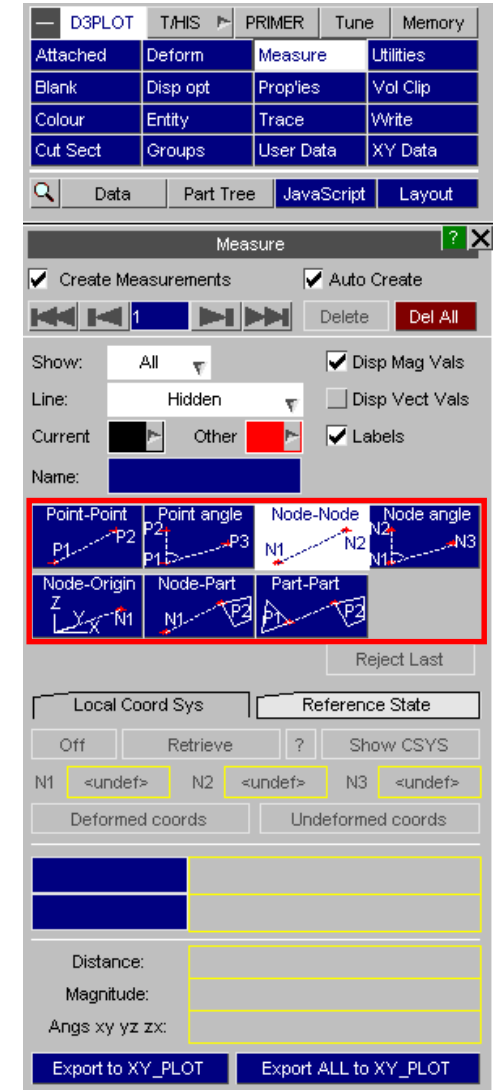


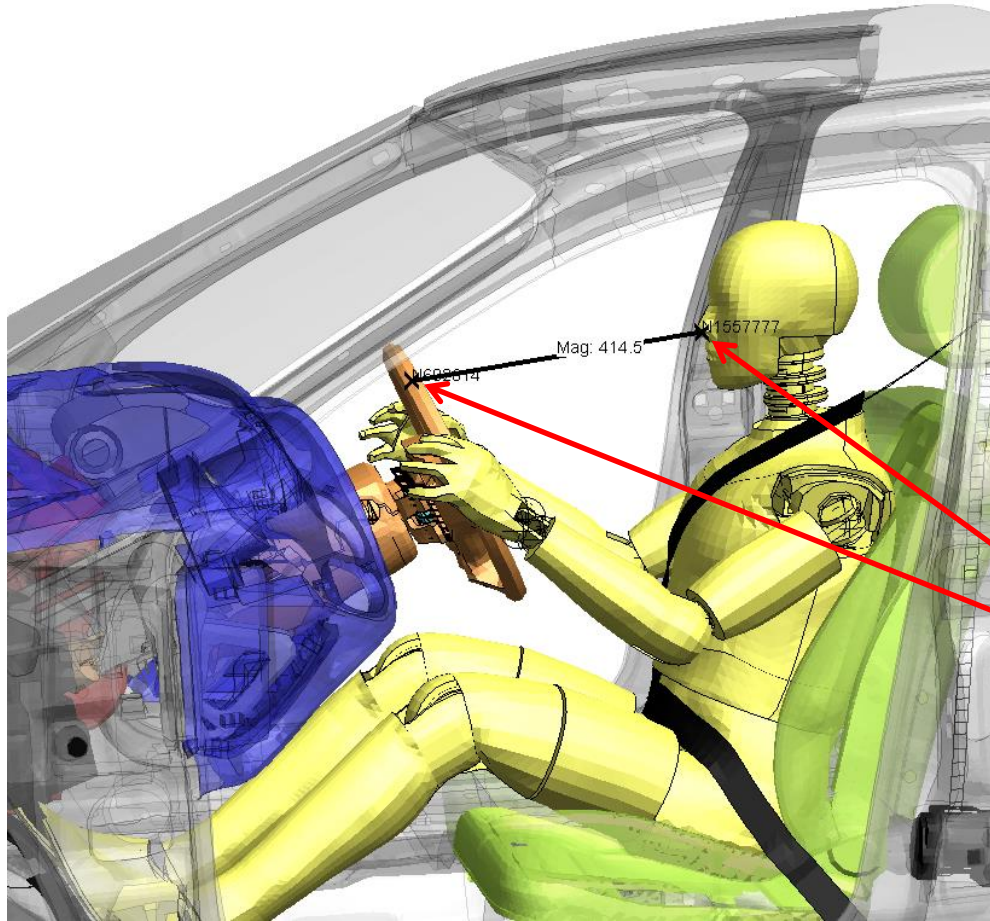
Measure

Measure Functions

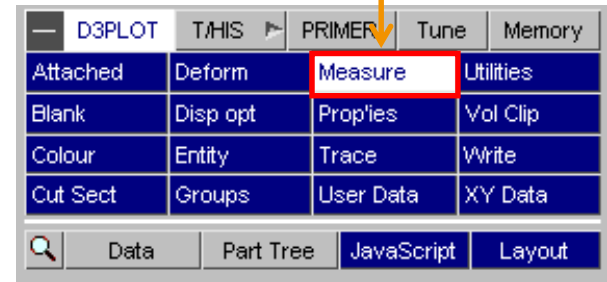
- **Point-Point** – Measure the distance between two points.
- **Point angle** – Measure the angle between 3 points.
- **Node-Node** – Measure the distance between 2 nodes.
- **Node angle** – Measure the angle between 3 nodes.
- **Node-Origin** – Retrieve nodal position and distance from [0,0,0].
- **Node-Part** – Retrieve the shortest distance between a node and a part.
- **Part-Part** – Retrieve the shortest distance between two parts.



Worked Example - Node-Node



(1) The distance between nodes can be measured by either accessing the 'Measure' panel or by pressing the 'M' button on a keyboard.



(2) Pick 2 nodes.

Modifying a Measurement

The nodes selected for the current measurement can be modified by right-clicking the text boxes, and clicking the 'PICK' button.

Or the measurement can be deleted by pressing the 'Delete' button.

Measure

Create Measurements Auto Create

Navigation buttons: [Left] [Right] [Delete] [Del All]

Show: All Disp Mag Vals

Line: Wireframe Disp Vect Vals

Current: [Black] [Other] Labels

Name: [Text Box]

Measurement Types: Point-Point, Point angle, Node-Node, Node angle, Node-Origin, Node-Part, Part-Part

