

Cut Section

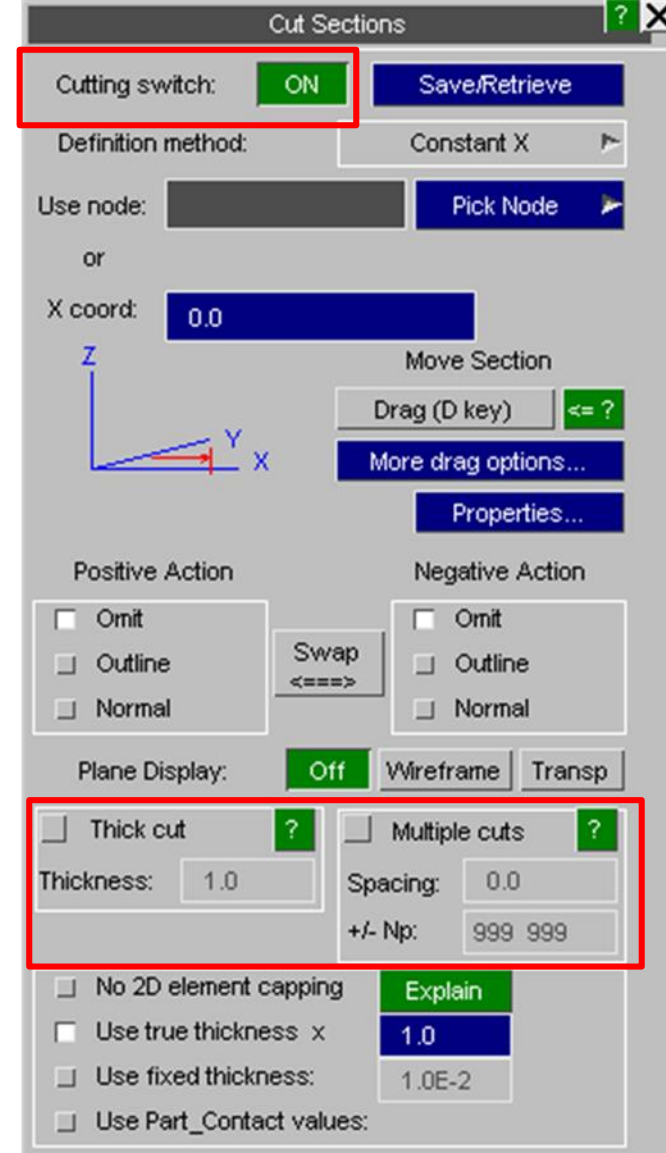
Model courtesy of the NHTSA website: www.ncac.gwu.edu

What is Cut Section?

- A cut section, sometimes referred to as a “cutting plane”, is a flat plane that cuts through the model.
- A cut section may be located anywhere in space and oriented at any angle.
- Cut sections allow users to more easily investigate model contents.
- The cutting plane can be easily turned on/off as well as modified/dragged through the model interactively.

