Tutorial 0.0: Introduction Tutorial

GridPro contains a number of highly advanced techniques that will dramatically improve your productivity while ensuring the creation of a high quality hexahedra grid. To take advantage of these techniques the user must know the basics on how to navigate within GridPro. The remaining tutorials will be dedicated to grid generation.

GridPro Layout

Sub-Menus

Like many software packages on the market, GridPro contains a GUI that allows the user easy access to all of its functions. The Sub- Menus are located on the top of the GUI. The details of the functions accessible by the GUI will be covered in later tutorials but a general description of GridPro menus and command panels are as follows:

|	
exit	: To quit the program
surf	: To load, reload and delete various surfaces
topo	: For creating topology, surfaces, starting and restarting the grid generation process and to interactively change the grid density.
grid	: Load, reload and delete the grid
dim=3/2	: Set GridPro in 2 or 3 dimensions
corn=C/S	: Allows you to place topology points on the surface or the Cut Plane
read=N/D/A	: Allows you to automatically read the grid into GridPro for display
panel=T/G/S/P	: Allows you to switch modes. T is for topology generation, G for grid viewing, S for minicad and P for setting grid properties (boundary conditions, etc.)
pty=PDC	: Allows you to select the solver to which the mesh has to export.
c=0/1	: Allows the user to invert the graphics colour
special	: To use some of the advanced tools
help:short / long	: Allows you to read through the help of each option.

Sub-Command Panel

On the right hand side of the GUI is the **Command Panel.**
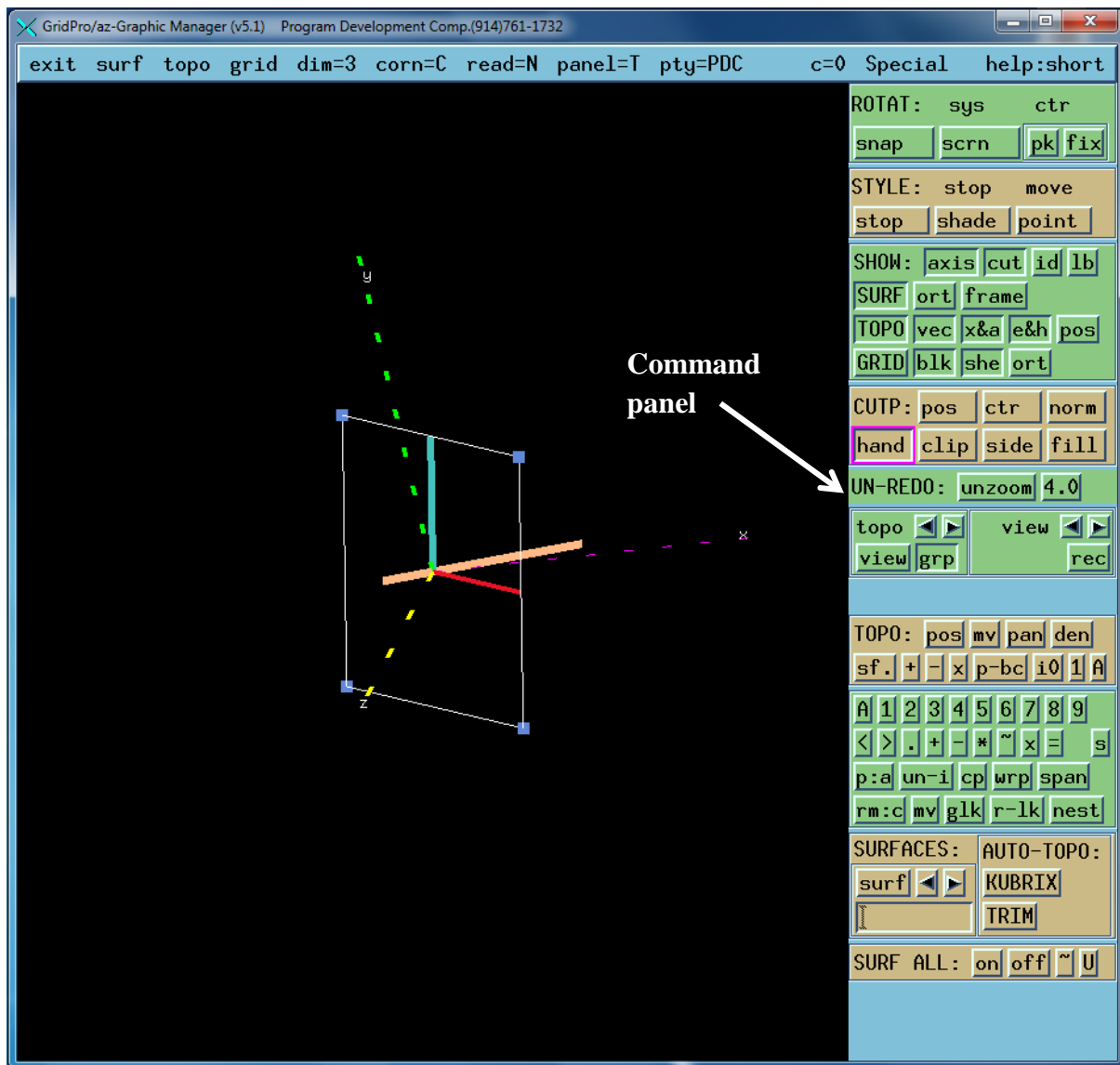
These are the names and basic functions of each Sub-Command panel. The details of the sub-command panel functions will be discussed in later tutorials.
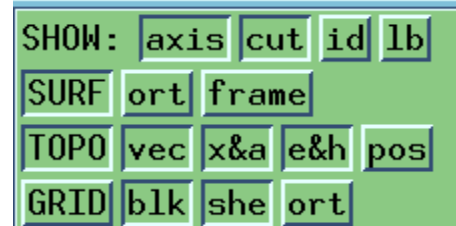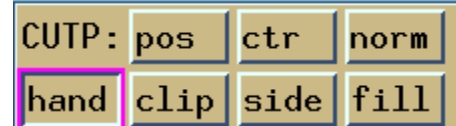
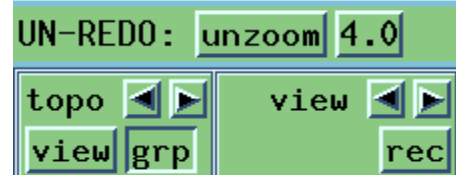Rotate, snap and screen pick functions ⟶
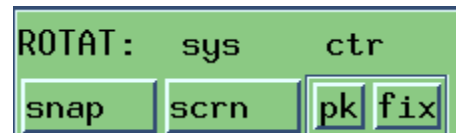
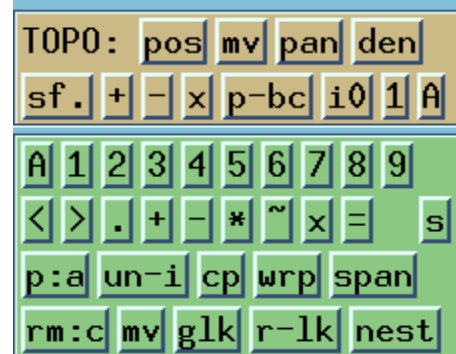Display style ⟶

