Recent Developments in Oasys Software and Barrier Models

Richard Sturt - Arup

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- PRIMER update
- Post-processing – brief demo
- Barrier model update

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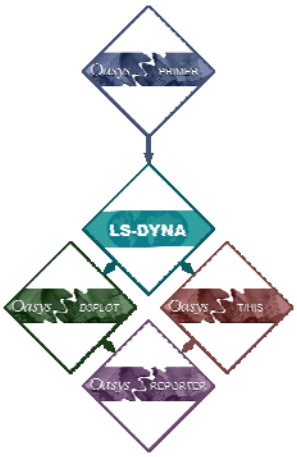
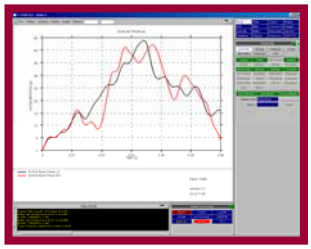
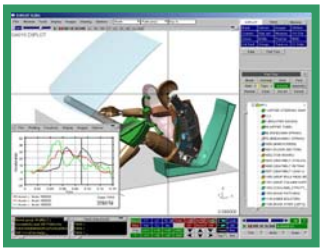
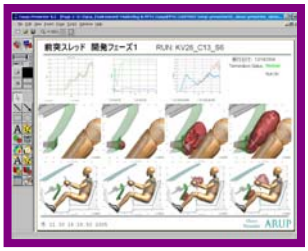
Oasys software products









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Software Releases so far during 2007

- 2006 – Version 9.2
- Feb 2007 – Primer 9.3 RC1
  - New capabilities for seat and occupant positioning
  - Solid element spotwelds, connections table
- July 2007 – T/HIS 9.3 RC1
  - Multiple graphs, quick-pick, etc
- Oct 2007 – Primer 9.3 RC2

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Primer Update

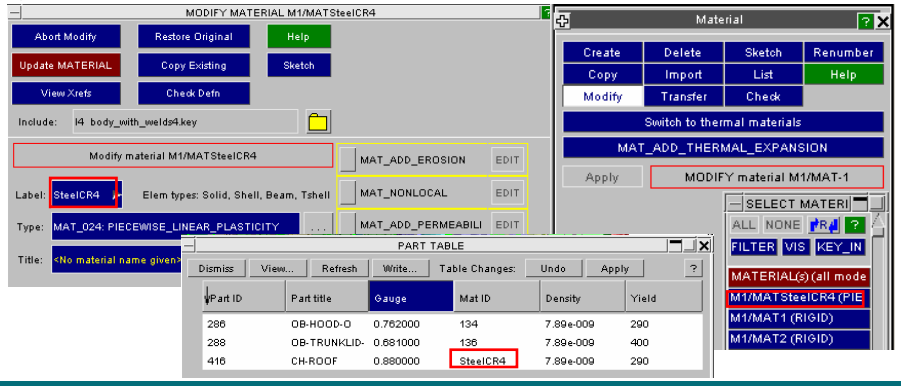
For more details about the new capabilities in Primer 9.3 RC2, please see the presentation and release notes available from our web site.

Primer 9.3 RC2 - Keywords

- Compatible with all keywords and data fields shown in the May 2007 LS-DYNA manual.
  - Includes keywords marked as 971 Release 3 only.
  - Includes some keywords not in the printed manual, e.g. *AIRBAG_PARTICLE
  - Excludes *CASE and *EF
- About 120 keywords have been added to LS-DYNA since LS970
- About 200 existing keywords have been modified

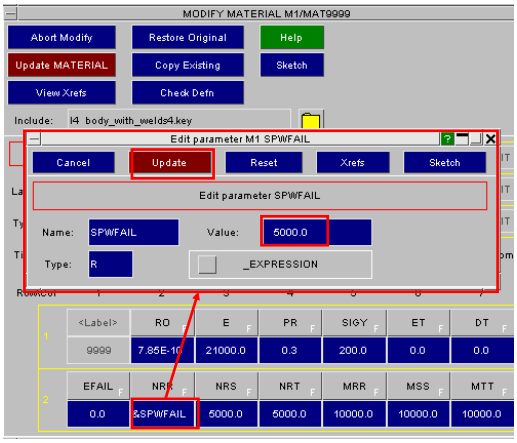
Keywords

- Materials, sections, hourglass and equations of state can now be referred to by an 8-character label instead of a numerical ID. This is supported in LS971 Release 2 and above, and by Primer 9.3 RC2.



