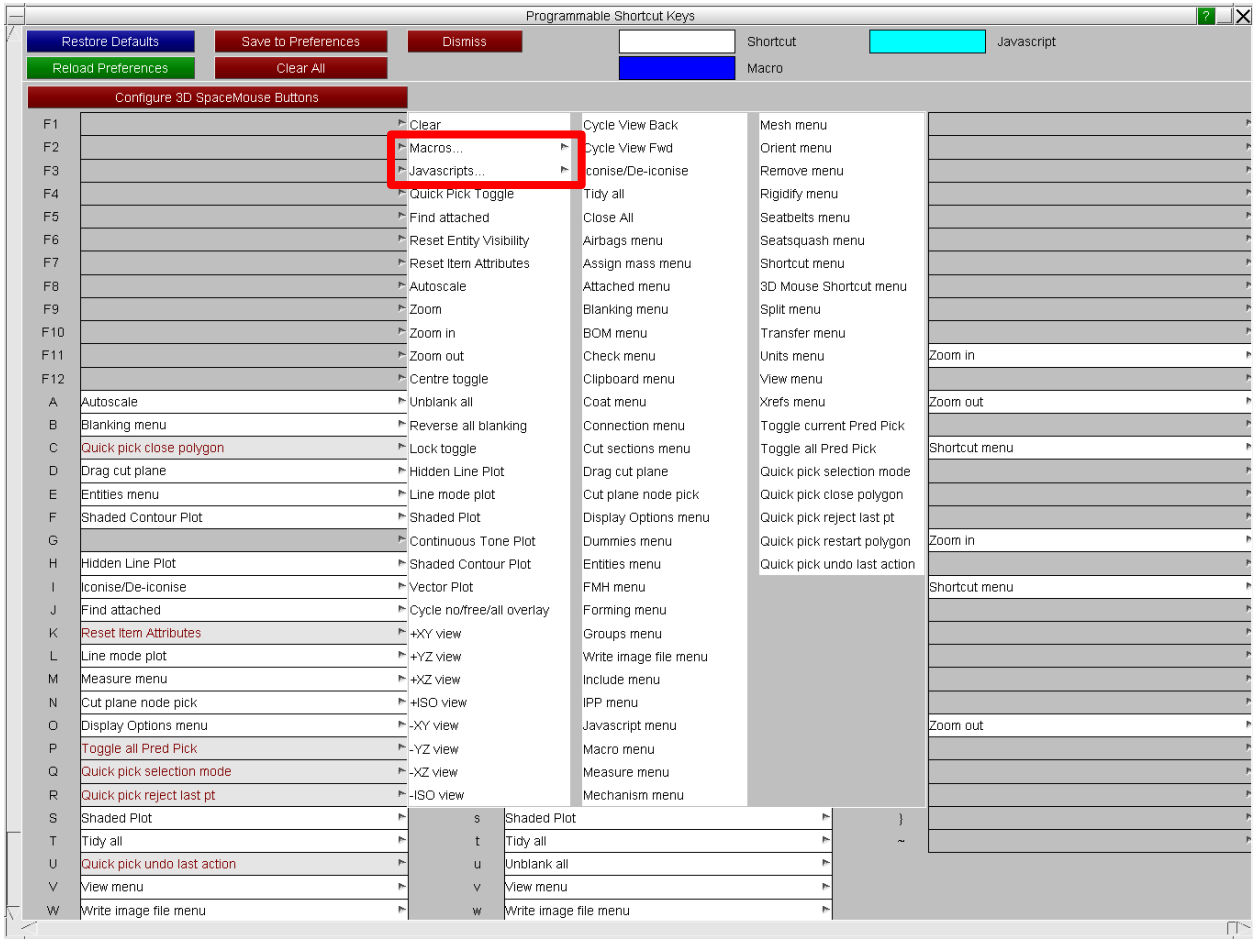
PRIMER Top Tips

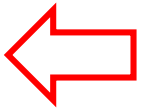
CONTENTS

PRIMER - Shortcuts

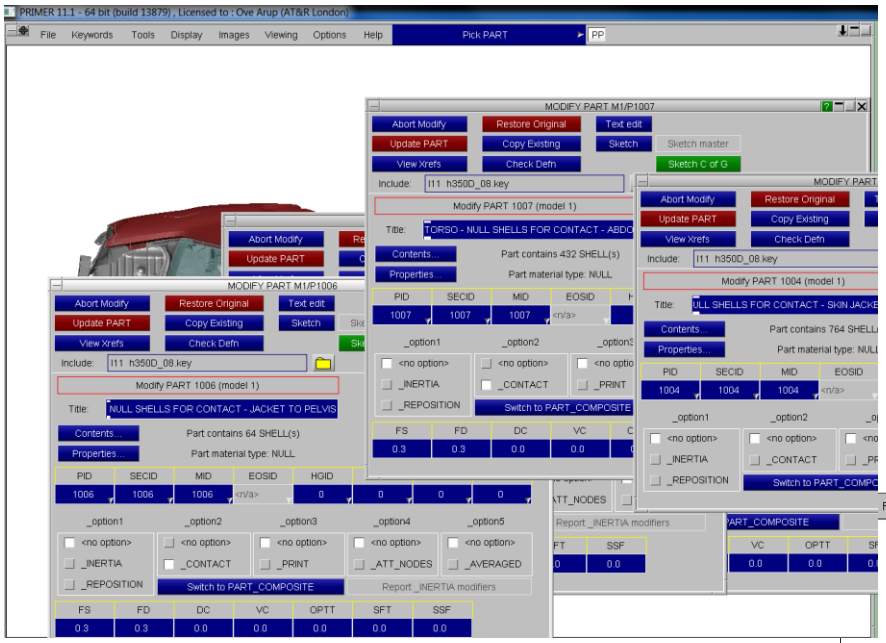
- Press “**?**” to bring up the programmable Shortcuts menu.



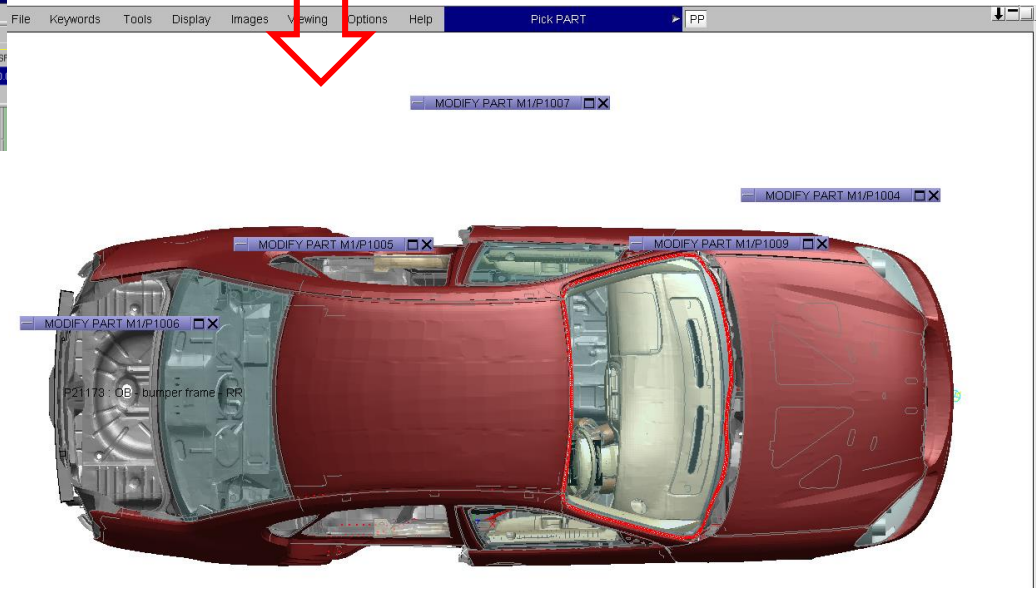
- By right-clicking on and any of the keys it is possible to view and change the action **as well as** assign macros or JavaScript's to an empty key.



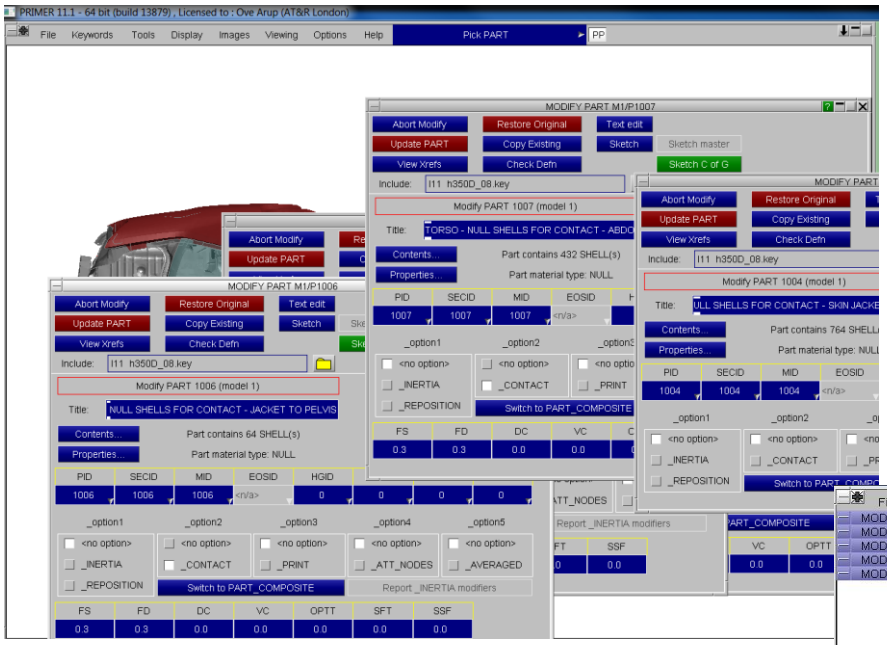
PRIMER Shortcuts - Iconise



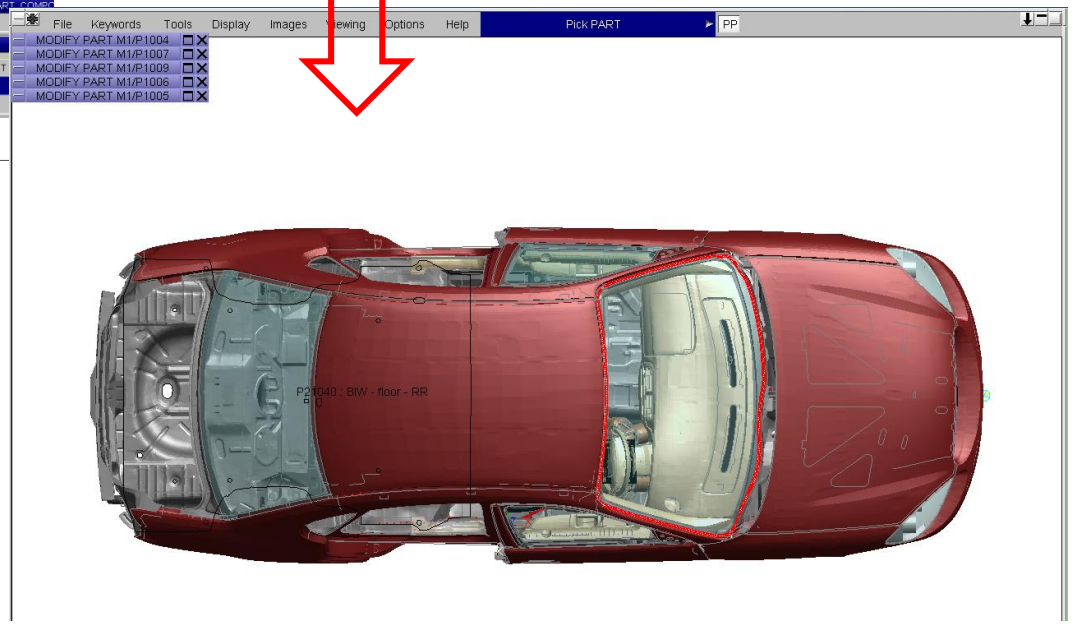
- Press “**i**” to iconize all open panels.



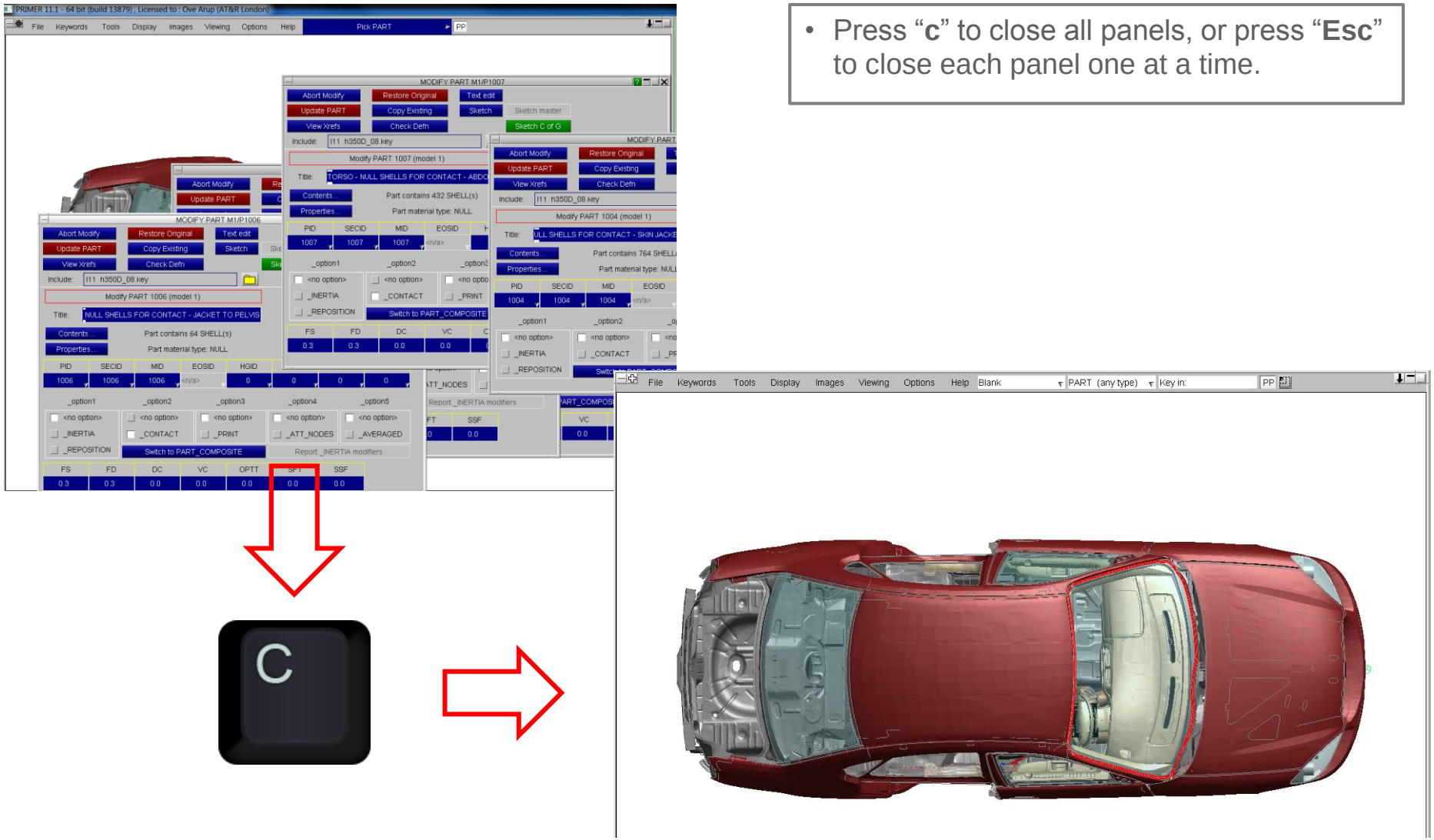
PRIMER Shortcuts - Tidy



- Press "**t**" to tidy and iconize all open panels at the top left hand corner of the display window.

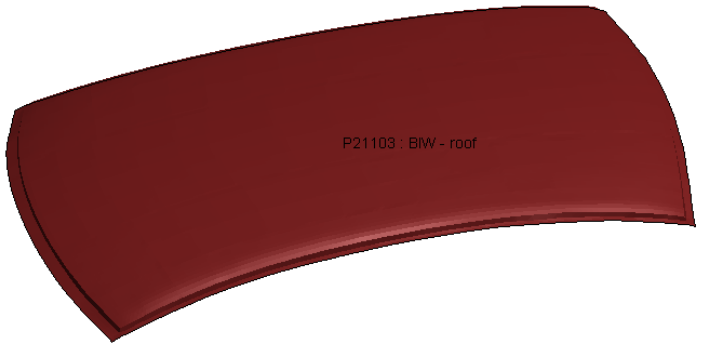


PRIMER Shortcuts – Close Panels

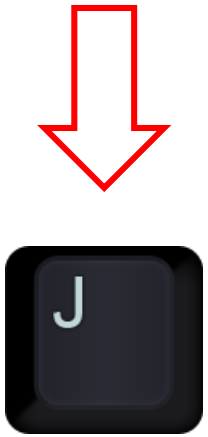


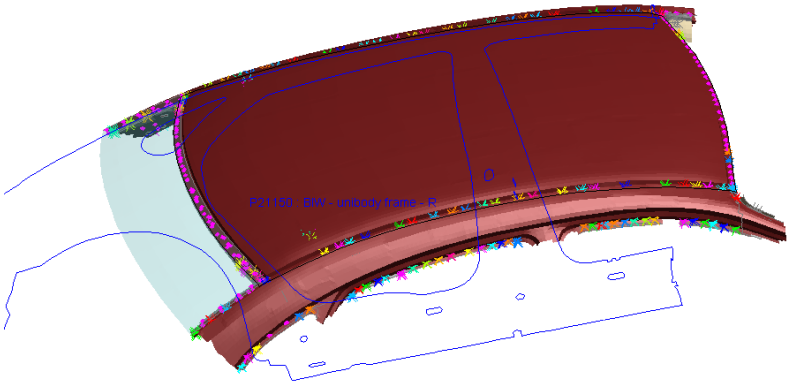
- Press “**c**” to close all panels, or press “**Esc**” to close each panel one at a time.

PRIMER Shortcuts – View Attached

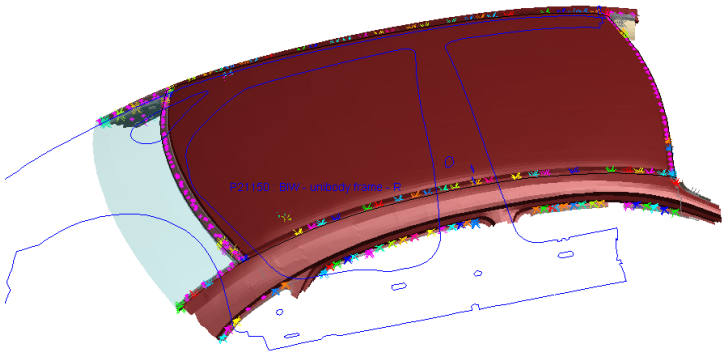


- Press “**j**” to find and display entities which are attached to the displayed entities.

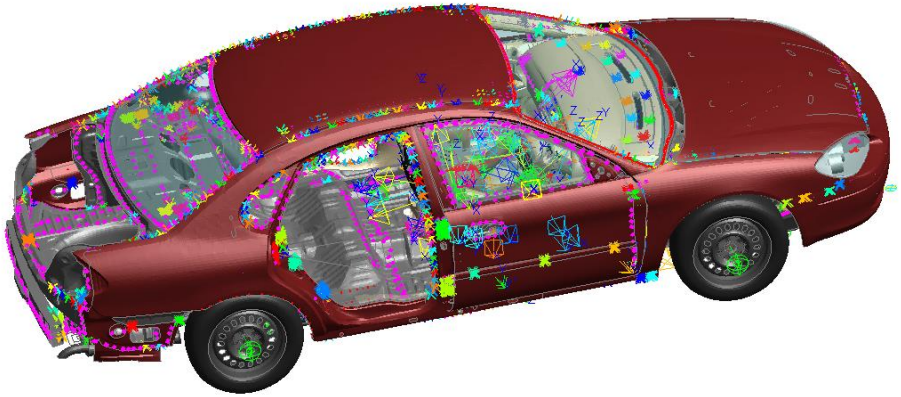




PRIMER Shortcuts – Close Panels

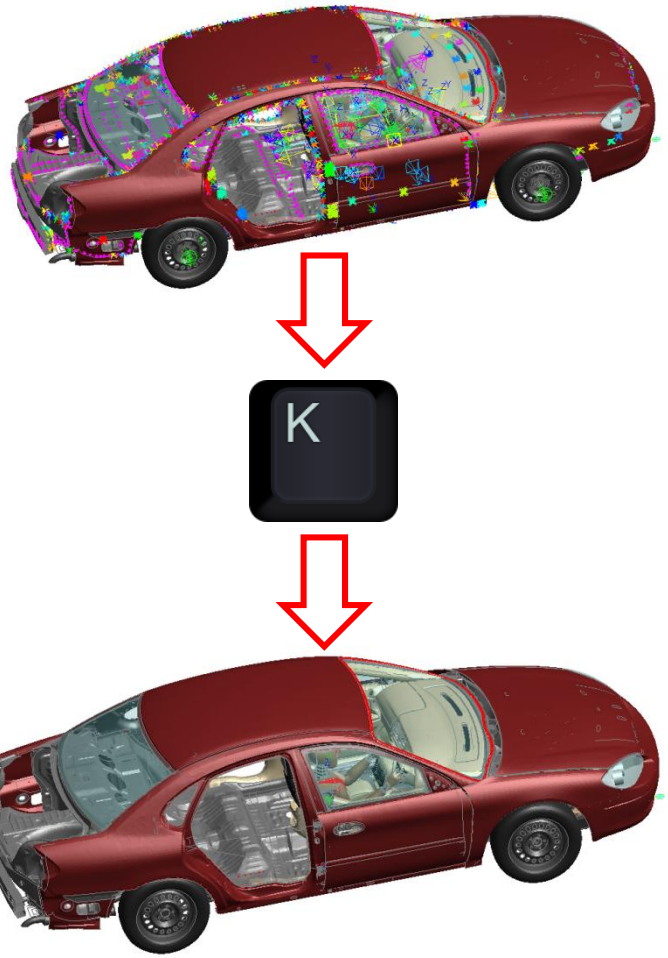


- Press “**u**” to un-blank all parts.

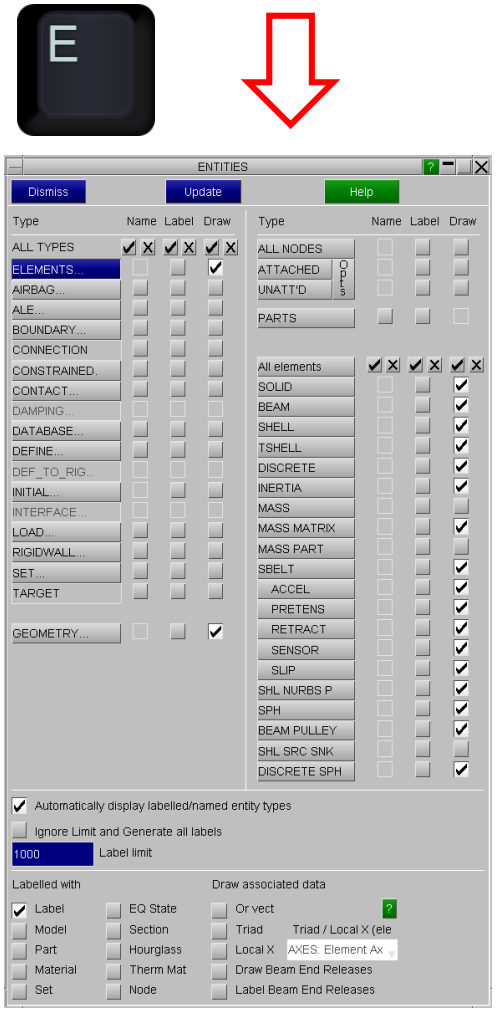


PRIMER Shortcuts – Entities

- Press “**k**” to view the default entities.



- Press “**e**” to bring up the entities menu.

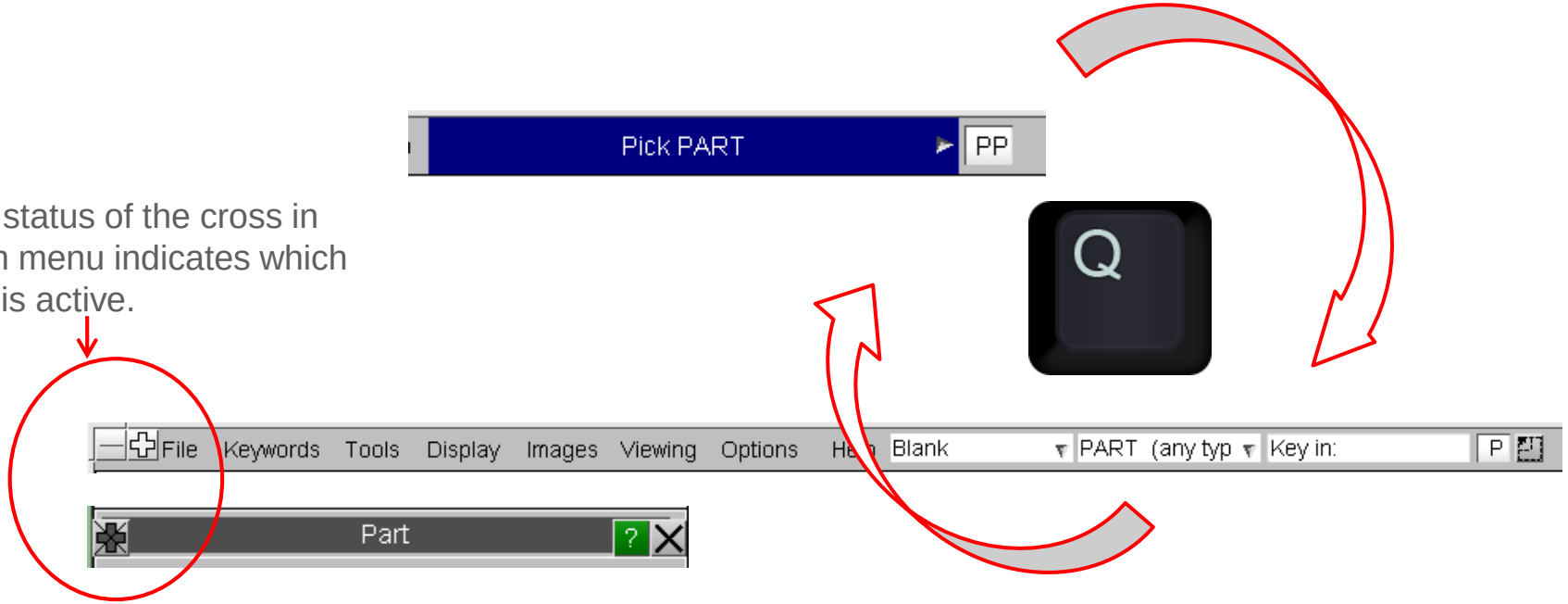


PRIMER Shortcuts – Toggle Quick Picks

- Most functions in Primer allow the user to pick parts or other entities to perform an action. In these cases the "**Quick Pick**" bar only allows the user to pick an entity of that type.

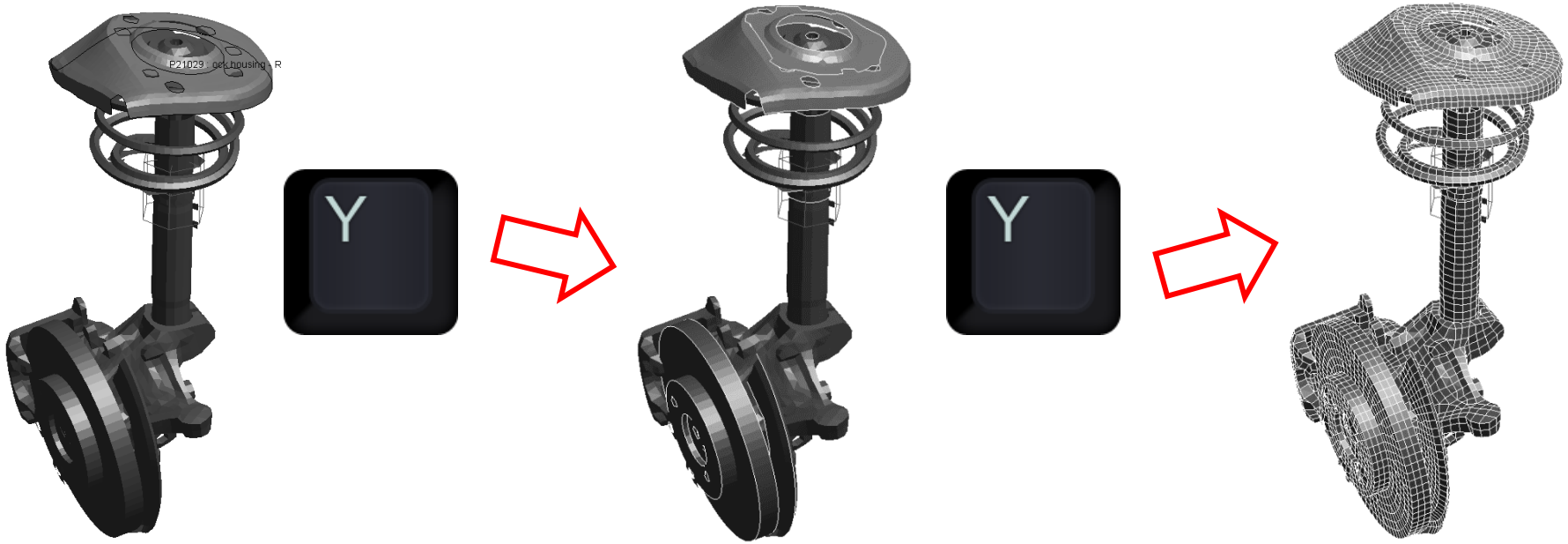
- Press "**q**" to toggle between the standard "Quick Pick" bar and the one driven by the Primer function.

- The status of the cross in each menu indicates which one is active.



PRIMER Shortcuts – Overlays

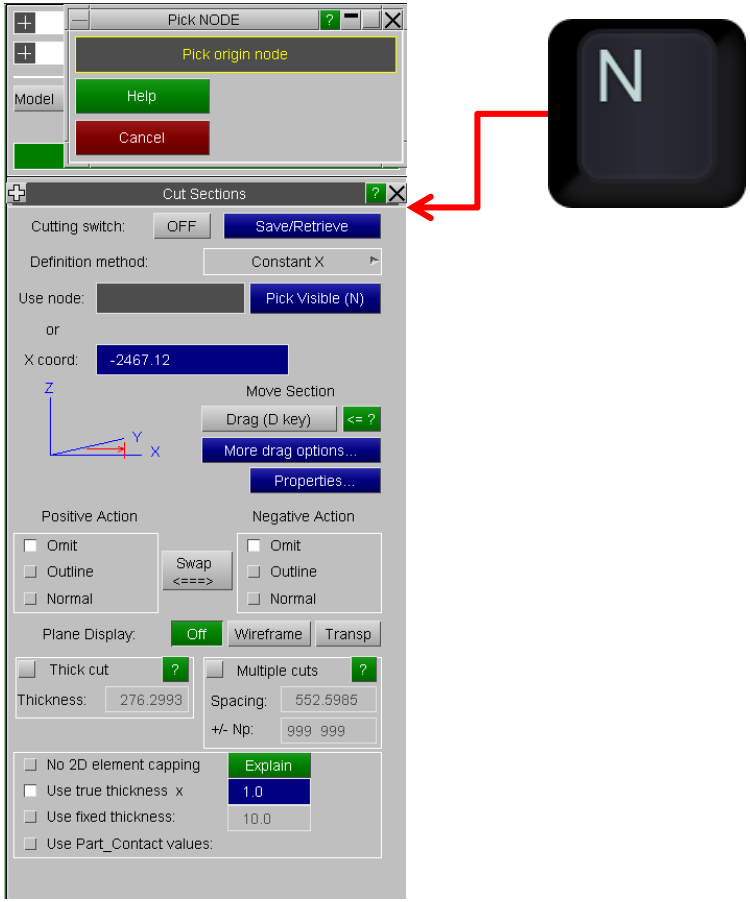
- Press “**y**” to cycle through the different overlays (None, Boundaries Only, All edges).

