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# Active3D™

## 3D Electronic Part Modeler and Database

### User Guide



**[www.kov.com](http://www.kov.com)**

*The philosophy behind Kovac Software's vision is the desire to provide a suite of software tools to enable today's engineers to develop world-class electronic solutions to today's problems; and have fun doing it!*

- Ilija Kovacevic

Architect and developer of AutoTRAX

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## **Patent Information**

This software contains designs that are patent pending.

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## Introduction

Welcome and congratulations on choosing Active3D, a modeler design exclusively to work with AutoTRAX, a leading Electronic Design Automation (EDA) tool designed to help you produce world-class electronic designs that you will be proud of and also enjoy designing! We are confident that it will deliver many years of increased productivity, superior designs and above all, enjoyment.

Great emphasis was placed on ease of use and your productivity during the design of Active3D. This ensures that Active3D utilizes the full power of your computer and puts it to work for you, not you working for the computer. You want to easily and quickly express your designs and test their working. You do not want to fight with the computer.

AutoTRAX is a Microsoft Windows based program suite designed to enable both the professional electronic engineer and the causal/hobbyist electronic engineer to rapidly develop:

## Installation

Active3D is distributed either on a CDROM or as a downloadable executable (.exe) file from [www.kov.com](http://www.kov.com).

Active3D requires that your video card be 16-bit (high color) or higher. It must also have a minimum resolution of 800x600. Right clicking on your desktop and selecting the Settings tab can change video setting.

To install Active3D:

Insert the CD-ROM. The installation program should start automatically (unless auto-start is disabled on your PC). If the installation does not start, open your Explorer and double-click on the SETUP.EXE file on the CD-ROM.

Follow the on-screen instructions. Most of the instructions can simply be confirmed by clicking the Next button. If you wish, you can customize the installation directory or the location of the applications icon in the Start menu. The icon normally appears under the Programs sub-menu.

Active3D setup will automatically set all ATX files to display the Active3D document icon. Any files which have the icon assigned can be opened in Active3D by double-clicking on the file.

## Operating Systems

The developers of AutoTRAX have found Windows 2000 to be far superior in performance and reliability to Windows 98 and in fact strongly discourage the use of Windows 98.

## Memory

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The more memory you have the better. You are recommended to have at 256 Mbytes.

## The Mouse

To get the best out of AutoTRAX you are strongly advised to purchase a 3-button mouse with a thumbwheel.

## Video Card

AutoTRAX takes full advantage of hardware acceleration of the current range of graphics card to give you real-time true WSIWG (what you see is what you get) viewing. It is recommended to use 24bit color and a resolution of 1024x768 or 1280x1024. Using a larger resolution may slow down the speed of the graphics as more pixels need to be drawn. Using a lower resolution makes it more difficult to manage floating toolbars and dialog boxes.

## Multiple monitors

### Multiple Monitors

With the advent of Windows 98 and Windows 2000 you now have the capability of adding additional monitors to your computer. AutoTRAX can be used with multiple monitors and the floating toolbars and dialogs can be positioned on these additional monitors. AutoTRAX remembers their position when it restarts.

All you need is an additional graphics card and monitor. See the Windows documentation of setting up the additional monitor.

### For Windows 2000

1. Turn off your computer.
2. Insert your additional Peripheral Component Interconnect (PCI) or Accelerated Graphics Port (AGP) video adapter into an available slot.
3. Plug your additional monitor into the card.
4. Turn on your computer. Windows 2000 will detect the new video adapter and install the appropriate drivers.
5. Open Display in Control Panel.
6. On the Settings tab, click the monitor icon that represents the monitor you want to use in addition to your primary monitor.
7. Select the Extend my Windows desktop onto this monitor check box, and then click Apply or OK.
8. Selecting the Extend my Windows desktop onto this monitor check box allows you to drag items across your screen onto alternate monitors.

Or, you can resize a window to stretch it across more than one monitor. To use the multiple monitor support feature, you need a PCI or AGP video adapter for each monitor. If you have an onboard video adapter (one that is not a plug-in card but is part of the motherboard) that you want to use as part of a multiple-monitor configuration, it must be set as VGA.

## The User Interface

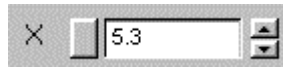
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## Numeric entry controls

AutoTRAX incorporates a unique method of number entry. It consists of a combination of a numeric entry box, an up and down arrow and a popdown calculator as shown below for the variable x.



You can change the value by either:

Clicking on the numeric entry box (showing 4.75 in this case) and typing the new numeric value or

Clicking on the numeric entry box and then rotating the middle thumbwheel on your mouse, (if you have one!) or

Clicking either the up or down arrows on the right of the numeric entry box or

Press down the left mouse button over either the up or down arrow and dragging the mouse up or down the screen to increase or decrease the numeric value or

Click the small button on the left of the numeric entry field. The calculator show below will appear. You can then use it by clicking on the numbers and %/\*- or + keys. Click Enter when you have done.

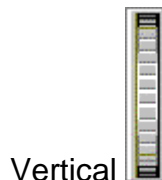
## The main menu

The main menu contains all the popdown menu commands.

It is initially at the top of the application but you can have it floating or docked to the bottom of the application.

## Thumbwheels

There are 2 types of thumbwheels. These are used to continuously vary a numeric value.



# Creating, saving and opening models

## Opening models

To open a previously saved model, select **<File\Open...>** from the main menu.

## Saving models

To save a previously saved model, select **<File\Save...>** from the main menu.

To save a new model, select **<File\Save As...>** from the main menu.

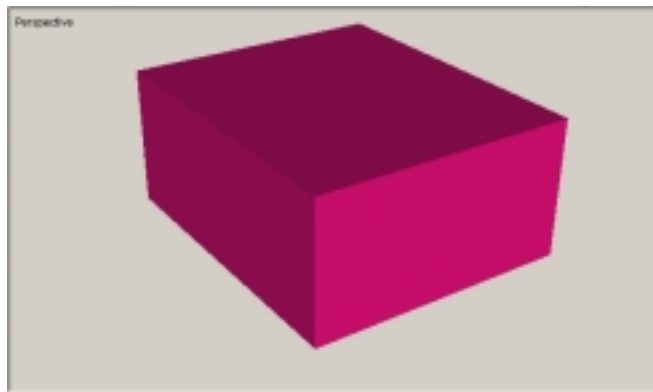
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# Viewing

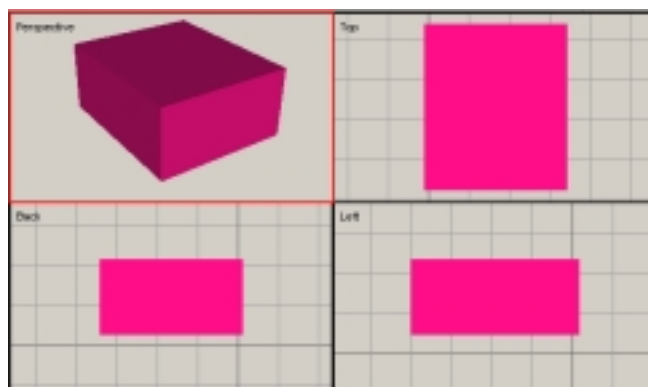
## Single and multiple views

You can either have 1 or 4 views of the model.

Check the **<View\Single viewport>** menu item from the main menu to have a single viewport.



Uncheck the **<View\Single viewport>** menu item from the main menu to 4 viewports.



The current viewport will have a red border. To select another viewport, click the left mouse button in the viewport you wish to select.

## Zooming in and out

To zoom in or out you can either:

1. Place the mouse in camera mode by selecting **<Edit\Camera>** from the main menu.
2. Rotate the mouse thumbwheel, if you have one.

or:

1. Press the **PgDn** or **PgUp** key on the keyboard.

or:

1. Selecting either
  - **<View\Zoom\In>** or
  - **<View\Zoom\Out>** orfrom the main menu.

---

## Panning

To pan the current view you can either:

1. Place the mouse in camera mode by selecting **<Edit\Camera>** from the main menu.
2. Hold down the left mouse button in the viewport and drag the mouse. The view will then pan. Release the left mouse button when the view is correct.

or:

1. Press one of the arrow button on the keyboard.

or:

1. Selecting either
  - **<View\Pan\Left>** or
  - **<View\Pan\Right>** or
  - **<View\Pan\Up>** or
  - **<View\Pan\Down>**

from the main menu.

## Creating a perspective view

To view a model with a perspective view, select check the **<View\Perspective>** menu item from the main menu. An example of a perspective view is shown opposite.



To view a model with a non-perspective view, select uncheck the **<View\Perspective>** menu item from the main menu. An example of a non-perspective view is shown opposite.



## Viewing from standard positions

You can view from a standard position by selecting either:

- **<View\Top>**
- **<View\Bottom>**
- **<View\Left>**
- **<View\Right>**
- **<View\Front>**
- **<View\Back>**
- **<View\Camera>**

from the main menu.

## Adding 3D objects

You can add several 3D objects to a scene. These are:

- Boxes.
- Cones.
- Cylinders.
- Spheres.
- Tori.
- Extruded surfaces.
- Revolved surfaces.

---

## Adding a box

To add a box:

Select **<Add/Box>** from the main menu.

1. Move the mouse to a corner of the box. Then either:
2. Press down the left mouse button and drag the mouse to the other corner of the boxes' base and release the left mouse button when the base is the correct size or
3. Click the left mouse button to start the box base, drag the mouse until the base is the required size and then click the left mouse button again.
4. Next, move the mouse to set the height of the box and finally click the left mouse button.



## Adding a sphere

To add a sphere:

Select **<Add/Sphere>** from the main menu.

1. Move the mouse to the center of the sphere Then either:
2. Press down the left mouse button and drag the mouse to set the size of the sphere. Release the left mouse button when the sphere is the correct size.
3. Click the left mouse button at the spheres center and move the mouse until the sphere is the correct size. Click the left mouse button again when the sphere is the correct size to finish.



