

Introduction to LS-PrePost 4.2 (workshops)

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Overview

About LS-PrePost

- LS-PrePost is an advanced pre and post-processor designed specifically for LS-DYNA
- LS-PrePost is developed for Windows and Linux
- LS-PrePost is ***Free***
- Core Functionality
 - Full support of LS-DYNA keyword files
 - Full support of LS-DYNA results files
 - Robust handling of geometry data (new CAD engine)
 - Pre-processing (meshing, model clean-up, entity creation)
 - Post-processing (animation, fringe plotting, curve plotting)

Online Resources

- Official Website
 - <http://www.lstc.com/lspg>
- User Group
 - <http://groups.google.com/group/lc-prepost>
- Latest Release Version:
 - <http://ftp.lstc.com/anonymous/outgoing/lcprepost/4.2/>
 - <ftp://ftp.lstc.com/outgoing/lcprepost/4.2/>
- Beta Version:
 - <http://ftp.lstc.com/anonymous/outgoing/lcprepost/4.3>
- Training notes:
 - <http://ftp.lstc.com/anonymous/outgoing/qyan/Training/Intro/>

Workshop 1

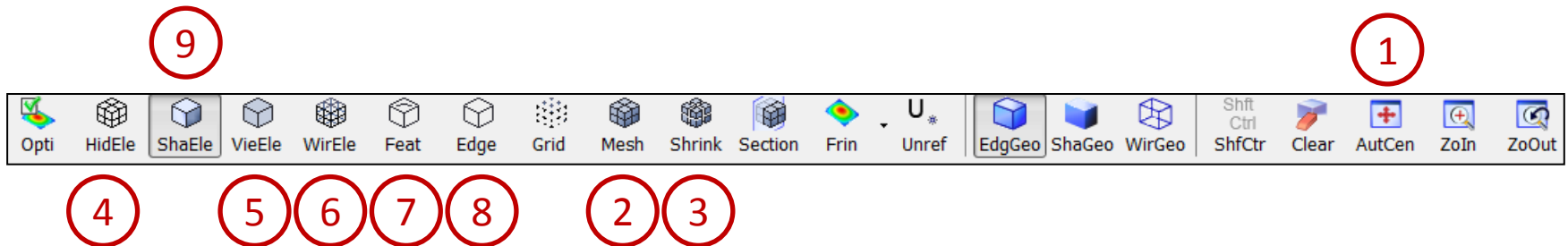
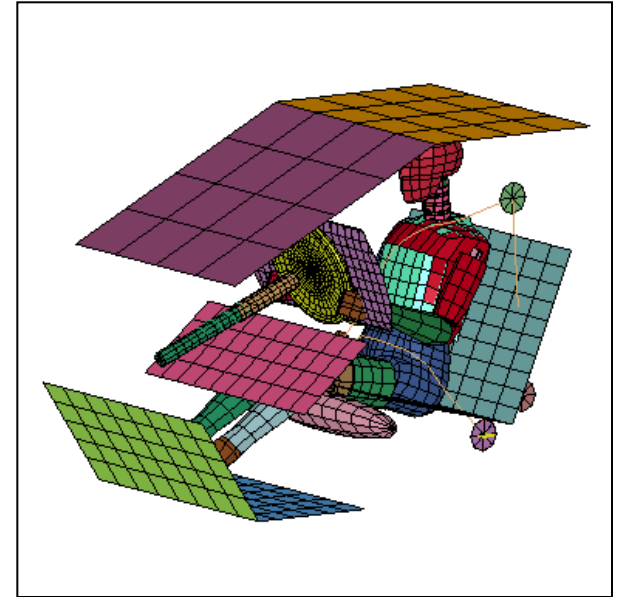
General Operations

- ❖ Parts on/off
- ❖ Render buttons (bottom toolbar)
- ❖ Group, appearance and view
- ❖ Identify and find
- ❖ Element blank(mask)
- ❖ Part color

Workshop 1

Load and view an LS-DYNA Keyword file...

- Launch a new session of LS-PrePost
- File > Open > LS-DYNA Keyword File
(select /workshop1/belted.k)
- Use Shift + Left Click to rotate the model
- Click render buttons **1** ---- **9**



Workshop 1 (continued...)

Use the part on/off interface...

- Go to **Model** → **SelfPart** (“Assembly and Select Part”) and select individual parts from the list
- Use Ctrl + Left Click to select multiple parts
- Click **All** to display all parts
- Toggle **Beam** / **Shell** / **Solid** / **Disc** / **Sbelt**
- Click **SortBy** button and turn on/off some check boxes in the setting columns in the Part Sort dialog
- Click the **MatTypeName** header to see the sorting effect

Part Sort

Sort Part

| | MatId | MatName | MatTypeName | EosId | Hrglass | Elfor |
|----|-------|---------|------------------|-------|---------|-------|
| 1 | 1 | | 006 VISCOELASTIC | 0 | 0 | |
| 2 | 36 | | 006 VISCOELASTIC | 0 | 0 | |
| 3 | 86 | | 009 NULL | 0 | 0 | |
| 4 | 88 | | 009 NULL | 0 | 0 | |
| 5 | 2 | | 020 RIGID | 0 | 0 | |
| 6 | 3 | | 020 RIGID | 0 | 0 | |
| 7 | 4 | | 020 RIGID | 0 | 0 | |
| 8 | 5 | | 020 RIGID | 0 | 0 | |
| 9 | 6 | | 020 RIGID | 0 | 0 | |
| 10 | 7 | | 020 RIGID | 0 | 0 | |

Setting Column:

- ☒ Type
- ☒ PartId
- ☒ PartName
- ☒ SectionId
- ☒ SectionName
- ☒ MatId
- ☒ MatName
- ☒ MatTypeName

Assembly and Select Part

Assembly GPart Part

Md1

- ☒ Beam
- ☒ Shell
- ☒ Solid
- ☐ Tshell
- ☐ CNRB
- ☐ Mass
- ☒ Disc
- ☒ Sbelt
- ☐ Inerta
- ☐ Rsurf
- ☐ Sphnd
- ☐ Fluid(Ale)
- ☐ Nurbs
- ☐ DiscShpere
- ☐ MSMesh

InputOrder

- ☐ Selected
- ☐ List CNRBs

Select Type >>

All Auto

Info None

SortBy Rev

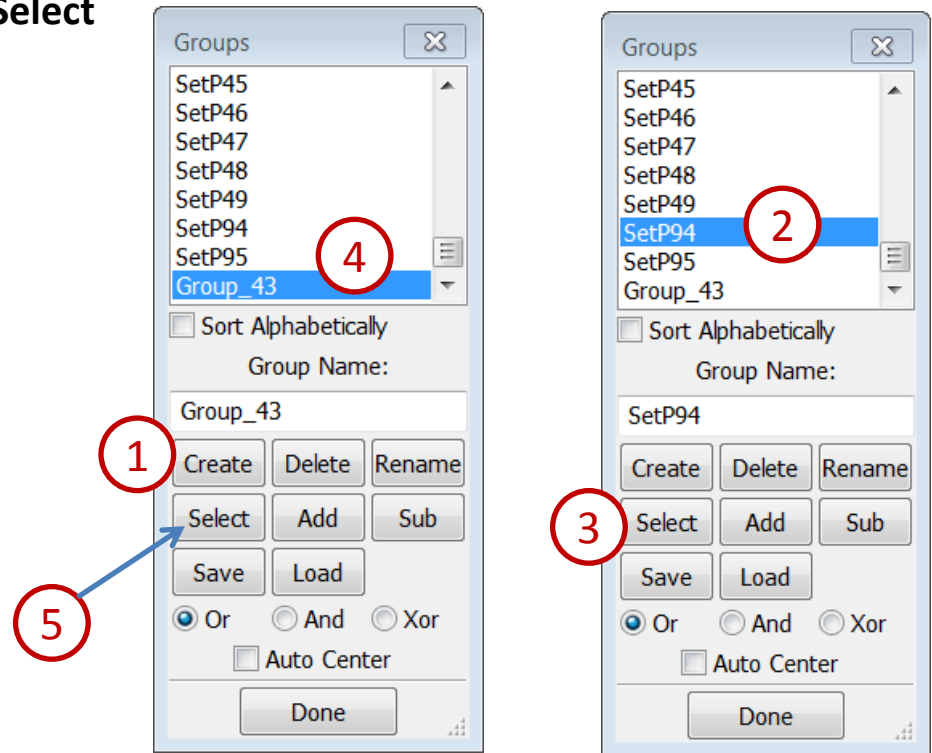
Apply Restore

Done

Workshop 1 (continued...)

Create a part group...

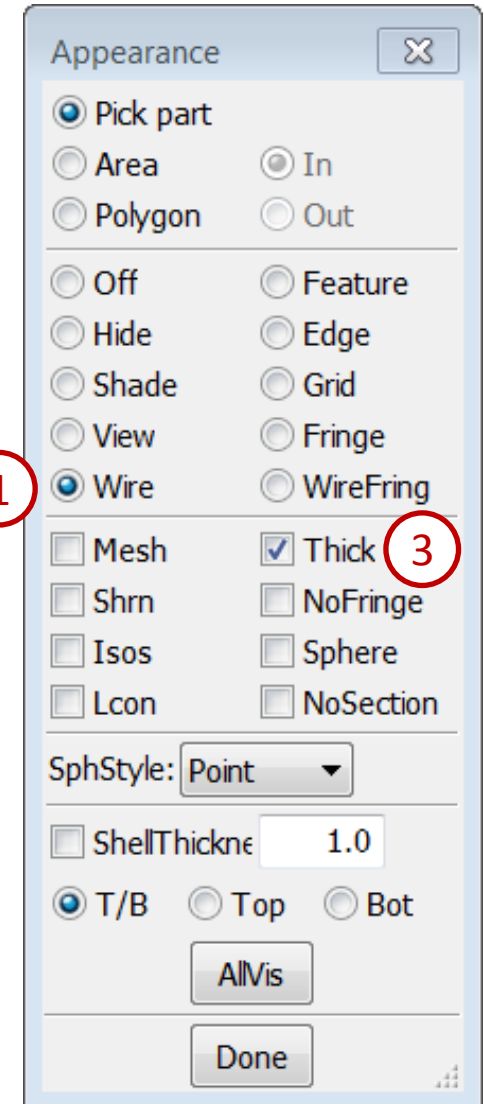
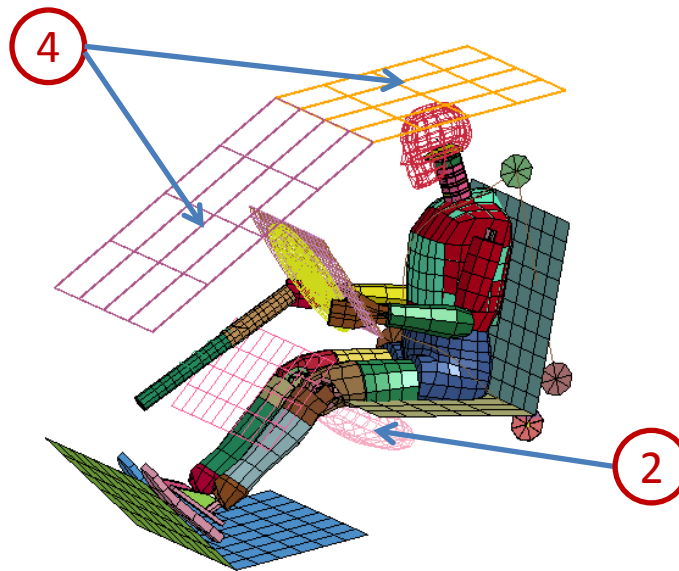
- Go to **Model** → **Groups**
- Click **Create** (all visible parts will be saved to “Group_43”)
- Select “SetP94” from the list and click **Select**
- Select “Group_43” from the list and click **Select**



Workshop 1 (continued...)

Modify part appearance...

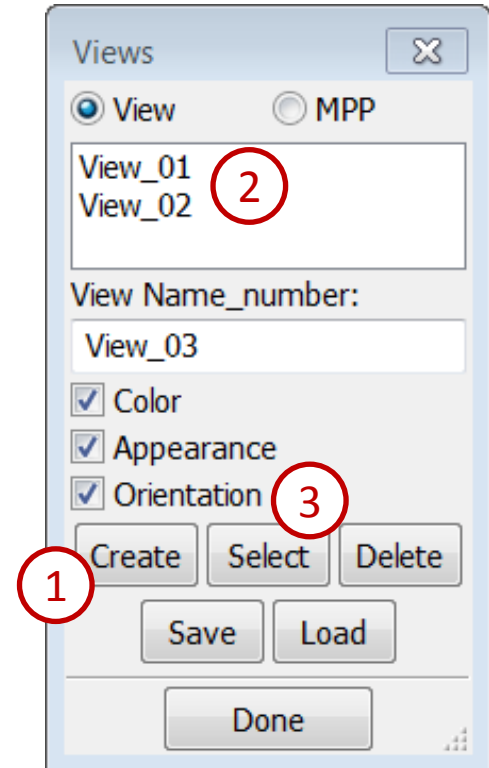
- Go to **Model** → **Appearance**
- Select any one of the drawing modes **Hide** / **Edge** / **View** / **Wire** in the Appearance interface
- Pick some parts in the model
- Toggle **Thick** in the Appearance interface and pick the roof parts
- Click the **Zoom In** render button (or hit Ctrl+Z) and zoom in on a shell part to verify that thickness is displayed



Workshop 1 *(continued...)*


Create a view...

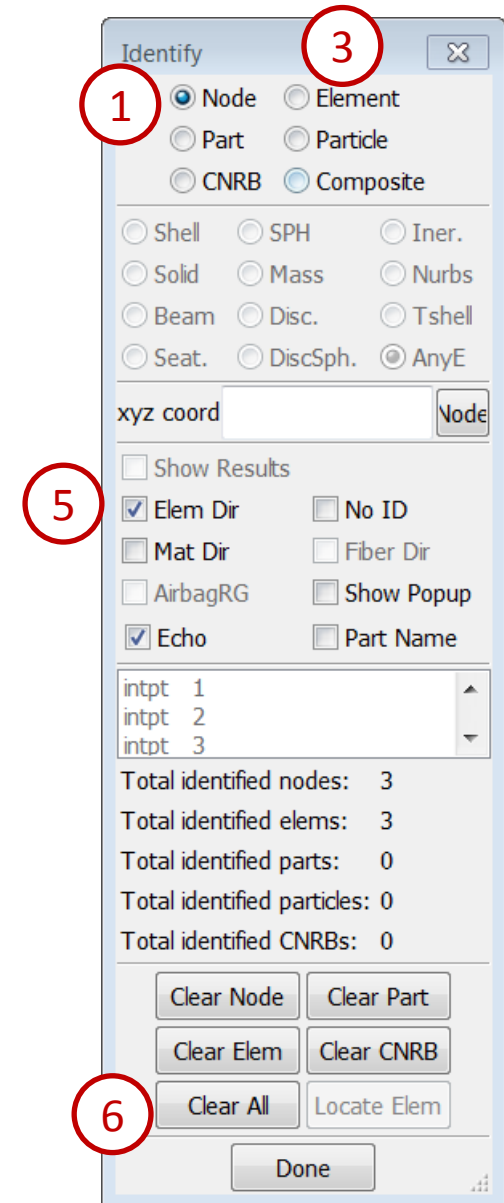
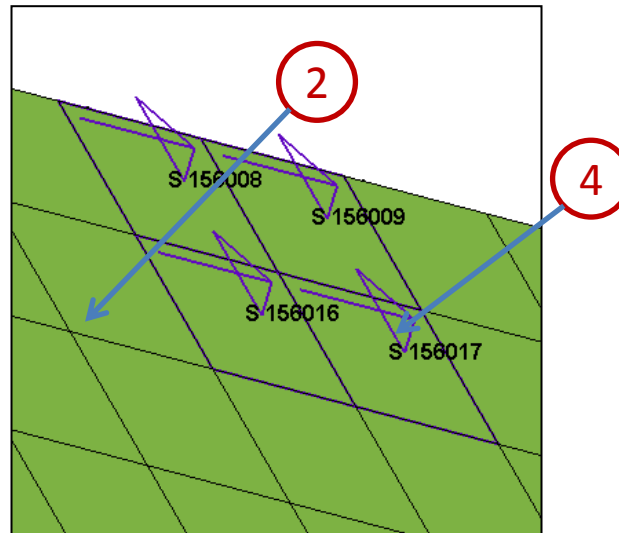
- Go to **Model** → **Views**
- Click **Create** (the current view will be saved as “View_01”)
- Rotate the model and click **Create** again (saved as “View_02”)
- Select “View_01” from the list and click **Select**
- Select “View_02” from the list and click **Select**



Workshop 1 (continued...)

Identify nodes and elements...

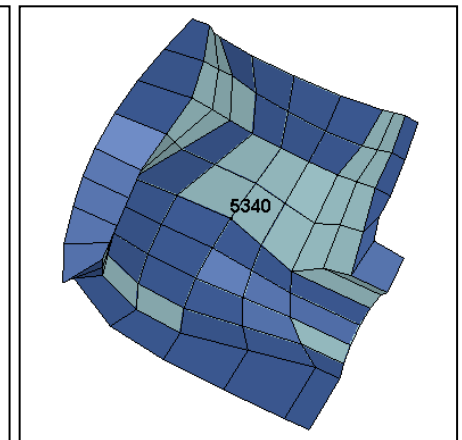
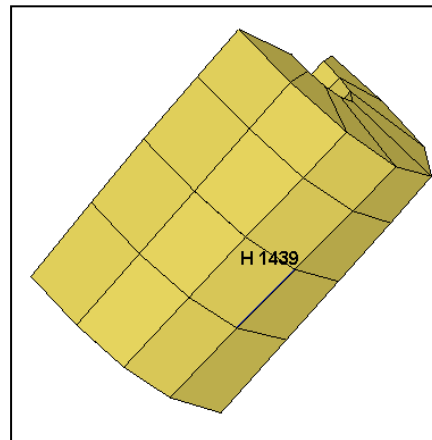
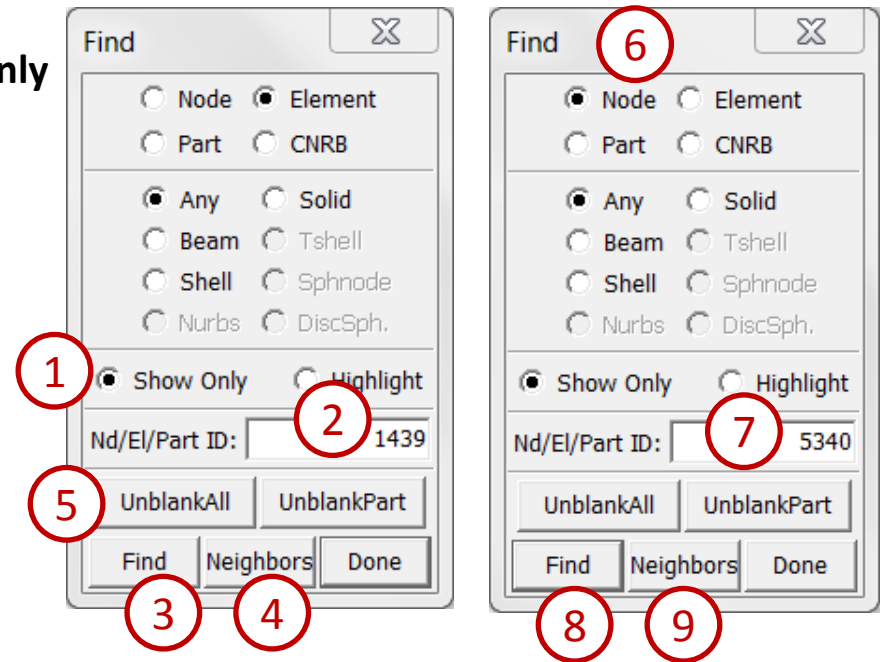
- Turn on the mesh (using the **Mesh** render button) 
- Go to **Element Tools** → **Identify**
- Select **Node** in the Identify interface and pick some nodes in the model to display their IDs
- Select **Element** in the Identify interface and pick some elements
- Toggle **Elem Dir** to display the N1 to N2 direction
- Click the **Clear All** button to clear all highlighted entities



Workshop 1 (continued...)

Find a node and element...

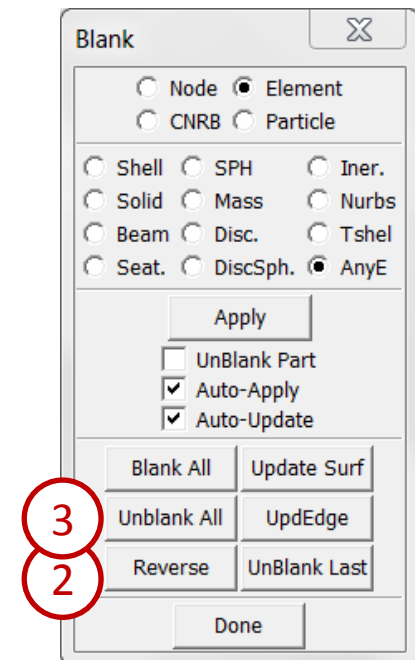
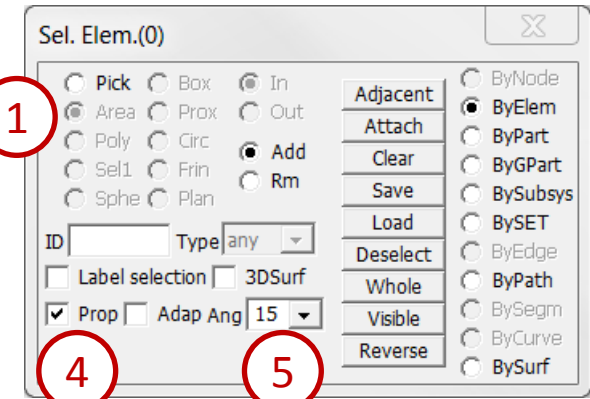
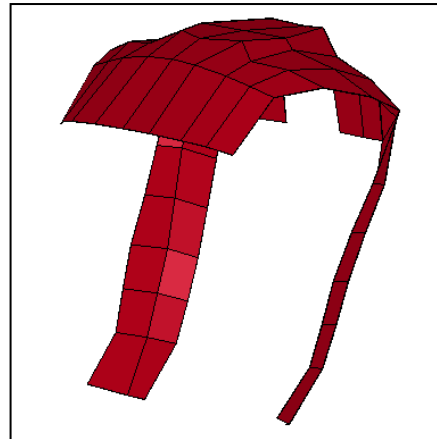
- Go to **Element Tools** → **Find** and select **Show Only**
- Enter 1439 in the text field and click **Find**
- Click **Neighbors** several times
- Click **UnblankAll** button
- Select **Node** in the Find interface
- Enter 5340 in the text field and click **Find**
- Click **Neighbors** several times



Workshop 1 (continued...)