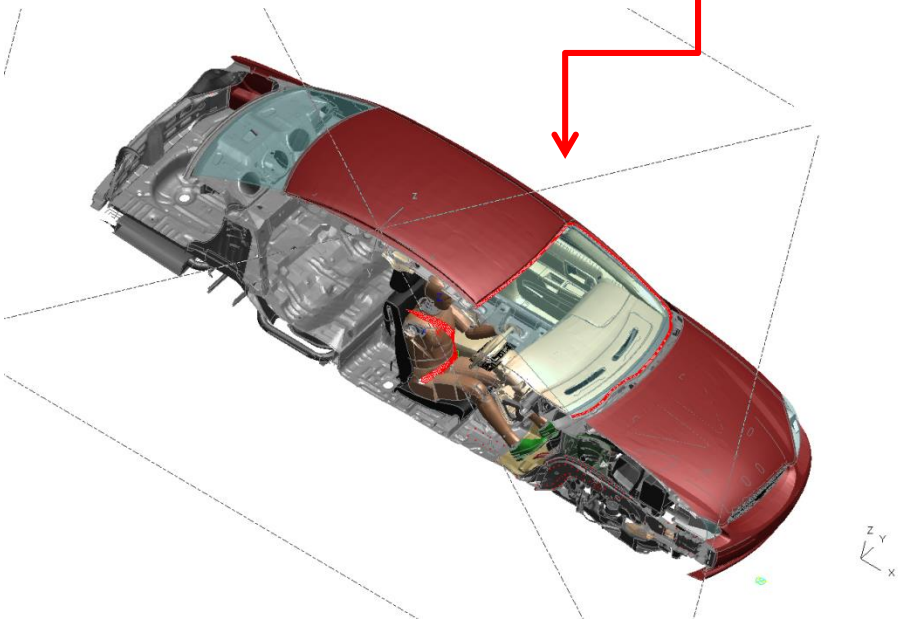


PRIMER Shortcuts – Cut Sections

1. Press “**n**” to bring up the Cut Sections menu. By default it is ready to pick a node to cut through (in constant X).

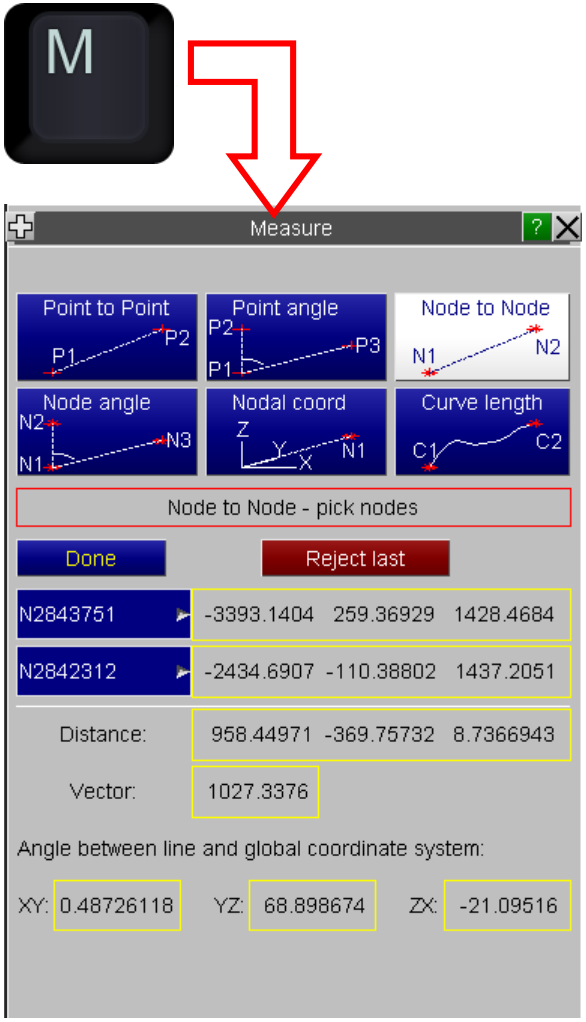
2. Press “**d**” to activate the drag option (use mouse to drag).



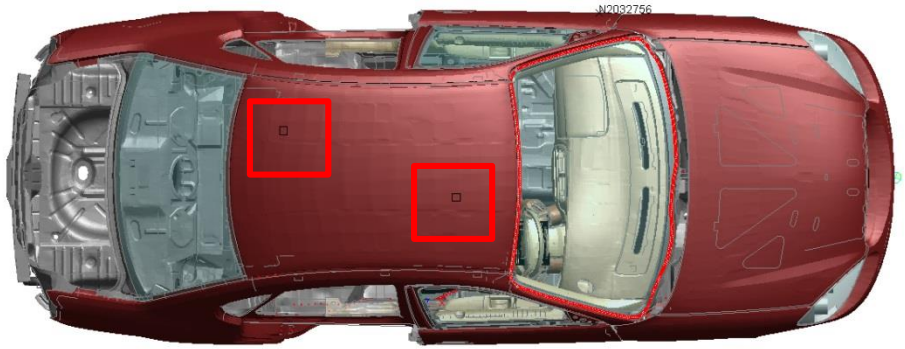


PRIMER Shortcuts – Measure

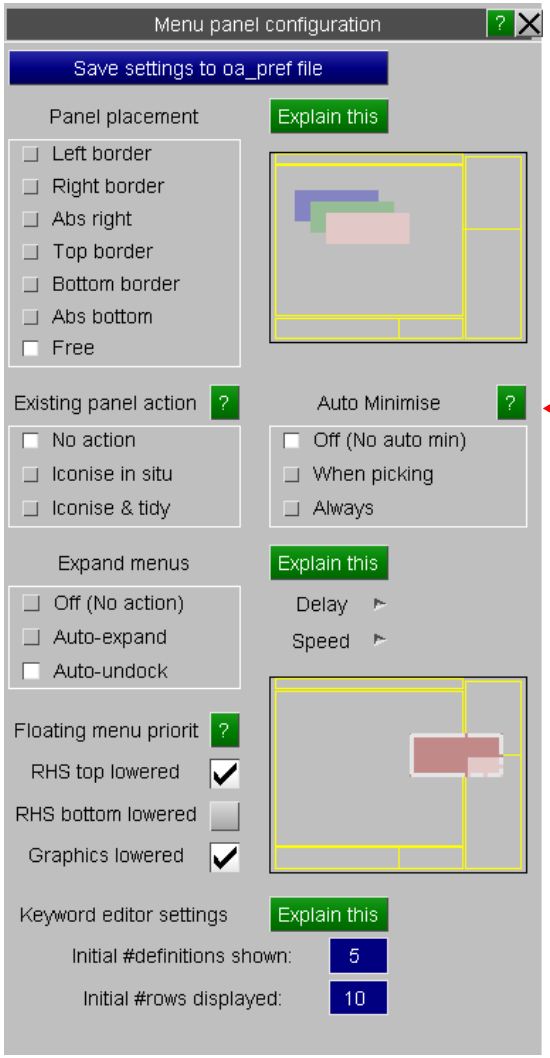
- Press “**m**” to bring up the Measure menu.



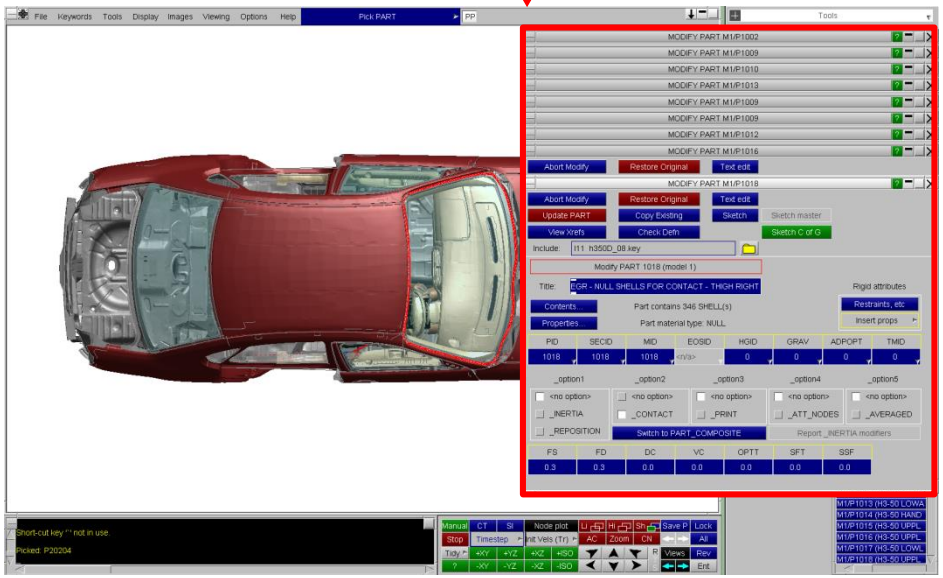
- By default it will be ready to pick two nodes.



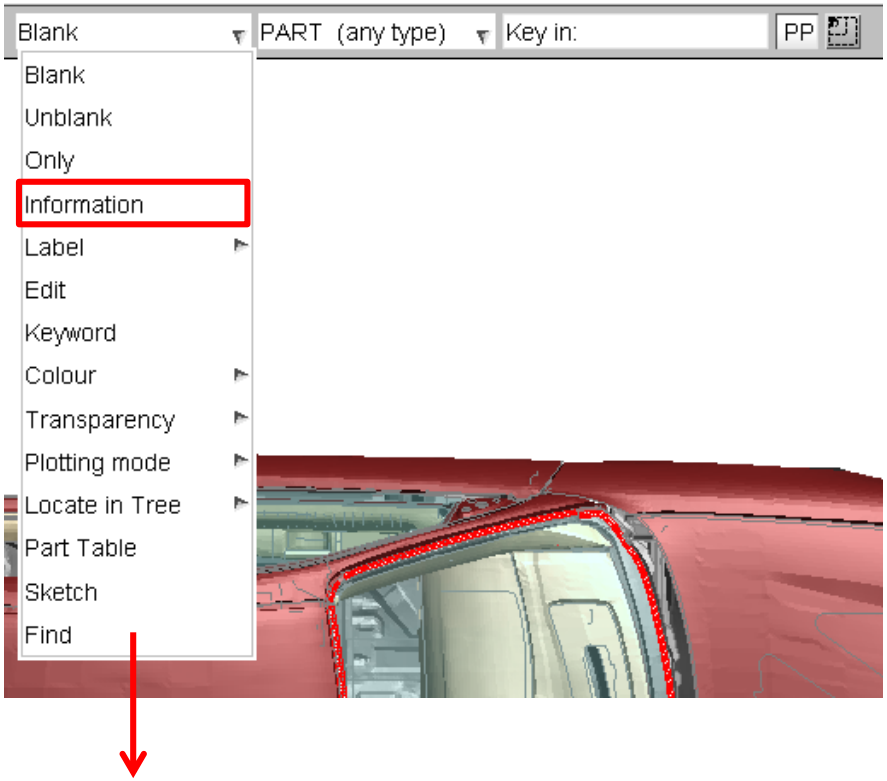
PRIMER – Panel Configuration



- The Panel Configuration Menu found under "**Options"->"Panel behaviour**" allows the user to set the location and behaviour of the pop-up panels in Primer.
- For example, selecting **"Abs right"** forces all panels to open at the top right hand corner of the Primer window.

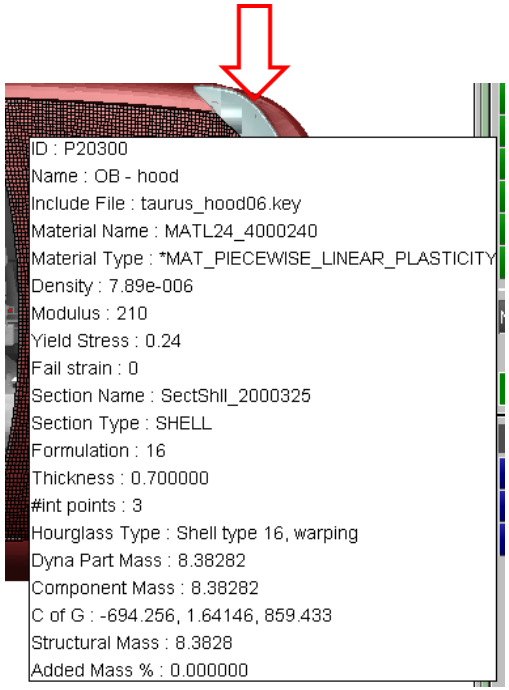


- By default the "**quick pick**" menu is set to "**Blank**". A lot of users forget how many other actions can be performed by changing the action in the drop down menu.

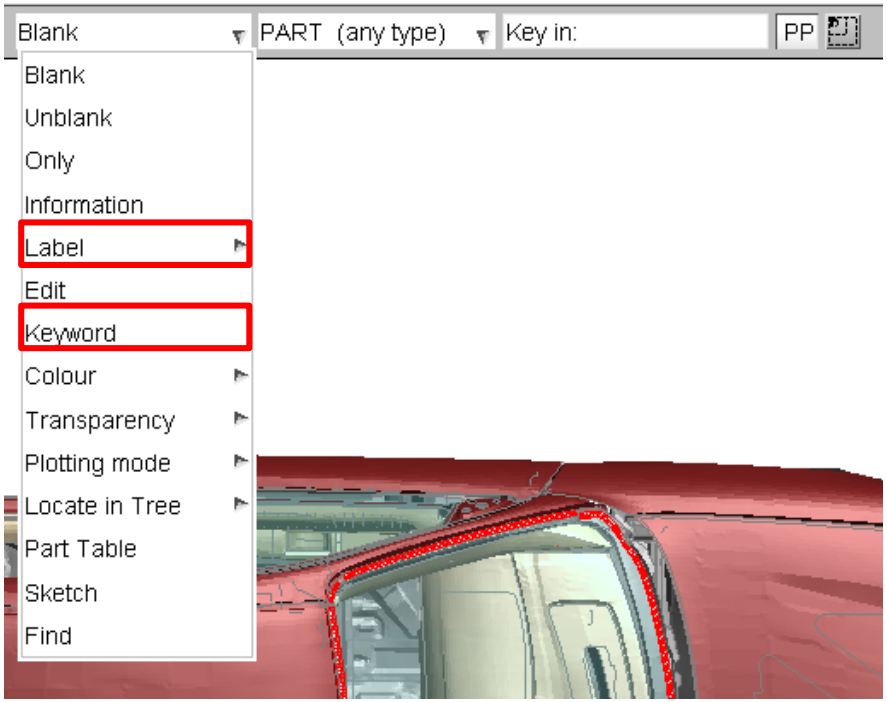


- **This menu also appears when right-clicking on a part.**

- Select "**Information**" and then click on a part to get the a summary of its properties:

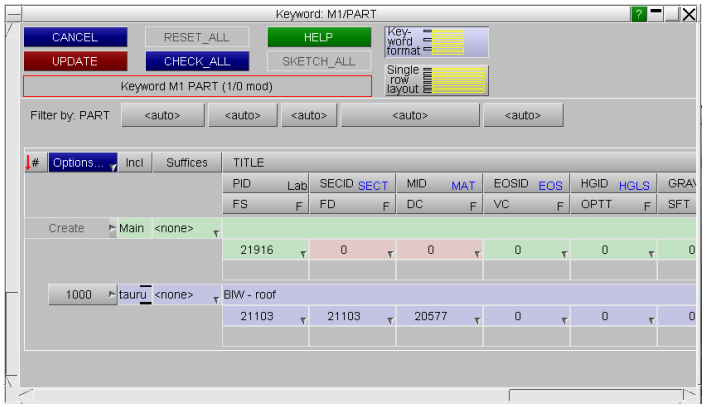


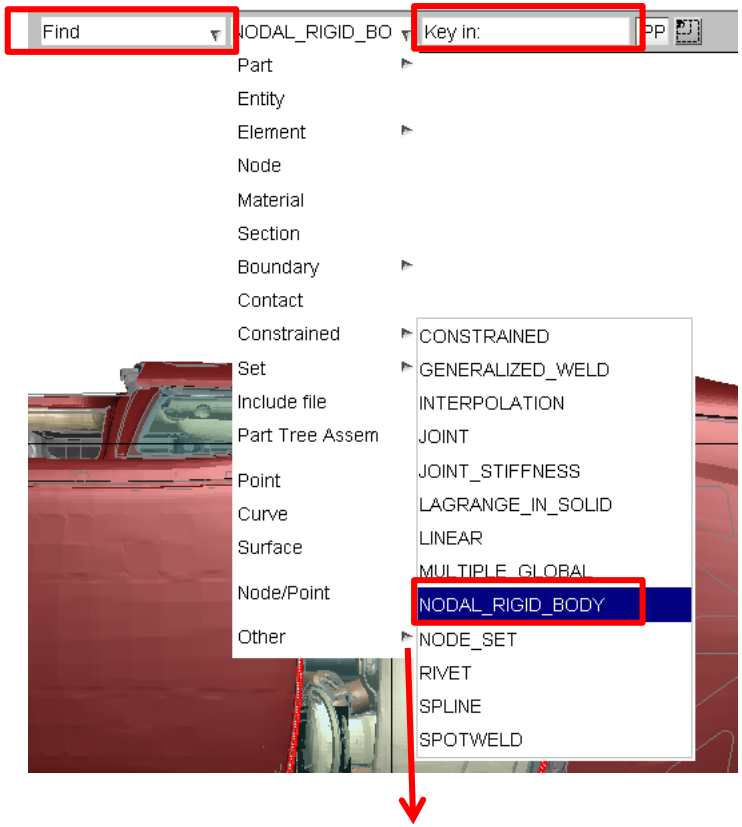
PRIMER – Quick Pick



- Select "**Label**" and click on a part to display the part ID:

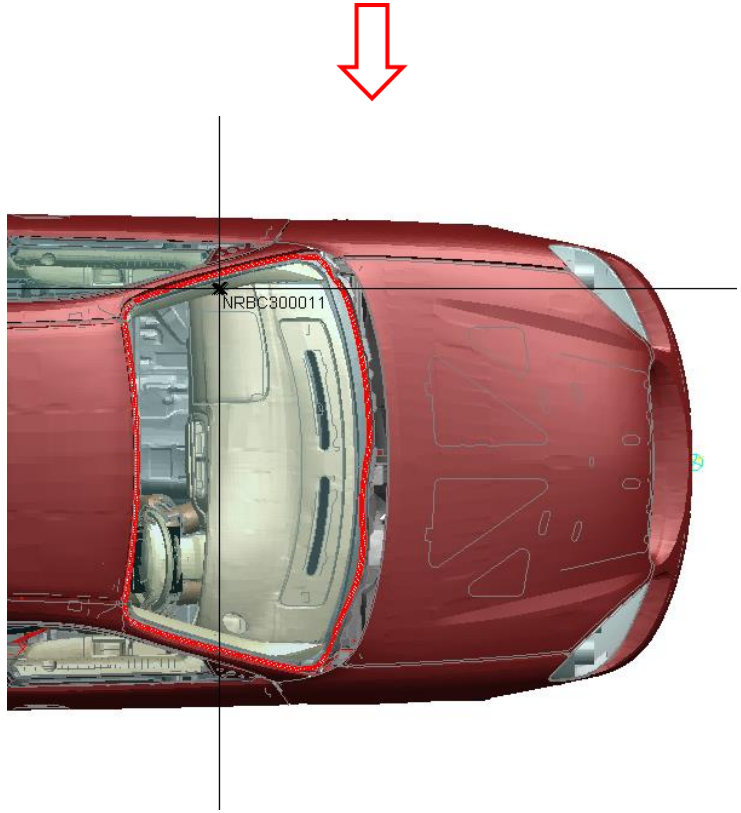
- Select "**Keyword**" and click on a part to open the part's keyword editor:



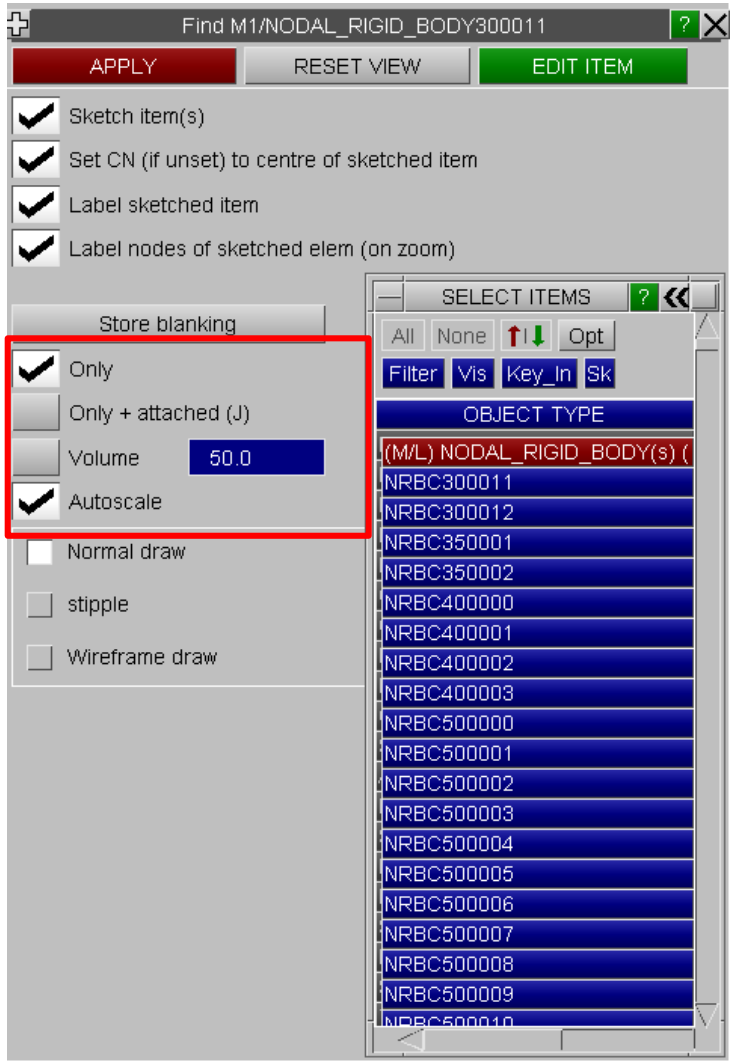


- **By default the entity type is "Part" but this can also be changed.**

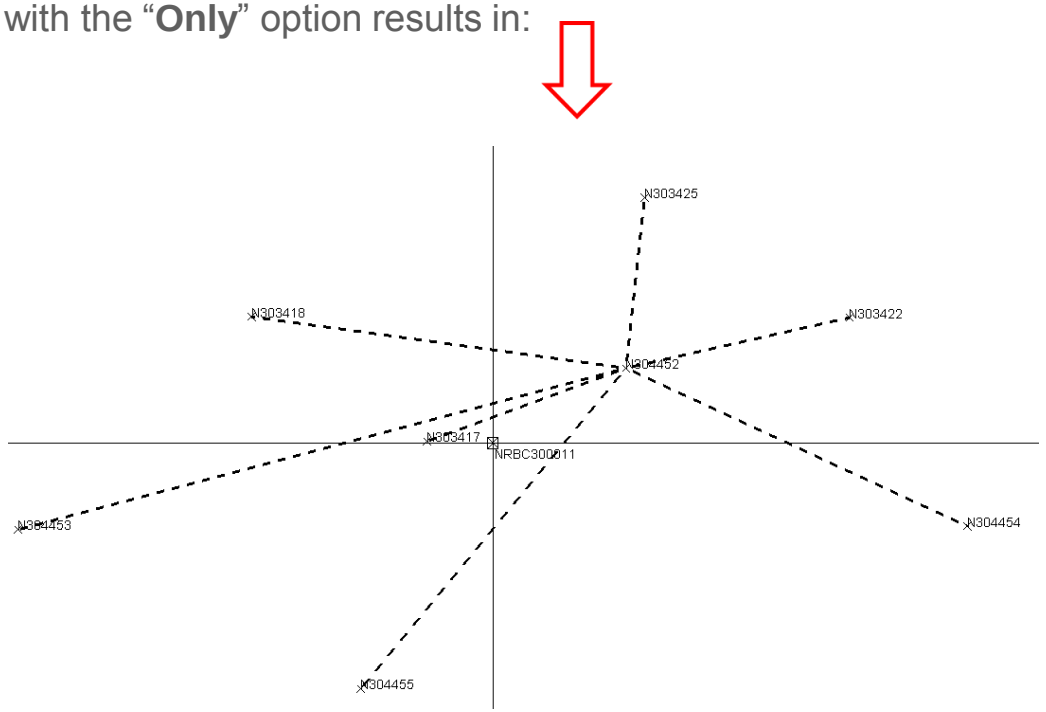
- Select "**Find**" and change from "**Part**" to "**Nodal Rigid Body**".
- Key in a NRB ID number to get a crosshair at the location of the object.



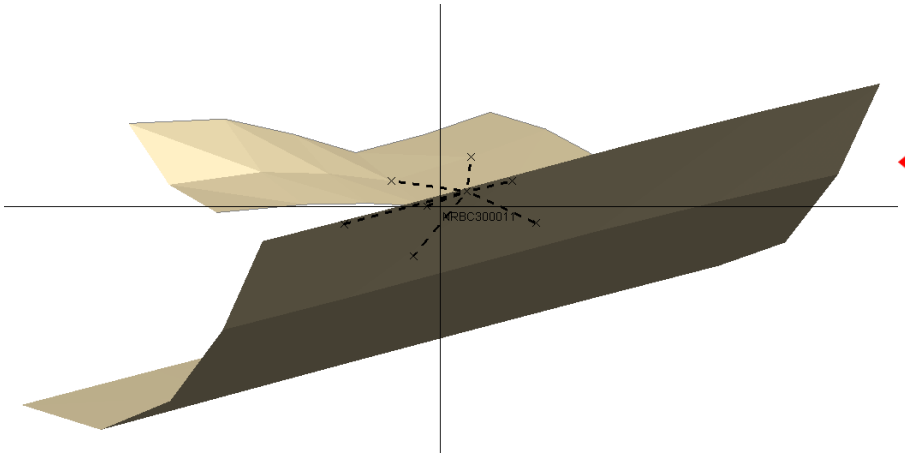
PRIMER – Find Tool

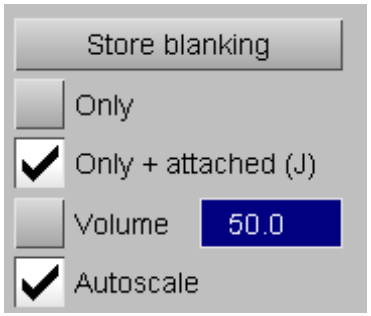


- Under the Tools menu is the function "**Find**". This opens a menu that allows the user to find any object in the model and sketch it.
- The option to display "**Only**" the entity in question can be very useful as is the "**Only + attached**" option.
- In our demo, selecting the Nodal_RIGID_BODY 300011 with the "**Only**" option results in:

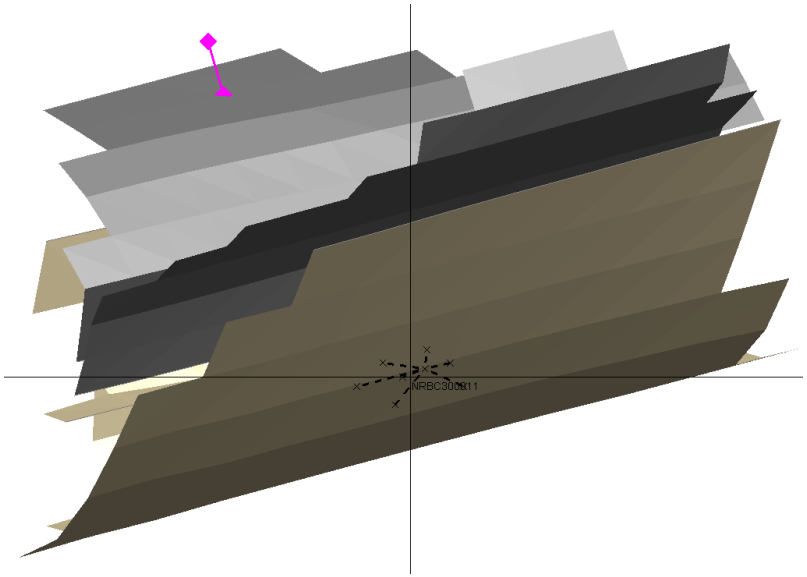


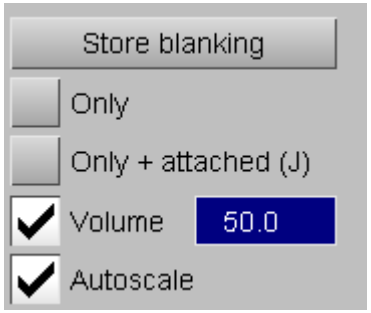
PRIMER – Find Tool





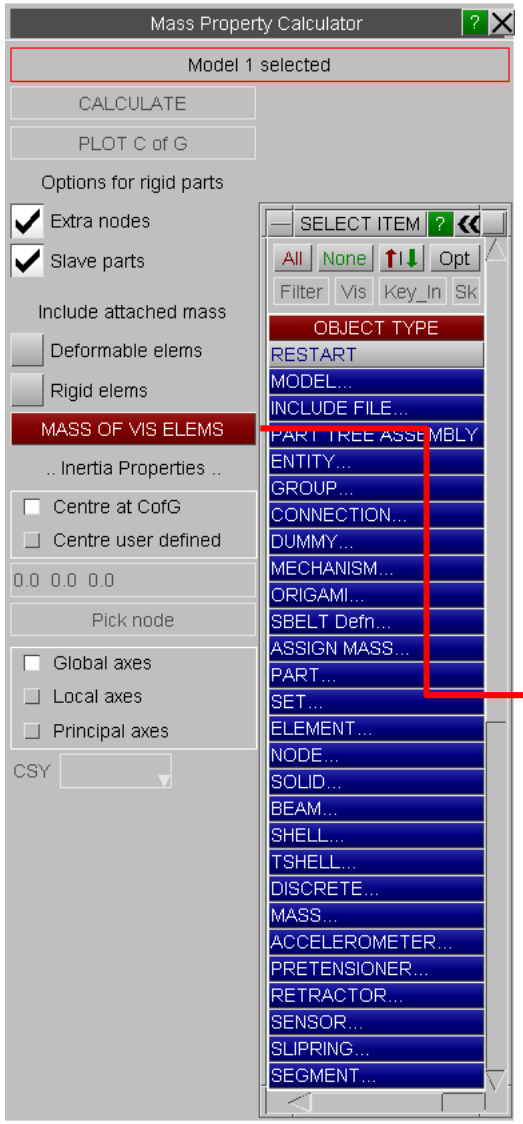
- Selecting "**Only + attached**" displays the NRB and the entities attached to it.





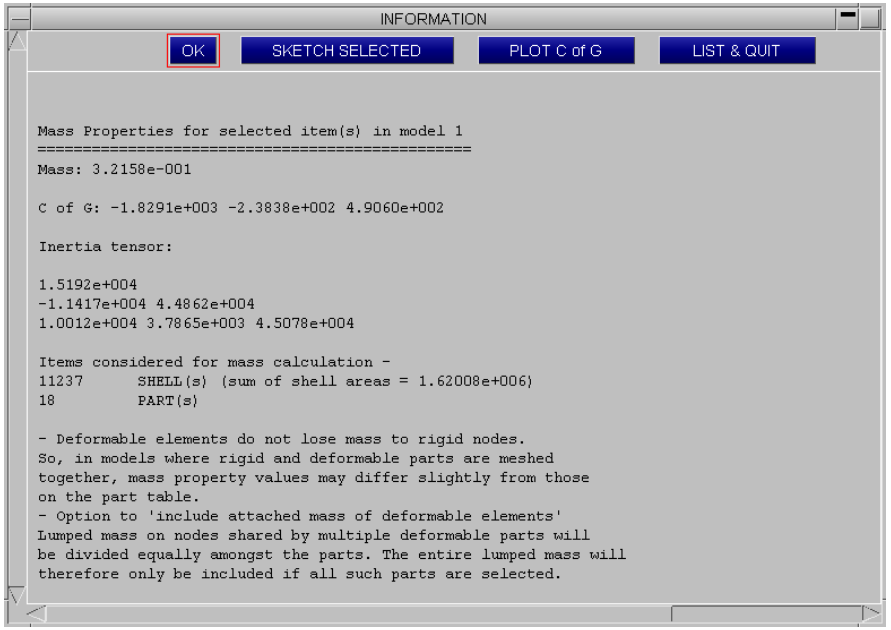
- Selecting a "**Volume**" of 50 displays the entities inside a cube with sides 50, centred at the NRB.

PRIMER – Mass Property Calculator



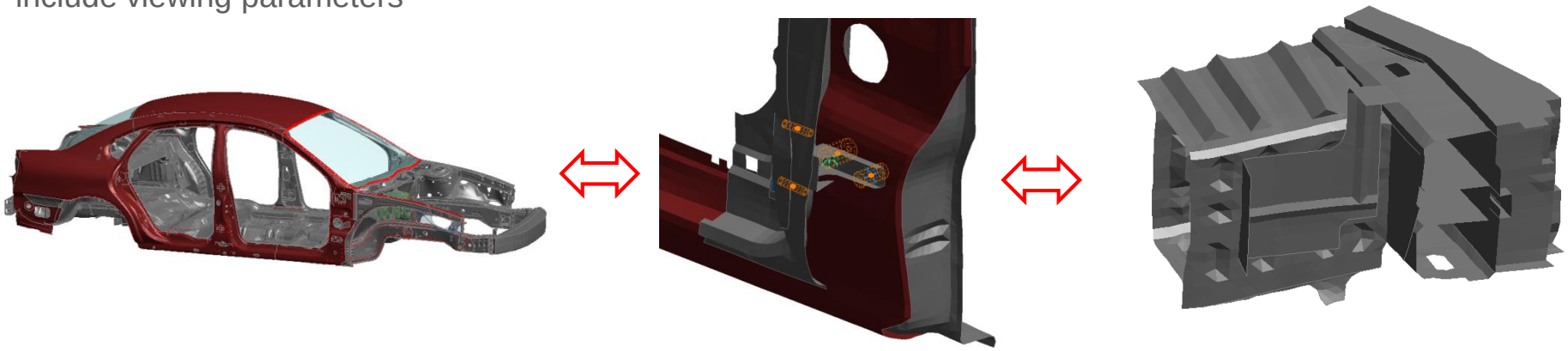
- The Mass Property Calculator found as "**Mass Prop**" in the Tools section allows the user to select elements and obtain a report with the mass, centre of gravity and inertia of the selection.

