

# Cut Sections

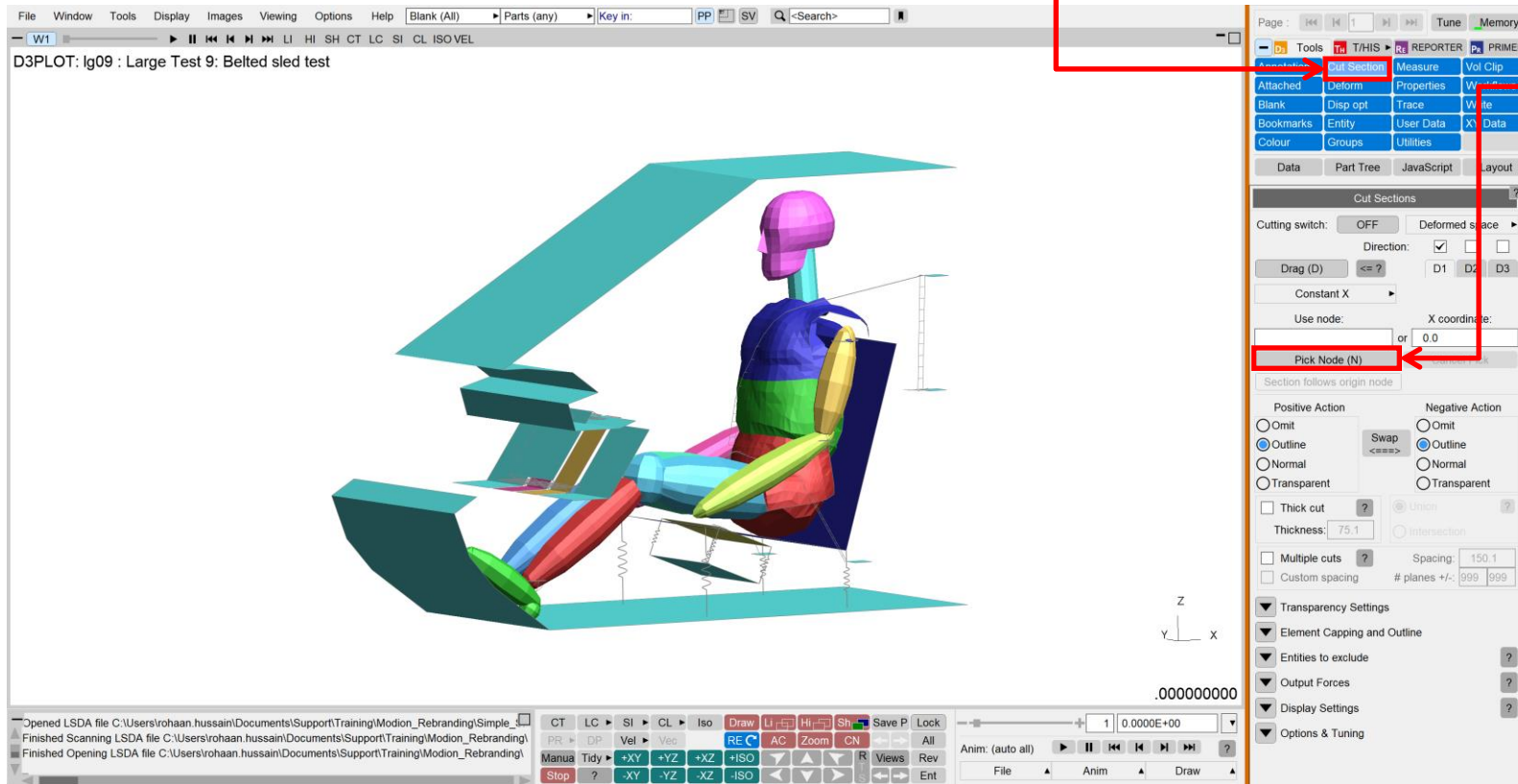


# Creating a Cut Section

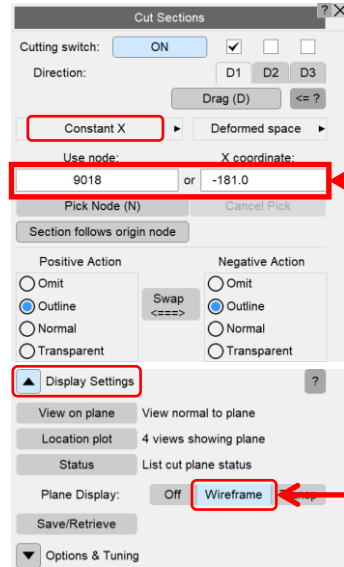
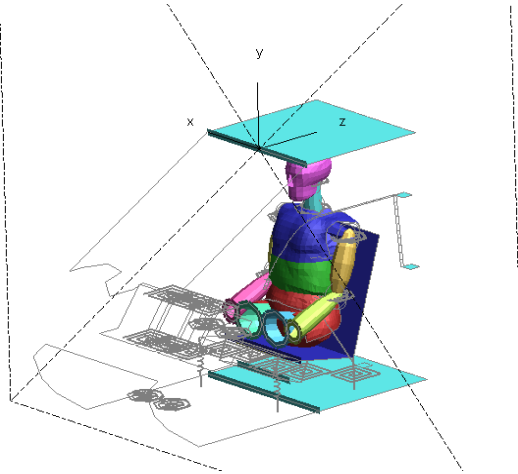
The Cut Sect menu can be accessed by either clicking the 'Cut Section' button within the D3PLOT menu or pressing the 'X' button on a keyboard.

1. To create a cut section click the 'Pick Node (N)' or press the 'N' button on a keyboard.

Then pick a node on the model...



