Welcome to the **DYNAmore Express Webinar!**

The session will start soon.

Please make sure to **mute your microphone**.
Feel free to **post questions in the chat** and we will answer them at the end.

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LS-PrePost: News, Tips and Tricks

Ansys LST & DYNAmore, February 2022

Silvia MANDEL – DYNAmore GmbH, Germany

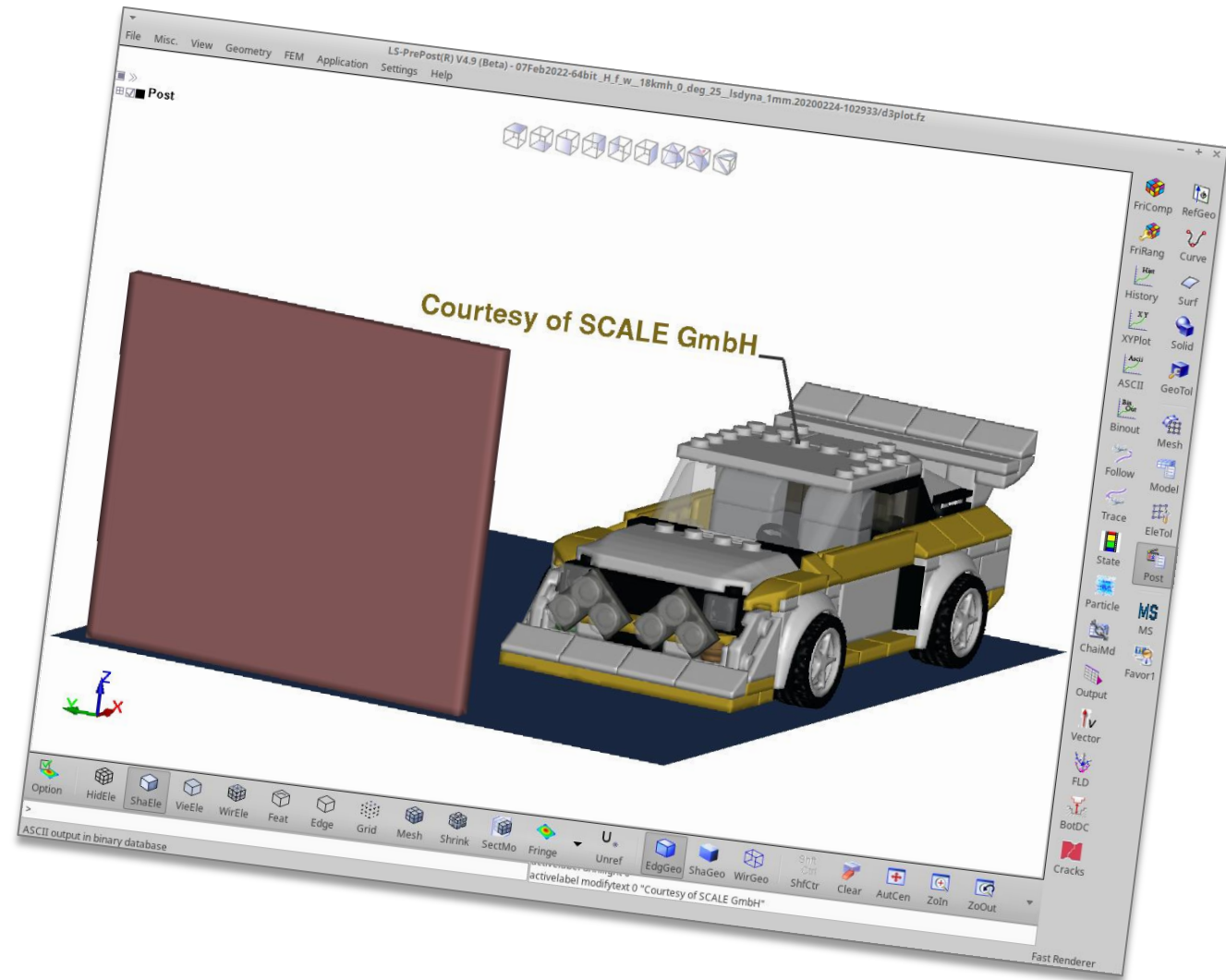Pierre GLAY – DYNAmore France SAS, France

support@dynamore.de
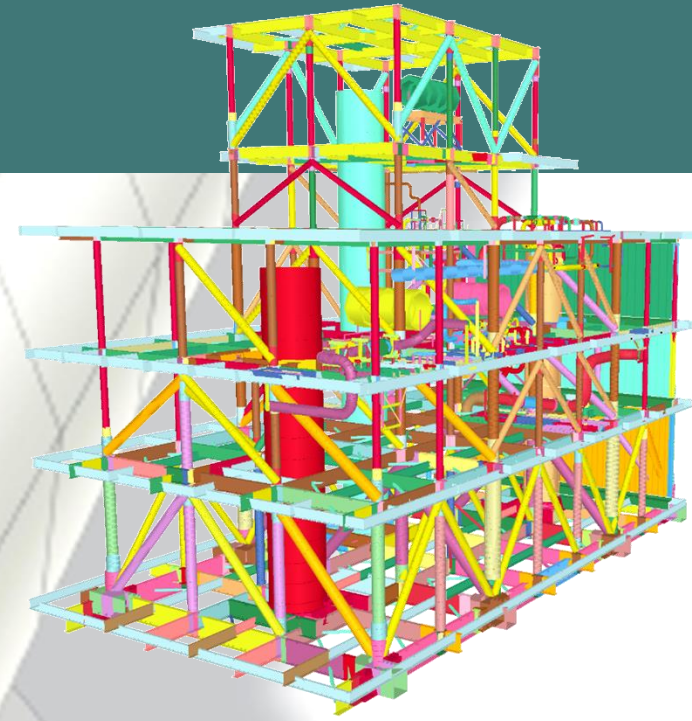
Courtesy of Gexcon France

Agenda

- **LS-PrePost Support Team**
- **LS-PrePost Version Overview**
- **Recent Developments**
  - **Pre-processing**
  - **Post-processing**
  - **Miscellaneous**
- **Conclusions**

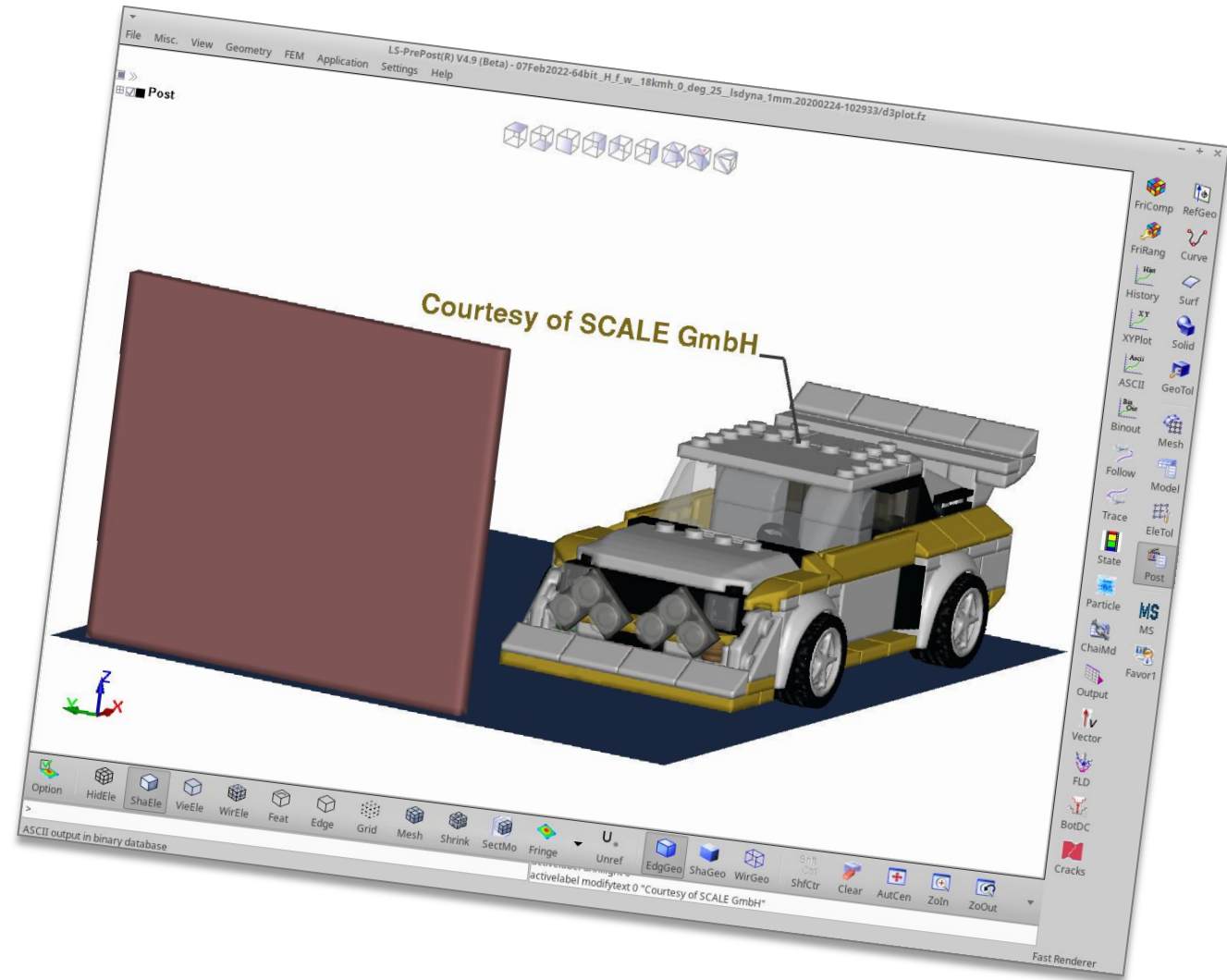Courtesy of SCALE GmbH

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LS-PrePost – The Team

Your LS-PrePost support team at DYNAmore:

- **France: Pierre GLAY**
- **Switzerland: David SCHRÖDER**
- **Sweden: Anders JERNBERG (LS-Prepost Developer)**
- **Germany: Silvia MANDEL**

- Do not hesitate to contact us for suggestions or improvements ideas!

- Closed and fruitful collaboration with LS-PrePost developers since many years.
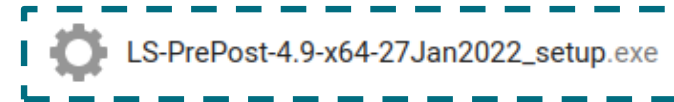
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LS-PrePost – Version Overview

- LS-PrePost is delivered **free** with LS-DYNA.

- LS-PrePost download area for the DYNAmore clients: https://fileshare.dynamore.de

  - LS-PrePost is developed for …   - Windows

    LS-PrePost-4.9-x64-27Jan2022_setup.exe

    - Linux (= Common version)

    lsprepost-4.9-common-20Jan2022.tgz

    - Mac OS

    LS-PrePost-4.9-14Jan2022.dmg

- Special versions are also available e.g. DP (double precision) and GTK3 development version.

- Current release version: **4.8**   *Tip* Python Scripting possible since 4.8!