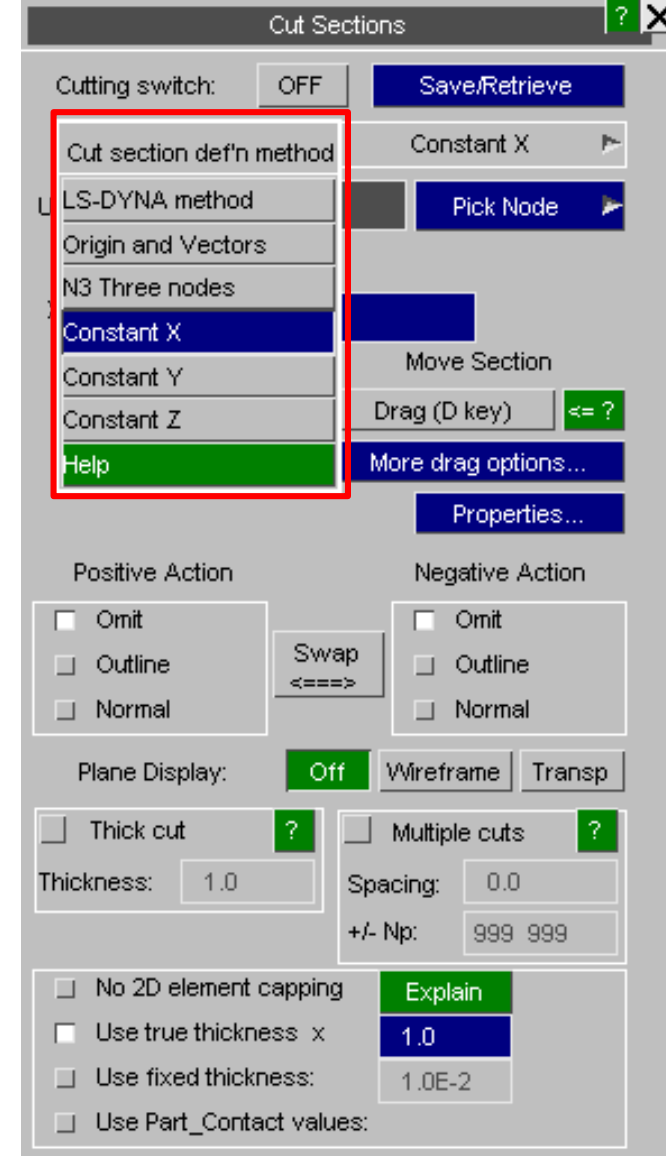
Cut Section Options

- “Cutting Switch” turns on/off the cut section.
- Using the “Thick cut” button allows the user to define “slice” through the model of a particular width.
- By default only a single cut section plane is drawn, but the user can choose to have multiple parallel cuts drawn on the structure.



Defining a Cut Section

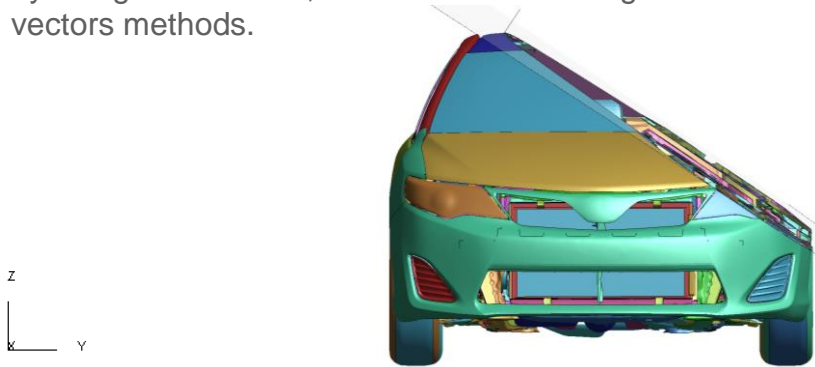
- There are 6 possible methods to define a cut section:
 - LS-DYNA method – Origin Coordinate, normal vector (N) 'head' coordinate, and in-plane axes.
 - Origin and Vectors – Define an origin coordinate, normal vector and in plane vector.
 - N3 Three Nodes – Nodes at the origin, head of normal vector and in the XY plane.
 - Constant X/Y/Z – Aligned with the global X/Y/Z axes with the origin at a given position on the axis.



Cut Section – Definition method

General Plane:

A general plane at any location/angle can be created by using the 3 nodes, LS-DYNA and the origin and vectors methods.



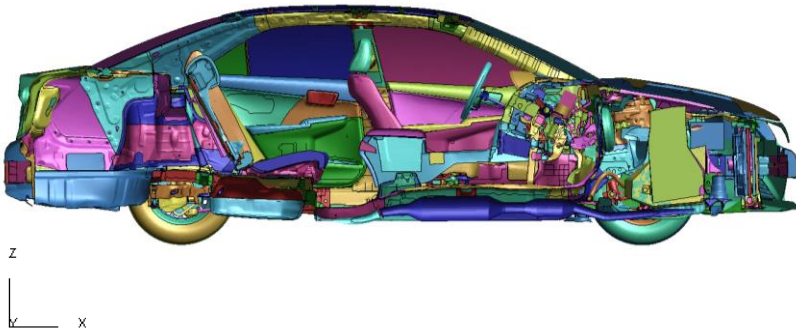
Constant X:

A node is picked where the cut section plane is formed along the x co-ordinate of the picked node.