# Creating a Cut Section

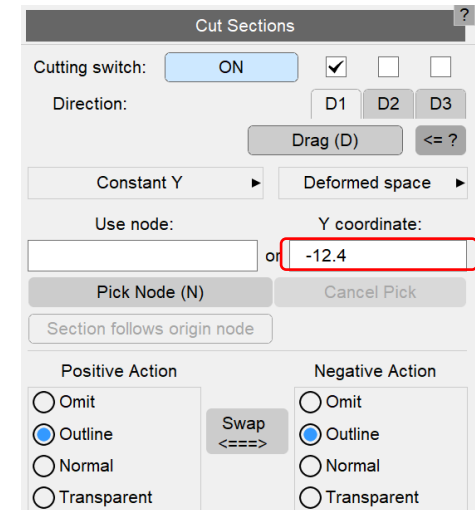
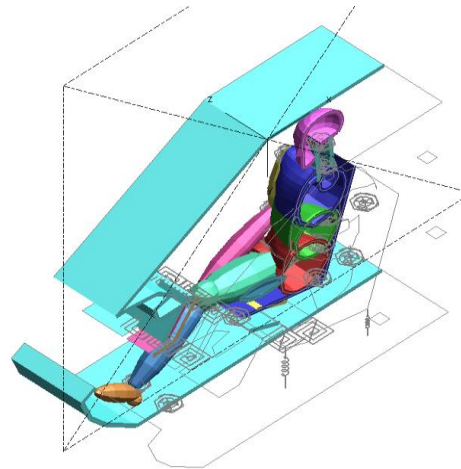


2. Chose the location of the cut plane.

e.g. Constant X generates the cut plane normal to the X-axis.

Plane display set to wireframe.

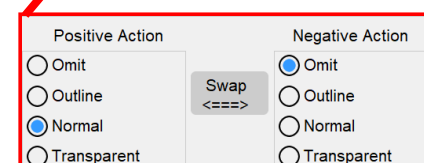
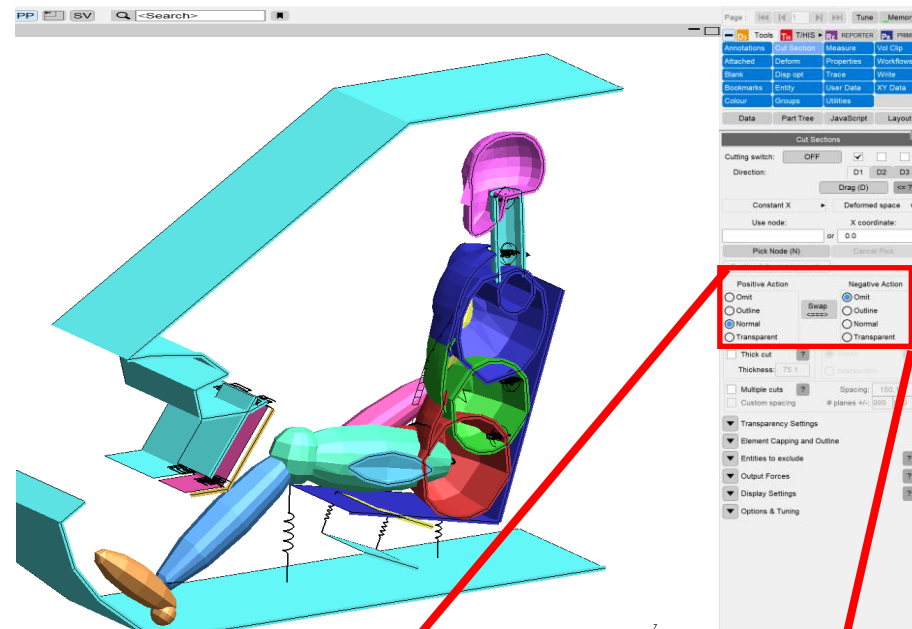
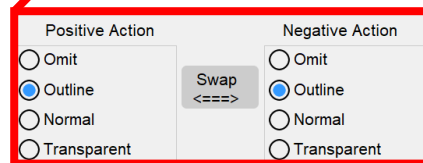
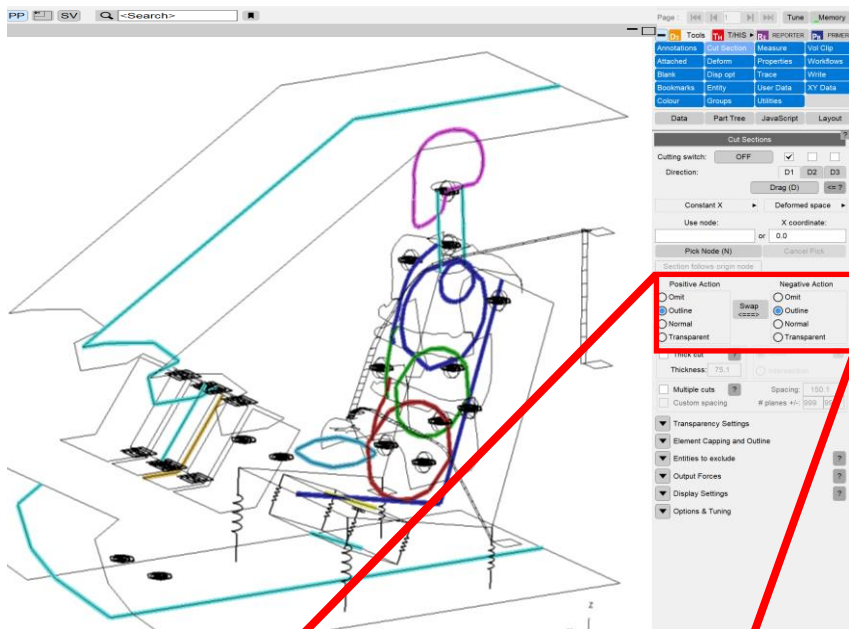
Constant X at node 9018



Constant Y at coordinate -12.4




# Positive and Negative Actions

- 3. You can choose the drawing style on either side of the cut plane ('Positive Action' and 'Negative Action').
- Omit: The mesh is not drawn at all.
- Outline: The mesh is drawn in "line" mode. The cut-plane is coloured.
- Normal: The mesh is drawn normally, with contoured data if applicable.