- Development Version: **4.9 (Dev)**
  - Official release expected for March 2022

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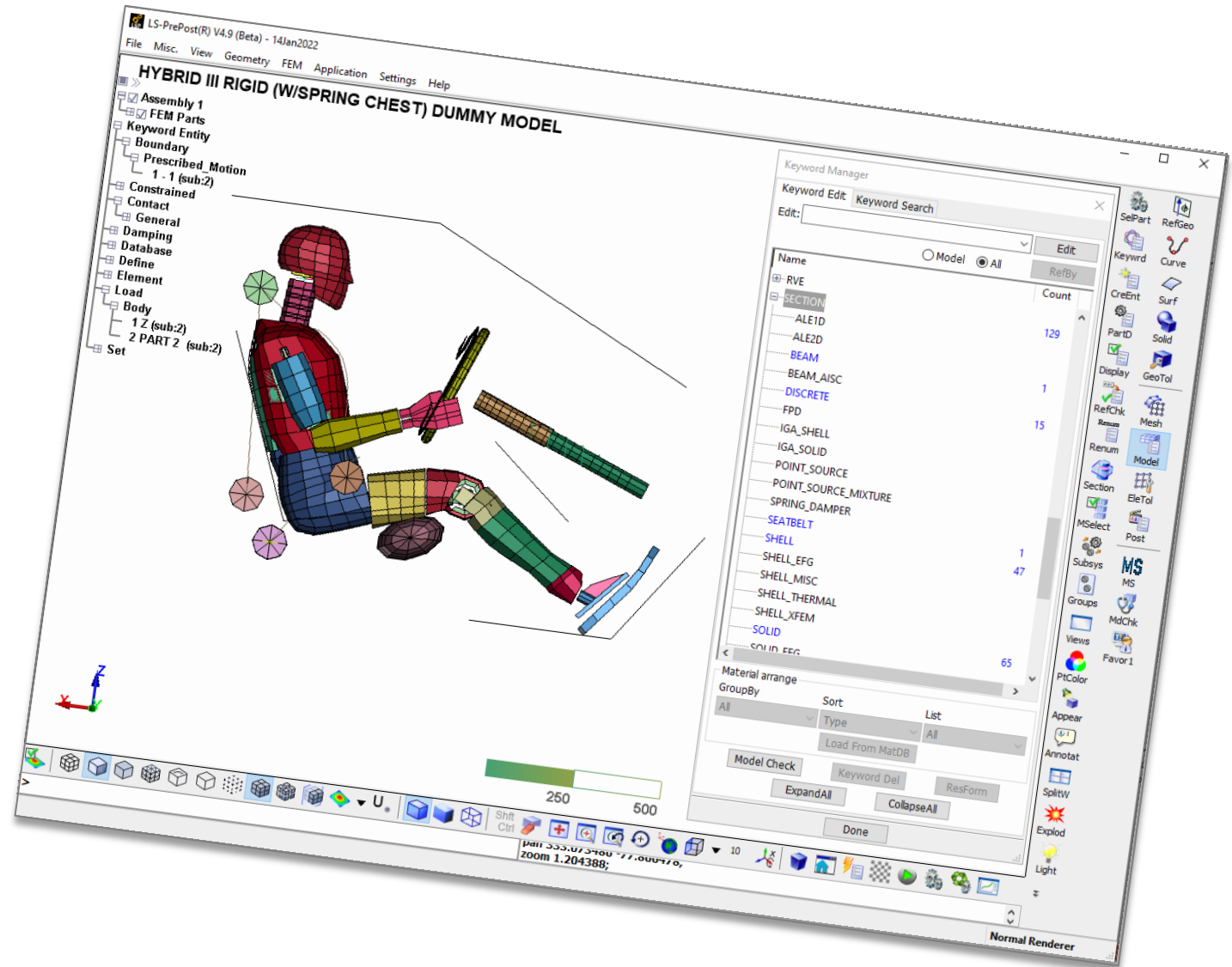
Mesh → EleGen (Element Generation)

■ Extent functions of Mesh→*ElGen→Solid→Solid By: Shell_Thickness*
   ■ Transfer the stress and strain (*INITIAL_xxx) from shell to solid when doing.
   ■ Create *CONSTRAINED_ADAPTIVITY in solid part when creating solid by *Shell_Thickness* and the selected shell elements uses *CONSTRAINED_ADAPTIVITY
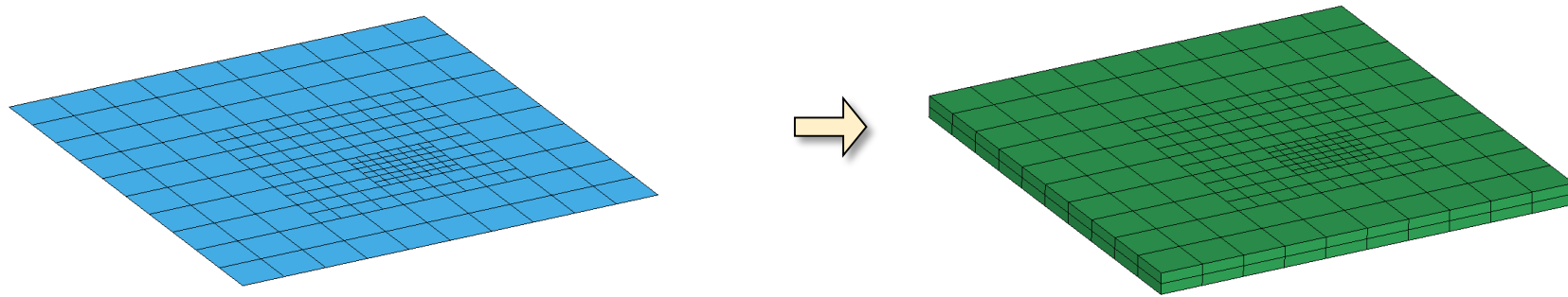
■ Can now create cohesive elements in-between **tshell** elements in *ElGen→Solid→Cohesive*

■ Add "Ratio" option in *Solid by→Shell sweep→By line*
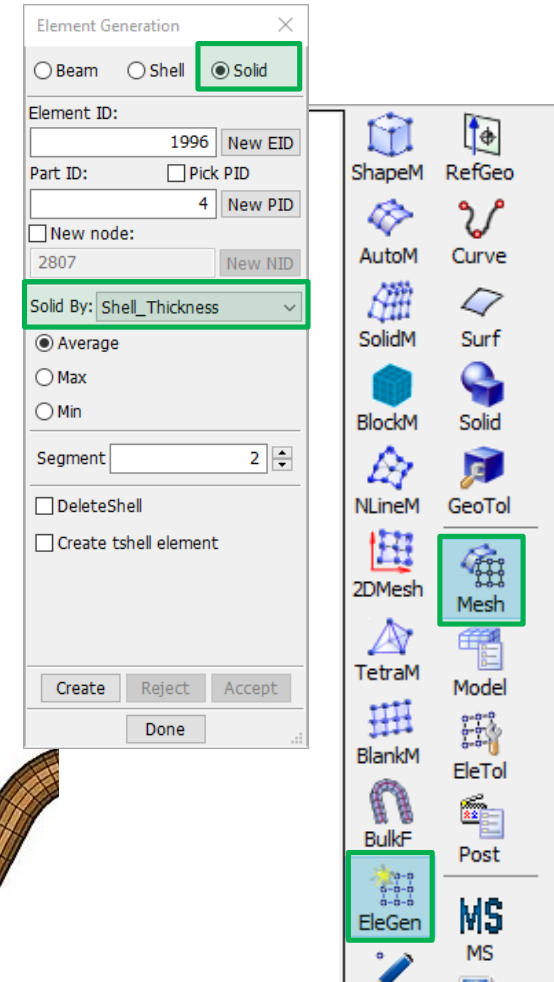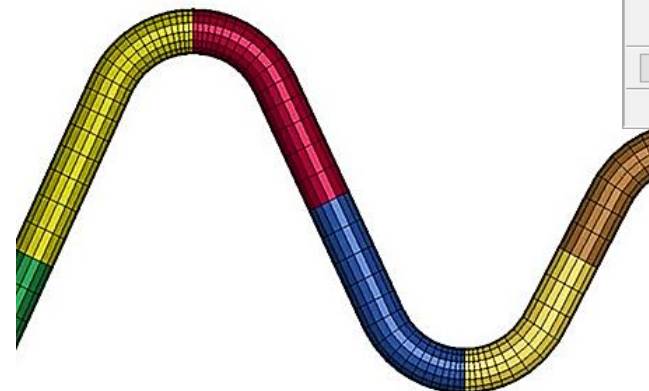
EleTol (Element Tools) → EleEdit (Element Editing)

- Create the transition element between adaptive mesh and regular mesh
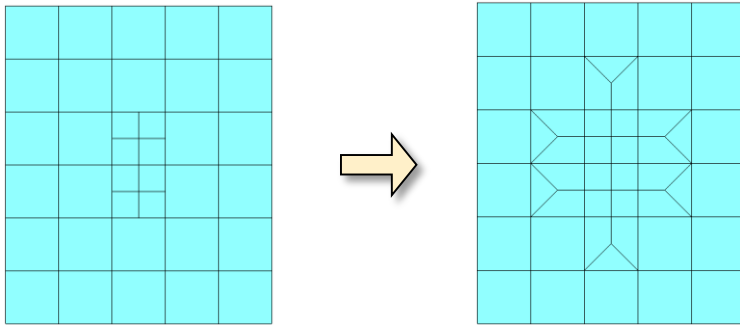

- Enhancement of the solid element quality check

  - Option "Show failed only"
    After user put in a criteria, the element below that values can be seen by showing other element with wireframe mode
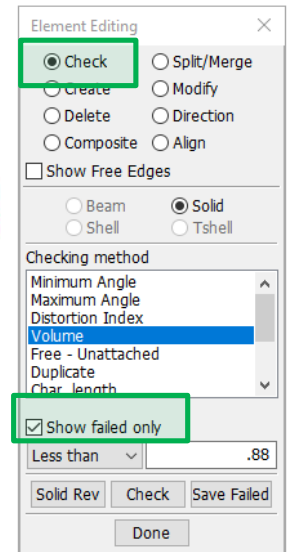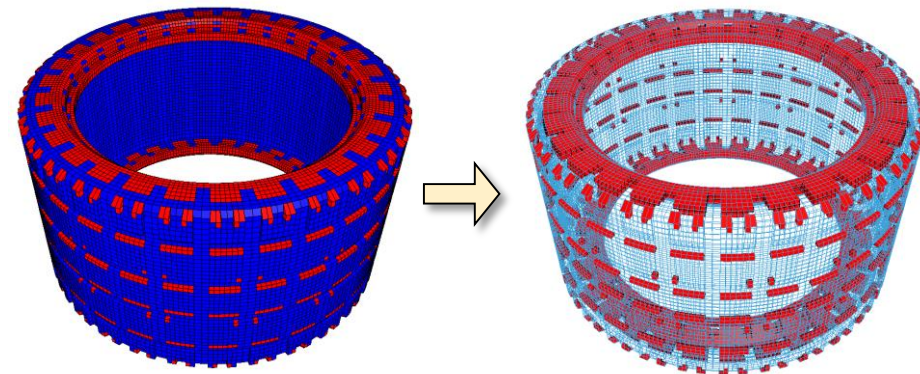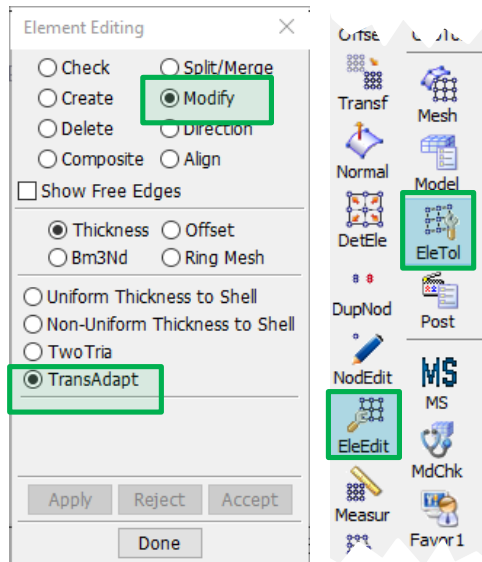
EleTol (Element Tools) → Transf (Transform)

- New options for transform (=copy) nodes to a new Part ID
  - Support keep part property (MAT-ID, Section-ID, HG-ID)
 - Support set part title when copy element

