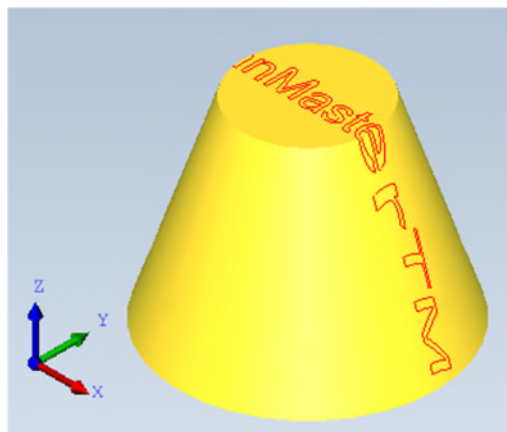



Figure 68: Shape and Mapped Image

## Bounding Box and Shape

The **Bounding Box and Shape**  function allows you to view the bounding box of the mapped 2D image along with the 3D model.

This feature efficiently adjusts a 2D image especially when you handle complex models.

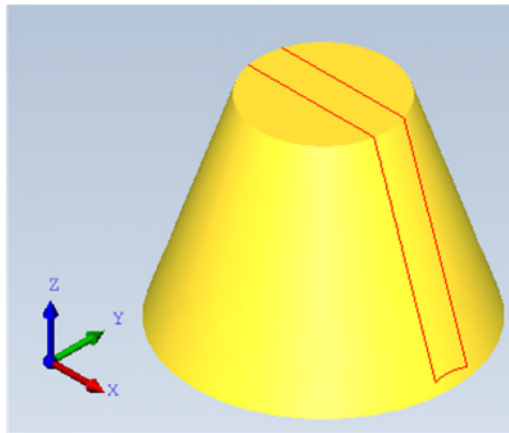



Figure 69: Bounding Box and Shape

## Mapped Image Only

The **Mapped Image Only**  function allows you to view only the mapped image on the drawing canvas.

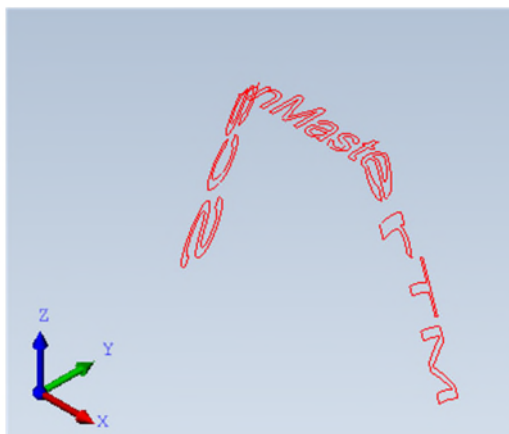



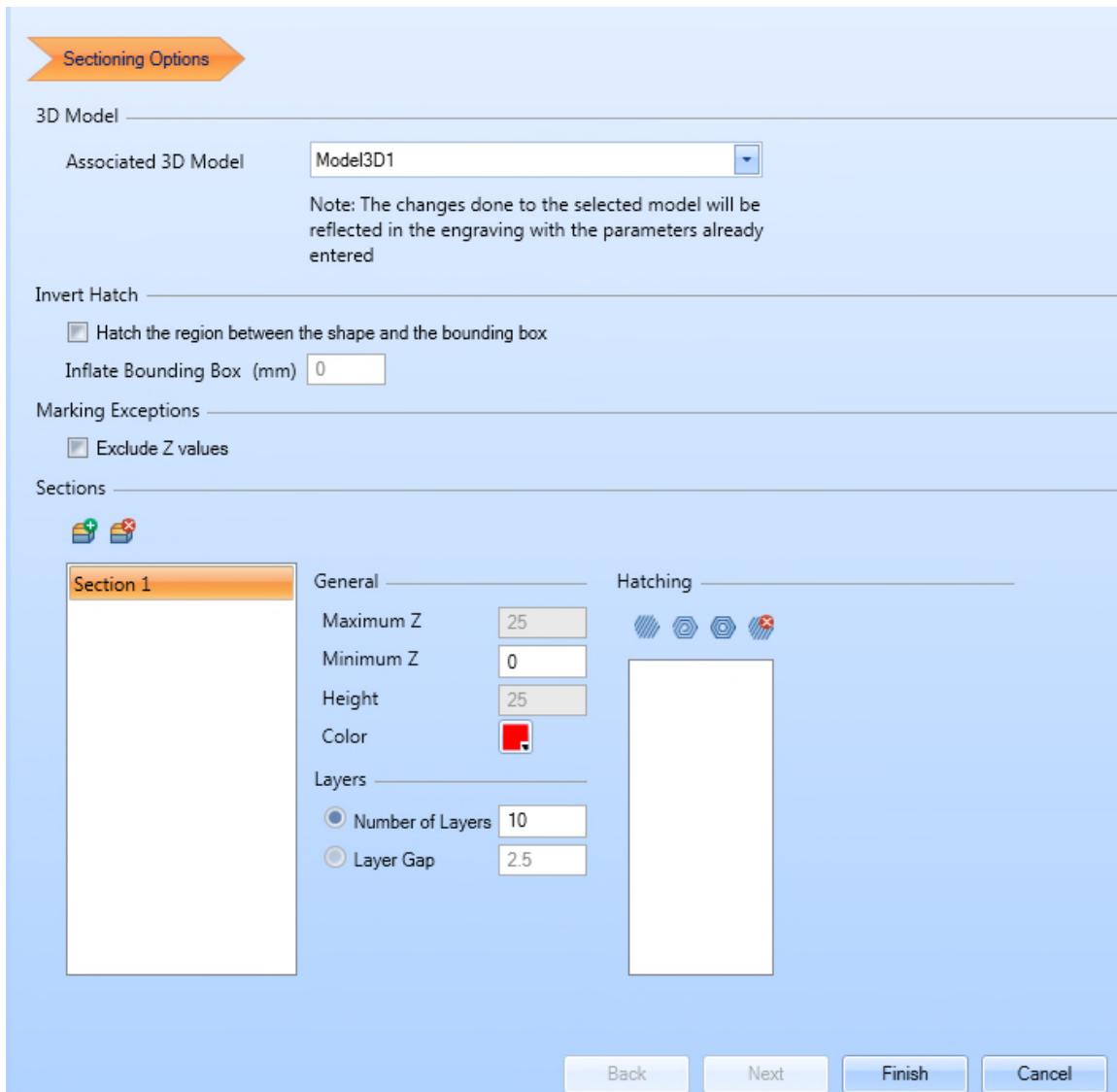
Figure 70: Mapped Image Only

## Engraving Process

Engraving is the process of implementing any desired 3D model by removing material from a 3D object. The process of engraving in ScanMaster™ Designer software enables you to do a laser engraving project.

### Create an Engraving Process

1. To create an engraving, click the **Engraving**  command on the Marking **Processes** panel of the **Project** tab



The dialog box is titled "Sectioning Options" and is divided into several sections:

- 3D Model**: A dropdown menu labeled "Associated 3D Model" with "Model3D1" selected. A note below states: "Note: The changes done to the selected model will be reflected in the engraving with the parameters already entered".
- Invert Hatch**: A checkbox labeled "Hatch the region between the shape and the bounding box" is unchecked. Below it is a text field for "Inflate Bounding Box (mm)" with the value "0".
- Marking Exceptions**: A checkbox labeled "Exclude Z values" is unchecked.
- Sections**: A list box on the left shows "Section 1". To its right are two columns of settings:
  - General**:
    - Maximum Z: 25
    - Minimum Z: 0
    - Height: 25
    - Color: A red square color picker.
  - Layers**:
    - Number of Layers: 10 (selected with a radio button)
    - Layer Gap: 2.5
  - Hatching**: A column with four hatching style icons (diagonal lines, cross-hatch, etc.) and a large empty rectangular preview area.