Blank some elements...

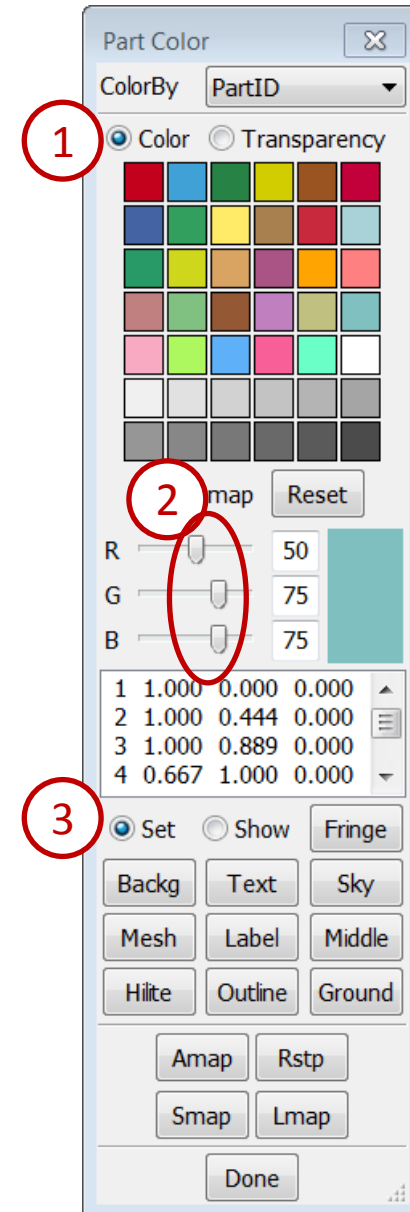
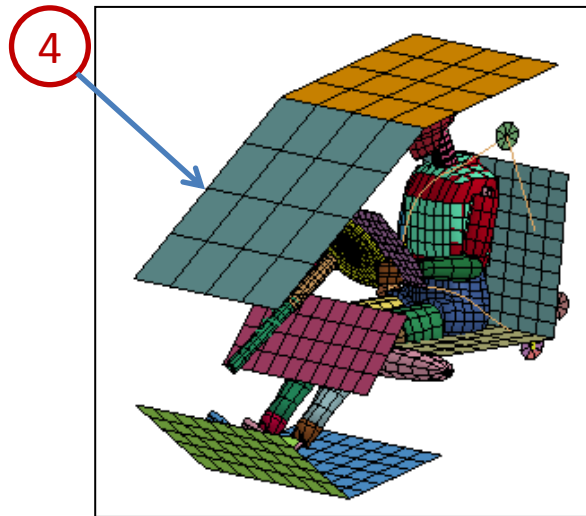
- Go to **Element Tools** → **Blank**
- Select **Area** in the General Selection interface and draw a box to blank some elements
- Click **Reverse** in the Blank interface
- Click **Unblank All** in the Blank interface
- Click the **Assembly and Part** (SelPart) render button
- Select “88 PSHELL” from the list, click the **Auto Center** (AutCen) render button, and click **Done** in the Assembly and Part interface
- Toggle **Prop** (propagate) in the General Selection interface, select **Ang: 15**, and pick an element on the front of the torso



Workshop 1 (continued...)

Modify part color...

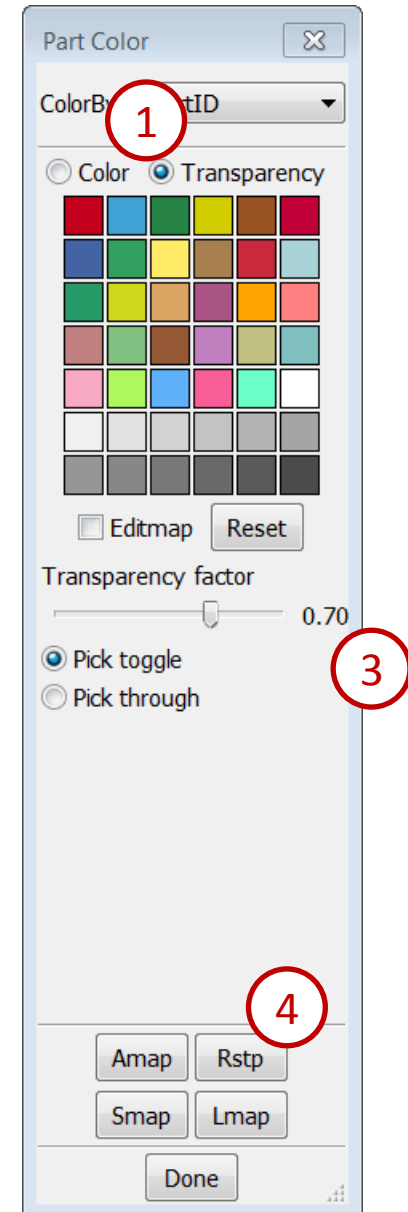
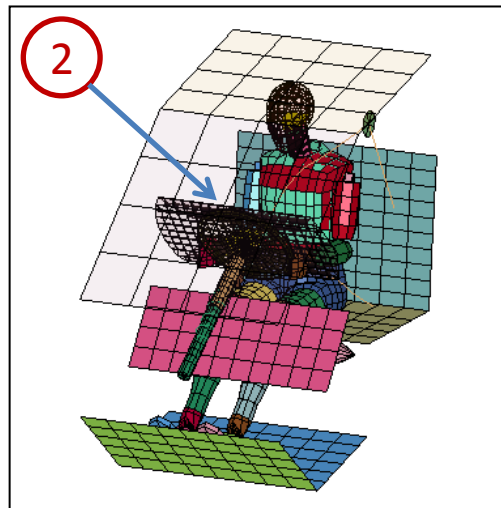
- Click the **Activate All** render button 
- Go to **Model** → **PtColor**
- Select **Color**
- Adjust color using the RGB sliders
- Select **Set** and pick some parts
- Select any color from color map
- Click **Backg** (only works when View > Background > Plain is selected)



Workshop 1 (continued...)

Modify part transparency...

- Select **Transparency**
- Pick the roof of the structure and adjust the slider
- Select **Pick Through** and pick through the roof to make some additional components transparent
- Click **Visible** and drag the slider to the far left
- Click **Rstp** button (reset all parts to opaque)
- Click **Amap** button (reset parts color by color map)



Workshop 2

Mesh Generation

- ❖ Shape mesh
- ❖ N-line mesh
- ❖ Auto mesh
- ❖ Solid mesh

Workshop 2

Create a solid cylinder...

- Launch a new session of LS-PrePost
- Go to **Mesh** → **Shape Mesher**
- Select **Entity: Cylinder_Solid**
- Enter **Radius: 5**, **Length: 10**,
Num Ele (Circumferential): 32, **Num (Length): 20**
- Enter **XYZ: 0,0,1** for position
- Click **dirz** (set direction to 0,0,1)
- Click **Create** and **Accept**

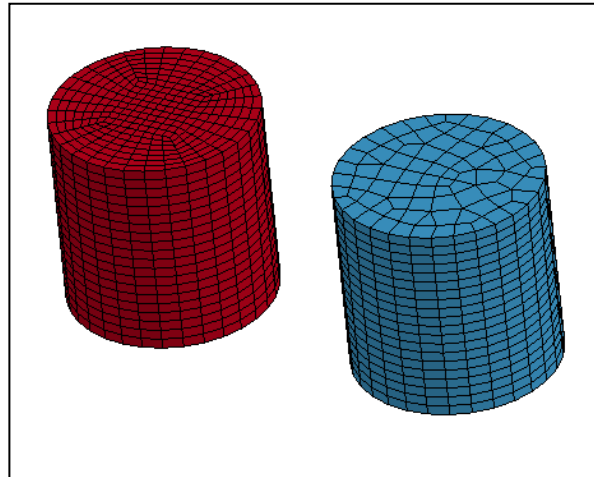
The screenshot shows the 'Shape Mesher' dialog box with the following settings and callouts:

- Entity:** Cylinder_Solid (Callout 1)
- Radius:** 5 (Callout 2)
- Length:** 10 (Callout 2)
- Num Ele:** 32 (Callout 2)
- Num:** 20 (Callout 2)
- Position:** x=0, y=0, z=1 (Callout 3)
- Direction:** dirx=0, diry=0, dirz=1 (Callout 4, with an arrow pointing to the 'dirz' button)
- ☐ Top And Bottom
- Target Name:** (empty field)
- Target Part ID:** 1
- Start Element ID:** 1
- Start Node ID:** 1
- Create** button (Callout 5)
- Reject** button
- Accept** button (Callout 6)
- Done** button

Workshop 2 (continued...)

Create a shell cylinder...

- Select **Entity: Cylinder_Shell**
- Enter **Num Ele: 30** (leave other parameters unchanged)
- Enter **XYZ: 15,0,1** for position
- Activate **Top And Bottom** (meshes ends of cylinder)
- Click **Create** and **Accept**
- Turn on the mesh (using the **Mesh** render button)
- Rotate the model such that you can see the cross-section of both cylinders
(note the different cross-sectional mesh of the two parts)



Shape Mesher

Entity: **Cylinder_Shell** (1)

Radius: 5 (1) | Length: 10 (1) | Num Ele: **30** (2) | Num: 20 (1)

Position | Direction

x: 15 (3) | dirx: 0 | y: 0 | diry: 0 | z: 1 | dirz: 1

☒ Top And Bottom (4)

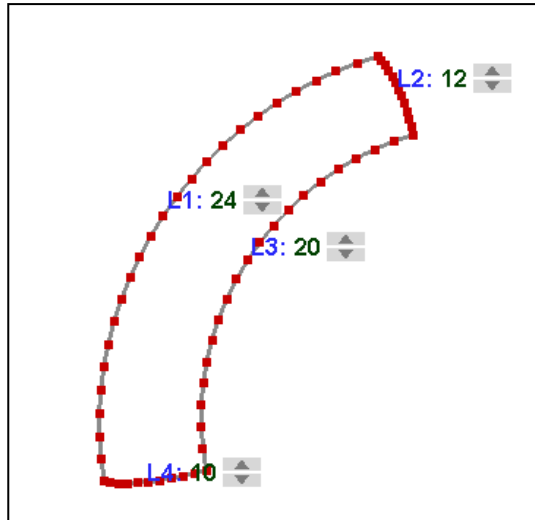
Target Name: | Target Part ID: 3 | Start Element ID: 6543 | Start Node ID: 7216

Create (5) | Reject | Accept | Done (6)

Workshop 2 (continued...)

Create a mesh from 4 lines...

- Launch a new session of LS-PrePost
- File > Open > IGES File
(select /workshop2/test_4lmesh_curves.igs)
- Click **Open** in the IGES Read Options popup
- Go to **Mesh** → **N-Line Mesher**
- Select **Type: 4 Line Shell**
- Pick the longest curve
- Pick the remaining curves in clockwise order
- Enter **N1: 24** and **hit Enter**
- Enter **N2: 12** and **hit Enter**
- Enter **N3: 20** and **hit Enter**
- Enter **N4: 10** and **hit Enter**
- Click **Mesh It** and **Accept**



N-Line Mesher

Type: 4 Line shell

Mesh By:

- ☒ Number of elements
- ☐ Element size
- ☐ Points of line

Mesh parameters

N1: 24 / 1 Ratio: 1.0 Two End

N2: 12 / 1 Ratio: 1.0 Two End

N3: 20 / 1 Ratio: 1.0 Two End

N4: 10 / 1 Ratio: 1.0 Two End

Wire Sampling ☐ MultiSelect

Part ID: 1 New PID

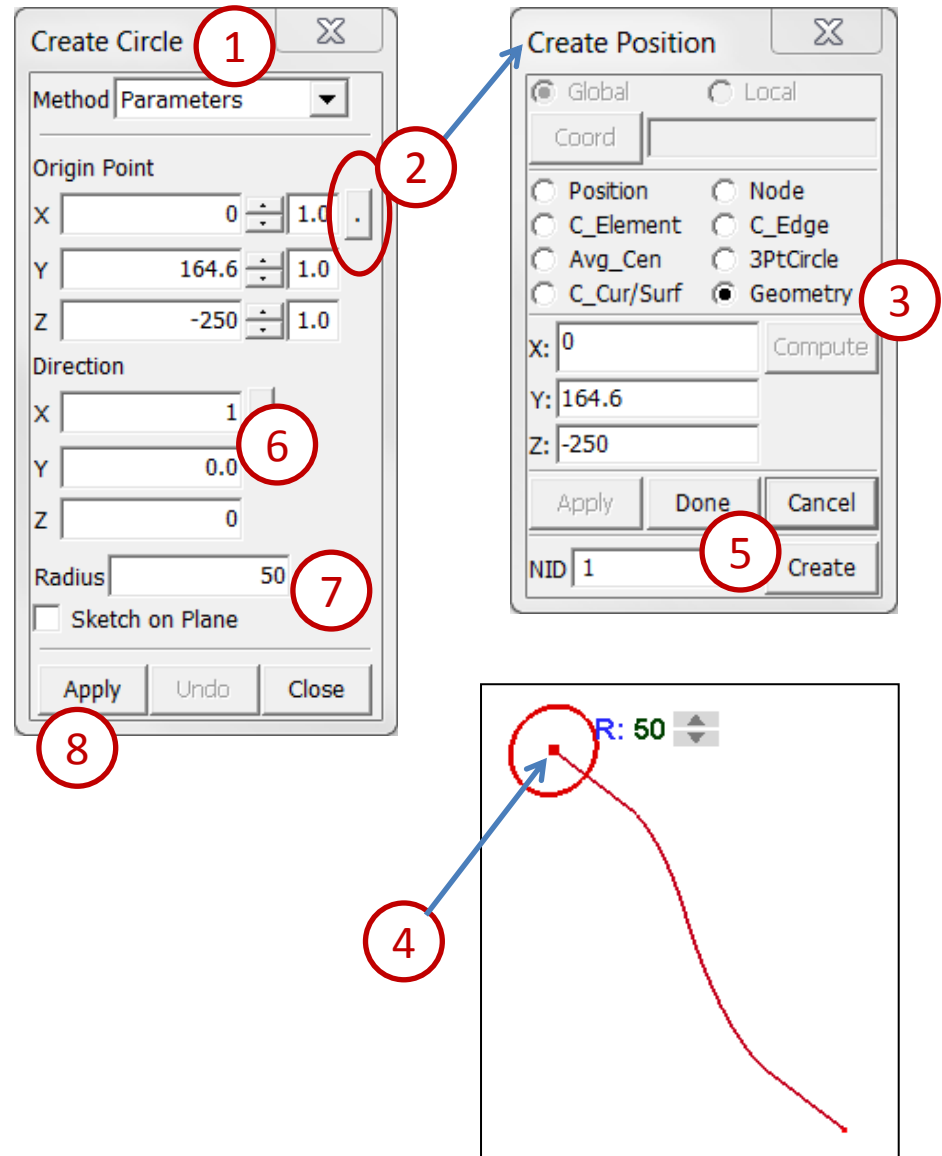
Mesh It

Accept Reject Done

Workshop 2 (continued...)

Sweep one line along another...

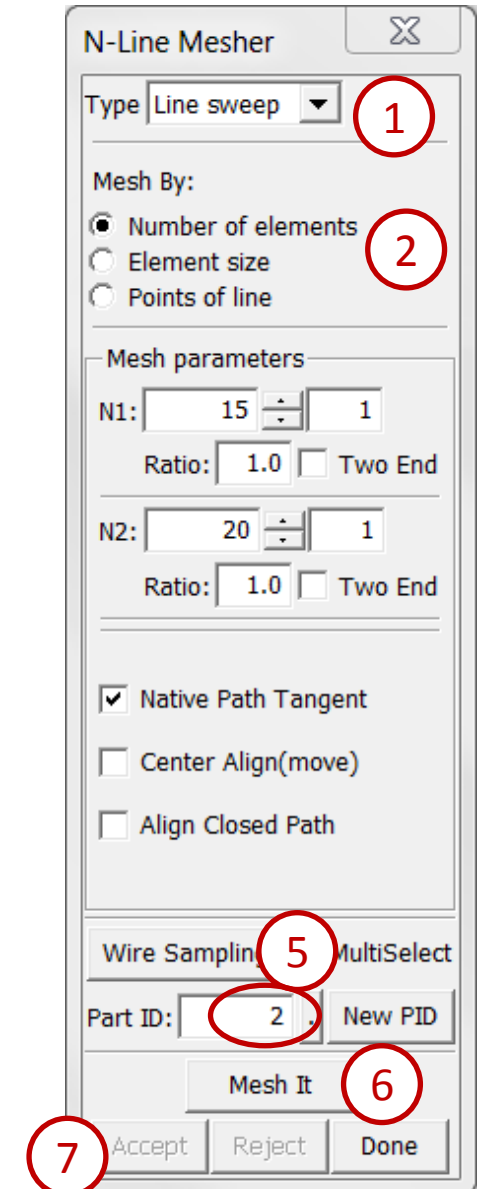
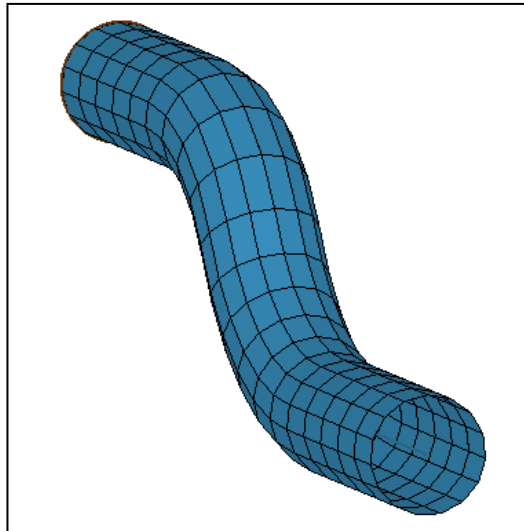
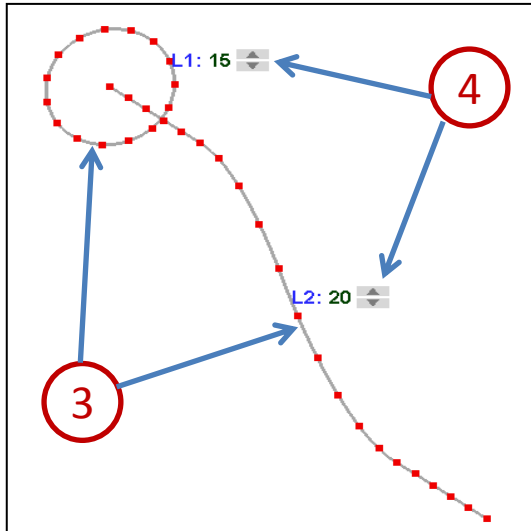
- Launch a new session of LS-PrePost
- File > Open > IGES File
(select /workshop2/sweep_lines.igs)
- Click **Open** in the IGES Read Options popup
- Go to **Curve** → **Circle**
- Select **Method: Parameters**
- Click the “.” button next to **Origin Point X**
- Select **Geometry** in the Create Position interface
- Pick the endpoint of the remaining curve
- Click **Done** in the Create Position interface
- Enter **Direction X Y Z: 1 0 0**
- Enter **Radius: 50** and click **Apply**



Workshop 2 (continued...)

Sweep one line along another...

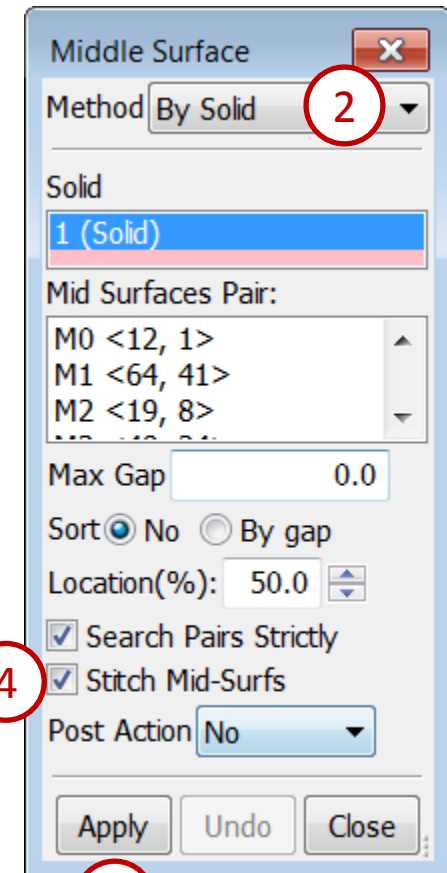
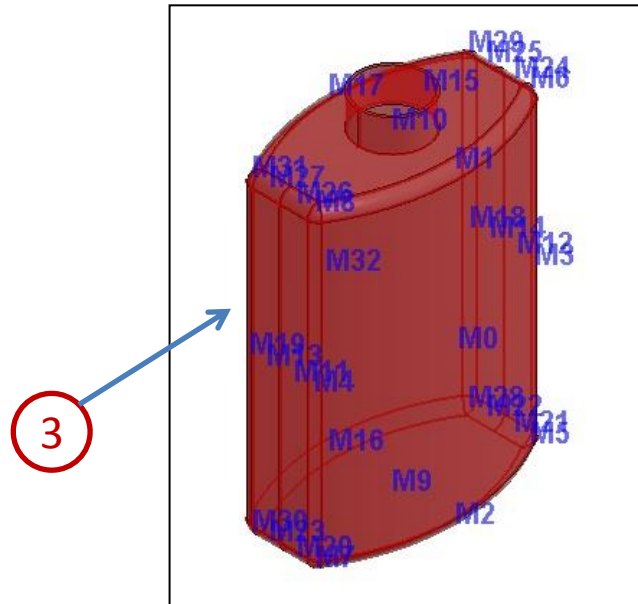
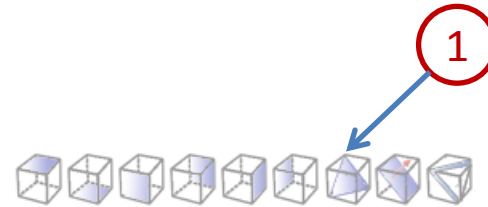
- Go to **Mesh** → **N-Line Mesher**
- Select **Type: Line sweep**
- Select **Mesh By: Number of elements**
- Pick the circle as L1
- Pick the red line as L2
- Click the up arrow near L1 several times to increase N1 to 15
- Click the up arrow near L2 several times to increase N2 to 20
- Enter **Part ID: 2**
- Click **Mesh It** and **Accept**



Workshop 2 *(continued...)*

Auto mesh an STEP file using Auto mesh...