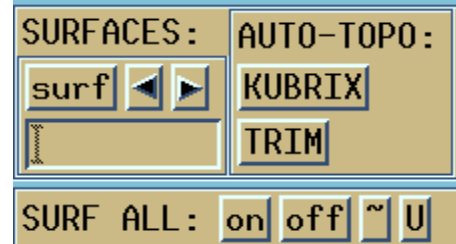CAD surface and topology display options ⟶

Cut plane display options ⟶

Topology backup function ⟶

Topology builder panel ⟶

Surface display ⟶

ROTAT: sys   ctr
snap | scrn | pk | fix

STYLE: stop   move
stop | shade | point

SHOW: axis | cut | id | lb
SURF | ort | frame
TOPO | vec | x&a | e&h | pos
GRID | blk | she | ort

CUTP: pos | ctr | norm
hand | clip | side | fill

UN-REDO: unzoom | 4.0
topo ◄ ►   view ◄ ►
view | grp   rec

TOPO: pos | mv | pan | den
sf. | + | − | x | p-bc | i0 | 1 | A

A 1 2 3 4 5 6 7 8 9
< > . + − * ~ x =   s
p:a | un-i | cp | wrp | span
rm:c | mv | glk | r-lk | nest

SURFACES: AUTO-TOPO:
surf ◄ ►   KUBRIX
[   ] TRIM

SURF ALL: on | off | ~ | U

Manoeuvring in GridPro

        In order to build topology the user must know how to manoeuvre inside of GridPro. A three button mouse is needed to manoeuvre inside of GridPro, an optional three button mouse with the middle as a scroll can also be used. Go to the **Introductory Tutorial** directory and double click on the **intro_tut.fra** file and the GUI will start. If you are in the directory of the command prompt you can start the GridPro GUI by typing in az and loading the topology and surfaces by going to the **topo/TIL Read** sub-menu at the top
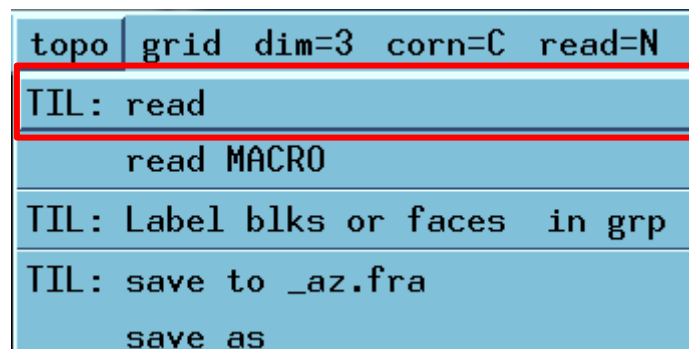
and reading in the **intro_tut.fra** file. The surface should appear on the screen as in the below picture:
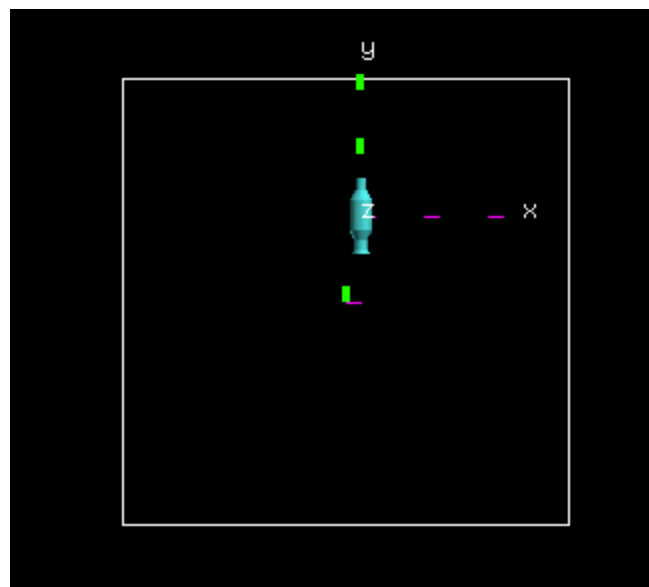
The three mouse buttons enable you to move the surface into position, these are the buttons and their function:

Left : Allows you to translate the surface in any x,y,z direction
Middle : By holding down the middle mouse button (or scroll)
**Right** : Zoom by holding down the right mouse button and dragging a box around the zoom area.