At the bottom of the dialog are four buttons: "Back", "Next", "Finish", and "Cancel".

Figure 71: Add Engraving Model Wizard

2. Click the **3D Model List** drop-down arrow to select the 3D model that you want to perform the engraving
3. Specify the settings of the sections and hatching styles of the engraving process.

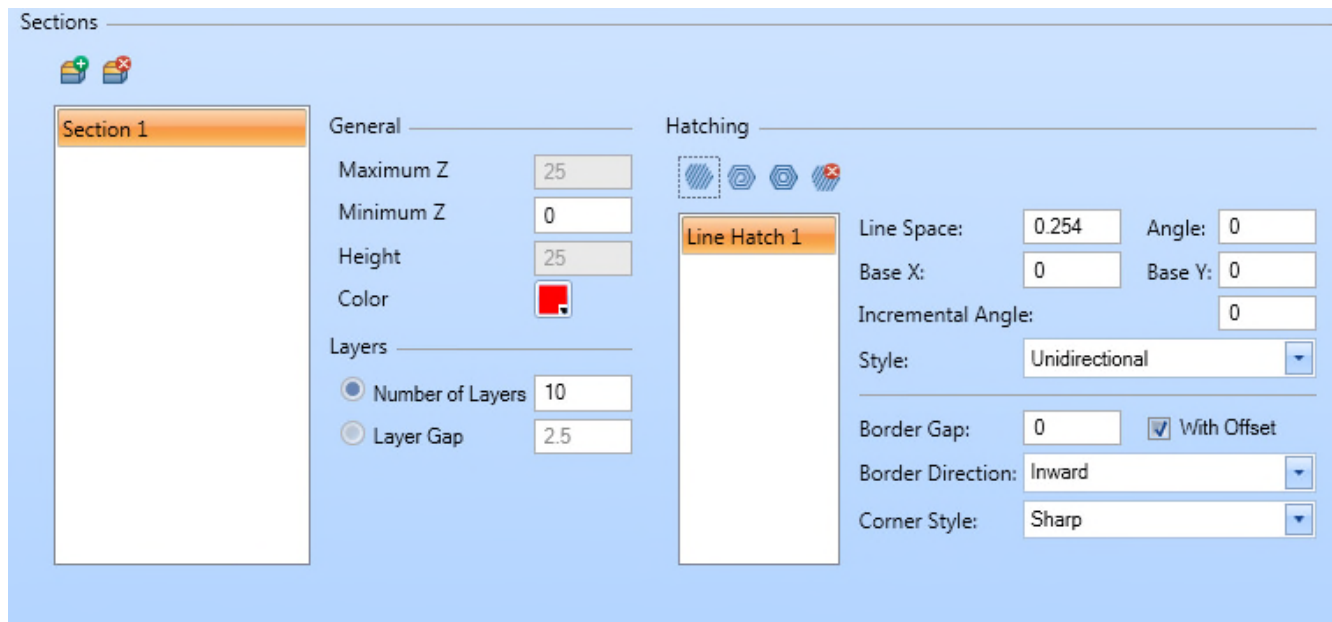


Figure 72: Sectioning Options

The **Sections** refers to a collection of layers in the engraving 3D model. Initially the 3D model is in a single section. You can split the 3D model into different sections if required. Dividing the 3D model into different sections is useful when there are variations in the properties of the materials, across the cross-section of the 3D model.



The number of layers in a section affects the quality of the output. The number of layers in a section depends on the materials. The harder the material, higher the number of layers should be.

You can specify the properties of the section(s) from the **Sectioning options** wizard.

To add a new **Section**:

1. Click on the **Add Section**  button on the **Sections** panel

To change the properties of the **Section**:

1. Specify the **Minimum Z** value of the section. The **Minimum Z** and **Maximum Z** values define the total **Z** range of the section by specifying the top-most and bottom-most values
2. Select either **Number of Layers** or **Layer gap** to specify the number of layers in which the engraving will be processed
3. Select a color for different sections so that you can identify the difference of the applied sections
4. Click the **Delete Section**  button to delete any sections from the process
5. Add a hatching style from the given **Hatch** styles in the **Hatching** panel
6. Specify the properties of the **Hatching** styles
7. Click the **Delete Hatch**  button to delete a **Hatch**
8. Click **Finish**

**Note:** Refer the ScanMaster™ Designer 2D user manual Hatch Operations in Chapter 8 Shape Operations, for more details on specifying the **Hatching** Styles.

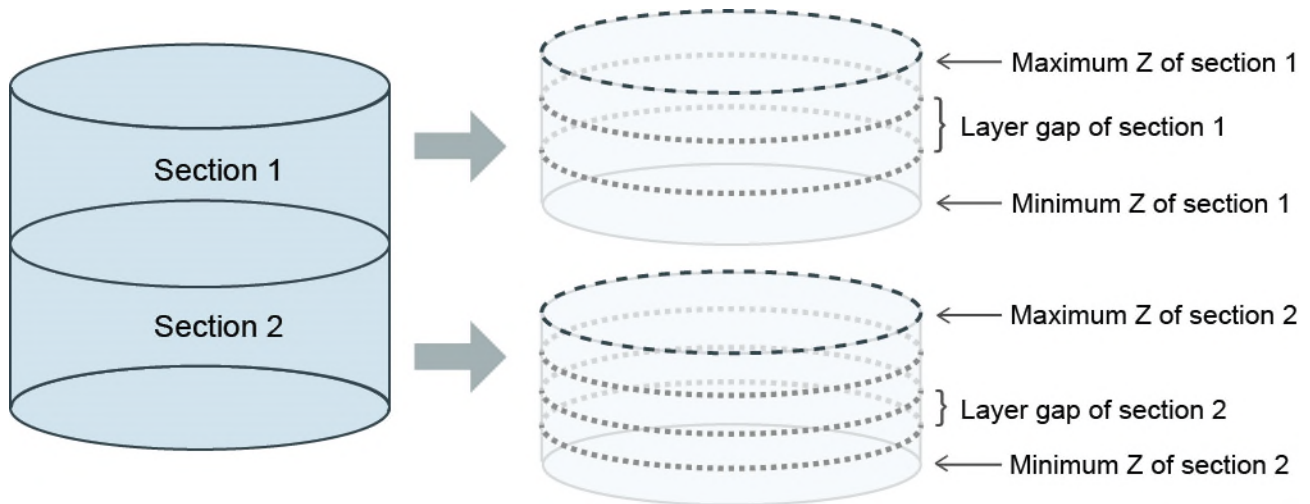


Figure 73: Sections and Layers of Engraving

## Modify an Engraving

From the **Properties** tab engraving properties can be changed even after creating the Engraving process. The changes made through the properties tab will be added while navigating back to **Engraving View**.