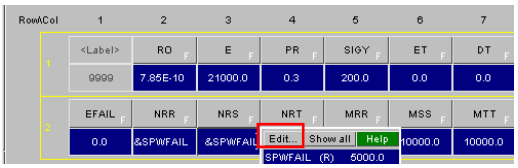
*PARAMETER

- Add a new parameter in any Edit menu by typing &NAME (where NAME is the Parameter name).
- A menu appears in which the Parameter's type and value can be set.
- Press "Update"

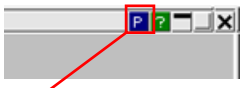


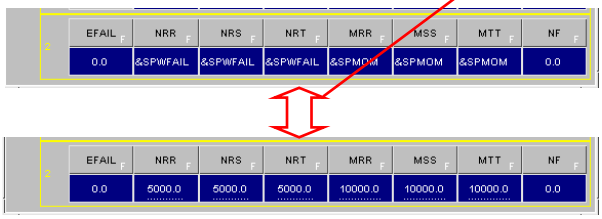
*PARAMETER

- Hover over a text box containing a parameter to see its value.
- The parameter's value or type can be edited from this menu.



- See the values of all parameters referred to in a menu using the P button to toggle between parameter names and values. Parameter values are then shown underlined with dotted lines.





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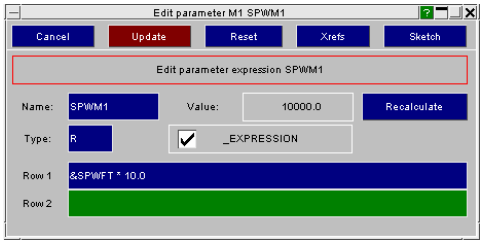
*PARAMETER

- *PARAMETER_EXPRESSION is now supported. Expression formulae may be typed in. The values of these parameters are calculated by Primer.



- If data governed by parameters is changed other than via the edit menu (e.g. shell thickness changed in Part Table, or node coordinates given by parameter, then the node is moved using Orient), the parameter definition for the affected entities is removed.

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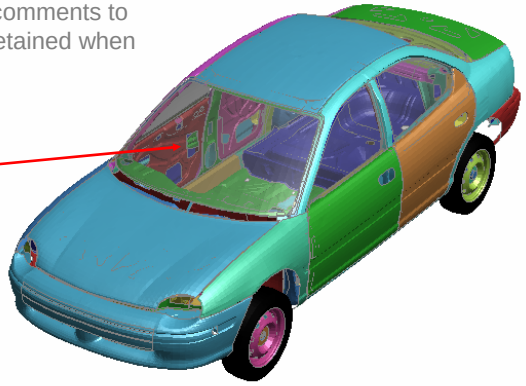
Colours & transparency retained

- Any user-defined part colour and transparency (e.g. colour defined from quick-pick) is now written as comments to the keyword file, and will be retained when the model is next read in

```
*PART
$PR_PART_COL 293 3800557f
OB-WINDSHIELD-RR
       293       138       138
```



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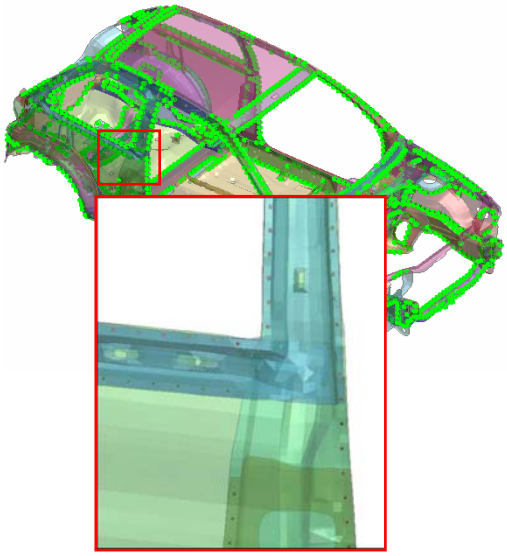
Primer 9.3 RC1 - Spotwelds

- Primer 9.3 RC1 could create and modify solid and beam element spotwelds.
- Creation methods include screen-pick (one click per weld), auto (Primer selects weld positions based on panel free edges), and File (various formats available).
- Special checking functions for spotwelds, e.g. detection of welds where the tied contact will fail



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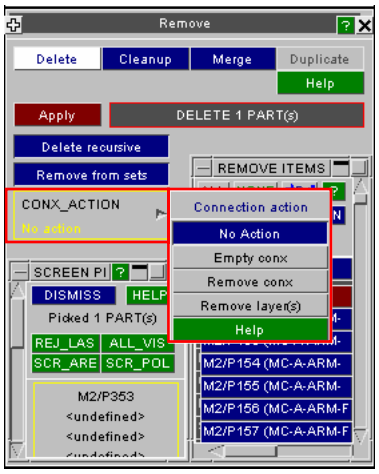
Primer 9.3 RC2 Spotwelds