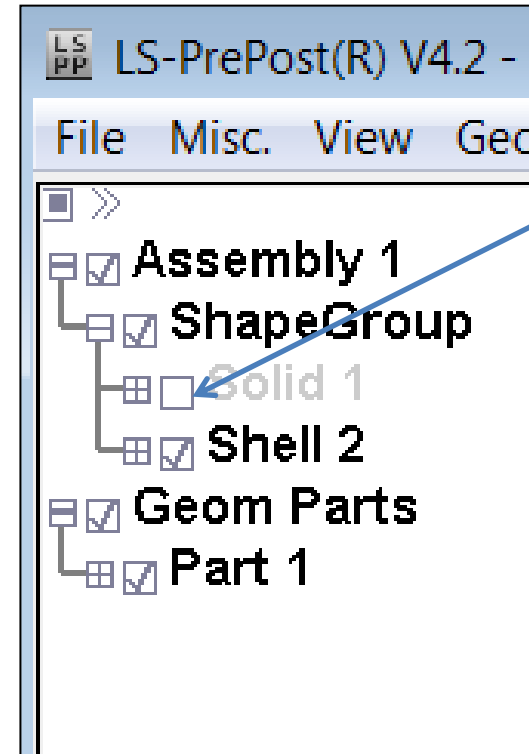
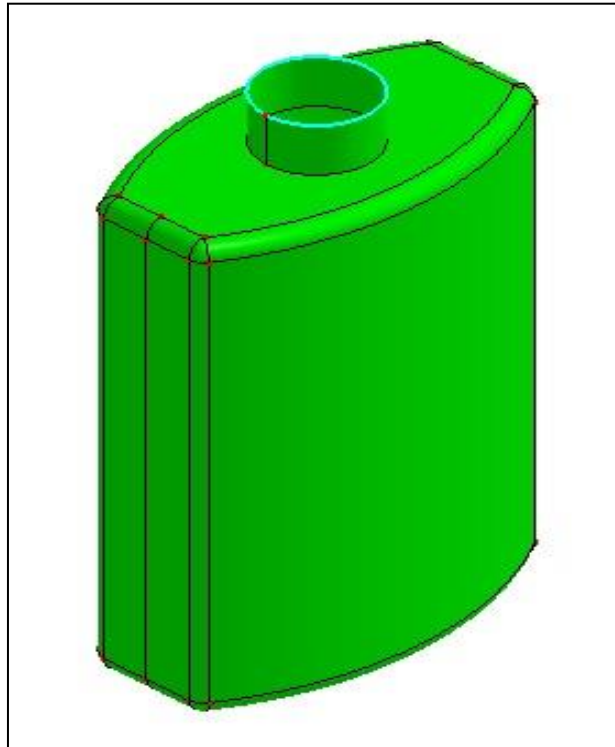
- Launch a new session of LS-PrePost
- File > Open > STEP File
(select /workshop2/bottle.stp)
- Click **Open** in the Open File Options popup
- Click the **IsoMetric** render button
- Go to **Surf → MidSurf**
- Select Method **By Solid**
- Pick **Solid 1**
- Activate **Stitch Mid-Surfs**
- Click **Apply**
- Click **Close**



Workshop 2 *(continued...)*

Auto mesh an STEP file using Auto mesh...

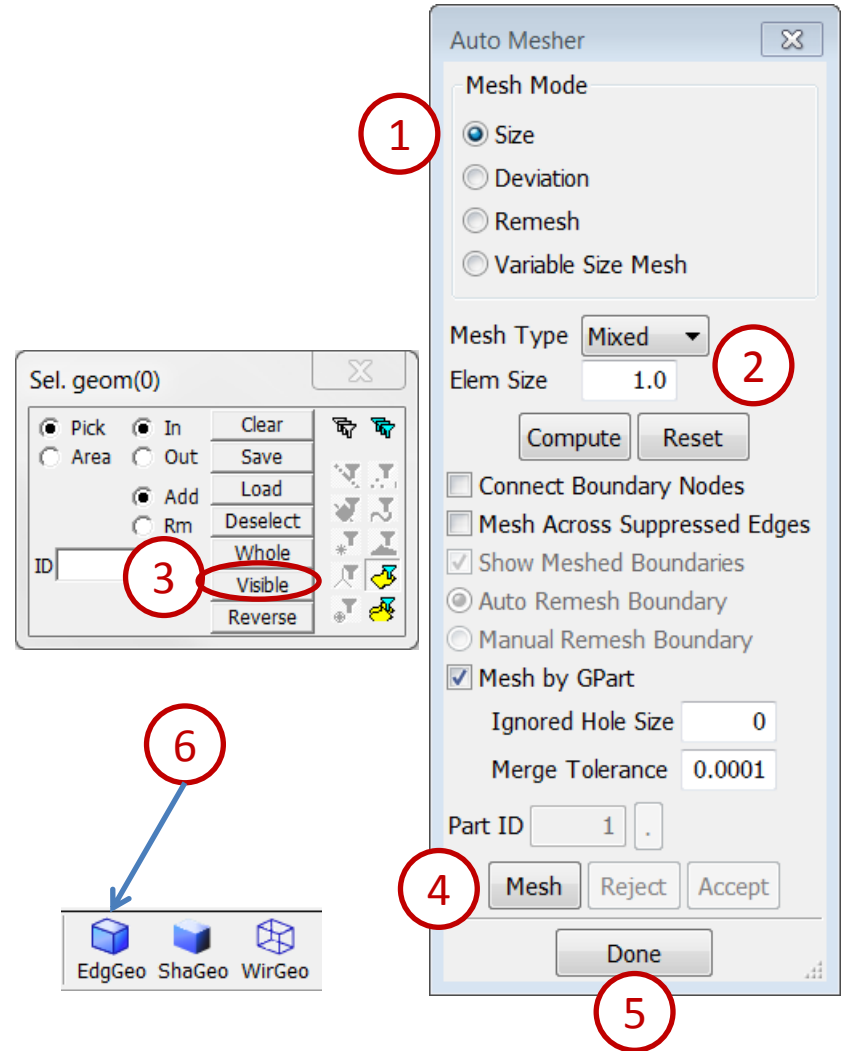
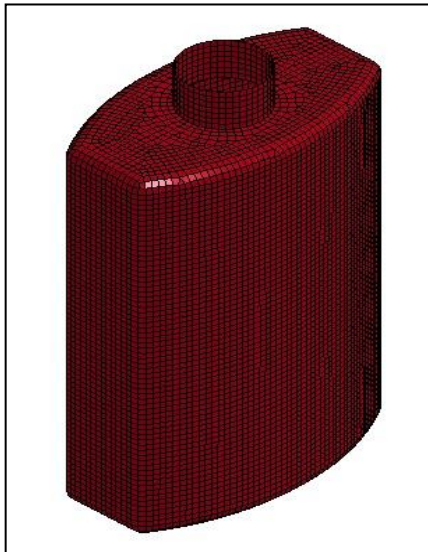
- Inactivate **Solid 1** in feature tree



Workshop 2 (continued...)

Purpose : Auto mesh an STEP file using Auto mesh...

- Go to **Mesh** → **AutoM**
- Select mesh mode by **Size**
- Enter **Elem Size** : **1.0**
- Click **Visible** on Sel. geom interface
- Click **Mesh**
- Click **Accept**
- Click **EdgGeo** render buttons turn geometry off



Workshop 3

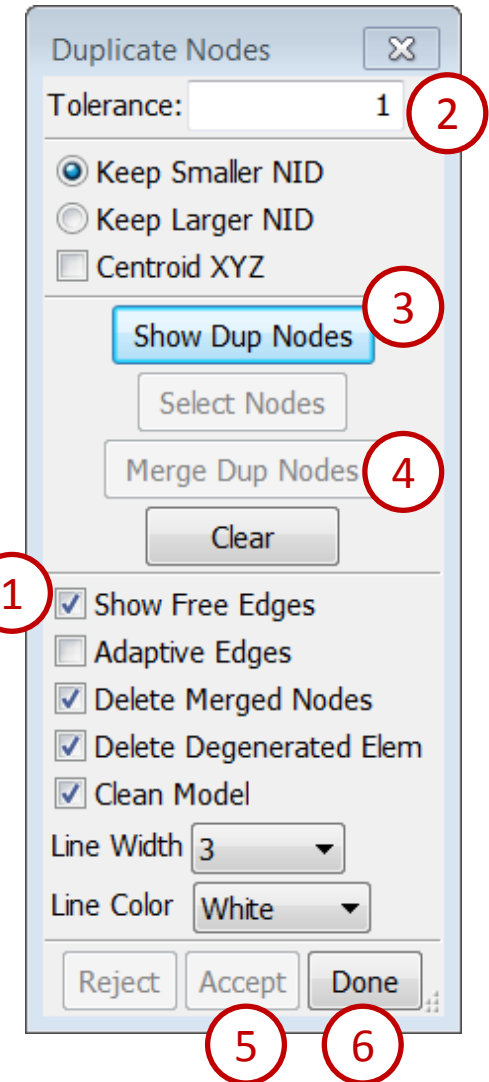
Model Editing

- ❖ Model free edge
- ❖ Duplicate nodes merge
- ❖ Node and element Editing
- ❖ Fill holes
- ❖ Element normal align
- ❖ Save a keyword file

Workshop 3

Merge duplicate nodes...

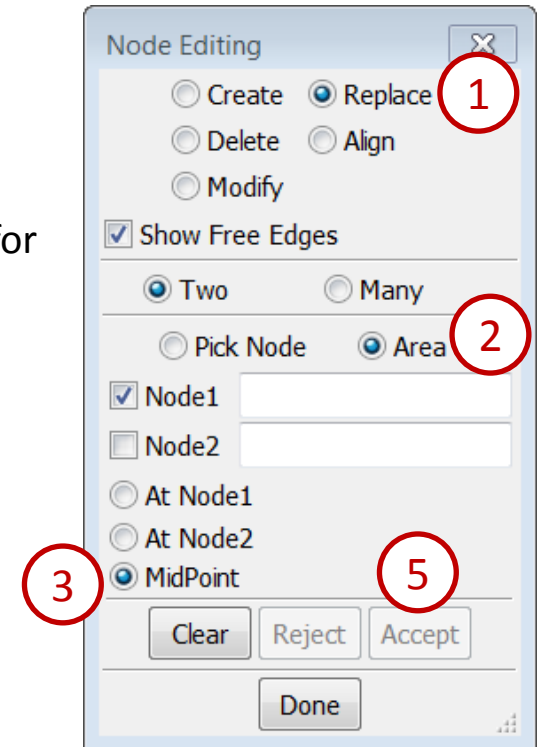
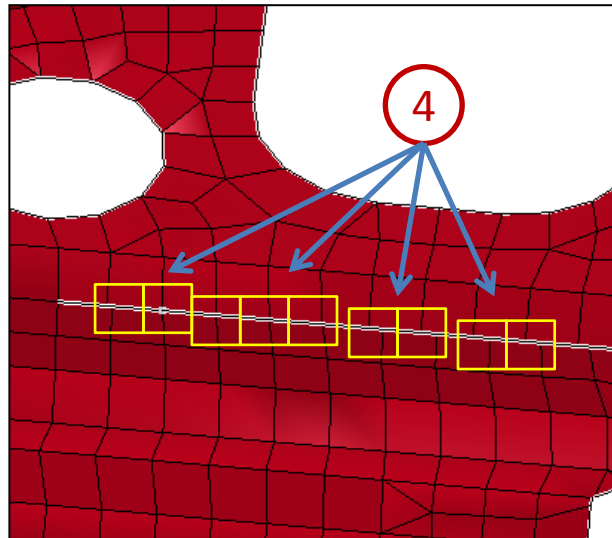
- Launch a new session of LS-PrePost
- File > Open > LS-DYNA Keyword File (select /workshop3/badmesh.k)
- Go to **Element Tools** → **Duplicate Nodes** and turn on the mesh (using the **Mesh** render button)
- Activate **Show Free Edges**
- Enter **Tolerance: 1.0**
- Click **Show Dup Nodes** (see figure)
- Click **Merge Dup Nodes**
- Click **Accept**
- Click **Done**



Workshop 3 *(continued...)*

Replace nodes...

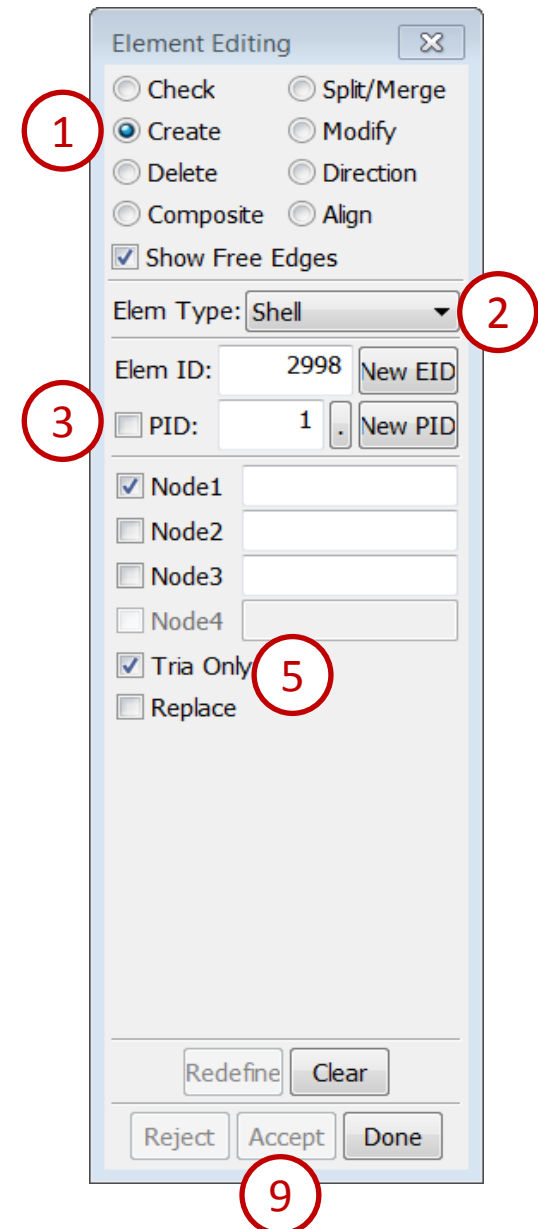
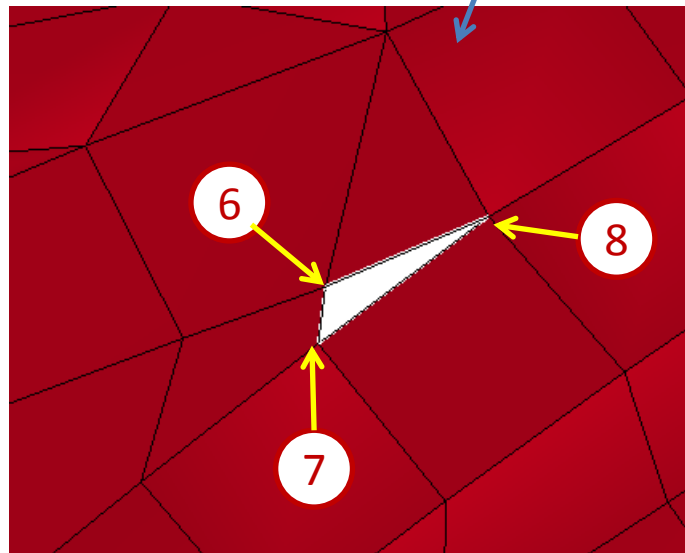
- Go to **Element Tool** → **Node Editing**
- Select **Replace**
- Select **Area** and **MidPoint**
- Zoom in the internal free edges area, select two nodes at a time for merging (by drawing a window)
- Click **Accept**
- Repeat ④ and ⑤ until all internal free edges have been eliminated



Workshop 3 (continued...)

Create a tria element...

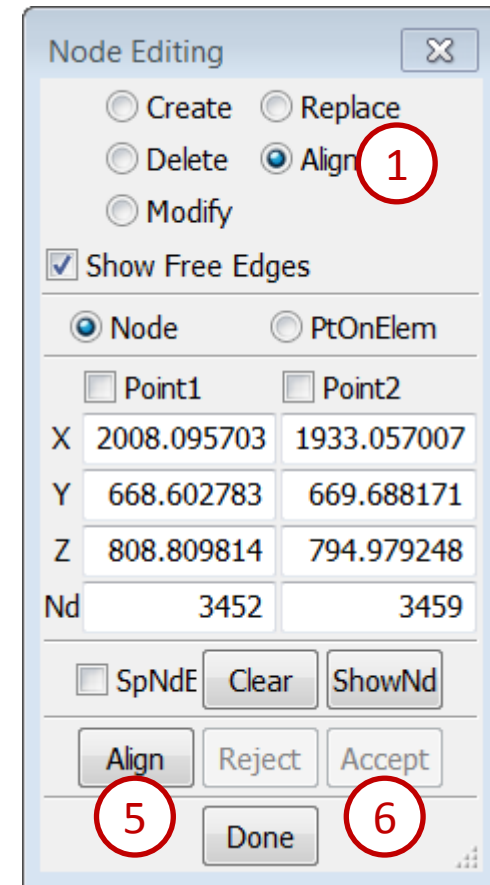
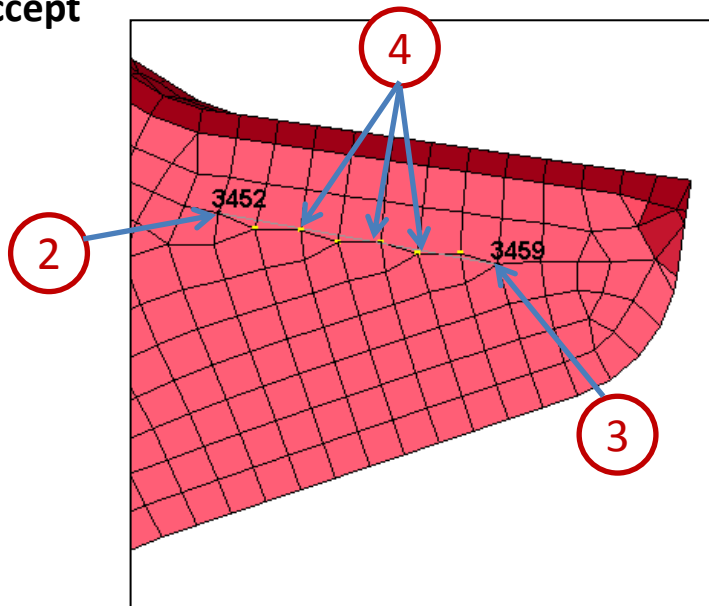
- Go to **Element Tool** → **Element Editing**
- Select **Create**
- Select **Elem Type: Shell**
- Activate **PID** and pick the part
- Activate **Tria Only**
- Pick the 3 nodes to fill the final gap in the part
- Click **Accept**



Workshop 3 (continued...)

Align nodes along a line...

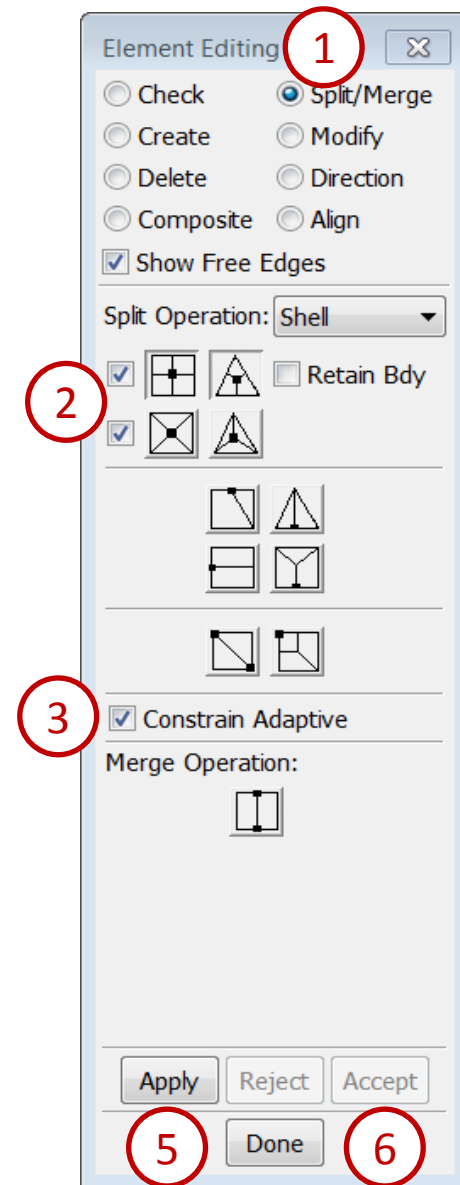
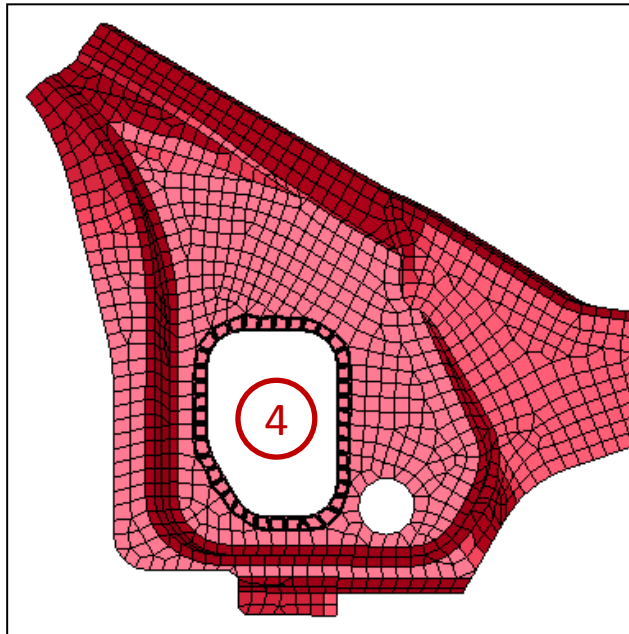
- Go to **Element Tool** → **Node Editing**
- Select **Align**
- Click the **Right** render button
- Click the **Zoom In** render button and zoom in as shown
- Pick 2 nodes to form a line
- Pick the nodes in between
- Click **Align**
- Click **Accept**



Workshop 3 (continued...)

Split elements...