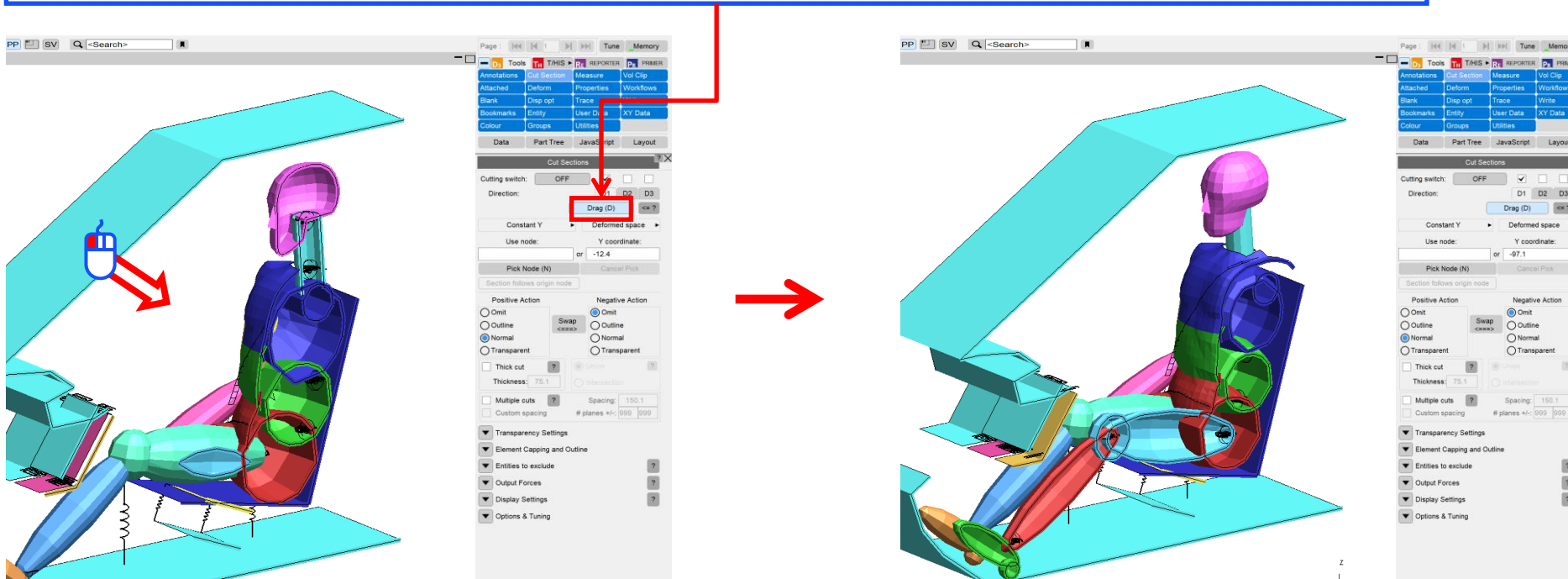


# Dragging

4. Click the 'Drag (D)' button or press the 'D' button on a keyboard. Then use the mouse to drag the cut section through the model.

-  translate
-  rotate about Y axis
-  rotate about Z axis

A new point can be chosen if needed by pressing the 'N' button on a keyboard, then picking a node.



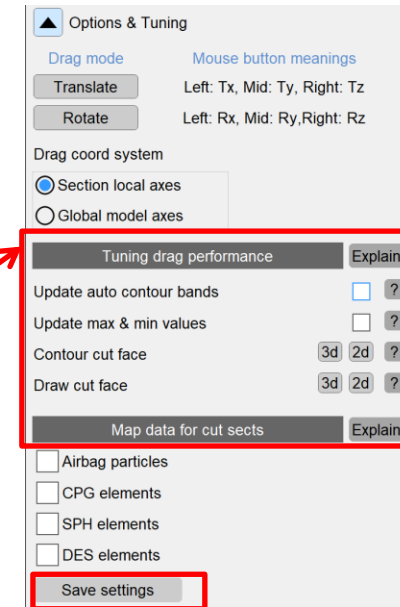
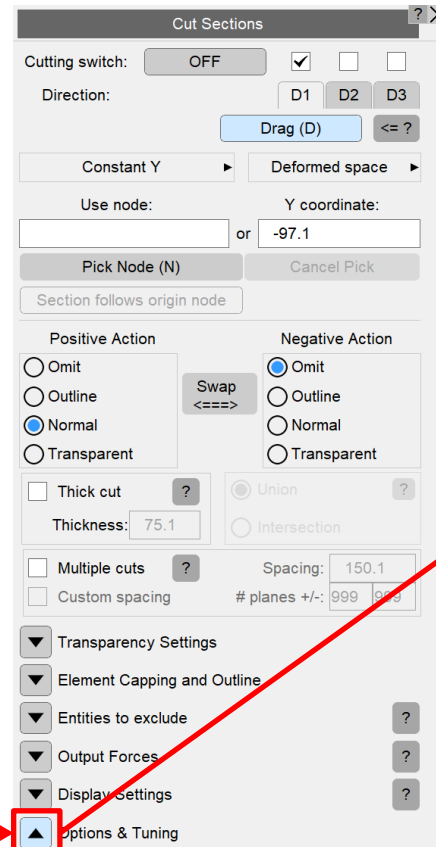
# Dragging with big models

The dragging of cut sections through big models while displaying contours can be sped up in the 'Options & Tuning' section.