Tip
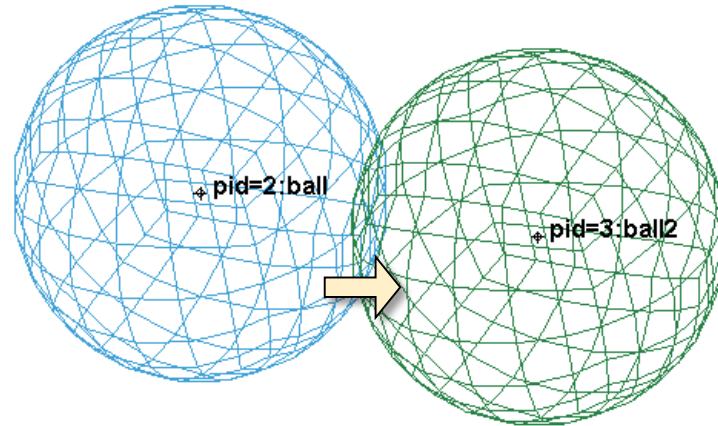
- The „Copy Entity" option is to copy also the *INITIAL cards of the elements, e.g. symmetric LS-DYNA runs can be reflect in LS-PrePost to a full model with all results. (Deactivate at first in Settings> Configuration Settings > Keyword > "Save initinfo to temporary file" to import really all INITIAL cards and not only the included values to the FringeComp interface).
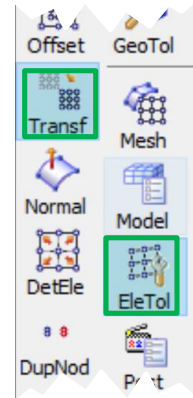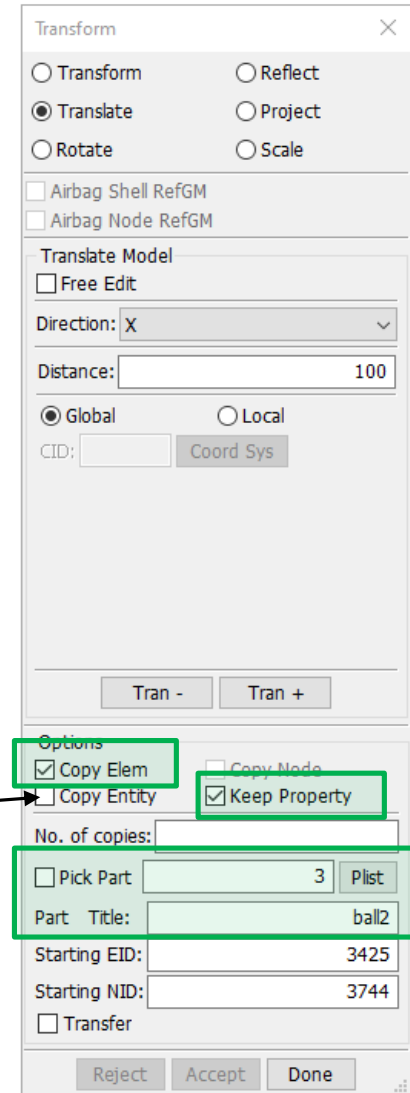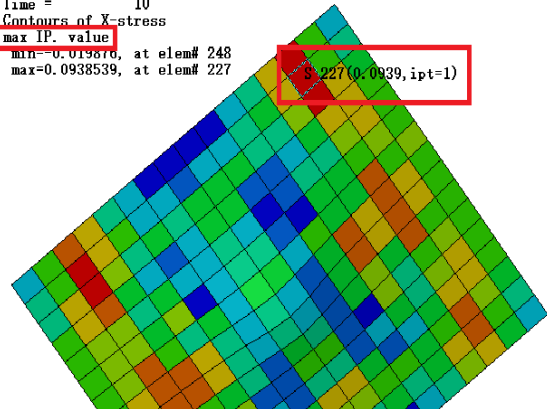
EleTol (Element Tools) → Find
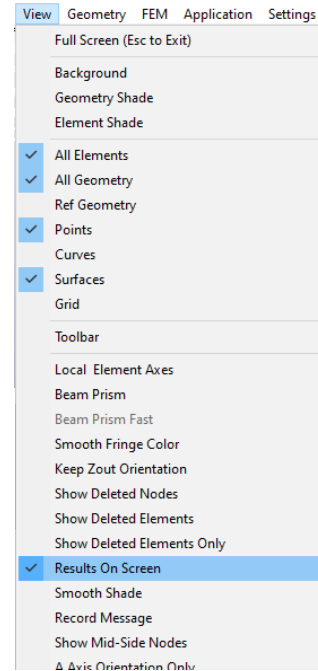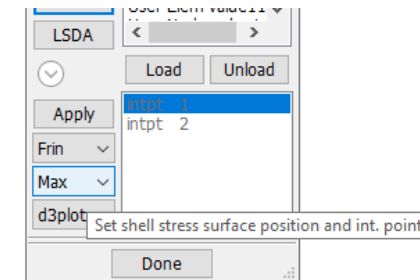
- Highlight attached elements for found node
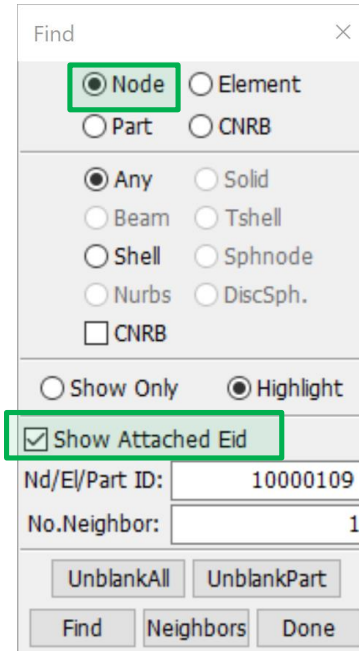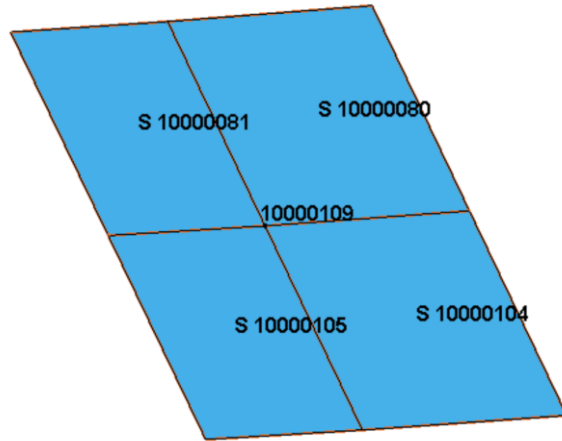
# EleTol (Element Tools) → Identify (Ident)

- Print integration point info in case the max option is active
  - Necessary settings for this option:
    - View → Results On Screen
    - Post → FringeRange → AVG: "None"
    - Post → FringeComp: Max
    - Ident → Element → "Show Results"

Beam visualization

■ Beam prism visualization for *INTEGRATION_BEAM has been revamped, showing the proper geometry
  ■ Various enhancements: *ELEMENT_BEAM_OFFSET/ORIENTATION well represented
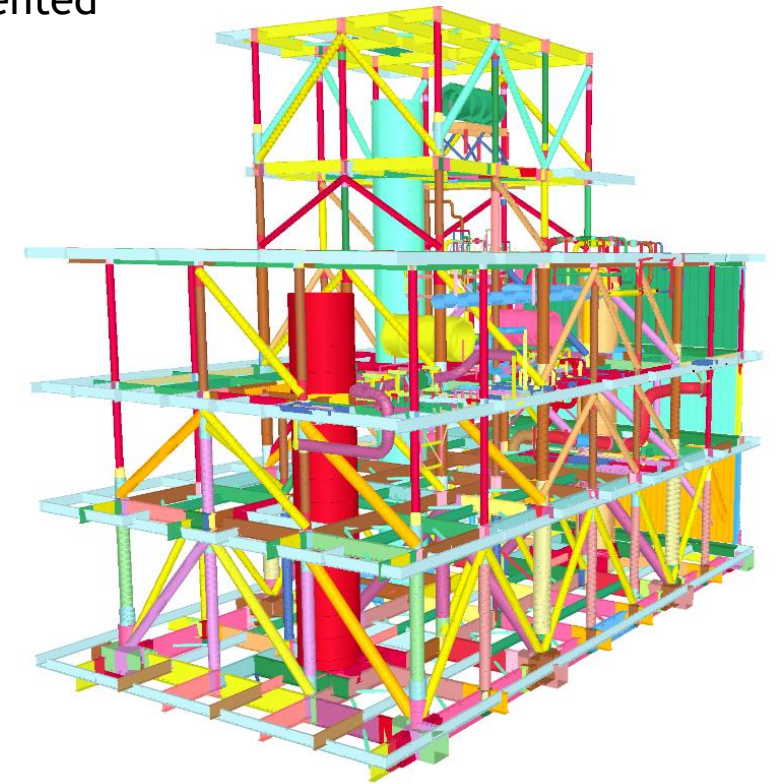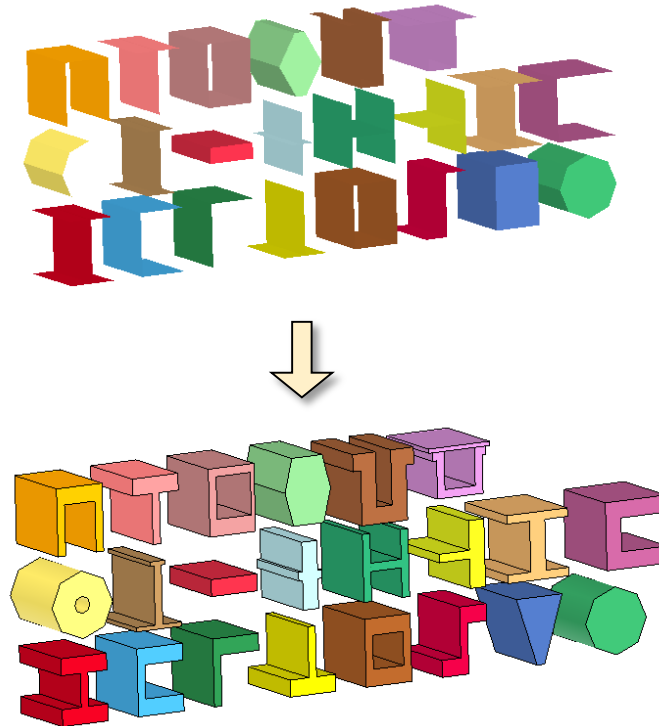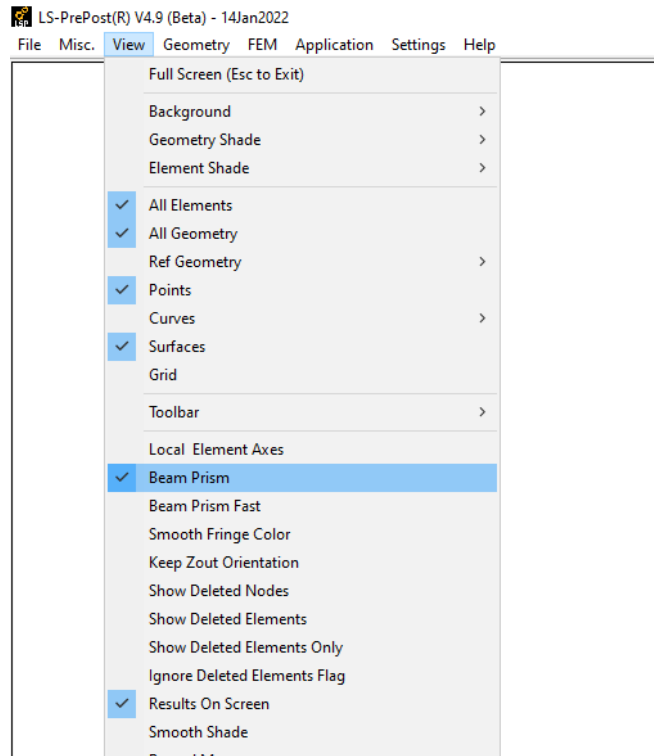

Courtesy of Gexcon France

For faster rendering of <u>models with many elements</u> try next option "Beam Prism Fast":
The beam will be drawn as line until stop rotating and the final picture will be beam prism.

Model → Section Plane/Cut

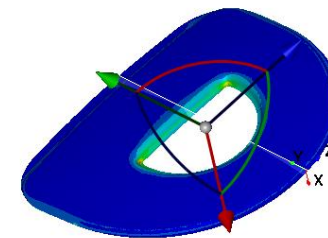- Add section cut function for beam elements

- Shell thickness, tshell and solid elements is now supported to *write* option:

Model   **Section cut**   **.iges**
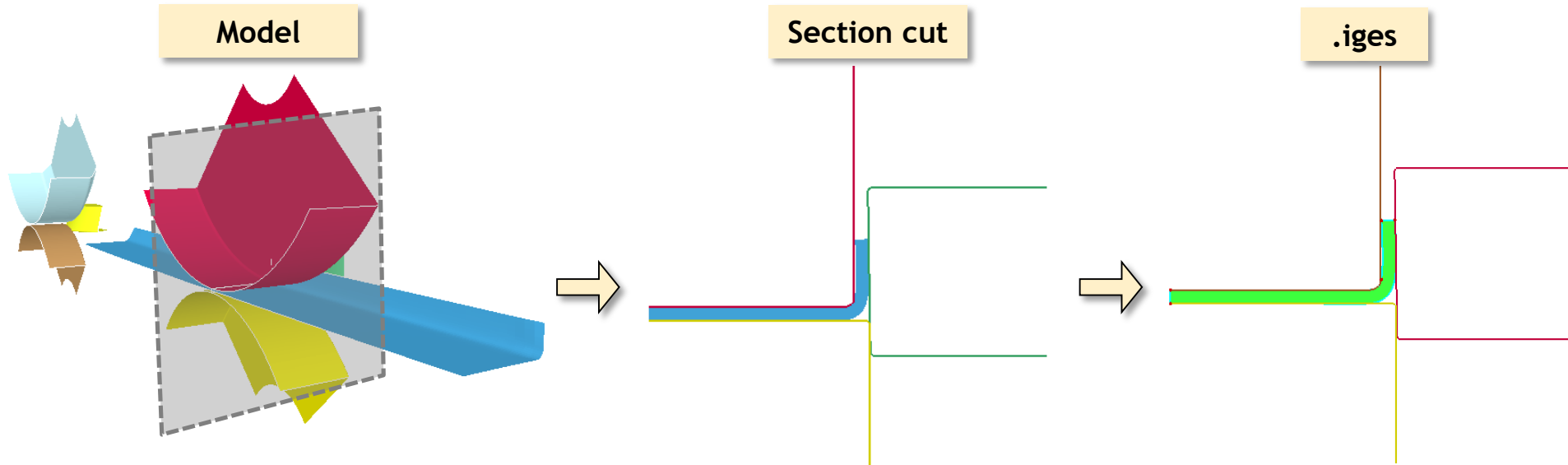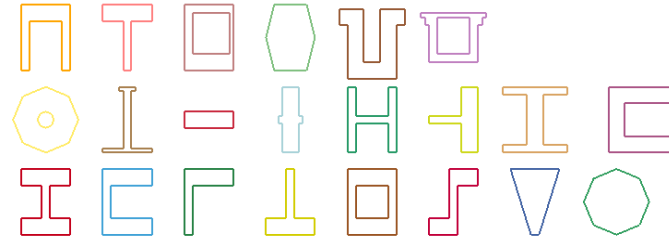
- Coming soon: Beam "Write" output in section cut interface.