## Adding a cone

To add a cone:

Select **<Add/Cone>** from the main menu.

1. Move the mouse to a corner of the cones base. Then either:
2. Press down the left mouse button and drag the mouse to the other corner of the cones' base and release the left mouse button when the base is the correct size or
3. Click the left mouse button to start the box base, drag the mouse until the base is the required size and then click the left mouse button again.
4. Next, move the mouse to set the height of the cone and finally click the left mouse button.

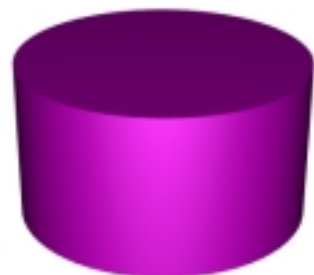


## Adding a cylinder

To add a cylinder:

Select **<Add/Cylinder>** from the main menu.

1. Move the mouse to a corner of the cylinders base. Then either:
2. Press down the left mouse button and drag the mouse to the other corner of the cylinders' base and release the left mouse button when the base is the correct size or
3. Click the left mouse button to start the cylinders base, drag



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the mouse until the base is the required size and then click the left mouse button again.

4. Next, move the mouse to set the height of the cylinder and finally click the left mouse button.

## Adding a torus

To add a torus:

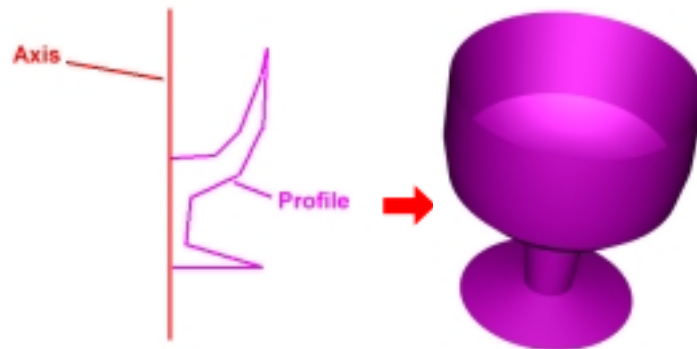
Select **<Add/Torus>** from the main menu.

1. Move the mouse to the center of the torus Then either:
2. Press down the left mouse button and drag the mouse to set diameter of the torus. Release the left mouse button when the torus is the correct size.
3. Now move the mouse again to set the diameter of the outer tube. Click the left mouse button when the tube diameter is the correct size.



## Adding a revolved surface

To create a revolved surface you need to define a profile and a rotation axis.



With closed revolved surfaces, the rotation axis is set at the first defined point of the profile. To create a closed revolved surface:

1. Select **<Add/Revolved Surface>** from the main menu.

The dialog box shown below will appear.

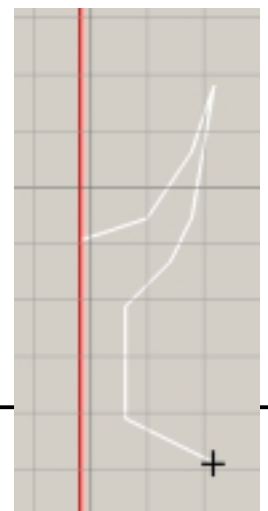
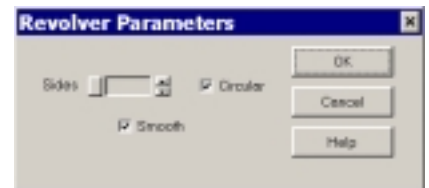
**Sides.** Enter the number of sides. (Faceted surfaces only. Circular must be unchecked)

**Circular.** Check to create a circular revolved surface. Uncheck to create a faceted surface.

**Smooth.** Check to smooth a surface.

Click the **OK** button to start the creation process.

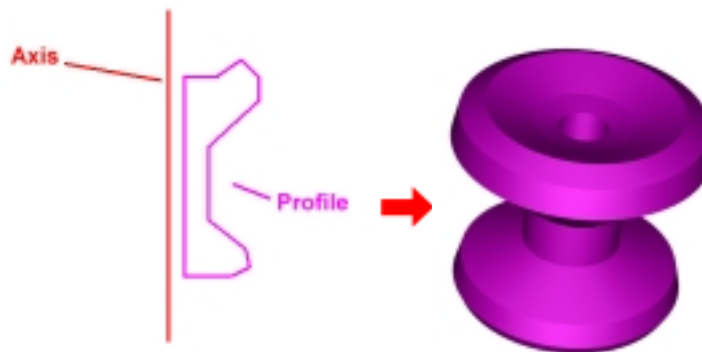
2. Move the mouse to the first point of the profile and click the left mouse button. This defines both the axis and the first point. You will see a straight line representing the axis, and the profile in white.
3. Move the mouse and left click the mouse button to set each side.
4. Finally to finish the profile, left click the mouse button on or very close to the red axis.



---

## Adding a revolved surface with a hole

To create a revolved with a hole surface you need to define a profile and a rotation axis.



With revolved surface with a hole, the rotation axis is set at the first defined point of the profile. To create a revolved surface with a hole:

1. Select **<Add/Revolved Surface with hole>** from the main menu. The dialog box shown below will appear.



**Sides.** Enter the number of sides. (Faceted surfaces only. Circular must be unchecked)

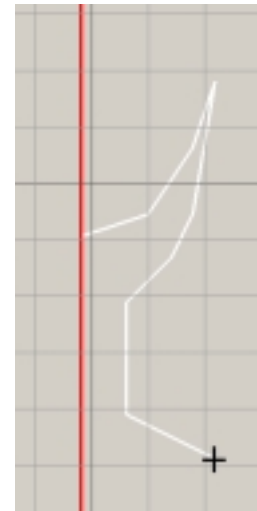
**Circular.** Check to create a circular revolved surface. Uncheck to create a faceted surface.

**Smooth.** Check to smooth a surface.

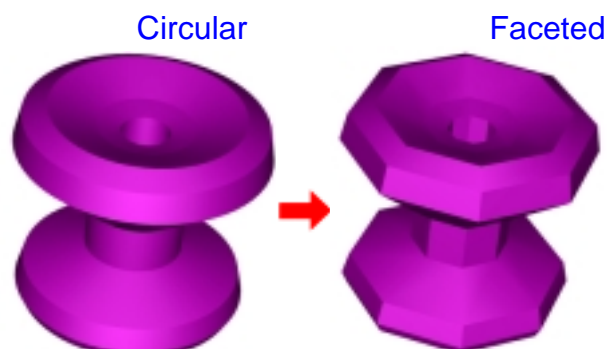
Click the **OK** button to start the creation process.

2. Move the mouse to the set the rotation axis and click the left mouse button. This defines both the axis.
3. Next move the mouse to the first point of the profile and click the left mouse button. You will see the profile in white.

3. Move the mouse and left click the mouse button to set each side.
4. Finally to finish the profile, left click the mouse button on or very close to the first profile point.



## Faceted revolved surfaces



Revolved surfaces can be circular or faceted. You define each type either at the start of the creation of revolved surfaces or using the object properties dialog.

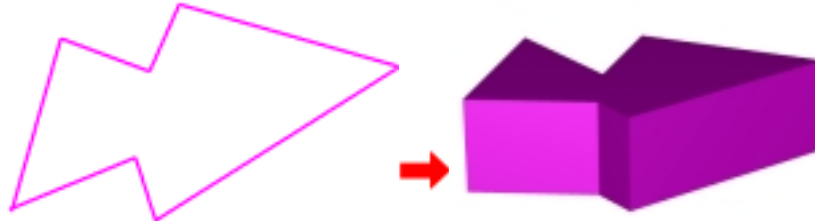


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## Adding an extruded shape

An extruded surface is a flat profile that is extruded (pulled out) in a direction perpendicular to the plane of the profile.

To create an extruded surface you need to first create the profile and then extrude it.  
profile extruded profile



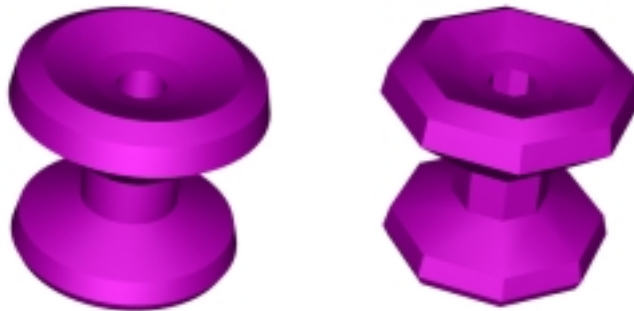
To create an extruded surface:

1. Select **<Add\Extrusion>** from the main menu.
2. Move the mouse to the first corner of the profile and click the left mouse button.
3. Move the mouse button and click the left mouse button to define more corners of the profile. Move the mouse over the first point and click the left mouse button to close the profile.
4. Now move the mouse to define the height of the extrusion. Click the left mouse button when the extrusion is the correct height.

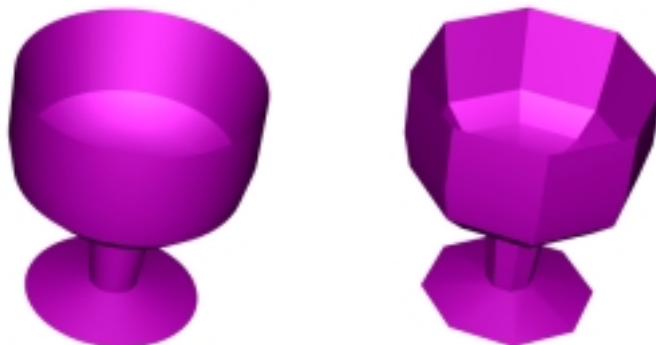
## Adding a revolved shape

You can create revolved surfaces similar to the ones below. A revolved surface is a profile that is rotated around a rotation axis.

**Revolved surfaces with a hole**



**Closed revolved surfaces**







- 
2. Hold down the left mouse button over a part and drag it into the scene by moving the mouse.
  3. Release the left mouse button when the part is at the correct location.