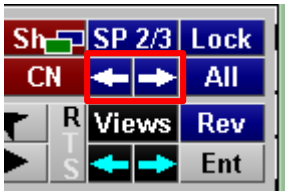
- It is also possible to blank any parts that are not of interest and obtain the report for just the Visible Elements.



PRIMER - Saving views

After blanking certain parts or elements, the blanking property status may be saved. The same blanking can be recovered later. "**Property**" includes blanking, colour, transparency, entity visibility status; optionally, it can also include viewing parameters

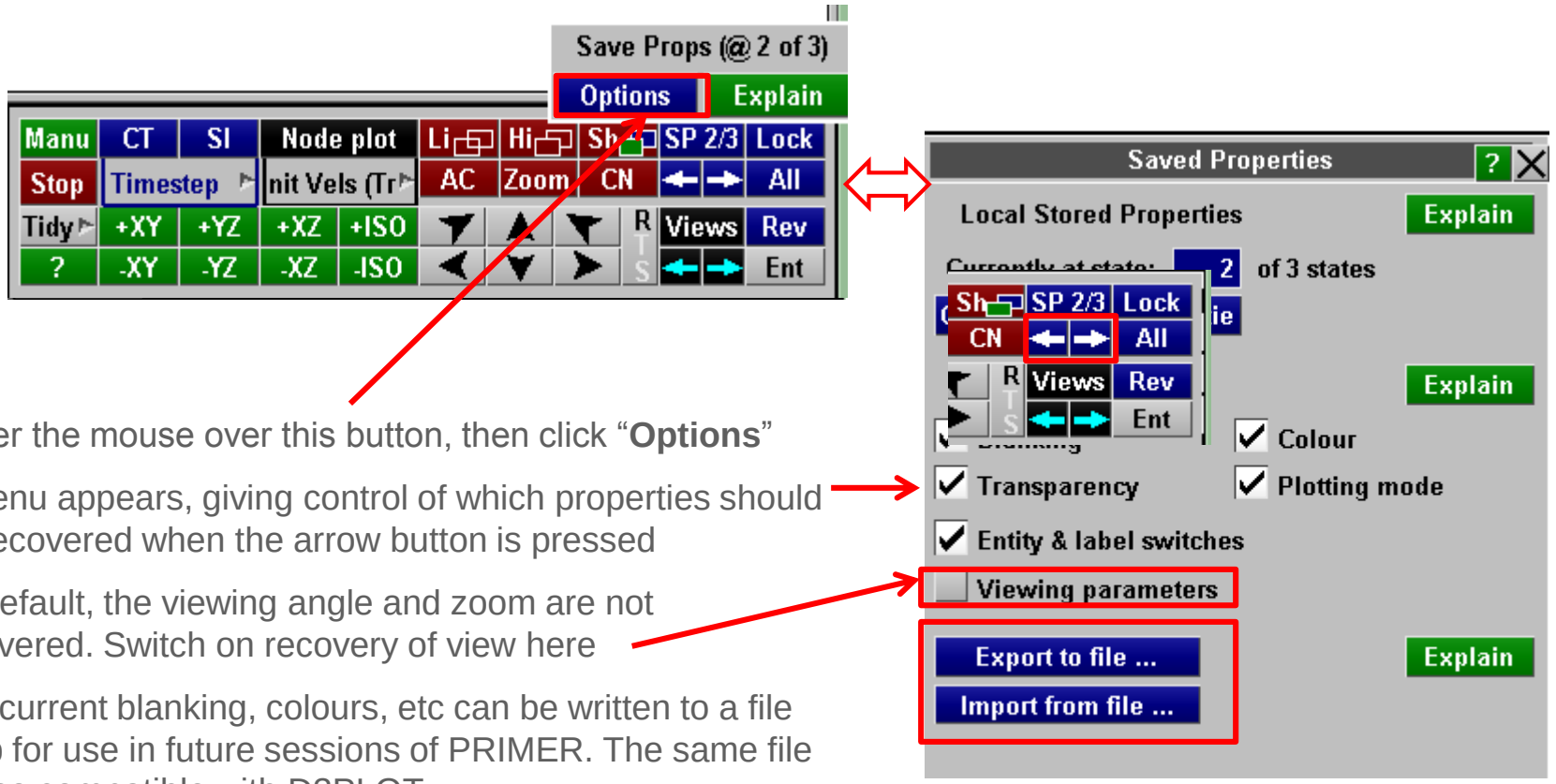




Save some blanking states, then toggle between them using the arrows.

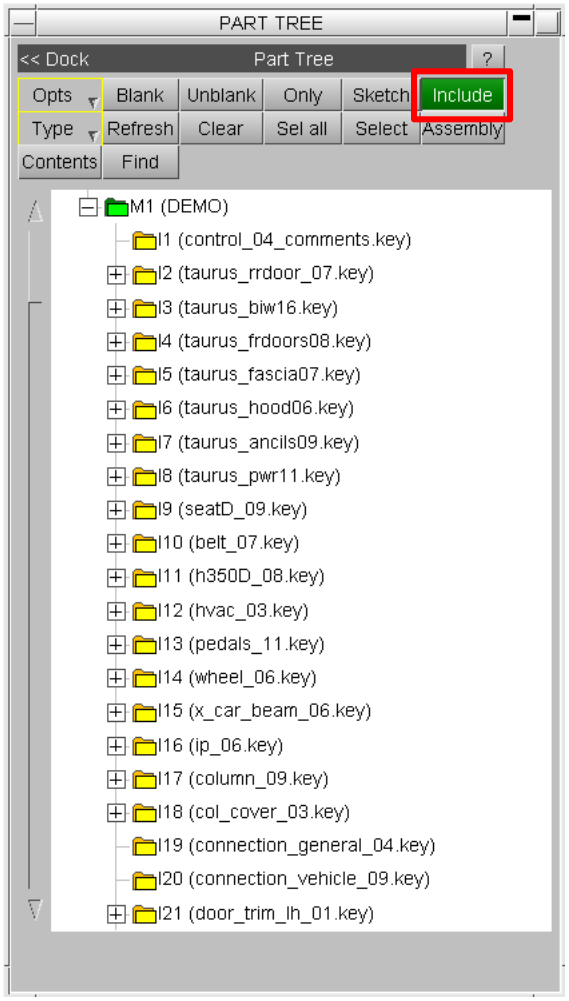
"**SP**" means "Save Properties"

PRIMER - Saving views

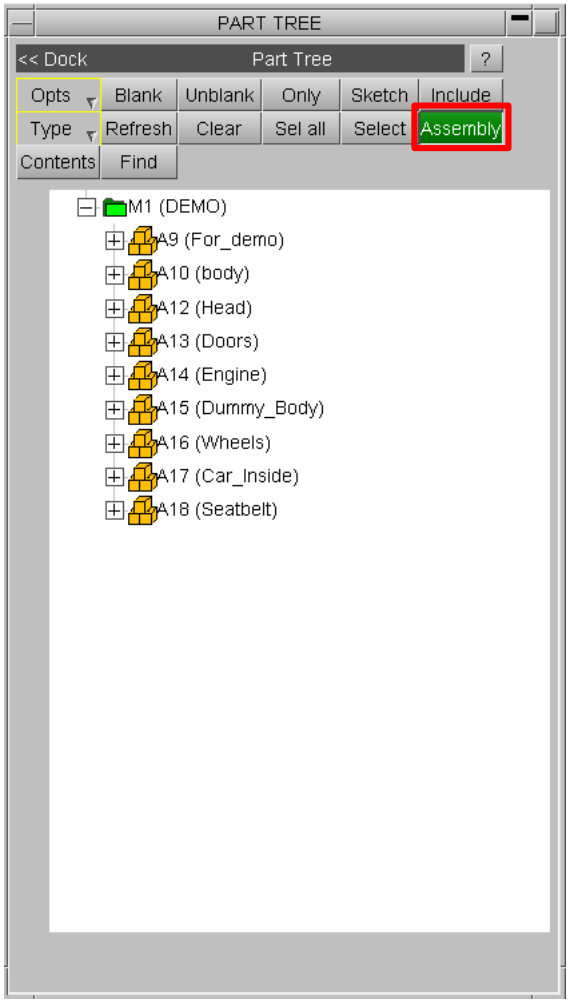


- Hover the mouse over this button, then click "**Options**"
- A menu appears, giving control of which properties should be recovered when the arrow button is pressed
- By default, the viewing angle and zoom are not recovered. Switch on recovery of view here
- The current blanking, colours, etc can be written to a file *.prp for use in future sessions of PRIMER. The same file is also compatible with D3PLOT

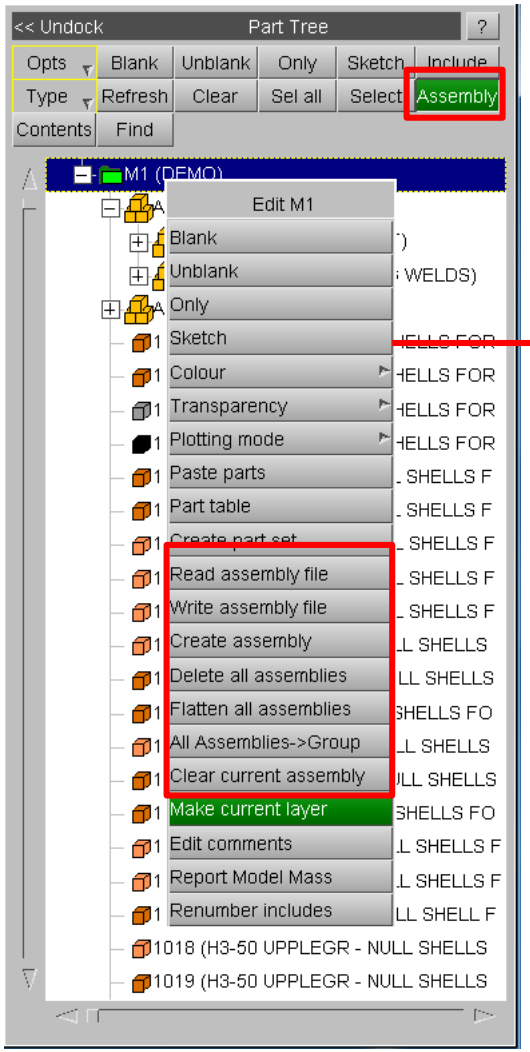
PRIMER – Part Tree Assemblies



- The "**Part Tree**" can be arranged in different ways to help users find parts as quickly as possible.
- Two of the most useful are the "**Include**" option, which sorts the parts by the include file in which they are defined; and the "**Assembly**" option, which sorts the parts by user defined assemblies created in Primer.

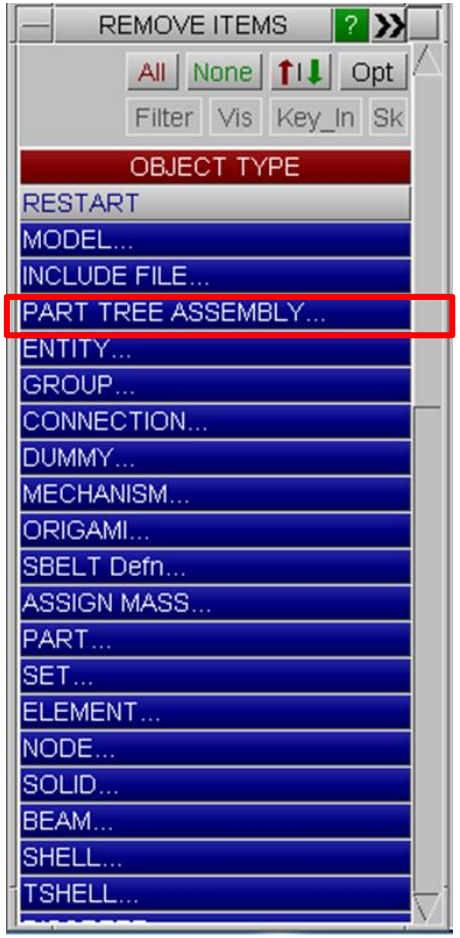


PRIMER – Part Tree Assemblies



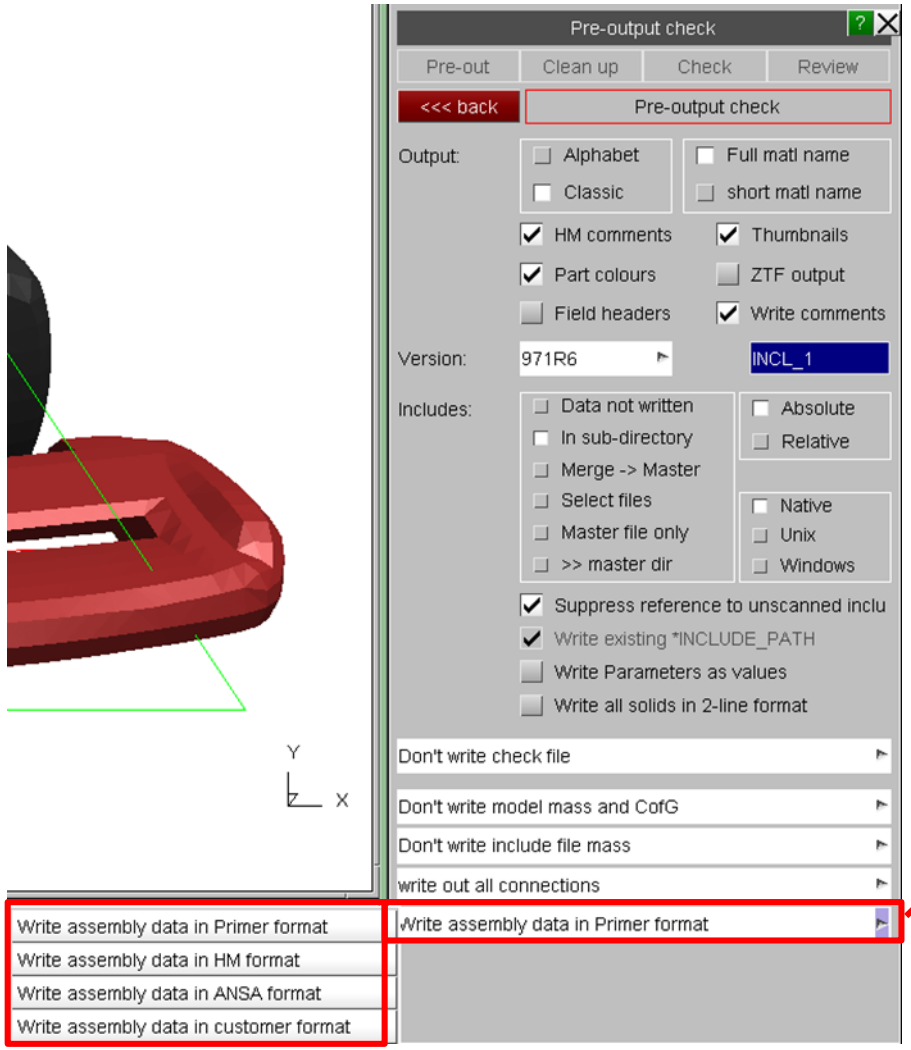
- To view, edit or create new assemblies go to the "**Part Tree**" menu and click on "**Assembly**".
- Right-clicking on the model to bring up the "**Edit**" menu.
- To add a new assembly, click on "**Create Assembly**", give your assembly a name in the pop-up window. Then drag and drop, or cut and paste the parts you wish to add into the assembly.

PRIMER - Part Tree Assemblies



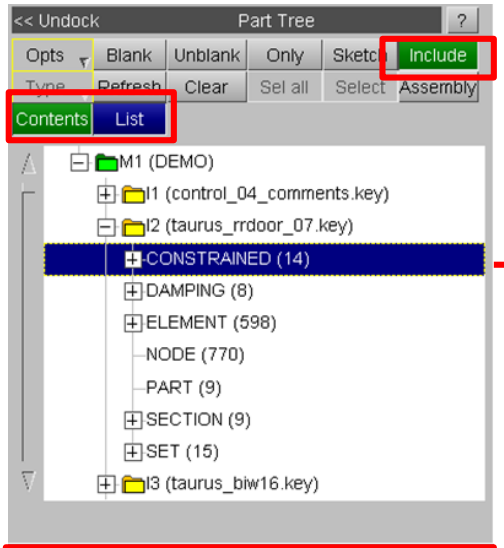
- Most Tools in Primer use the object menu to pick which elements the action will be performed on.
- Part Tree Assemblies created by the user are one of the categories available to users in the object menu.
- Actions can be performed on all the parts belonging to the Part Tree Assembly.

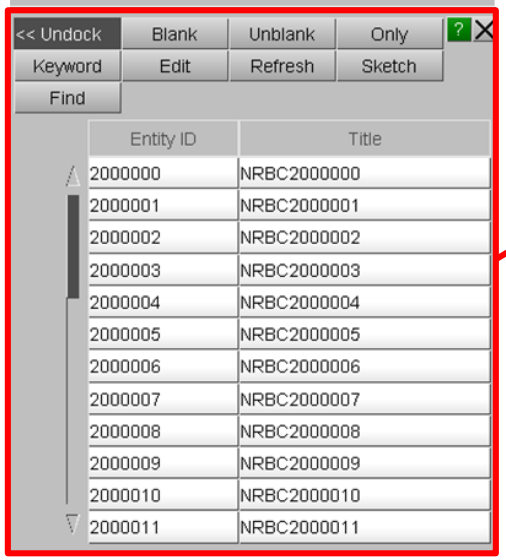
PRIMER - Part Tree Assemblies



- Information for the assemblies created in Primer can be saved as comments in the keyword deck or in HM/ANSA format.
- This it done by going to "**Model -> Write -> LS-Dyna output options**".
- Use the last drop down menu to chose the format in which the Part Tree Assemblies are written.

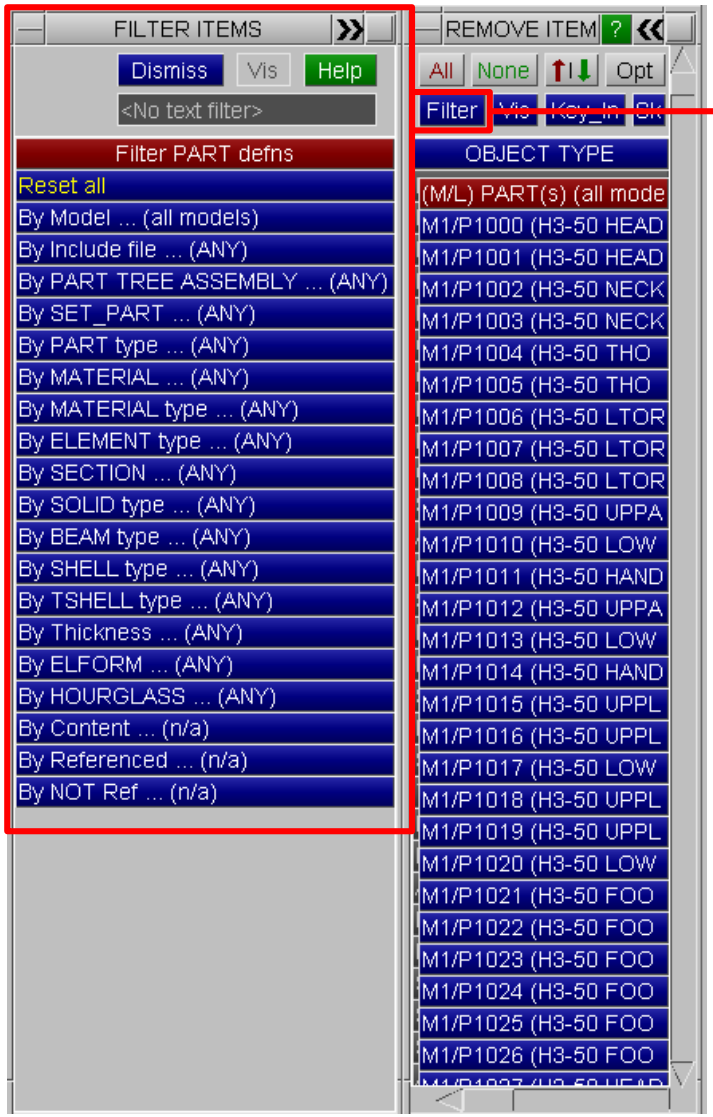
PRIMER – Part Tree Contents



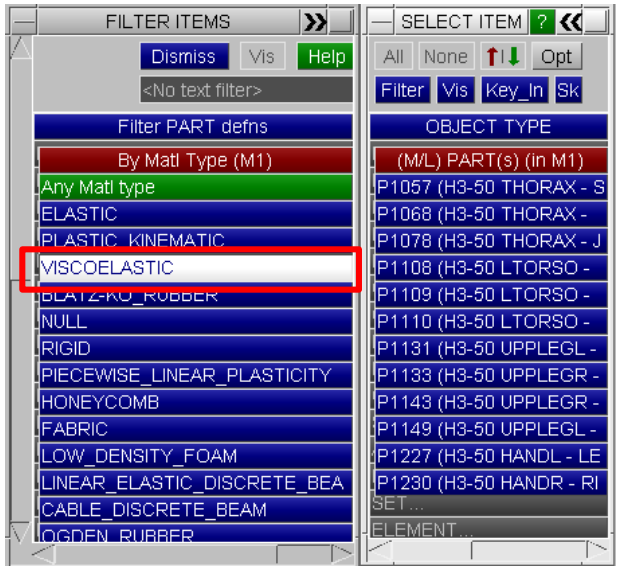


- Another useful function within the "**Part Tree**" menu is the "**Contents**" tree.
- This organizes all the different objects by entity type, and can be grouped by which include file they are in by toggling on/off the "**Include**" button.
- Furthermore, by turning on the "**List**" button the bottom half of the menu will list all the objects found in the selection. Including options to Blank, Unblank, Only, Edit and Sketch.

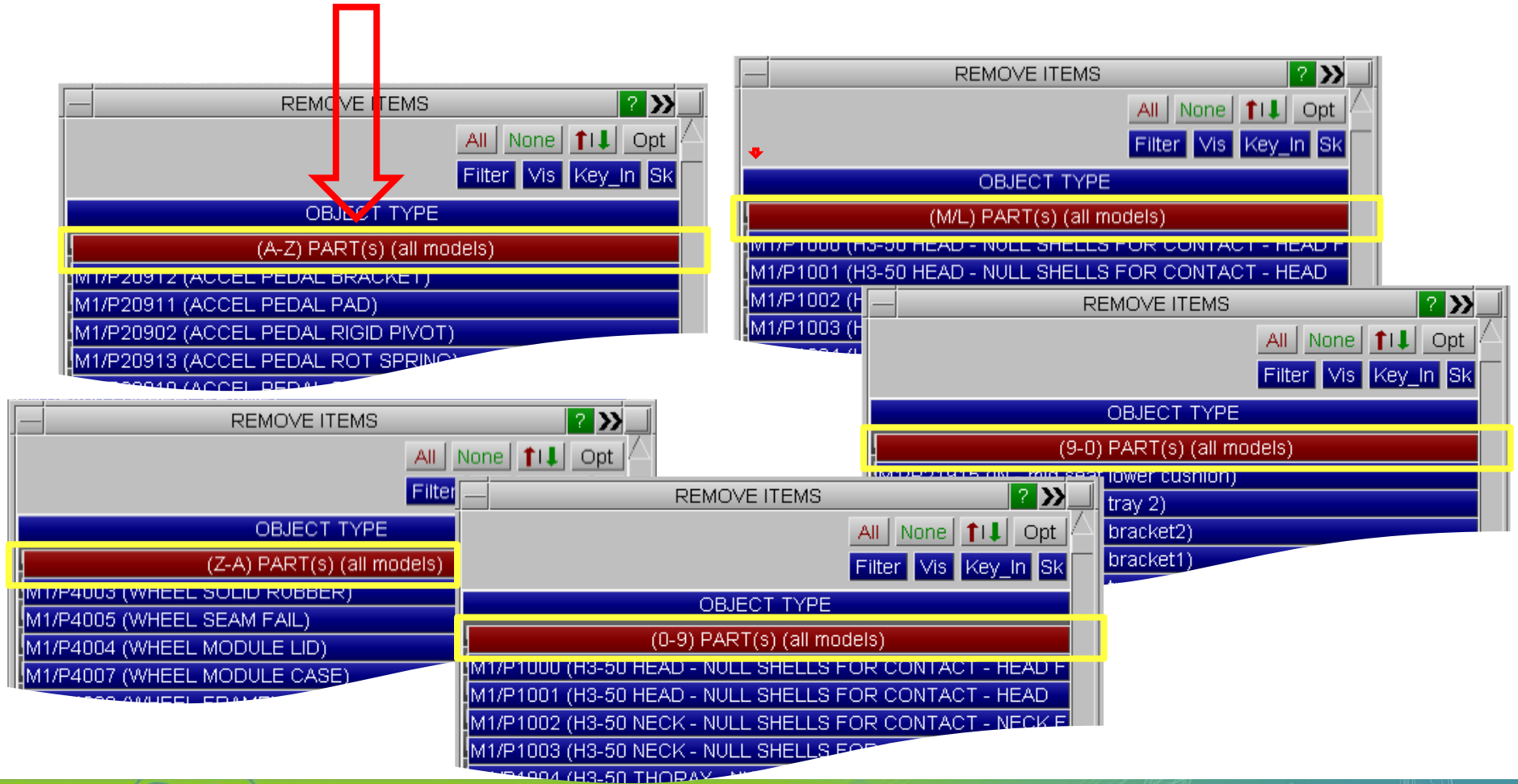
PRIMER – Object Menus



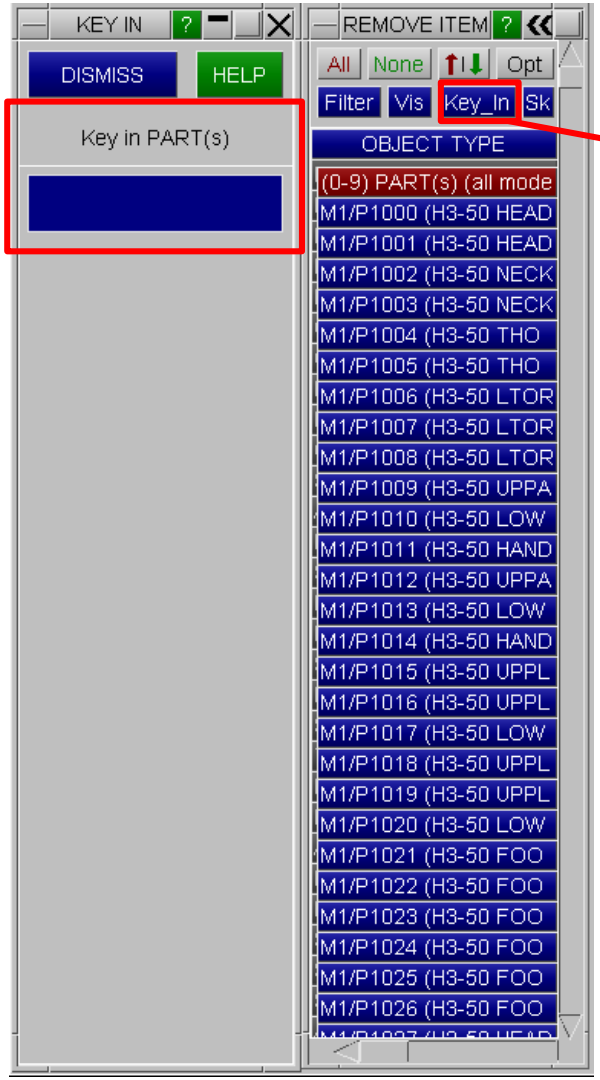
- Most actions in Primer involve using the Object menu to pick which entities the action will be performed on.
- The "**Filter**" option in the Object menu allows the user to find parts faster, especially in bigger models.
- In the demo, selecting "**Filter by MATERIAL type**-> **VISCOELASTIC**" results in just 12 parts to pick from



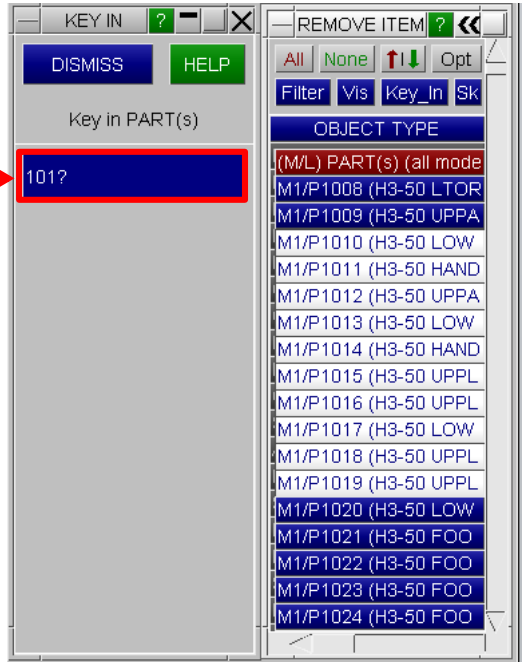
- Clicking on the red bar labelled "**PART(s) (all models)**" sorts the parts in the object menu by different quantities.

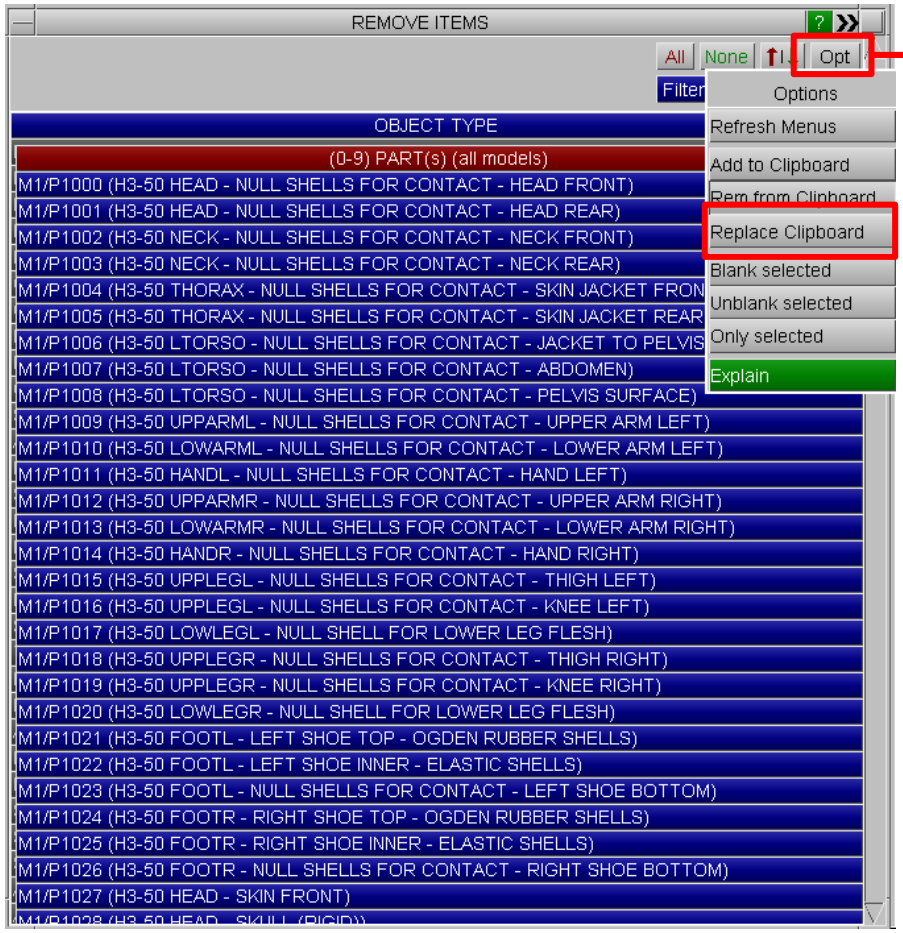


PRIMER – Object Menus

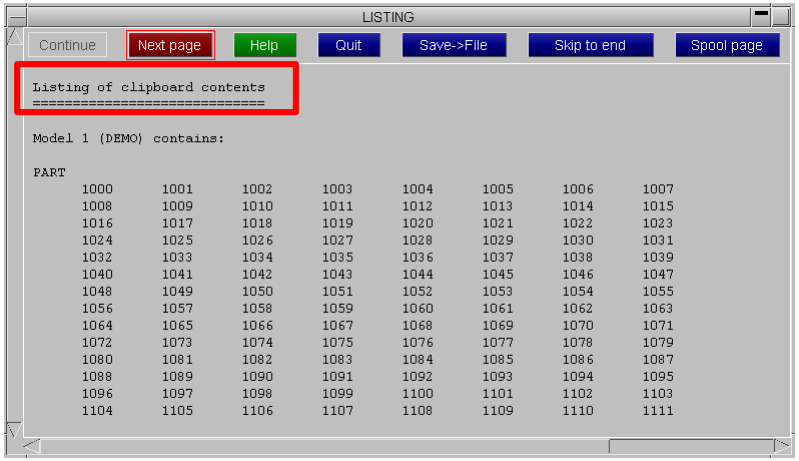


- The “**Key_In**” command opens a text box for the user to input a particular part number.
- However, it is also possible to include a range, for example: 1000-2000.
- Or key in “101?” to select all part IDs consisting of four numbers beginning with 101.
- Or key in “1*” to select all parts beginning with 1.