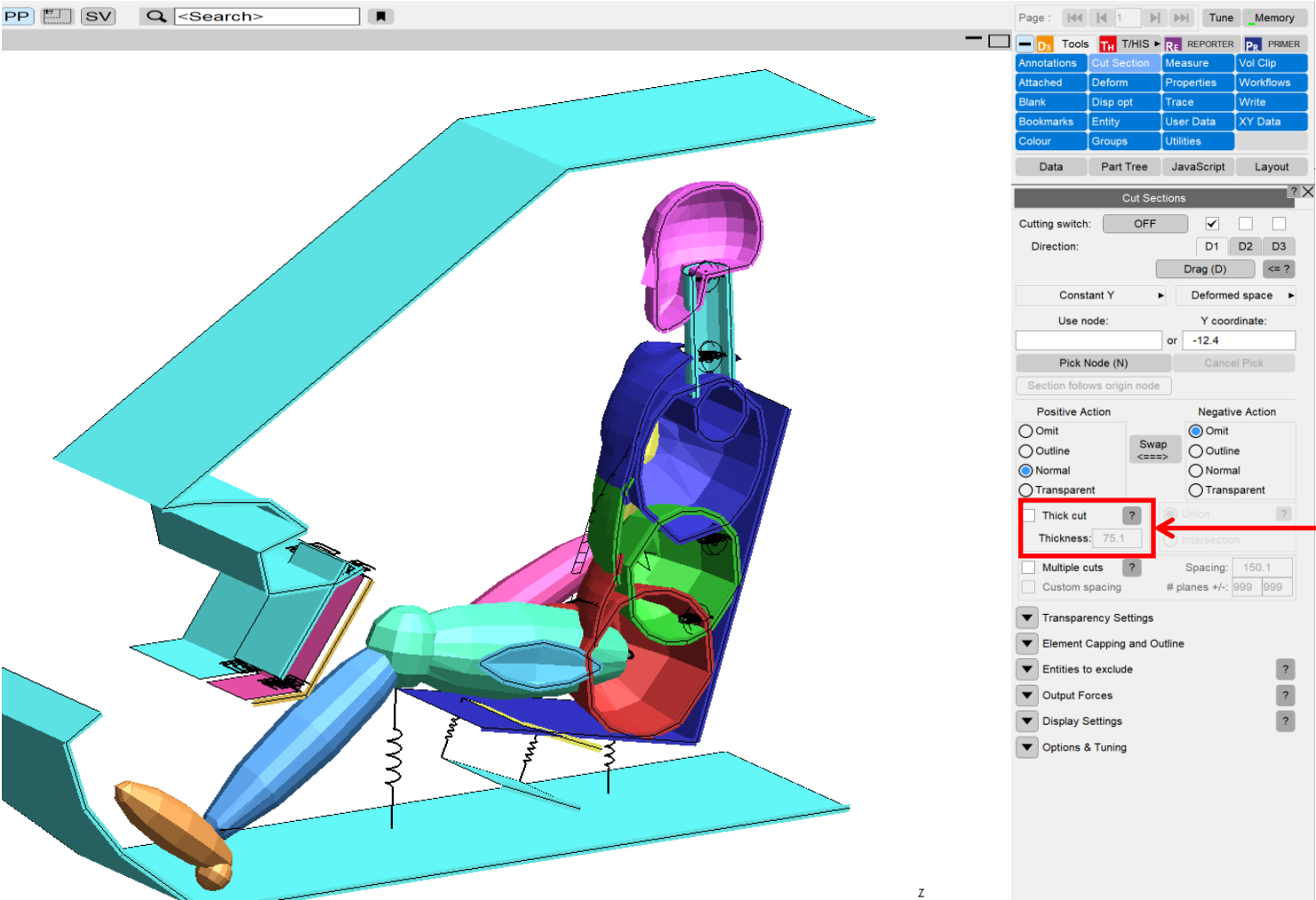
Available options include :

- Update auto contour bands
- Update max and min values
- Draw the contours on the cut face
- Draw the cut face
- The settings can be saved as preferences in the oa\_pref file by pressing the 'Save settings' button.

The options available are only applicable to the "dragging" process only. Therefore once the mouse is released to end the dragging process, the image will be redrawn and display any missing graphical information.