## **Adding colors**

To add a color to an object:

1. Select the color tab in the parts library toolbar.
2. Hold down the left mouse button over a color and drag it into the scene by moving the mouse.
3. Release the left mouse button when the color is on the correct object.

## **Adding materials**

To add a material to an object:

1. Select the materials tab in the parts library toolbar.
2. Hold down the left mouse button over a material and drag it into the scene by moving the mouse.
3. Release the left mouse button when the material is on the correct object.

# **Selecting objects**

To select an objects:

1. Place the mouse mode in select using the menu command **<Edit>Select>** from the main menu.

**Click the left mouse button over the object you wish to select.**

## **Selecting all objects**

Select **<Edit>Select all>** from the main menu to select all objects.

## **Deselecting all objects**

Select **<Edit>Select none>** from the main menu to deselect all objects.

## **Complementing the selection**

Select **<Edit/Complement Selection>** from the main menu to invert the selection.

# **Changing objects**

## **Editing objects**

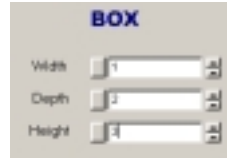
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## Editing boxes

To edit a box:

1. Place the mouse mode in select using the menu command **<Edit\Select>** from the main menu.
2. Double click the left mouse button over the box you wish to edit. The properties dialog box will appear.
3. Select the Parameters properties tab. The tab will contain the following dialog box.



**Width.** The width of the box.

**Depth.** The depth of the box.

**Height.** The height of the box.

*See numeric entry controls of how to enter values.*

The object properties tab also contains tabs to change:

- The objects color.
- The texture map on the object.
- The texture mapping mode.

You can also:

- Resize objects. See resizing objects.
- Rotate objects. See rotating objects.

## Editing spheres

To edit a sphere:

1. Place the mouse mode in select using the menu command **<Edit\Select>** from the main menu.
2. Double click the left mouse button over the sphere you wish to edit. The properties dialog box will appear.
3. Select the Parameters properties tab. The tab will contain the following dialog box.



**Radius.** The width of the sphere.

*See numeric entry controls of how to enter values.*

The object properties tab also contains tabs to change:

- The objects color.
- The texture map on the object.
- The texture mapping mode.

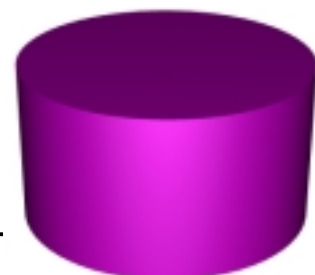
You can also:

- Resize objects. See resizing objects.
- Rotate objects. See rotating objects.

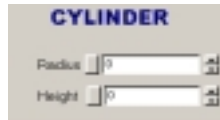
## Editing cylinders

To edit a cylinder:

1. Place the mouse mode in select using the menu command **<Edit\Select>** from the main menu.



- 
2. Double click the left mouse button over the cylinder you wish to edit. The properties dialog box will appear.
  3. Select the Parameters properties tab. The tab will contain the following dialog box.



**Radius.** The radius of the cone.

**Height.** The depth of the cone.

*See numeric entry controls of how to enter values.*

The object properties tab also contains tabs to change:

- The objects color.
- The texture map on the object.
- The texture mapping mode.

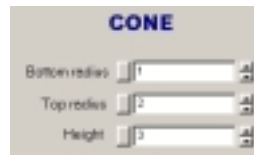
You can also:

- Resize objects. See resizing objects.
- Rotate objects. See rotating objects.

## Editing cones

To edit a cone:

1. Place the mouse mode in select using the menu command **<Edit\Select>** from the main menu.
2. Double click the left mouse button over the cone you wish to edit. The properties dialog box will appear.
3. Select the Parameters properties tab. The tab will contain the following dialog box.



**Bottom radius.** The radius of the base. Set to zero for an inverted cone.

**Top radius.** The radius of the top. Set to zero for a pointed cone.

**Height.** The height of the cone.

*See numeric entry controls of how to enter values.*

The object properties tab also contains tabs to change:

- The objects color.
- The texture map on the object.
- The texture mapping mode.

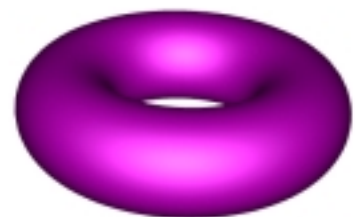
You can also:

- Resize objects. See resizing objects.
- Rotate objects. See rotating objects.

## Editing tori

To edit a torus:

1. Place the mouse mode in select using the menu command **<Edit\Select>** from the main menu.
2. Double click the left mouse button over the torus you wish to edit. The properties dialog box will appear.
3. Select the Parameters properties tab. The tab will contain the following dialog box.





**Width.** The width of the box.

**Depth.** The depth of the box.

**Height.** The height of the box.

See *numeric entry controls of how to enter values*.

The object properties tab also contains tabs to change:

- The objects color.
- The texture map on the object.
- The texture mapping mode.

You can also:

- Resize objects. See resizing objects.
- Rotate objects. See rotating objects.

## Editing extruded surfaces

To edit an extrusion:

1. Place the mouse mode in select using the menu command **<Edit\Select>** from the main menu.
2. Double click the left mouse button over the extrusion you wish to edit. The properties dialog box will appear.
3. Select the Parameters properties tab. The tab will contain the following dialog box.



**Height.** The height of the extrusion.

See *numeric entry controls of how to enter values*.

The object properties tab also contains tabs to change:

- The objects color.
- The texture map on the object.
- The texture mapping mode.

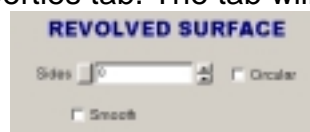
You can also:

- Resize objects. See resizing objects.
- Rotate objects. See rotating objects.

## Editing revolved surfaces

To edit a revolved surface:

1. Place the mouse mode in select using the menu command **<Edit\Select>** from the main menu.
2. Double click the left mouse button over the revolved surface you wish to edit. The properties dialog box will appear.
3. Select the Parameters properties tab. The tab will contain the following dialog box.



**Sides.** Enter the number of sides. (Faceted surfaces only. Circular must be unchecked)

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**Circular.** Check to create a circular revolved surface. Uncheck to create a faceted surface.

**Smooth.** Check to smooth a surface.

See *numeric entry controls of how to enter values*.

The object properties tab also contains tabs to change:

- The objects color.
- The texture map on the object.
- The texture mapping mode.

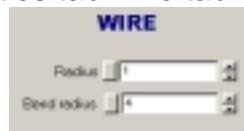
You can also:

- Resize objects. See resizing objects.
- Rotate objects. See rotating objects.

## Editing wires

To edit a wire:

1. Place the mouse mode in select using the menu command **<Edit\Select>** from the main menu.
2. Double click the left mouse button over the wire you wish to edit. The properties dialog box will appear.
3. Select the Parameters properties tab. The tab will contain the following dialog box.



**Wire radius.** Enter the diameter of the wire.

**Bend radius.** Enter the radius of bends.

See *numeric entry controls of how to enter values*.

The object properties tab also contains tabs to change:

- The objects color.
- The texture map on the object.
- The texture mapping mode.

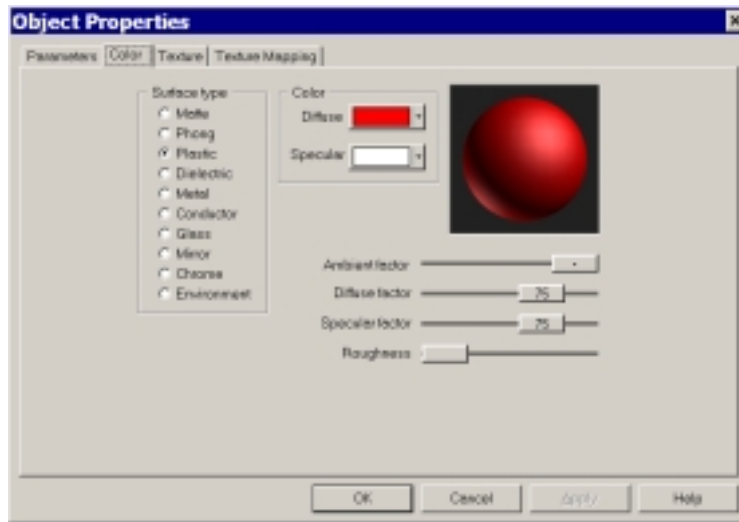
You can also:

- Resize objects. See resizing objects.
- Rotate objects. See rotating objects.

## Setting object colors

To edit an objects' color:

1. Place the mouse mode in select using the menu command **<Edit\Select>** from the main menu.
2. Double click the left mouse button over the object you wish to edit. The properties dialog box will appear.
3. Select the **Color** properties tab. The tab will contain the following dialog box.



## Surface Type

Check the surface type.

- Matte
- Phong
- Plastic
- Dielectric
- Metal
- Conductor
- Glass
- Mirror
- Chrome
- Environment

Color and color parameters see the details in the above topics.

## Chrome

A chrome-like reflectance using a two-dimensional chrome map.

Description A reflectance model providing a chrome-like effect which generates a reflection pattern from a two dimensional array of colors. The map is projected onto surfaces using a spherical mapping. Reflectance coefficients are provided which allow specification of the amount of ambient, diffuse, specular and 'chrome' light reflected, corresponding to arguments "ambient factor", "diffuse factor", "specular factor" and "chrome factor" respectively. The sharpness of the specular reflection highlights can be controlled by means of argument "roughness". The reflection is made sharper with small values for the roughness, such as 0.1. Larger values, such as 10.0, decrease the specular fall-off. This model is suitable for shiny or highly polished chrome-like materials.

"ambient factor" 1.0

"diffuse factor" 0.5

"specular factor" 0.5

"chrome factor" 0.3

"roughness" 0.1

## Conductor

Physically accurate metallic simulation using ray tracing, supporting reflection.