Local Coord Sys: Off, Retrieve, Show CSYS

Reference State: N1 <undef>, N2 <undef>, N3 <undef>

Deformed coords / Undeformed coords

N1 557777	-2371.079 383.725 1081.091
N602614	-1968.239 476.008 1049.148
PICK...	402.840 92.283 -31.943

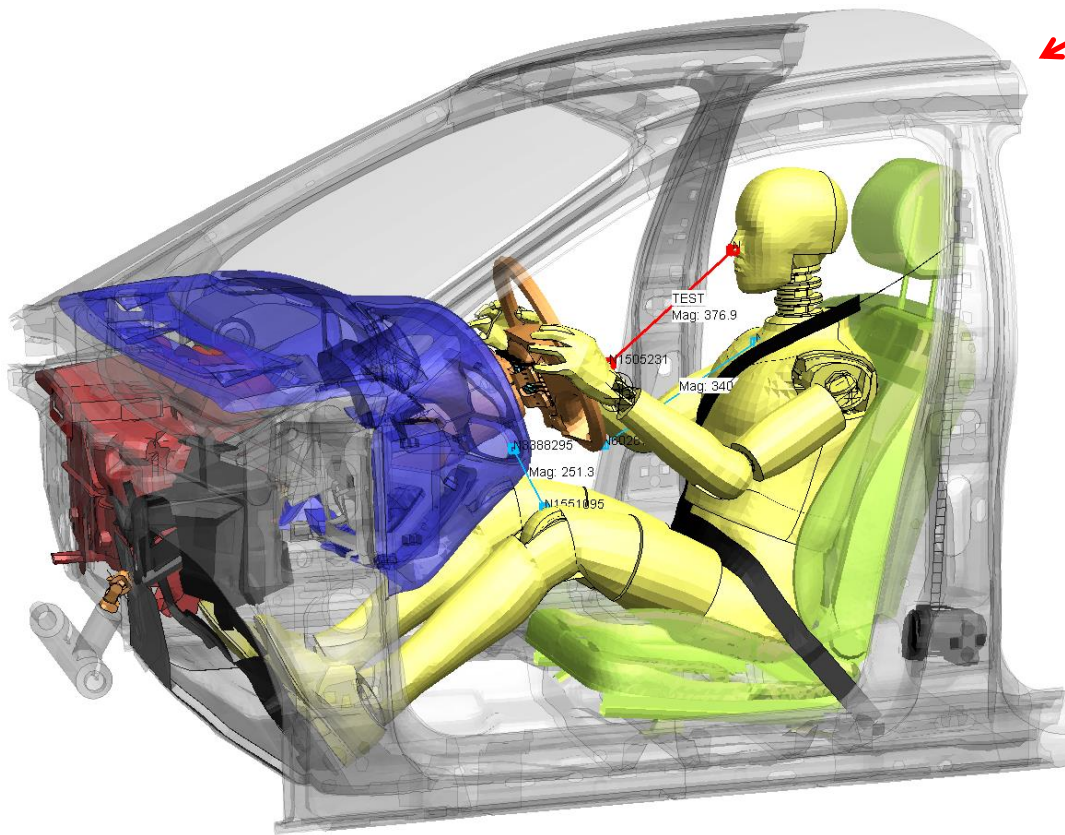
Magnitude: 414.508

Angs xy yz zx: -4.4198 76.373 12.864

Export to XY_PLOT Export ALL to XY_PLOT

Formatting Options

- **Show** – choose which measurements are displayed.
- **Line** – select if the measurement lines are on top of the model (Wireframe) or Hidden.
- **Current** – specify the colour of the current measurement.
- **Other** – specify the colour of measurements, excluding the current measurement.
- **Name** – define the measure with a name.



Measure

Create Measurements Auto Create

1 Delete Del All

Show: All

Line: Hidden

Current Other

Name: TEST

Disp Mag Vals Disp Vect Vals Labels

Point-Point Point angle Node-Node Node angle

Node-Origin Node-Part Part-Part

Local Coord Sys Reference State

Off Retrieve ? Show CSYS

N1 <undef> N2 <undef> N3 <undef>

Deformed coords Undeformed coords

N1557777	-2371.079 383.725 1081.091
N1505231	-2081.917 563.913 919.907

Distance: 289.162 180.188 -161.185

Magnitude: 376.912

Angs xy yz zx: -25.318 50.102 28.559

Export to XY_PLOT Export ALL to XY_PLOT

Measurement Display

The value of the current measurement can be seen in the 'Magnitude' box within the 'Measure' menu. Also the magnitude of the measurements can be displayed on the model by selecting the 'Disp mag Vals' option.

The vector between both points chosen for "measure" is displayed in the 'Distance' box within the 'Measure' menu.

Measure

Create Measurements Auto Create

2 Delete Del All

Show: All Disp Mag Vals

Line: Wireframe Disp Vect Vals

Current: Other Labels

Name:

Point-Point Point angle Node-Node Node angle

Node-Origin Node-Part Part-Part

Local Coord Sys Reference State

Off Retrieve Show CSYS

N1 <undef> N2 <undef> N3 <undef>

Deformed coords Undeformed coords

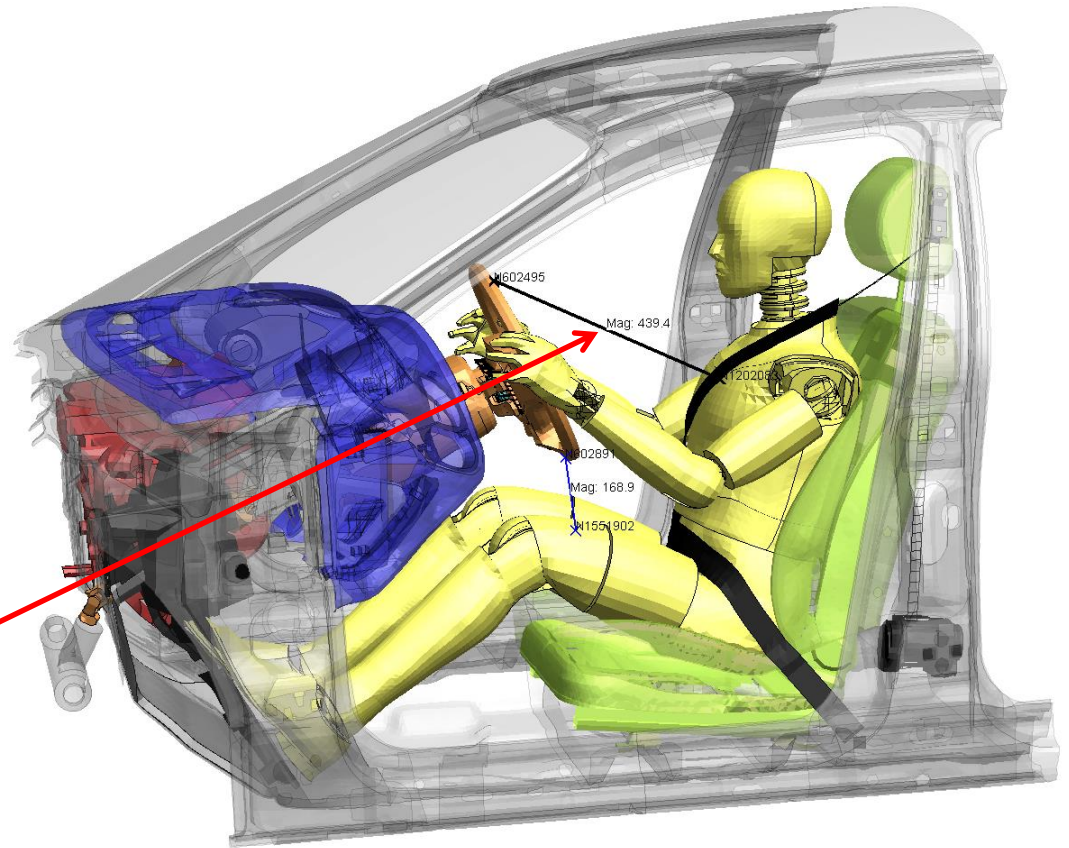
N1202083	-2368.584 427.540 868.822
N602495	-1974.947 446.787 1063.010