- When deleting parts that have spotwelds (or other connections) attached, several options for deletion of the spotweld elements and/or connection data are now available; e.g. converting 3-layer weld to 2-layer.
- Control over numbering of nodes and elements created by realizing a connection has been added
- Control over INCLUDE file location of connections and their nodes/elements has been added

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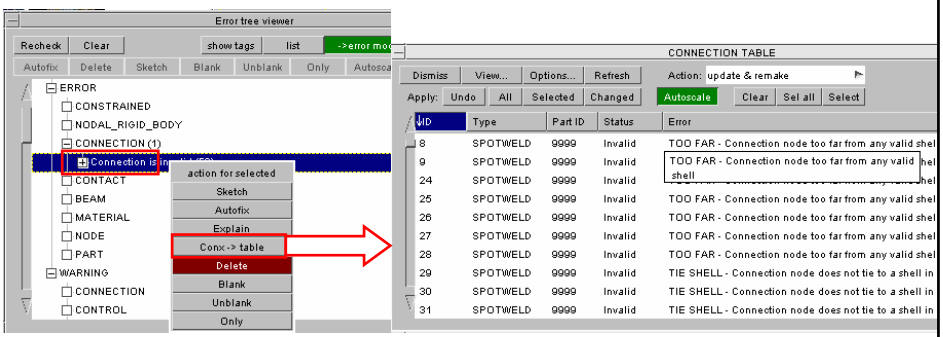
Error checks for spotwelds

- When performing a Model Check, error checks for spotwelds are performed by testing the validity of each connection. If connection entities do not already exist, they are created automatically during the checking process.
- Spotweld nodes that are too far from panels (so the tied contact will not stick) will be caught by this process
- From the error check tree, the offending connections can now be passed to the Connections Table so that the errors can be investigated and fixed.



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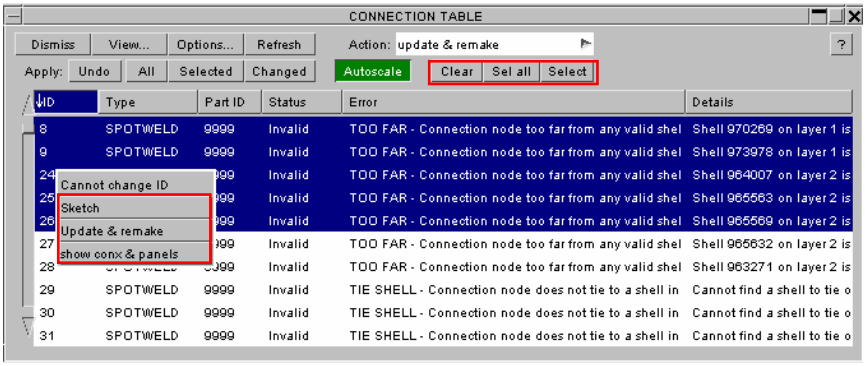
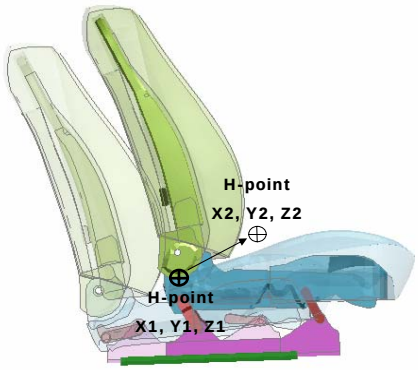
Connections Table Improvements

- The most common actions performed in the Table are now accessible by right-click on selected welds.
- Selection of welds in the table by screen-picking has been added.



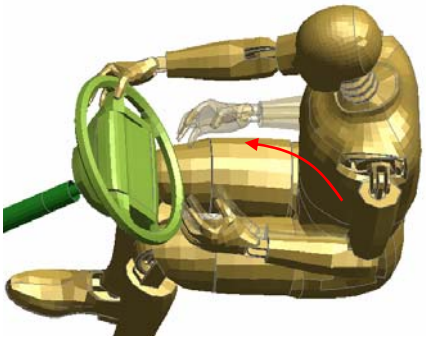
Primer 9.3 RC1 - Mechanisms

- In Primer 9.3 RC1, mechanisms can be defined: assemblies and joints.
- The motion can be limited by restraining an assembly, locking a joint, or defining limits of travel for line joints.
- Position the mechanism by
  - Dragging
  - Typing in angles
  - Typing in coordinates of reference points
- Save and retrieve positions
- Command file capability