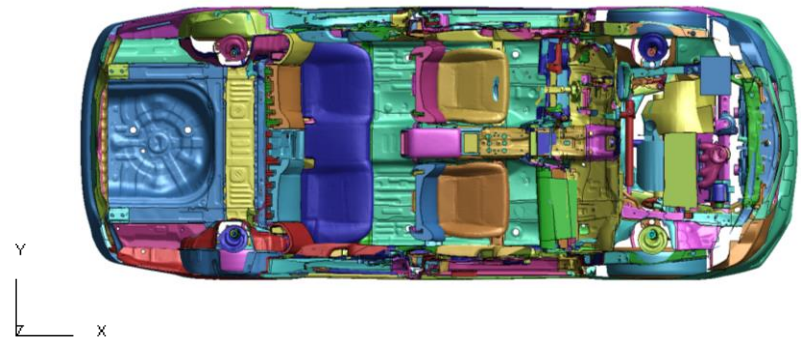
Constant Y:

A node is picked where the cut section plane is formed along the y co-ordinate of the picked node.



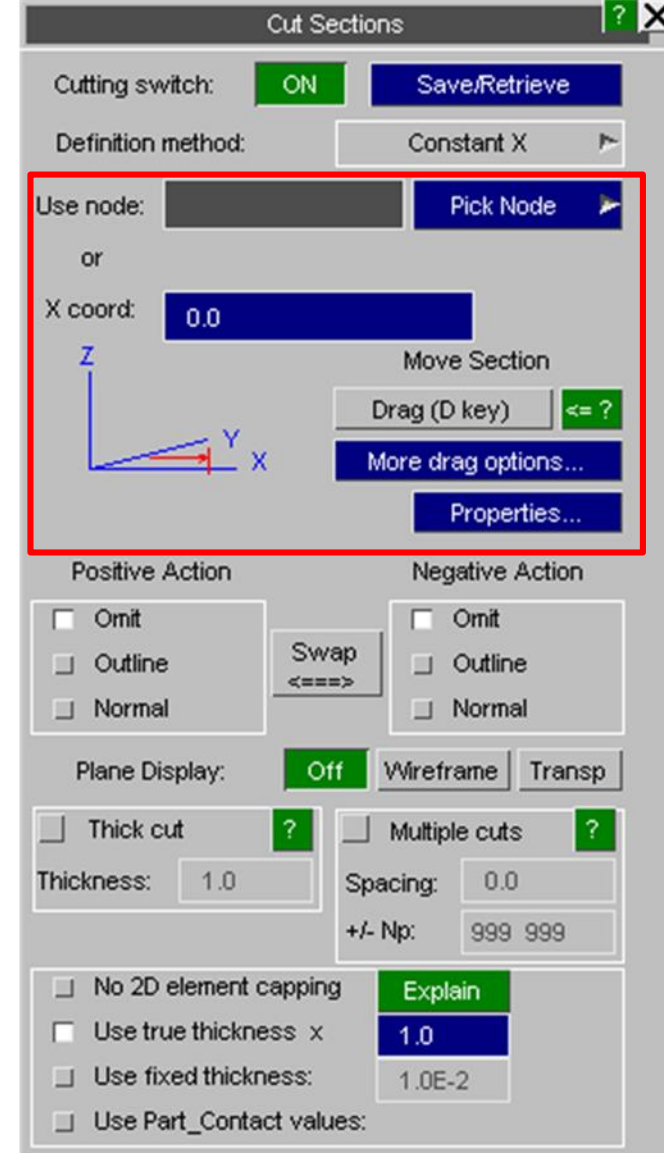
Constant Z:

A node is picked where the cut section plane is formed along the z co-ordinate of the picked node.