Distance: 393.638 19.246 194.188

Magnitude: 439.352

Angs xy yz zx: 26.231 63.631 2.5107

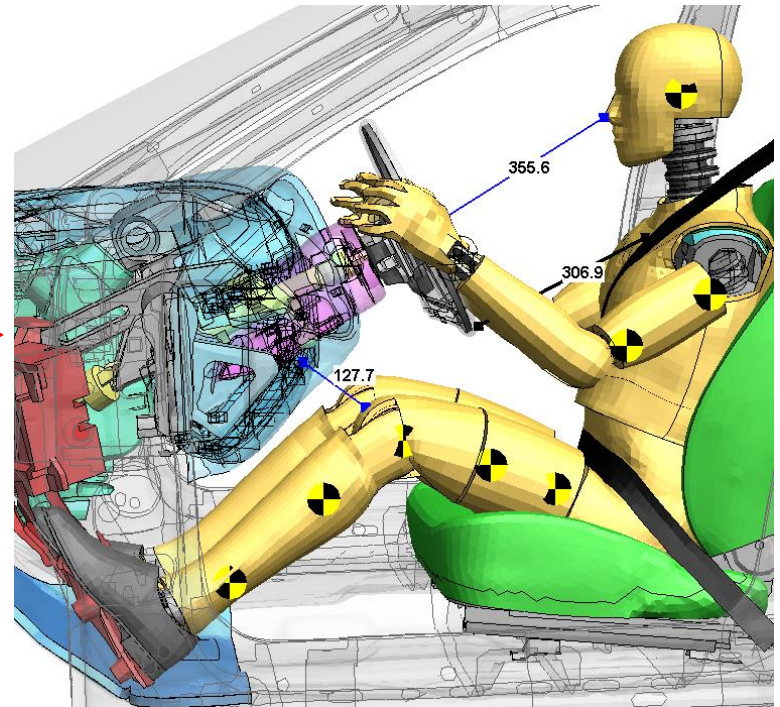
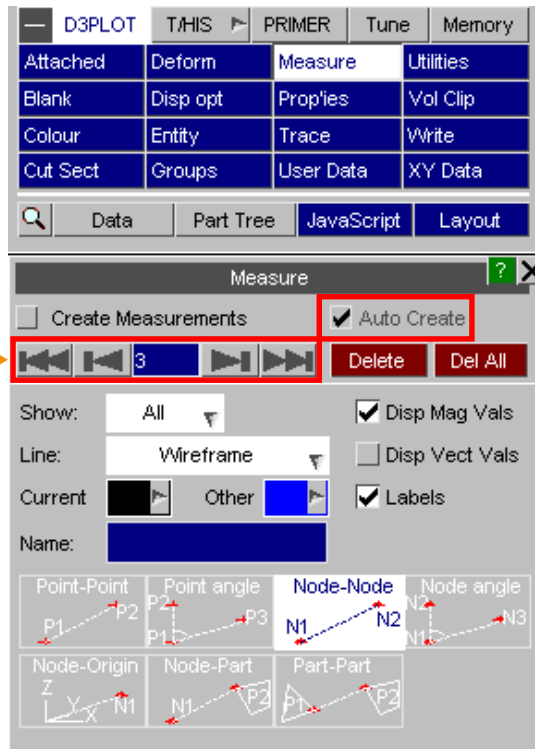
Export to XY_PLOT Export ALL to XY_PLOT



Multiple Measurements

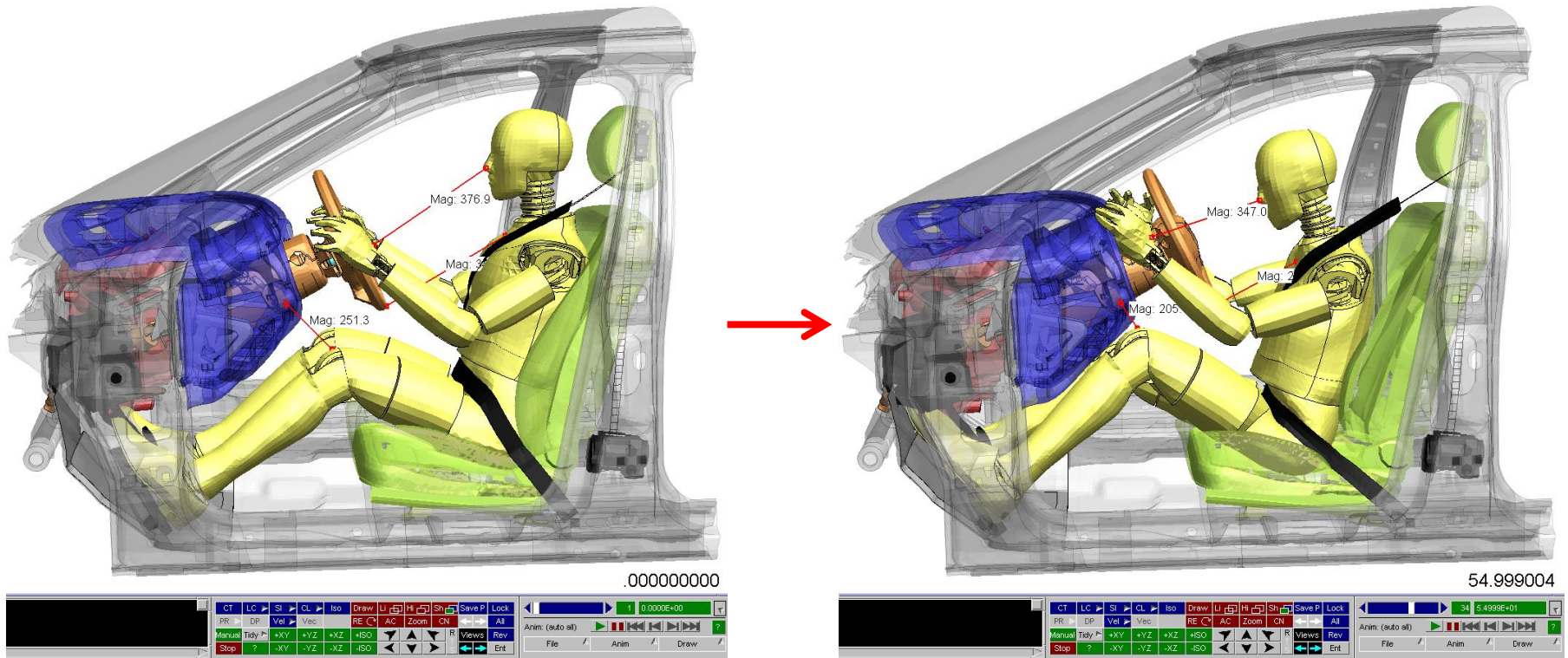
Up to 100 “measures” may be defined. With the ‘**Auto Create**’ option selected, each time the user clicks on another pair of nodes, a new “measure” is created. If the ‘**Auto Create**’ option is not selected, creating a new “measure” requires navigating to the next undefined measurement using the ‘>>|’ button and then creating the measurement (e.g. picking 2 nodes).