**Invert Hatch**

☐ Hatch the region between the shape and the bounding box

Inflate Bounding Box (mm)

**Marking Exceptions**

☐ Exclude Z values

**Script**

Variable Name

Before Layer Function  [Add New Script Function](#) [Clear](#)

After Layer Function  [Add New Script Function](#) [Clear](#)

**Sections**

**Section 1**

**General**

Maximum Z

Minimum Z

Height

Color

**Layers**

☒ Number of Layers

☐ Layer Gap

**Hatching**

**Line Hatch 1**

Line Space:  Angle:

Base X:  Base Y:

Incremental Angle:

Style:

Border Gap:  ☒ With Offset

Border Direction:

Corner Style:

Note: The changes will be applied after navigating back to Engraving View tab

**Figure 74 : Engraving Properties**

## Modify a Section

You can also change the properties of the hatching styles and the colors of the sections.

1. Select the section(s) from the **Engraved Layers** tab

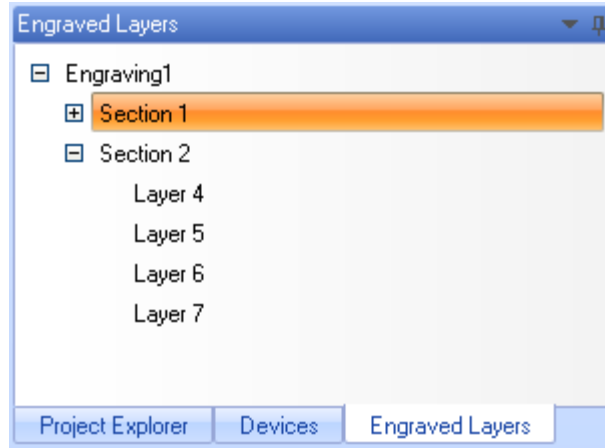


Figure 75: Engraving Process Tree

2. Edit the properties of the section from the options in the **Properties** panel below the **Engraved Layers**

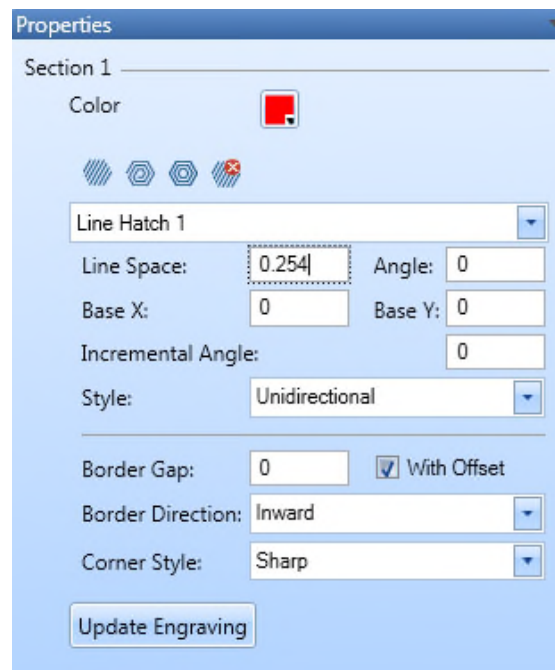




Figure 76: Section Properties

3. Click on the **Update Engraving** button to confirm the changes.


## Viewing Engraved Objects

The options in the **Viewing Engraved Objects** panel of the **Processed Model** tab are featured in a way that enables you to view the engraved objects in three different styles.

The **Boundary Only**  function allows you to view only the boundary of the engraving sections

The **Hatch Only**  function allows you to view only the hatch applied to the 3D shape.



The **Boundary and Hatch**  function allows you to view both the boundary and the hatch of the 3D shape which is to be engraved.

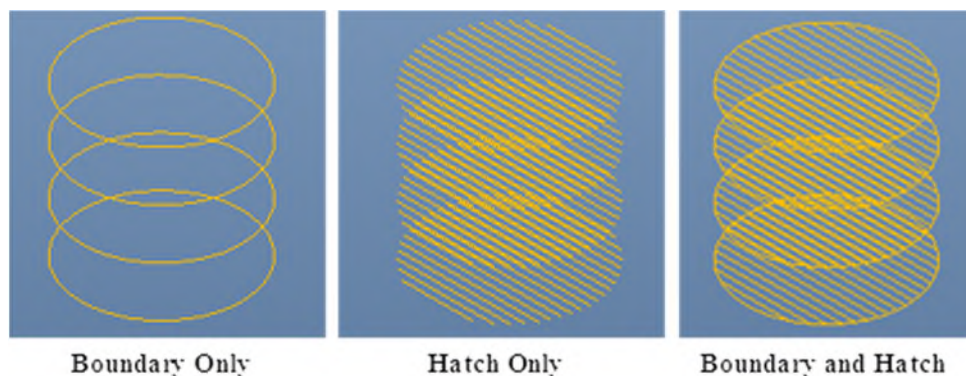




Figure 77: Viewing Engraved Objects

## Engraving Simulations

After you have specified the sections of your engraving process you can preview the engraving process using the options in the **Engraving Simulations** panel of the **Processed Model** tab.



Figure 78: Engraving Simulations

1. Select the desired section(s) from the **Engraved Layers** tab.
2. Click on the **Start**  button to see the order of the engraving process
3. Click the **Stop**  to stop the simulation

The simulation will depend on your selection of the section(s) from the **Engraved layers** tab.

If you want to preview the whole 3D model engraving process select the engraving process from the **Engraved Layers** tab, or select the desired section only to view the simulation of that particular section only.

## Sample Surface Marking

In this section you will be provided an example considering a simple scenario in 3D surface marking process.

Scenario: Create a model of a pipe, project and wrap a text ScanMaster to the internal surface of the pipe.


To try this sample you need to :

1. [Start ScanMaster™ Designer](#)
2. [Create the 3D Model](#)
3. [Modify the 3D Model](#)
4. [Transform the 3D Model](#)
5. [Create the 2D Model](#)
6. [Change the Viewing Orientation](#)
7. [Process](#)
8. [Edit the 2D Model](#)

### Starting ScanMaster™ Designer

1. Click **Start | Programs | CTI | ScanMaster™ Designer**
2. Click **New | New 3D Project**

### Create the 3D model

1. To insert a cylinder shape to the drawing canvas click on the **Cylinder**  command on the **Basic** panel of the **Home** tab.
2. Specify the **Radius** and **Height** of the **Cylinder**
3. Click **OK**

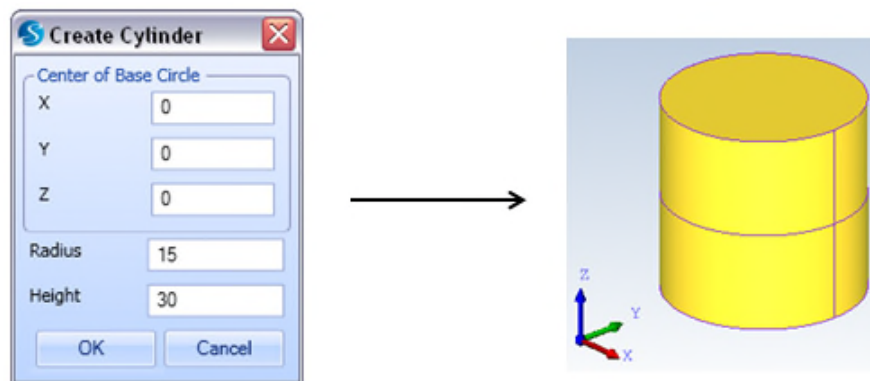



Figure 79: Cylinder on the canvas

4. To insert a box shape click on the **Box**  command on the **Basic** panel of the **Home** tab
5. Specify the **Base Point**, **Width**, **Height** and **Length** of the **Box**
6. Click **OK**