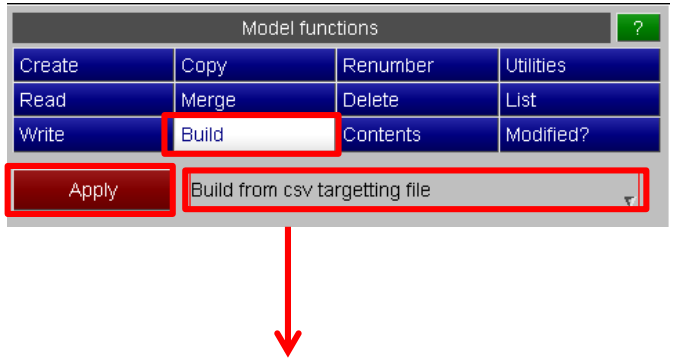




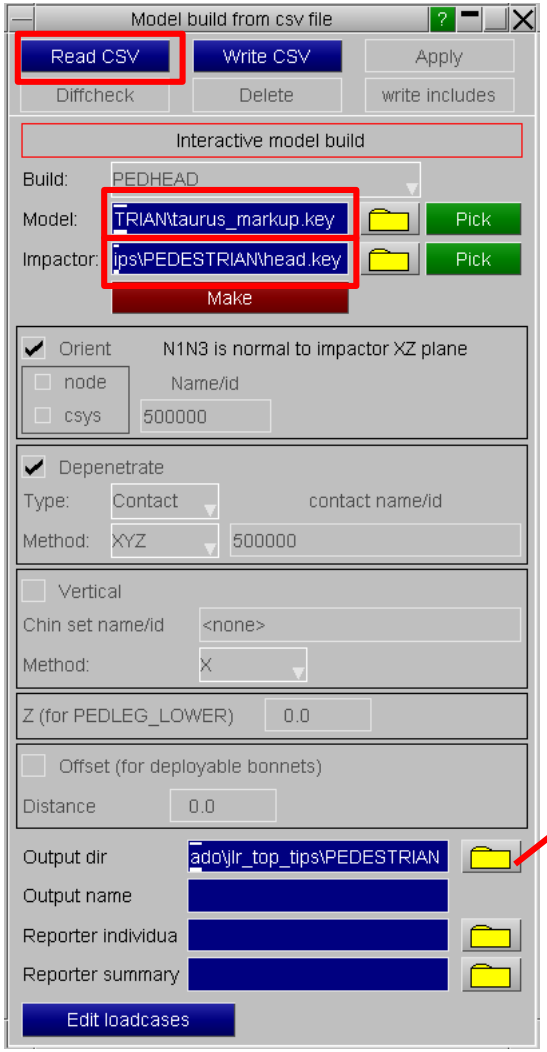
- The options menu "**Opt**" can be useful for blanking and un-blanking selected parts.
- Also, adding or replacing on the clipboard the selected parts or removing the selected parts from the clipboard.



PRIMER – Model Building From CSV

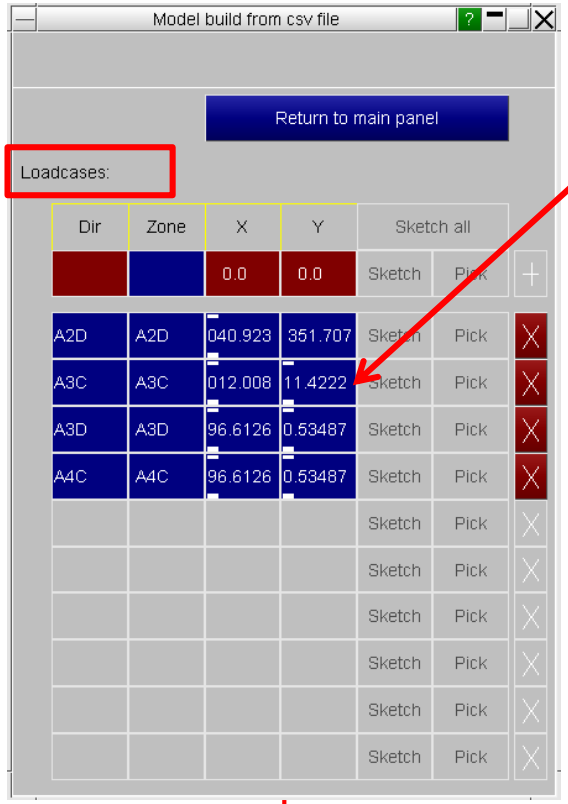


- In the Model menu, select “**Build**” and then “**Build from csv targeting file**” from the drop down menu. Press Apply.
- It’s possible to “**Read CSV**” file if one has already been made.

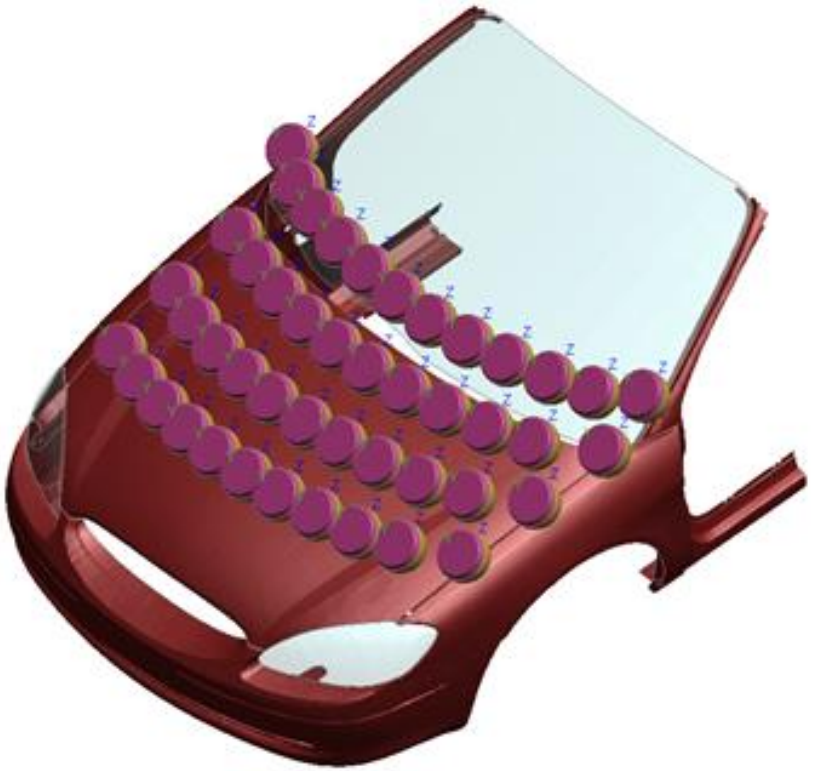


- This function is used for impactor positioning in multiple locations on a model.
- Select the “**Model**” that is to be tested, and the “**Impactor**” file.
- This will create a certain number of cases with the impactor set up at different locations.
- Select the output directory for all the new models.

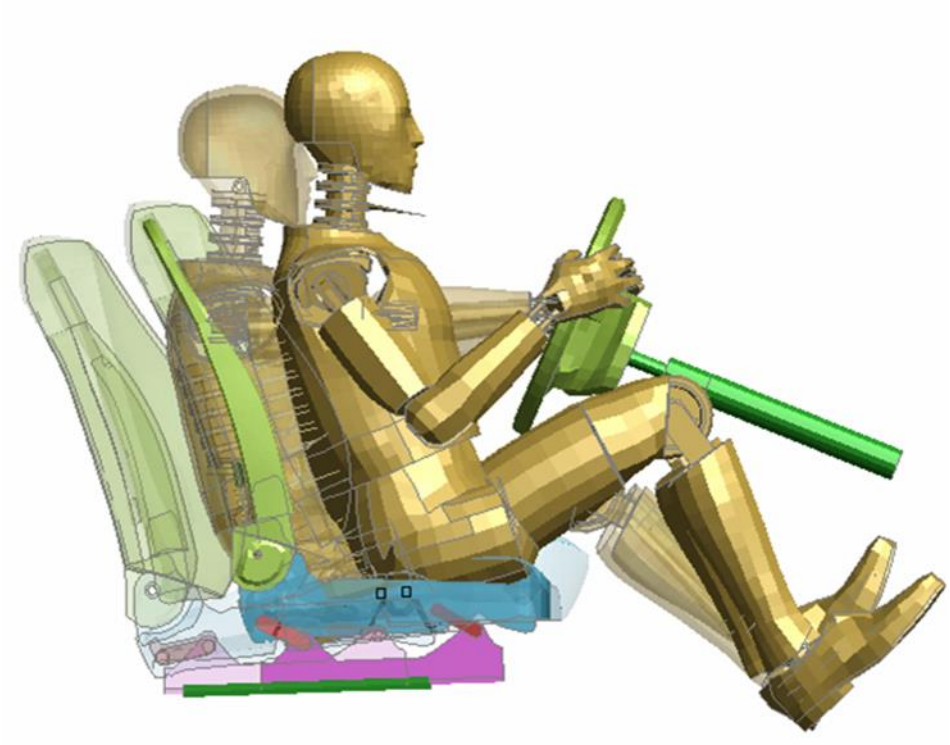
PRIMER – Model Building From CSV



- Insert the locations of the impactor and the name of the directory to be created.
- Go back to the previous menu and "**Write a CSV**" file for future use.



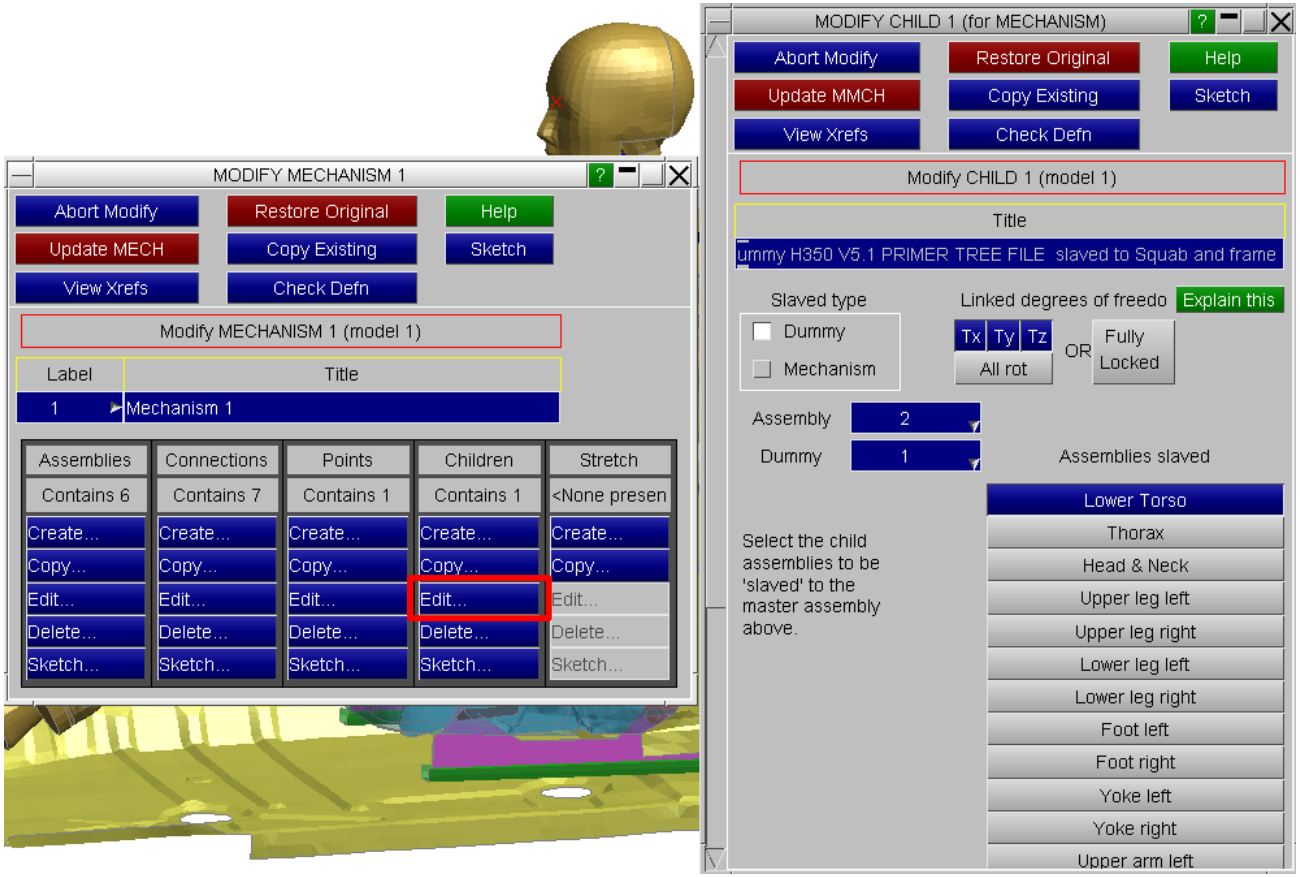
- Open this menu in order to "**Edit the Loadcases**", from the previous menu "**Model Building from CSV**".



- One mechanism may be linked to another, e.g. seat squab to dummy pelvis. Then the dummy and seat can be dragged together in a single action.
- Go into “**Mechanism -> Position**” and drag the seat to the desired location. If the dummy is “**slaved**” to the seat it will move with it.

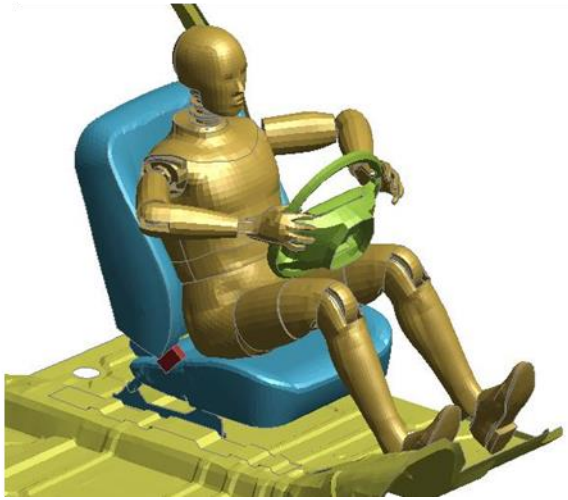
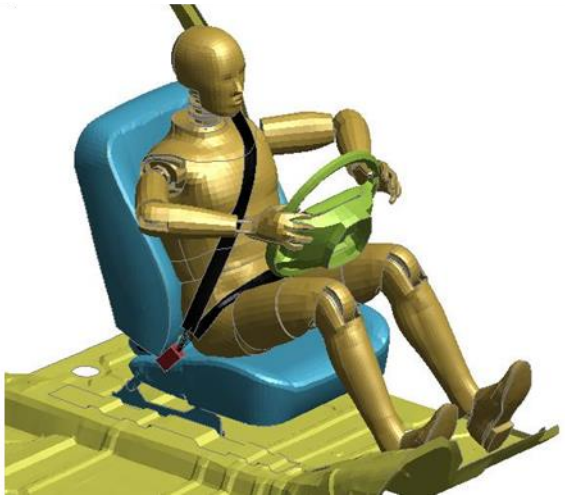
PRIMER – Dummies and Seats

- The Dummy can be “**slaved**” to the Seat assembly by going into “**Mechanism->Modify->Edit Children**”.
- This brings up the menu where the “**Master**” and “**Slave**” assemblies can be selected. It is possible to select which parts of the dummy are slaved to the seat assembly.



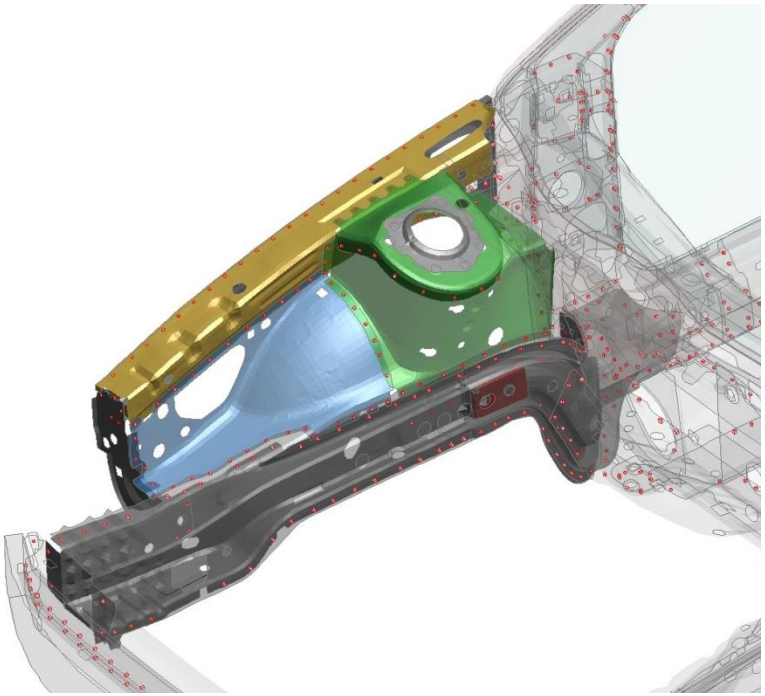
PRIMER – Dummies and Seats

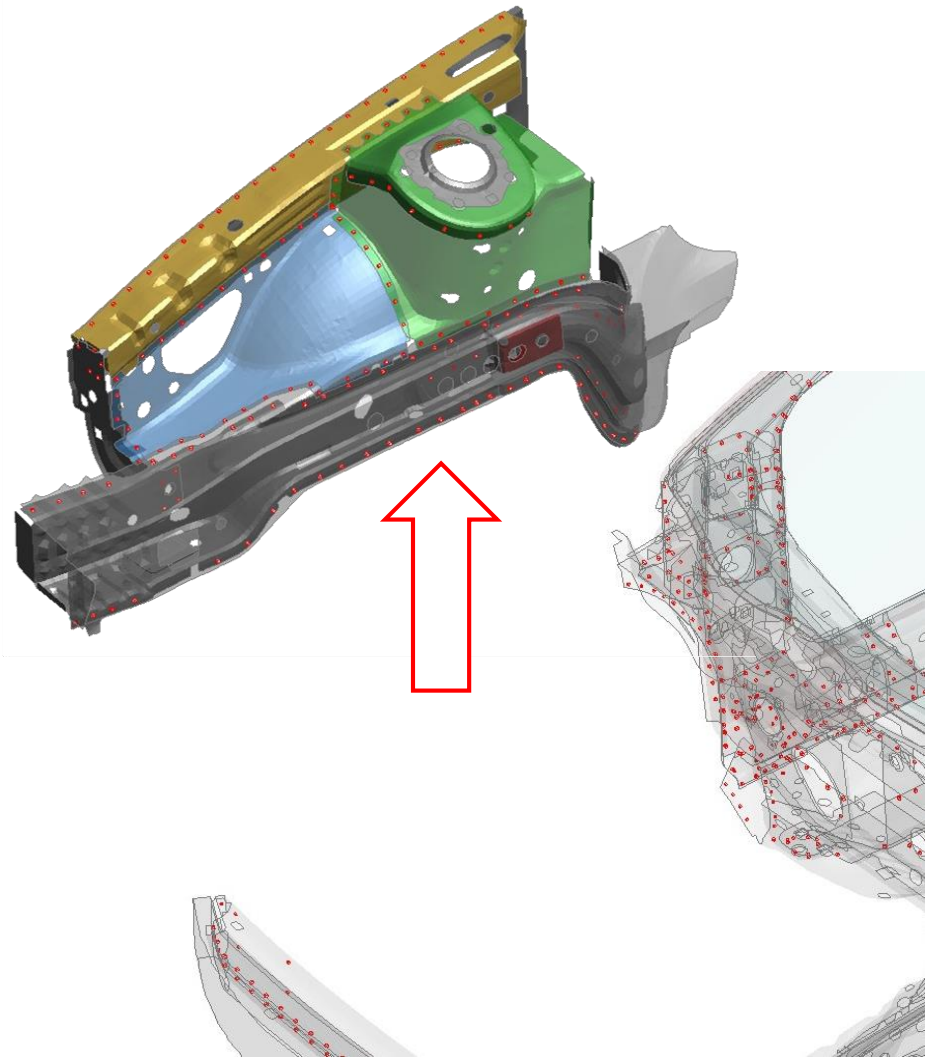
- In most cases after repositioning the seat and dummy it is necessary to re-fit the seatbelt.
- PRIMER remembers the belt information at the end of the keyword files so the belt can be re-fitted in one operation if the dummy is moved
- This can be done by going into "**Occupant -> Seatbelts -> Auto-Refit**" and selecting **Apply** if no further changes are to be made.

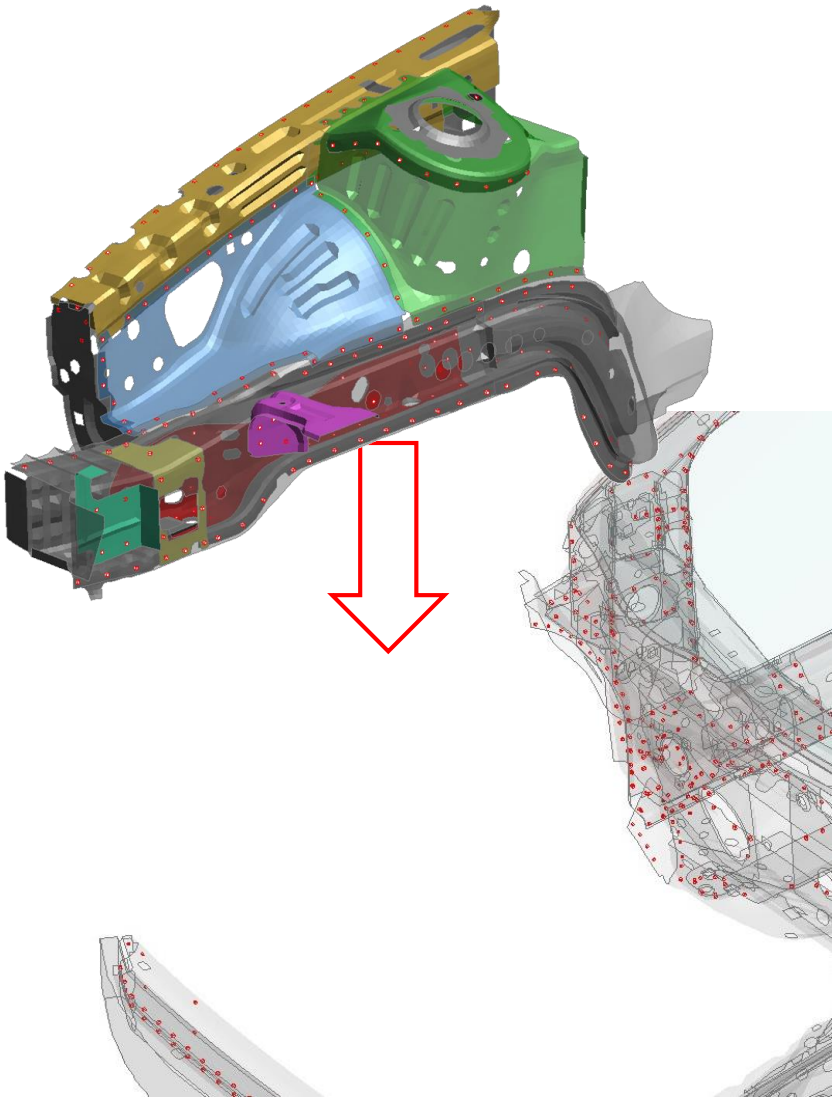
PRIMER - Assembly Replace

- Old meshes are removed, including any spotwelds and other connected items that are “internal” to the selected parts

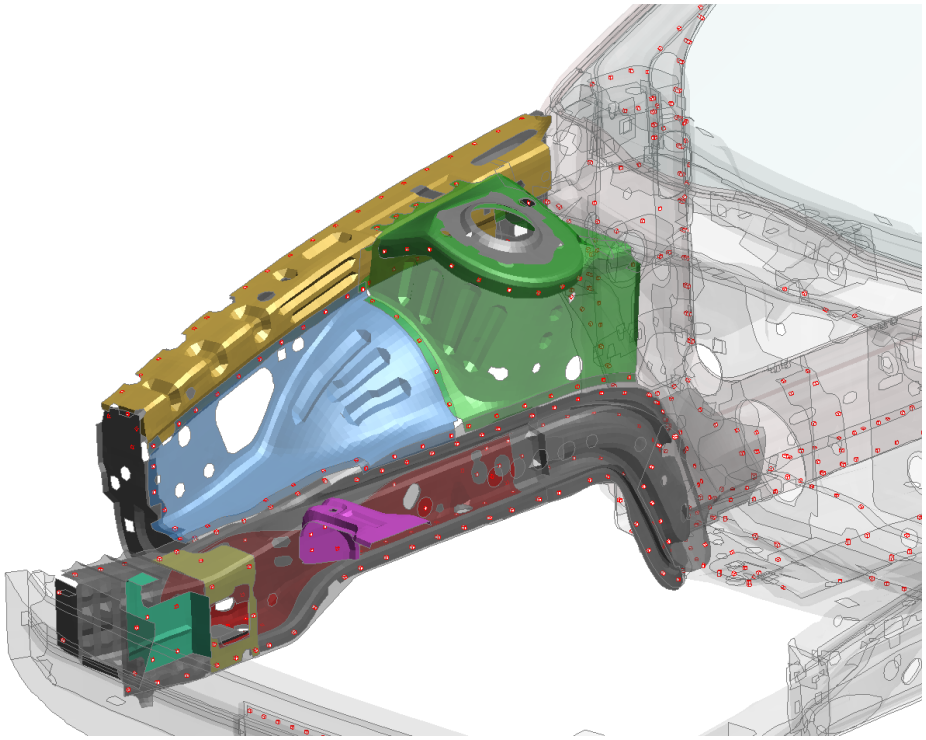




PRIMER - Assembly Replace



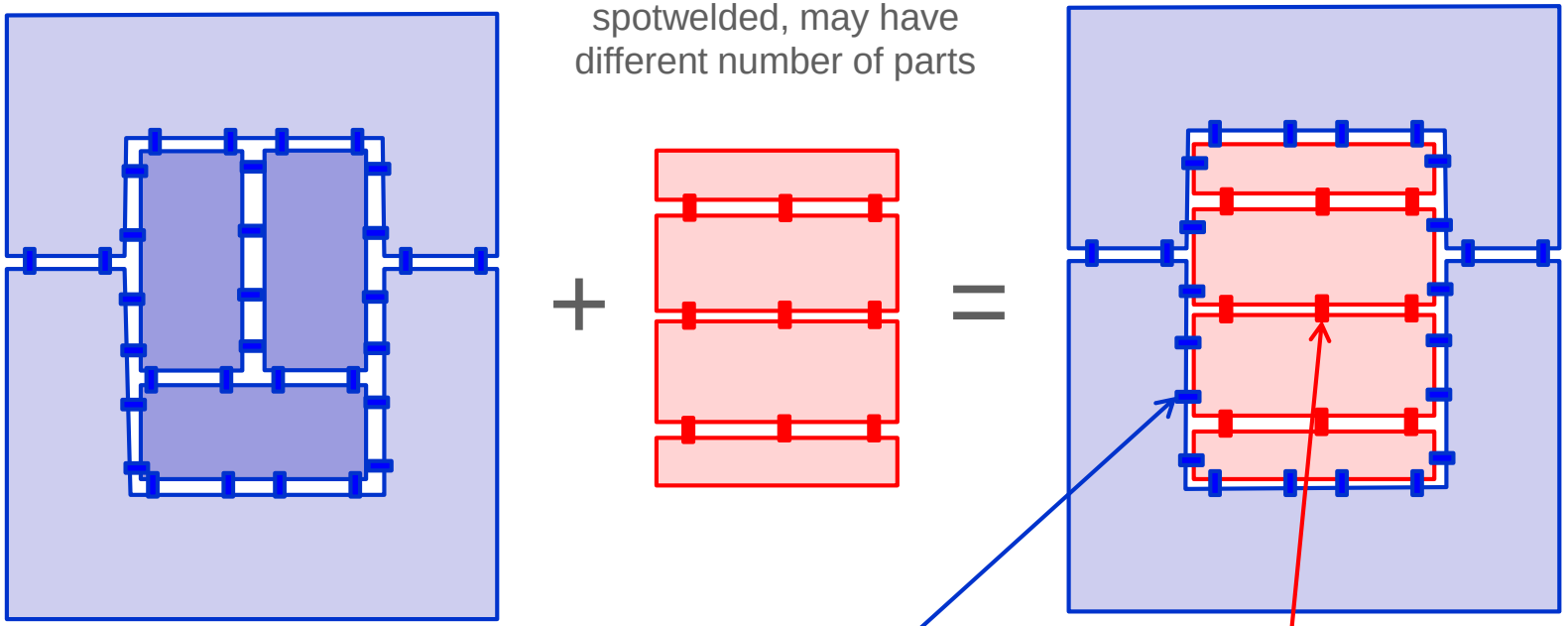
- New assembly, which can include its own spotwelds and other connected items, new parts, etc. The new assembly is connected to the rest of the structure using existing spotwelds



Old model with spotwelds

New mesh of assembly, spotwelded, may have different number of parts

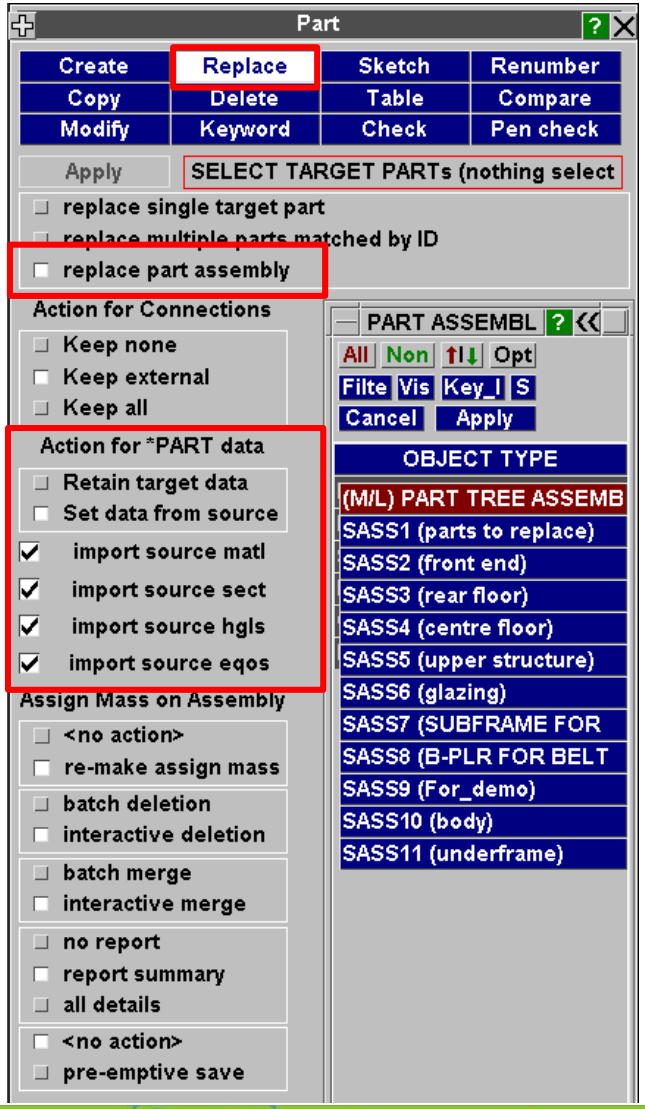
Old model with spotwelds



Spotwelds “around the edges” of the assembly are taken from the old model, and re-connected.