# Thick cut

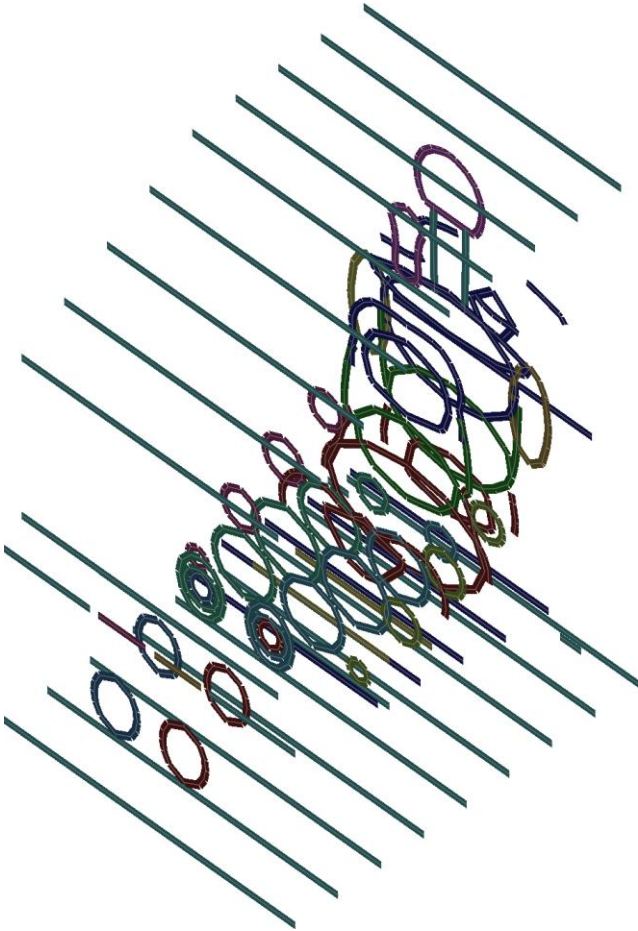


Alternatively a 'Thick cut' can be taken of the model with the desired width.





# Multiple parallel cuts



**Cut Sections**

Cutting switch: ☒ ON

Direction: D1 D2 D3

Drag (D) <= ?

Constant X Deformed space

Use node: X coordinate: -200.0

Pick Node (N) Cancel Pick

Section follows origin node

Positive Action Negative Action

☒ Omit ☐ Outline ☐ Normal ☐ Transparent

Swap <==>

☐ Thick cut ?

Thickness: 75.1

☒ Multiple cuts ?

☐ Custom spacing

Spacing: 100.0

# planes +/-: 4 4

Union ?

Intersection ?

Transparency Settings

Element Capping and Outline

Entities to exclude ?

Output Forces ?

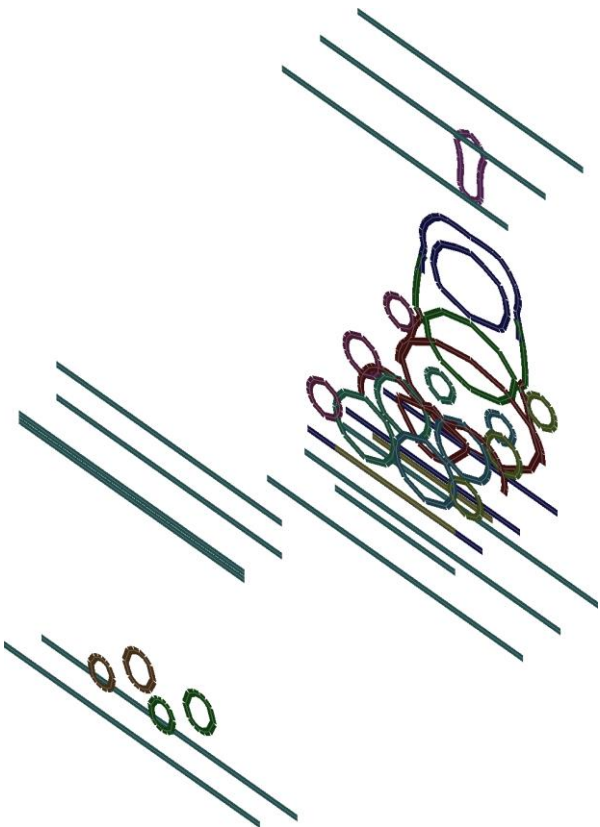
Display Settings ?

Options & Tuning

Multiple cuts will offset the cut plane by multiples of the given Spacing, where the numbers of positive and negative planes can be defined as well.



# Custom spacing



Custom spacing allows to define any sequence of offsets relative to the cut origin, which is not necessarily uniformly spaced.

**Cut Sections**

Cutting switch: ☒ ON

Direction: D1 D2 D3

Drag (D) <= ?

Constant X Deformed space

Use node: X coordinate: -200.0

Pick Node (N) Cancel Pick

Section follows origin node

Positive Action Negative Action

☒ Omit ☒ Omit

☐ Outline ☐ Outline

☐ Normal ☐ Normal

☐ Transparent ☐ Transparent

☐ Thick cut ?

Thickness: 75.1

☒ Multiple cuts ?

☒ Custom spacing

Union Intersection

Swap <==>

Edit spacing

Transparency Settings

Element Capping and Outline

Entities to exclude ?

Output Forces ?

Display Settings ?