A reflectance model that supports secondary mirrored views through ray tracing. Fresnel filtering is incorporated for accurate modeling of light interaction on the surfaces of objects. Reflectance coefficients are provided which allow specification of the amount of ambient,

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diffuse and specular light components, and the contribution made by light reflected in the mirror direction, corresponding to arguments "ambient factor", "diffuse factor", "specular factor" and "mirror factor" respectively. The sharpness of specularly reflected highlights can be controlled by means of argument "roughness". The reflection is made sharper with small values for the roughness, such as 0.1. Larger values, such as 10.0, decrease the specular fall-off. The conductor's indices of refraction for red, green and blue light are given by the arguments "refraction red", "refraction green" and "refraction blue" respectively. Similarly, the absorption coefficients for red, green and blue light are given by "absorption red", "absorption green" and "absorption blue" respectively. This model is appropriate for simulating metallic surface finishes accurately.

The default values for the refraction and absorption coefficients correspond to those for silver. The appropriate values for other conductors can be obtained from published data in handbooks of optical constants a sample of the properties of some common metallic looking materials is given in the table below.

"ambient factor" 0.1  
"diffuse factor" 0.1  
"specular factor" 0.8  
"mirror factor" 0.8  
"roughness" 0.1  
"refraction red" 0.13764  
"refraction green" 0.128079  
"refraction blue" 0.156556  
"absorption red" 3.75633  
"absorption green" 4.37743  
"absorption blue" 2.3437

## Dielectric

Physically accurate glass-like simulation using ray tracing, supporting reflection.

A reflectance model that supports an accurate simulation of dielectric (glass-like) materials that have both reflective and transmissive properties. Secondary mirrored and transmitted views are incorporated by the use of ray tracing. Fresnel filtering is incorporated for the specular reflection, the mirrored view and the transmitted view, for accurate modeling of light interaction on the surfaces of objects. Reflectance coefficients are provided which allow specification of the amount of ambient, diffuse and specular light components, and the contribution made by light from the mirror and transmission directions, corresponding to arguments "ambient factor", "diffuse factor", "specular factor", "mirror factor" and "transmission factor" respectively. The sharpness of the specular reflection highlights can be controlled by means of argument "roughness". The reflection is made sharper with small values for the roughness, such as 0.1. Larger values, such as 10.0, decrease the specular fall-off. The dielectric's index of refraction for all wavelengths of light is given by the argument "re-fraction". The default value for the refractive index corresponds to that for glass. The appropriate value for other dielectrics can be obtained from published data in handbooks of optical constants. This model is appropriate for simulating glass surface finishes.

"ambient factor" 0.0  
"diffuse factor" 0.0  
"specular factor" 0.9  
"transmission factor" 0.9  
"mirror factor" 0.9  
"roughness" 0.1

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"refraction" 1.59144

## Environment

A reflectance model providing environment mapping. Reflectance coefficients are provided as arguments which allow specification of the ambient ("ambient factor"), diffuse ("diffuse factor"), specular ("specular factor") and environment ("environment factor") terms. The sharpness of the specular reflection highlights can be controlled by means of argument "roughness". The reflection is made sharper with small values for the roughness, such as 0.1. Larger values, such as 10.0, decrease the specular fall-off. A scaling factor for the area of sampling in the global environment map is given by "angle scale"; a value of 0 will cause point sampling, a value greater than the default of 1 will cause 'diffuse' environment reflections. This model is suitable for reflective materials such as shiny metals.

"ambient factor" 1.0  
"diffuse factor" 0.5  
"specular factor" 0.5  
"environment factor" 0.3  
"roughness" 0.1  
"angle scale" 1.0

## Glass

Approximation of glass-like materials using ray tracing, supporting reflection and refraction. Description A reflectance model that supports an approximation of glass-like materials that have both reflective and transmissive properties. Secondary mirrored and transmitted views are incorporated by the use of ray tracing. Reflectance coefficients are provided as arguments which allow specification of the amount of the specular light component ("specular factor", and the contribution made by light from the mirror ("mirror factor") and transmission ("transmission factor") directions. The sharpness of the specular reflection highlights can be controlled by means of argument "roughness". The reflection is made sharper with small values for the roughness, such as 0.1. Larger values, such as 10.0, decrease the specular fall-off. The index of refraction for all wavelengths of light is given by the argument "refraction". The default value for the refractive index corresponds to that for glass. The appropriate value for other materials can be obtained from published data in handbooks of optical constants. This model is appropriate for approximating glass surface finishes.

"specular factor" 0.5  
"transmission factor" 0.9  
"mirror factor" 0.1  
"roughness" 0.1  
"refraction" 1.59144

## Matte

Dull matte-like reflectance.

A reflectance model providing a dull matte appearance. Reflectance coefficients are provided to allow specification of the amount of ambient and diffuse light reflected in arguments "ambient factor" and "diffuse factor" respectively. This model is suitable for non-glossy materials such as brick or fabric.

"ambient factor" 1.0  
"diffuse factor" 1.0

## Metal

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Shiny metallic reflectance.

Description A reflectance model providing a specular metallic appearance. Reflectance coefficients are provided to allow specification of the amount of ambient and specular light reflected in arguments "ambient factor" and "specular factor" respectively. The sharpness of specular re-reflections can be controlled by means of the "roughness" argument. The reflection is made sharper with small roughness values (less than 1), such as 0.1. Larger values, such as 10.0, decrease the specular fall-off. This model is suitable for most metallic materials such as steel or brass.

"ambient factor" 1.0

"specular factor" 1.0

"roughness" 0.25

## Mirror

Approximation of mirror reflecting materials using ray tracing, supporting reflection.

Description A reflectance model that supports secondary mirrored views through ray tracing. Reflectance coefficients are provided as arguments which allow specification of the amount of ambient light ("ambient factor"), diffuse light ("diffuse factor") and specular light ("specular factor") components, and the contribution made by light reflected in the mirror direction ("mirror factor"). The sharpness of the specular reflection highlights can be controlled by means of argument "roughness". The reflection is made sharper with small values for the roughness, such as 0.1 or less. Larger values, such as 10.0, decrease the specular fall-off. This model is appropriate for representing mirror-like surface finishes.

"ambient factor" 0.1

"diffuse factor" 0.1

"specular factor" 0.8

"mirror factor" 0.8

"roughness" 0.0625

## Phong

Phong-style reflectance. A reflectance model conforming with the popular Phong model in which reflections are greatest in the "mirror" direction of a surface opposite the viewing direction with respect to the surface normal. Reflectance coefficients are provided which allow specification of the amount of ambient, diffuse and specular light reflected, corresponding to arguments "ambient factor", "diffuse factor" and "specular factor" respectively. The sharpness of the specular reflection highlights can be controlled by means of argument "exponent". The reflection is made sharper with large values of the exponent, such as 10.0. Small values, such as 1.0, decrease the specular fall-off. The color of the specular highlights is filtered by the color argument "specular color". This model is suitable for shiny or highly polished materials such as ceramic or glass.

"ambient factor" 1.0

"diffuse factor" 0.75

"specular factor" 0.5

"exponent" 10.0

"specular color" LtColour (1.0, 1.0, 1.0)

## Plastic

Glossy plastic-like reflectance.

A reflectance model providing a specular effect which is similar to the Phong model.

Reflectance coefficients are provided which allow specification of the amount of ambient, diffuse and specular light reflected, corresponding to arguments "ambient factor", "diffuse

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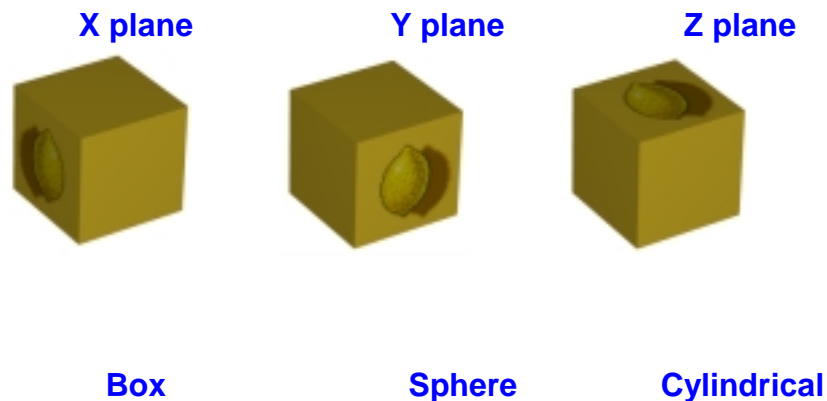
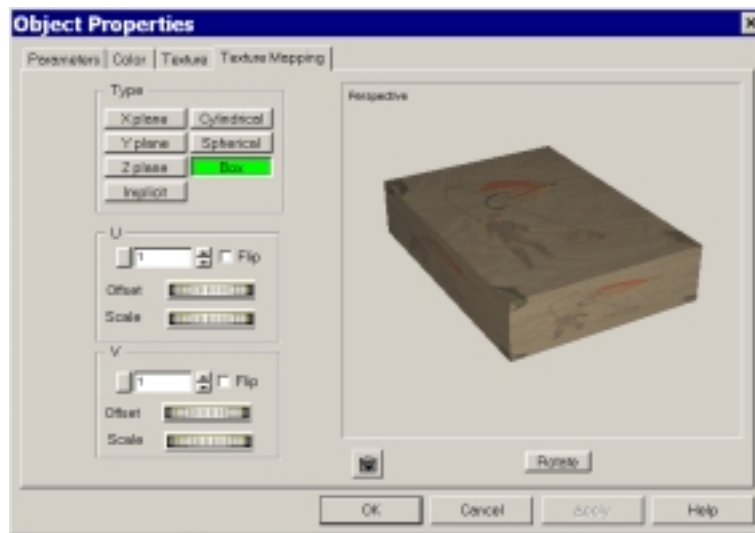
factor" and "specular factor" respectively. The sharpness of the specular reflection highlights can be controlled by means of argument "roughness". The reflection is made sharper with small values for the roughness, such as 0.1. Larger values, such as 10.0, decrease the specular fall-off. The color of the specular highlights is filtered by the color argument "specular color". This model is suitable for shiny or highly polished materials such as plastic or varnished surfaces.