Primer 9.3 RC1 – Dummy positioning

- In Primer 9.3 RC1, the dummy's parts can be dragged into position
- Can type in coordinates of H-point
- Can define reference points e.g. on hands, nose, etc; these can also be moved to user-defined coordinates.
- Positions can be saved and retrieved
- "Dummy angles file" can be written out and re-used in another model
- Command file capability



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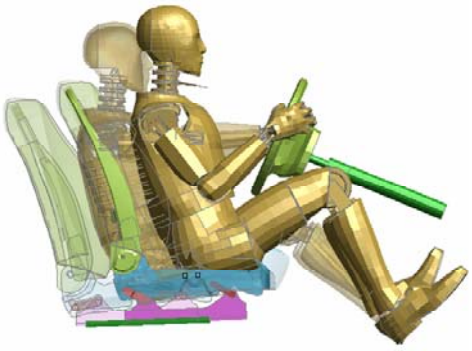
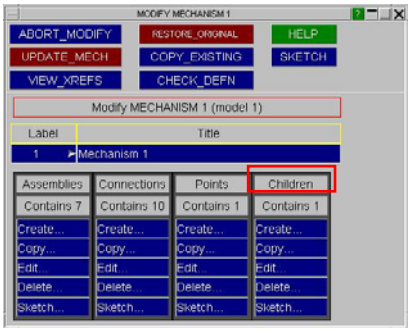
Primer 9.3 RC1 - Combined mechanisms



- 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.
- To do this, use "children" on the mechanism menu.



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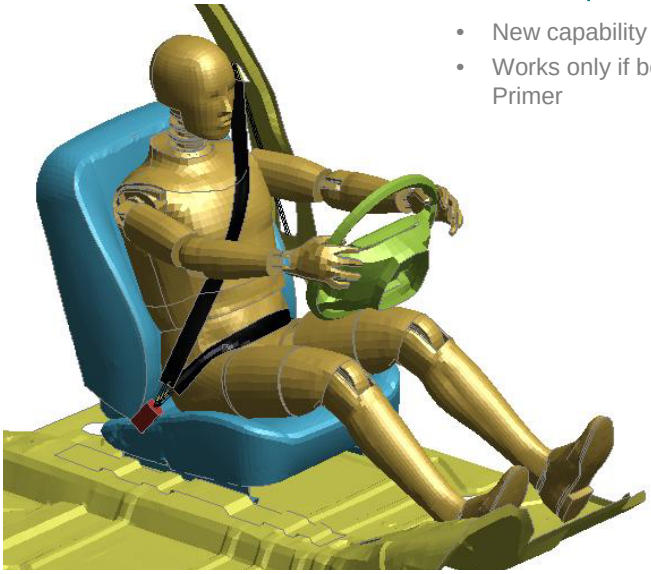
Belt re-fit



- New capability in 9.3 RC2
- Works only if belt was initially fitted in Primer

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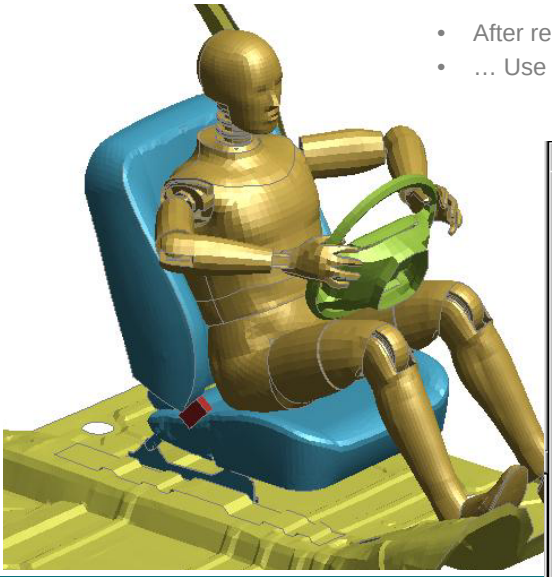
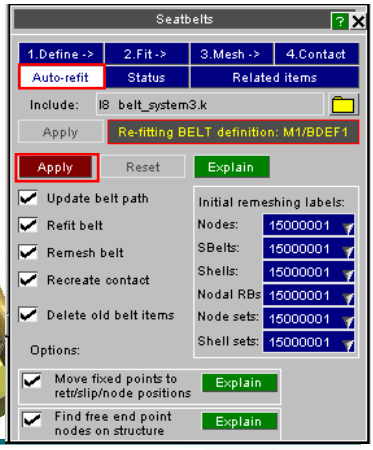
Belt re-fit