Spotwelds “inside” the assembly are taken from the new mesh

PRIMER - Assembly Replace



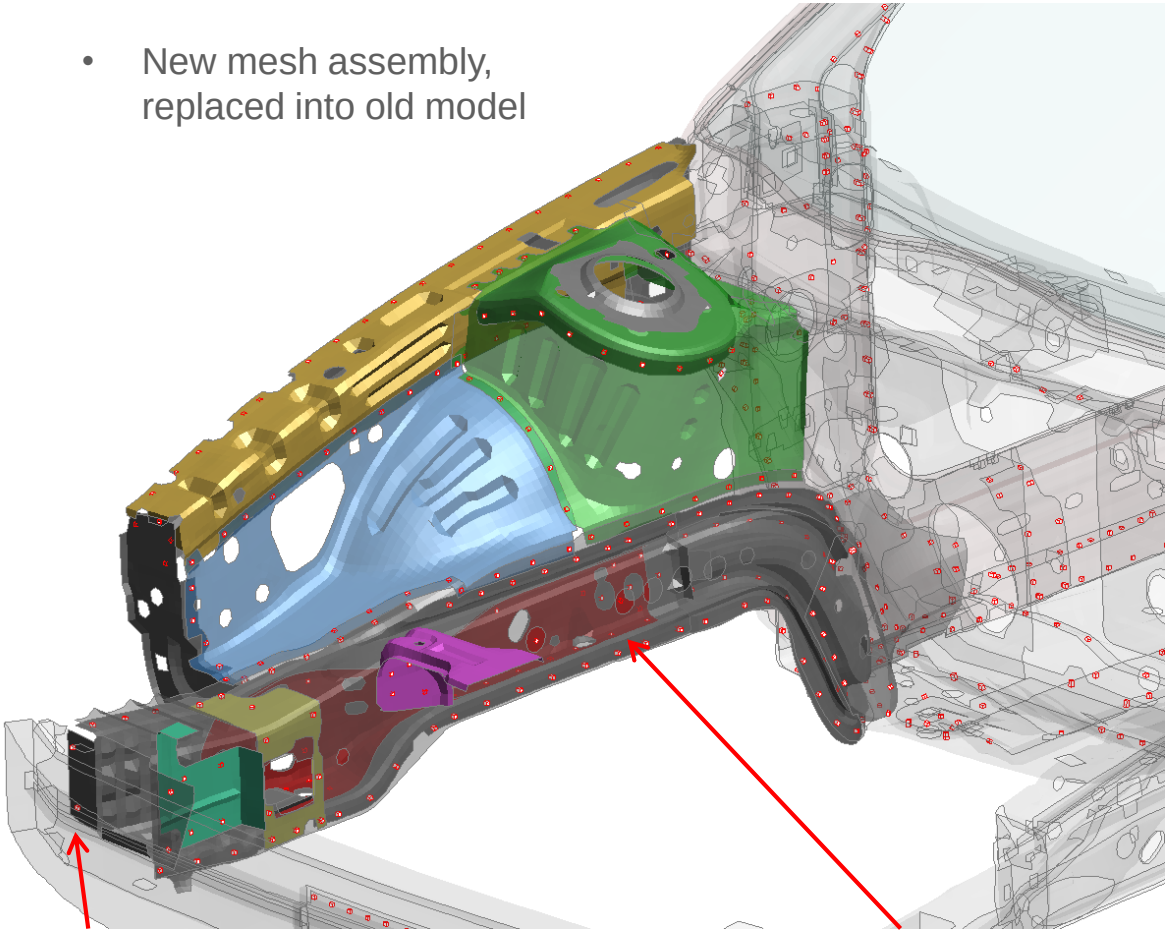
Action for *PART data

- When replacing an assembly, if a part in the source model has the same label as a part in the assembly you are replacing in the target model, there are two options available for data on the *PART card:
  - **Retain target data** – part will reference the section, material etc. that it references in the target model
  - **Set data from source** – part will reference the section, material etc. that it references in the source model. With this option you can also choose to import the referenced section, material, section, hourglass and equation of state cards from the source model to the target model

- Note that if a part in the source model does not match the label of a part in the assembly you are replacing in the target model, all referenced data (section material etc.) will be copied across

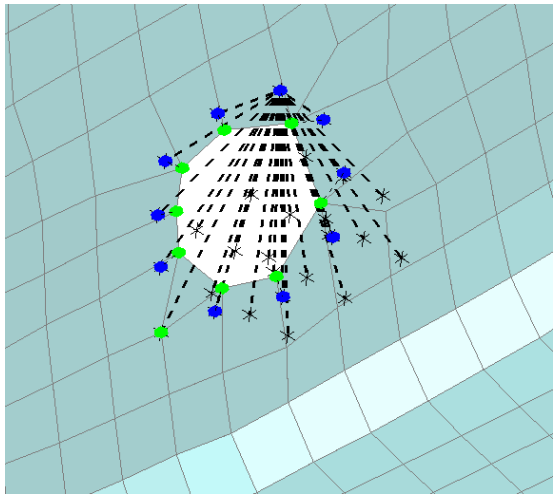
PRIMER - Assembly Replace

- New mesh assembly, replaced into old model



Spotwelds “around the edges” of the assembly are taken from the old model, and re-connected

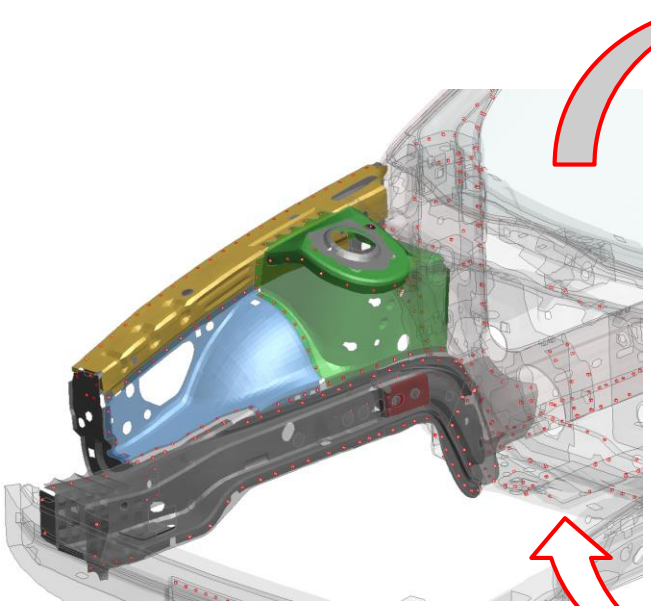
Spotwelds “inside” the assembly are taken from the new model



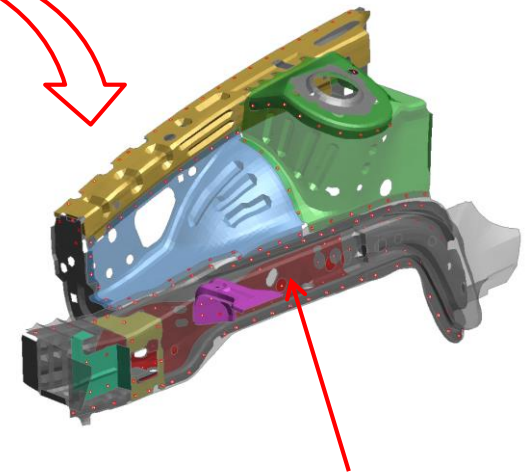
Same capabilities as existing Part Replace: re-creating bolt connections, re-attaching entities to the new mesh, etc

PRIMER - Assembly Replace

- How to ensure that new parts are in the correct Part Sets for contact, initial velocity, etc?
- Method 1 - *SET_PART_LIST_GENERATE.
  - Incoming new parts are correctly numbered to fall within the ID range



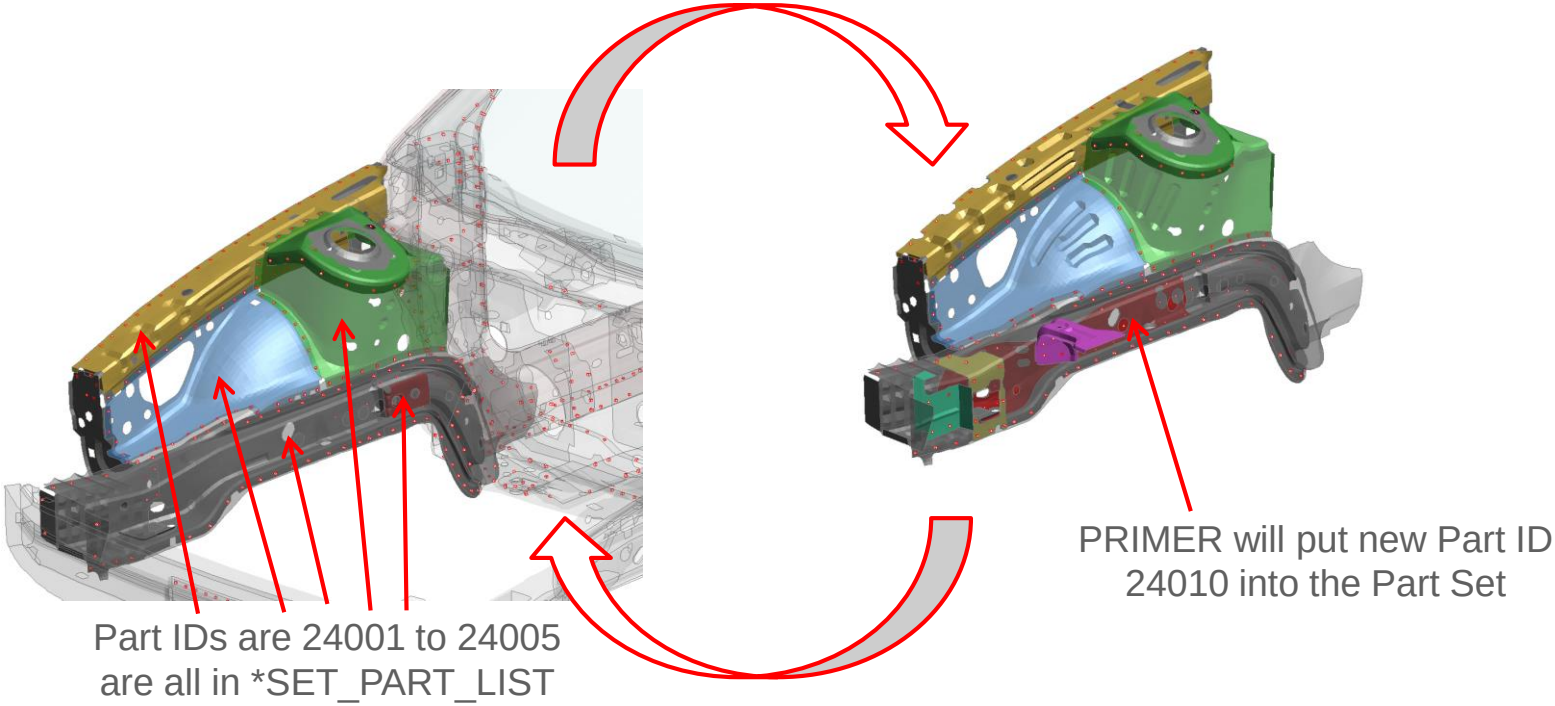
Body structure Part IDs are 20000 to 29999; SET_PART_LIST_GENERATE references this ID range



New Part ID 24010 will automatically fall into the Part Set

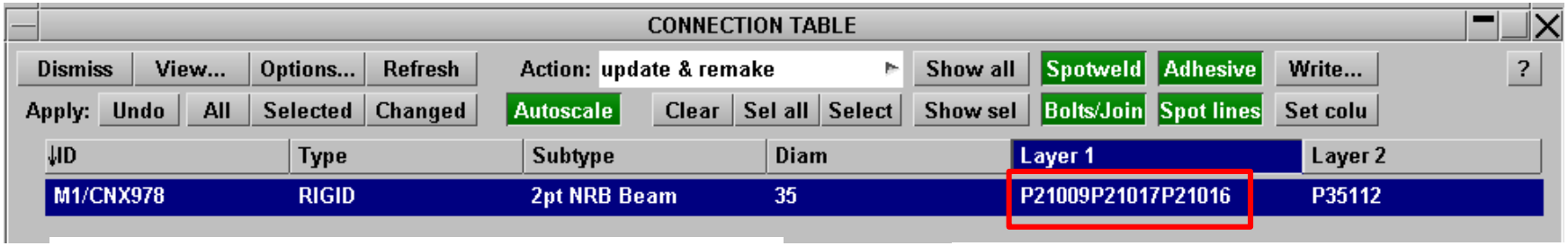
PRIMER - Assembly Replace

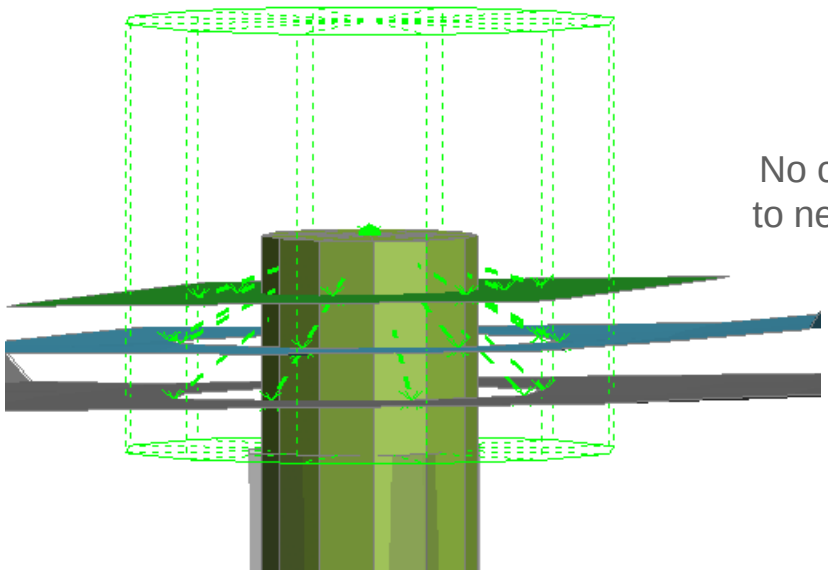
- How to ensure that new parts are in the correct Part Sets for contact, initial velocity, etc?
- Method 2 - *SET_PART_LIST.
  - If ALL the outgoing parts are in the set, then the incoming parts will all be placed into the set automatically



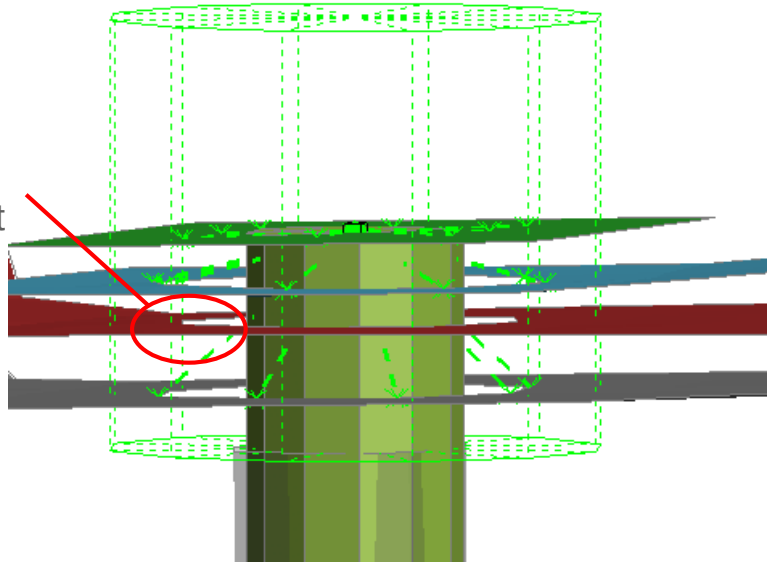
PRIMER - Assembly Replace

- Re-connection of bolt connections at the boundary of the new mesh depends on the definition method. If the layer definition consists of Part IDs, the bolt will re-connect only to those Part IDs, not to the new parts



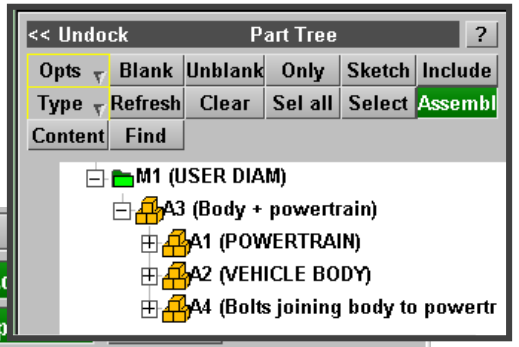


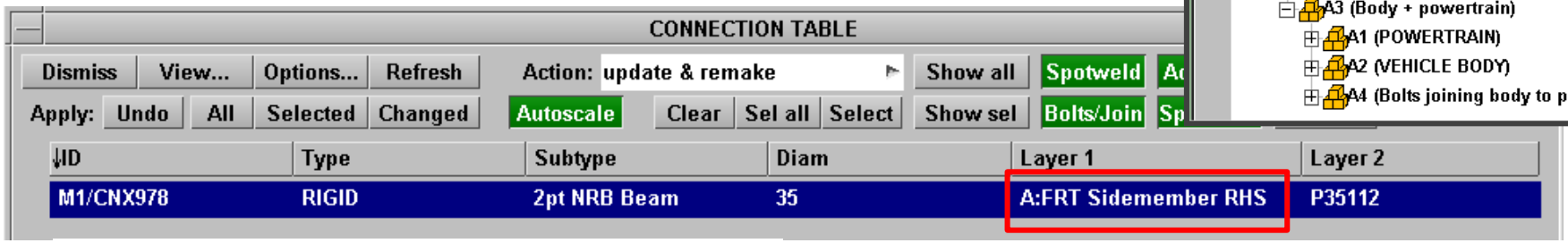
No connection to new red Part

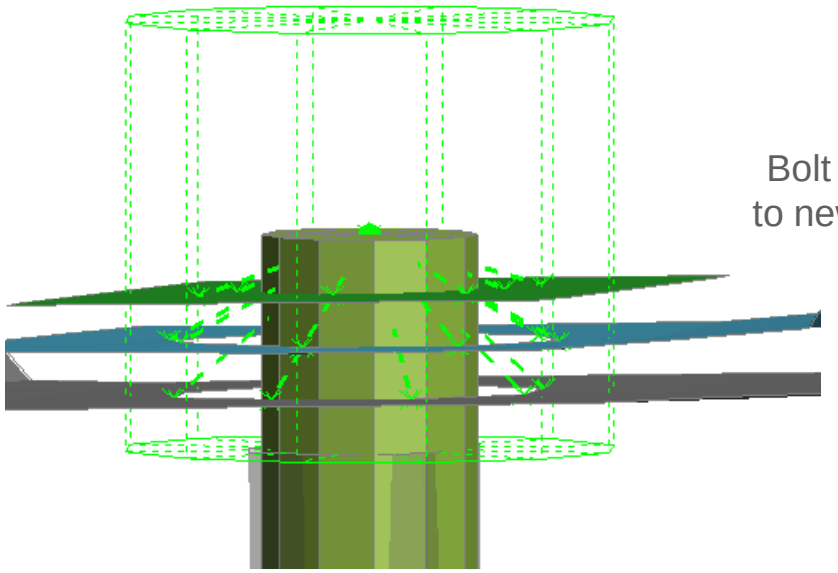


PRIMER - Assembly Replace

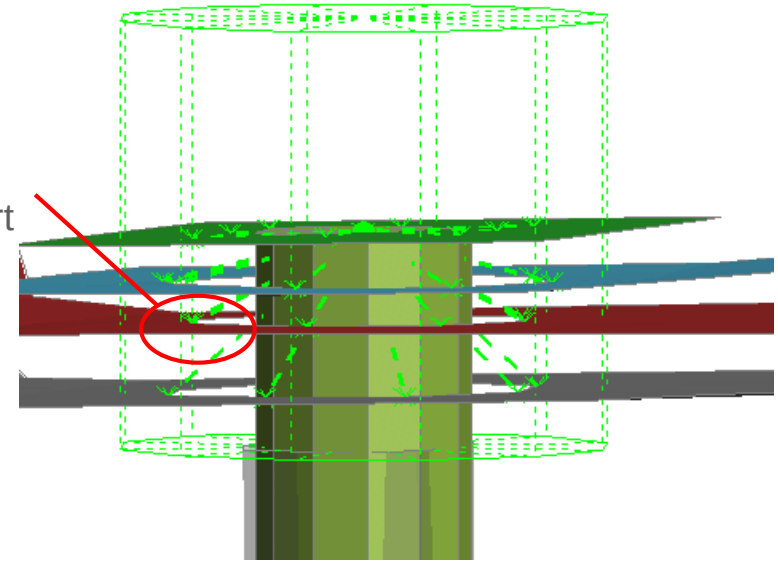
- If Part Set ID or Part Tree Assembly name is used in the bolt definition, and if the new parts are included in that set or assembly, then the bolt will re-connect to the new parts too



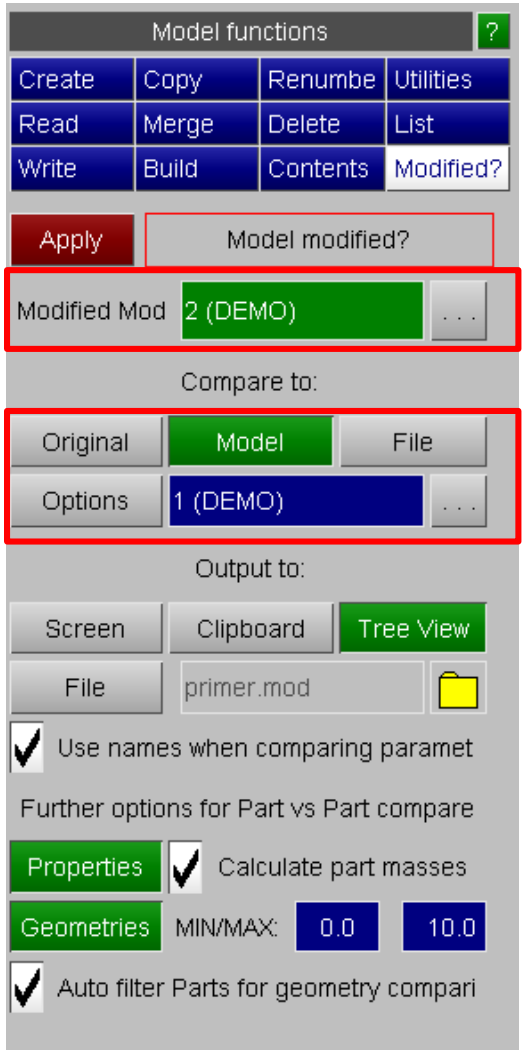




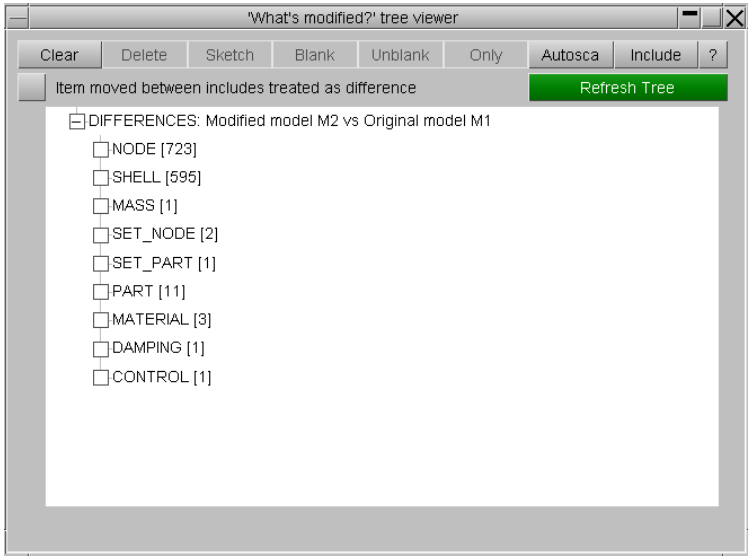
Bolt connects to new red Part



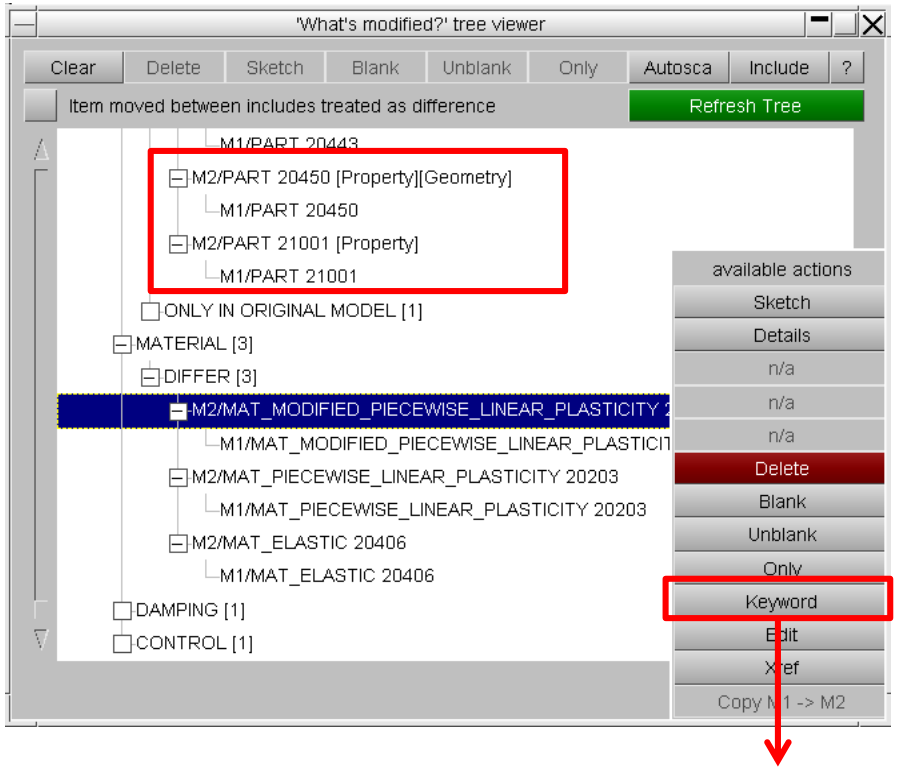
PRIMER – Compare Models



- With two versions of a model open in the same Primer window, it is possible to compare the keyword files and find any differences between the two models.
- Go to Model ->Modified? and select one model as the Modified version and one as the comparing version. This can be a model already open, the original version of the current model, or another file which can be read in.
- Turn on the Geometries button if any changes in geometry are to be recorded. Then click on Apply.
- Primer will output a tree viewer listing all the differences.

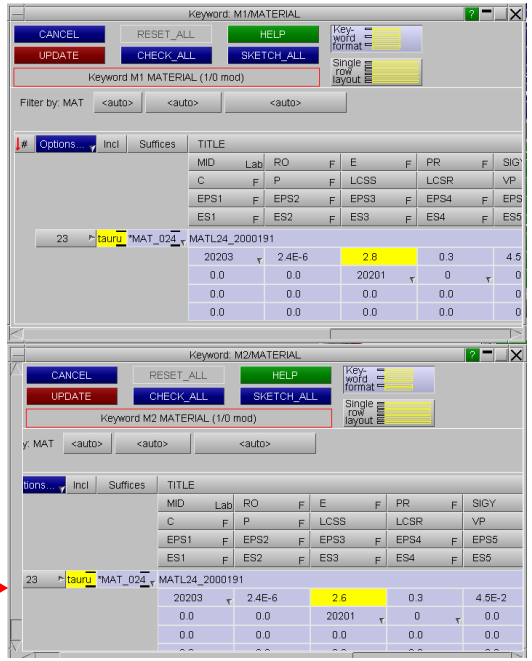


PRIMER – Compare Models



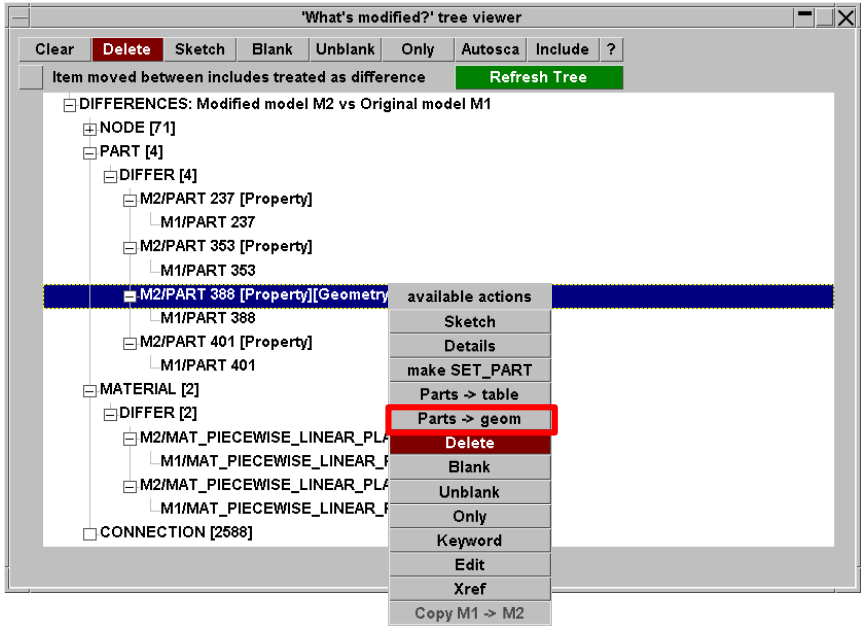
- In the Part category of the tree viewer, Primer differentiates between differences in the properties or geometry of parts.
- It also list any entities that are only present in one of the models.
- When entities are present in the original model only, it is possible to copy them to the second model.

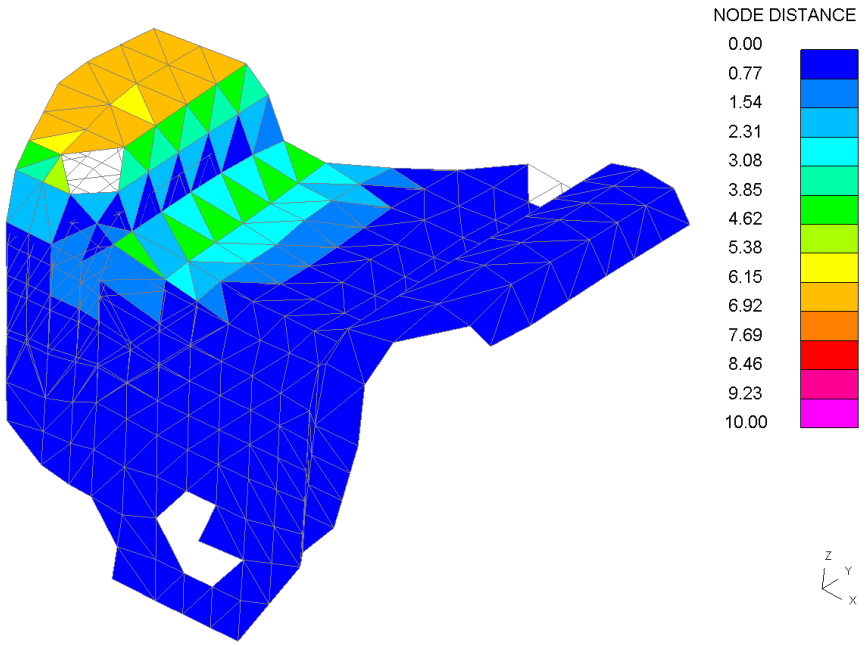
- Right clicking on any of the entity differences opens a menu with the option of opening the Keyword.
- This opens a keyword for each model with the differences HIGHLIGHTED!



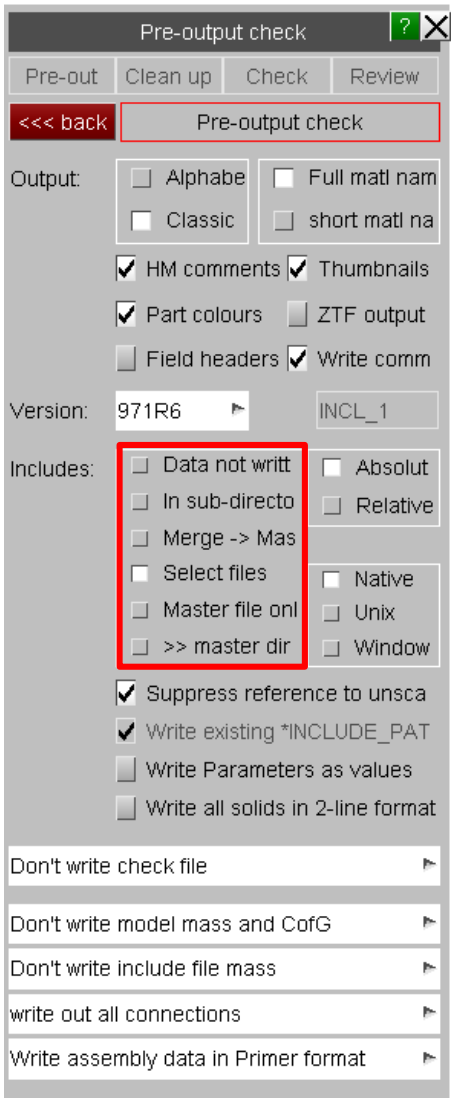
PRIMER – Compare Models

- Another option available when right mouse clicking on one of the differences is:
  - Checking and contouring geometric differences between parts.