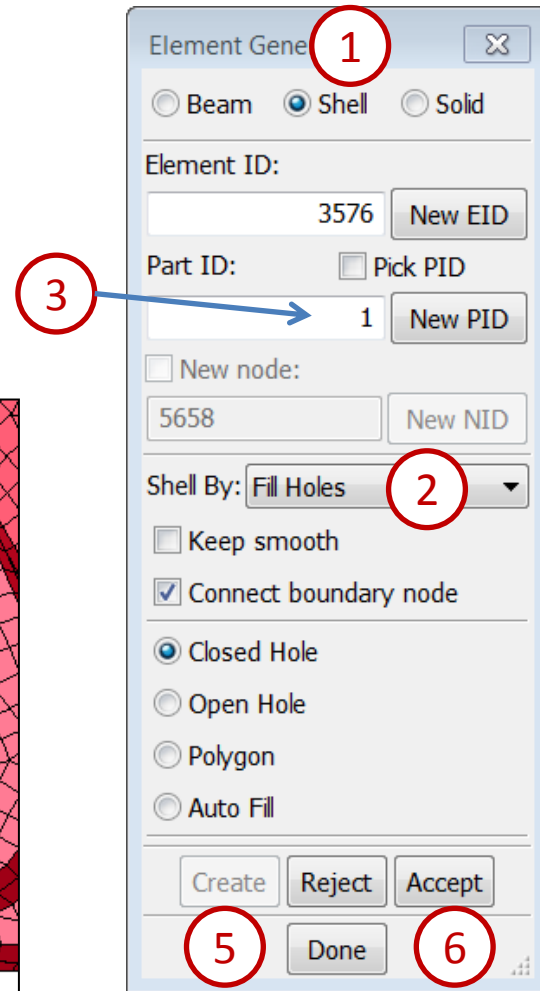
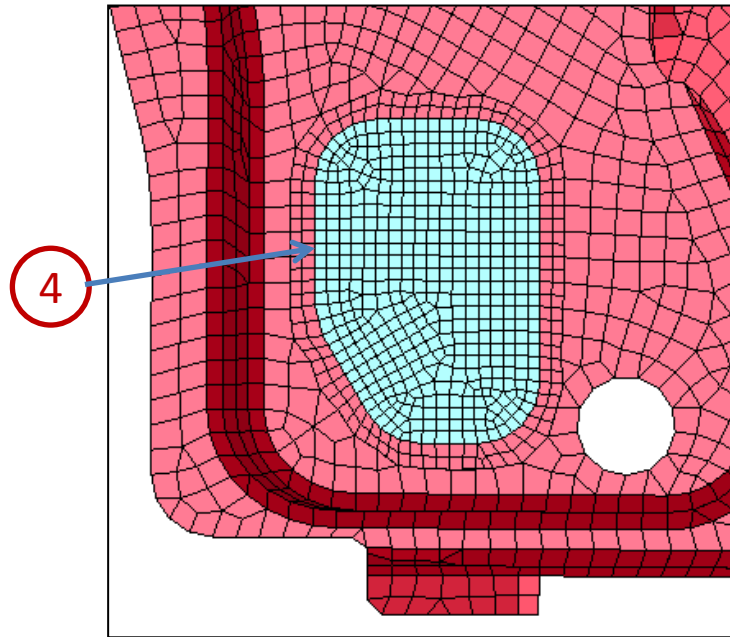
- Go to **Element Tool** → **Element Editing**
- Select **Split/Merge**
- Activate **Constrain Adaptive**
- Pick the elements around the hole as shown
- Click **Apply**
- Click **Accept**



Workshop 3 (continued...)


Fill a hole...

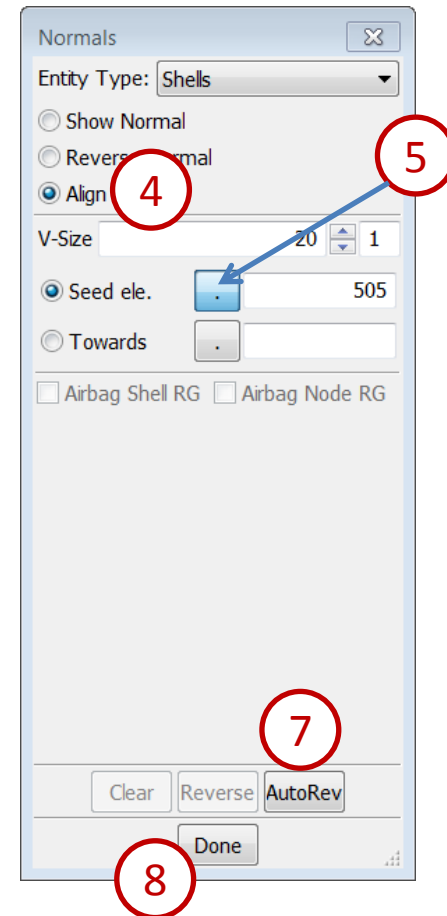
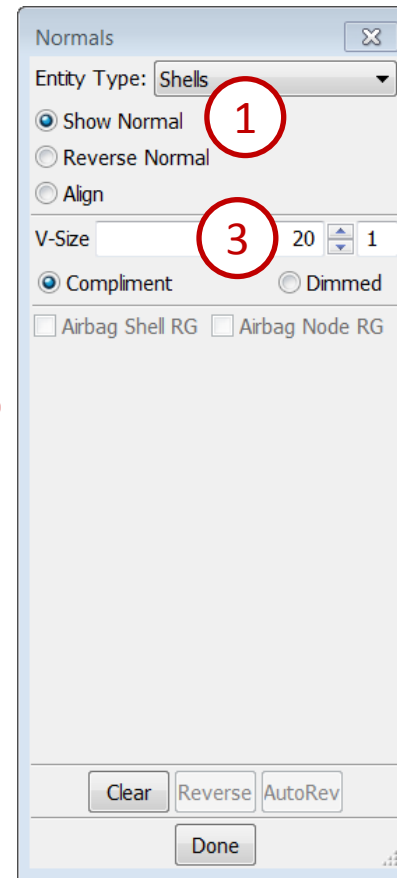
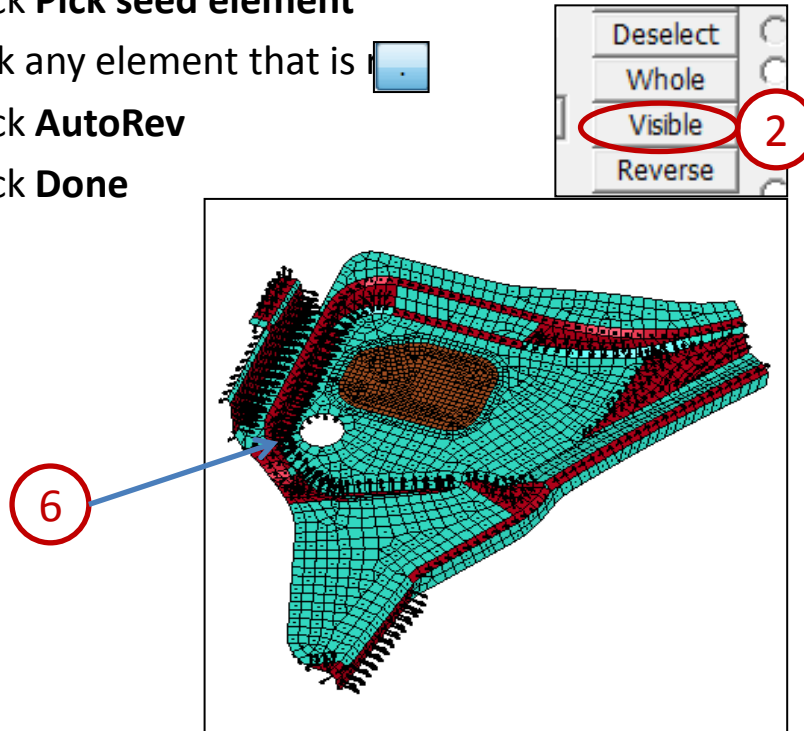
- Go to **Mesh** → **Element Generation**
- Select **Shell**
- Select **Shell By: Fill_Holes**
- Type **1** in Part ID
- Pick any node on the perimeter of the hole
- Click **Create**
- Click **Accept**



Workshop 3 (continued...)

Align shell normals...

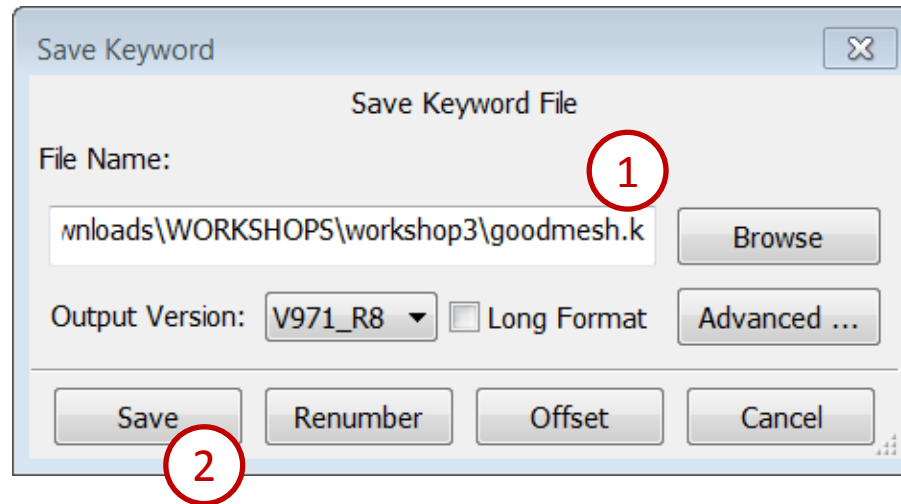
- Go to **Element Tools** → **Normals**
- Select **Show Normals** (should be already selected)
- Click **Visible** in the General Selection interface
- Select **Align**
- Click **Pick seed element**
- Pick any element that is 
- Click **AutoRev**
- Click **Done**



Workshop 3 (continued...)

Save the modified input file...

- File > Save As > Save Keyword As...
- Click **Browse**
- Enter a file name (save as /workshop3/goodmesh.k)
- Click **Save**



Workshop 4

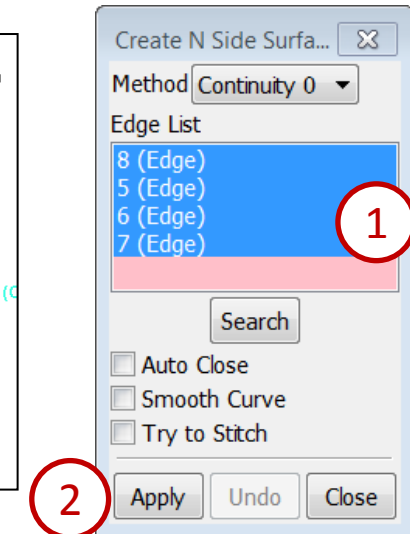
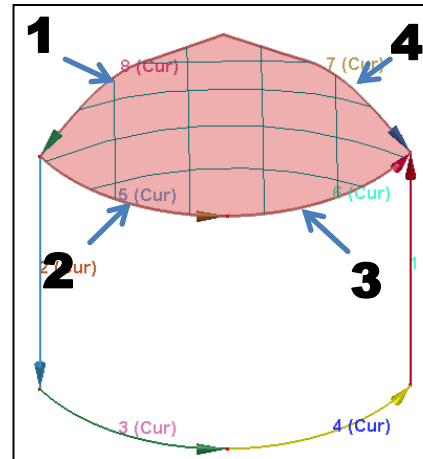
Build a fan model

- ❖ Create a surface
- ❖ Surface mesh
- ❖ 2Line mesh
- ❖ Part trim
- ❖ Model transform (rotate)
- ❖ Save a keyword file

Workshop 4

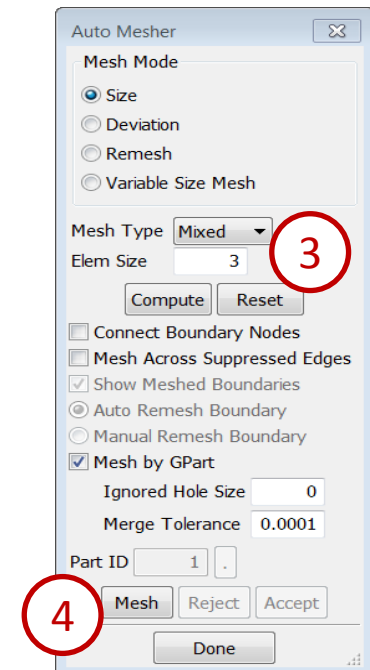
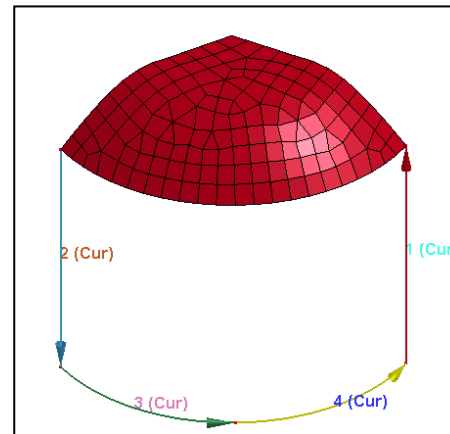
Create a surface...

- Launch a new session of LS-PrePost
- File > Open > IGES File
(select /workshop4/hub.igs)
- Rotate model as shown in figure
- Go to **Surf** → **N-Side**
- Pick edge **8,5,6,7** then click **Apply**



Surface mesh...

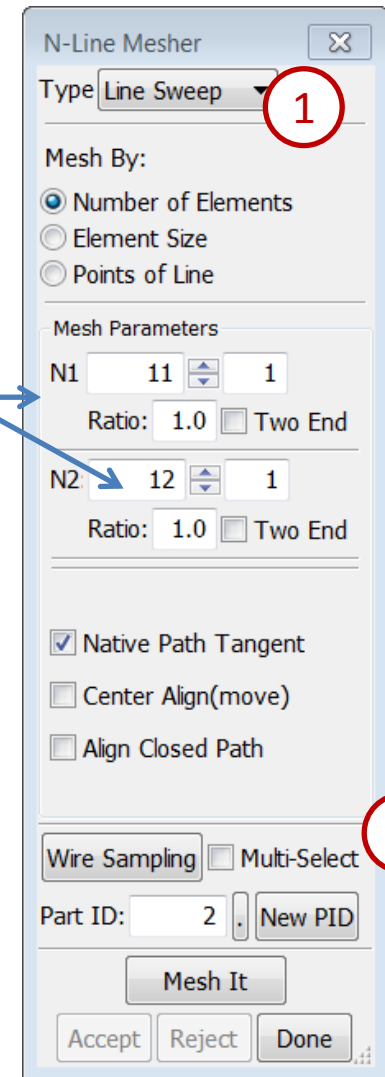
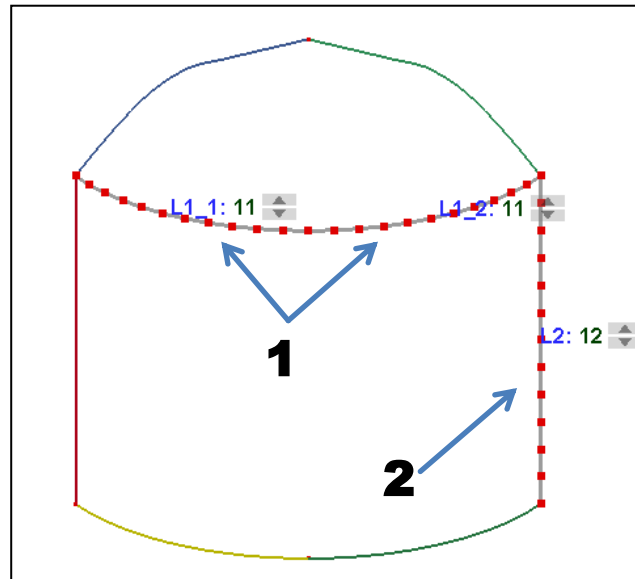
- Go to **Mesh** → **AutoM**
- Select mesh mode by **Size**
- Enter **Elem Size : 3.0**
- Pick **Face 1** then click **Mesh**
- Click **Accept**
- Click **Done**



Workshop 4 (continued...)

Hub mesh(sweep)...

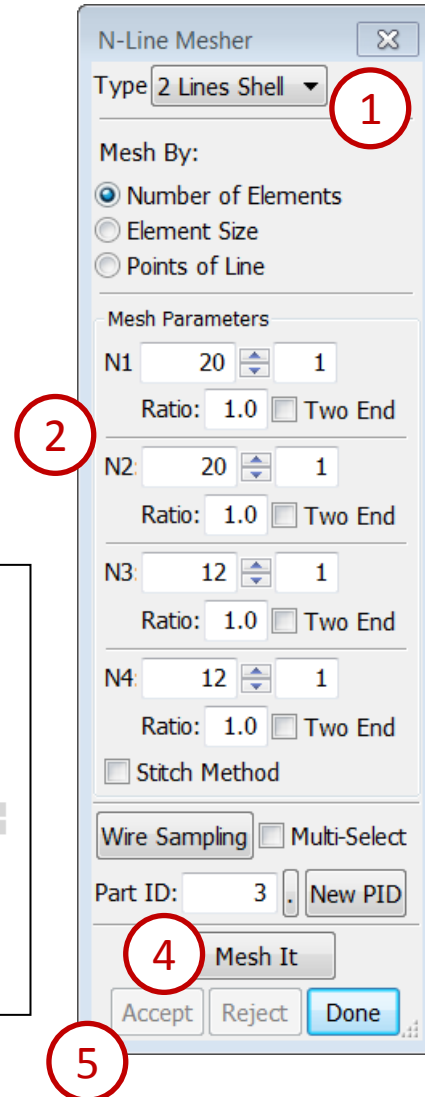
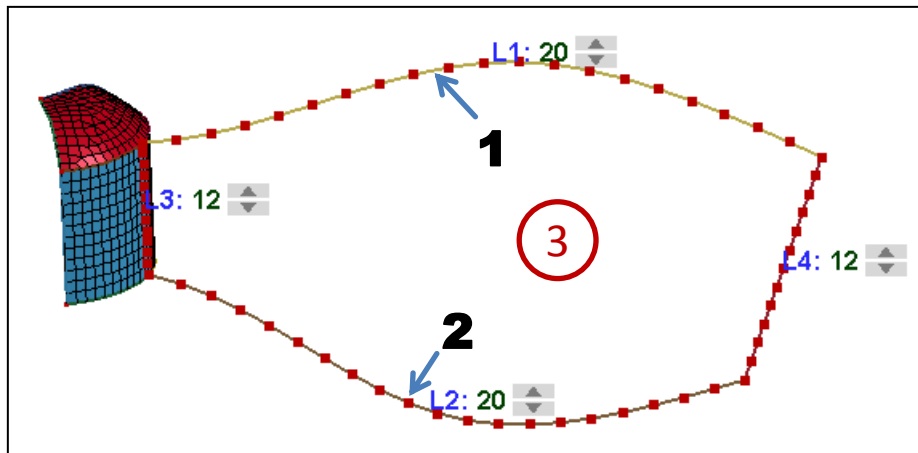
- Go to **Mesh** → **NlineM**
- Select mesh type by **Line Sweep**
- Enter **N1: 11** hit **Enter** and **N2: 12** hit **Enter**
- Activate **Multi_Select** ☒ Multi-Select
- Pick curve **L1_1** and **L1_2**
- Inactivate **Multi_Select** ☐ Multi-Select
- Pick curve **L2**
- then click **Mesh**
- Click **Accept**
- Click **Done**



Workshop 4 (continued...)

Blade mesh...

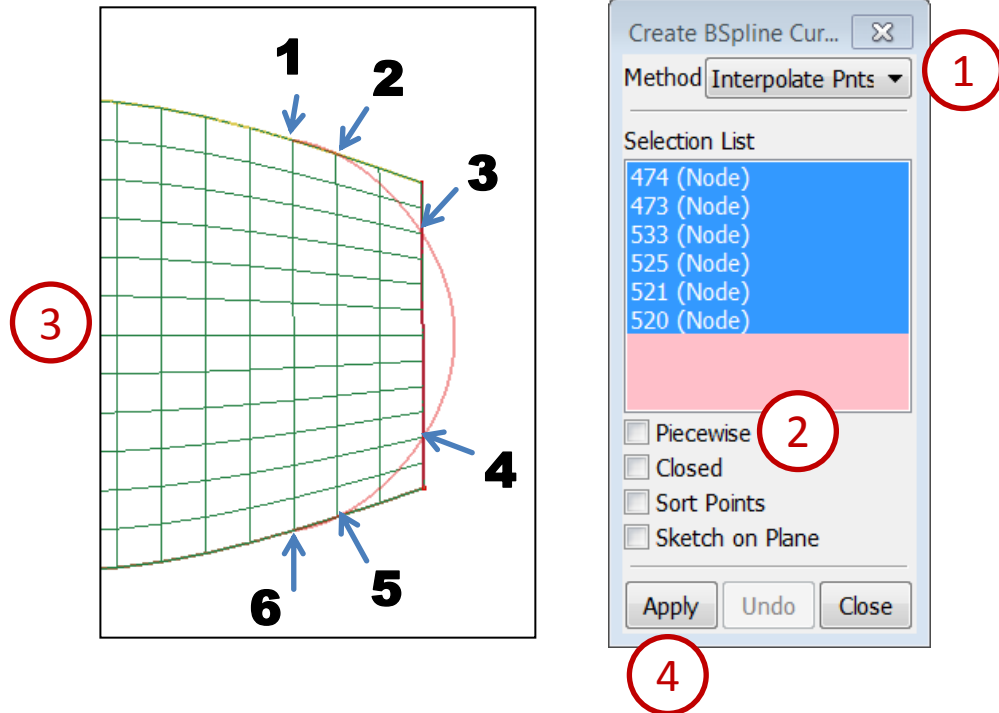
- File > Import> IGES File
(select /workshop4/blade.igs)
- Go to **Mesh** → **NlineM**
- Select mesh type by **2 Lines Shell**
- Enter **N1: 20** hit **Enter** and **N2: 20** hit **Enter**
- Enter **N3: 12** hit **Enter** and **N4: 12** hit **Enter**
- Pick curve **L1** and **L2**
- then click **Mesh**
- Click **Accept**
- Click **Done**



Workshop 4 (continued...)

Trim curve create...