"ambient factor" 1.0  
"diffuse factor" 0.75  
"specular factor" 0.5  
"roughness" 0.1  
"specular color" LtColour (1.0, 1.0, 1.0)

## Setting texture mapping modes

To edit an objects' color:

1. Place the mouse mode in select using the menu command **<Edit\Select>** from the main menu.
2. Double click the left mouse button over the object you wish to edit. The properties dialog box will appear.
3. Select the **Color** properties tab. The tab will contain the following dialog box.





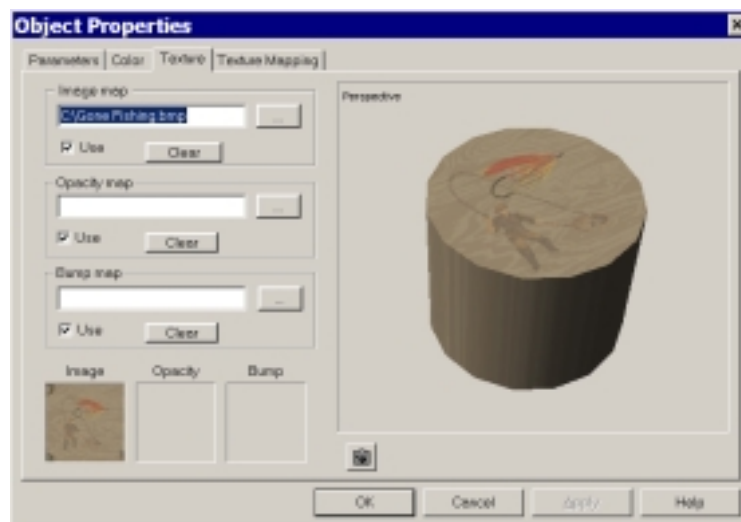
**U and V** - Set the number of tiles, offset and scale.

**Rotate** – rotates image 90°.

## Setting textures

To edit an objects' texture:

1. Place the mouse mode in select using the menu command **<Edit\Select>** from the main menu.
2. Double click the left mouse button over the object you wish to edit. The properties dialog box will appear.
3. Select the **Texture** properties tab. The tab will contain the following dialog box.



### Image map

An image that is wrapped around the surface of the object.

### Opacity map

Transparency shader which varies coverage (alpha) value depending on angle between surface normal and view direction. Useful for creating glow effects when applied to spheroid surfaces (such as spheres or ellipsoids). Such spheres are placed around a light source, this transparency shader is applied, and the effect is of a spherical glow around the light source.

### Bump map

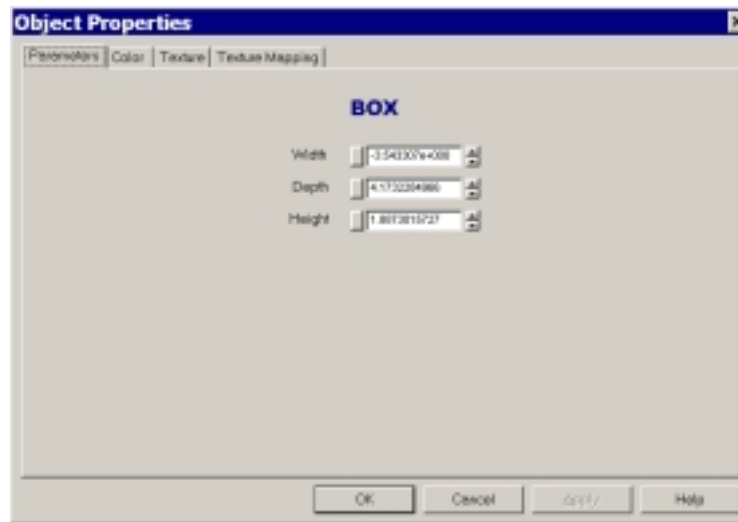
A wrapped displacement shader providing a bump map from an image file in a supported format. The file name for the image file is supplied as the "file name" parameter.

## Using the object properties dialog box

To edit an objects properties.

1. Place the mouse mode in select using the menu command **<Edit\Select>** from the main menu.
2. Double click the left mouse button over the object. The properties dialog box will then

appear.



The properties dialog box consists of 4 tabbed dialog pages.

**Parameters.** The objects editable parameters. See editing objects.

- Box
- Cylinder
- Sphere
- Cone
- Extruded surface
- Revolved surface

**Color.** The objects color.

**Texture.** The texture images applied to the surface of the object.

**Texture mapping.** The texture mapping mode, tiling, scale etc.

## Moving and resizing objects

To move an object:

1. Place the mouse mode in select using the menu command **<Edit\Select>** from the main menu.
2. Select the object.
3. Hold down the left mouse button over the object and drag the mouse. Release to mouse button when the object is in the right position.

## Placing objects on the ground

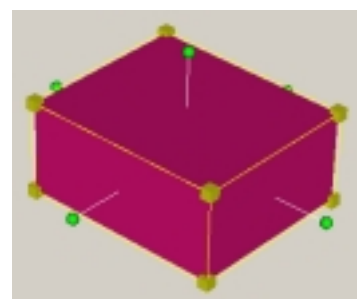
To place objects on the ground (base of object at Z=0):

1. Select the object.
2. Select the **<Tools\Place on ground>** from the main menu.

## Centering objects

To center objects at the origin:

1. Select the object.
2. Select the **<Tools\Place at Center>** from the main menu.



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## Resizing objects

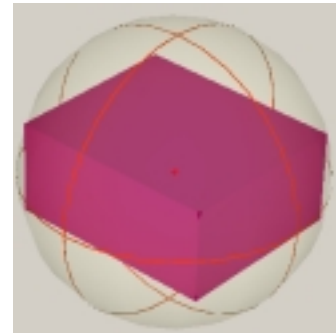
To resize an object:

1. Place the mouse mode in select using the menu command **<Edit\Select>** from the main menu.
2. Select the object.
3. Hold down the left mouse button over the object and either :
  - drag the mouse one of the yellow corner boxes to move a corner or
  - drag one of the green face balls to move a face.

## Rotating objects

To rotate an object:

1. Place the mouse mode in select using the menu command **<Edit\Rotate>** from the main menu.
2. Select the object.
3. Hold down the left mouse button over the object and drag the mouse.



## Rotating 90° about axes

To rotate objects 90° about an axis:

1. Select the object.
2. Select either:  
**<Tools\Rotate 90° about X axis>** from the main menu or  
**<Tools\Rotate 90° about Y axis>** from the main menu or  
**<Tools\Rotate 90° about Z axis>** from the main menu.

## Grouping objects together

To ungroup a group:

1. Select the objects.
2. Select **<Edit\Group>** from the main menu.

## Ungrouping objects that are in a group

To ungroup a group:

1. Select the group.
2. Select **<Edit\Ungroup>** from the main menu.

## Deleting objects

To delete objects, you can either:

1. Select the objects.
2. Select **<Edit\Cut>** from the main menu.

## Deleting all objects

To delete all objects, you can either:

1. Select **<Edit\Clear>** from the main menu.

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or:

1. Select **<Edit>Select all>** from the main menu.
2. Select **<Edit\Cut>** from the main menu.

## Changing colors

You can change an objects color using:

1. The object's property dialog or
2. Dragging a color/texture map from the parts library toolbar.

## Copying objects to the clipboard

To copy objects to the clipboard.

1. Select the objects.
2. Select **<Edit/Copy>** from the main menu.

## Pasting objects from the clipboard

To paste objects from the clipboard.

Select **<Edit/Paste>** from the main menu.

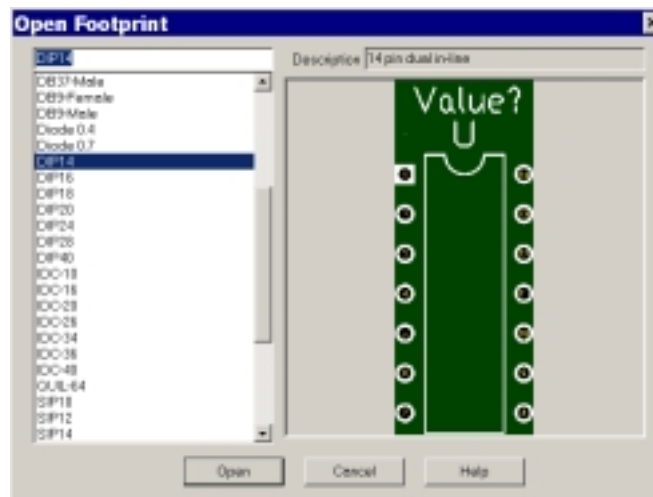
## Drawing aids

### Adding a footprint

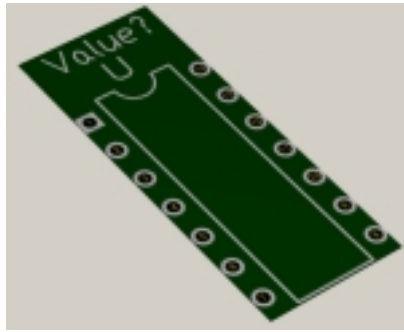
When creating a model for a PCB part, it is advantageous to have the footprint available.

With Active3D you can add a footprint by:

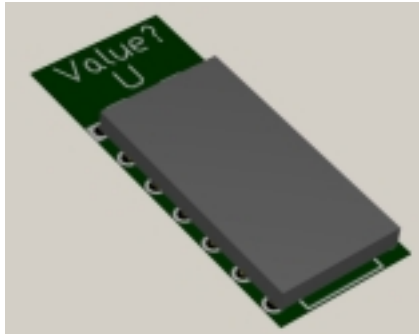
Selecting **<Tools\Add footprint>** from the main menu. This will display the Open Footprint dialog shown below.