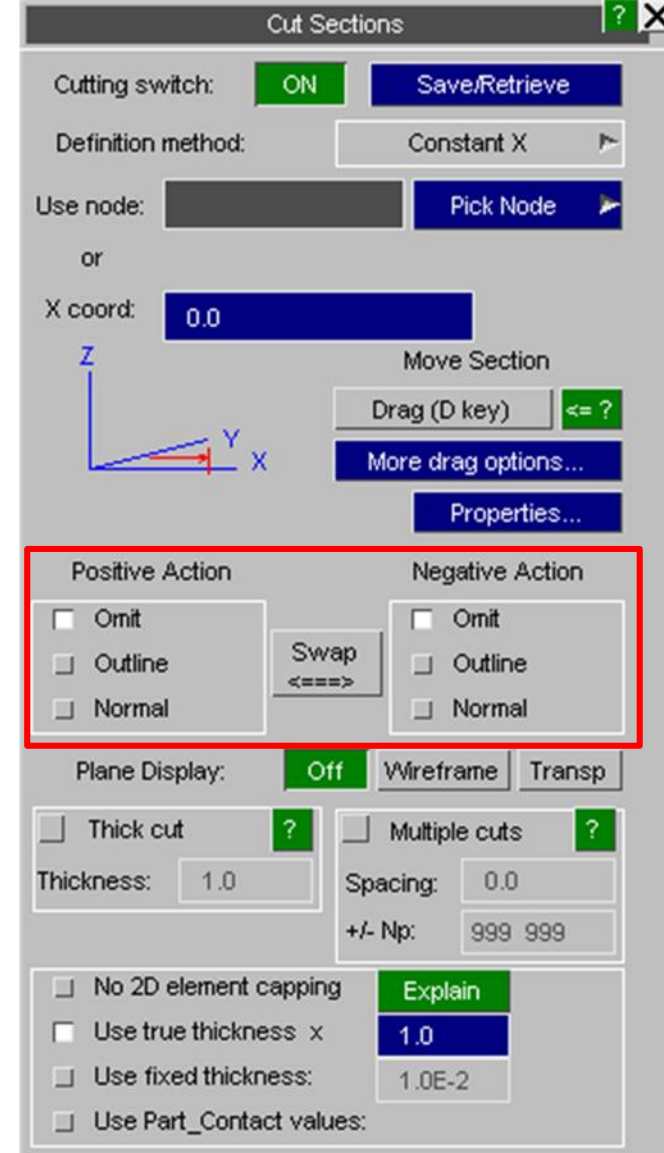
Dragging Cut Section

- The “drag” cut section operation allows the user to translate the cut along the plane normal Z vector or to rotate it about its local X or Y axes.
- The default operation when dragging is invoked is:
 - Left mouse – Translate in plane local X.
 - Middle mouse – Rotates about plane local X.
 - Right mouse – Rotates about plane local Y.
- Other dragging degrees of freedom are available through “More drag options”.
- “Properties” will calculate various elastic and plastic properties based on the current cut section.