- Go to **Curve** → **Spline**
- Inactivate **Piecewise**
- Pick nodes **1, 2, 3, 4, 5** and **6**
- Click **Apply**
- Click **Close**



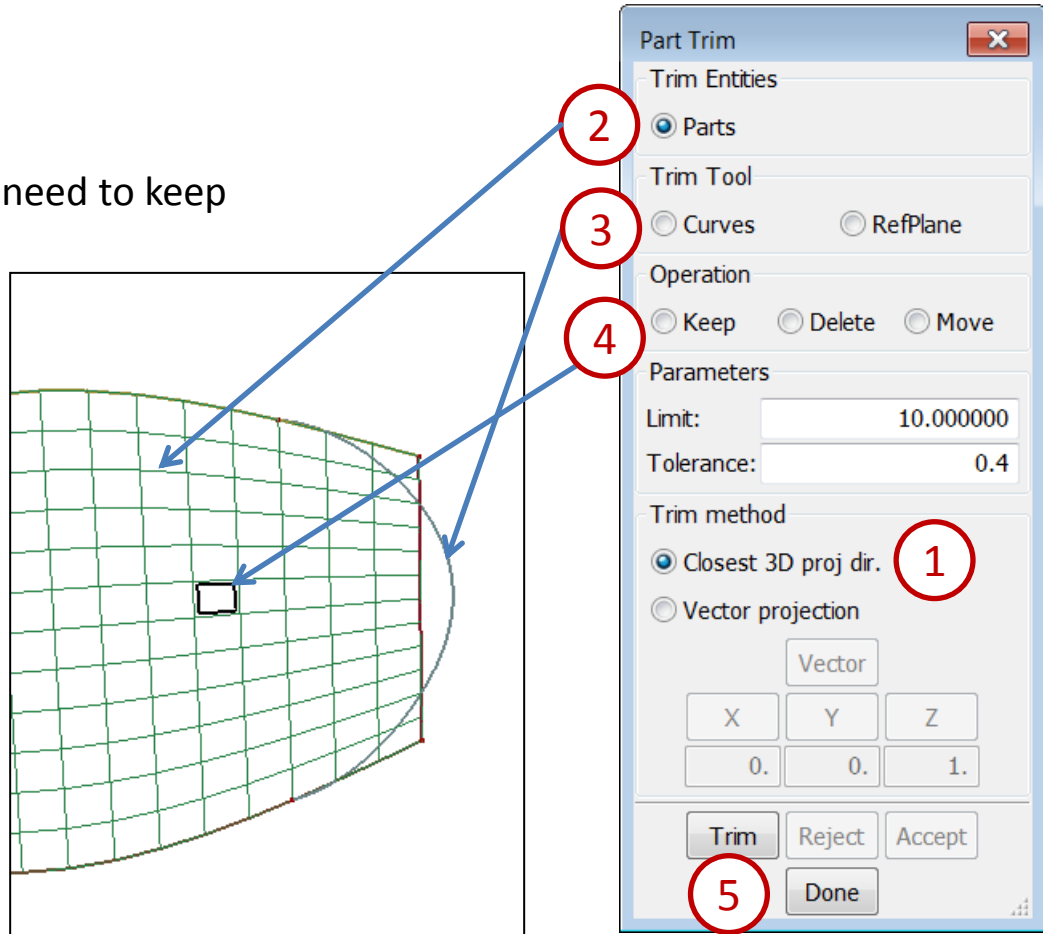
Workshop 4 (continued...)

Trim blade...

- Go to **EleTol** → **PtTrim**
- Click **Closest 3D proj dir.**
- Select **Parts**, pick part **3** (blade)
- Select **Curves**, pick trim curve
- Select **Keep**, pick a seed element need to keep
- Click **Trim**
- Click **Accept**
- Click **Done**

Save a project file...

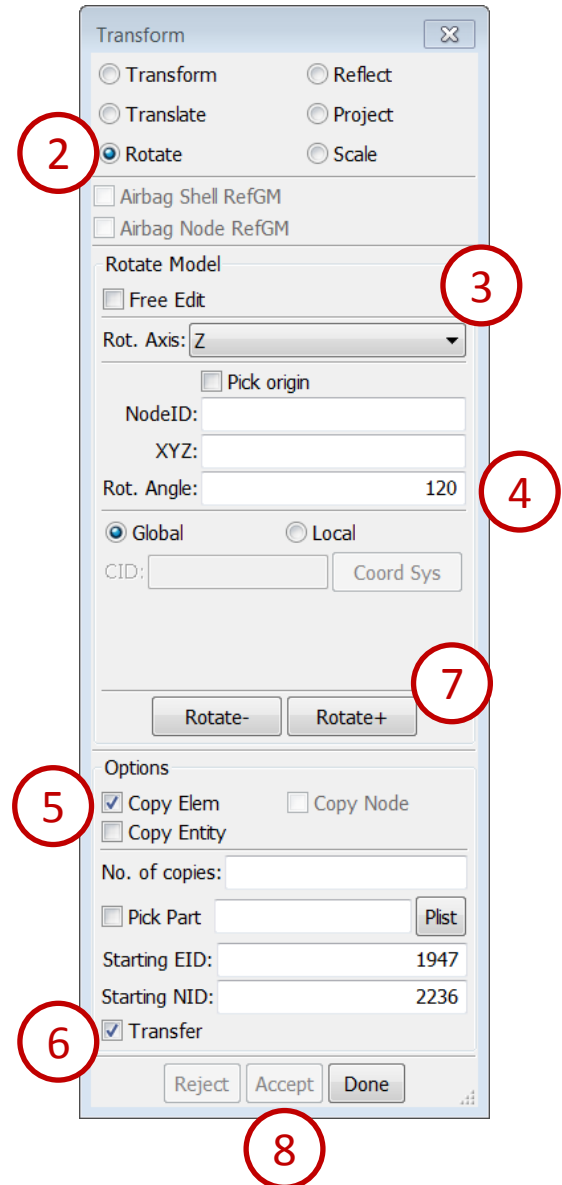
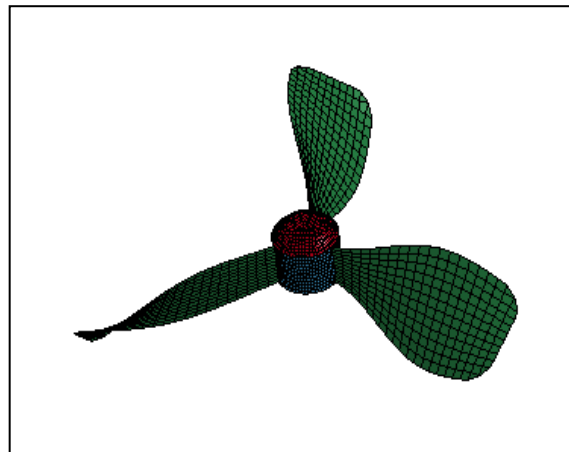
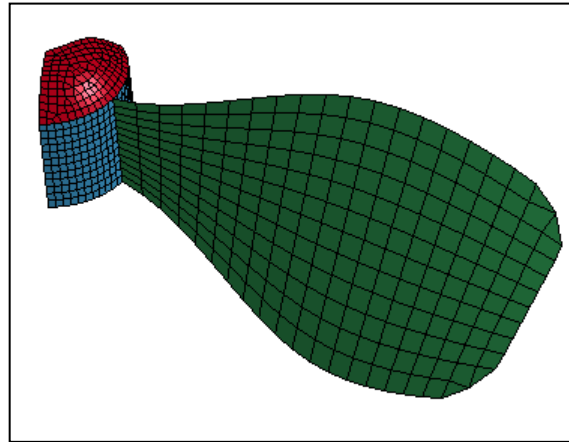
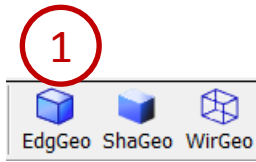
- Go to File > Save > Save Project
- Enter a file name (save as /workshop4/fan.proj)
- Click **Save**



Workshop 4 (continued...)

Model rotate...

- Click **EdgGeo** render buttons turn geometry off
- Go to **EleTol** → **Transf**
- Select **Rotate**
- Select Rot.Axis: **Z**
- Enter **120** at Rot. Angle
- Activate **Copy Elem**
- Activate **Transfer**
- Click **Visible** in the General Selection interface
- Click **Rotate+**
- Click **Accept**
- Click **Rotate+** again
- Click **Accept**
- Click **Done**



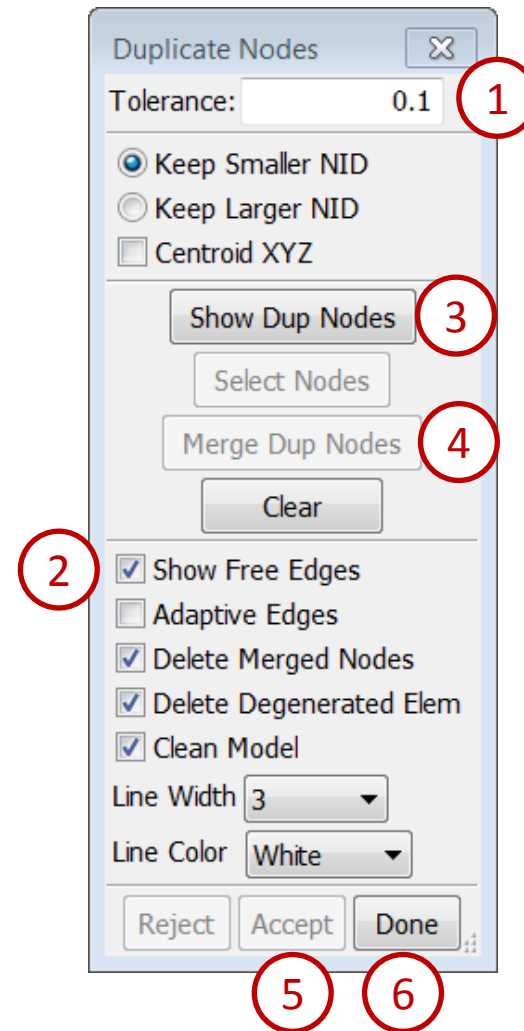
Workshop 4 (continued...)

Duplicate nodes merge...

- Go to **Ele Tol** → **DupNod**
- Enter **Tolerance: 0.1**
- Activate **Show Free Edges**
- Click **Show Dup Nodes**
- Click **Merge Dup Nodes**
- Click **Accept**
- Click **Done**

Save a keyword file...

- Go to **File > Save > Save Keyword**
- Enter a file name (save as /workshop4/fan.k)
- Click **Save**



Workshop 5

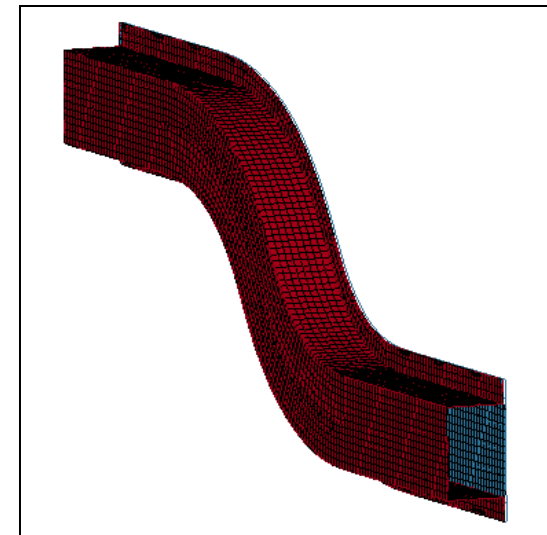
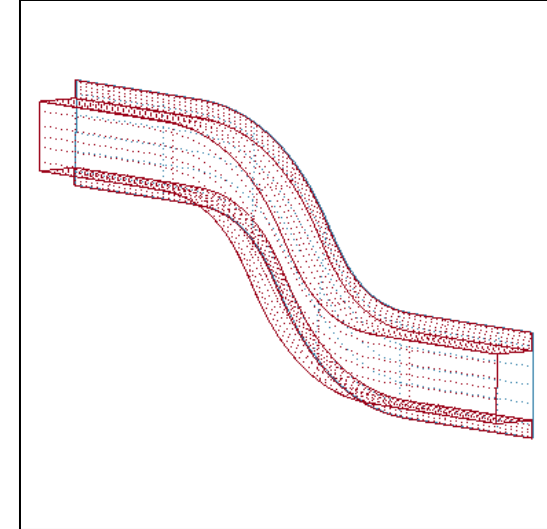
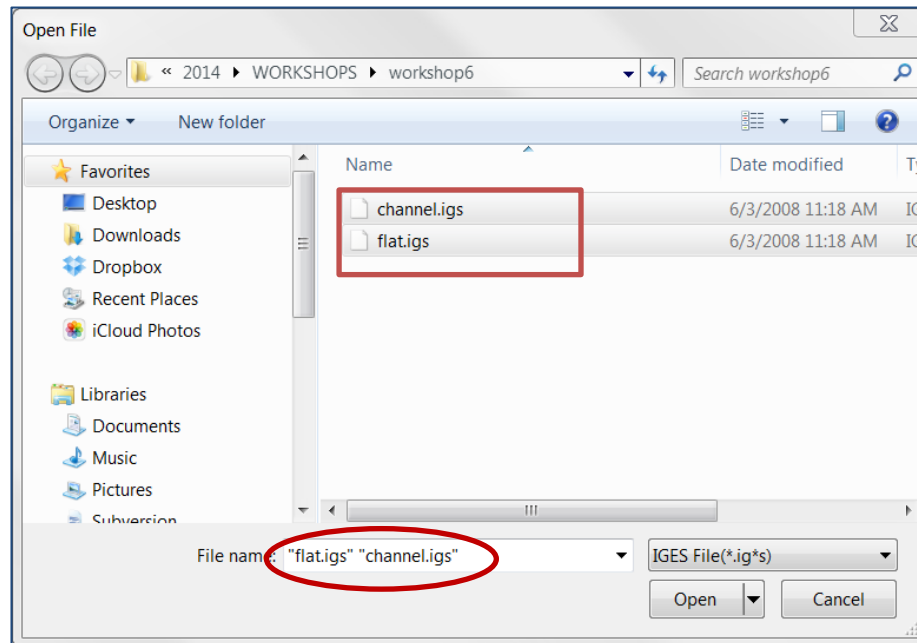
Create a Keyword File (S-Rail to Rigidwall Impact)

- ❖ Mesh model
- ❖ Assign material and property
- ❖ Apply mass, constraint and velocity
- ❖ Rigid wall creation
- ❖ Define spot welding
- ❖ Save a keyword file
- ❖ Model comparison

Workshop 5 (continued...)

Import and mesh IGES surfaces...

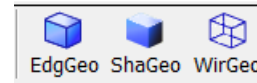
- Launch a new session of LS-PrePost
- File > Open > IGES File (select /workshop5/channel.igs and flat.igs both)
- Click **Open** in the IGES Read Options popup
- Go to **Mesh** → **Auto Mesher**
- Enter **Elem Size: 6**
- Click **Visible** in the General Selection interface
- Click **Mesh**
- Click **Accept**
- Click **Done**



Workshop 5 (continued...)

Define section property...

- Click **EdgGeo** render buttons turn geometry off
- Go to **Model** → **Keyword Manager**
- Select **All**
- Expand **SECTION**
- Double-click “**SHELL**”
- Click **NewID** in the Keyword Input Form
- Enter **TITLE: 1.0mm**
- Enter **ELFORM: 16** , **T1: 1.0** (and hit the Enter key)
- Click **Accept** and **Done**



The screenshot shows the 'Keyword Input Form' dialog box. It has a title bar with a close button (circled 5) and a maximize button (circled 6). The dialog contains several buttons: 'NewID' (circled 1), 'Draw', 'RefBy', 'Sort/T1', 'Add', 'Accept', 'Delete', 'Default', and 'Done'. There is a checkbox for 'Use *Parameter' and a '(Subsys: 1)' label. The main area displays the keyword '*SECTION_SHELL_(TITLE) (0)'. Below this, there is a table with two rows of input fields. The first row has fields for 'SECID' (1), 'ELFORM' (16, circled 3), 'SHRF' (1.0), 'NIP' (2), 'PROPT' (1), 'QR/IRID' (0), 'ICOMP' (0), and 'SETYP' (1). The second row has fields for 'T1' (1.0, circled 4), 'T2' (1.0), 'T3' (1.0), 'T4' (1.0), 'NLOC' (0.0), 'MAREA' (0.0), 'IDOF' (0.0), and 'EDGSET' (0). A blue arrow points from the 'T1' field to the 'ELFORM' field. The 'TITLE' field above the table contains '1.0mm' (circled 2).

| | SECID | ELFORM | SHRF | NIP | PROPT | QR/IRID | ICOMP | SETYP |
|---|-------|--------|------|-----|-------|---------|-------|--------|
| 1 | 1 | 16 | 1.0 | 2 | 1 | 0 | 0 | 1 |
| 2 | T1 | T2 | T3 | T4 | NLOC | MAREA | IDOF | EDGSET |
| | 1.0 | 1.0 | 1.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0 |

Workshop 5 (continued...)

Define material property...

- Expand **MAT** in Keyword Manager
- Double-click "**024-PIECEWISE_LINEAR_PLASTICITY**"
- Click **NewID** in the Keyword Input Form
- Enter **TITLE: Mild Steel**
- Enter **RO= 7.83e-6, E= 207.0, PR= 0.3, SIGY= 0.2, ETAN= 2.0**
- Click **Accept**
- Click **Done**

Keyword Input Form

1 NewID MatDB RefBy Pick Add Accept Delete Default Done

☐ Use *Parameter (Subsys: 1) Setting

*MAT_PIECEWISE_LINEAR_PLASTICITY_(TITLE) (024) (0)

2 TITLE

Mild Steel

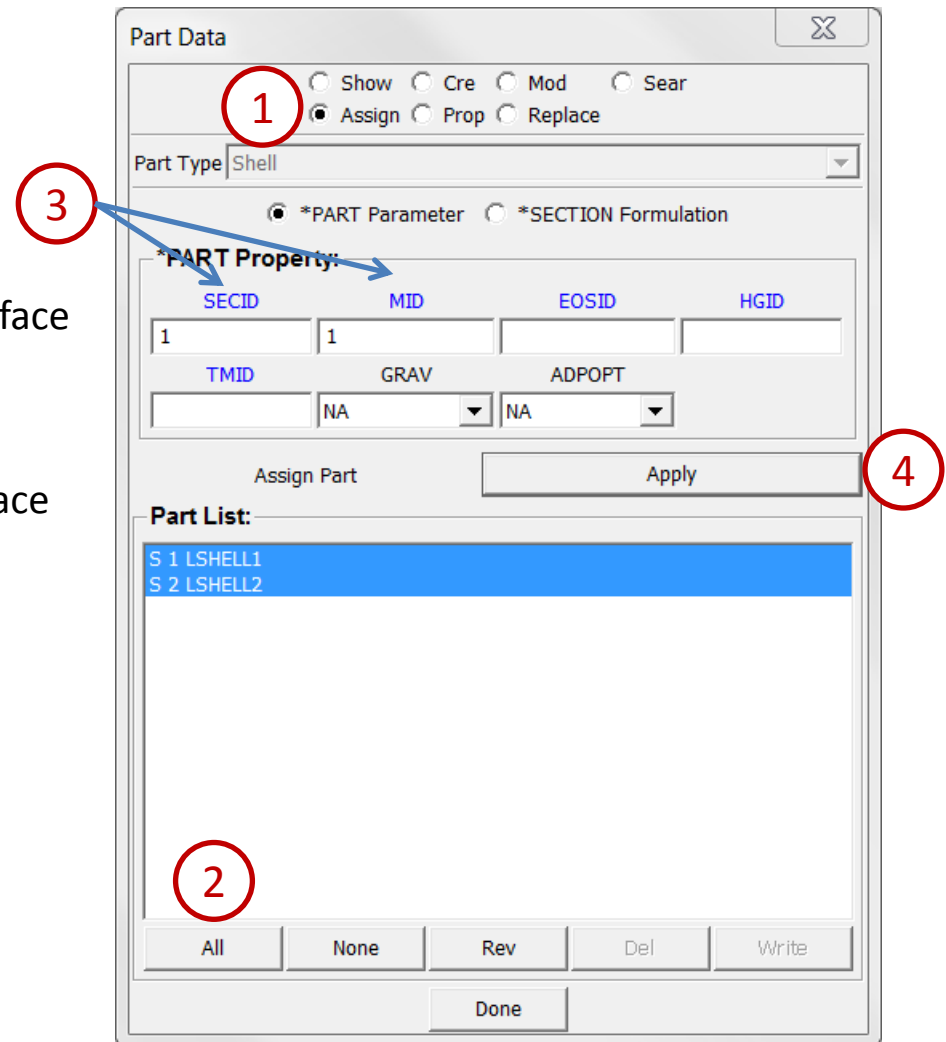
| 1 | MID | RO | E | PR | SIGY | ETAN | FAIL | TDEL |
|---|-----|---------|-------|-----|------|------|---------|------|
| 1 | 1 | 7.83e-6 | 207.0 | 0.3 | 0.2 | 2.0 | 10.E+20 | 0.0 |

3

Workshop 5 (continued...)

Assign section and material...

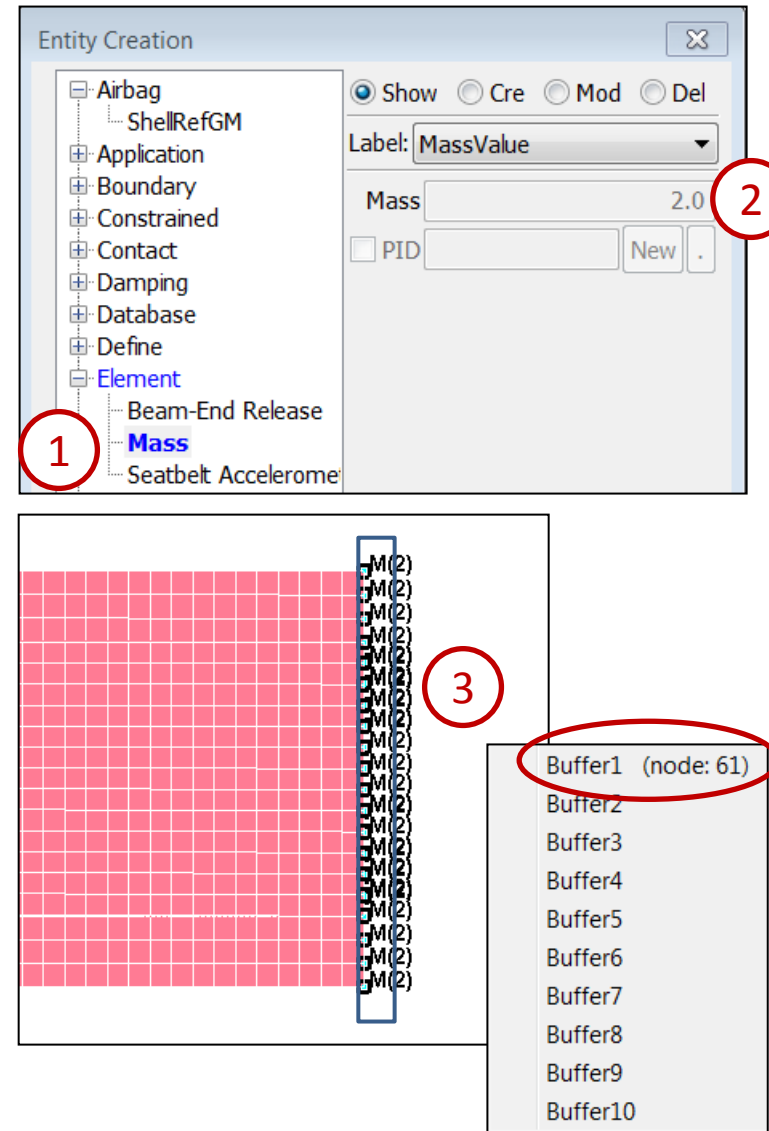
- Go to **Model** → **Part Data**
- Select **Assign**
- Click **All**
- Click **SECID**
- Select “1.0mm” in the Link SECTION interface
- Click **Done** in Link SECTION interface
- Click **MID**
- Select “Mild Steel” in the Link MAT interface
- Click **Done** in Link MAT interface
- Click **Apply**
- Click **Done**



Workshop 5 (continued...)