- After repositioning dummy and seat…
- … Use Seatbelt=>Auto-refit, press Apply



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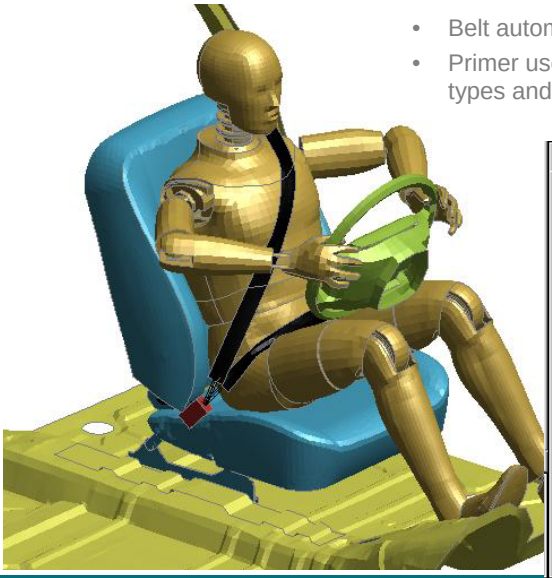
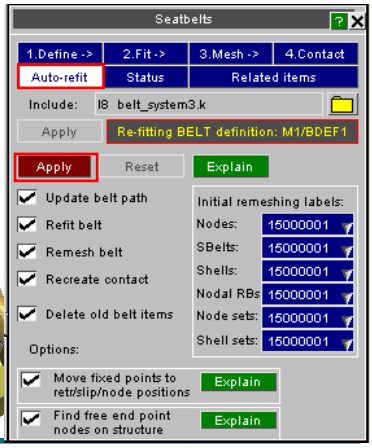
Belt re-fit

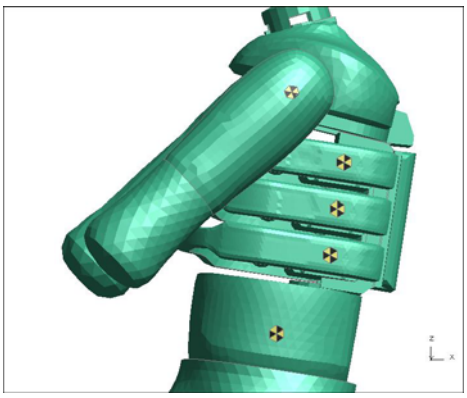


- Belt automatically re-fitted and remeshed
- Primer uses the same parameters, element types and labels as the initial belt mesh



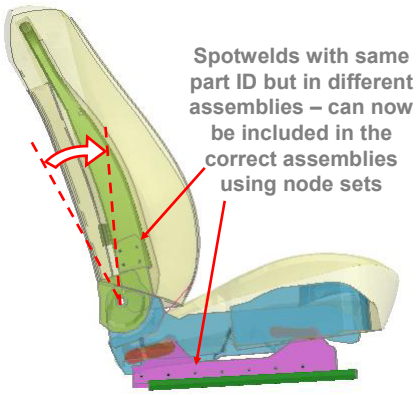
Dummy positioning – new in Primer 9.3 RC2

- MAT_NULL parts can now be added to assemblies if their nodes are not shared with structural parts (e.g. dummy target markers)
- Belt re-fit
- Use of background image for positioning



Mechanisms – new in 9.3 RC2

- Hinge joints now allow input of angle limits (relative to the position in which the mechanism was originally defined)
- Node sets can now be added to Assemblies for mechanisms. This is needed, for example, when mesh-independent spotwelds in different assemblies have the same part ID.



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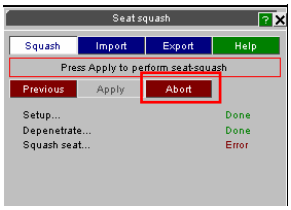
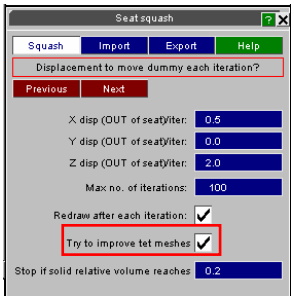
Seat foam compression improvements

- Primer method:
  - Can now Abort to reset the coordinates to their initial values
  - Optional iterative mesh improvement for tetrahedra during foam compression – prevents elements becoming flattened
  - Other general improvements to the algorithm – foam compression more likely to be successful that with Primer 9.3 RC1.
- Dyna method:
  - Can select parts of the dummy to remain deformable