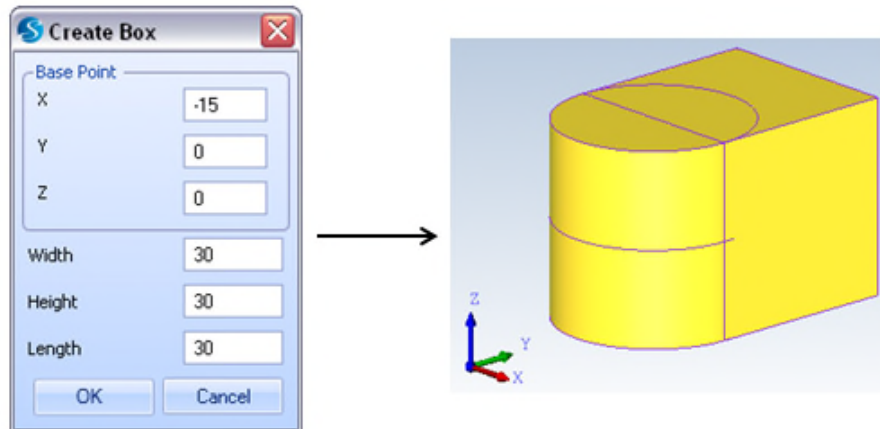


Figure 80: Box shape on the canvas

## Modify the 3D model

1. Select both the shapes

**Note:** Select the **Cylinder** shape initially and then select the **Box shape** as you are about to cut the **Cylinder** using the **Box** shape.

2. Click **Cut**  from the **Boolean Operations** panel of the **Modeling** tab

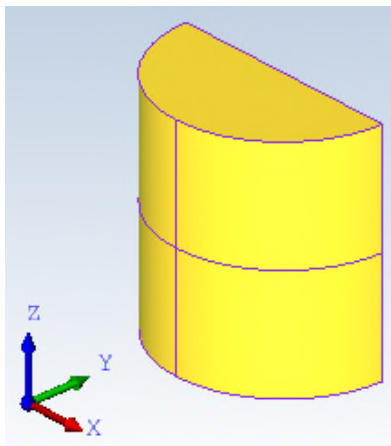



Figure 81: Edited Cylinder

3. Insert another **Cylinder**  shape
4. Specify the **Radius** and **Height** of the **Cylinder**
5. Click **OK**

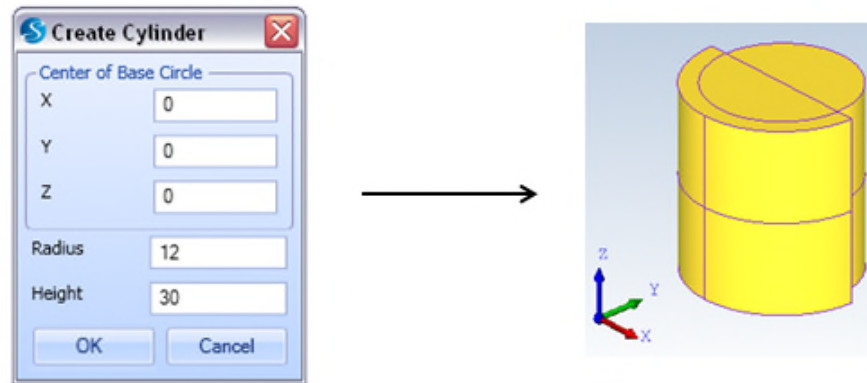


Figure 82: the Two Cylinders

6. Select both shapes

7. Click **Cut**  from the **Boolean Operations** panel of the **Modeling** tab

The result will be as shown in the figure below.

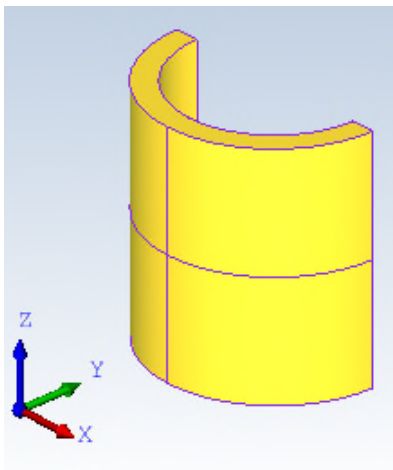


Figure 83: The edited Cylinder

## Transform the 3D Model

### Rotate

1. Select the 3D model
2. Click on the **Rotate** option in the **Transformations** panel of the **Modeling** tab
3. Specify the **Standard Axis** and the **Angle** to be rotated

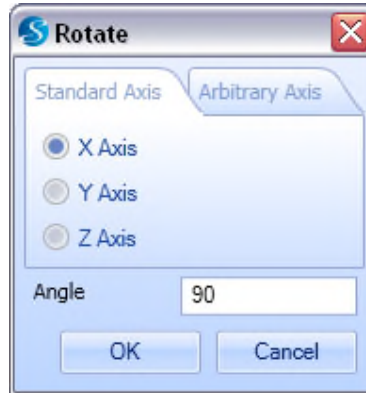



Figure 84: Rotating Parameters

## Move to Origin

1. Click the **Move To Origin**  button in the **Transformations**
2. Select the **Center of Bottom**  option from the list

## Create the 2D Image

1. Click the 2D image that is already added to the project by default
2. Click the **Insert Text**  button

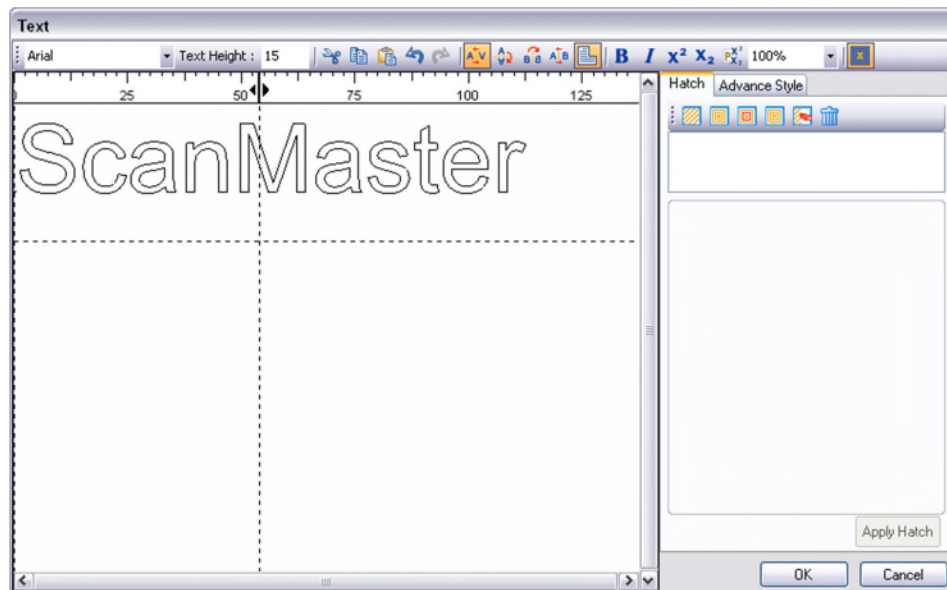


Figure 85: Text Editor



3. Specify the **Text Height** and press **Enter**
4. Type "ScanMaster" as the text
5. Click **OK**



Figure 86: 2D Image

## Change the Viewing Orientation

Before you start the process change the viewing orientation to **Top** in order to make your work much easier.