Zoom in on the surface by clicking on the right mouse button and dragging a box around the desired zoom location, in this case, the surface. Use the middle mouse button to rotate it in an isometric view. You should see the **surface**, the **Work-Plane** (called the Cut-Plane in GridPro) and t**wo coordinate systems**.
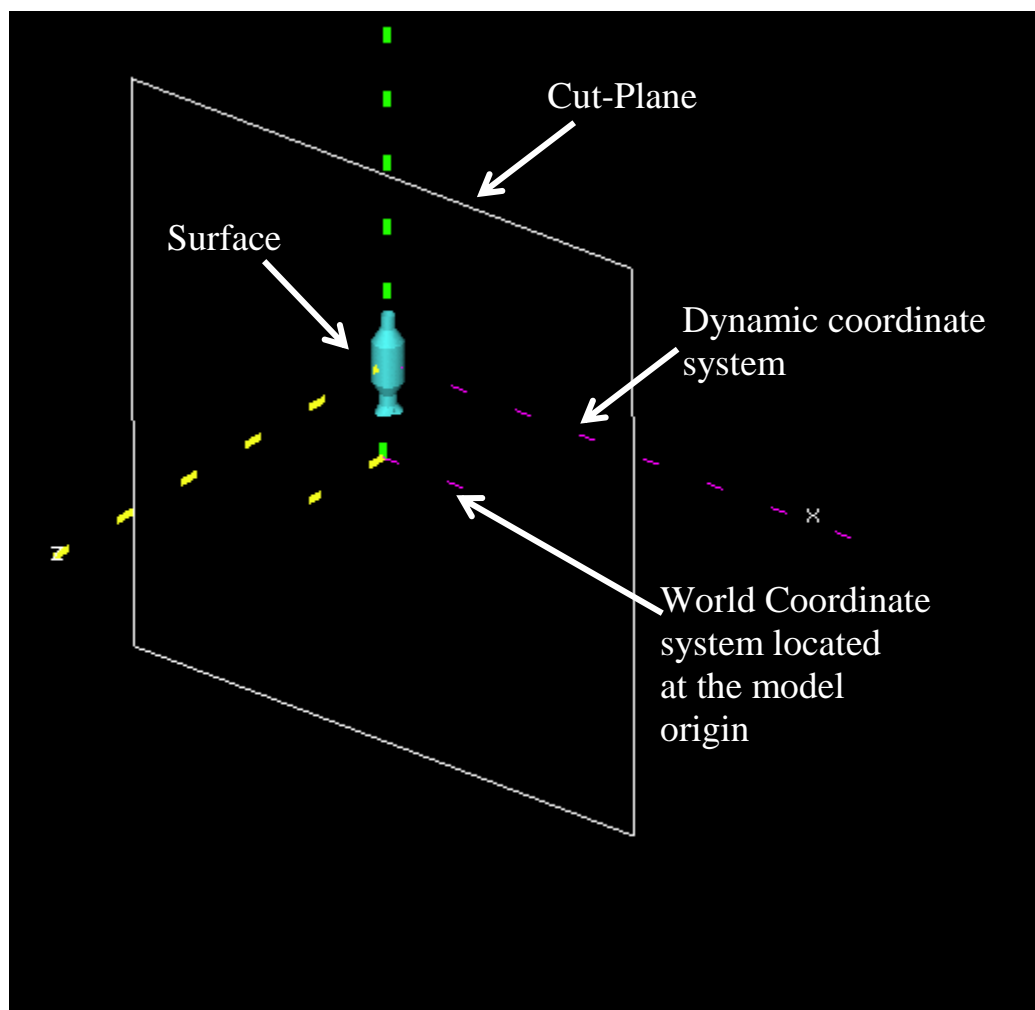
Coordinate Systems: GridPro automatically displays two coordinate systems. The **Dynamic Coordinate System**, which by default is located in the centroid of the model or surface. It can be moved to any location within GridPro and is always the default point of rotation. The **World Coordinate System** always remains static at the model origin.

Cut-Plane: The Cut-Plane is an infinite plane in space that is primarily used to create topology. How to orient the Cut-Plane in space will be discussed below.

Let's learn how to change the location of the Dynamic Coordinate system. Zoom in on the top of the model and click on the **pk** button in the **Rotate** sub-command panel
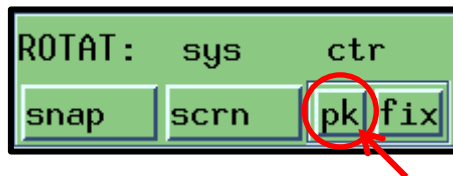

and then click on the top edge of the model as in the picture below.


Click here with left mouse button
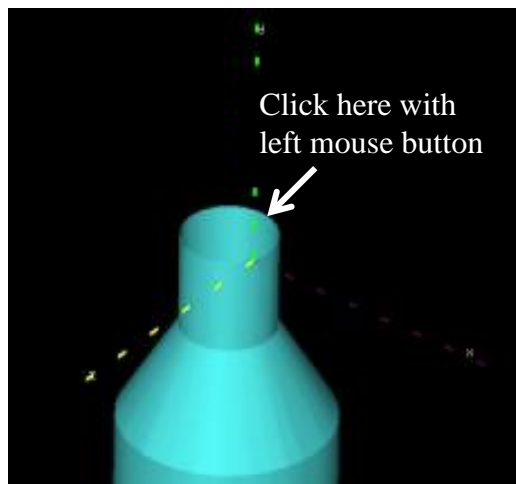
Now click and hold the middle mouse button, and as you can see, the model will rotate about the **Dynamic Coordinate System**.