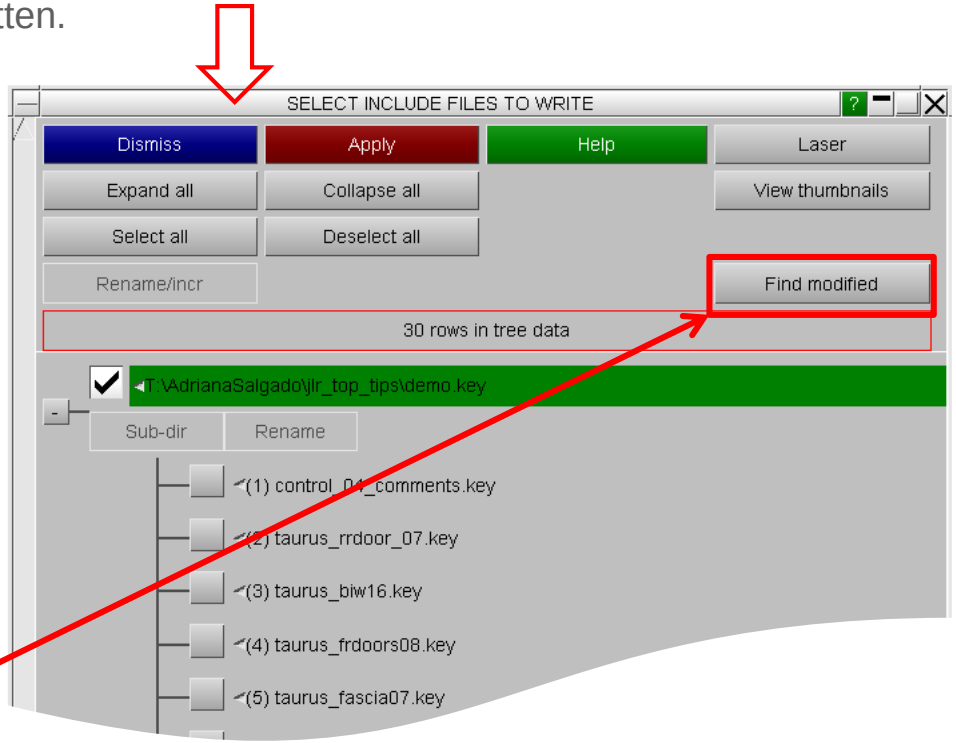




PRIMER – Compare Models



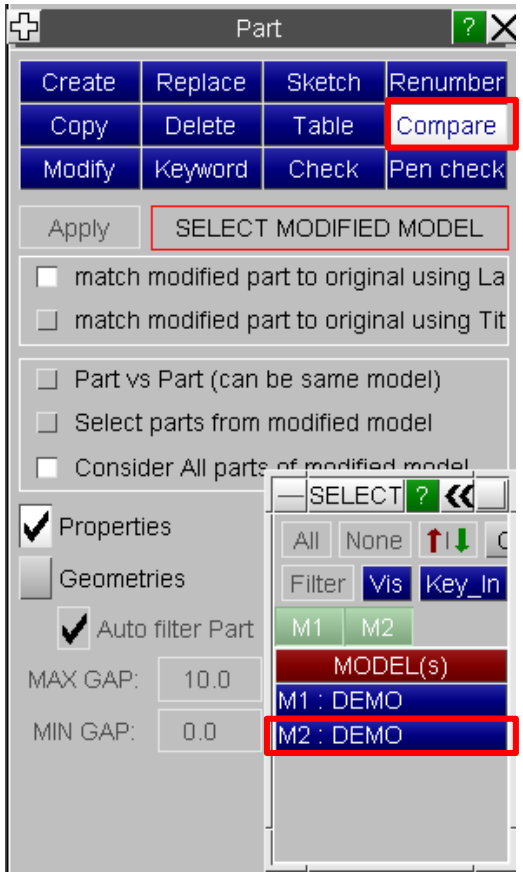
- In order to save only the include files with differences in them got to: Write -> LS-Dyna output options, then tick “Select files”.
- When saving the file a new window will appear for the user to select the includes to be written.

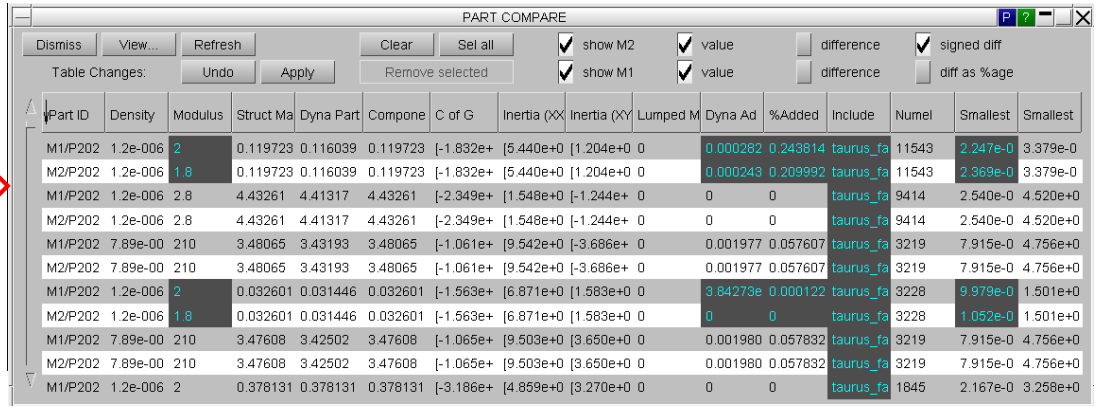


Select “Find Modified” for a list of the include files which have changed.

PRIMER – Compare Models

- Another way to compare differences is to go into Part -> Compare and select the modified model.

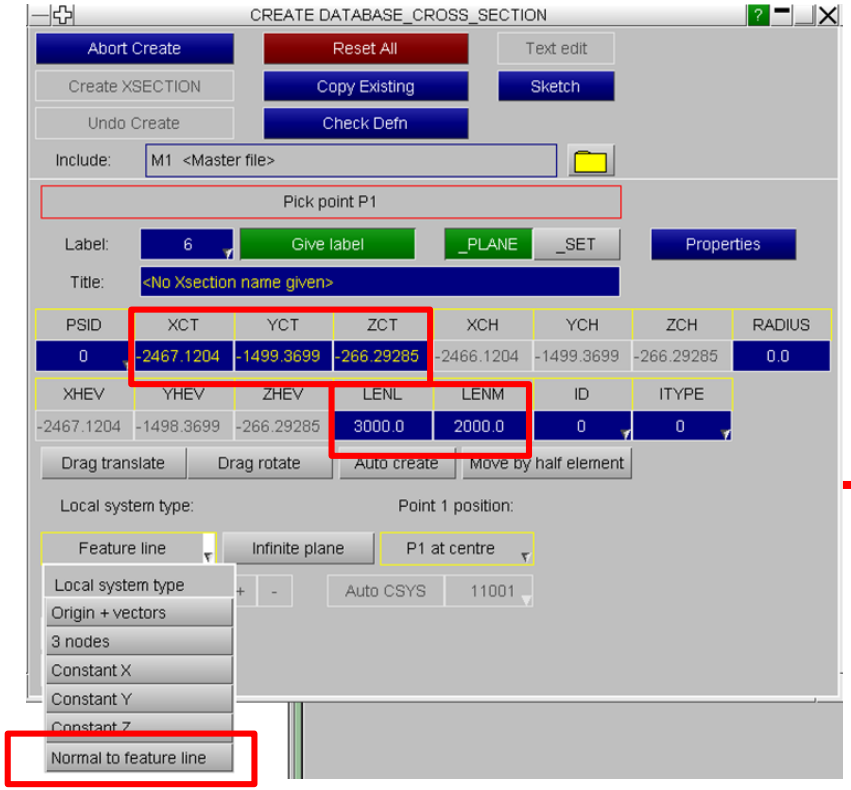


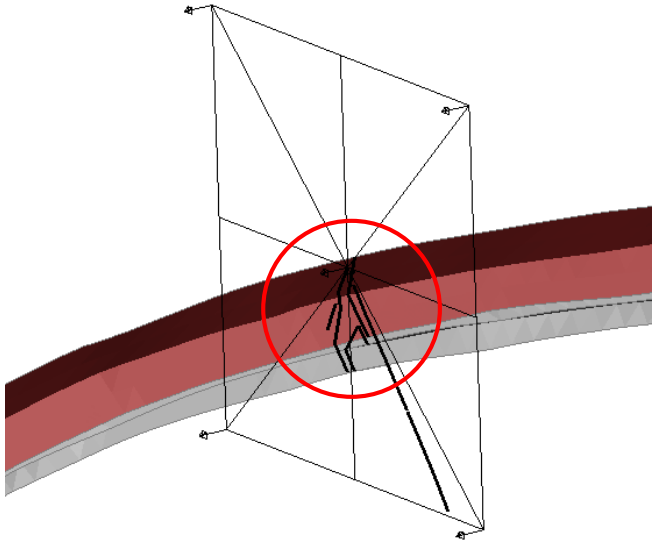


- This brings up a table of all the model parts and their differences with the original model.
- The table can be sorted by column and more properties can be added by clicking on “View”.

PRIMER – Cross Sections

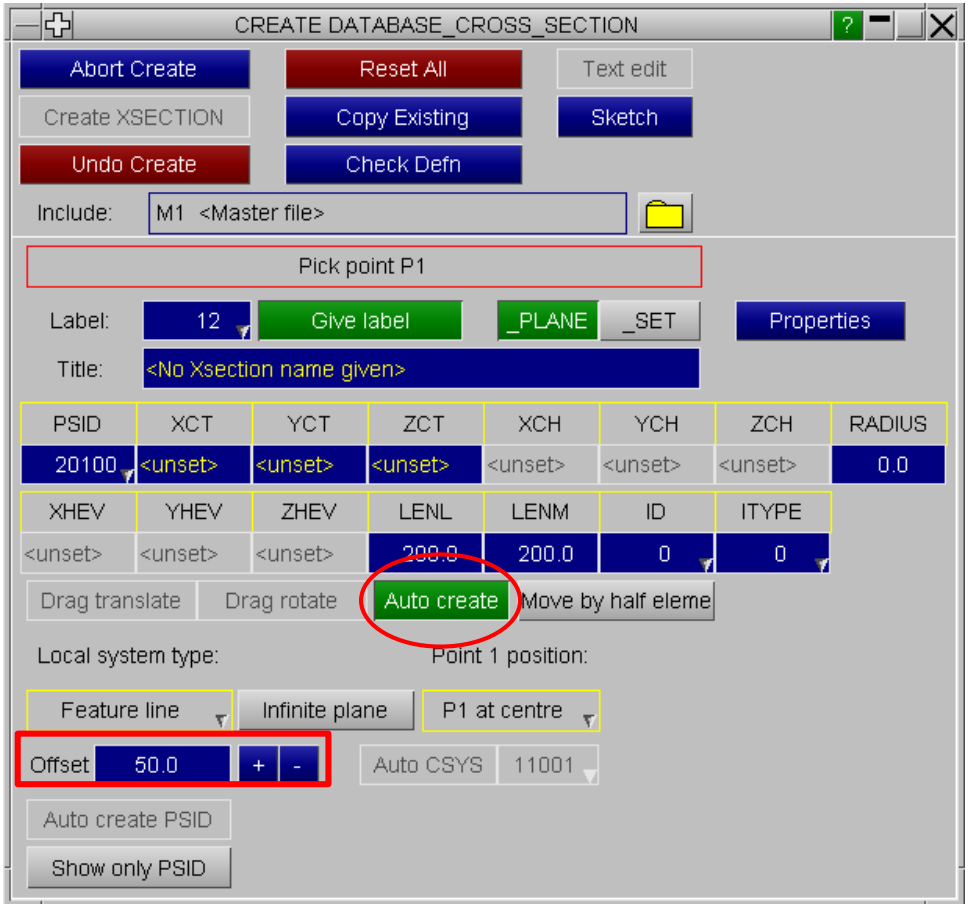
- Cross sections can be created normal to a feature line by selecting this option in the “Local System Type” drop down menu.
- This allows the user to select a point on the feature line (XCT,YCT,ZCT) and the size of the plane (LENL & LENM).
- It is also possible to select the part set that the cross section is applied to (PSID).

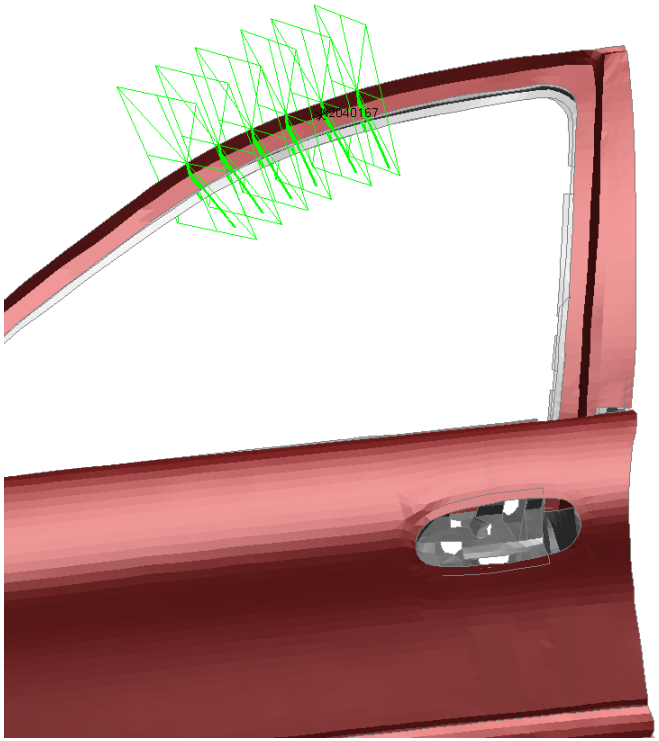




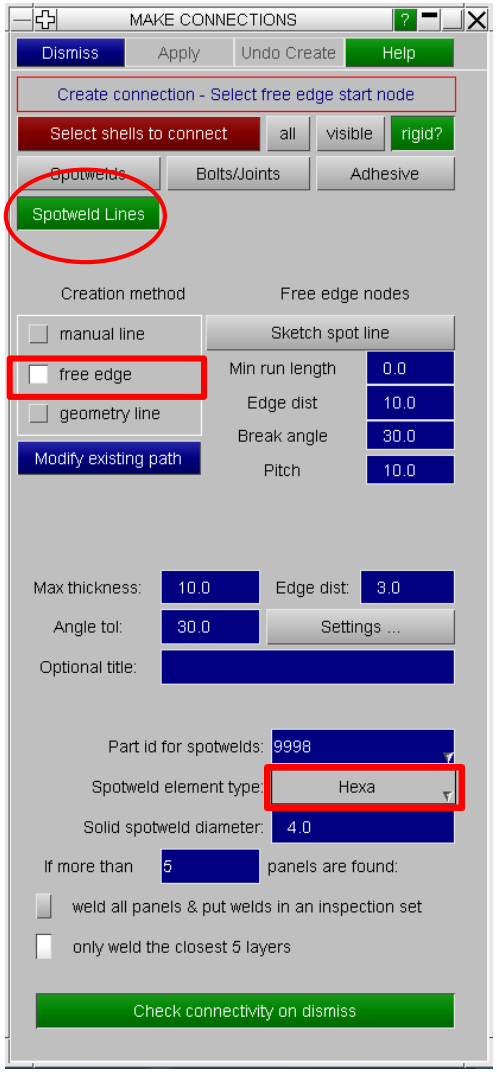
PRIMER – Cross Sections

- Turn on the Auto Create option and set the Offset to 50 (or desired amount).
- Press “+” to create multiple cross sections along the feature line at a constant distance.



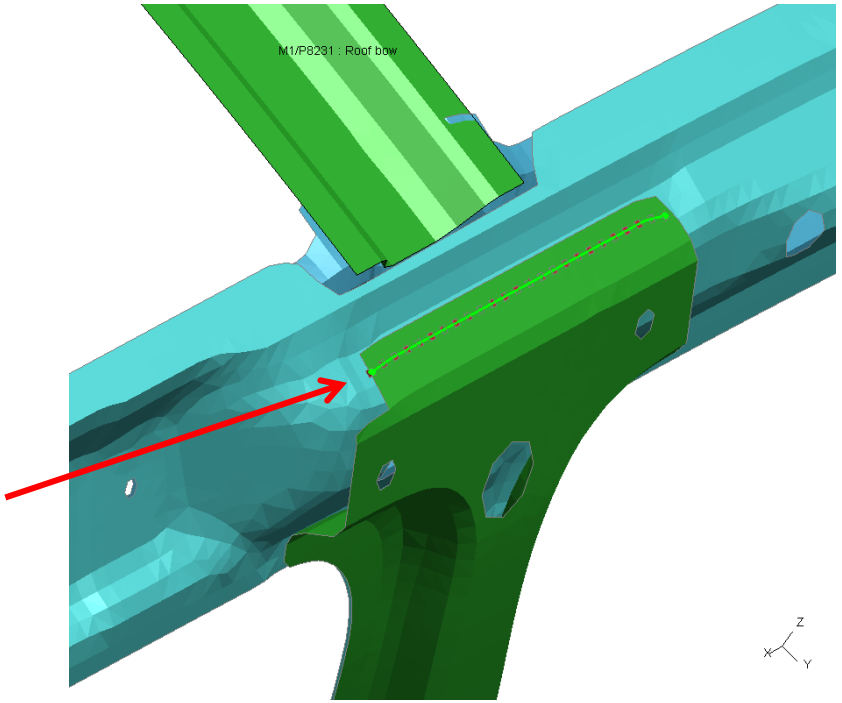


PRIMER – Connections

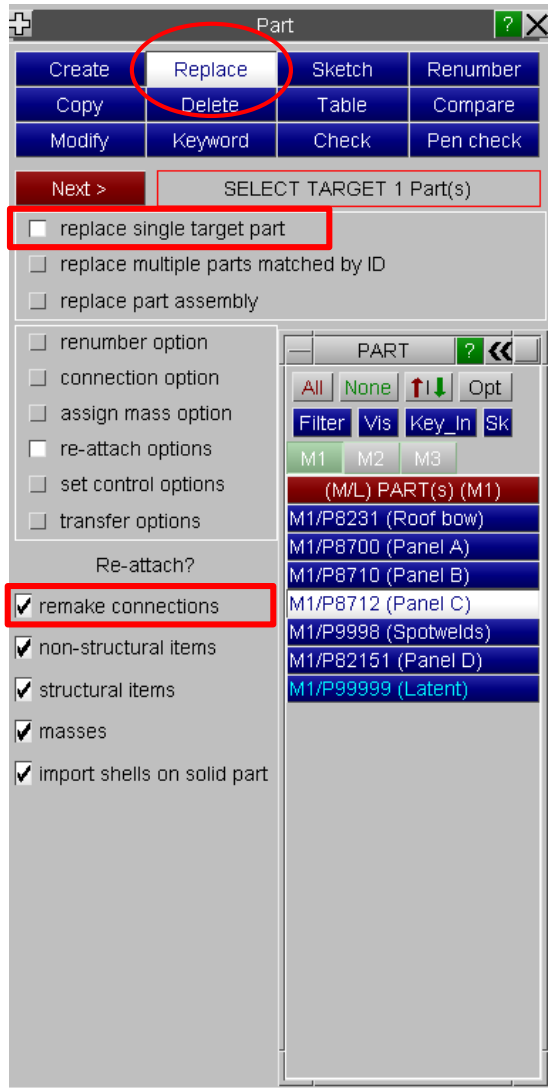


- A useful feature of Primer connections is that a line of Spotwelds can be created along a free edge.
- Set the distance from the edge and the size and type of the Spotweld element.
- Pick the parts to be joined and two nodes defining the free edge. Then click Apply.

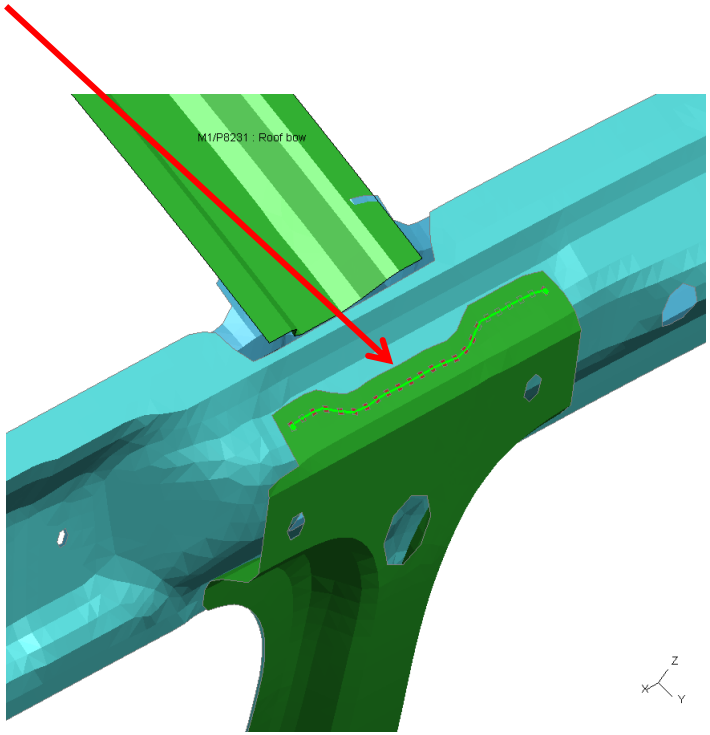
- The result is a line of Spotwelds such as in this example.



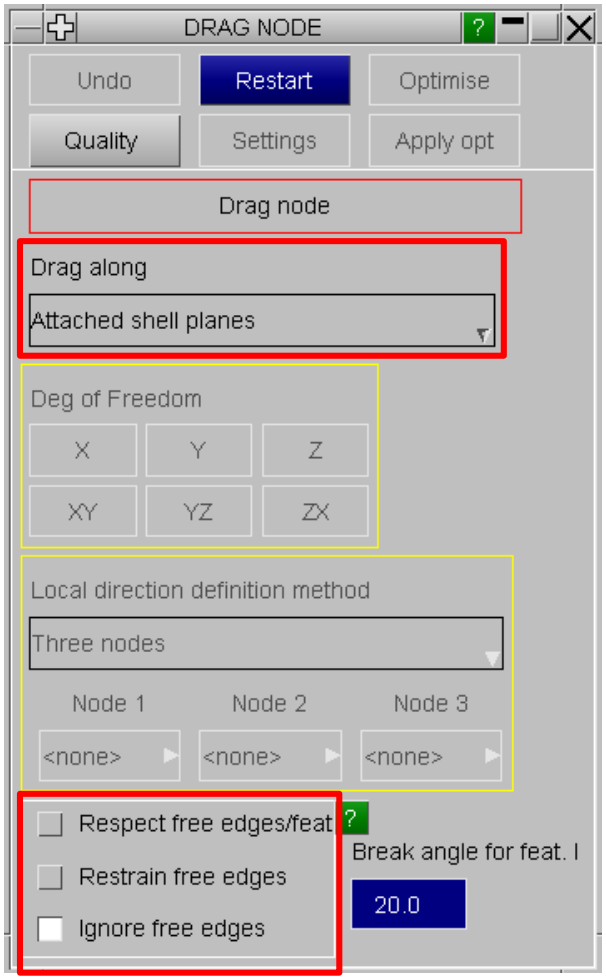
PRIMER – Connections



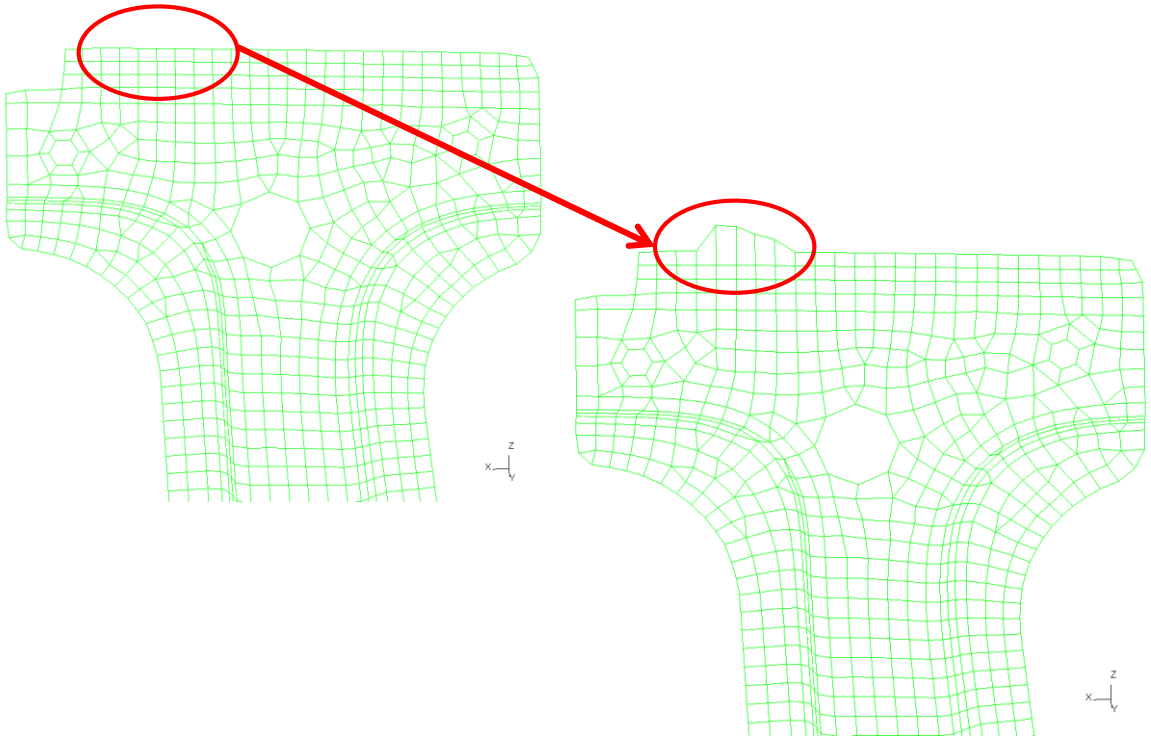
- If one of the parts that were welded together needs to be replaced, first load the new version of the part.
- Go to Part -> Replace, select the old and new parts and make sure the “re-attach options” include “remake connections”.
- The Spotwelds are re-made by Primer so that they still follow the free edge defined earlier.



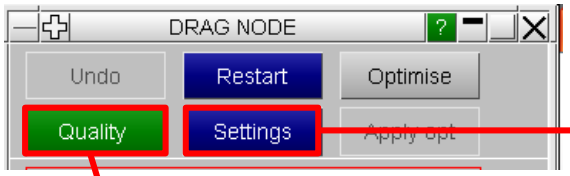
PRIMER – Mesh Quality and Modifying

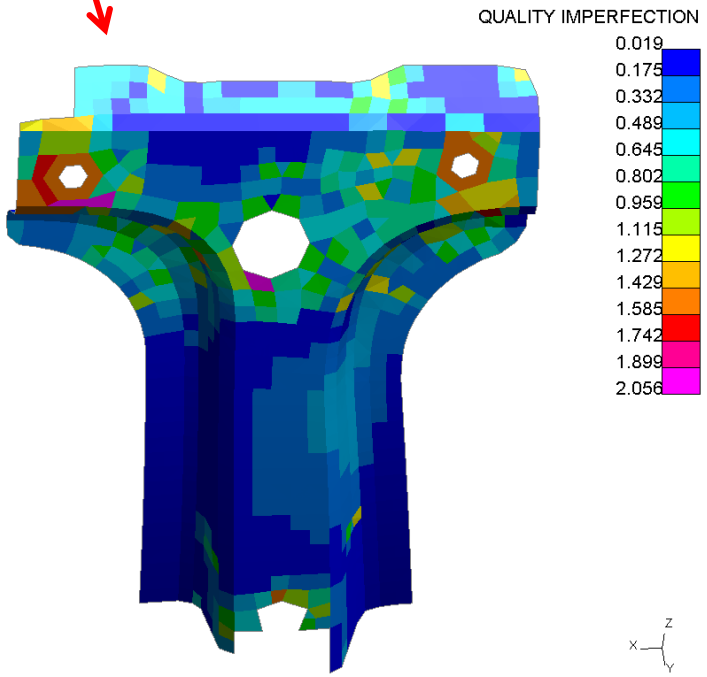


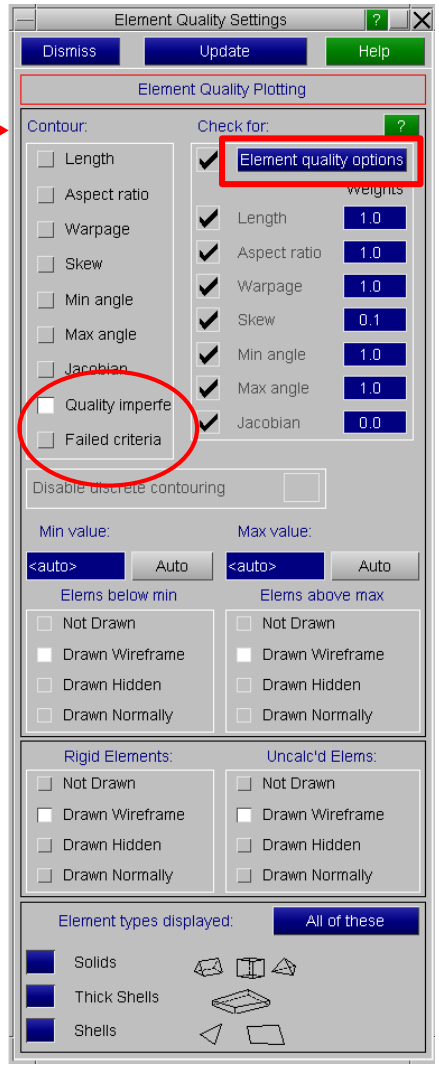
- A useful tool in Primer to make small changes to the mesh is “Drag Node”.
- This allows the user to move nodes along different directions, with the added feature of respecting or not any free edges.



PRIMER – Mesh Quality and Modifying

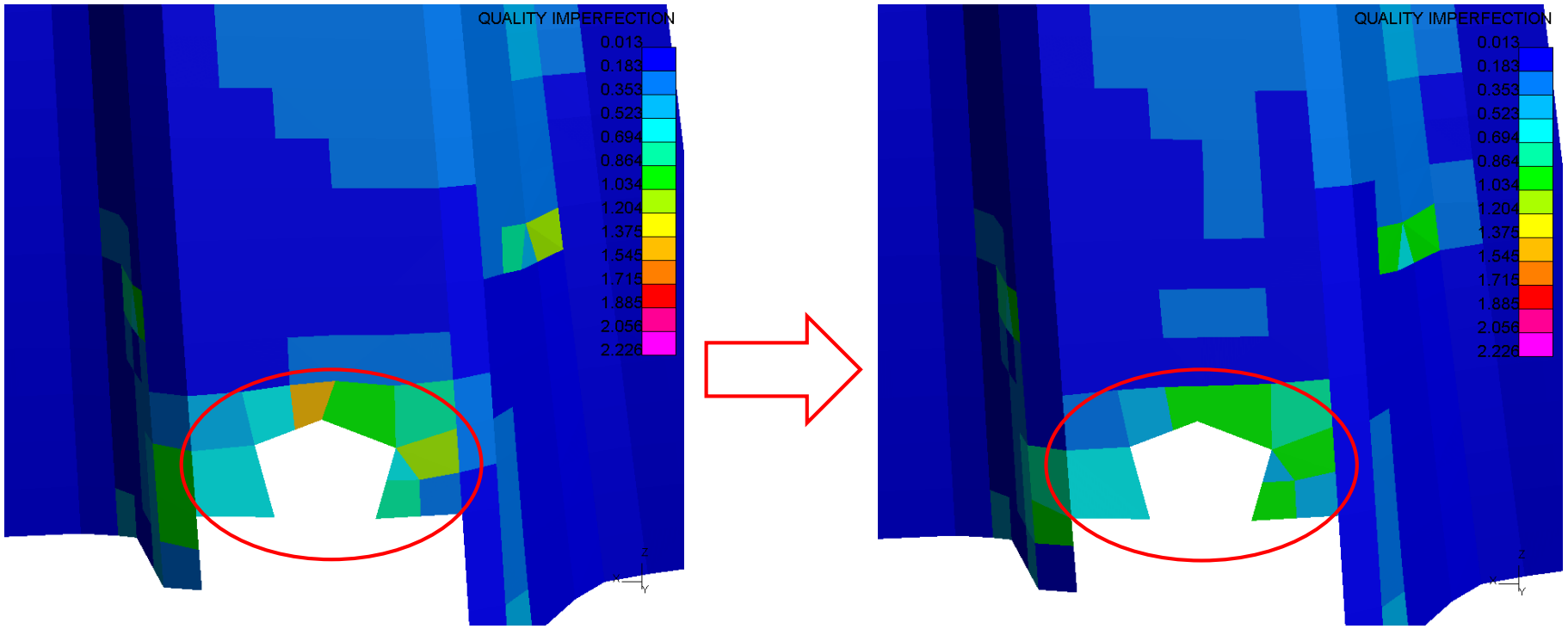






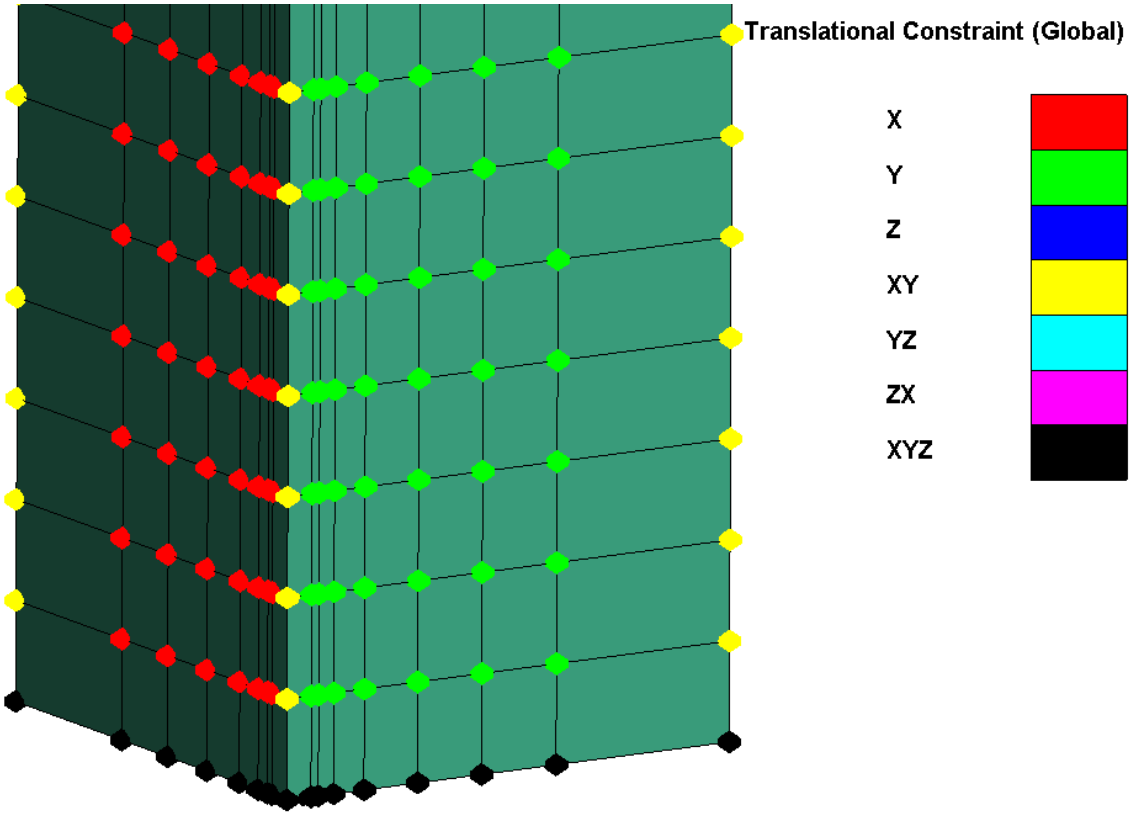
- To visualize the quality of the elements turn on the “Quality” button.
- This plots the quality imperfection of each element by default.
- In order to change the plot click on “Settings”. This brings up the “Element Quality Settings” menu where the user can select what is visualized.
- Selecting the Failed Criteria box allows the user to only colour the elements which are failing given a user defined criteria.
- Click on “Element quality options” to specify the criteria.