1. Click **View Orientation**  button on the **View** panel
2. Select **Top**  from the **View Orientation** list

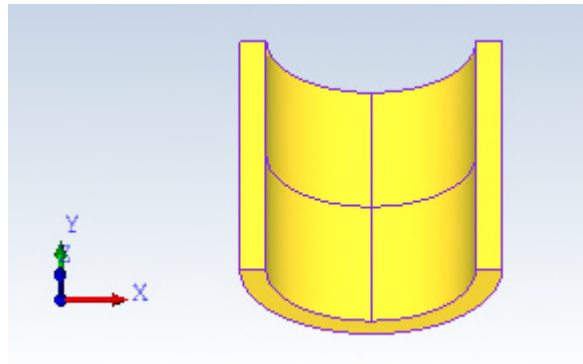




Figure 87: Top Orientation

## Process

To do a **Projection**:

1. Click the **Surface Marking**  button from the **Processes** panel of the **Home** tab
2. Select the **Surface Marking1** process from the **Project Explorer** tab
3. Click the **Add 2D Image**  button on the **Surface Marking** panel of the **Processed Model** tab

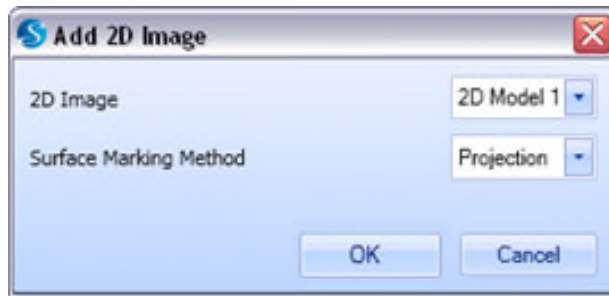



Figure 88: Add 2D Image

4. Select the **2D Model 1**
5. Select **Projection** from the **Surface Marking Method** drop-down menu
6. Click **OK**

## Edit the 2D Image

1. Select the **Shape Tree** tab
2. Select the **2D Model 1**
3. Select the **Properties** tab of the **Shape Tree**
4. Check the **Maintain Aspect Ratio** check box
5. **Scale** down the 2D image across the **X** axis to adjust according to the 3D model
6. Click on the **Apply**  button to project the 2D image to the 3D model

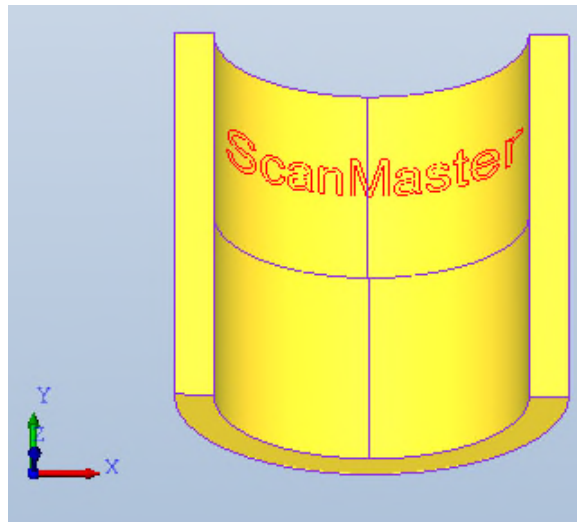



Figure 89: Apply Projection

To do a **Wrapping**:

1. Click **Add 2D Image**  button on the **Surface Marking** panel of the **Processed Model** tab
2. Select the **2D Model 1**
3. Select **Wrapping** from the **Surface Marking Method** drop-down menu
4. Select the desired face of the 3D model where you need to wrap the 2D image

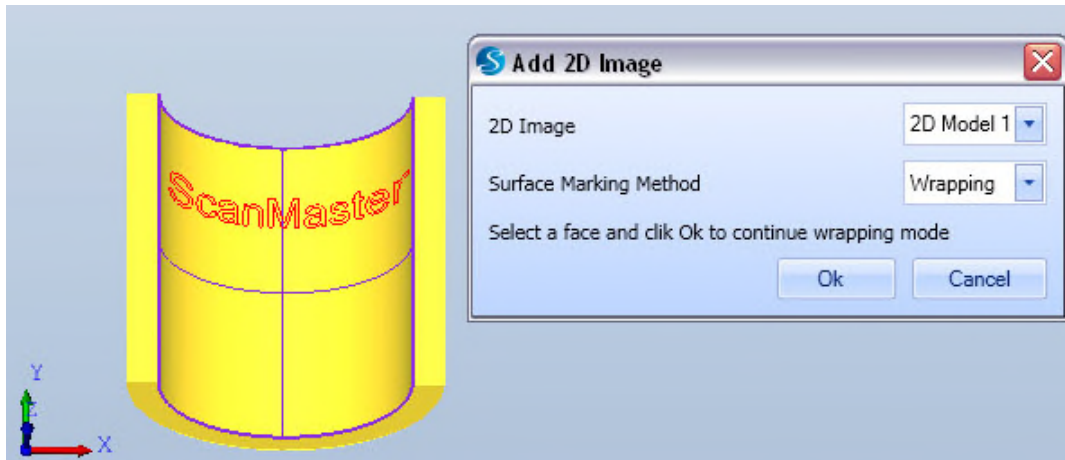



Figure 90: Select the Desired Face

5. Click **Ok**.
6. Adjust using the **Scale** and **Move** functions in the **Properties** panel
7. Click **Apply**  button to wrap the 2D image to the 3D model

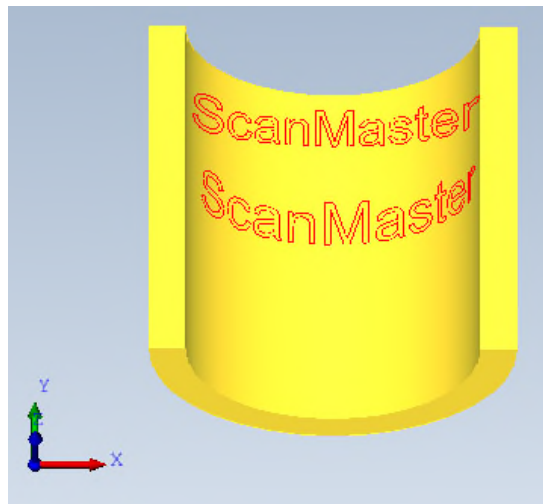


Figure 91: Projection and Wrapping



## Sample Engraving

In this section you will find a sample engraving process performed using ScanMaster™ Designer software. The expected output of this sample scenario is to create a physical logo using a work piece of two metals including aluminum and brass.



**Figure 92: Predesigned Engraving Model**

Assume that you have a cylindrical work piece with a combination of two metal layers as aluminum and brass. To create this physical logo you need to remove the unnecessary sections by engraving.

For you to get this output you have to create an appropriate mold that tells the system which parts to be engraved and which parts are not to be engraved. The mold should consist only the sections that needs to be engraved. A predesigned 3D model which looks exactly as the actual output will be required to extract some sections from the mold which are not supposed to be engraved.