The measure which is ‘current’ can be selected.



Measurement Data

The measurement data (distance) is updated automatically when a different time-state is loaded.



Deleting Measures

The “measures” remain visible until deleted. To remove all the “measures”, click the ‘Delete All’ button in the Measure panel or press the ‘Delete’ button on a keyboard.

The screenshot shows the Measure panel in D3PLOT. The panel includes a toolbar with a 'Delete' button (a red arrow points to it) and a 'Del All' button. Below the toolbar are various settings: 'Show: All', 'Line: Wireframe', 'Current: Other', and 'Name:'. There are also diagrams for different measurement types: Point-Point, Point angle, Node-Node, Node angle, Node-Origin, Node-Part, and Part-Part. At the bottom, there are buttons for 'Local Coord Sys' and 'Reference State', and a table of measurement data.

Measure	Value 1	Value 2	Value 3
N5302	70.000	35.000	325.000
N5357	70.000	35.000	140.000

Property	Value 1	Value 2	Value 3
Distance:	0.000	0.000	-185.000
Magnitude:	185.000		
Angs xy yz zx:	-90.000	0.000	0.000

Local Coordinate System

Measurements can be transformed to a local coordinate system using the 'Local Coord Sys' function within the 'Measure' Panel.

Coordinate systems can be retrieved from "csys.loc" files or coordinates defined in a ZTF file, using the 'Retrieve' button. Alternatively, if no coordinate system can be retrieved. A coordinate system can be created and stored in the Deform -> Shift Def menu.

The user has a choice of whether the local coordinate system is defined by the undeformed coordinates of the nodes, or changes with each state to following the deformed coordinates.

Different coordinate systems can be used for different measures.

The screenshot shows the 'Measure' panel in the D3PLOT software. The panel is divided into several sections:

- Measure Panel:** Includes 'Create Measurements' (unchecked), 'Auto Create' (checked), and navigation buttons (1, Delete, Del All).
- Show:** 'All' (dropdown), 'Disp Mag Vals' (checked), 'Disp Vect Vals' (unchecked), 'Labels' (checked).
- Line:** 'Wireframe' (dropdown).
- Current:** 'Other' (dropdown).
- Name:** (text input field).
- Diagram:** Shows three types of coordinate systems: Point-Point (P1-P2), Point angle (P1-P2), and Node-Node (N1-N2). Below are Node-Origin, Node-Part, and Part-Part diagrams.
- Local Coord Sys:** A red box highlights this section, which includes a 'Reference State' dropdown, 'Off' (checkbox), 'Retrieve' (button), and 'Show CSYS' (checkbox). Below are three columns for nodes N1, N2, and N3, each with a '<undef>' value.
- Table:** A table with columns for node ID and coordinates.
- Summary:** Fields for 'Distance', 'Magnitude', and 'Angs xy yz zx'.
- Buttons:** 'Export to XY_PLOT' and 'Export ALL to XY_PLOT'.