PRIMER – Mesh Quality and Modifying

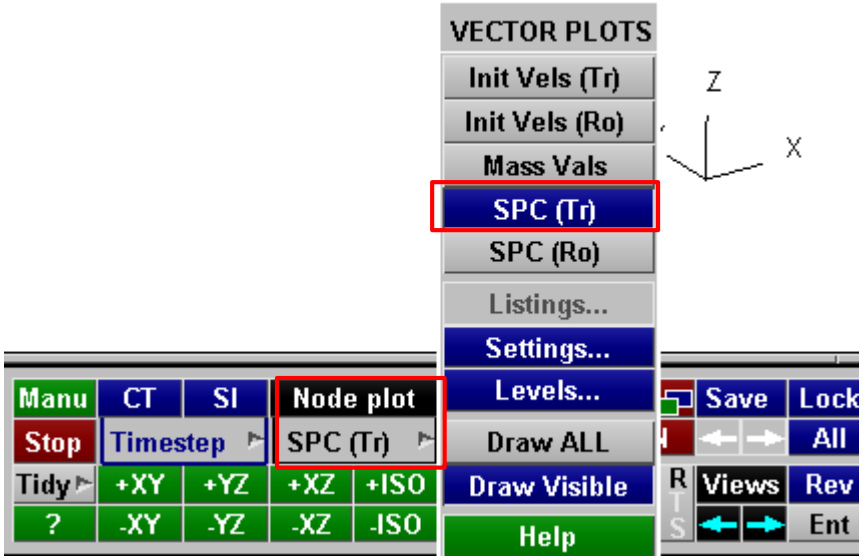


- It's useful to have the quality setting on when dragging nodes in order to visualize any improvements, given that the contour updates in real time.

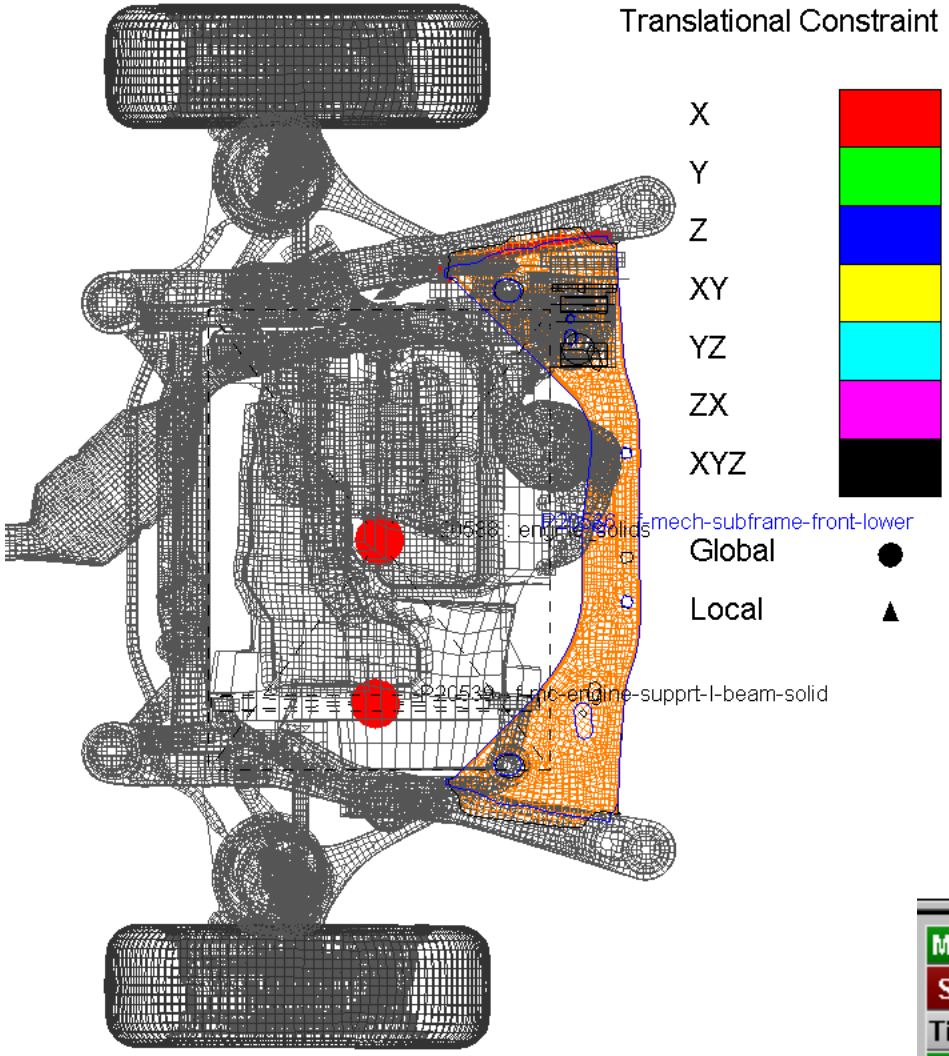
PRIMER - SPC display



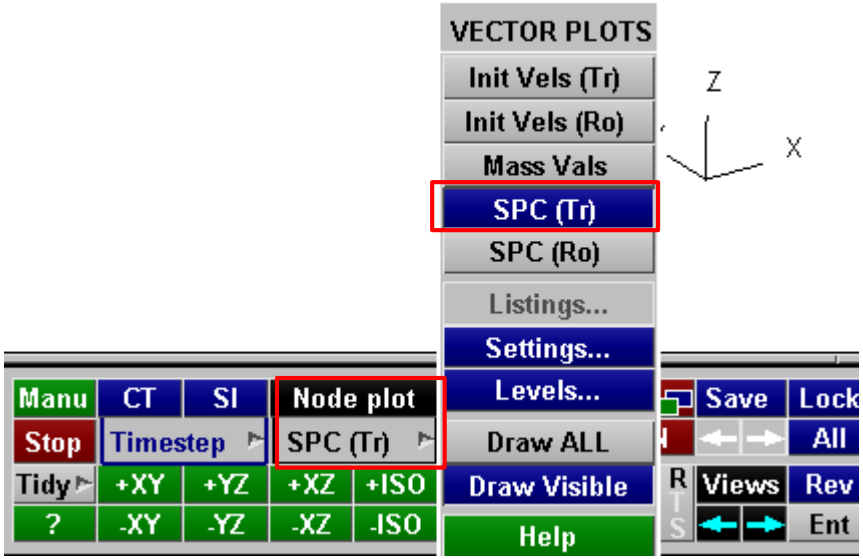
Translational or rotational restraints applied by either *BOUNDARY_SPC or MAT_RIGID can be plotted in PRIMER. The colour indicates the degrees of freedom of the SPC.



PRIMER - SPC display



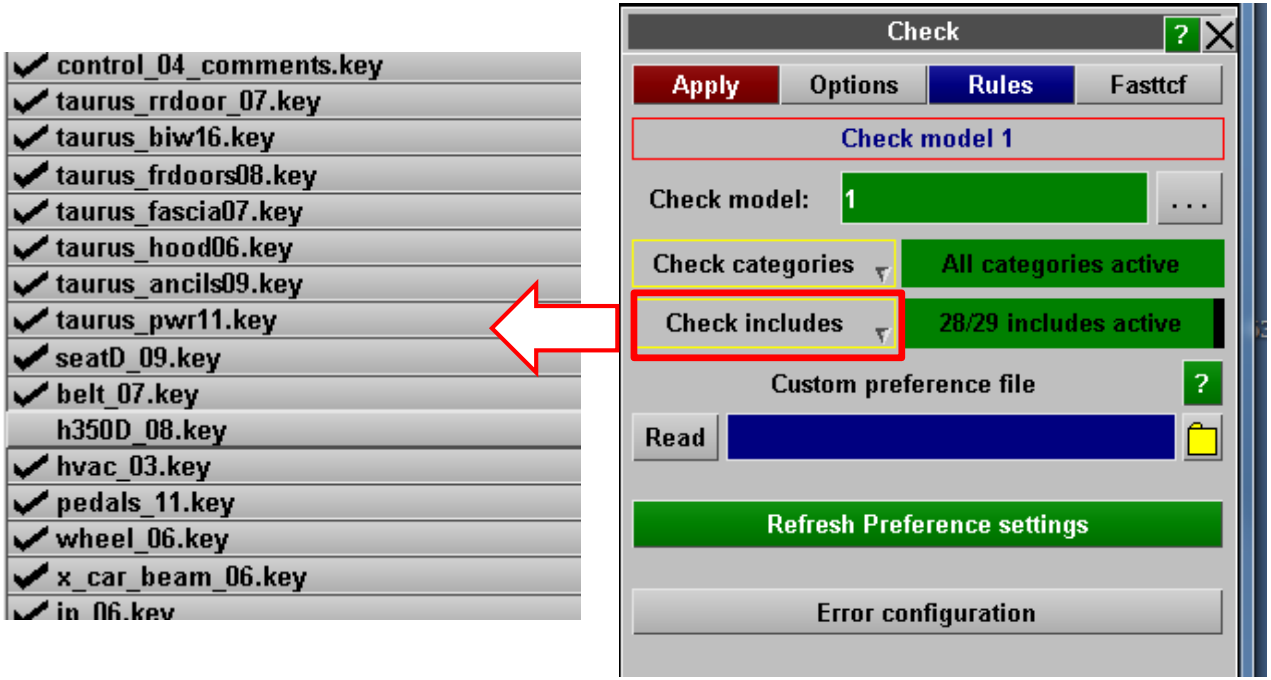
For *MAT_RIGID, a larger circle is drawn at the Centre of Mass. This may be hidden inside the part; we recommend to draw in Line mode.



Model check – selective by Include File

When I perform a Model Check, how can I stop Primer reporting errors in standard dummy models?

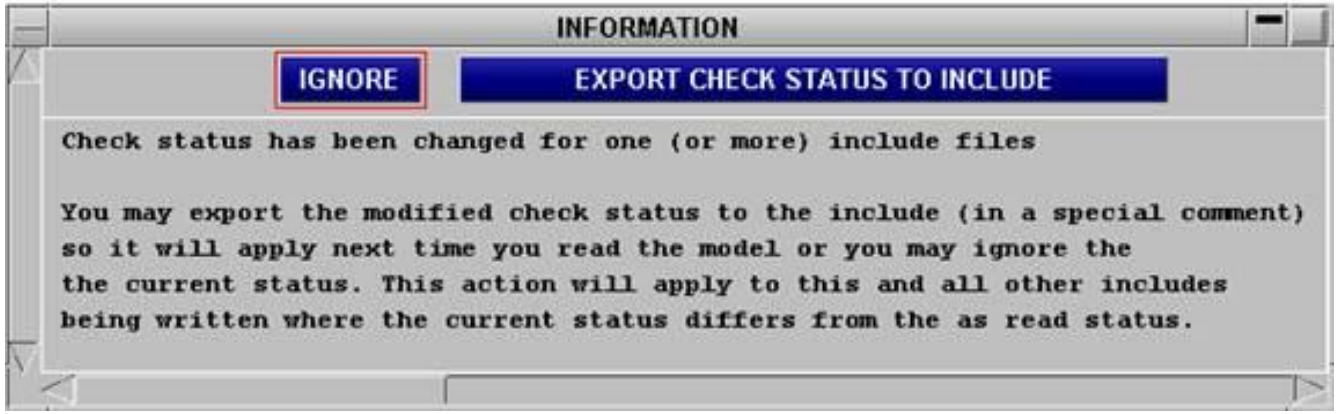
How can I find errors in the Include file for which I am responsible?



Switching off the checking for an Include File means “do not check the entities in this Include File”. Entities in other Include files might still have errors caused by entities in the switched-off Include Files, and these errors would still be reported.

Model check – selective by Include File

Write out model

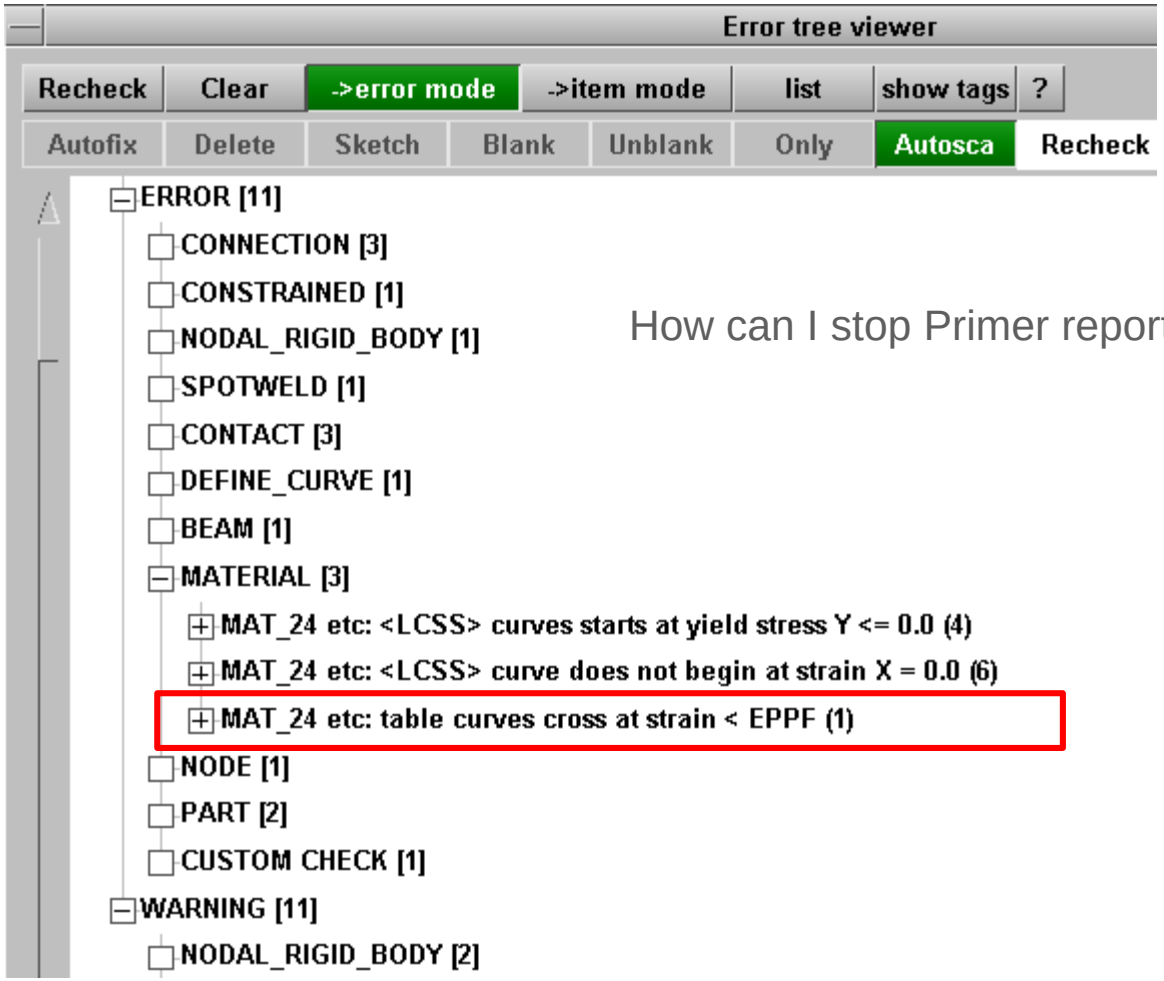


Comment at top of Include File

(same comment could be added by text-edit)

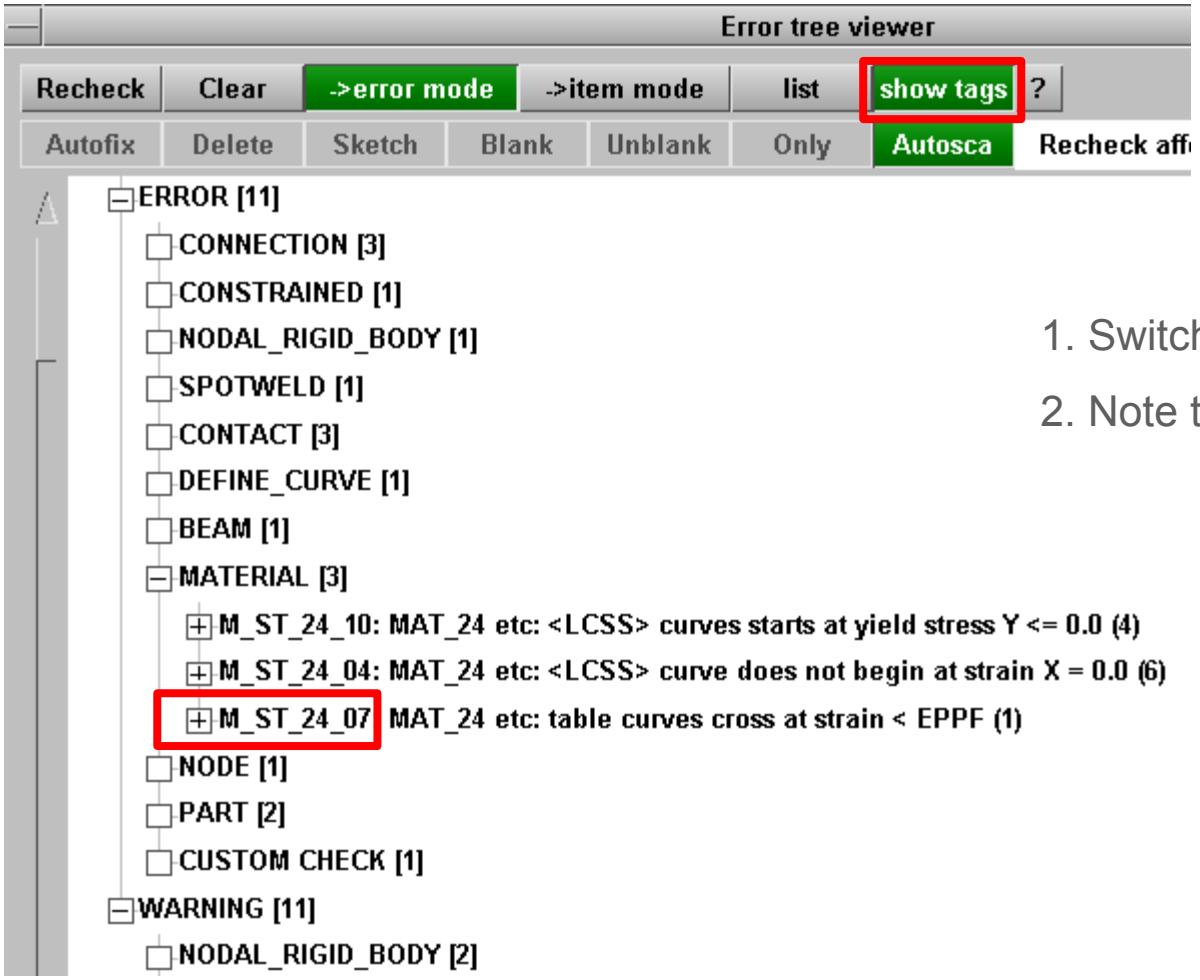
$PR_SUPPRESS_INCLUDE_CHECK

Model check – suppress certain types of error



How can I stop Primer reporting a certain type of error?

Model check – suppress certain types of error

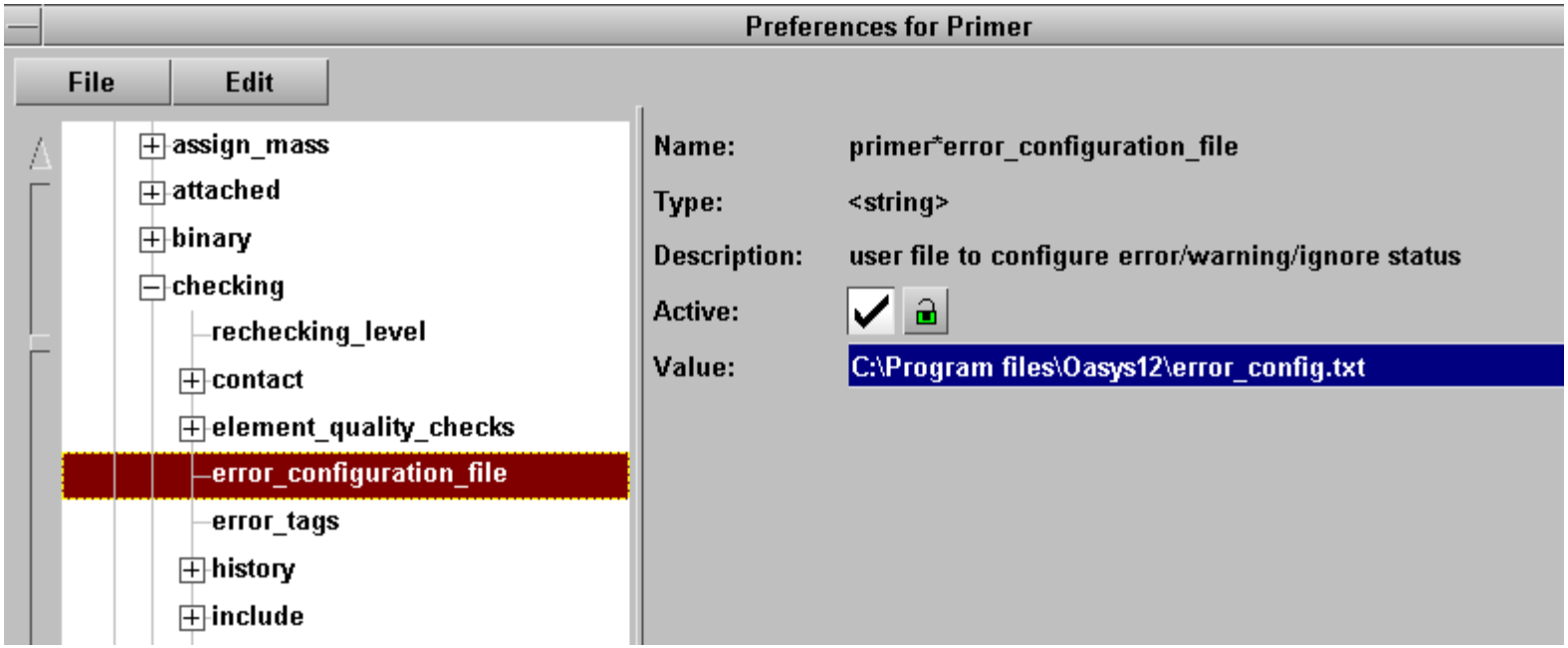


1. Switch on “Tags”
2. Note the Tag for this type of error…

Model check – suppress certain types of error

```
M_ST_24_07   WARNING
M_ST_24_10   IGNORE
PART_122     ERROR
```

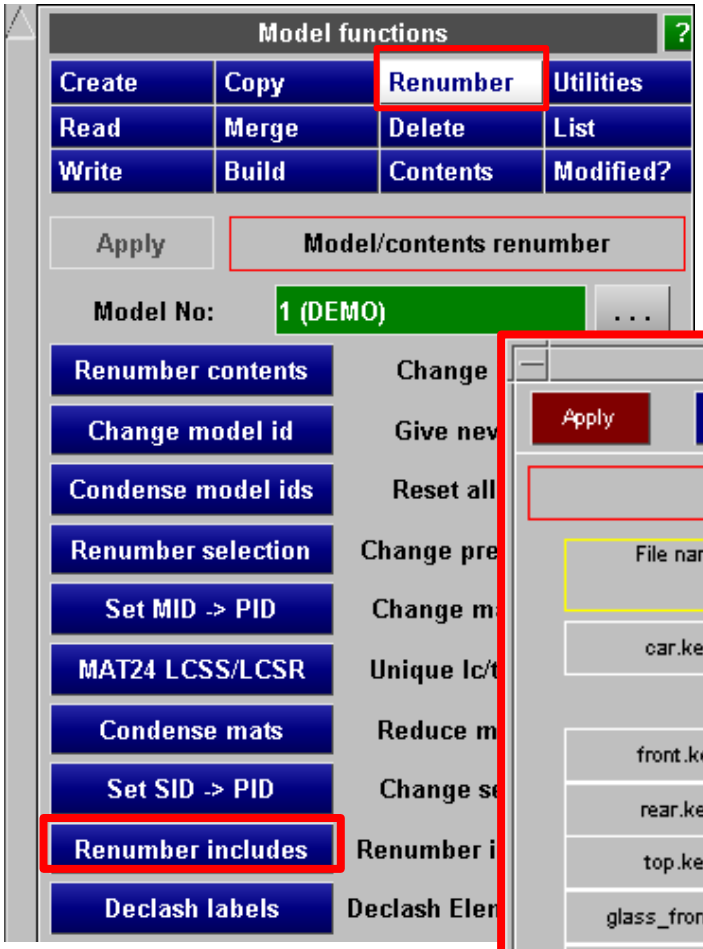
3. Create “error configuration file”
4. Set preference to refer to this file



My company has a numbering scheme defining the IDs for each Include File. What is the easiest way to implement that in Primer?

- Example:
  - Barrier: 1-999999
  - Dummy (driver): 1000000-1999999
  - Dummy (passenger): 2000000-2999999
  - Engine: 5000000-5999999
  - Suspension: 6000000-6999999
  - Body: 10000000-19999999

Include File numbering ranges

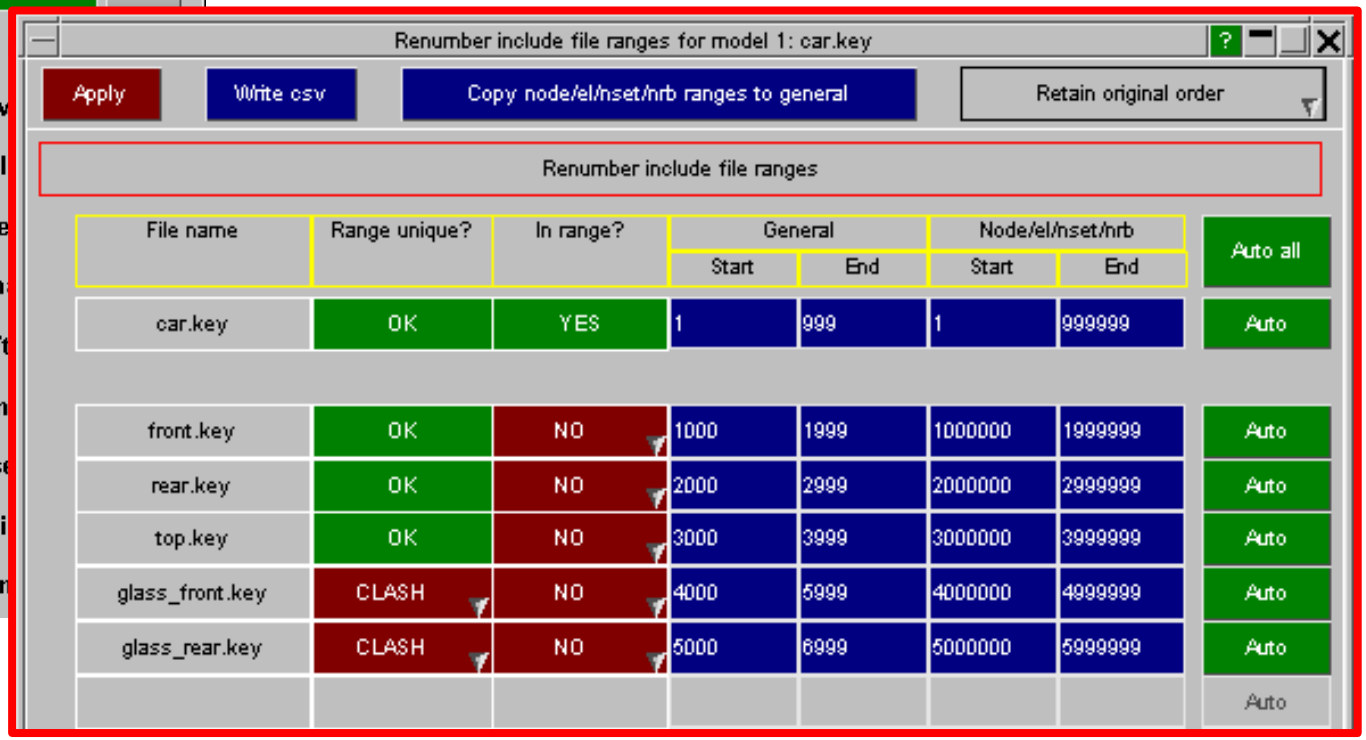


$PR_MIN_LABEL: 1000000

$PR_MAX_LABEL: 1999999

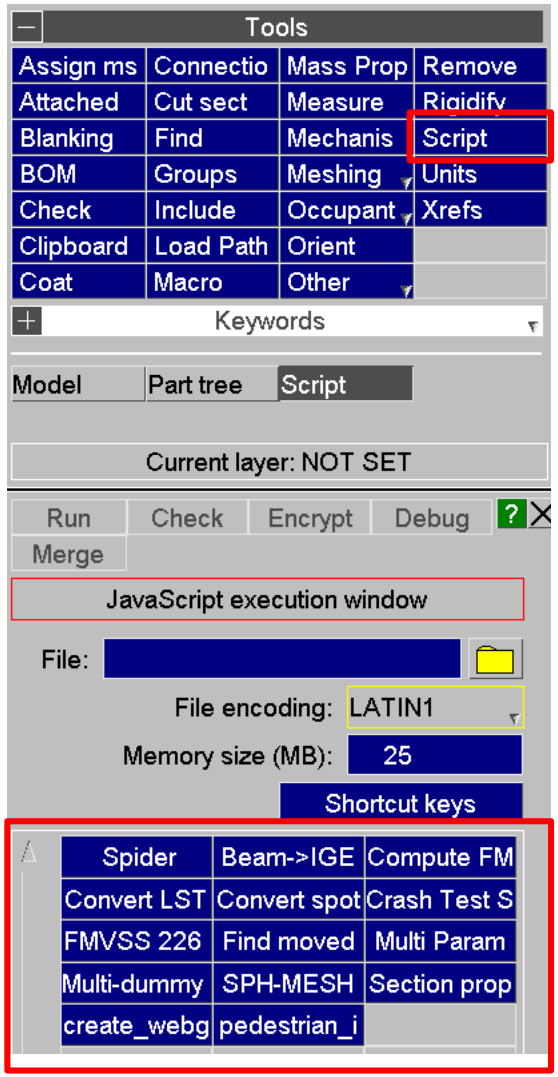
$PR_N_EL_MIN_LABEL: 1000000

$PR_N_EL_MAX_LABEL: 1999999

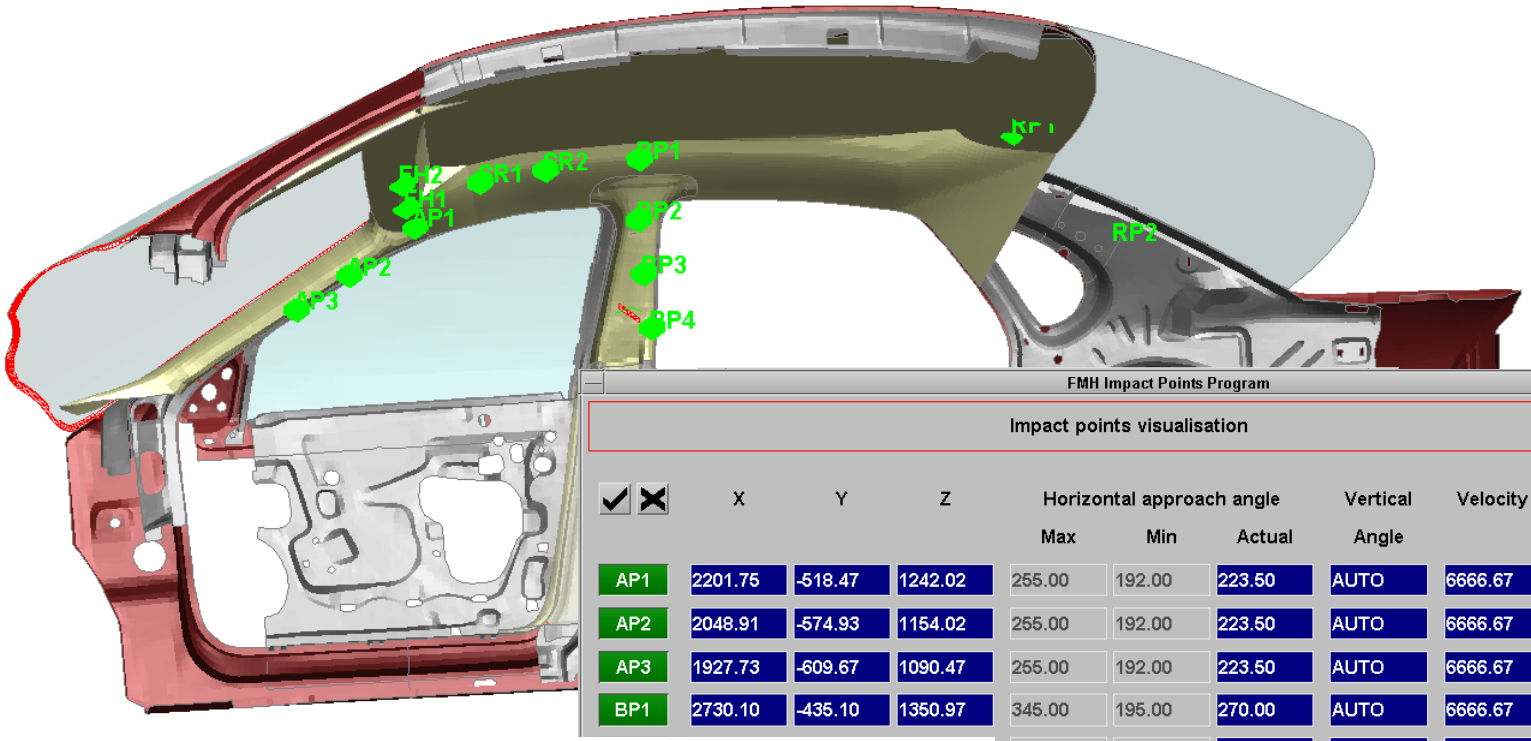


PRIMER - Scripts

- Some PRIMER capabilities are issued in the form of scripts.
- See Tools=>Scripts