Select the footprint from the list of names on the left and click on the **Open** button to add it to the scene. Below is an example of a DIP14 footprint added to a scene.



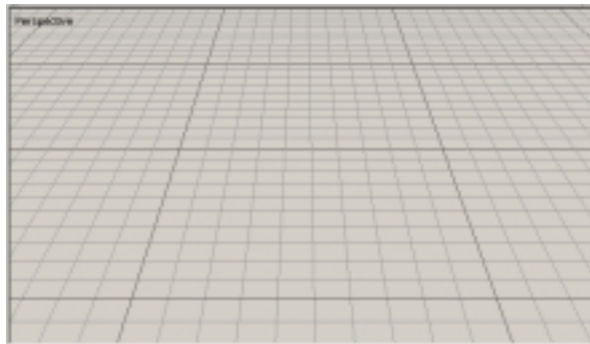
Below is the same footprint with a box added to represent a 3D part. This is a very simple representation and you may wish to add terminals and a texture map to improve realism.



**NOTE:** The footprint is saved with the model of the part and there is no need to delete it as it is not used when building a model of a complete PCB.

## Displaying a grid

To display a grid:  
Select **<View\Grid>** from the main menu.

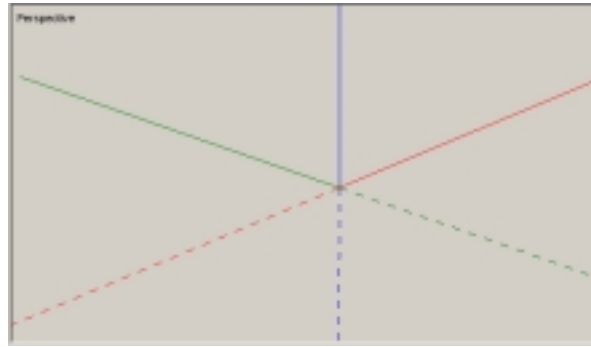


## Snapping to a grid

To toggle snapping points to a grid:  
Select **<Edit\Snap to grid>** from the main menu.

## Showing the X,Y,Z axis

To display a grid:  
Select **<View\Axis>** from the main menu.



The X axis is in red.  
The Y axis is in green.  
The Z axis is in blue.

The negative direction is dotted.

## Photorendering

### Creating a photorealistic picture

To create a photorealistic picture Select **<View\Photorender>** from the main menu.

### Adding a textured background

To add a textured background:

1. Select **<Add\Background image>** from the main menu.

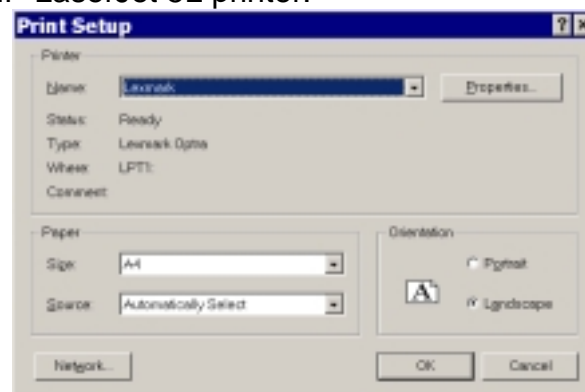
## Printing

### Selecting an configuring the printer

To setup and configure the printer:

Select **<File/Print Setup>** from the main menu.

The Print Setup dialog will be shown. The Print Setup dialog box shown below shows the print setup dialog for a HP LaserJet 5L printer.



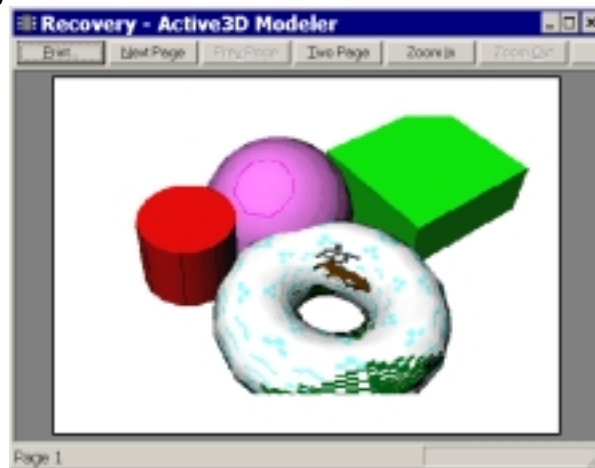
### Previewing the printed output

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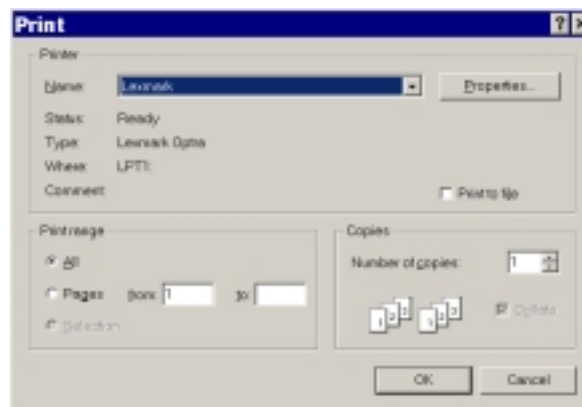
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To preview the printed output:  
Select **<File/Print Preview>** from the main menu.  
The Print Preview dialog will be shown.



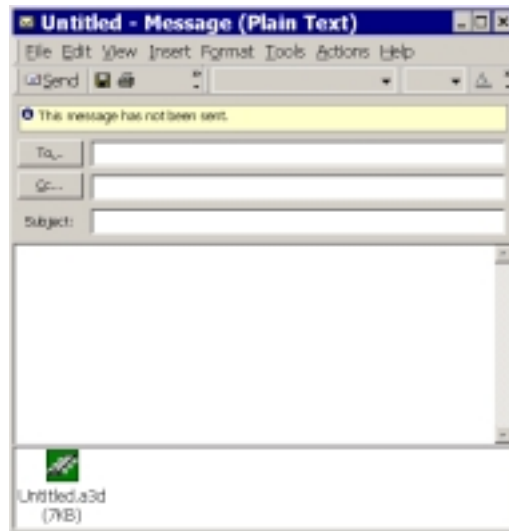
## Printing the current model image

To print the current design:  
Select **<File/Print...>** from the main menu.  
The Print Dialog shown below will be displayed. The dialog below shows the print dialog for a HP LaserJet 5L printer. It may be different from your printer as some printers have their own dialogs.



## Mailing your model to others

To mail the current model to another person  
Select **<File/Send...>** from the main menu. The mail dialog box shown below will be displayed.



The current design has been attached to the email message.  
Fill in the **To...** **CC...** and **Subject** fields.  
Type in any notes in the text message area.  
Click the **Send** button at the top left to send the design.

## Customizing\_Active3D

### Setting Options

All Active3D program settings are changeable using either

- The Options Dialog or
- The Shortcut Keys Dialog.

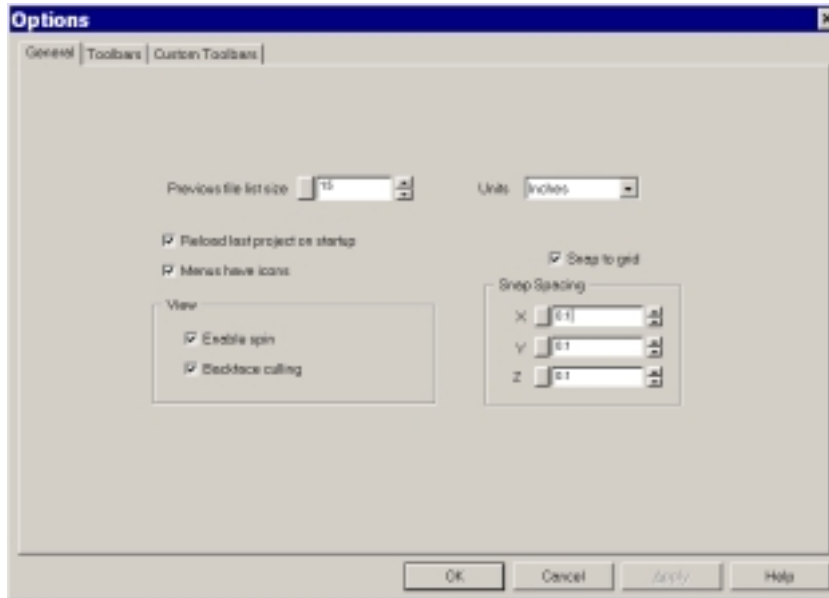
### The Options dialog

Select <Tools/Options> to view the Options dialog. The options dialog contains several tabbed dialogs that group together configuration settings. These are:

- General
- Toolbars
- Custom Toolbars

### General options

The General options tab is shown below.



**Previous file list size.** Enter the maximum number of previous files to display in the File menu. The maximum number is 15.

**Units.** Enter the units that you wish to use. You can use millimeters, centimeters, meters, thou (thousandths of an inch) or inches.

**Reload last project on startup.** Check this to reload the last project that you saved when you start AutoTRAX.

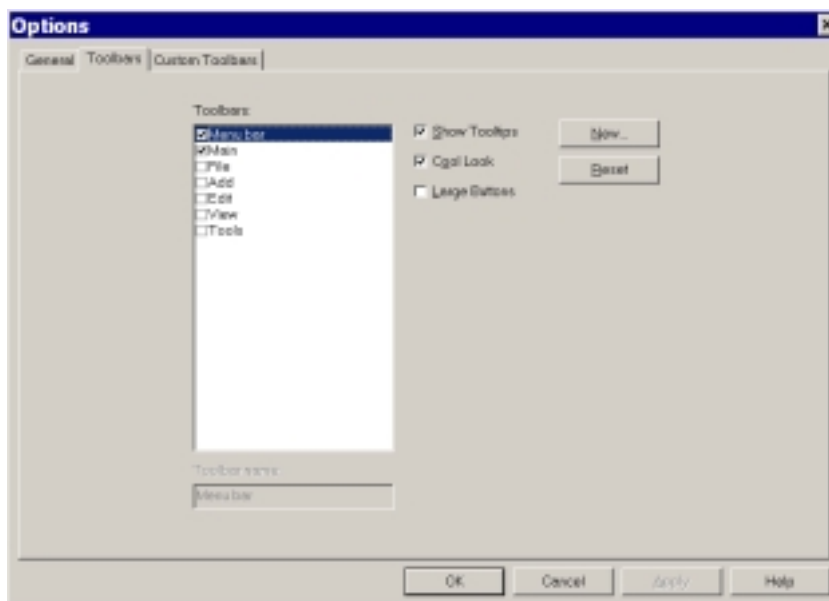
**View - Enable spin.** Enable objects to spin if you rotate the view and then release the left mouse button.