- Modify easy the cutting plane position by moving with pressed mouse on the cutting coordinate since LS-PrePost version 4.8.
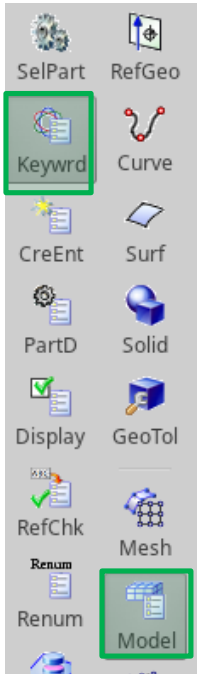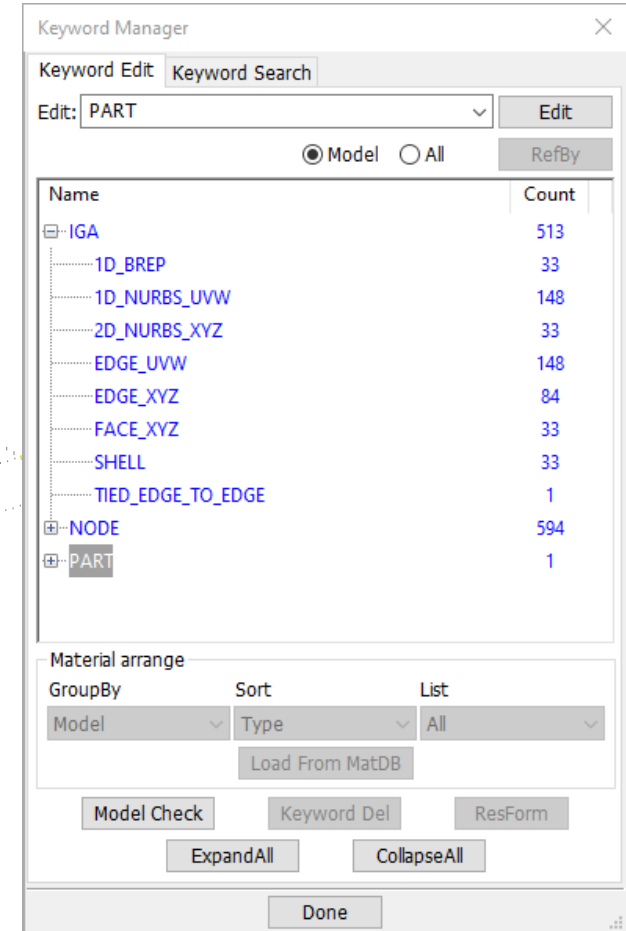
Tip

Isogeometric Analysis = IGA

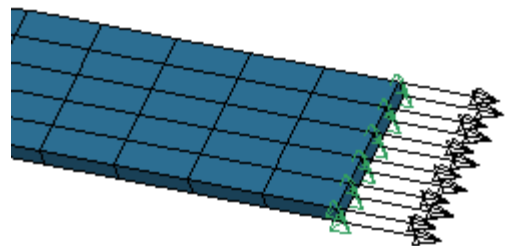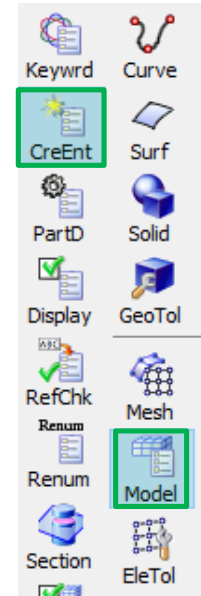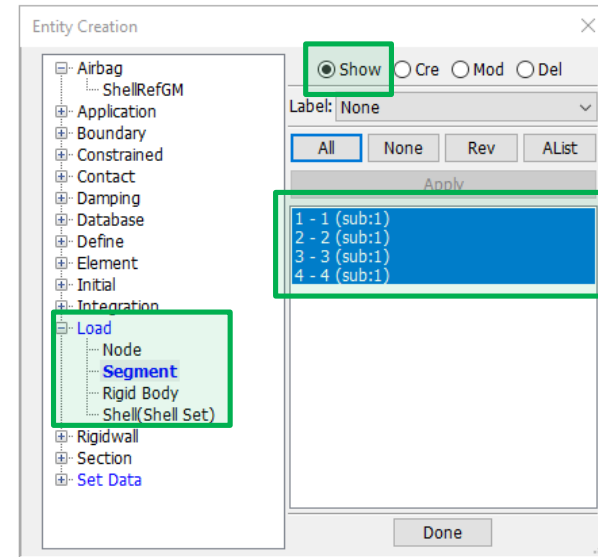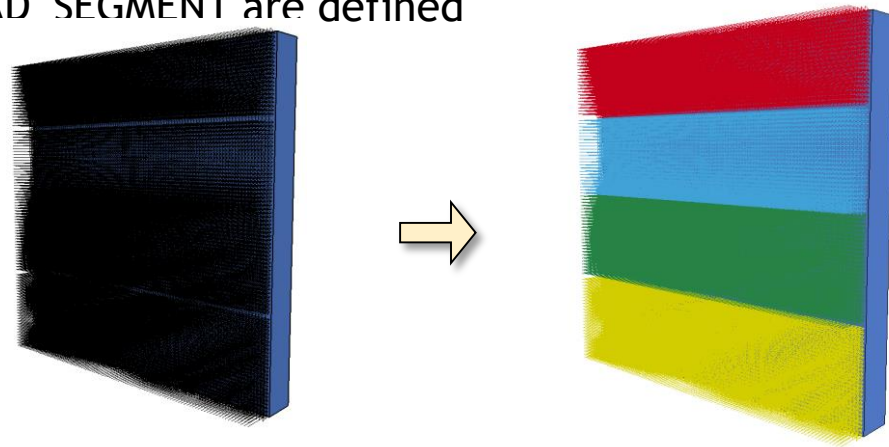- Create shell/volume element in new IGA format (*IGA_...)
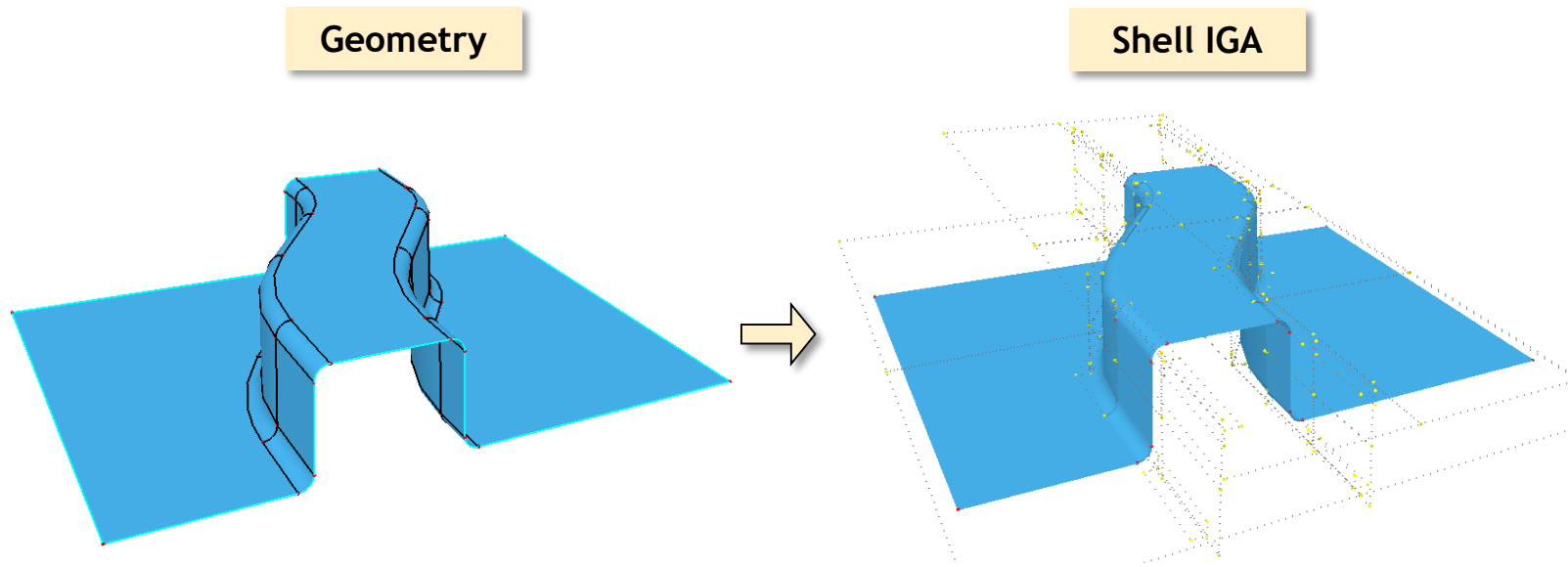
- Editing element (e.g. refinement) works with new format
- Trimmed solid is now supported

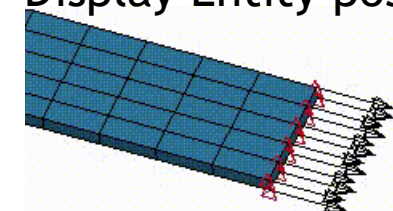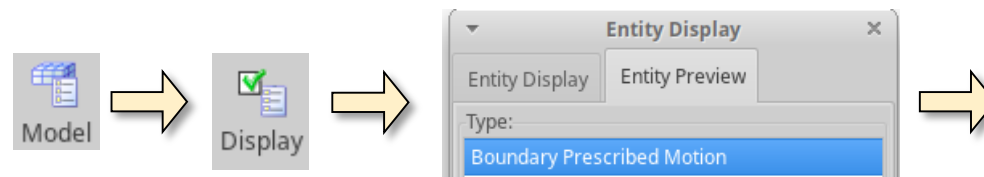- Model generation for NURBS shells and NURBS solids possible

Model→CreEnt (Entity Creation)

■ Improve "Show" option by assign different color per *LOAD_... and per *BOUNDARY_SPC

   ■ E.g., 4 *LOAD_SEGMENT are defined

■ Visualization with arrows of load direction in *BOUNDARY_PRESCRIBED_MOTION

■ Animation of a prescribed motion keyword under Display Entity possible:

Tip

Model→CreEnt (Entity Creation)

- Support create circle plane via entity creation dialog (*DATABASE_CROSS_SECTION_PLANE)
  - If radius is greater than 0.0, the plane is created by the radius and coordinates of two points(head and tail)
  - If radius is less than 0.0, it will be created from two nodes(NID1 and NID2)