Introduction to the Cut-Plane:

The cut plane is used primarily to make topology and will be covered starting from **Tutorial 1**. For now, it is important to learn the characteristics of the Cut-Plane. Turn on the Cut-Plane axis and handles by clicking on the **hand** button in the CUTP sub-command panel on the right:
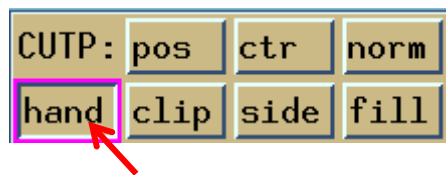
The axis and handles will be turned on as in the below picture.
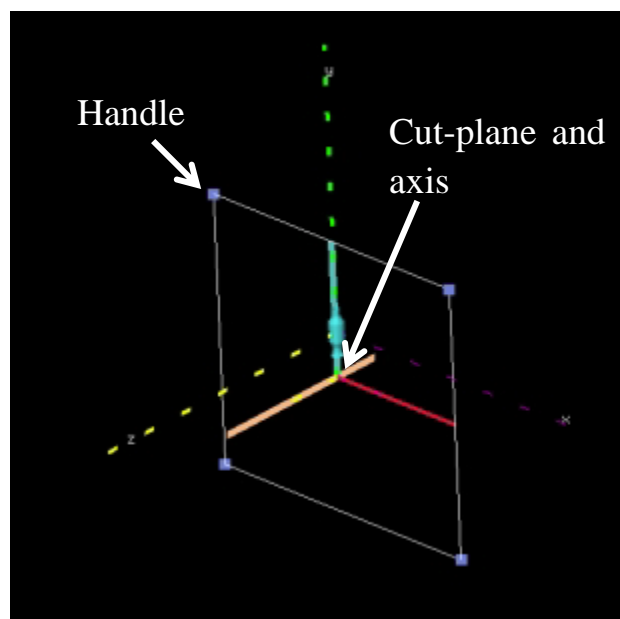
These are the definitions of the axis:

**Z-axis :** Orange; always located perpendicular to the plane
X-axis : Red
Z-axis : Light blue

The colours always remain constant and the default position is always at the model origin.
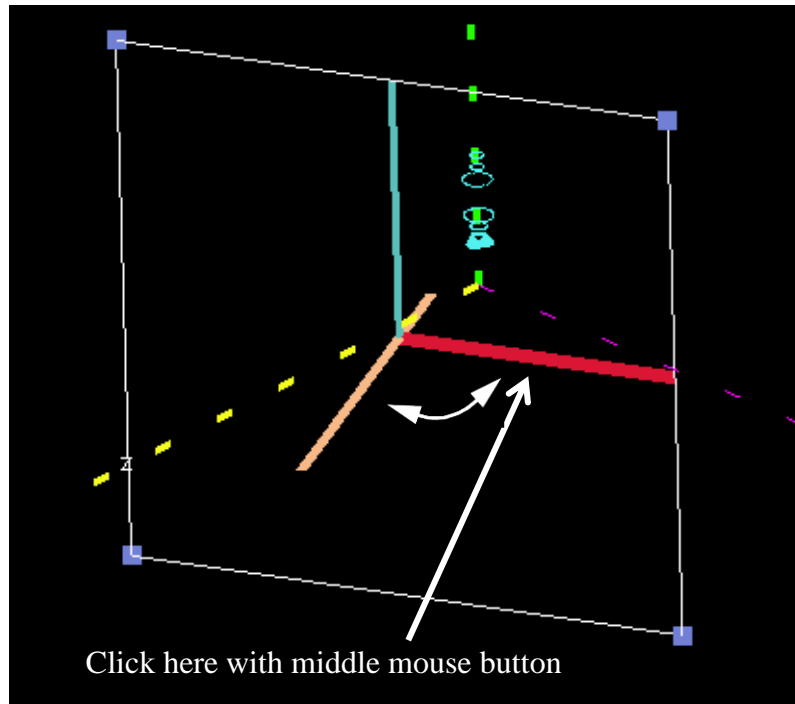
Moving the Cut-Plane along an axis:

Many techniques exist in GridPro to move the Cut-Plane. Let's move the **Cut-Plane** along the z-axis, to move it along an axis move the your mouse button over the axis, hold down the left mouse button and drag it back and forth as in the picture below.
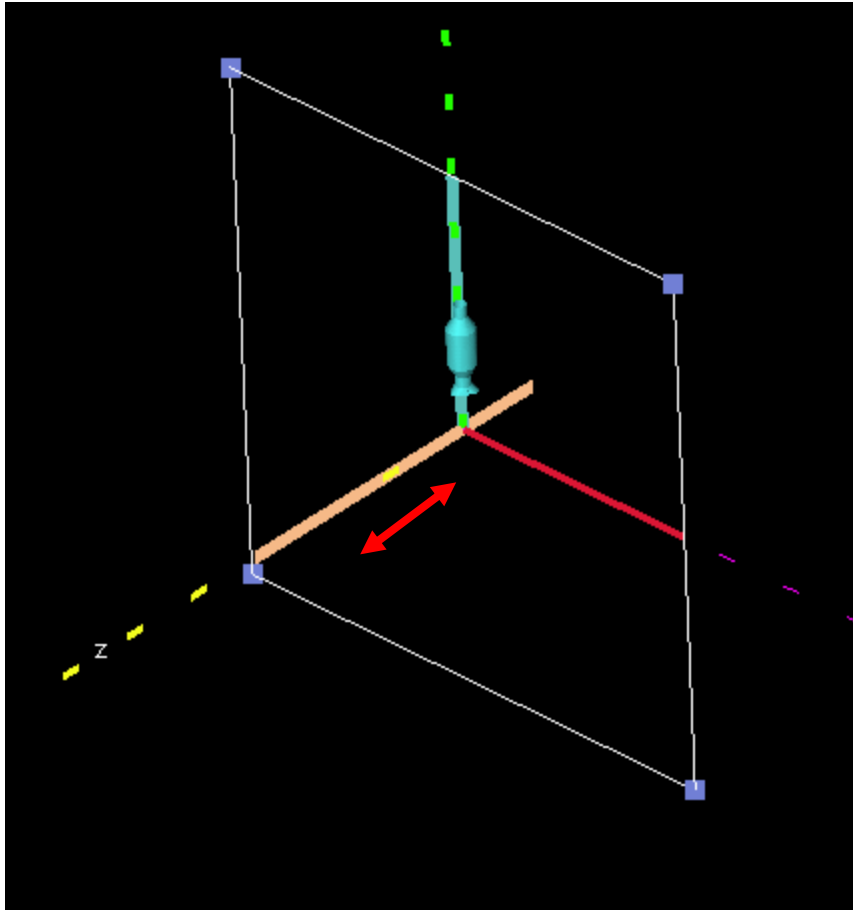
If you drag the Cut-Plane along the z-axis it will move parallel, if you drag it along the x or y axis the movement is arbitrary.

## Rotating the Cut-plane about and axis:

The Cut-Plane can also be rotated. Let's rotate the Cut-Plane about the y-axis (the blue axis). Click on the y-axis once with the left mouse button and it will become thinner than the other axes. Now click and hold down the middle mouse button on the x-axis (red axis) and move it back and forth and the Cut-Plane will rotate. See the below picture.

Click here with middle mouse button

The Cut-Plane can be rotated about the other axes using the same procedure.

Resizing the Cut-Plane:

The Cut-Plane can also be resized by grabbing and moving the handles. Place the mouse over the blue box at the upper right hand corner of the Cut-Plane and drag it diagonally and it will be resized accordingly, see the below picture.

Click here with left Mouse button
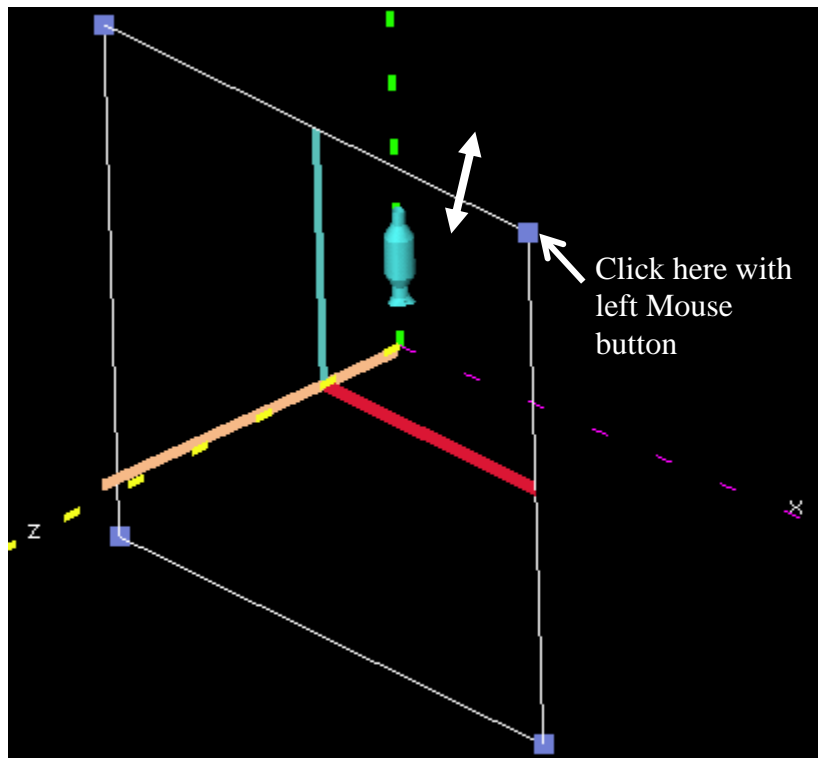
Positioning the Cut-plane:

The coordinate system can also be positioned precisely by clicking on the pos button in the CUTP sub-command panel on the right, a window will pop up where you can place the x,y,z coordinates.
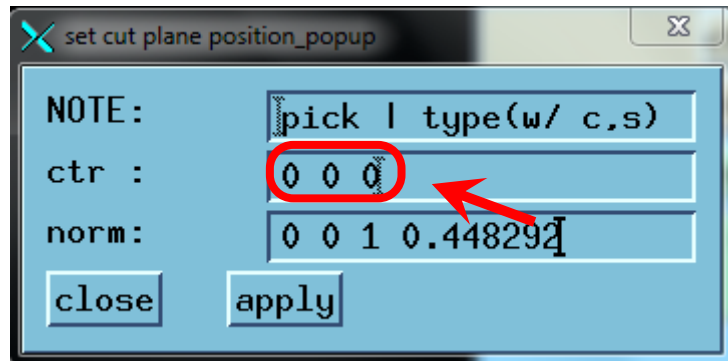
The Cut-Plane can also be placed on the surface. Turn on the hidden line removal display by clicking on HLR in the STYLE subcommand panel as in the below picture.
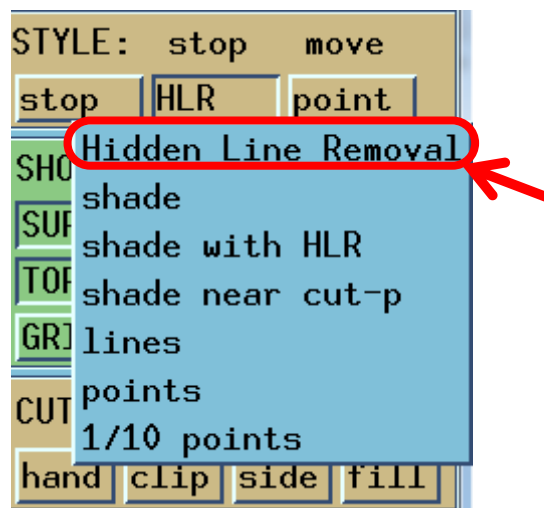

In order to place the Cut Plane on the surface you must change the mode to triangle format. Go to the surf/reload current sub-menu at the top and change the type from auto to tria and hit apply at the bottom of the popup menu:
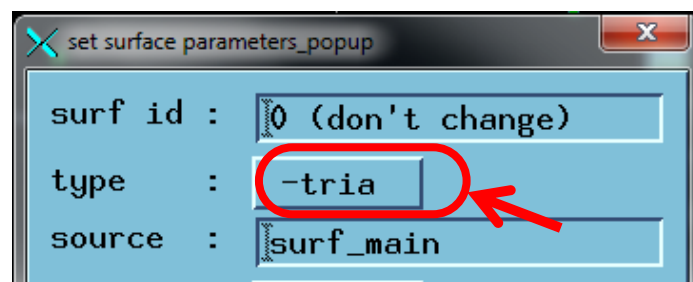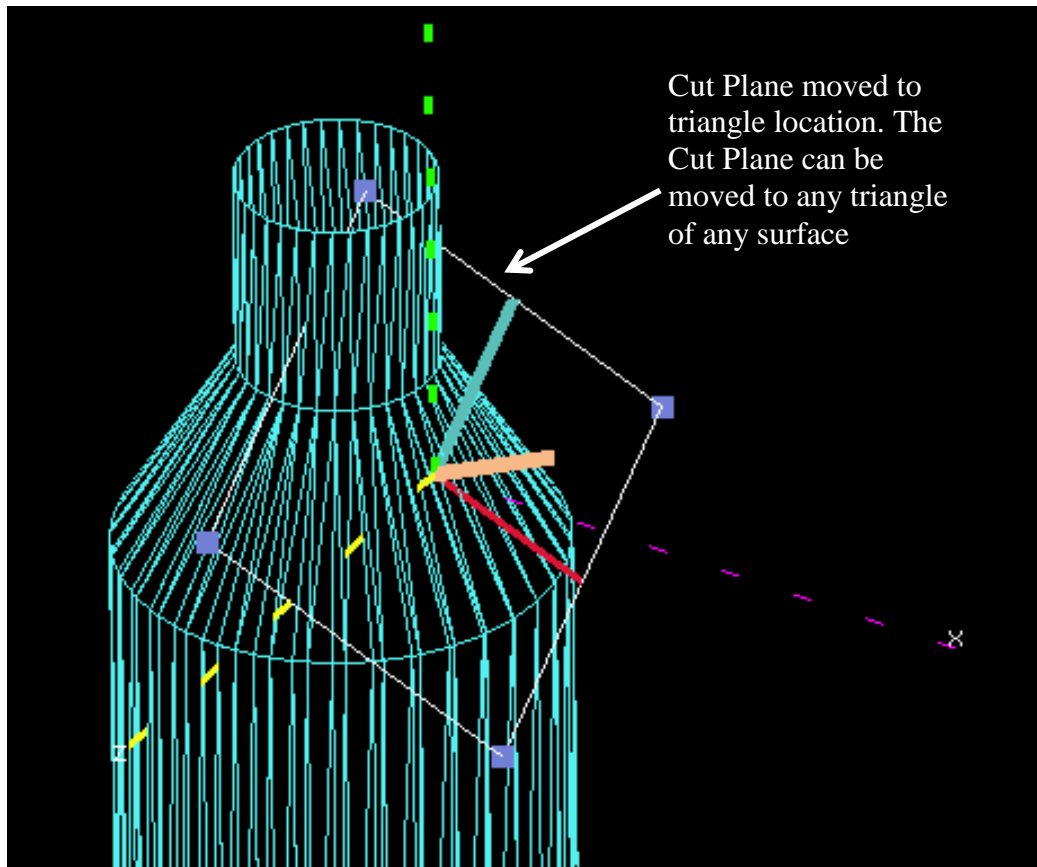