The ultimate result of this process should remain a “S” shape on the aluminum layers and make two screw holes in the brass layer.

Refer the following sections to check how this sample engraving can be performed using ScanMaster Designer 3D Extension.

To try this sample you need to:

1. [Open ScanMaster™ Designer 3D project](#)
2. [Create the mold](#)
3. [Modify the model](#)
4. [Prepare the engraving process](#)

5. [Check the engraving simulation](#)

## Open ScanMaster™ Designer 3D Project

1. Click **Start | Programs | CTI | ScanMaster™ Designer**
2. Click **New**

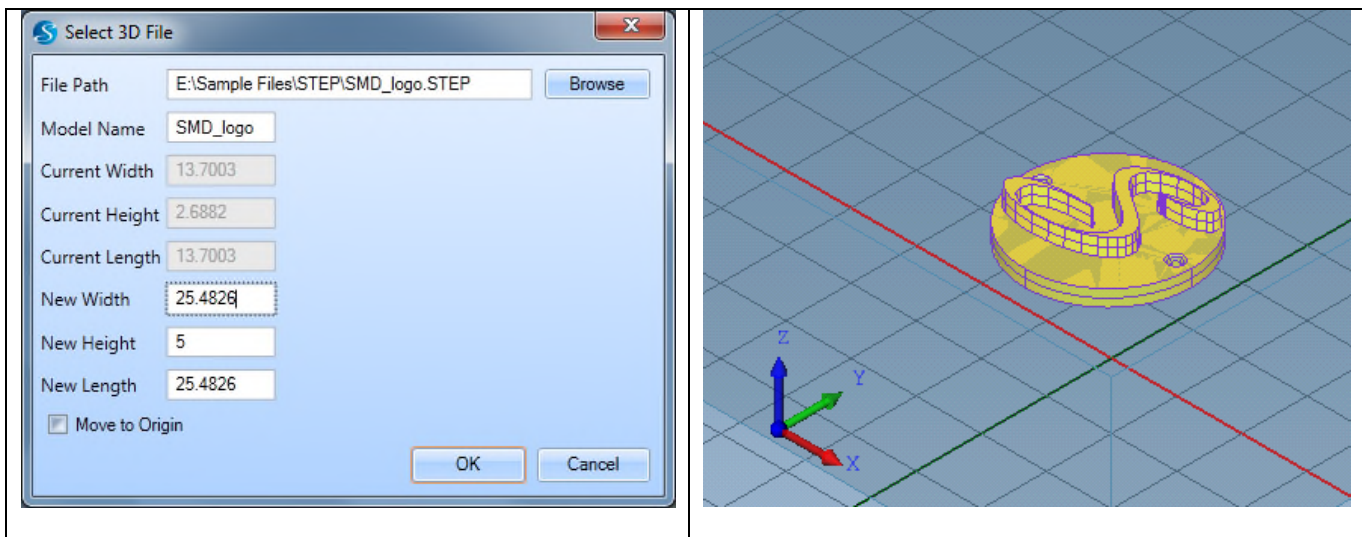
**Note:** Check the [Before You Begin](#) section of this document to revise the facts that you should keep in mind when handling a 3D project using ScanMaster™ Designer.

## Create the Mold


The aim of creating this mold is to extract an appropriate virtual model that allows you to engrave the desired structure on the original material.

Import the predesigned 3D model:

1. Go to **Project** Ribbon tab.
2. Select 3D model  button from the import  drop down button.
3. Click the **Move to Origin | Center of Bottom** option of the transformations panel if required.



To insert a cylinder:

1. Insert a **Cylinder**  from the **Basic** panel of the **Home** tab.
2. Define the **Radius** and **Height** as 12.6 and 5

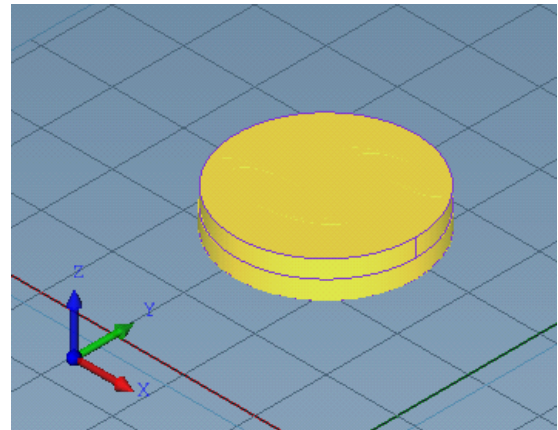
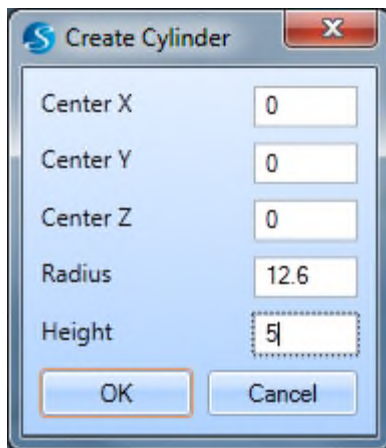



Figure 93: Inserted Cylinder

## Modify the Mold

Make sure that you have moved both the models to the origin of the drawing canvas.

**Note:** The cylinder shape is inserted to the origin of the drawing canvas by default and the imported model should be moved to the origin. Both models will be placed in the same position of the canvas in order to perform the **Boolean Operation**.

1. Select the two models. First select the **Cylinder** and then the imported 3D model.
2. Click **Cut**  command in the **Boolean Operations** panel of the **Modeling** tab.

The figure below shows the mold that was created.