**View - Backface culling.** Speed up redraw by not drawing surfaces facing away from you.

**Snap to grid.** Enable objects to snap to the grid. **X**, **Y** and **Z** are the grid spacings.

## Toolbars

The **Tools/Options/Custom** Toolbars tab is shown below. AutoTRAX gives you complete control over the toolbars displayed in your workspace. You can create toolbars, add buttons to a toolbar, remove buttons and rearrange buttons.



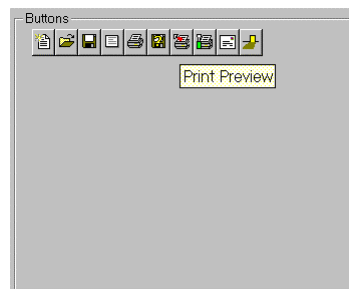
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## Adding Buttons to a Toolbar

You can add buttons to a toolbar. The Custom Toolbars tab shown above contains a Categories list box, which displays the type of commands you can use. When you select a category in the list box, the associated commands appear in the Buttons box to the right. Many of the commands featured in the functional categories are not included in the default toolbars, so take a few minutes to review your options and pick your favorites to help improve your productivity.

Many of the command names also have buttons associated with them, and these tend to make the most efficient toolbar buttons. If you want to learn more about what a button does you can either:

- Click the button. The Description area will display information on what the button does.
- Hover the mouse cursor over the button. A tooltip will appear as shown below.



**To add a button to a toolbar**, follow these steps:

1. Display the toolbar you wish to modify.
2. Choose Tools/Options from the main menu and select the Custom Toolbars tab.
3. Click the group in the Categories list box containing the command you wish to select. For example to select the Mail button (a button that does the same as the <File/Send >menu item) click the File category.
4. Drag the button you want from the dialog box to the target toolbar. (As you drag, the mouse pointer changes to a toolbar pointer). Place the button exactly where you want it on the toolbar, and then release the mouse button. AutoTRAX will shift existing buttons to the right to make room for the new button.

Repeat steps 3 and 4 to add additional buttons, if necessary. When you have finished, click the OK button.

### Removing Unwanted Buttons

If you have wish to remove one or more buttons from an existing toolbar, follow these steps:

1. Display the toolbar you wish to modify.
2. Choose Tools/Options from the main menu and select the Custom Toolbars tab.
3. Pick the toolbar and then the button you want to remove. Click and drag the toolbar button (the one on the toolbar, not the one in the dialog box) away from the toolbar and release the mouse button and the toolbar will be removed from your toolbar.

Continue to remove as many buttons as you like. Click OK when you are finished.

### Rearranging Toolbar Buttons.

You can also change the order of toolbar buttons, or move buttons from one toolbar to another, while the Options dialog box is open and the Custom Toolbars tab is selected. Like adding and removing toolbar buttons, rearranging toolbar buttons is a matter of dragging the buttons from one location to another.

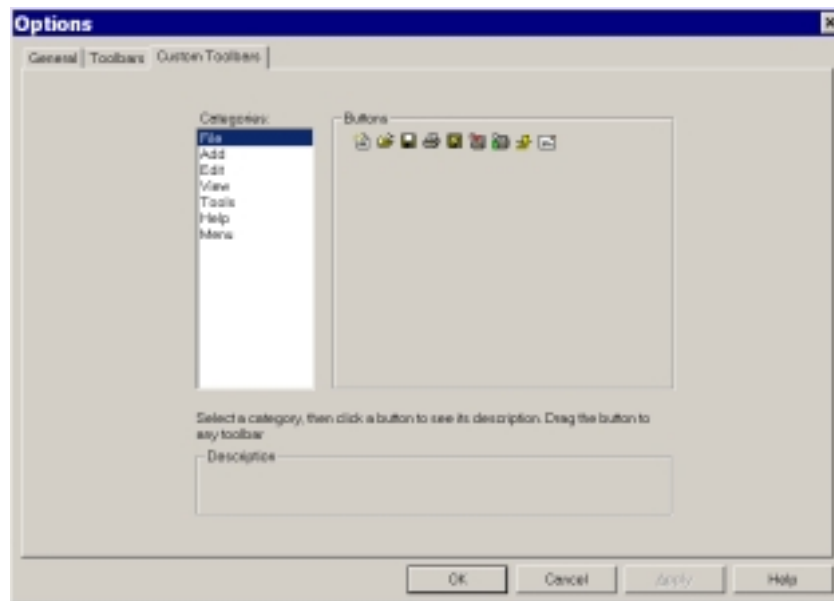
To rearrange toolbar buttons, follow these steps:

1. Display the toolbar you want to rearrange. If you want to move buttons from one

- 
- toolbar to another, display both toolbars.
  2. Choose Tools/Options from the main menu and select the Custom Toolbars tab.
  3. Drag toolbar buttons from one location to the next. When you release the mouse button, the button you have just dragged will be relocated.
  4. Continue to rearrange as many buttons as you like. Click OK when you are finished.

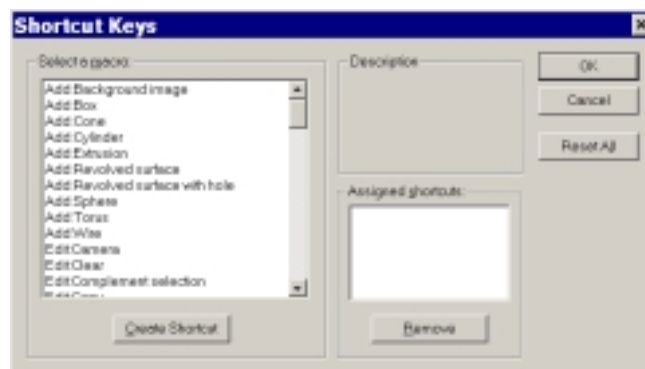
## Custom toolbars

The **Tools/Options/Custom** Toolbars tab is shown below. AutoTRAX gives you complete control over the toolbars displayed in your workspace. You can create toolbars, add buttons to a toolbar, remove buttons and rearrange buttons.

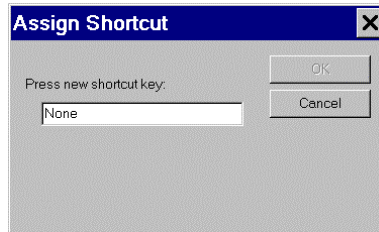


## The Shortcut Keys dialog

The Shortcut Keys dialog is shown below.



**Create Shortcut.** First select one of the command/macros from the macro list. You will then be prompted for the keyboard key to act as the shortcut key.



Type key. You can press the **Alt**, **Shift** and **Ctrl** key at the same time.

## Showing and hiding toolbars

Select **<Tools/Options>** from the main menu and select the **Toolbars tab**.  
For more information, see the Toolbars tab.

## Creating new toolbars

Select **<Tools/Options>** from the main menu and select the **Custom Toolbars tab**.  
For more information, see the Custom Toolbars tab.

## Adding and removing keyboard shortcuts

See the Shortcuts dialog.

## Adding new buttons to toolbars

Select **<Tools/Options>** from the main menu and select the **Custom Toolbars tab**.  
For more information, see the Custom Toolbars tab.

# Getting help and support

## Fault recovery

### The recovery file

Before all operations, the current state of the design is saved on an undo stack. In addition, before any significant operation that modifies the design database, the current design is save to as recovery file on the hard drive. When Active3D terminates normally, the recovery file is deleted. However, if the operation fails and Active3D terminates due to a serious error then the recovery file is not deleted. The presence of the recovery file will be detected when Active3D is restarted and the user will be prompted to load the recovery file. This will restore the design to the point just before the serious error occurred. The user will not have lost any work!

If the operating system fails due to say a power outage, Active3D will detect the recovery file on restart allowing the user to recover their work. In this case at most only the last operation is lost.

One of the main advantages of the recovery file is the improved effective reliability of using Active3D and the effect that recovery has after a program or system failure. Imagine, if you will, the user having worked on a design for 2 hours without saving the design and then the program crashes or the power goes off. The user will be none too pleased! Now imagine

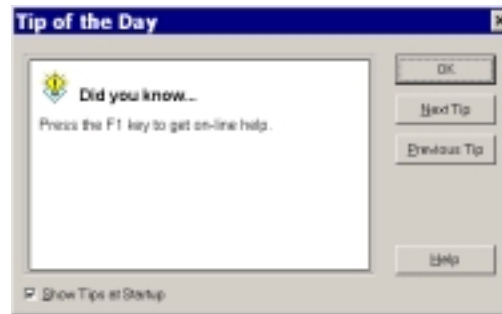
---

their delight when then start up Active3D again to find that their work is still there. NOTE: Unfortunately a hard drive crash will not save enable recovery of the users work if a RAID system was not used.

By chance during the creation of the actual paragraph (using Word 2000 on Windows 2000 Professional) the computer decided to reboot. All the work was lost so it had to be retyped....

## Getting a tip of the day when you start Active3D

Every time you start Active3D you can optionally display a 'Tip of the Day' to help you learn how the get the most out of AutoTRAX. The 'Tip of the Day' dialog is shown below:



Every time it is displayed, it displays another helpful tip.

To display the 'Tip of the Day' select **<Help/Tip of the Day>** from the main menu.