- Create discrete sphere element via entity creation dialog
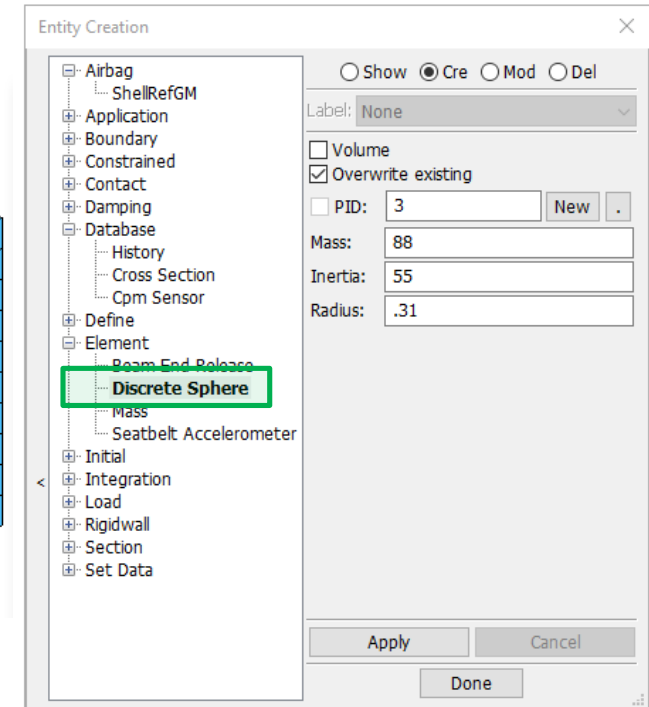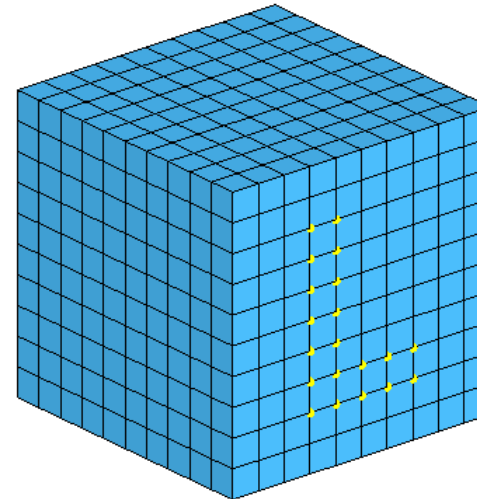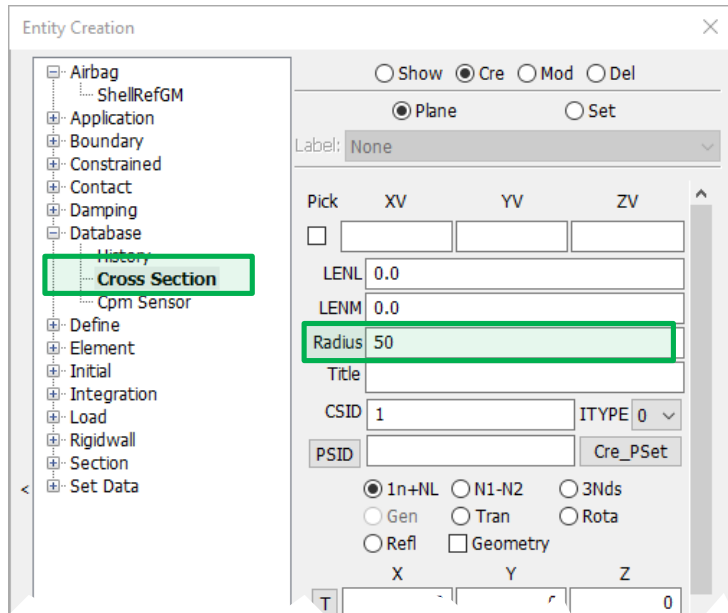
View → Solution Explorer → Structure

■ It provides the complete model tree view, visualization of the tree items, error checking **before** run, and of course the automatic keyword output

■ Structure:

- In "Explicit Dynamics", the "time step" settings are supported.
- Add some new objects like "General Contact", "Deform2Deform", "Rigid Merge", "Unreferenced Part" etc.
- Add inertia data in the property of part objects which will lead to "_INERTIA" option in *PART keyword
- Replace the old icons with some new icons and change the font size of tree items
- A new object called "Unsupported Keywords" is added to show some significant unsupported keywords in current tree structure
- Support to get correct "PreStress" property data from keyword file
- Add "Keyword Preview" at the root tree item menu
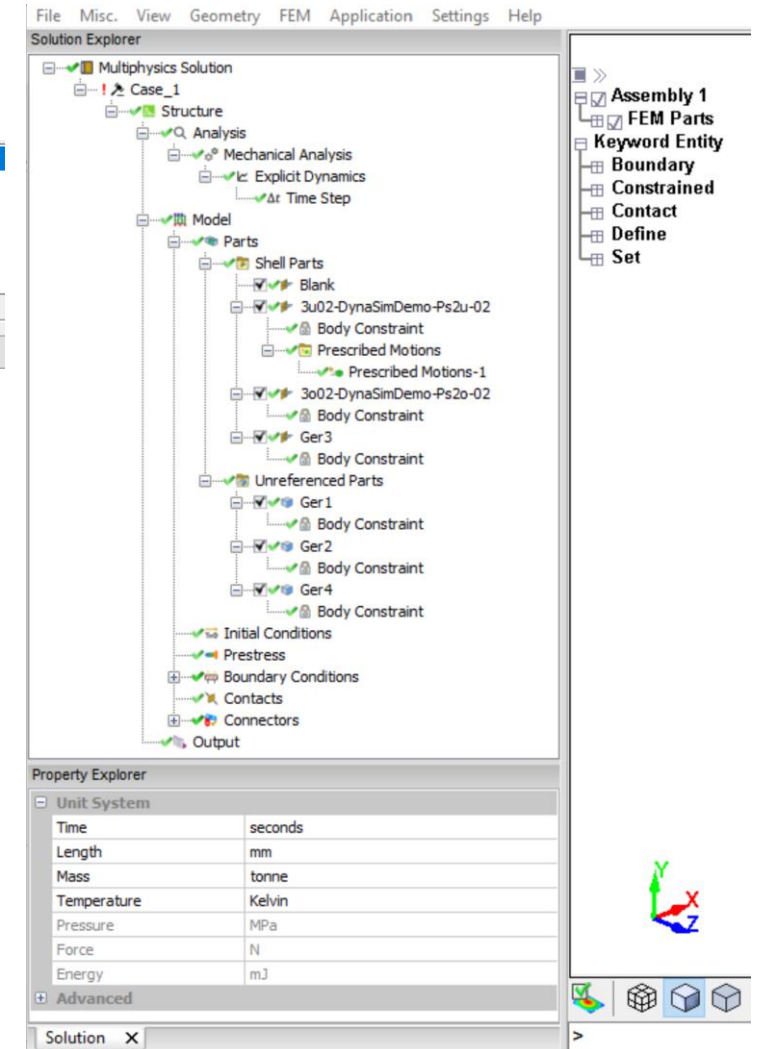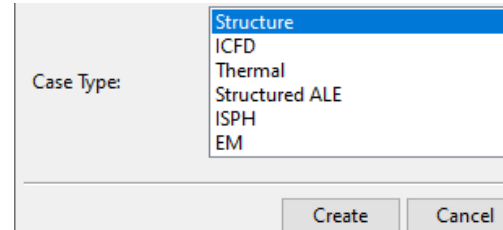
View → Solution Explorer → EM
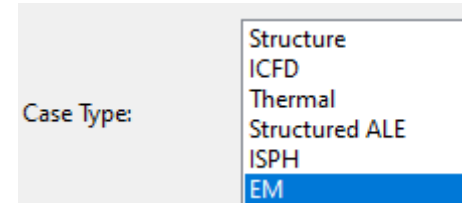
- **EM**
  - The "EM" module is added to solve the problems about **electromagnetism**. Users can load an executable keyword file and FEM data (parts, elements, nodes) by using the "Structure" module coupling the "EM" module

  - Support to do following analysis
    - Eddy Current
    - Inductive Heating
    - Resistance Heating
  - Do the coupling analysis of "Structure" and "EM". And the FEM data and mechanical settings like initial conditions, boundary conditions, connectors and contacts between the FEM parts should be built in the "Structure" module
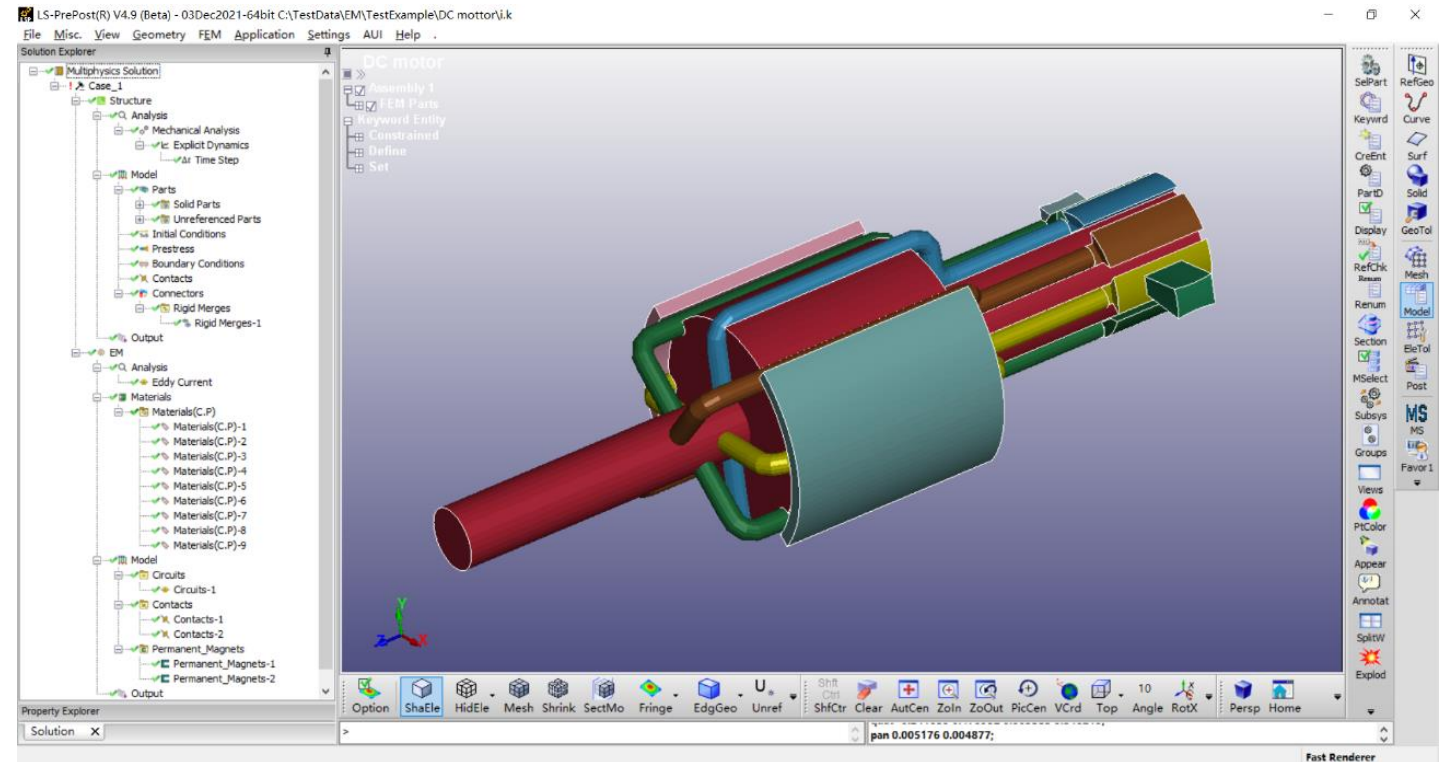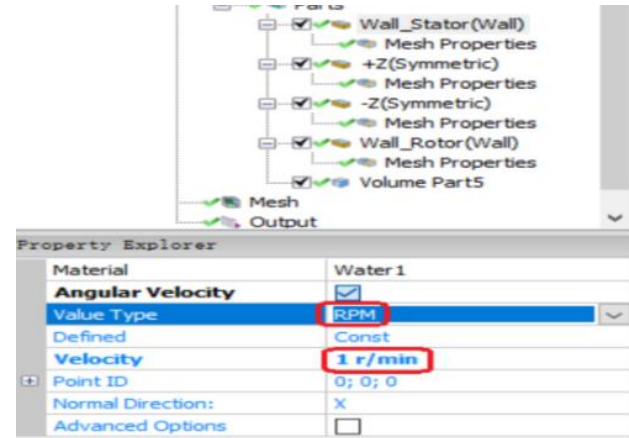