PRIMER - Interior Head Impact Mark-up (FMVSS201)



FMH Impact Points Program

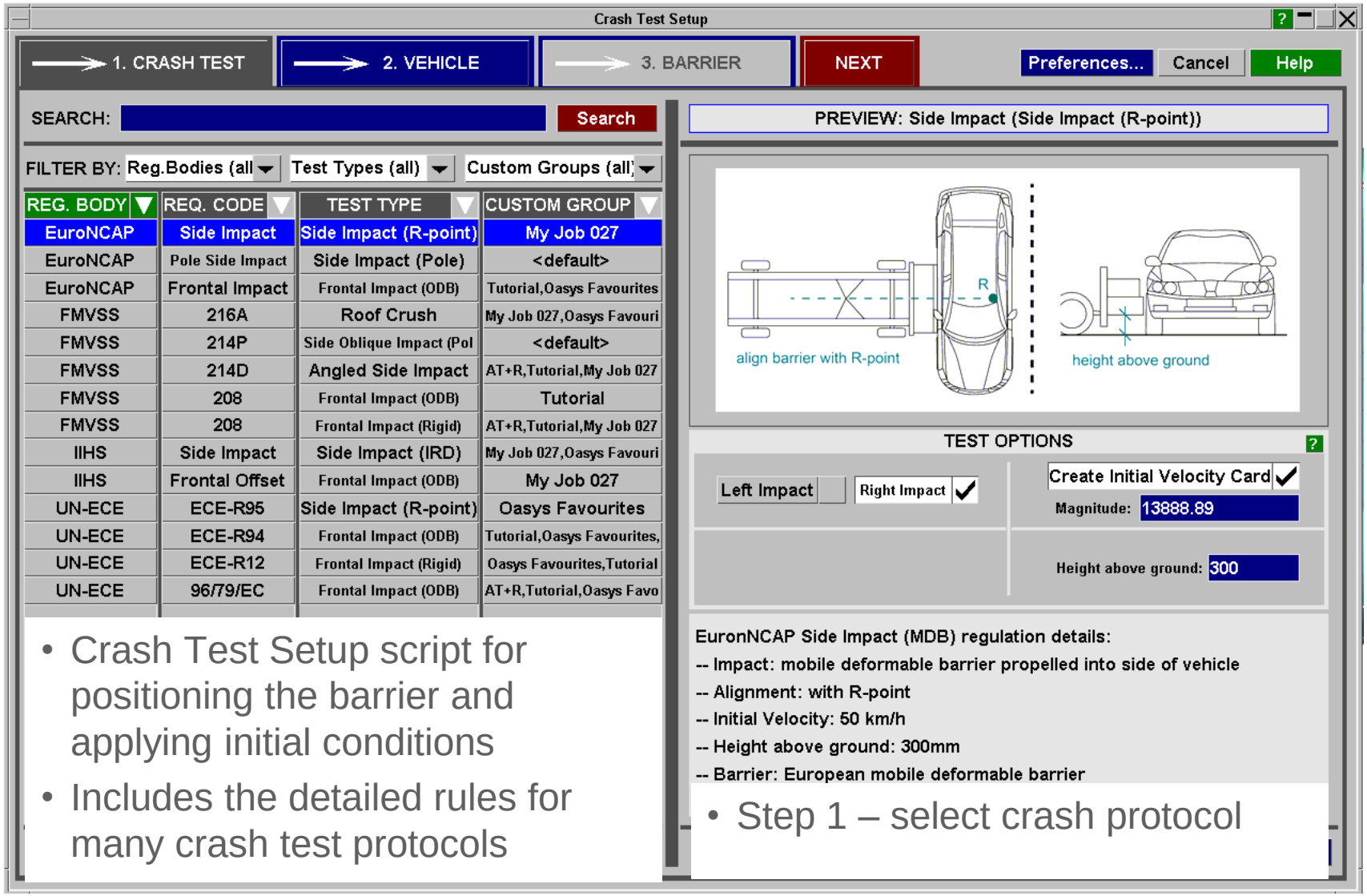
Impact points visualisation

	X	Y	Z	Horizontal approach angle Max	Min	Actual	Vertical Angle	Velocity	Sketch all	
AP1	2201.75	-518.47	1242.02	255.00	192.00	223.50	AUTO	6666.67	Visualise	?
AP2	2048.91	-574.93	1154.02	255.00	192.00	223.50	AUTO	6666.67	Visualise	?
AP3	1927.73	-609.67	1090.47	255.00	192.00	223.50	AUTO	6666.67	Visualise	?
BP1	2730.10	-435.10	1350.97	345.00	195.00	270.00	AUTO	6666.67	Visualise	?
				345.00	195.00	270.00	AUTO	6666.67	Visualise	?
				345.00	195.00	270.00	AUTO	6666.67	Visualise	?
				345.00	195.00	270.00	AUTO	6666.67	Visualise	?
				345.00	270.00	307.50	AUTO	6666.67	Visualise	?
				345.00	270.00	307.50	AUTO	6666.67	Visualise	?
				180.00	180.00	180.00	AUTO	6666.67	Visualise	?
				180.00	180.00	180.00	AUTO	6666.67	Visualise	?

M1:Main file

- Calculates impact points according to rules of FMVSS201
- Angles and velocity can be modified by the user
- Creates impact point file (csv format)

PRIMER - Barrier positioning tool



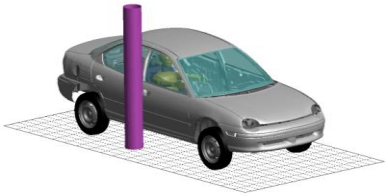
- Crash Test Setup script for positioning the barrier and applying initial conditions
- Includes the detailed rules for many crash test protocols

- Step 1 – select crash protocol

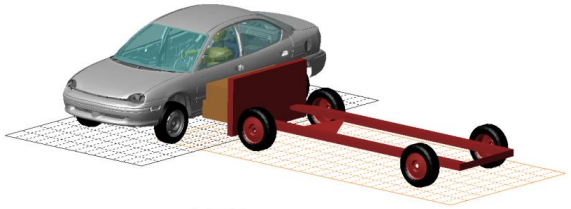
PRIMER - Barrier positioning tool

The supported crash test protocols are listed here. Small changes to these crash types (e.g. impact velocity) can be made by the user and saved easily:

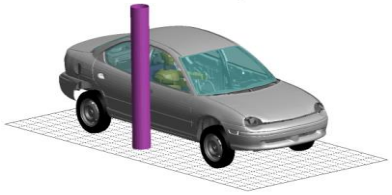
EuroNCAP: Side Impact (Pole)



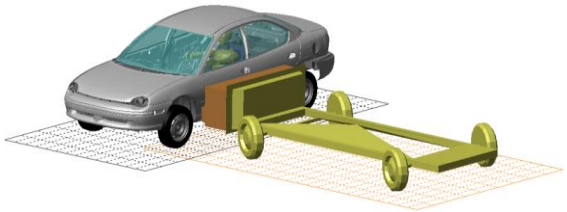
EuroNCAP, UN-ECE: Side Impact (R-Point)



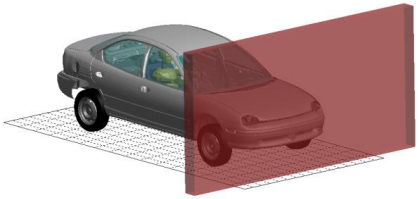
FMVSS 214P: Side Oblique Impact (Pole)



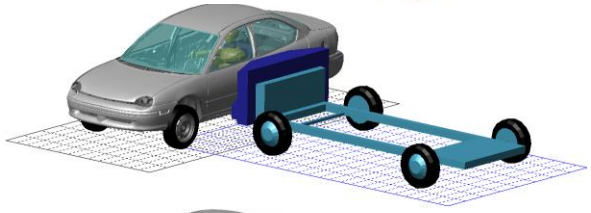
FMVSS 214D: Angled Side Impact



FMVSS, UN-ECE: Frontal Impact (Rigid)

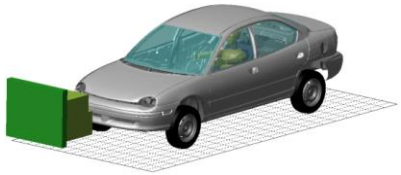


IIHS: Side Impact (IRD)

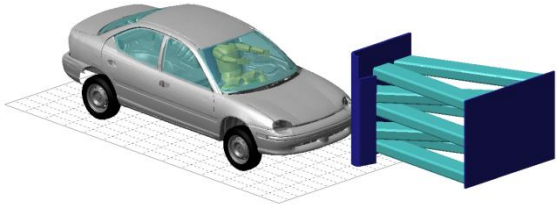


FMVSS 216A: Roof Crush

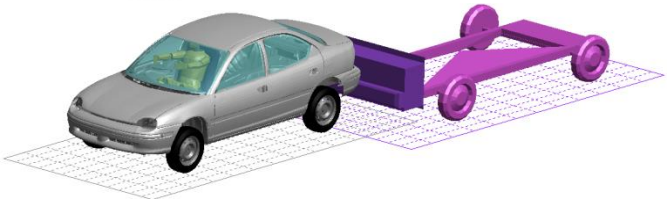
EuroNCAP, FMVSS, IIHS, UN-ECE: Frontal Impact (ODB)



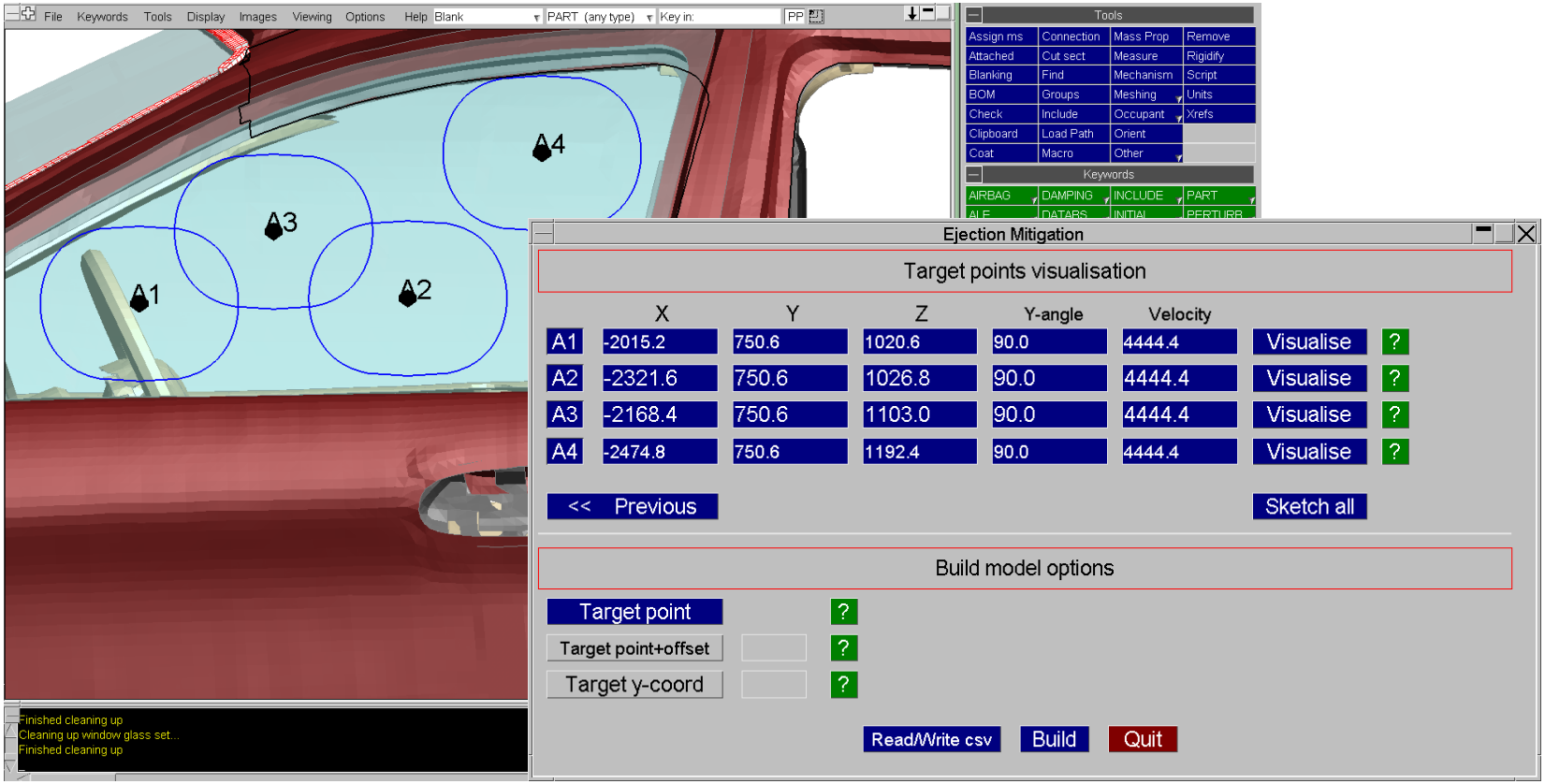
IIHS: Frontal Small Overlap



FMVSS 301R: Rear Impact (MDB)

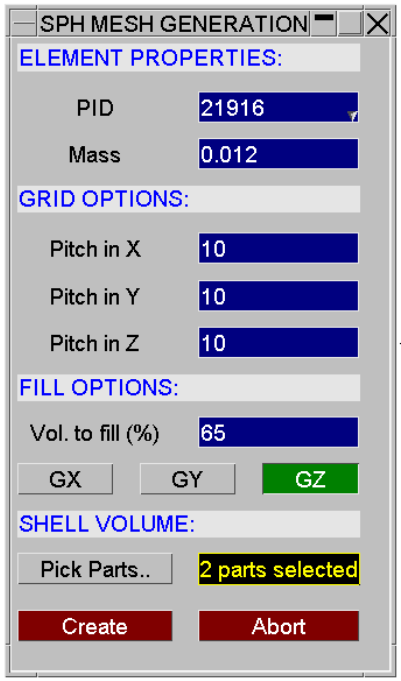


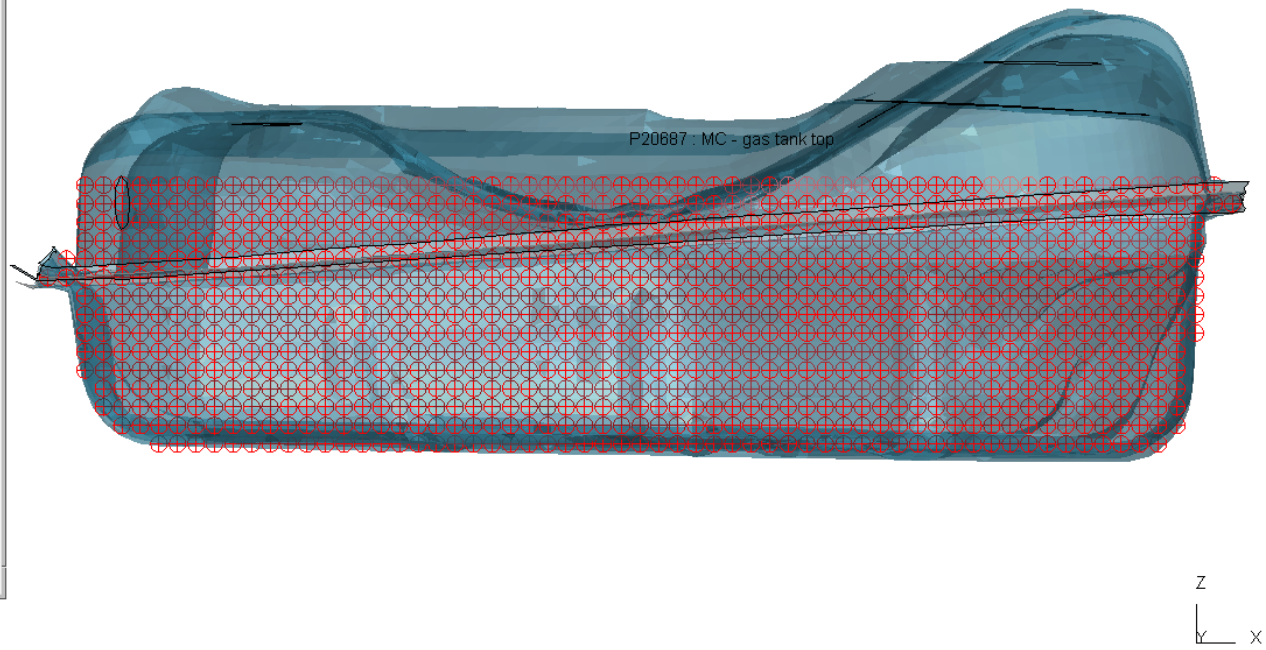
PRIMER - Ejection Mitigation (FMVSS 226)



- Calculates impact points according to rules of FMVSS 226.
- Multiple models can be built automatically.

- Script for creation of SPH elements within an enclosed volume.

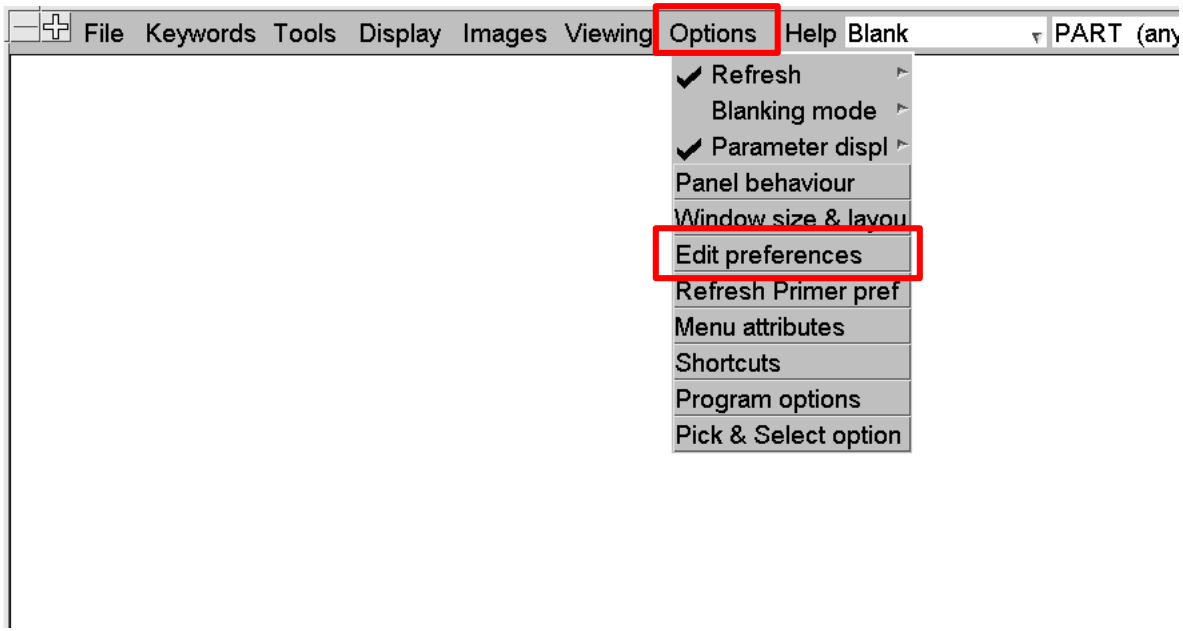




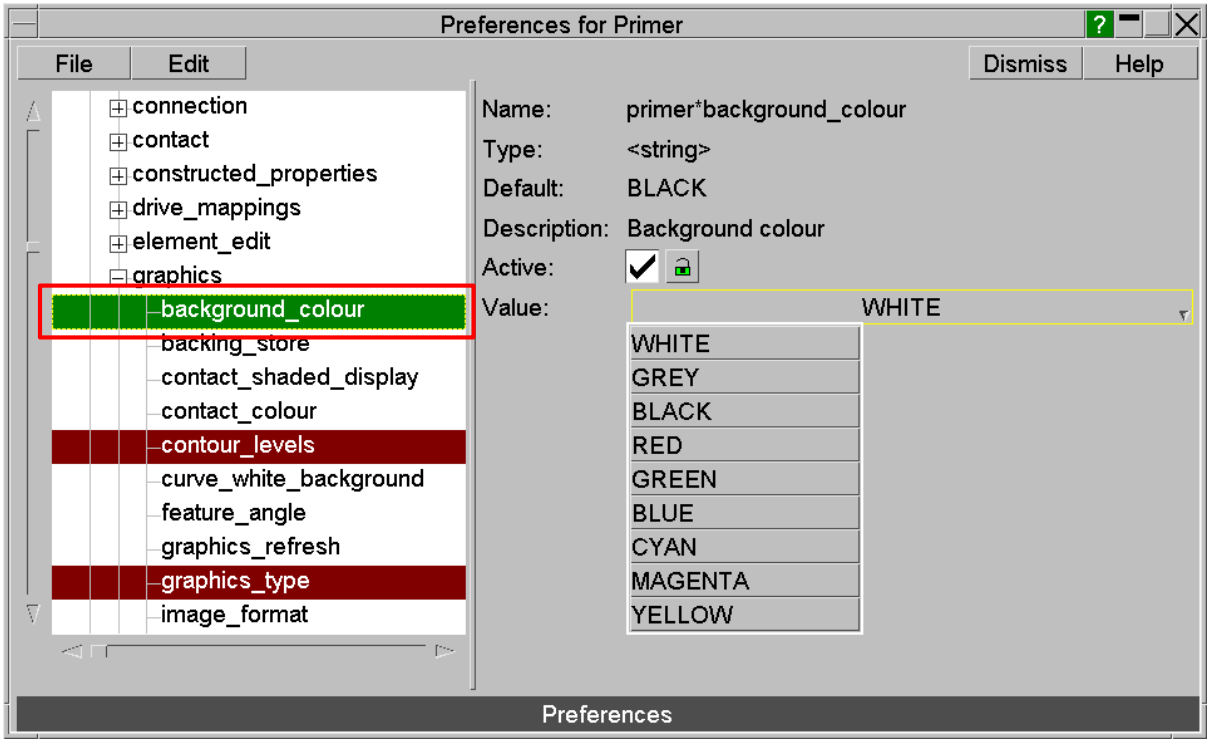
- oa_pref files are text files saved on your system that contain preferences used by Oasys software.
- These are useful so you don't have to change settings every time you open PRIMER/D3PLOT etc.
- The file will contain lines that look like this:

```
primer*display_factor:              1.40
primer*display_brightness:          1.00
primer*display_saturation:          1.00
primer*button_gradation:            0.00
primer*font_size:                   default
primer*font_type:                   helvetica
primer*background_colour:           WHITE
```

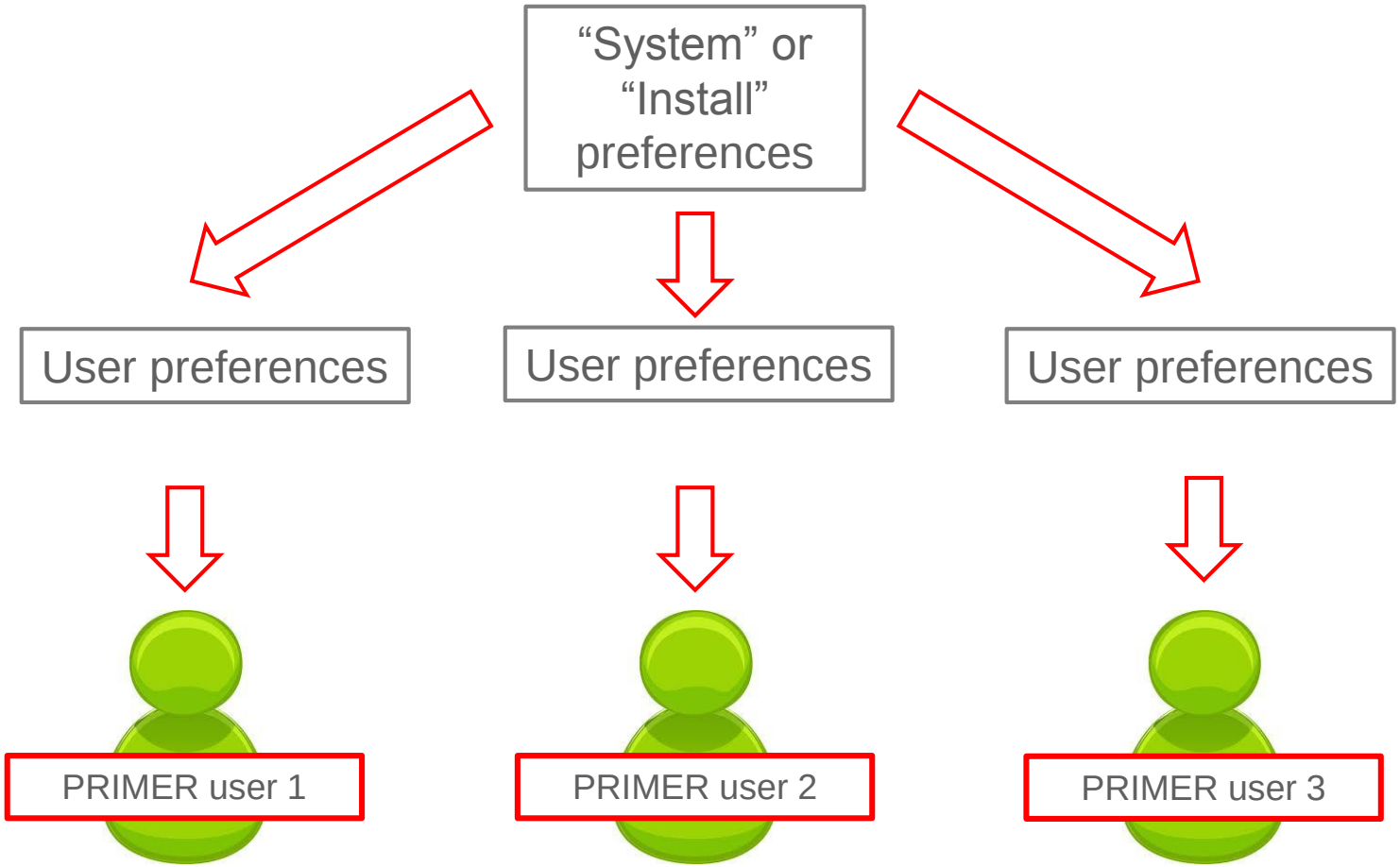
- Preferences can be set in PRIMER through the “Options” menu:



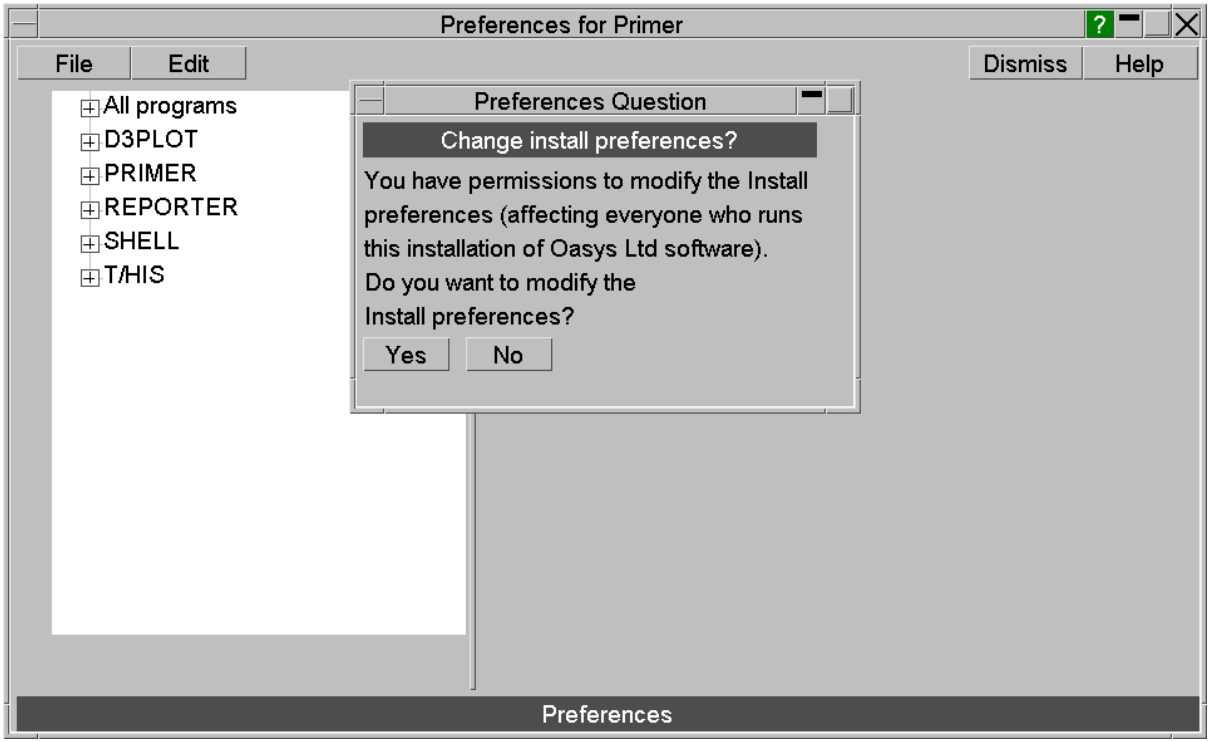
- Preferences can be changed in the preference panel which opens. The example below shows how to change the background colour of the graphics window.



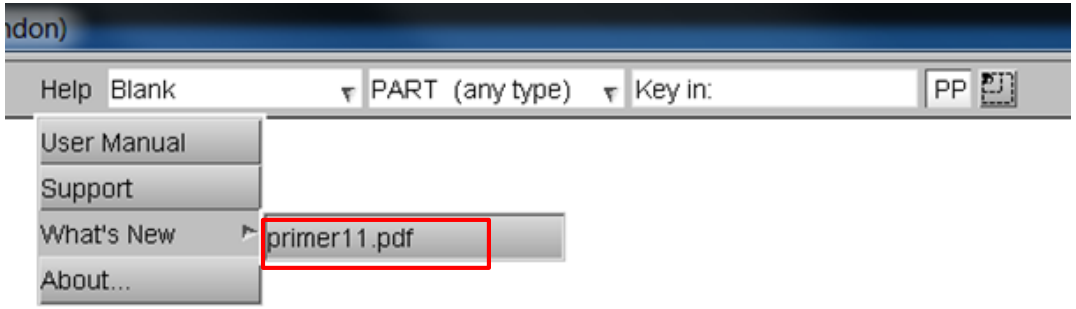
- oa_pref files can be read from a number of locations



- When opening the preference panel, you may get a message about modifying the install preferences – this is because preferences can be saved in a number of places:



- oa_pref files can be stored in 4 locations:
  - OA_ADMIN – top level configuration – often the same as OA_INSTALL
  - OA_INSTALL – Installation level (location of executables)
  - HOME – users personal home area
  - Current working directory (rarely used)
- Oasys software will read the oa_pref files in the order above. When modifying preferences from within the software, if you get the option shown on the previous slide, it is because you have permission to change the preferences stored in the installation area. If you do have permission and choose not to modify the installation preferences, any preference modifications will be saved in the HOME area.
- If you do not have permission to change installation preferences, any preference modifications will be saved in the HOME area.



- Don't forget that every version of Primer comes with a PDF detailing all the new functions added in that version.

PRIMER Top Tips