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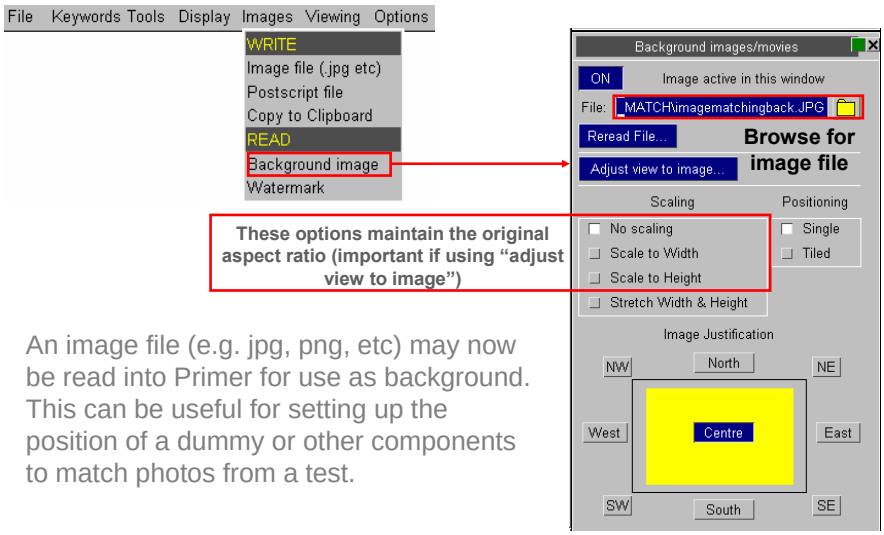
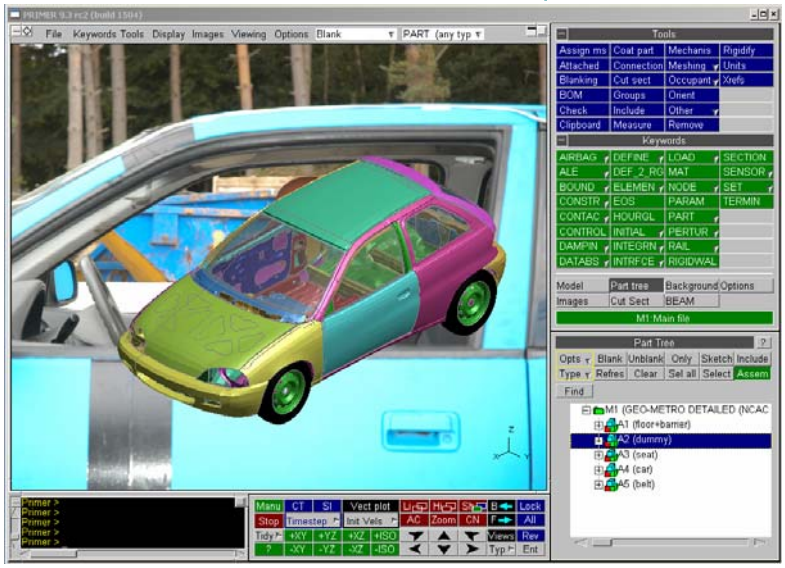
Background image

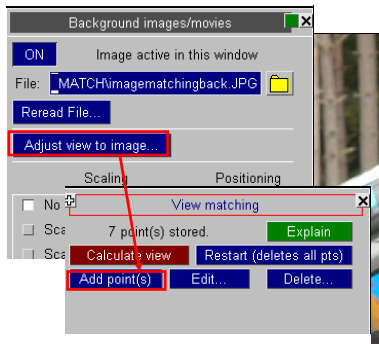


- An image file (e.g. jpg, png, etc) may now be read into Primer for use as background. This can be useful for setting up the position of a dummy or other components to match photos from a test.