  - "TEAM 3" problem, "Rail gun" problem and "D.C Electric motor" can pass the test by using this "EM" module
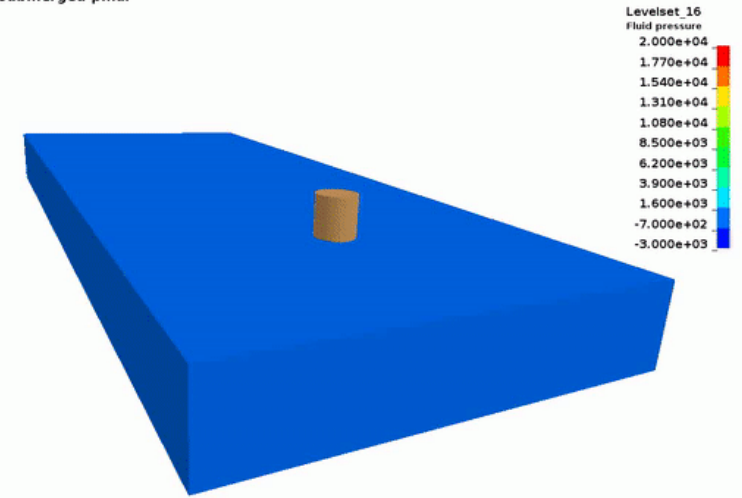
View → Solution Explorer → ICFD

- **ICFD**
  - Add the unit for "velocity"
  - Add prescribed turbulence condition
  - Add initial turbulence condition
  - Add -X,-Y,-Z in Load Body->"Options"

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Contours of ForChain
min=0, at node# 5096
max=63.4491, at node# 12048

Fringe Levels
3.000e+00
2.700e+00
2.400e+00
2.100e+00
1.800e+00
1.500e+00
1.200e+00
9.000e-01
6.000e-01
3.000e-01
0.000e+00

Fringe Plot Options

Main menu "Settings" → "General Settings":

- Add of "Fringe Scale Factor"
  - Multiply and Divide
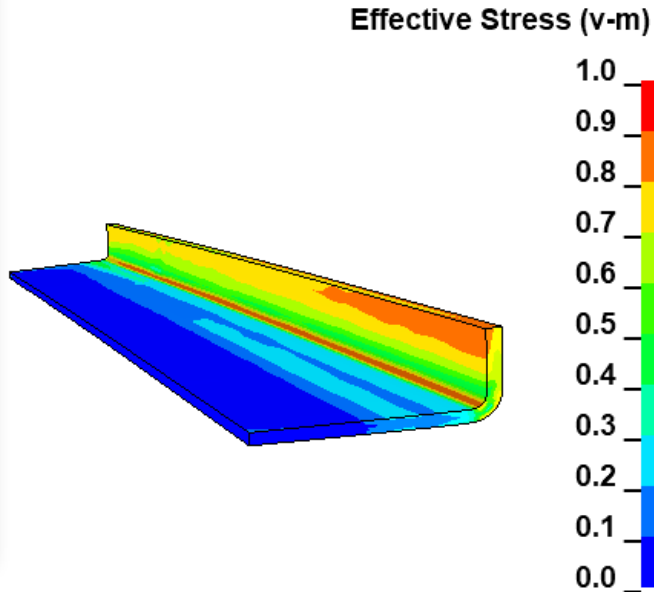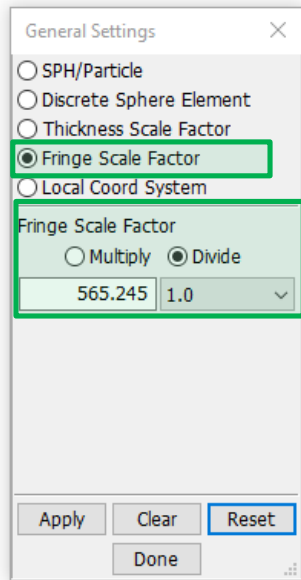
Post → FringComp (Fringe Component) → Stress:

- Add of Component "*Signed Von Mises Stress*" (in *Post → History* interface too)
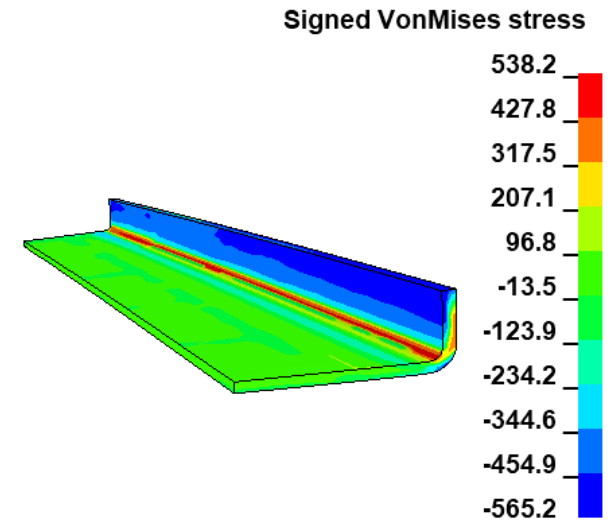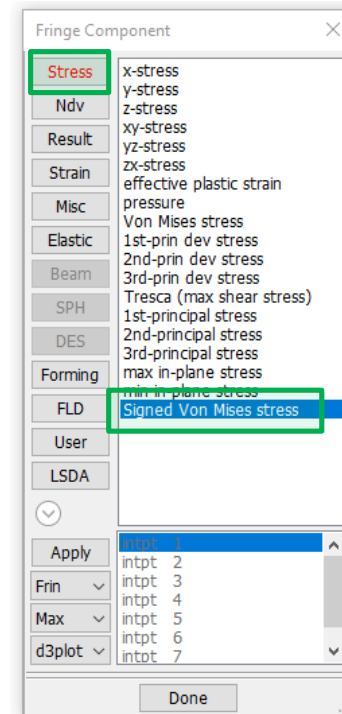
Fringe Plot Options

Post → FringComp (Fringe Component)

- Iso-surface: support TSHELL

- Fringe now recognizes *INITIAL_TEMPERATURE in LS-DYNA keyword input decks

- Fringe Strain: Reduced components
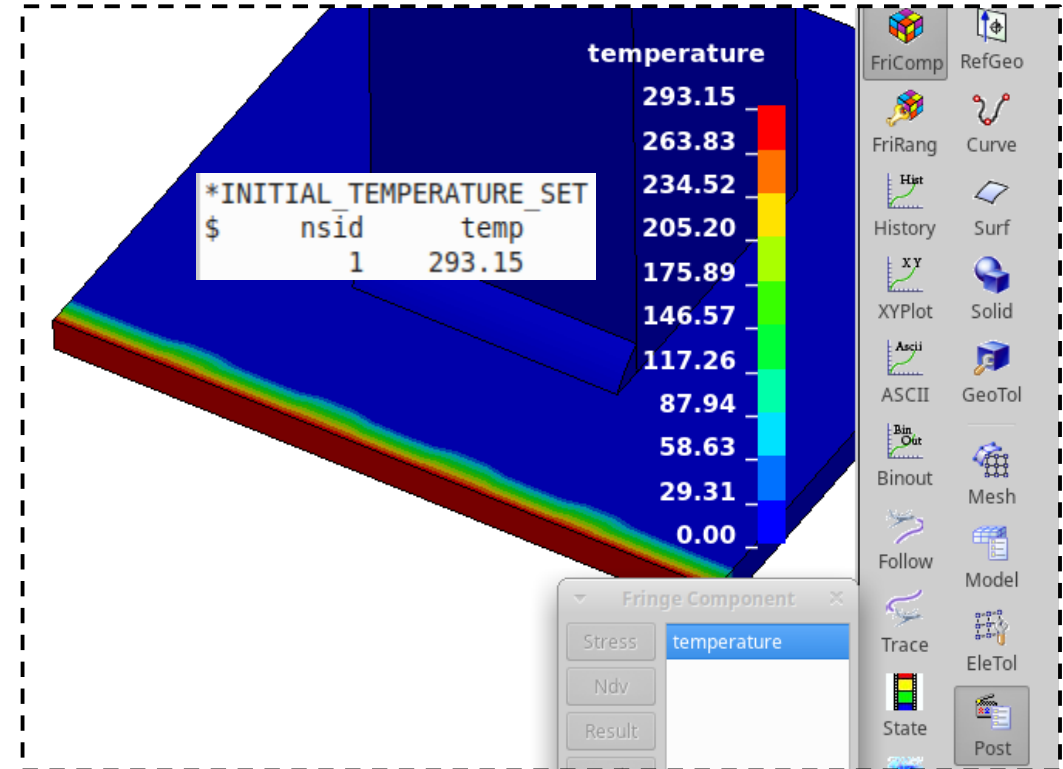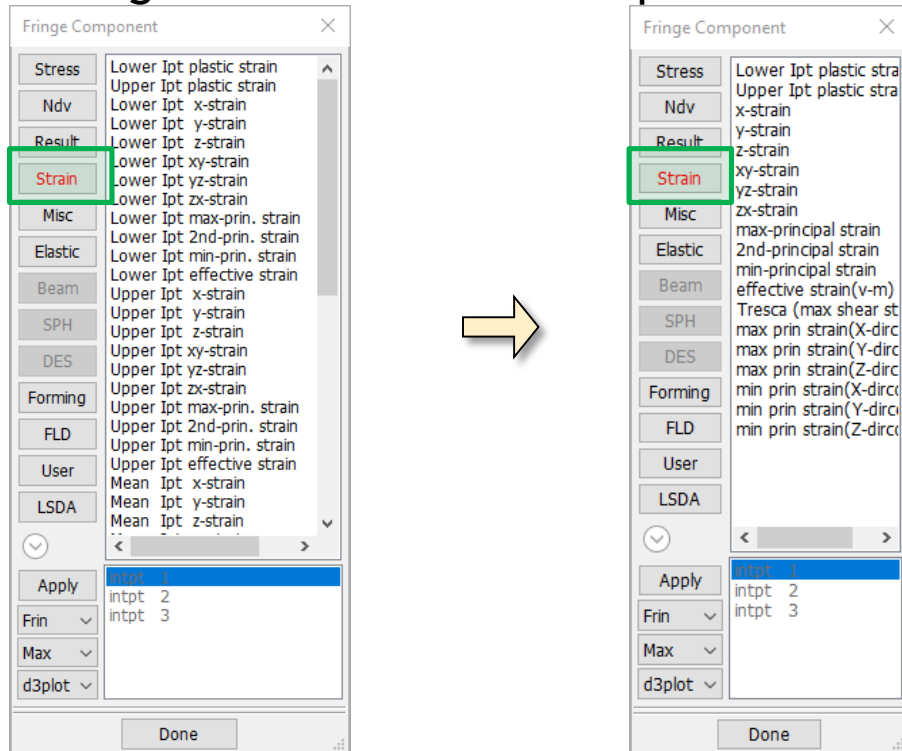
Fringe plot

- Fringe plot the shortest distance between two groups of segments in *EleTol → Measure*
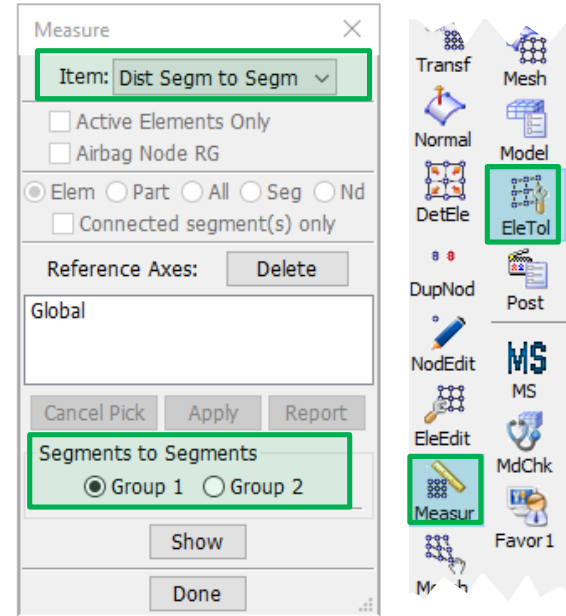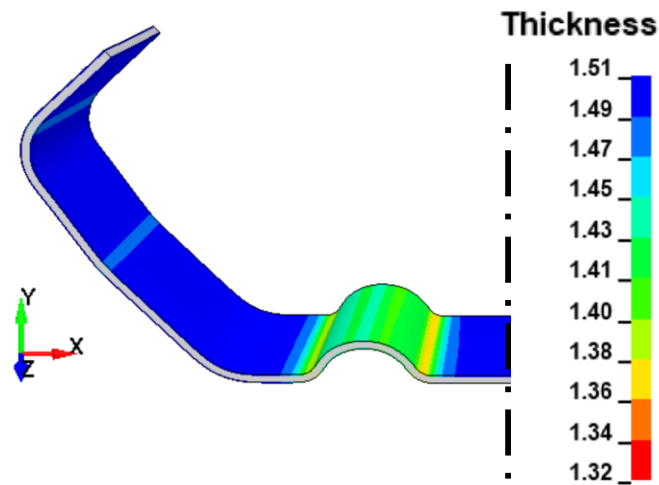
- Fringe plotting of solid thickness and %thickness reduction if *DEFINE_FORMING_SOLID_SURFACE is present to define the two opposite sides of the solid