Now click on the pos button in the CUTP sub-command panel again and click on a triangle on the surface, zoom in if necessary. The menu will automatically load up the

triangle centroid coordinates. Click on apply and the Cut Plane will automatically be moved to the centroid of the triangle with the z-axis aligned with the triangle surface normal. The surface must be the current surface and highlighted in light blue for this procedure to work.
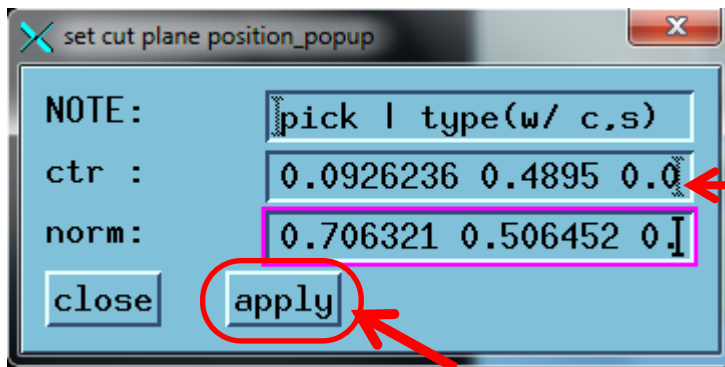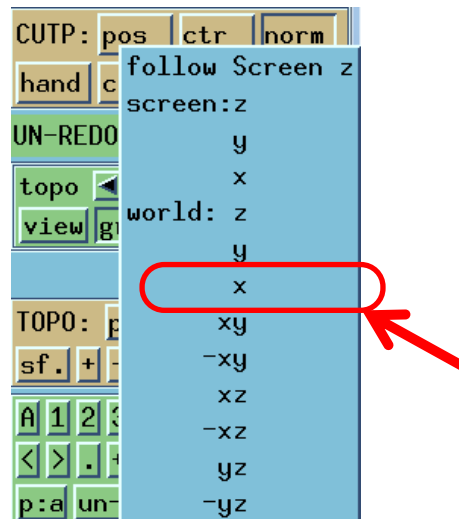

Center automatically loaded

Cut Plane moved to triangle location. The Cut Plane can be moved to any triangle of any surface
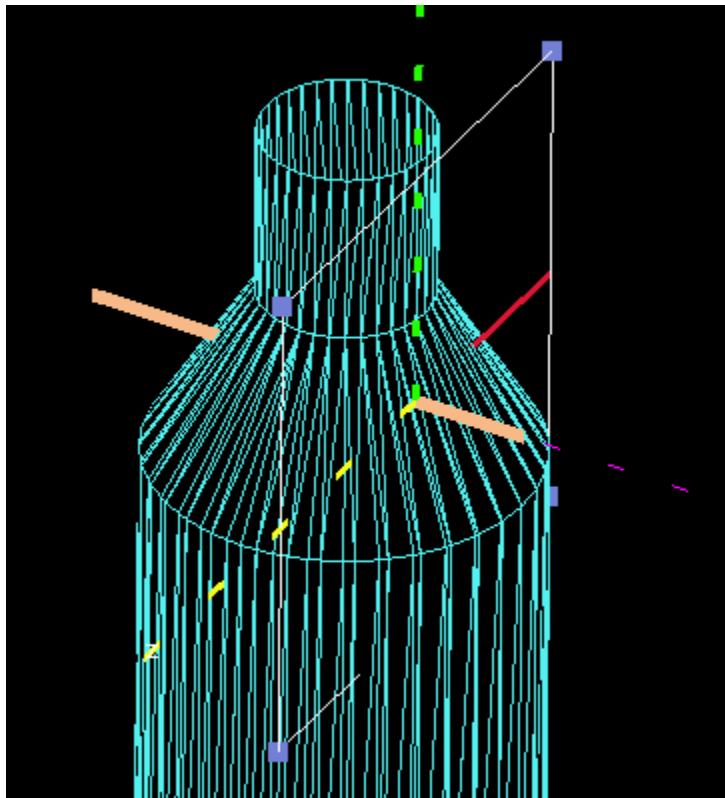
Snapping the Coordinate System:

The Cut-Plane coordinate system can be snapped along any of the World Axes. Let's snap it along the World X-Axis, click on the norm button in the CUTP sub-command menu and choose world: x as in the picture below.


Notice that the Cut Plane is aligned along the world x-axis and has remained on the triangle centroid.
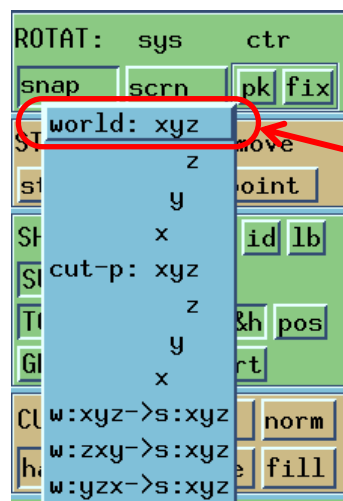

The Cut Plane can also be snapped to the Screen x-axis by choosing screen: x. The screen axes are defined in reference to the computer screen position and always remain fixed.

The positive x-axis points to the right (East), the positive y-axis is straight up (North) and the z-axis is perpendicular to the screen pointing straight at the user. By choosing the screen: x the axis will be displayed as shown in the picture below:

Cut Plane aligned along the screen x-axis
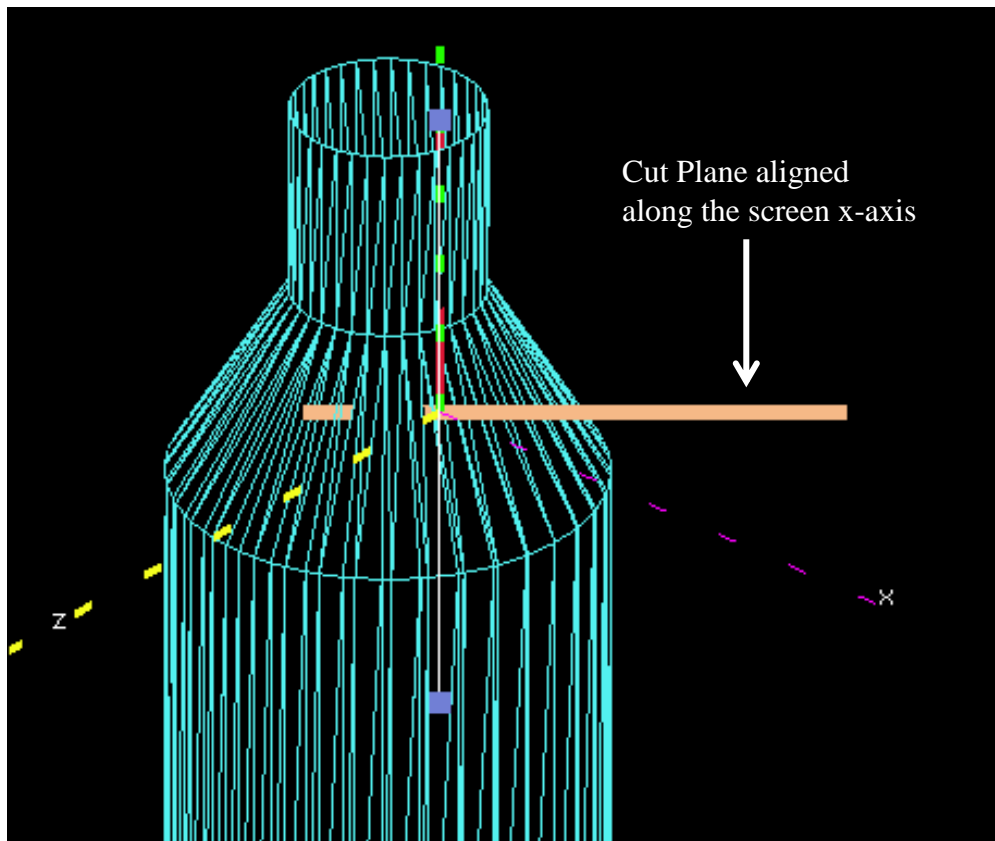
Global Snapping

The model can also be snapped along the global axis which would be equivalent to snapping to a top, side and front view in a CAD package. Snap the view to the x-y plane by clicking on the **snap** button in the **ROTATE** sub-command panel and choosing **world:xyz**.

The model will snap to the closest plane. For example, if the model is rotated closer to the x-y plane (side view) as compared to the x-z plane (top view) the view will snap to the x-y plane and vice-versa.
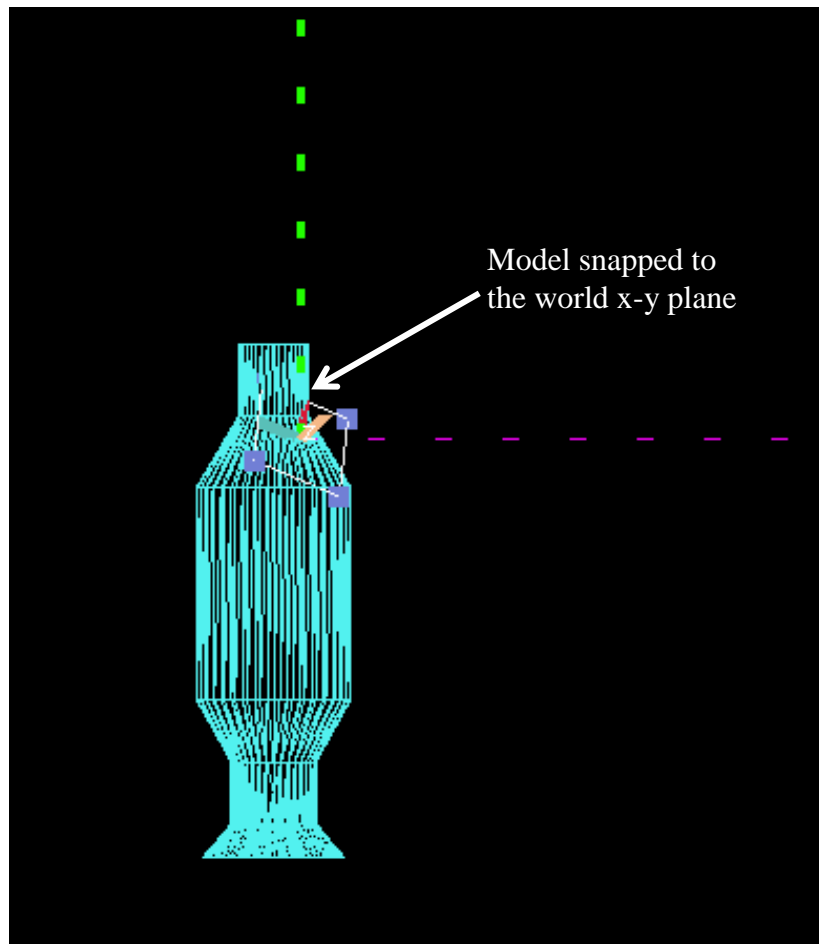
The view can also be snapped to the Cut Plane axis by choosing **cut-p: xyz** in the same menu.

Clipping:

The Cut Plane can be used to clip the model for viewing purposes. Turn on the **shade** in the **STYLE** sub-command panel and go to the CUTP sub-command panel and click on the **clip** button. The clip can be reversed by clicking on or off the **side** button.

Cut Plane is used to clip the model for viewing only