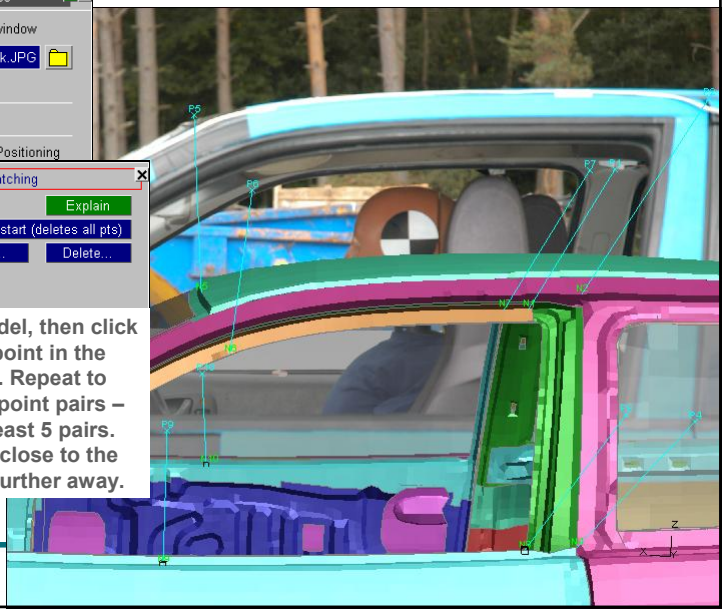
Background image



Adjusting view to match image

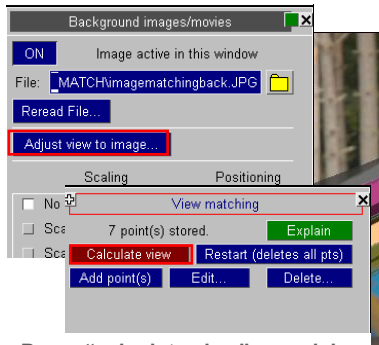


Pick a node in the model, then click on the equivalent point in the background image. Repeat to create several node-point pairs – we recommend at least 5 pairs. Choose some pairs close to the camera, and others further away.

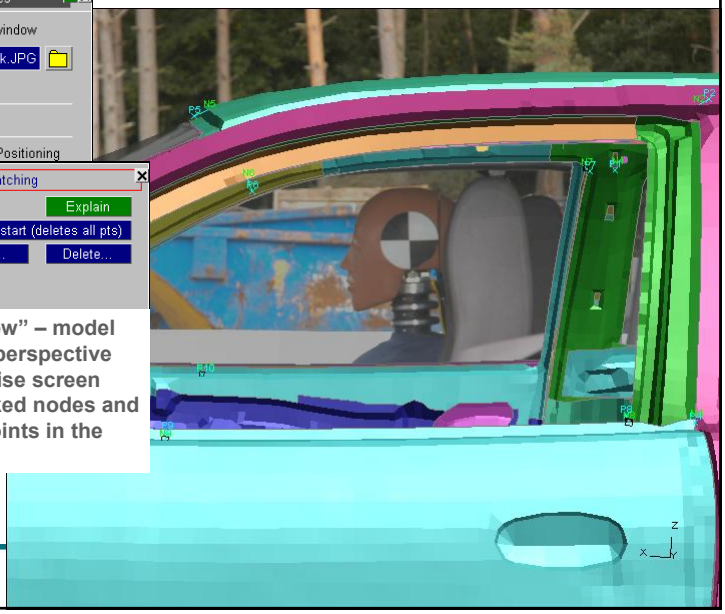


Oasys

Adjusting view to match image

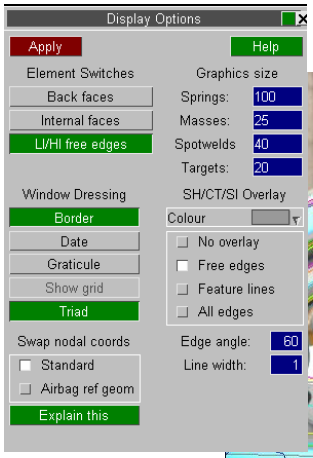


Press “calculate view” – model viewing angle and perspective changes to minimise screen distance between picked nodes and their equivalent points in the image.