Resultant vector in intfor

Post → Vector → Force Resultant

- Resultant force vector is now implemented
  - A yellow resultant force arrow is computed from the currently visible force vectors in an "intfor" file
  - The resultant value and its components are written to the message dialog when the checkbox is toggled ON

Total Element Force Vectors

```
22.53
20.27
18.02
15.77
13.52
11.26
9.01
6.76
4.51
2.25
0.00
```

resultant = 2028.288574 (0.064523, 0.460880, -2028.288523)
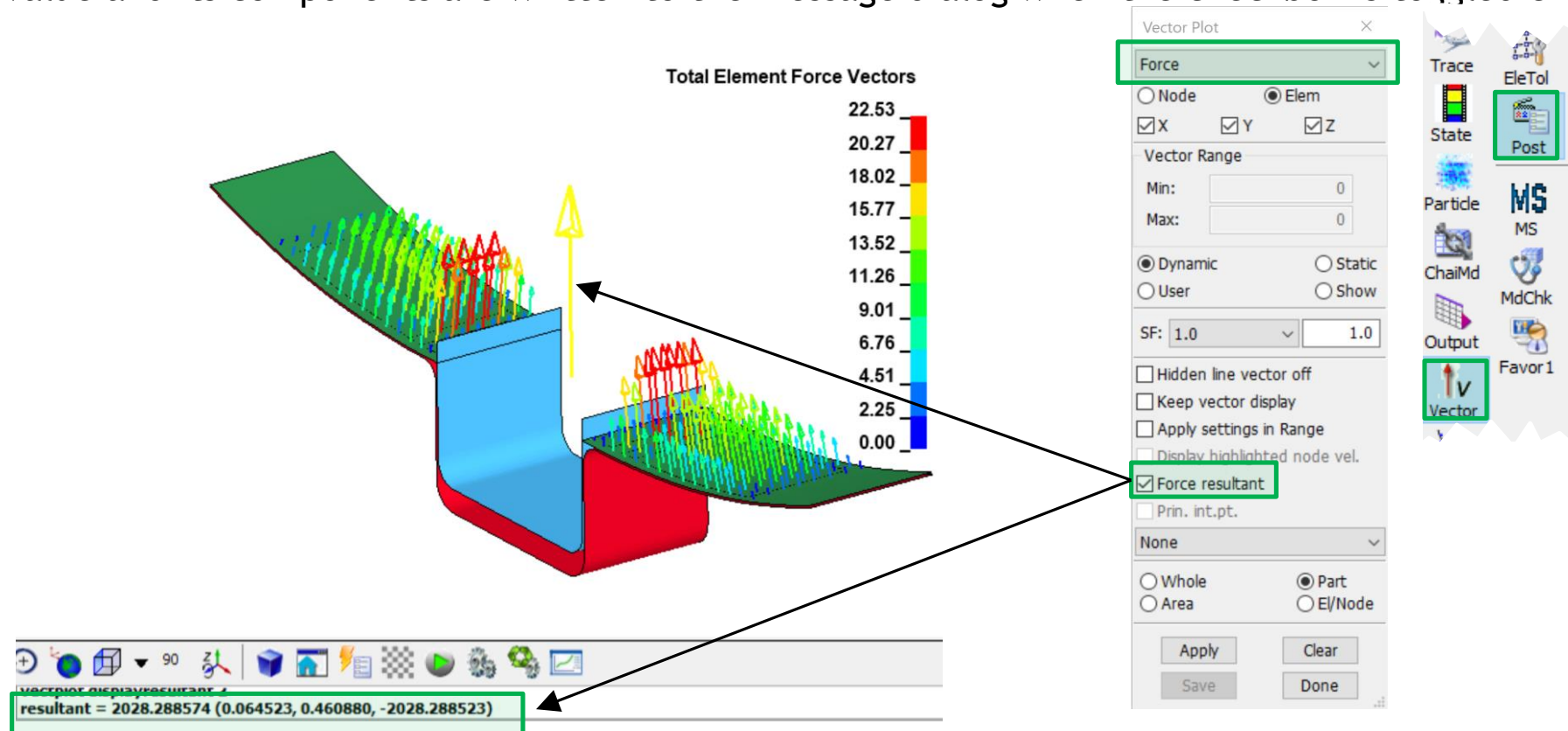
ALE/S-ALE – *EleTol→Measure*

■ Support measure points of S-ALE mesh box

- ■ Model → Display Entity: "S-ALE mesh box" in Entity Display dialog first
- ■ Then select method item "Dist SALE Points" of the EleTol→ Measure dialog:

■ Interface force file: dynamic fringe label for special SPH, ALE

EleTol→ Measure

- Output of tributary area is now supported in the message box:
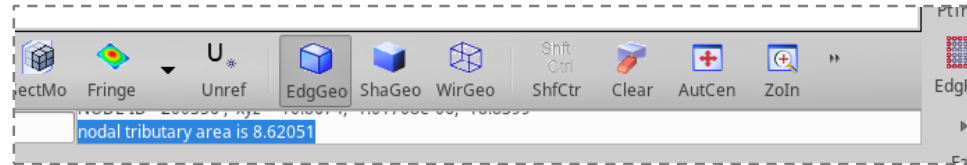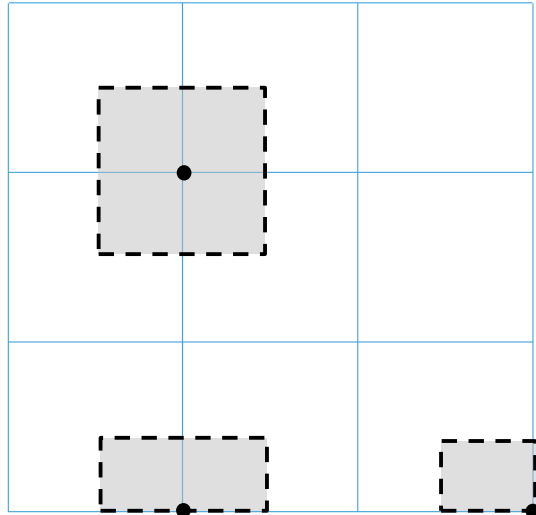
- Scale factor for mass, area and volume
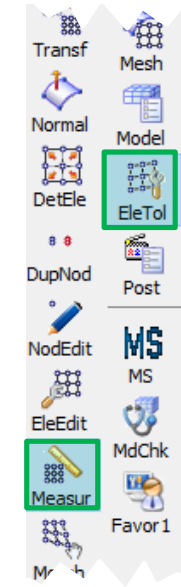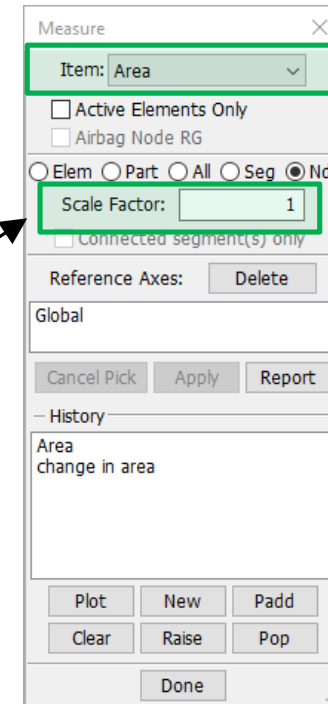
SPH fringe and SPH Post Output

■ Support fringe for history variable

■ Post → Output

  ■ Output SPH surface to STL
  ■ Support SPH mass output

```
*ELEMENT_SPH
  1000001    101    4.2000e-07
  1000002    101    4.2000e-07
  1000003    101    4.2000e-07
  1000004    101    4.2000e-07
  1000005    101    4.2000e-07
  1000006    101    4.2000e-07
  1000007    101    4.2000e-07
```

Tip

■ Post → Output tool is very useful for example (FAQ in support):
  ■ Output the *NODE coordinates of the last animation d3plot state
  ■ Output of the current strains and stresses in LS-DYNA keyword cards *INITIAL to use the initial values for follow-on simulation (DYNAIN)
  ■ Output of the current fringed element or nodal values and re-import with the FringeComp>User

Post → Trace and Streamline

■ Add a Flow Curve tracing tool
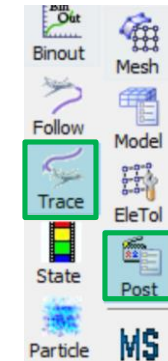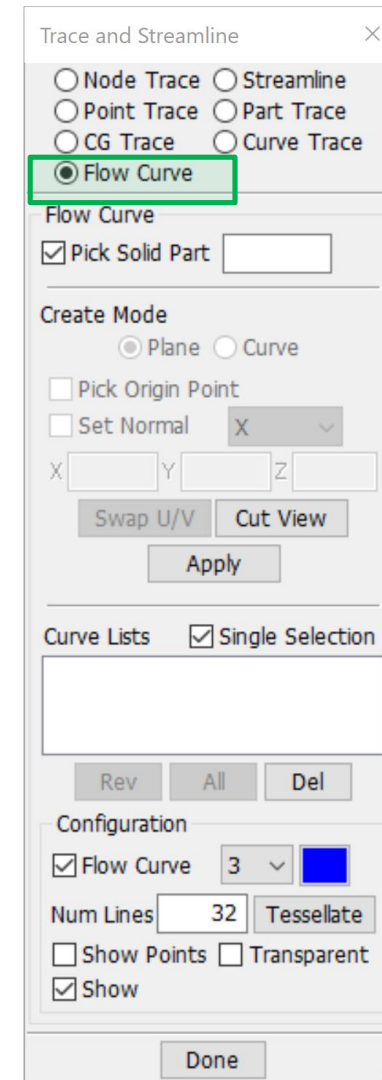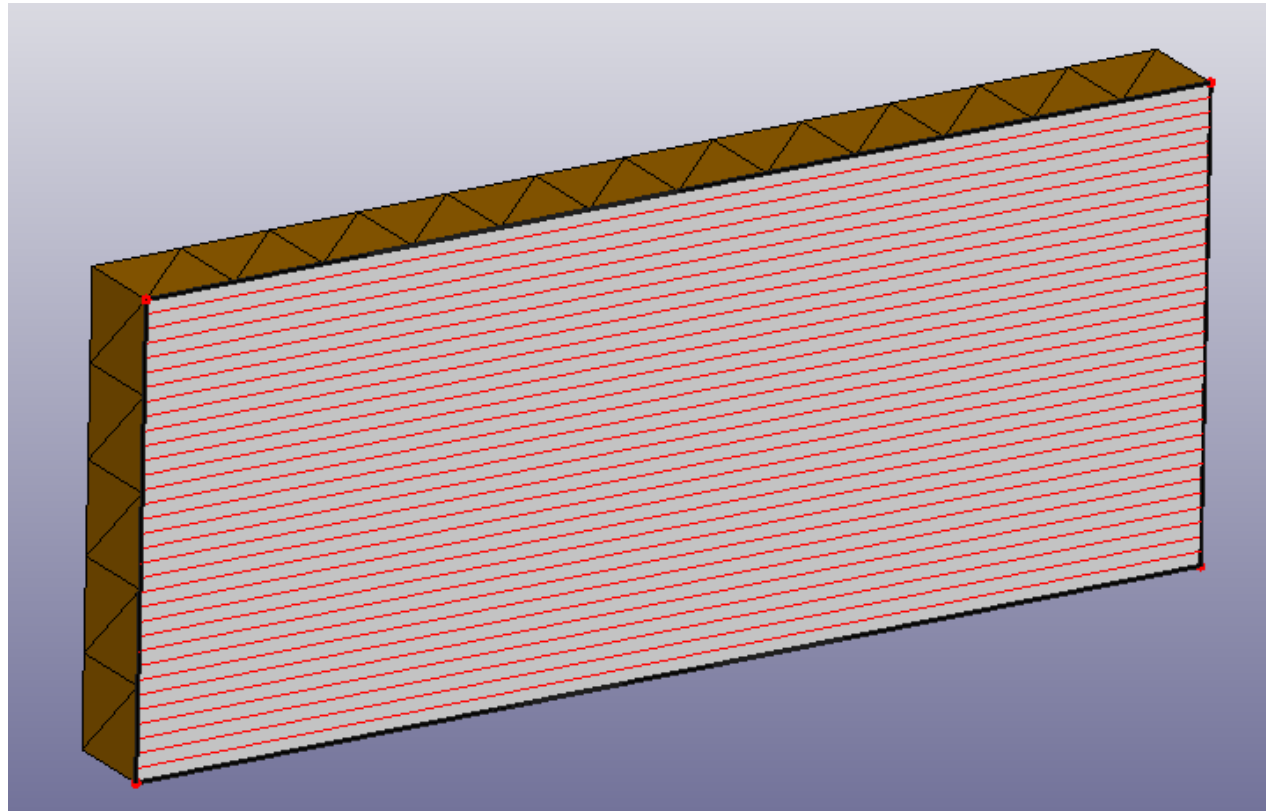
View → *Ignore Deleted Elements Flag*