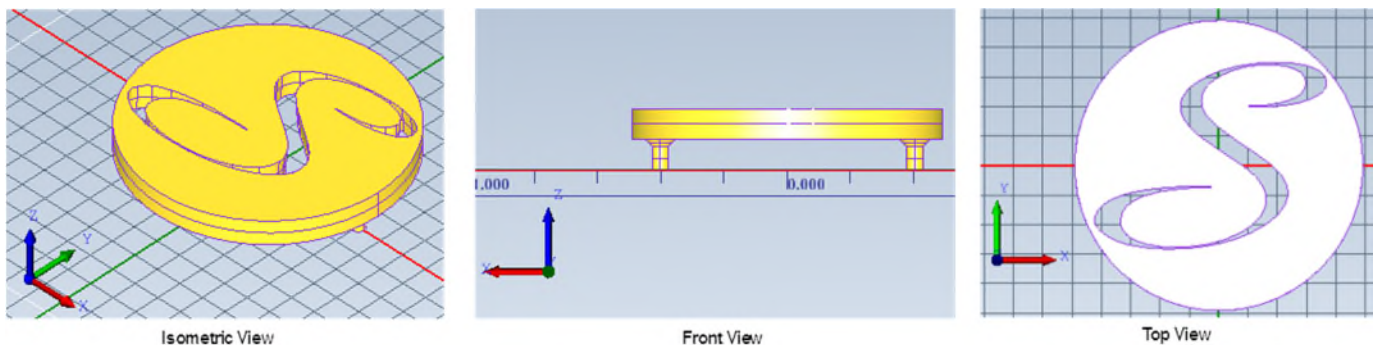

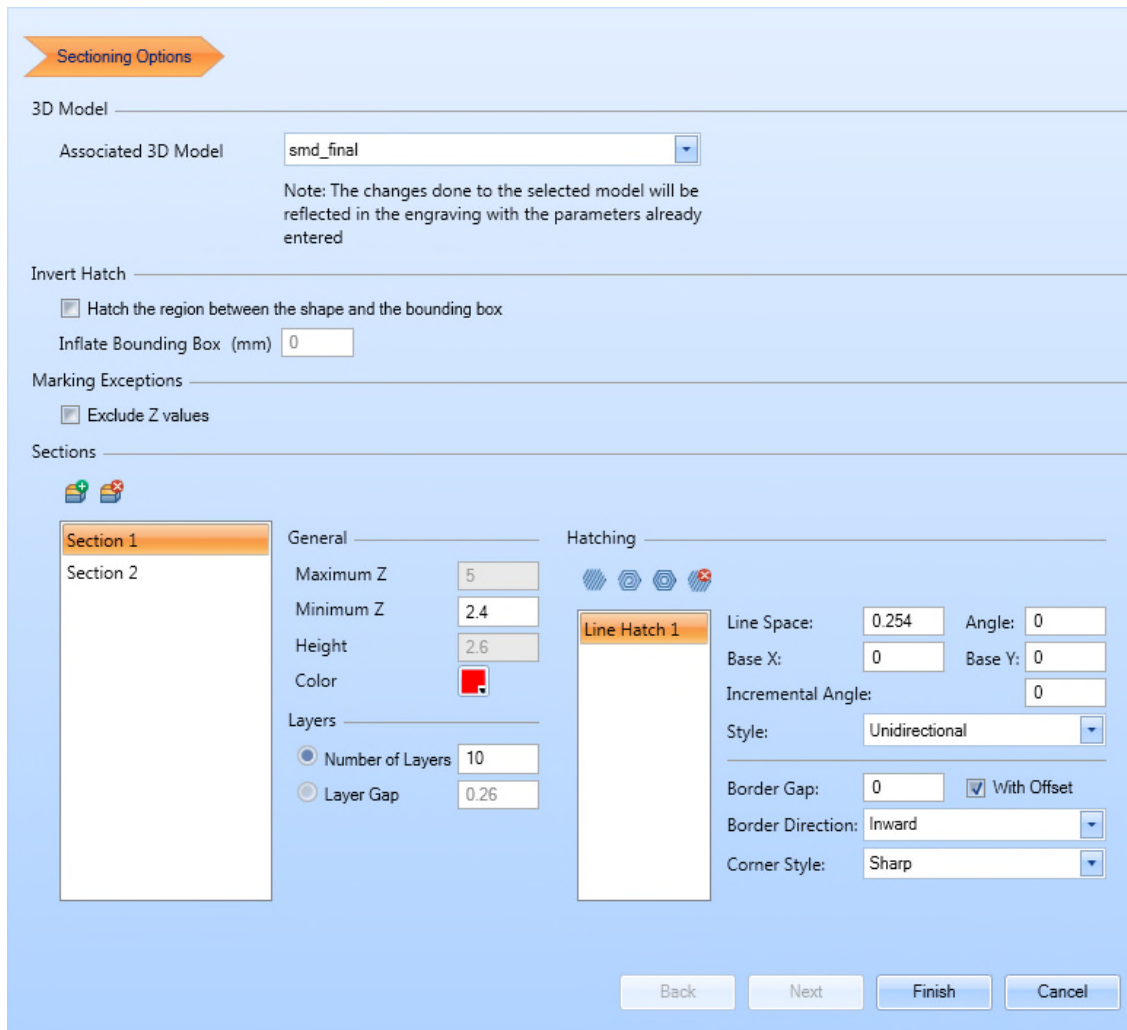


Figure 94: Modified image in different View orientations

## Prepare for the Engraving Process

The next step in this scenario is to prepare the model for the engraving process.

1. Click the **Engraving**  command on the Marking **Processes** panel of the **Project** tab



**Sectioning Options**

3D Model

Associated 3D Model:

Note: The changes done to the selected model will be reflected in the engraving with the parameters already entered

Invert Hatch

☐ Hatch the region between the shape and the bounding box

Inflate Bounding Box (mm):

Marking Exceptions

☐ Exclude Z values

Sections

Section 1

Section 2

General

Maximum Z:

Minimum Z:

Height:

Color:

Layers

☒ Number of Layers:

☐ Layer Gap:

Hatching

Line Hatch 1

Line Space:  Angle:

Base X:  Base Y:

Incremental Angle:

Style:

Border Gap:  ☒ With Offset

Border Direction:

Corner Style:

Back Next Finish Cancel

Figure 95: Specifications of Section 1

- Specify the **Minimum Z** of **Section 1** as 2.4.

**Note:** The height of the sections depends on the heights of the two materials. Measure the height of the original materials and specify the heights of the sections respectively.

- Define appropriate number of layers to each section depending on the materials of the sections.
- Insert a desired type of hatch for both of the sections from the given hatching styles
- Click **Finish**

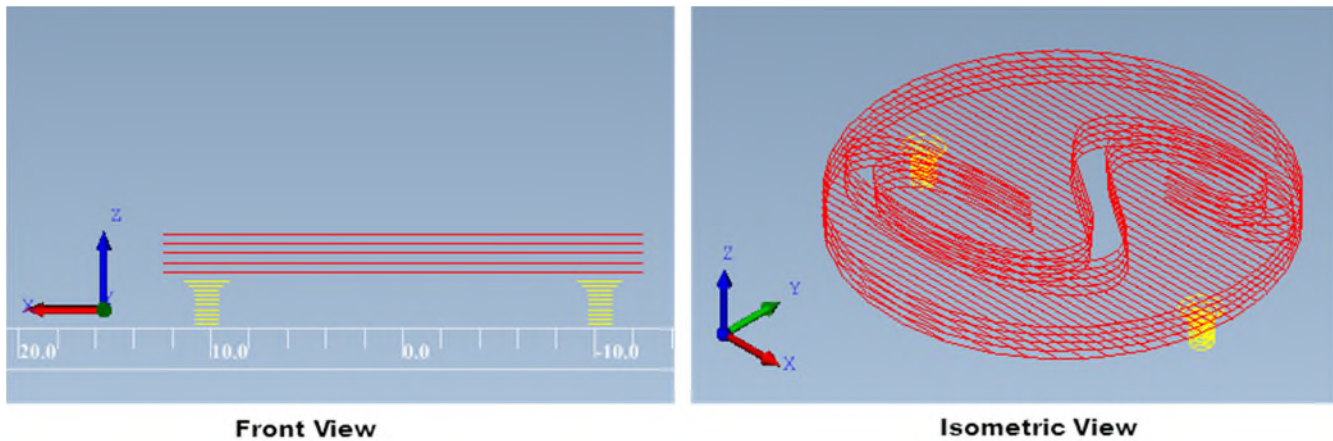




Figure 96: Engraving layers and Sections of the 3D Model

## Check the Engraving Simulation

After you specified the parameters for your engraving process you can use the **Engraving Simulation** commands to view the simulation and make adjustments if needed.

- Click **Start**  command of the **Processed Model | Engraving Simulation** panel to view the engraving simulation
- Click **Stop**  command to stop the simulation

## Appendix A

### Surface Marking

Surface marking is one of the available 3D scanning processes. **Surface Marking** in 3D scanning projects refers to mapping a 2D image to a 3D surface there by obtaining a quality 3D marking. ScanMaster™ Designer provides you features that enable you to do surface markings in two different styles.