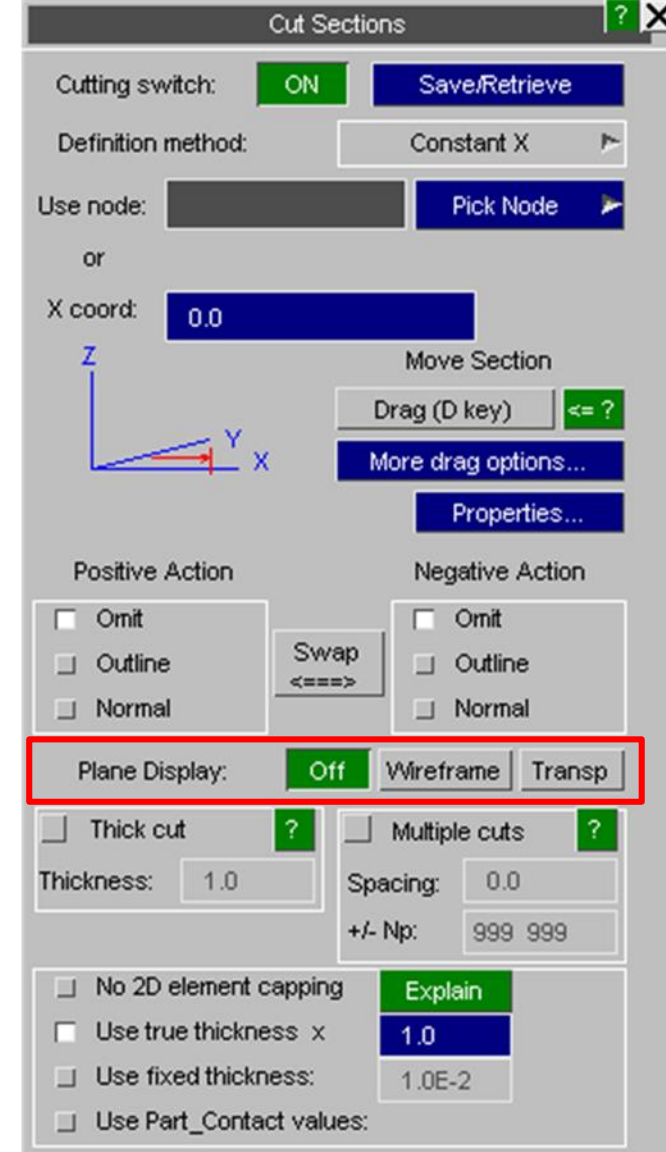
Positive and Negative Action

- This controls how the model on either side of the plane is rendered.
- By default the cutting plane itself is always rendered in the current display mode, but for each side of the cutting plane you must choose how the image is to be rendered:
 - Omit – means that it will not be drawn at all.
 - Outline – means that it will be drawn in a wireframe outline, in the edging mode of the current display mode.
 - Normal – Means it will be drawn in the current display mode.
- Note that “Swap” simply swaps the positive and negative display modes and redraws.



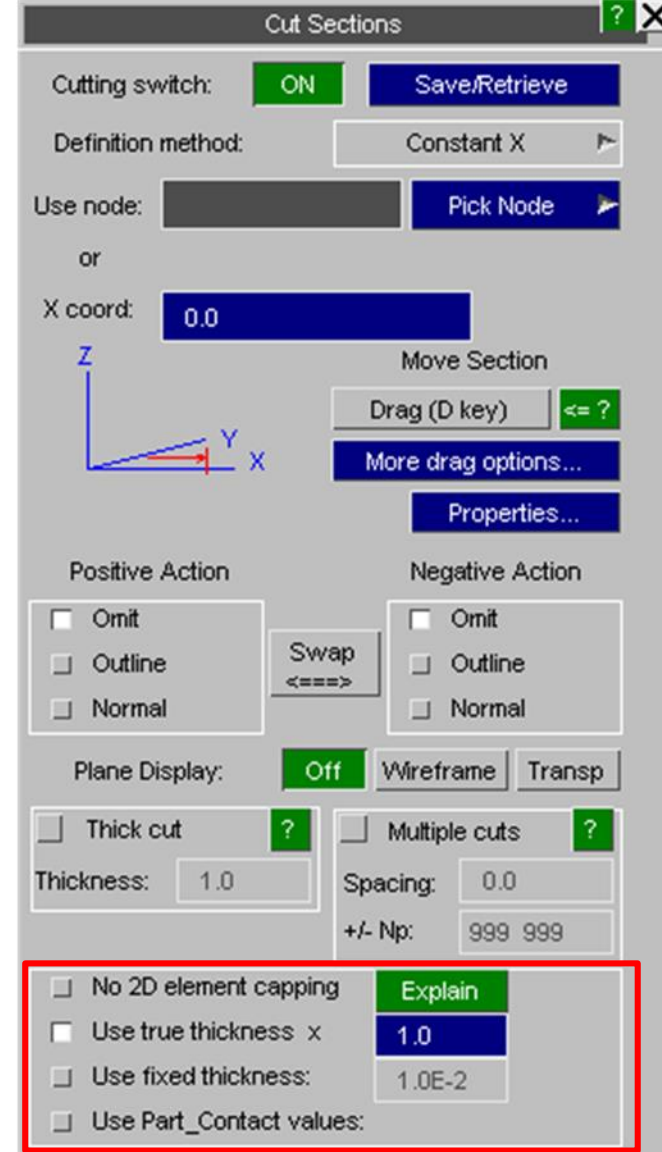
Plane Display

- This option displays how the plane itself is displayed. It is possible to draw the plane in one of the two modes:
 - Wireframe – Draws the plane boundaries and a diagonal as a wireframe overlay on the plot.
 - Transparent – Draws the plane as a partially transparent rectangle, occupying model space and intersecting the structure.



2D Element Capping

- 2D element capping controls how the cut edges of 2D elements (shells) are displayed.
- When shell elements are cut it is possible to draw their cut edges in three modes:
 - No 2D capping – The cut is simply displayed as a line but no thickness.
 - True thickness (x factor) – Extracts the true shell thickness, multiplies it by a user specified factor and uses that value.
 - Fixed Thickness – Uses a constant value of thickness in the model space units for all shells.
 - Use Part_Contact values – For shells on a Part Contact card contact thickness and scale factor are taken into account.





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