Add mass to end of rail...

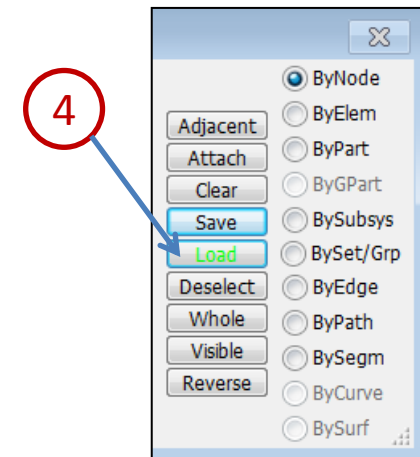
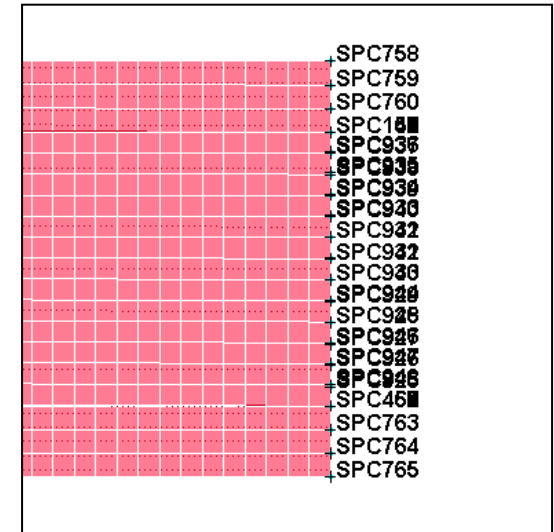
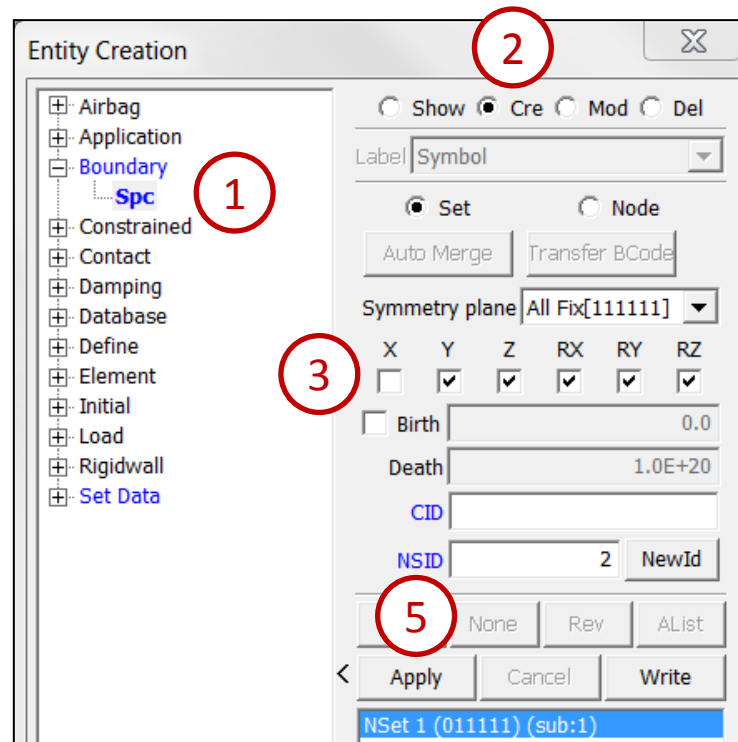
- Click the **Top** render button
- Click the **Zoom In** render button and zoom in on the right end of the rail
- Go to **Model** → **Create Entity**
- Expand **Element**
- Select **Mass**
- Select **Cre**
- Enter **Mass: 2.0**
- Select **Area** in the General Selection interface
- Click and drag to select 1 row of nodes along the end of the rail (see 3)
- Click **Save** → **To Buffer** → **Buffer1** in the General Selection interface
- Click **Apply**
- Select **Show**
- Select **Label: MassValue**
- Click **Visible** in the General Selection interface



Workshop 5 (continued...)

Create constraints at end of rail...

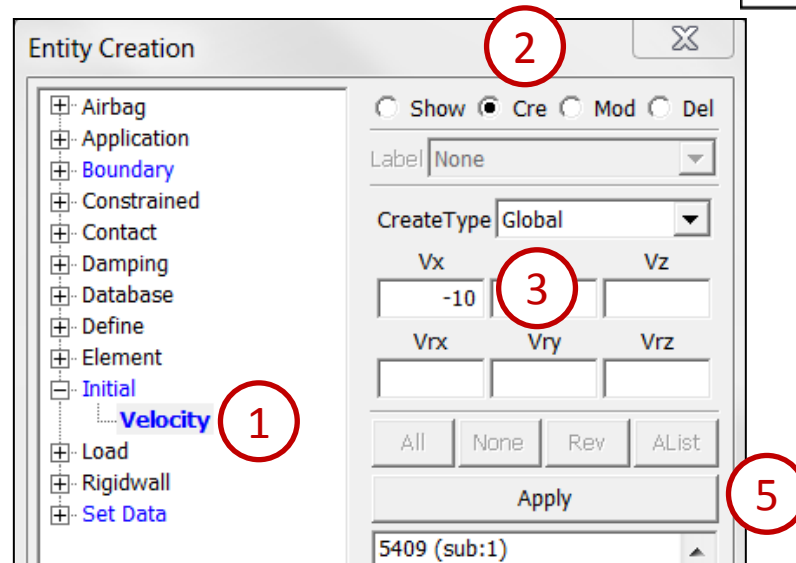
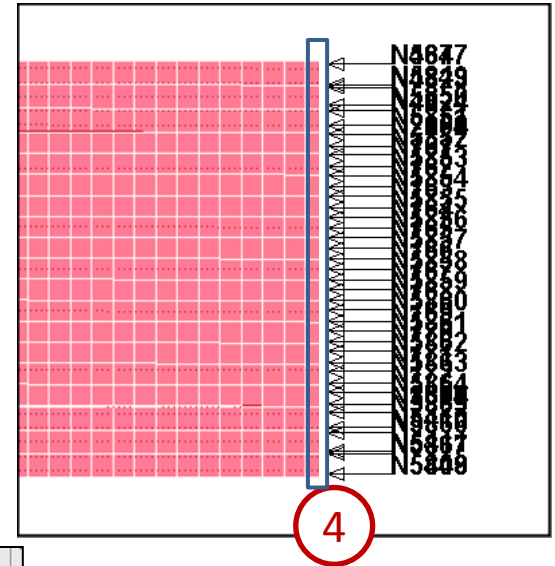
- Expand **Boundary** in entity creation
- Select **Spc**
- Select **Cre**
- Activate **Y, Z, RX, RY, and RZ** (everything except X)
- Click **Load** → **From Buffer** → **Buffer1** in the General Selection interface
- Click **Apply**



Workshop 5 (continued...)

Create initial velocities at end of rail...

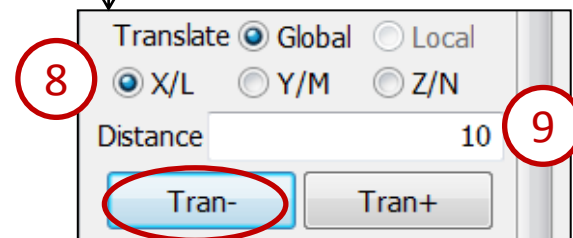
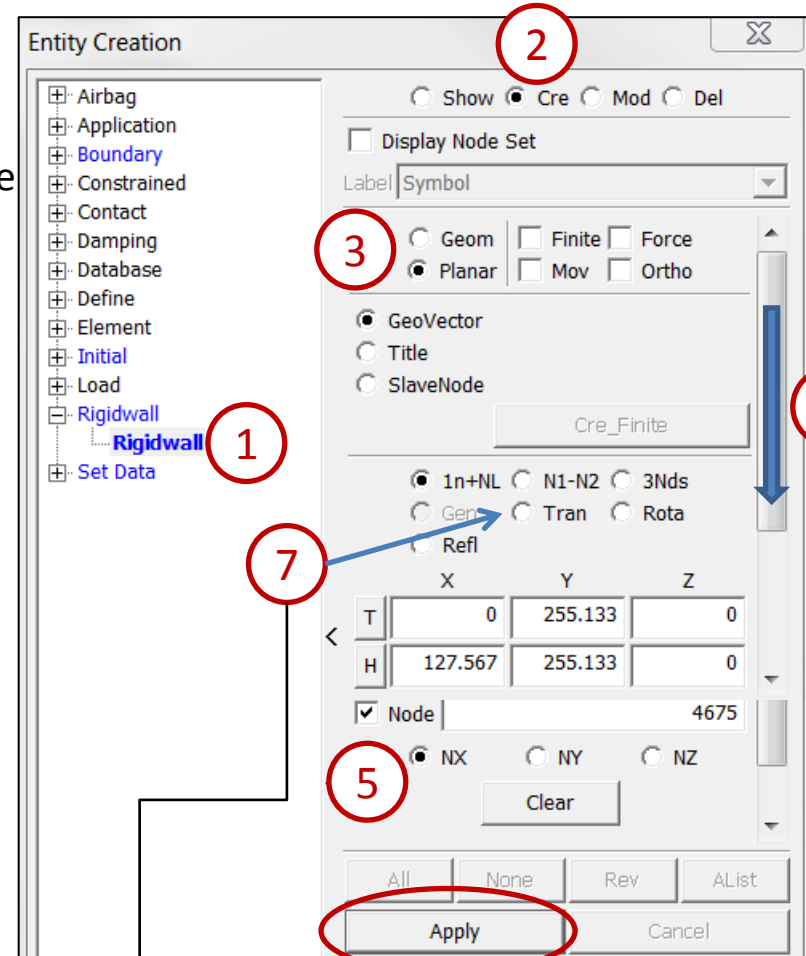
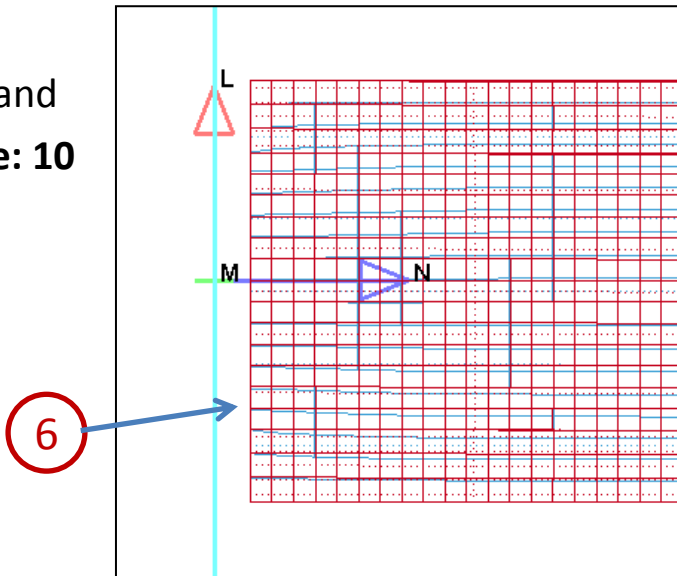
- Expand **Initial** in entity creation
- Select **Velocity**
- Select **Cre**
- Enter **Vx: -10.0**
- Click **Load** → **From Buffer** → **Buffer1** in the General Selection interface
- Click **Apply**



Workshop 5 (continued...)

Create a rigid wall...

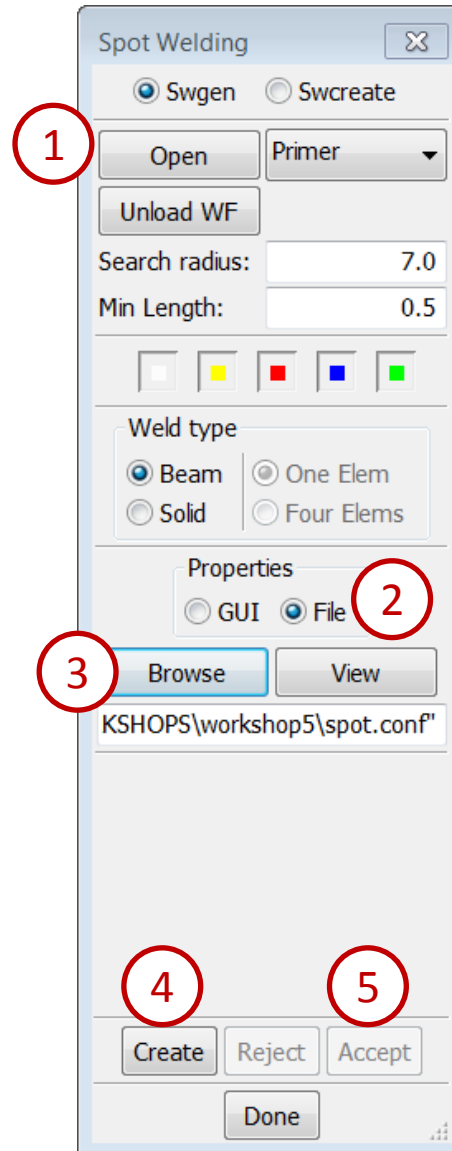
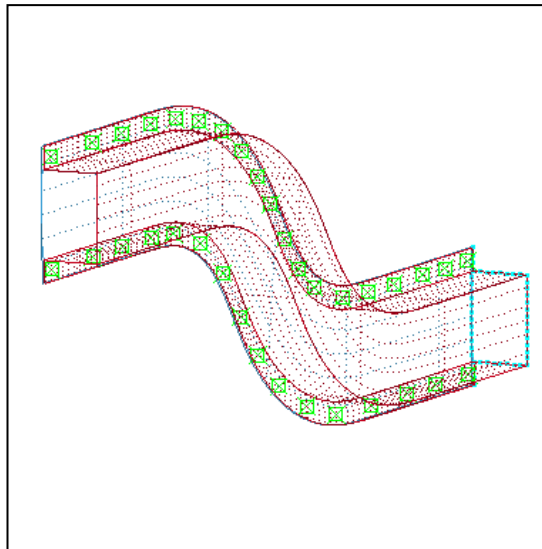
- Click the **Auto Center** (AutCen) render button
- Click the **Zoom In** render button and zoom in on the left end of the rail
- Expand **Rigidwall** in entity creation
- Select **Rigidwall**
- Select **Cre**
- Select **Planar**
- Select **NX** (you may have to scroll down)
- Pick any node at the left end of the rail
- Select **Tran**
- Select **X/L** and enter **Distance: 10**
- Click **Tran -**
- Click **Apply**
- Click **Done**



Workshop 5 (continued...)

Create welds using a master weld file...

- Go to **Mesh** → **Spot Welding**
- Select **Format: Primer** (from the drop-down menu)
- Click **Open** (select /workshop5/welds.spot)
- Click **Open** in the Read Options popup
- Click the **Wire** render button to see weld locations
- Select **Properties: File**
- Click **Browse** (select /workshop5/spot.conf)
- Click **Open** in the Read Options popup
- Click **Create**
- Click **Accept**
- Click **Done**



Workshop 5 (continued...)

Define contact...

- Go to **Model** → **Keyword Manager**
- Select **All** then expand **CONTACT**
- Double-click "**AUTOMATIC_SINGLE_SURFACE**"
- Click **NewID** in the Keyword Input Form
- Set **SSTYP: 2**
- Click the Link Button next to the **SSID** field
- Select "1 spotweld part set" in the Link SET interface
- Click **Done** in the Link SET interface
- Click **Accept**
- Click **Done**

Keyword Input Form

NewID Draw Pick Add Accept Delete Default Done

☐ Use *Parameter (Subsys: 1 New_Subsystem_1) Setting

*CONTACT_AUTOMATIC_SINGLE_SURFACE_(ID/TITLE/MPP) (1)

1 CID TITLE

2

☐ MPP1 ☐ MPP2

2 IGNORE BUCKET LCBUCKET NS2TRACK INITITER PARMAX UNUSED CPARAMS

0 200 3 2 1.0005 0

3 UNSEED CHKSEGS PENSE GRPABLE

0 0 1.0

4 SSID MSID SSTYP MSTYP SBOXID MBOXID SPR MPR

1 0 2 0 0 0 0 0

Workshop 5 (continued...)

Set termination time...

- Go to **Model** → **Keyword Manager**
- Select **All**
- Expand **CONTROL**
- Double-click “**TERMINATION**”
- Enter **ENDTIM: 10** in Keyword Input Form
- Click **Accept**
- Click **Done**

Keyword Input Form

☐ Use *Parameter

*CONTROL_TERMINATION (0)

1 **ENDTIM** **ENDCYC** **DTMIN** **ENDENG** **ENDMAS**

10 0 0.0 0.0 0.0

Set d3plot frequency...

- Expand **DATABASE** in Keyword Manager
- Double-click “**BINARY_D3PLOT**”
- Enter **DT: 1** in Keyword Input Form
- Click **Accept** and **Done**

Keyword Input Form

☐ Use *Parameter

*DATABASE_BINARY_D3PLOT (0)

1 **DT** **LCDT** **BEAM** **NPLTC** **PSETID**

1 0 0 0 0

2 **IOOPT**

0

Workshop 5 (continued...)

Set ASCII output frequency...

- Expand **DATABASE** in Keyword Manager
- Double-click “ **ASCII_option**”
- Enter **Default DT: 0.1** (and hit the Enter key)
- Activate **GLSTAT**
- Activate **MATSUM**
- Activate **SWFORC** (spotweld forces)
- Click **Accept** and **Done**

The screenshot shows the 'Keyword Input Form' interface. At the top right, there are two buttons labeled 'Accept' (5) and 'Done' (6). Below them, a checkbox 'Use *Parameter' is present. A red circle with the number '1' highlights the 'Default DT' input field, which contains the value '0.1'. A blue arrow points from this field to the 'Default DT' label. To the right of the 'Default DT' field is a label '*DATABASE_OPTION (0)'. Below the 'Default DT' field are two more fields: 'Default LCUR' and 'Default IOOPT'. To the right of 'Default LCUR' is a dropdown menu for 'Default BINARY' with the value '0'. Below the 'Default DT' field is a section with a checkbox 'ABSTAT' and four input fields: 'DT' (0.1), 'BINARY' (0), 'LCUR' (0), and 'IOOPT' (1). Below this section are three rows of settings, each with a checkbox and four input fields: 'GLSTAT' (checked), 'MATSUM' (checked), and 'RWFORC' (checked). Each row has the same input values: 'DT' (0.1), 'BINARY' (0), 'LCUR' (0), and 'IOOPT' (1). Red circles with numbers 2, 3, and 4 highlight the checkboxes for GLSTAT, MATSUM, and RWFORC respectively.

| | DT | BINARY | LCUR | IOOPT |
|--|-----|--------|------|-------|
| <input type="checkbox"/> *Parameter | | | | |
| Default DT | 0.1 | | | |
| Default LCUR | | | | |
| Default BINARY | | 0 | | |
| Default IOOPT | | | | 1 |
| <input type="checkbox"/> ABSTAT | 0.1 | 0 | 0 | 1 |
| <input checked="" type="checkbox"/> GLSTAT | 0.1 | 0 | 0 | 1 |
| <input checked="" type="checkbox"/> MATSUM | 0.1 | 0 | 0 | 1 |
| <input checked="" type="checkbox"/> RWFORC | 0.1 | 0 | 0 | 1 |

Workshop 5 *(continued...)*

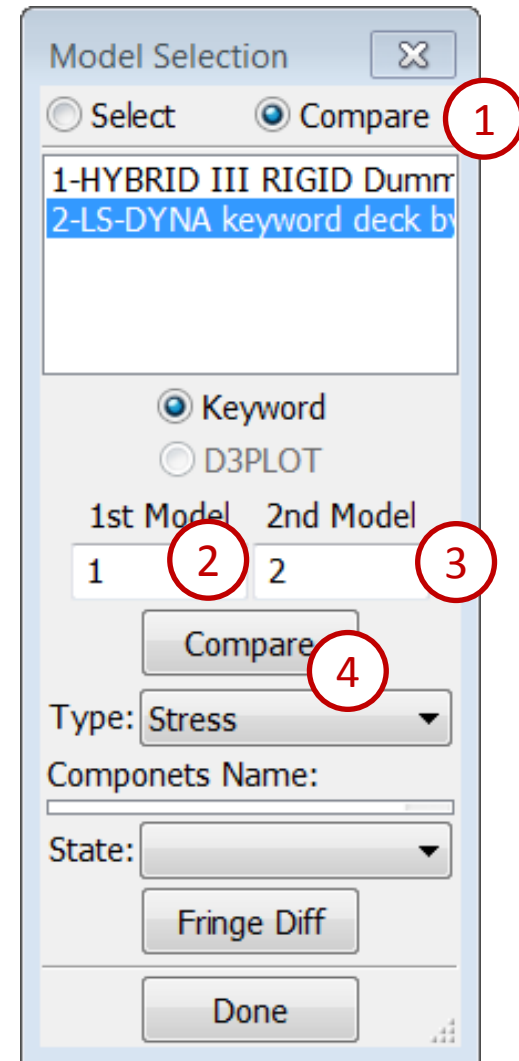
Save keyword file...

- File > Save As > Save Keyword As...
- Click **Browse** (save as /workshop5/srail.k) then **Save**
- Click **Advanced...**
- Click customize order: **Expert**
- Click **Ok** in the Advanced Setting interface
- Click **Save** in the Save Keyword interface

Workshop 5 (continued...)

Compare a set of LS-DYNA Keyword files...

- Launch a new session of LS-PrePost
- File > Open > LS-DYNA Keyword File
(select /workshop5/compare/belted1.k)
- File > Open > LS-DYNA Keyword File
(select /workshop5/compare/belted2.k)
- Go to **Model** → **MSelect**
- Select **Compare**
- Click in the **1st Model** field and select model 1
- Click in the **2nd Model** field and select model 2
- Click **Compare**



Workshop 5 (continued...)

Compare a set of LS-DYNA Keyword files...