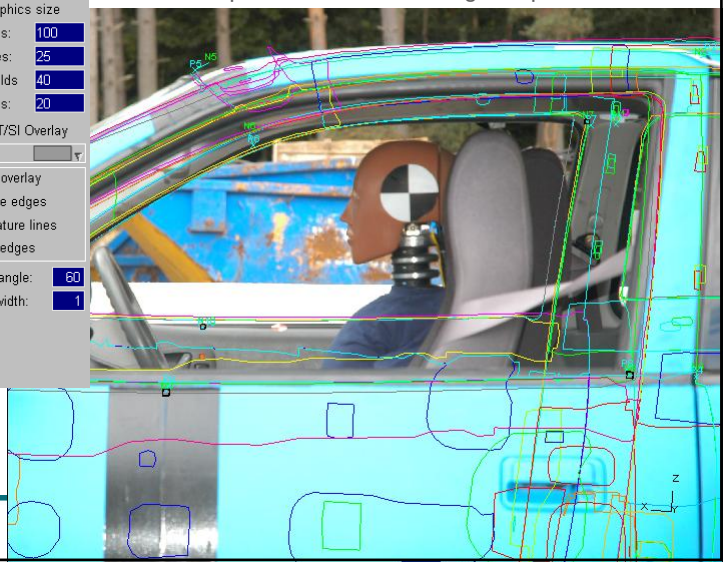


Oasys

Adjusting view to match image



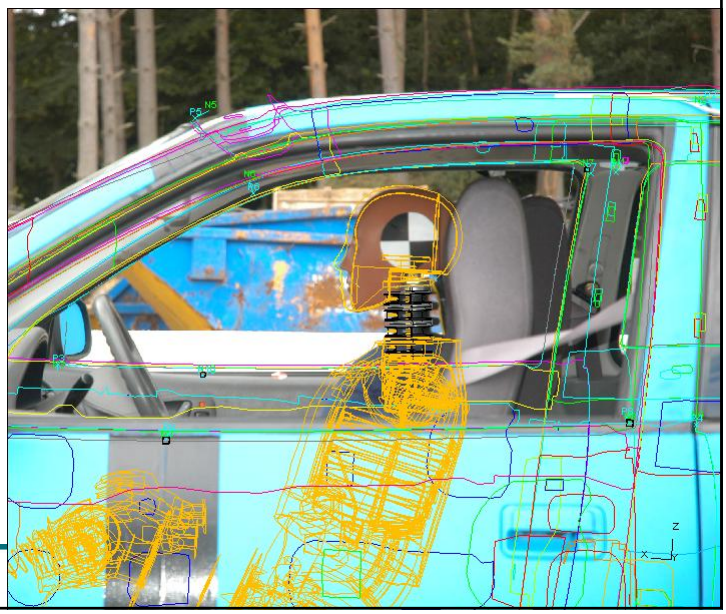
Sometimes it is easier to check the result using a Line plot with “LI/HI free edges” option



Oasys

Adjusting view to match image

Now the dummy can be positioned to match the test.



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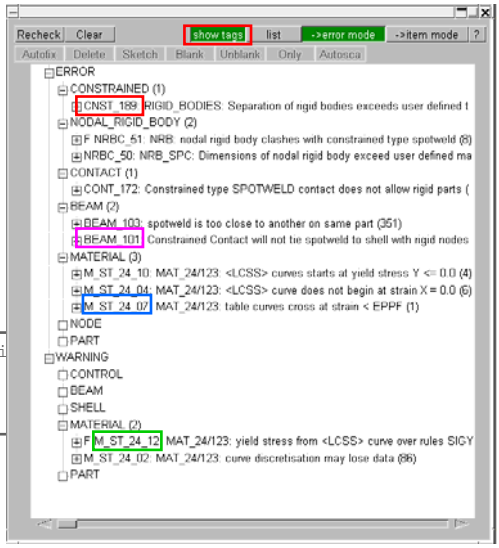
Error/Warning definition

- Many users wish to re-categorize certain checks from “Error” to “Warning”, or to ignore certain checks, according to personal or company preference.
- To find the tag of a particular error or warning, switch on the “Show tags” button in the error tree:

```
CNST_189,   ERROR,    Manual check requi
BEAM_101,   ERROR,    FATAL
M_ST_24_07,WARNING
M_ST_24_12,IGNORE
```



Error/Warning definition

- Create an Error Configuration file (comma-separated text file) like this:

```
CNST_189,   ERROR,    Manual check required
BEAM_101,   ERROR,    FATAL
M_ST_24_07,WARNING
M_ST_24_12,IGNORE
```

Error tag	ERROR, WARNING or IGNORE	Extra text

- Reference the file using the new preference “error_configuration_file”

Oasys Post-processing

Reporter demo

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Barrier models

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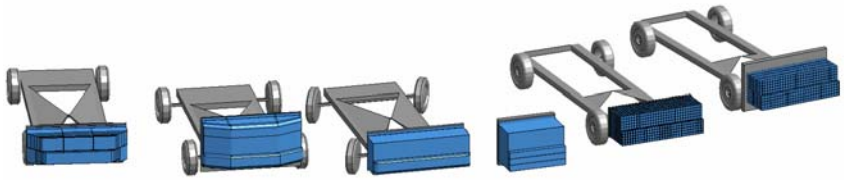
Arup Cellbond Barrier Model Development



CELLBOND

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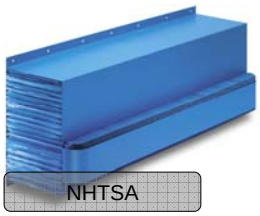
FE Barriers Models

IIHS



NHTSA

Advanced 2000

AE-MDB

ODB

FWDB / FWCB Due Dec 07

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