Node ID	X	Y	Z
N5302	70.000	35.000	325.000
N5357	70.000	35.000	140.000

Distance:	0.000	0.000	-185.000
Magnitude:	185.000		
Angs xy yz zx:	-90.000	0.000	0.000

Reference State

The 'Reference State' menu within the 'Measure' panel allows for a reference value to be applied to the measurement.

The measurement displayed when the reference state is on is the difference in distance at the current time from the distance at the reference time.

The reference state can be turned on and off for each measurement. The same reference state is used for all measurements.

The screenshot shows the D3PLOT software interface. The top menu bar includes D3PLOT, THIS, PRIMER, Tune, and Memory. Below it is a grid of buttons: Attached, Deform, Measure, Utilities; Blank, Disp opt, Prop'ies, Vol Clip; Colour, Entity, Trace, Write; Cut Sect, Groups, User Data, XY Data. A search bar and buttons for Data, Part Tree, JavaScript, and Layout are also visible. The main panel is titled 'Measure' and contains several sections:

- Measure Panel:** Includes checkboxes for 'Create Measurements' and 'Auto Create', navigation buttons (1, Delete, Del All), and display options like 'Show: All', 'Line: Wireframe', 'Current', and 'Name'.
- Measurement Types:** A grid of icons for Point-Point, Point angle, Node-Node, Node angle, Node-Origin, Node-Part, and Part-Part.
- Reference State:** A section with a red border containing a green 'On' button, 'State: 50', and 'Time: 4.8966E-03 (M1)'. Below this is a slider for 'State number' ranging from 0 to 114, currently set at 50.
- Data Table:** A table with two rows of data:

N4532	55.657	73.928	508.667
N4620	53.994	67.341	223.905

Below the table are fields for 'Distance: -1.6633 -6.5874 -284.762', 'Magnitude: 62.822', and 'Angs xy yz zx: -2.8246 -1.4586 -5.3623'. At the bottom are buttons for 'Export to XY_PLOT' and 'Export ALL to XY_PLOT'.

Exporting Measurements

The measurements can be graphed over time in the XY-Data tool by clicking the 'Export ALL to XY_PLOT' button.

The screenshot shows the 'Measure' tool interface. At the top, there is a menu bar with options: D3PLOT, THIS, PRIMER, Tune, Memory. Below the menu bar is a grid of buttons: Attached, Deform, Measure, Utilities; Blank, Disp opt, Prop'ies, Vol Clip; Colour, Entity, Trace, Write; Cut Sect, Groups, User Data, XY Data. Below this is a search bar and buttons for Data, Part Tree, JavaScript, and Layout.

The main 'Measure' panel includes:

- Create Measurements Auto Create
- Navigation buttons: back, forward, and a button with '3'.
- Buttons: Delete, Del All
- Show: All (dropdown)
- Line: Wireframe (dropdown)
- Current: Other (dropdown)
- Labels: Labels
- Measurement types: Point-Point, Point angle, Node-Node, Node angle, Node-Origin, Node-Part, Part-Part.
- Local Coord Sys: Retrieve (dropdown), Show CSYS (button)
- Reference State: ? (button)
- Measurement IDs: N1 <undef>, N2 <undef>, N3 <undef>
- Deformed coords: Undeformed coords
- Table of measurement data:

N4616	55.000	70.000	95.000
N1463	70.000	30.000	100.000

Summary statistics:

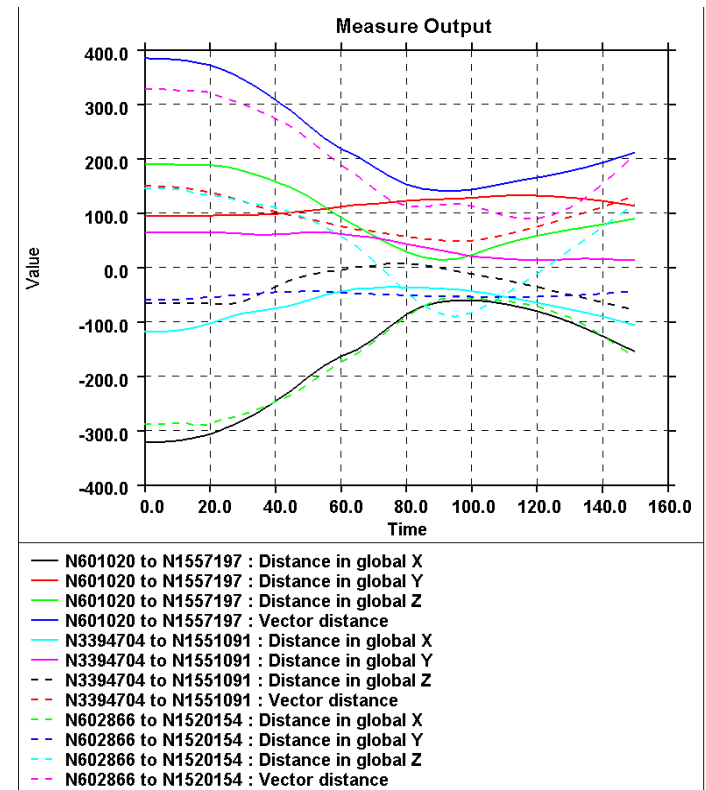
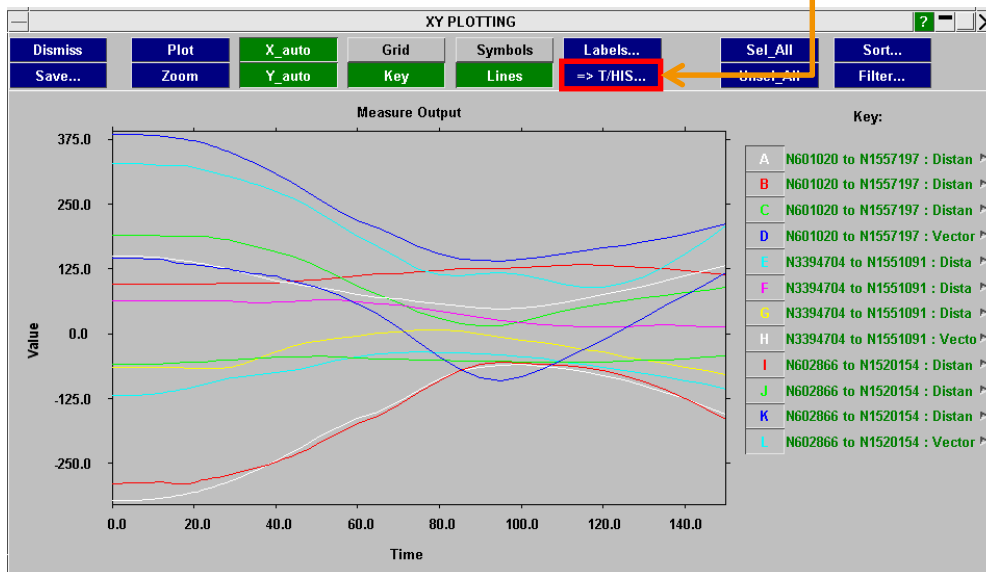
- Distance: 15.000 -40.000 5.0000
- Magnitude: 43.012
- Angs xy yz zx: 6.6756 20.410 -68.432

Buttons at the bottom: Export to XY_PLOT, Export ALL to XY_PLOT

Exporting Measurements

Four separate curves are generated for each measurement: Distance in X,Y and Z and Vector distance.

Tip: Click the '=> T/HIS...' button to further process the curves within T/HIS.



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