- Select the **Common Keywords** tab
- Examine the **RED** items to identify differences

Model Compare

Summary Info **Common Keywords** Model1 only Model2 only

Keyword count: 1

Keyword ID range: 116 To 116

CONTROL_OUTPUT(1, 1)

| | Field #1 | Field #2 | Field #3 | Field #4 | Field #5 | Field #6 | Field #7 | Field #8 | Field #9 | Field #10 |
|----------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| Card #0 | NPOPT | NEECHO | NREFUP | IACCOP | OPIFS | IPNINT | IKEDIT | IFLUSH | | |
| Value 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5000 | | |
| Value 2 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 5000 | | |
| Card #1 | IPRTF | IERODE | TET10 | MSGMAX | IPCURV | GMDT | IP1DBLT | EOCS | | |
| Value 1 | 0 | 0 | 2 | 50 | 0 | 0 | 0 | 0 | | |
| Value 2 | 0 | 0 | 2 | 50 | 0 | 0 | 0 | 0 | | |
| Card #2 | TOLEV | NEWLEG | FRFREQ | MINFO | SOLSIG | MSGFLG | CDETOL | | | |
| Value 1 | 2 | 0 | 1 | 0 | 0 | 0 | 10 | | | |
| Value 2 | 2 | 0 | 1 | 0 | 0 | 0 | 10 | | | |

☐ ViewAll ☐ Draw Keyword 1 Keyword 2

WriteSummary WriteDetail Done

Workshop 6

Post-Processing

- ❖ Animation interface
- ❖ Fringe (contour) plotting
- ❖ Time history/ASCII data plotting
- ❖ Section cut
- ❖ Cross plotting
- ❖ Vector draw

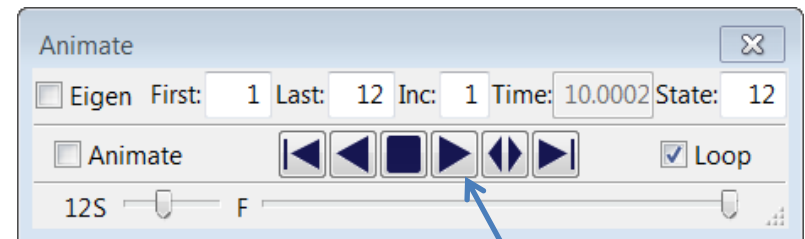
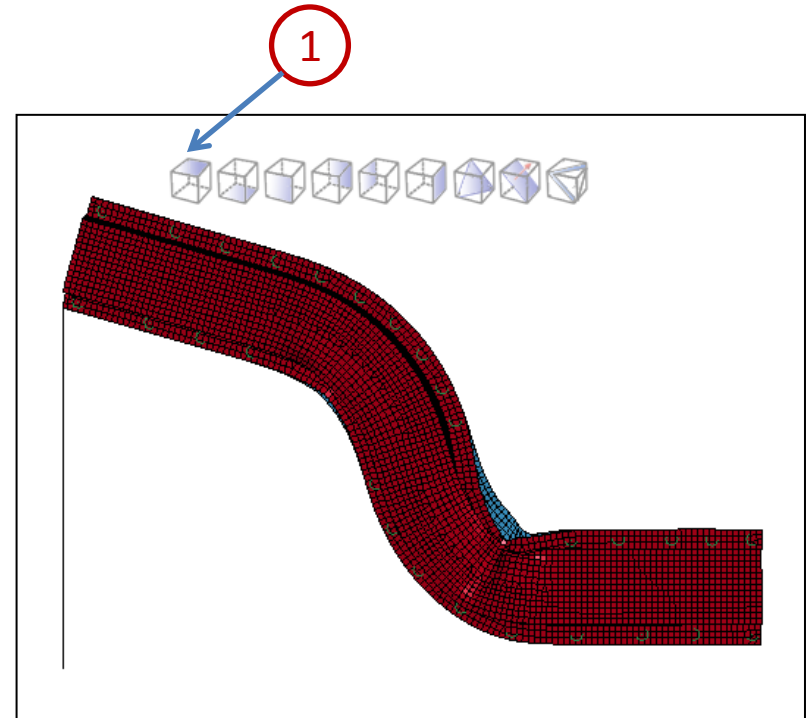
Workshop 6

Load results d3plot file...

- Launch a new session of LS-PrePost
- File > Open > LS-DYNA Binary Plot (select /workshop6/d3plot), click **Open**
- Click the **Top** render button
- Click **Animate Forward** (click the **Anim** render button first if necessary)
- Decrease the animation speed using the slider

Generate a movie...

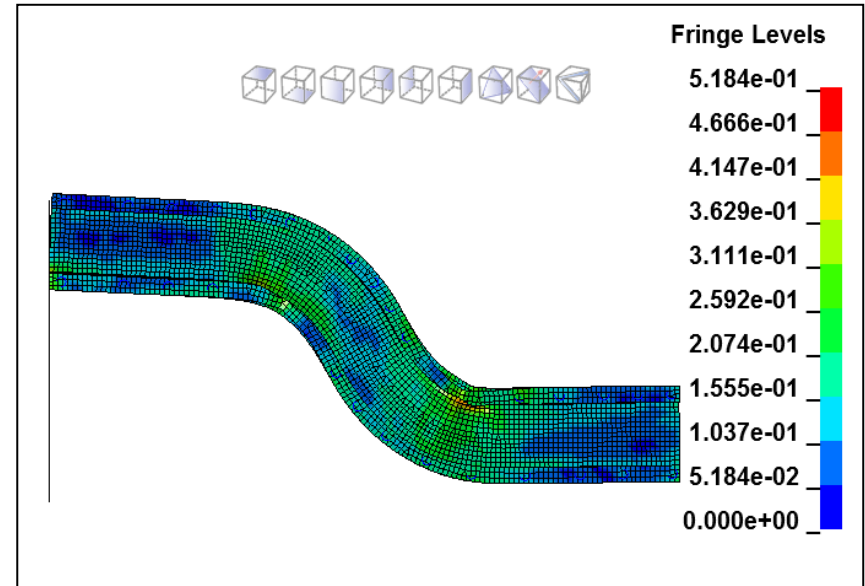
- File > Movie...
- Select Format : **JPEG**
- Enter **File Name: animation1**
- Click **Start**



Workshop 6 (continued...)

Create a fringe contour plots...

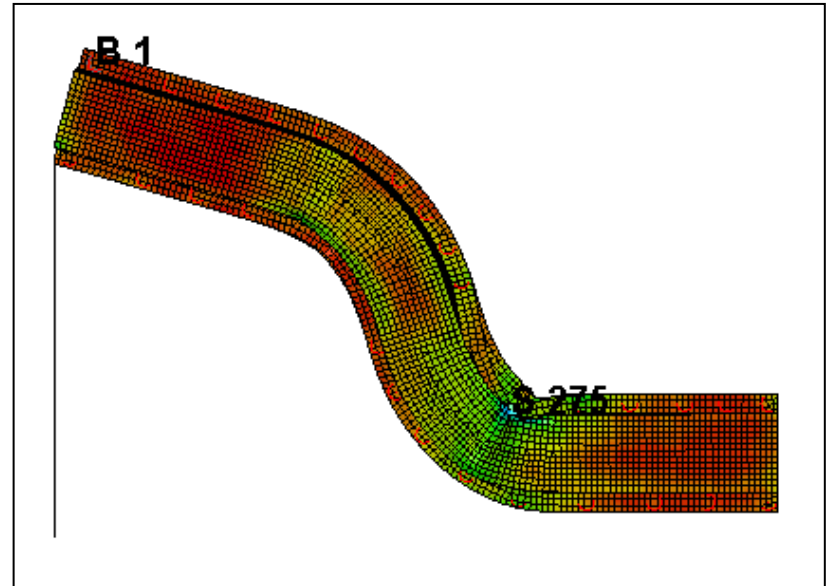
- Go to **Post** → **Fringe Component**
- Click **Ndv**
- Select “result displacement” from the list
- Click **Animate Forward**
(if the animation is not already playing)
- Click **Stress**
- Select “von mises stress” from the list
- Click **Stop Animation**



Workshop 6 *(continued...)*

Modify range settings...

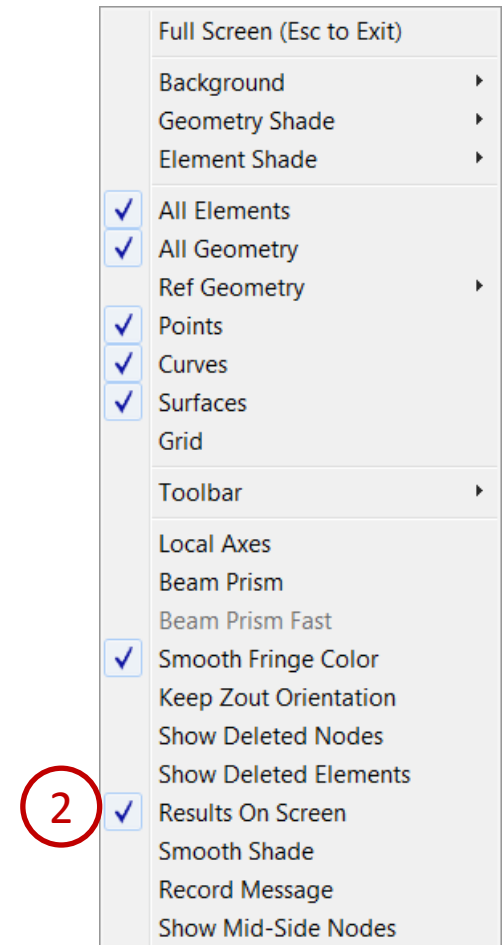
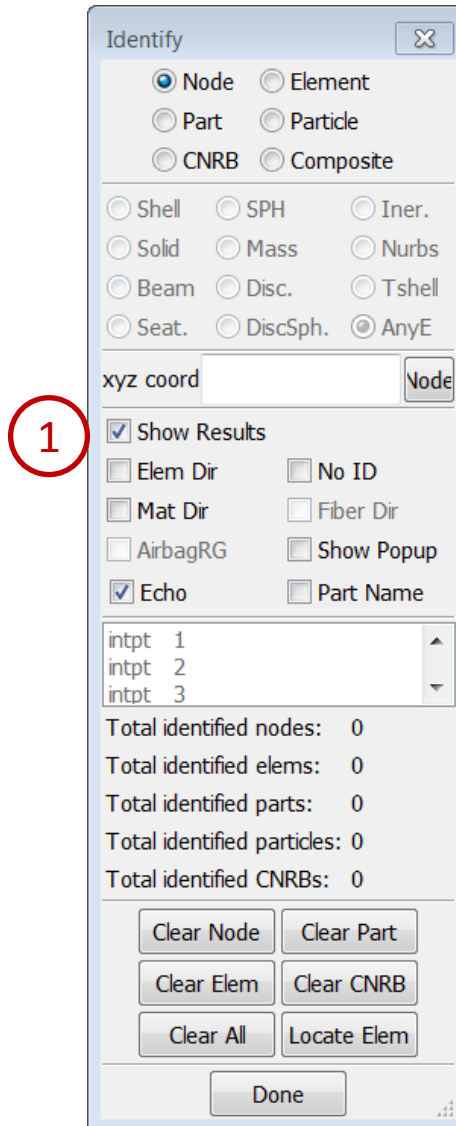
- Drag the slider to the last frame
- Go to **Post** → **Fringe Range** (FriRang)
- Select **Avg: None**
- Activate **Reverse Colors**
- Activate **Ident Min** and **Max**
- Enter **No. Min/Max Entities: 1** (and hit Enter)
- Select **Level: 20**
- Click **Animate Forward**
(if the animation is not already playing)
- Click **Stop Animation**
- Click the **Shade Element** (ShaEle) render button



Workshop 6 (continued...)

Identify nodes and elements by ID...

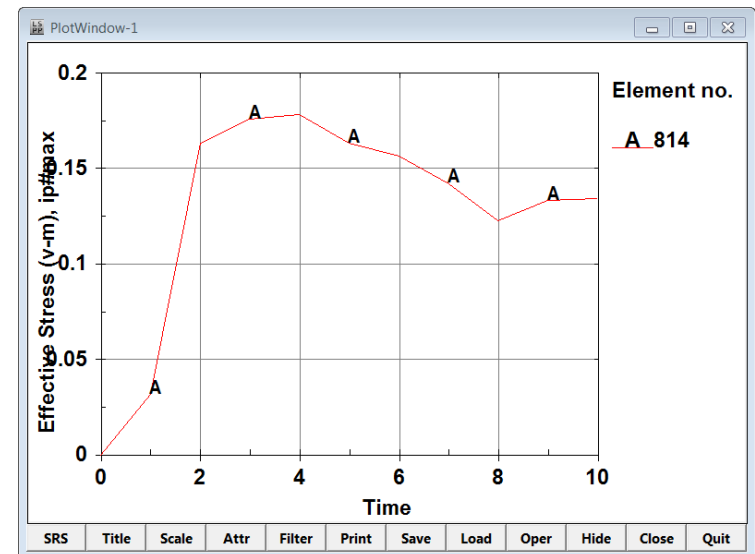
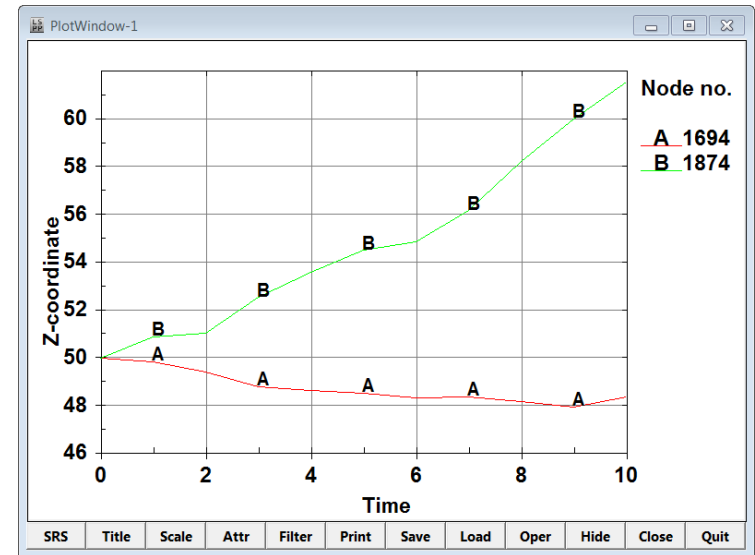
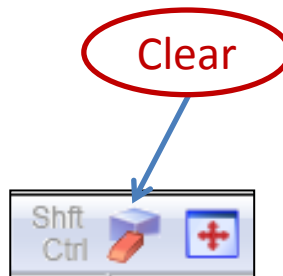
- Drag the slider to the last frame
- Go to **Post** → **Fringe Range** (FriRang)
- Click **Stress**
- Select “von mises stress” from the list
- Go to **Element Tools** → **Ident**
- Select **Node**
- Activate **Show Results** in Identify
- Go to **View** (drop down menu)
- Activate **Results On Screen** in view
- Pick some nodes in the model
- Select **Element**
- Pick some elements by clicking
- Click **Clear Node**
- Click **Clear Elem**
- Click **Done** in Identify



Workshop 6 (continued...)

Plot time history data...

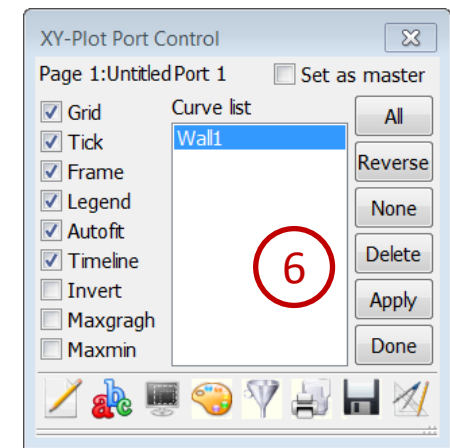
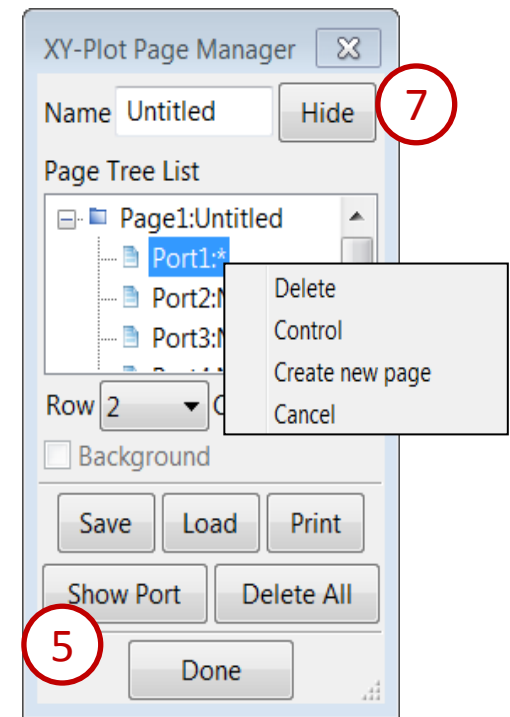
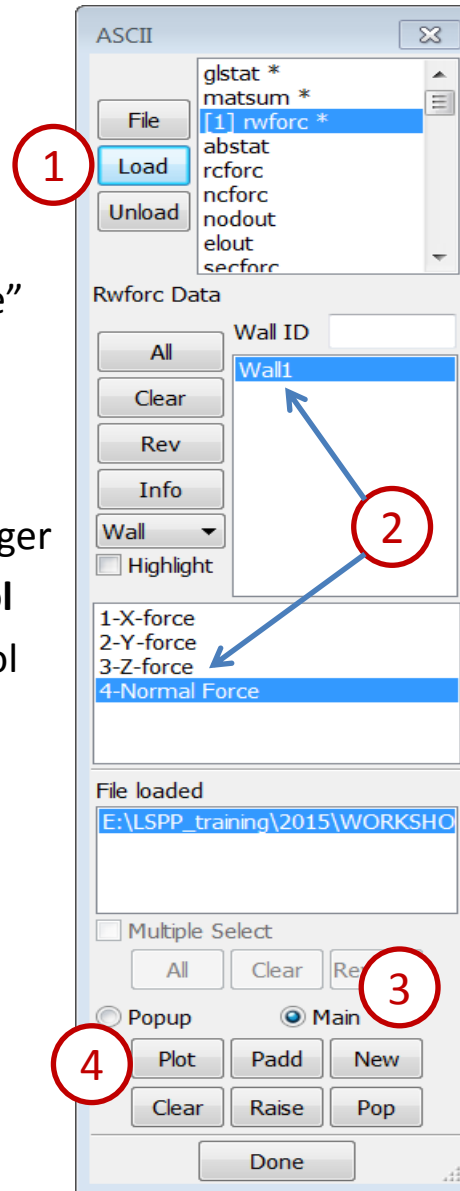
- Go to **Post** → **History**
- Select **Nodal**
- Select “Z-displacement” from the list
- Pick 2 nodes on the Model
- Click **Plot**
- Click **Quit** in the Plot Window
- Select **Element**
- Select “Effective Stress (v-m)” from the list
- Pick an element on the plate
- Click **Plot**
- Click **Quit** in the Plot Window
- Click the **Clear** render button



Workshop 6 (continued...)

Plot ASCII data...

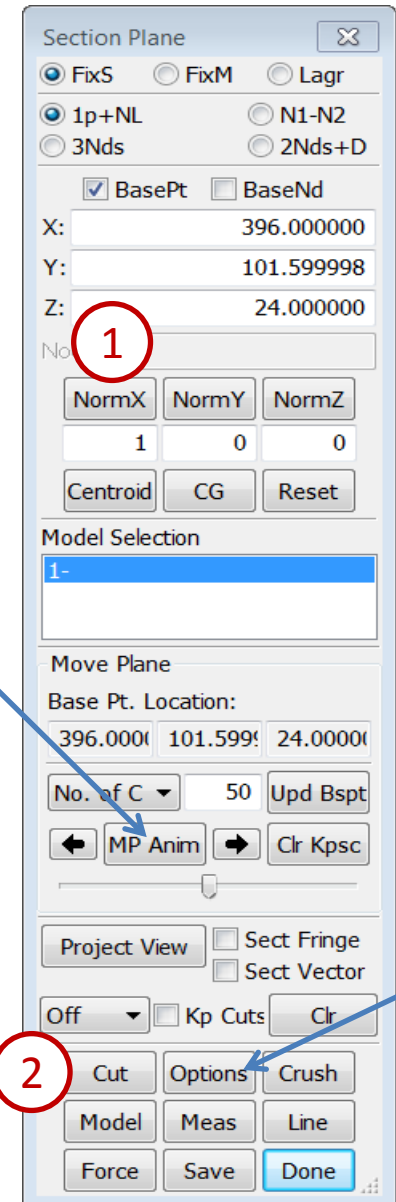
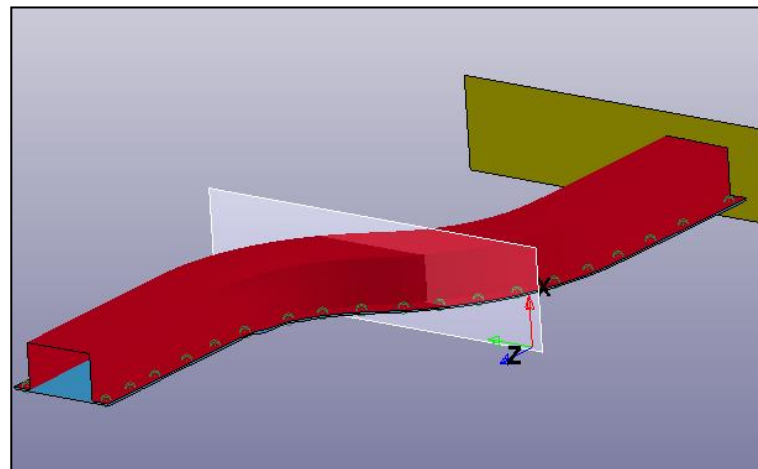
- Go to **Post** → **ASCII**
- Select “rwforc *” from the top list
- Click **Load**
- Select the “Wall1” and “4-Normal Force” in the bottom list
- Activate **Main** in ASCII dialog
- Click **Plot** in ASCII dialog
- Select **Show Port** at XY-Plot Page Manager
- **Right click** “Port1:*” then select **Control**
- Activate **Timeline** in XY-Plot Port Control
- Click **Animate Forward**
- Click **Hide** at XY-Plot Page Manager
- Click **Stop Animation**



Workshop 6 (continued...)