Options & Tuning

**CUT SECTION CUSTOM SPACING**

Positions relative to local cut origin Done

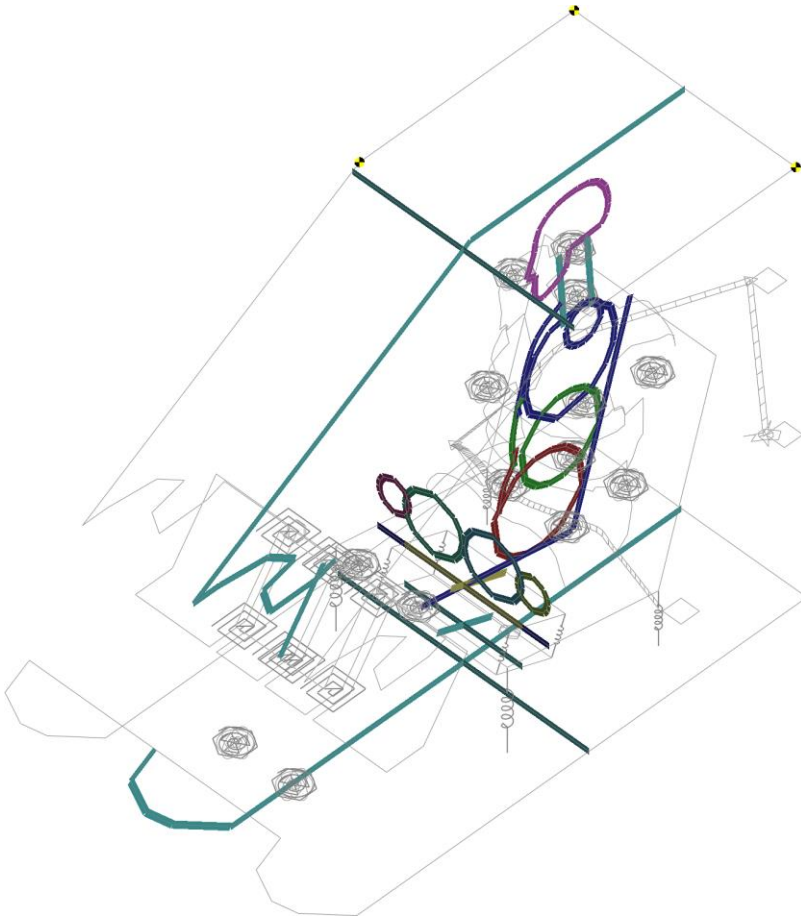
Number of parallel planes 5

Add position:

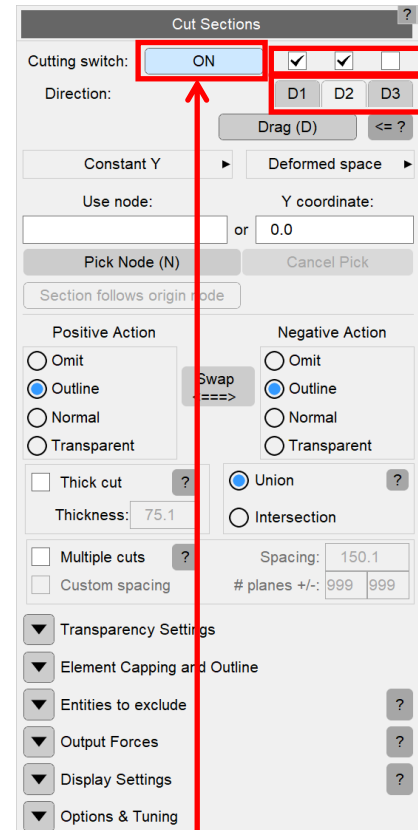
Sort positions

1	-700.0
2	-600.0
3	0.0
4	100.0
5	200.0
6	undefined
7	undefined
8	undefined
9	undefined
10	undefined
11	undefined
12	undefined
13	undefined
14	undefined

# Multiple cut directions



Up to three cut directions can be turned on or off here individually.

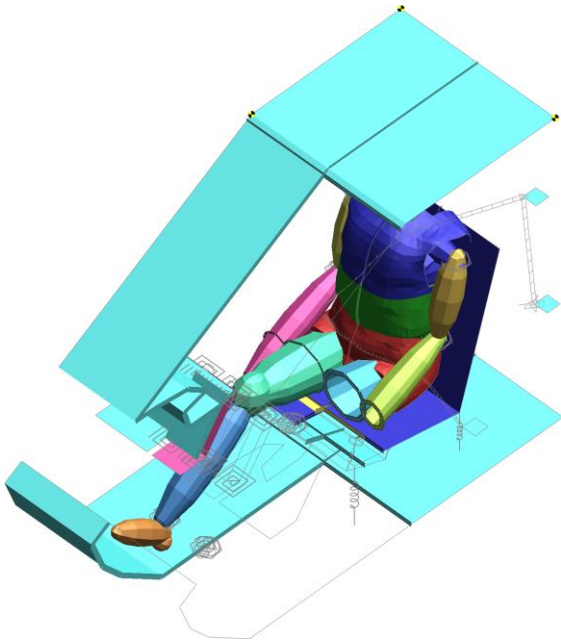


Each direction has got its own definition method (constant X, Y, Z etc.) and positive and negative actions. To view or modify these properties for one cut direction, select the **D1**, **D2** or **D3** tab here.

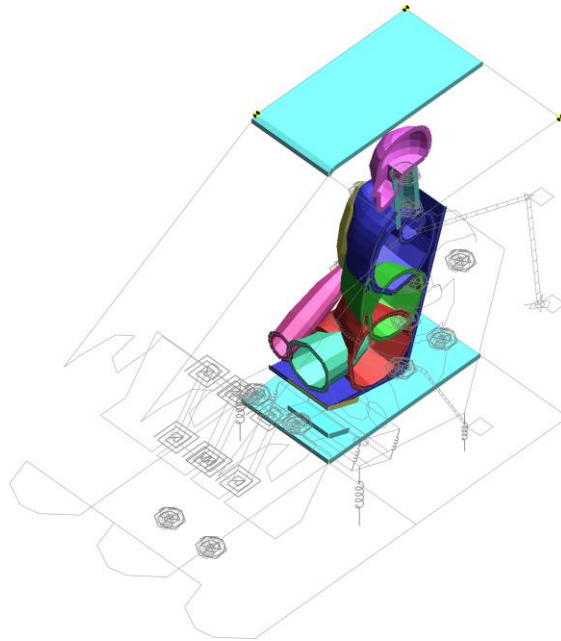
The cutting switch applies to all directions together.

# Union and intersection

Positive and negative actions for multiple directions can be combined in either union or intersection mode.



Union



## Intersection

Cut Sections

Cutting switch: ON

☒☒☐

Direction: D1 D2 D3

Drag (D) <= ?