If you do not want to see the tips at startup, uncheck **Show Tip at Startup**.

To cycle through the tips, click the **Next Tip** or **Previous Tip** buttons.

## I wish Active3D would do this....

Do you have a feature that you would like to see in Active3D?

If so, select **<Help/Wish List>** from the main menu.

This will guide you to Kovac Software's web site and will allow you to request new features. Your features will be considered and hopefully included in new versions. You will be notified by email.

## Kovac Software on the Web

Select **<Help/Kovac Software on the Net>** from the main menu to go to the Kovac Software home web page. There you will find information on new versions, other useful products and design resources.

## Obtaining information about your copy of Active3D

Select **<Help/About>** from the main menu to display information about your copy of Active3D.

A dialog box similar to the one shown below will be displayed.



## Registering your copy of Active3D

To register your copy of Active3D Select **<Help/Register..>** from the main menu. You will then be taken to the registration page on Kovac Software's web site.

## The Help System

The AutoTRAX Help System is designed to rapidly assist you in learning how to use AutoTRAX. It is task orientated with each topic based on 'How do I do...' questions. This is in sharp contrast to conventional help systems, which are more like a reference manual. The Help System is displayed in a window that looks and acts very much like a web browser, see below.



On the top is a navigation bar.  
On the left is a set of tabbed windows; these are:



- Contents. A list of Books with 'How to' topic pages.
- Index. A index of all words in the help topics.
- Search. A powerful search engine to help you find relevant topics.
- Favorites. A list of your favorite topics.
- A Glossary.

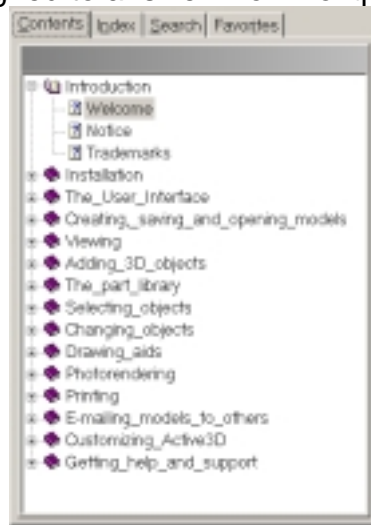
To the right of the tabbed windows is the information pane that contains the selected topic. Finally, above the information pane is a browse sequence to assist you in browsing through related topics.

## Viewing the contents

The Table of Contents for the Help system contains a collection of Books on different subjects.

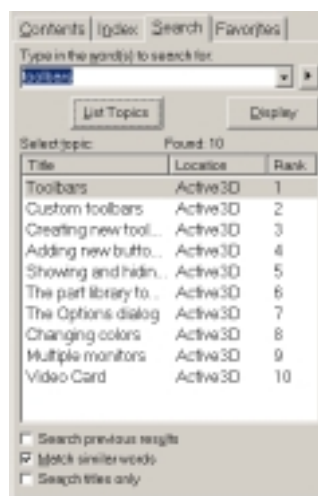
Click a book icon ( ) to open the book and view the topic pages in the book. Books can also contain other Books. A Book can also be views as a Chapter.

The help topics have been designed to answer 'How To' questions.



## Searching for help

If you can't find the Help you're looking for with the Contents or the Index tab, use the Search function. To search for a phrase or a combination of words, you can use Boolean terms (AND, OR, NOT).



- 
1. Type a word or a phrase in the Type in the keyword to find field.
  2. Click the List Topics button.
  3. A list of topics will appear in the Select Topic to display window.
  4. Select a topic and click the Display button.
  5. The topic will appear in the Help window.

Many topics contain drop-down and expanding links. The word or phrase you are searching for may be in one of these links and not immediately visible. Click these links (which are not underlined, making them distinguishable from hyperlink jumps) to view the entire contents of the Help topic.

## The information pane

### *The pane showing this text is the information pane.*

The Information Pane is where you will find the actual topic you have requested. If the topic is larger than the available display space, you can use the scroll bars to view the rest of the topic. You can also expand the entire Help window so more of the topic is visible.

## Navigating help topics

The navigation bar at the top of the Help System assists you in moving from topic to topic.



**Hide.** Hides the contents tab. If you select this, the contents tab will be hidden. A Show button will then replace the button. Select this to show the contents tab.

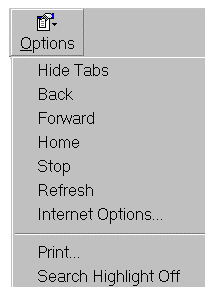
**Back.** This will be taken to the last topic that you viewed.

**Forward.** The Forward button will only have an effect after you use the Back button. If you click it, the Help window will display the topic you viewed BEFORE you clicked the Back button.

**Home.** This will take you to the Kovac Software web site. [www.kov.com](http://www.kov.com).

**Print.** This will print the current topic.

**Options.** This will be display a popdown list of options. See below.



**Hide Tabs.** Hides the contents tab. If you select this, the contents tab will be hidden. TA Show button will then replace the button. Select this to show the contents tab.

**Back.** This will be taken to the last topic that you viewed.

**Forward.** The Forward button will only have an effect after you use the Back button. If you click it, the Help window will display the topic you viewed BEFORE you clicked the Back button.

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**Home.** This will take you to the Kovac Software web site. [www.kov.com](http://www.kov.com).


**Stop.** Stops search.

**Refresh.** Updated the information pane.

**Internet Options...** Sets Internet options. See your Internet Explorer Help System.

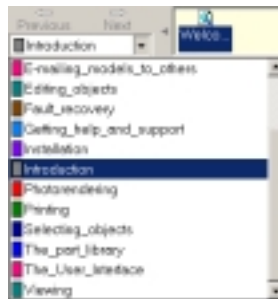
**Search Highlight On/Off.** Turns On/Off Highlighting text in displayed topics.

## Browse sequences

Many topics in the Active3D Help System are part of an overall "stream" of information. For example, there are several topics that cover how to start a form. These topics are part of the "Starting a Design" Browse Sequence, which you can read from beginning to end without having to click a hyperlink. Simply use the Previous and Next buttons (  ) to flip through the related information as if you are turning pages in a book.

Selecting a Browse Sequence

You can choose from the defined Browse Sequences by clicking the drop-down list and making a selection. This list is found just to the right of the Navigation Pane in the Help window.



After you make your selection, the Information Window will display the first topic in the selected sequence.

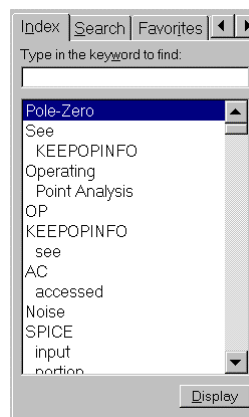
### Using the Browse Sequence Map

The Browse Sequence Map shows you where you are within a specific sequence. You can open a topic by clicking it on the map. If the Browse Sequence contains a lot of topics, use the arrows at either end of the map to navigate through the entire sequence.



## Using the index

The index pane allows you to browse through a list of keywords and find the topics that will contain relevant information.



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You can find a keyword by scrolling through the list or typing it in the Type in the keyword to find: field. Then double-click the keyword or select it and click the Display button. If the keyword applies to just one topic, the topic it will be displayed immediately otherwise if the keyword applies to more than one topic, you'll be prompted to choose which one you would like to see.

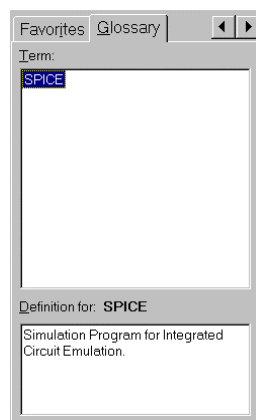
## Saving and viewing your favorite topics

The favorites tab holds all you favorite or frequently used topics.



## The Glossary

The Glossary is a list explaining important terms, acronyms, and technical jargon.



If you come across a word or acronym in the Help Topics that you don't understand, then check for a definition in the Glossary. The topic you are reading in the Information pane of the Help window will remain visible while you are searching for it.

## Printing the help information

Click the **Print** button in the Navigation bar.

## Glossary

arc

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A curved line.

**bmp**

Bitmap, a rasterized graphic format in which the image is represented as a combination of dots. The TIFF and JPEG formats are variants of the bitmap file type.

**cancel**

To place your cursor over an object, toolbar button, menu, or other screen item and press the left mouse button.

**cut**

copy 1 or more objects to the clipboard and then delete them (not from the clipboard). They can then be pasted.

**ellipse**

A squashed circle.

**footprint**

A collection of pads and silkscreen graphics representing a physical component. It defines the electrical points to route to.

**grid**

A design aid that helps you place objects on your sheet. The Snap to Grid function, when enabled, causes objects to "jump" to the nearest grid point. This function can also help you draw perfectly straight lines and round circles.

**group**

Arrange a collection of objects so that they act as a single object. They move together, are all selected together.

**hover**

To place your cursor over an object, a toolbar button, or a menu item without actually clicking.

**jpeg**

Joint Photographic Experts Group, a rasterized graphic format.

**left click**

To place your cursor over an object, toolbar button, menu, or other screen item and press the right mouse button.

**OK**

The OK button on a dialog box confirms any changes or commands you have initiated.

**paste**

to copy/add (paste) objects from the clipboard onto a sheet.

**PCB**

Printed Circuit Board

**png**

Portable Network Graphic, a 48-bit graphic format designed especially for online viewing and endorsed by the World Wide Web Consortium (W3C).

**properties**

The characteristics that define an object.

**right click**

To place your cursor over an object, toolbar button, menu, or other screen item and press the right mouse button.

**shortcut**

A keyboard combination that acts as a 'shortcut' for a command.

**snap**

force a point to 'snap' to a regular grid

**thumbwheel**

The rotating wheel in the middle of some mice.

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**tiff**

Tagged Image File Format, a rasterized graphic format.

**toolbar**

A group of buttons on a dialog box

**wmf**

Windows MetaFile, a 16-bit graphic format typically used for vector drawings.

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