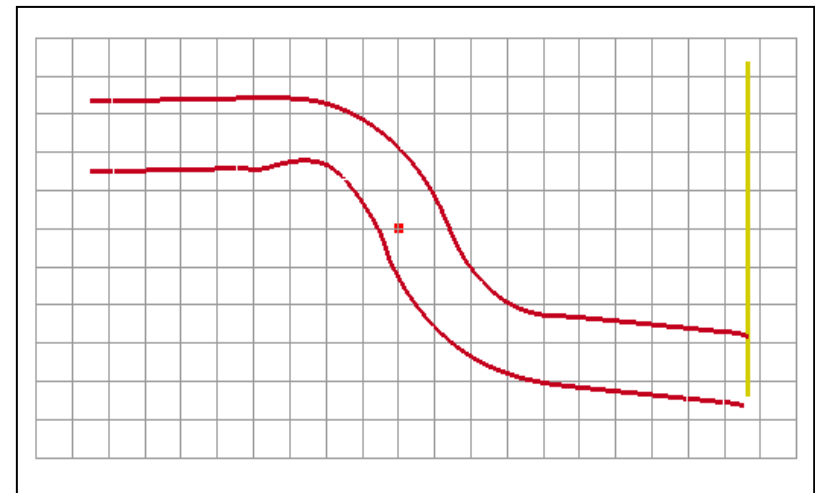
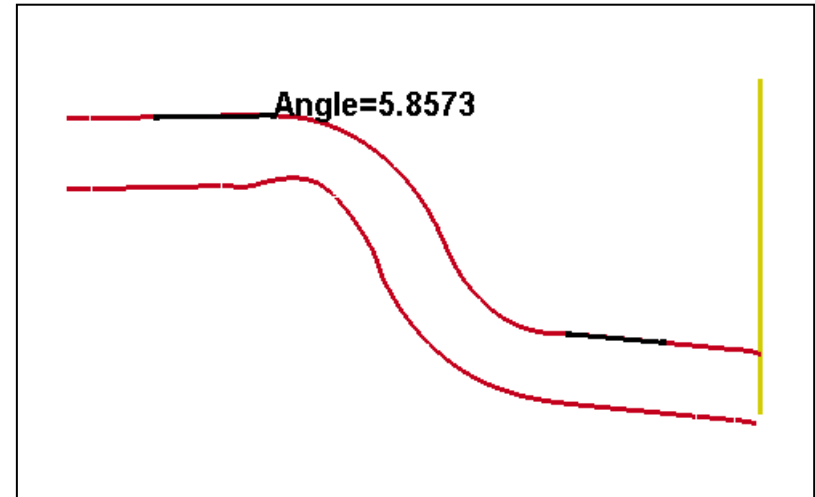
Cut a section plane...

- Rotate the model for an isometric view
- Go to **Model** → **Section Plane**
- Click **NormX**
- Click **Cut**
- Click **Options**
- Select **Line Width: 3**
- Click **Animate Forward**
- Click **MP Anim**
- Click **MP Anim** again stop the animation
- Click **Stop Animation**



Take section plane measurements...

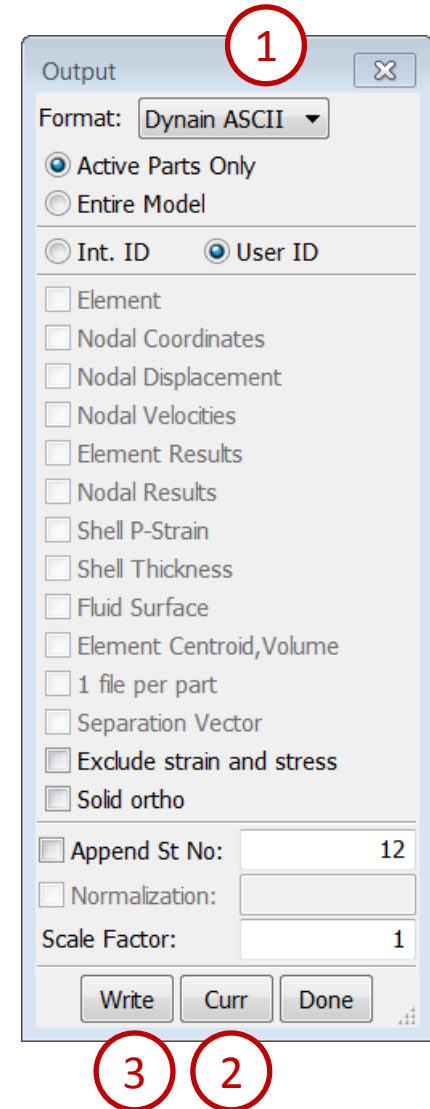
- Click **Model** in Section Plane
- Click **NormZ**
- Click **Cut**
- Click **Project View** in Section Plane
- Click **Meas** in section plane(NOT Measur)
- Select **2Ln-Angle**
- Click two points to form a line on the left top
- Click two points to form a line on the right top
- Click **Options**
- Activate **ShMesh** (section plane as a mesh)
- Click **Curr State**
- Click **Write** to save the section data
(writes keyword file with beam elements only)
- Click **Done** in Section Plane interface



Workshop 6 (continued...)

Output dynain file...

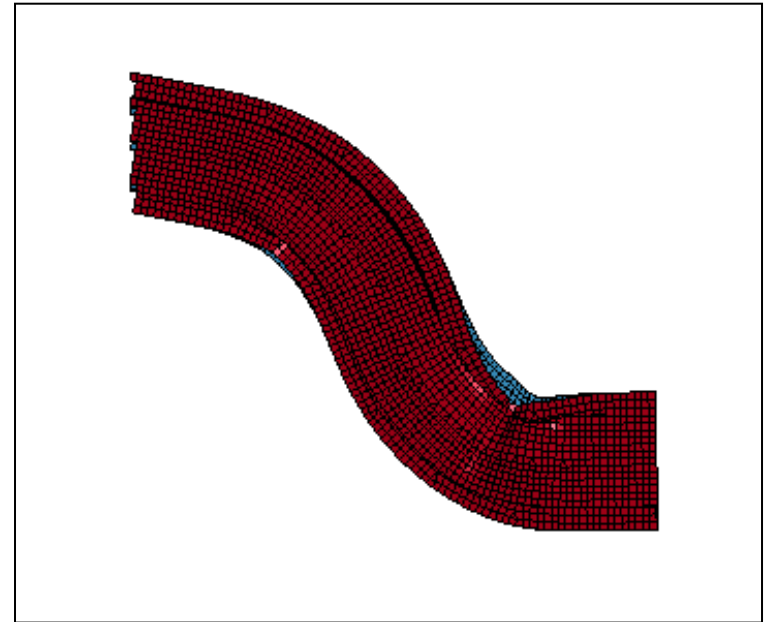
- Go to **Post** → **Output**
- Select **Format: Dynain ASCII**
- In the animation controls, advance to the last state
- Click **Curr** (current state)
- Click **Write**
(writes a dynain ASCII file that contains stress, strain, and thickness information)



Workshop 6 *(continued...)*

Save LS-PrePost database (post.db)...

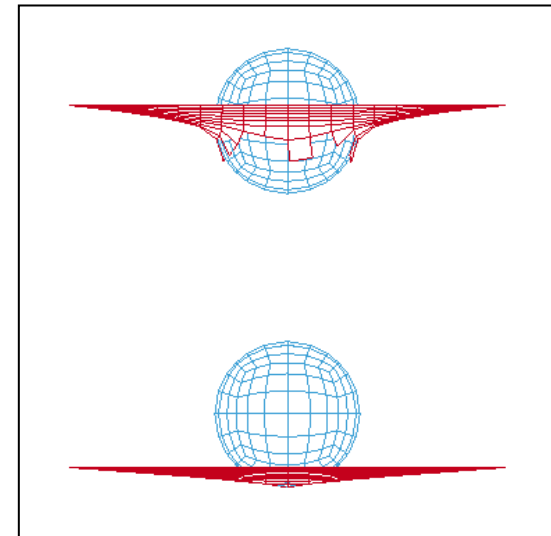
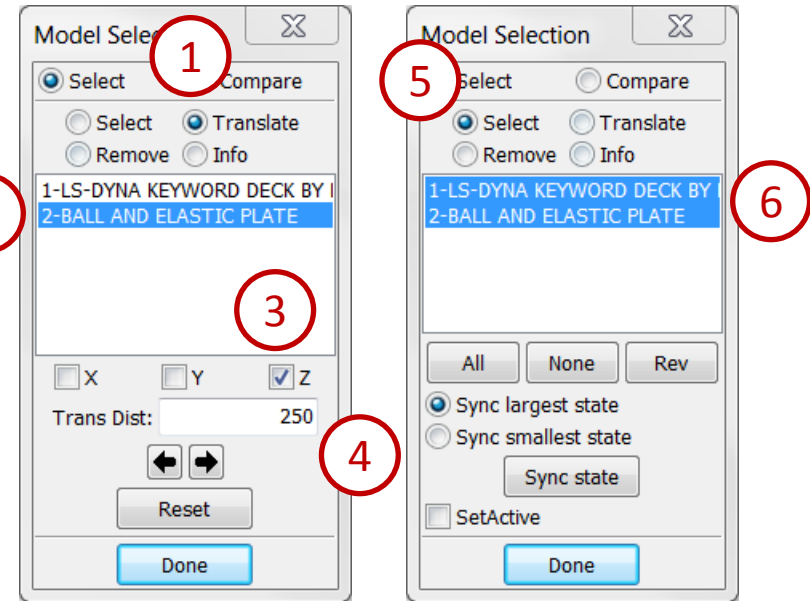
- In the animation controls, advance to the desired state
- Go to **Model → Assembly and Part** (SelPart)
- Select “1 LSHELL1” and “2 LSHELL2” only
- Go to **Element Tools → Blank**
- Select **Area** in the General Selection interface
- Select **Out**
- Draw a box around a portion of the model
- File > Save As > Save Post.db As...
- In the Save PostProcess DB interface, select the data you want
- Click >>
- Enter a file name
(select /workshop6/post.db)
- Click **Write DB**



Workshop 6 (continued...)

View multiple models...

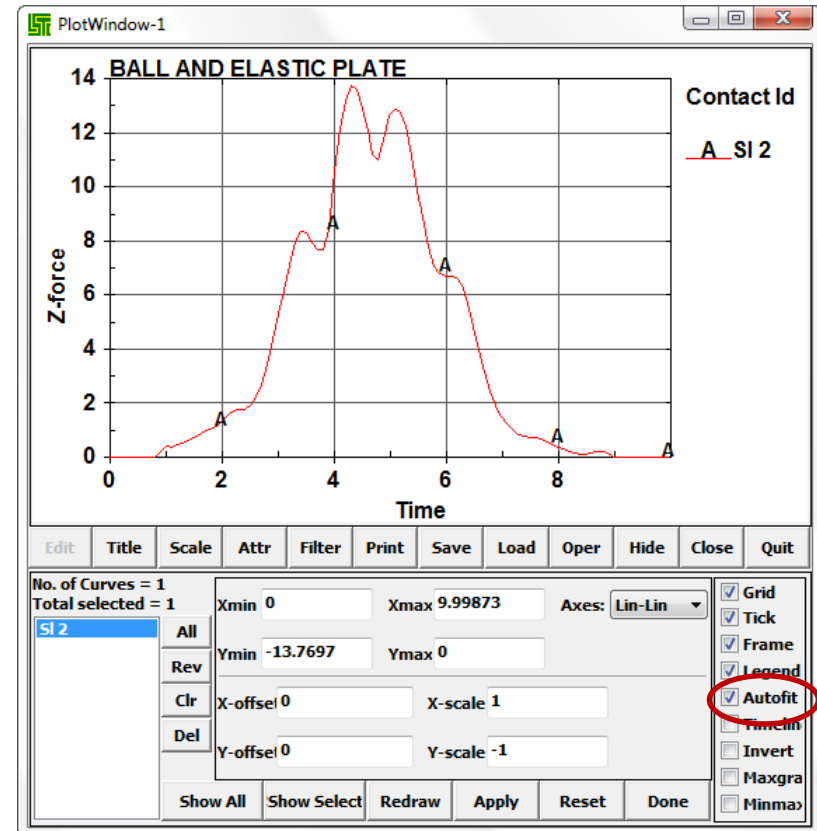
- Launch a new session of LS-PrePost
- File > Open > LS-DYNA Binary Plot (select /workshop6/example2/d3plot), click **Open**
- File > Open > LS-DYNA Binary Plot (select /workshop6/elastic_plate/d3plot), click **Open**
- Click the **Left** render button
- Go to **Model** → **MSelect**
- Select **Translate**
- Select “2-BALL AND ELSTIC PLATE” from the list
- Activate **Z** only
- Enter **Trans Dist: 250.0**
- Click the Left Arrow button
- Select **Select**
- Click and drag to select both items in the list
- Click the **Auto Center** (AutCen) render button
- Click the **Hide Element** (HidEle) render button
- Click **Animate Forward**



Workshop 6 (continued...)

Create a cross plot...

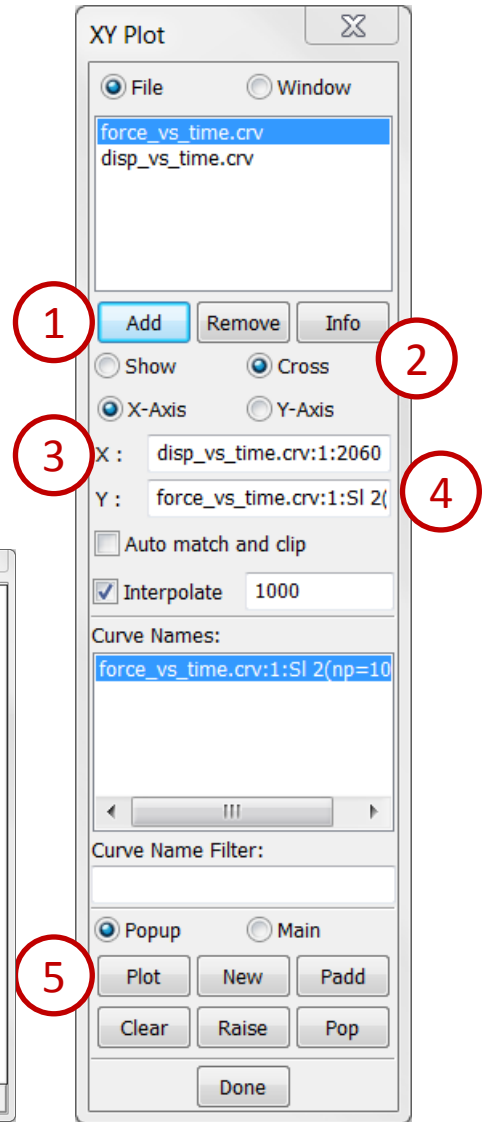
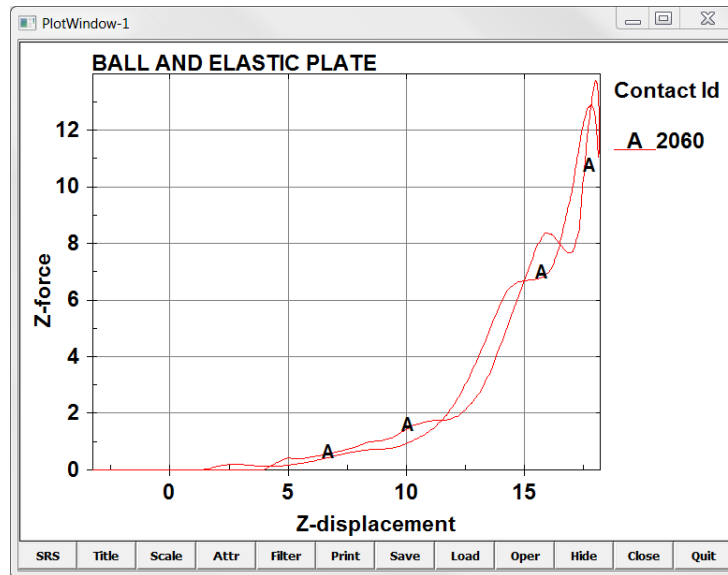
- Launch a new session of LS-PrePost
- File > Open > LS-DYNA Binary Plot (select /workshop6/elastic_plate/d3plot), click **Open**
- Go to **Post** → **ASCII**
- Select “rcforc *”
- Click **Load**
- Select “SI-2” from the middle list
- Select “Z-force” from the lower list
- Click **Plot**
- Click **Scale** in PlotWindow-1
- Enter **Y-scale: -1**
- Click **Apply**
- Activate **Autofit**
- Click **Save** enter **Filename:** force_vs_time.crv
- Click **Save** in the bottom row of buttons
- Click **Quit** in PlotWindow-1



Workshop 6 (continued...)

Create a cross plot (continued)...

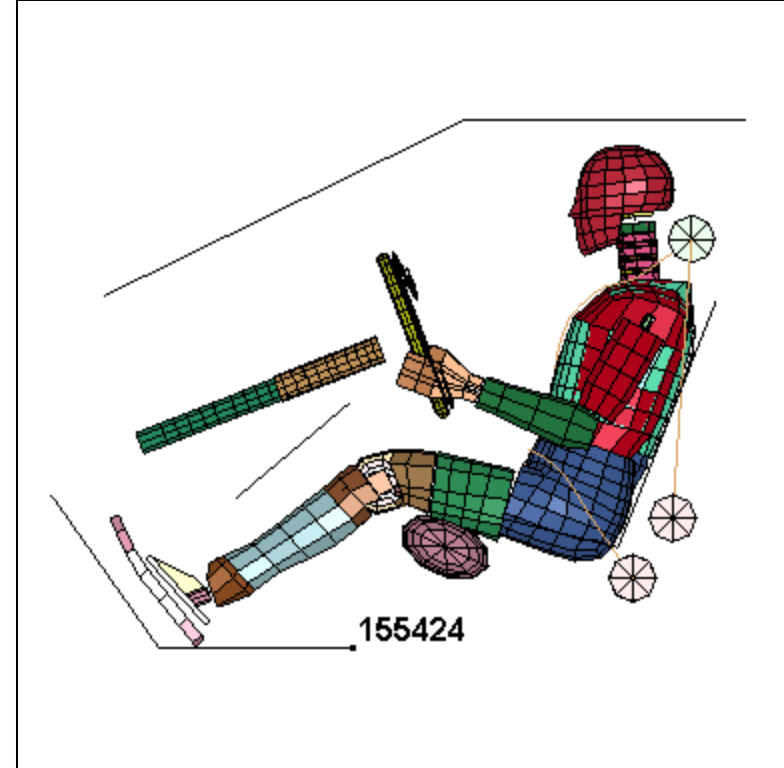
- Go to **Post** → **XYPlot**
- Click **Add**
(select /workshop6/elastic_plate/disp_vs_time.crv)
- Select **Cross**
- Select **X-Axis**
- Select “disp_vs_time.crv” in file
- Click “disp_vs_time.crv:2060” in Curve Names
- Select **Y-Axis**
- Select “force_vs_time.crv”
in file
- Click “force_vs_time.crv:Sl 2”
in Curve Names
- Click **Plot**



Workshop 6 *(continued...)*

Set a reference point...

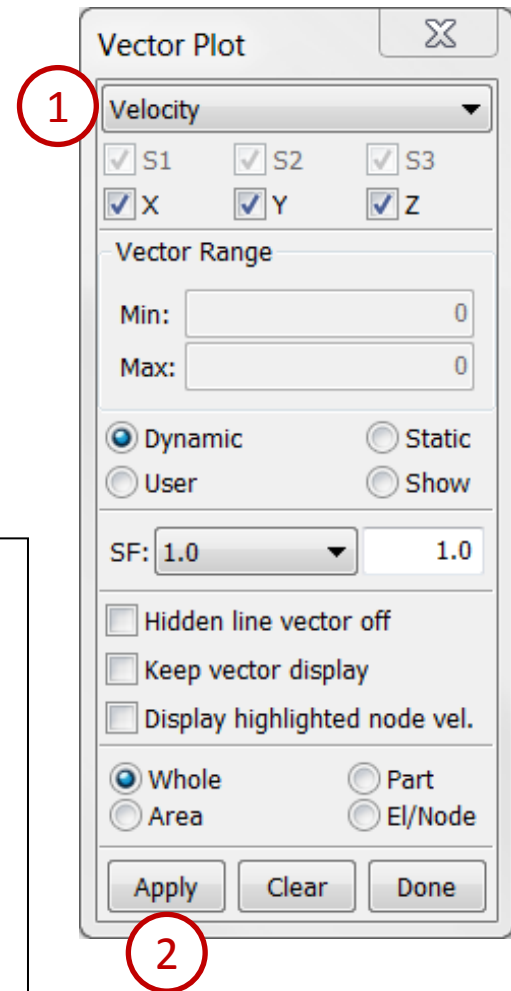
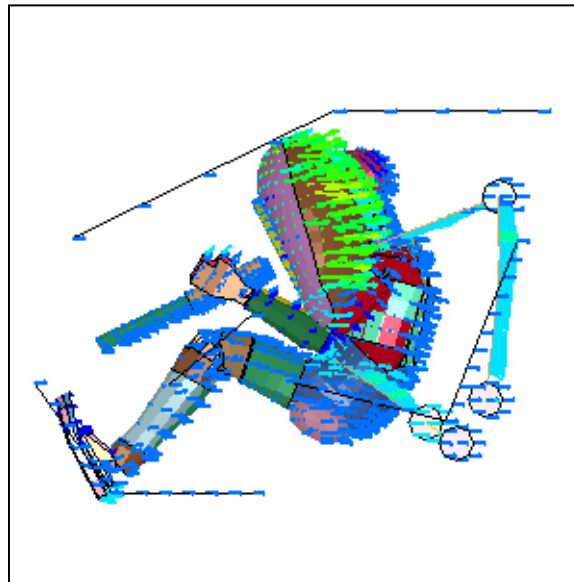
- Launch a new session of LS-PrePost
- File > Open > LS-DYNA Binary Plot (select /workshop6/belted/d3plot), click **Open**
- Click the **Left** render buttons
- Click **Animate Forward**
- Click **Stop Animation**
- Go to **Post** → **Follow**
- Pick any node on the structure
- Click **Apply**
- Click **Animate Forward**
- Click **Reset** (in the Follow interface)
- Click **Done** (in the Follow interface)



Workshop 6 (continued...)

View velocity vectors...

- Go to **Post** → **Vector**
- Select **Velocity** from the drop down menu
- Click **Apply**
- Click **Next State** (in the animation interface) to step through the animation frame by frame
- Click **Done**



Workshop 6 *(continued...)*

Colors, Groups, and Views...

- Go to **Model** → **Part Color**
- Click **Lmap**
(select /workshop6/colors_groups_views/colors)
- Go to **Model** → **Groups**
- Click **Load**
(select /workshop6/colors_groups_views/groups)
- Select “dummy” from the list
- Click **Select**
- Go to **Model** → **Views**
- Click **Load**
(select /workshop6/colors_groups_views/views)
- Select “View_01” from the list
- Click **Select**
- Click **Done**