Constant Y

Deformed space

Use node:

Y coordinate:

or

0.0

Pick Node (N)

Cancel Pick

Section follows origin node

Positive Action

Negative Action

☐ Omit

☐ Outline

☒ Normal

☐ Transparent

Swap <==>

☒ Omit

☒ Outline

☐ Normal

☐ Transparent

☐ Thick cut ?

☒ Union ?

Thickness: 75.1

☐ Intersection

☐ Multiple cuts ?

Spacing: 150.1

☐ Custom spacing

# planes +/-: 999 999

Transparency Settings

Element Capping and Outline

Entities to exclude

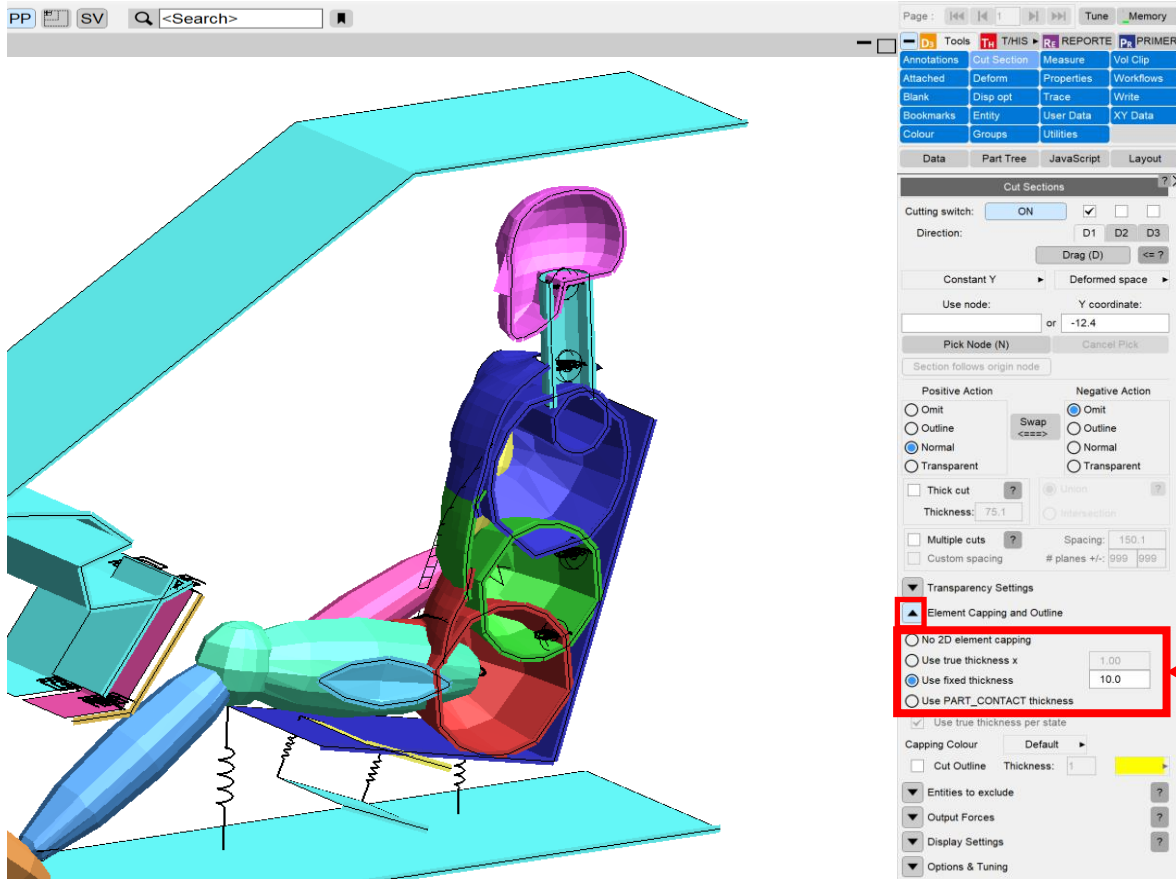
Output Forces

Display Settings

Options & Tuning



# Element Capping



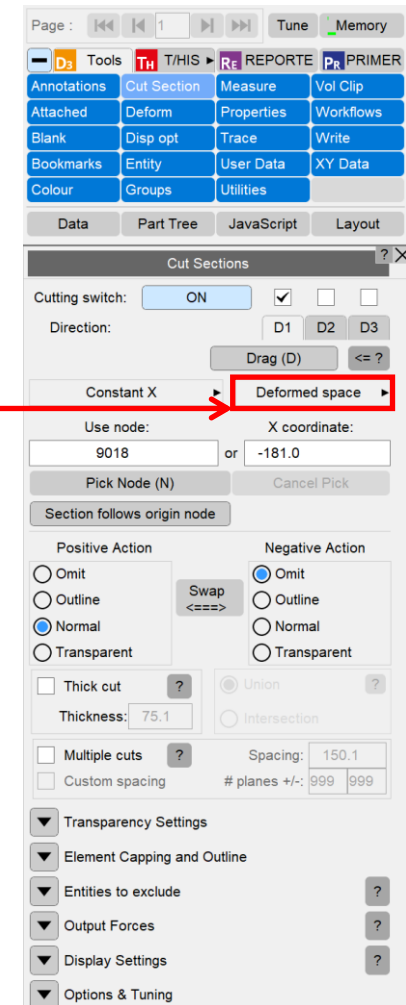
2D element capping changes the appearance of shells on the cut plane.