1. Projection
2. Wrapping

Multiple 2D images can be projected or wrapped to a 3D model in different viewpoints according to the users requirements.

### Projection

Projection is used to project a 2D image to a 3D surface. Projection in 3D surface marking refers to mapping a 2D image to a 3D surface in a way that the resulting 3D image will be undistorted when viewing in the direction of the projection. If you view the projected image in a different direction you will see that the edges of the image have extended beyond the border or line.

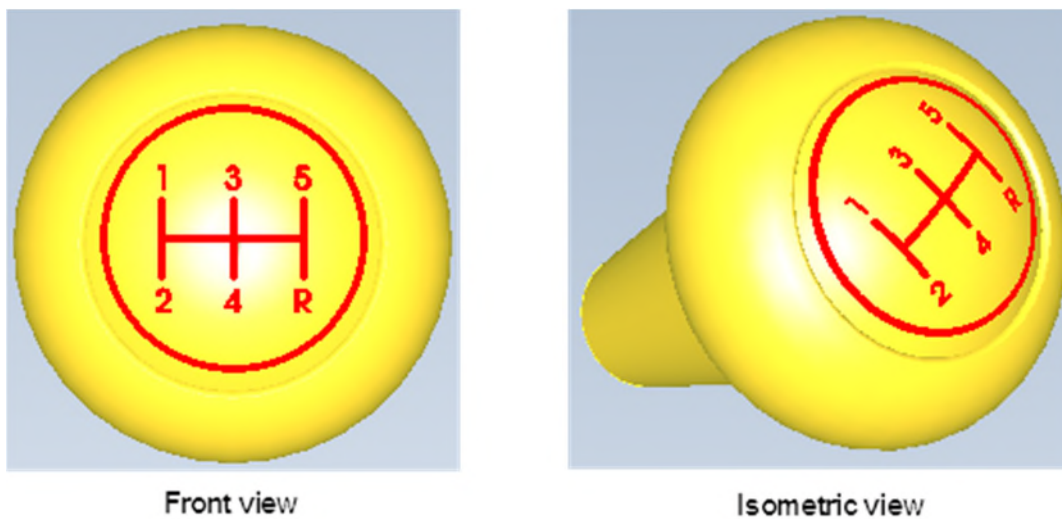


Figure 97: Projection



## Wrapping

This technology is used to wrap a 2D image to a 3D surface. Wrapping in 3D surface marking refers to mapping a 2D image in a way that the resulting image will have the minimum distortion locally when viewed in any direction.



Figure 98: Wrapping

## Appendix B

### Specifying the Axes

Most of the functions in ScanMaster™ Designer allow you to select the **Standard Axis** or the **Arbitrary Axis**. This section will help you to understand the difference between the standard axes and the arbitrary axes.

#### Standard Axis

The standard axes are defined by the **X**, **Y** and **Z** values as you see in the figure below. These axes refer to the normal axes to define the position on the drawing canvas.

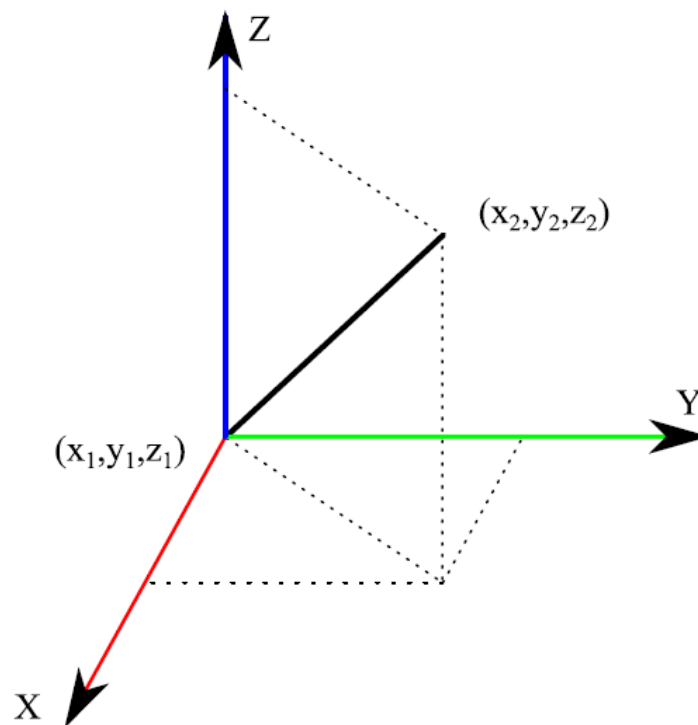


Figure 99: Standard Axes



## Arbitrary Axis

To define the **Arbitrary Axis** you can specify in two ways. You specify either the **Point and Vector** or the **Two Points**.

**Point and Vector** can be used in situations where you want to specify a position and the vector or the direction from that point onwards

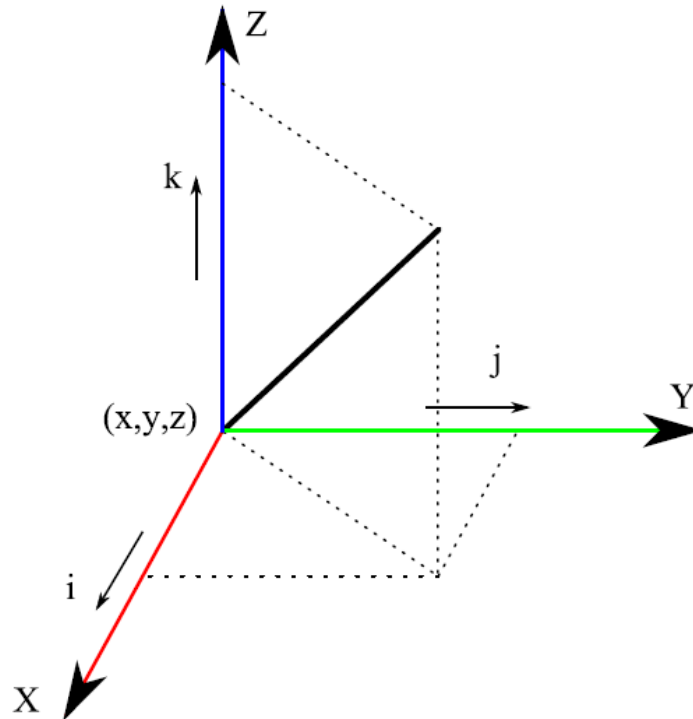


Figure 100: Arbitrary Axes – Point and Vector

**Two Points** can be used in situations where you want to specify two points to define a direction across the defined two points which includes the starting points and the end points on the drawing canvas.

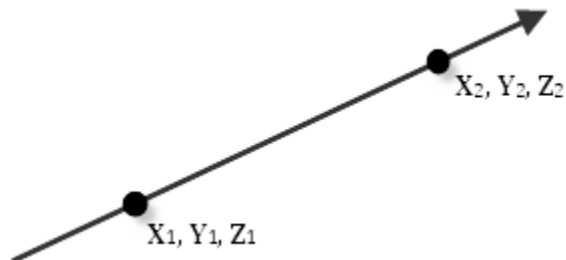


Figure 101: Arbitrary Axes - Two Points

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