- No 2D element capping: Thin mesh line.
- Use true thickness x: Thickness of the shell multiplied by an optional scaling factor. (Requires shell thickness to be written to the results or the ztf file.)
- Use fixed thickness: All shells have the same specified value.
- Use PART\_CONTACT thickness

# Cut Section Geometry

The cut plane can be set to two differing systems:

- (i) Basic Space: plane is computed on the undeformed geometry. If the elements deform, the plane deforms with the model. (*This is the default LS-DYNA approach – recommended for force results.*)
- (ii) Deformed Space: the plane is fixed in the model coordinates and the model moves through it. The plane remains flat, but the elements can move through it. (*This is the default D3PLOT approach. Fine for animations, but not recommended for force results.*)



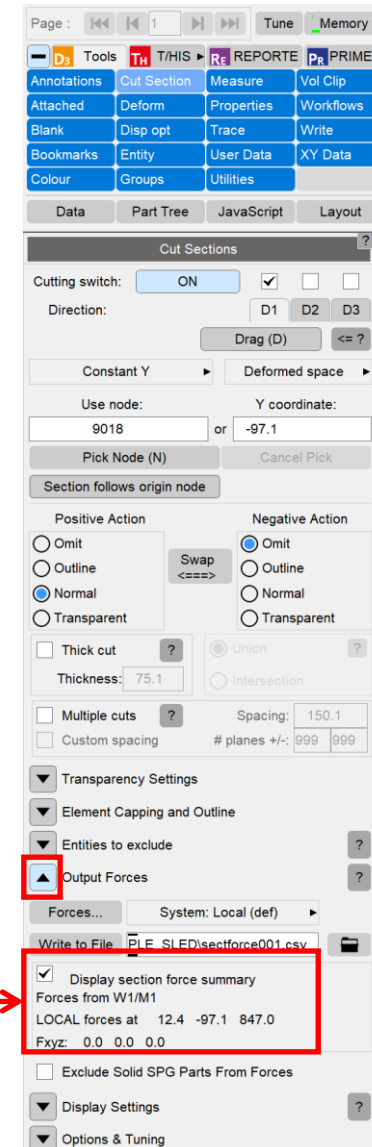
# Forces

D3PLOT can calculate forces in a user defined cut section.

When extracting cut section forces, it is important to cut through the centre of the elements. The cut section can be dragged to achieve this.

In the 'Output Forces' section:

- Click 'Forces...' to display a message box with the forces.
- Select 'Local' or 'Global' coordinate system.
- Tick 'Display section force summary' to see a summary of Fx, Fy and Fz forces.





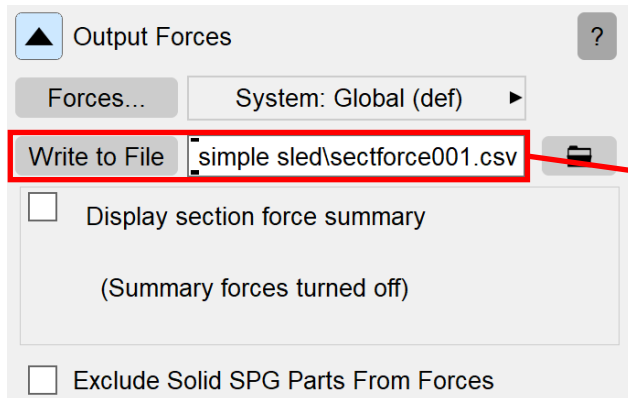
# Forces

Cut section forces and moments can be written to a .csv file.

Select a file name and destination using the text entry box and/or folder button



Click the 'Write to File' button and a .csv file should be created.



M1/W1: Cut-plane force and moment output at time, 4.99950E+00

PART	Fx	Fy	Fz	Mxx	Myy	Mzz
800	-7.9010E-03	3.1136E-02	1.7722E-01	1.2989E+02	-1.8429E-01	4.1719E+00
801	-5.3758E-03	2.7748E-03	3.2521E-02	1.7323E+01	6.3289E+00	3.9410E+00
802	3.5208E-02	1.6776E-02	-2.7701E-02	-4.2919E+00	-1.0906E+01	-8.0308E+00
804	-1.7741E-04	3.1860E-05	-9.0481E-05	1.1861E-03	-3.1389E-02	-2.5036E-02
810	1.0578E-02	-3.9736E-04	-7.6691E-02	-5.7626E+01	1.5117E+01	-8.0408E+00
	.	.	.	.	.	.
	.	.	.	.	.	.
2000242	-1.3652E-03	-4.4917E-03	-2.3154E-03	-3.0806E-01	1.6120E-02	-1.7210E+00
2000246	1.2085E-02	6.4670E-03	2.2472E-02	1.1535E+01	-1.6359E+01	-1.5320E+00
2000252	9.4278E-03	3.5153E-04	3.5429E-03	7.1106E-01	-3.5469E+00	-1.6143E+00
2000265	8.7467E-04	-9.9446E-04	2.0211E-03	6.4750E-01	-1.3898E+00	-8.4476E-01
2000266	-2.9885E-03	-4.8606E-04	3.7147E-03	4.9111E-01	-3.1330E+00	-6.8825E-02
Total	-8.0324E-01	1.0326E-01	-7.9019E-01	-2.3442E+02	5.9231E+02	3.1704E+02

# Contact us

## Global / UK

T: +44 121 213 3399

E: [dyna.support@arup.com](mailto:dyna.support@arup.com)

## India

T: +91 40 69019723 / 98

E: [india.support@arup.com](mailto:india.support@arup.com)

## China

T: +86 21 3118 8875

E: [china.support@arup.com](mailto:china.support@arup.com)

## USA

T: +1 415 940 0959

E: [us.support@arup.com](mailto:us.support@arup.com)

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