- Since 2021 a new option is added in LS-DYNA to write results to d3plot/d3part for deleted elements
- In LS-PrePost the option "Ignore Deleted Elements Flag" ignores element deletion information:

Ignore Deleted Elements Flag: OFF

Ignore Deleted Elements Flag: ON

Element History from d3plot
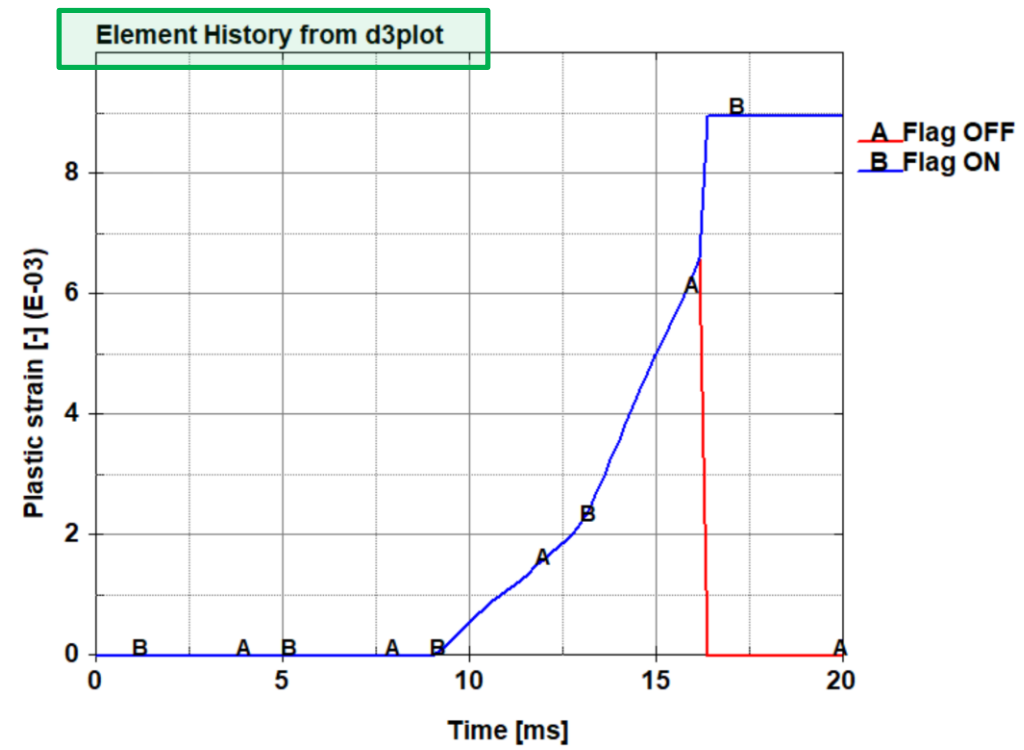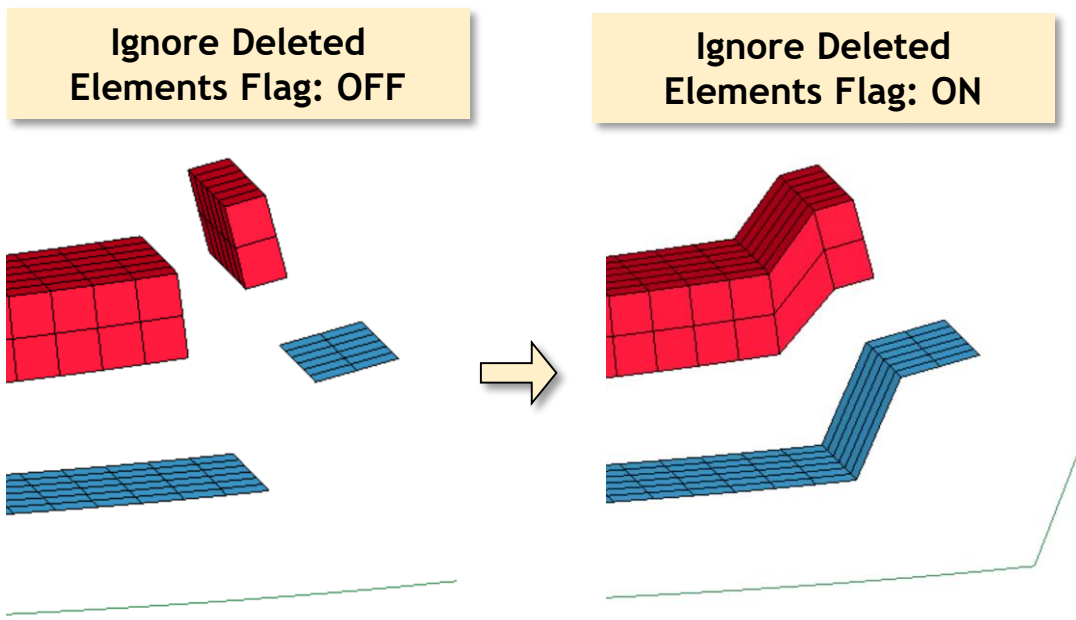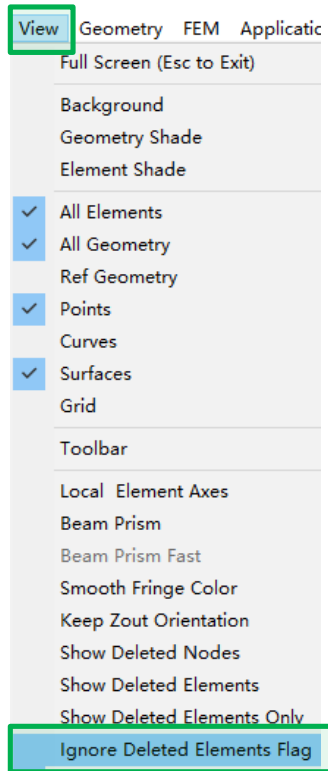
Post →ASCII / BINOUT / MS-ASCII

- **Binout interface**
  - NodFor: Apply local CS to Force
  - Support for derived strain components, like max, min principal strain, effective strain
  - Support for searching part id in "matsum" branch
  - Support for bndout branch's "set id" feature
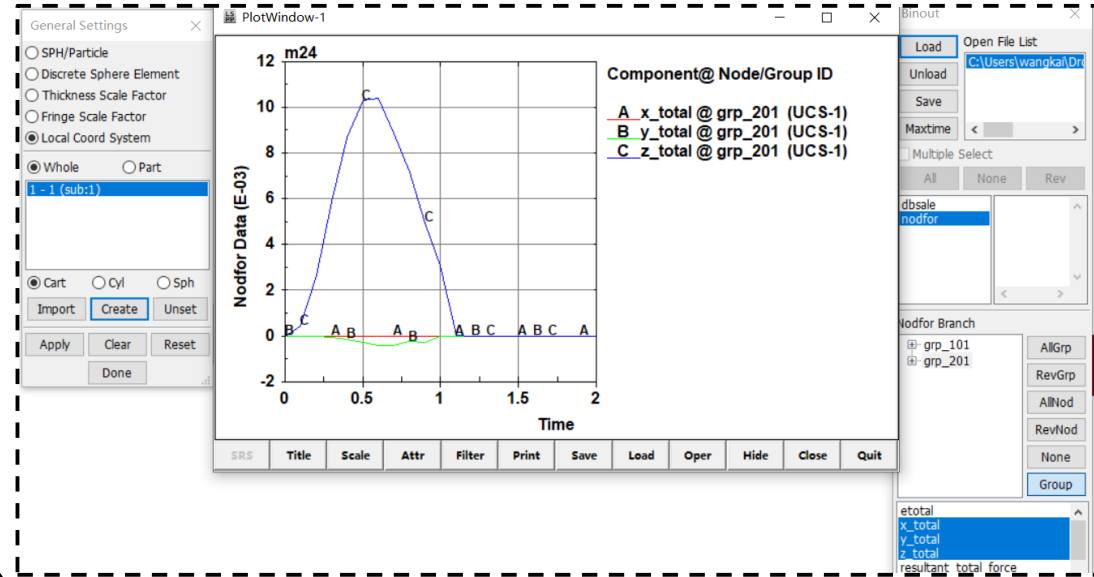
- **ASCII interface**
  - Support for the eloutdet node global strain of ASCII reader
  - Support for the dem pattern post processing

- **MS-ASCII**
  - Support for new component of icfd_point.
  - Support for plotting xy-data from em_magnet file

POST → XYPlot

Z:\Downloads\bndout\rcforc

- If force is plotted against displacement, there will now be a red point to trace the values while animating through the simulation (when "Timeline" option is activated). This feature is only available when the plot is created in combination with the result files (d3plot), such that the time-scale is somehow available.

Tip

- Import of multiple CSV data possible:
  There is no unique standard for the csv header.
  These input formats are supported from LS-PrePost:
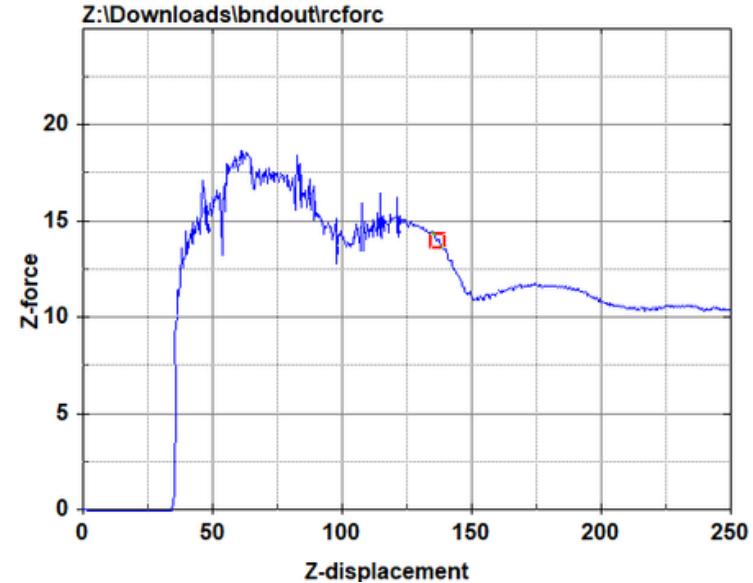
```
===============================================================================
/* Designed to handle three types of .csv formats
form==1.   First is x-value rest are y-values. At least on y-value is needed.
xvalue1, yvalue1_1, yvalue1_2, ...
xvalue2, yvalue2_1, yvalue2_2, ...
...

form==2.   First column is always abscissa, If a curve label is called [Tt]ime, then
           it is abscissa. Otherwise ordinate
Abscissa, curvelabel1, curvelabel2, [Tt]ime, ...
xvalue1, yvalue1_1, yvalue1_2, ...
xvalue2, yvalue2_1, yvalue2_2, ...
...

form==3.
Window label, Ordinate
Abscissa, curvelabel1, curvelabel2, [Tt]ime, ...
number1, number1, ...
number2, number2, ...
===============================================================================
```

Common („old") curve plot manager
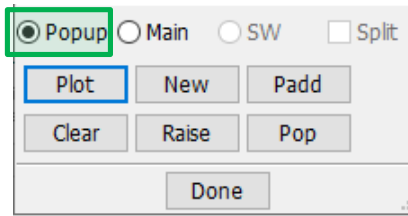
- Filter option: Support for multiple curves to force to zero per SAE J211.

- Improve the history New button's behaviors when no XYData is ready (don't create the empty window)

- Support for "Exp to Decimal" and "No. of Digits"

- Output option at "Info" tab: Write in the message box the part id or curve legend label of the curve with the maximum y-value
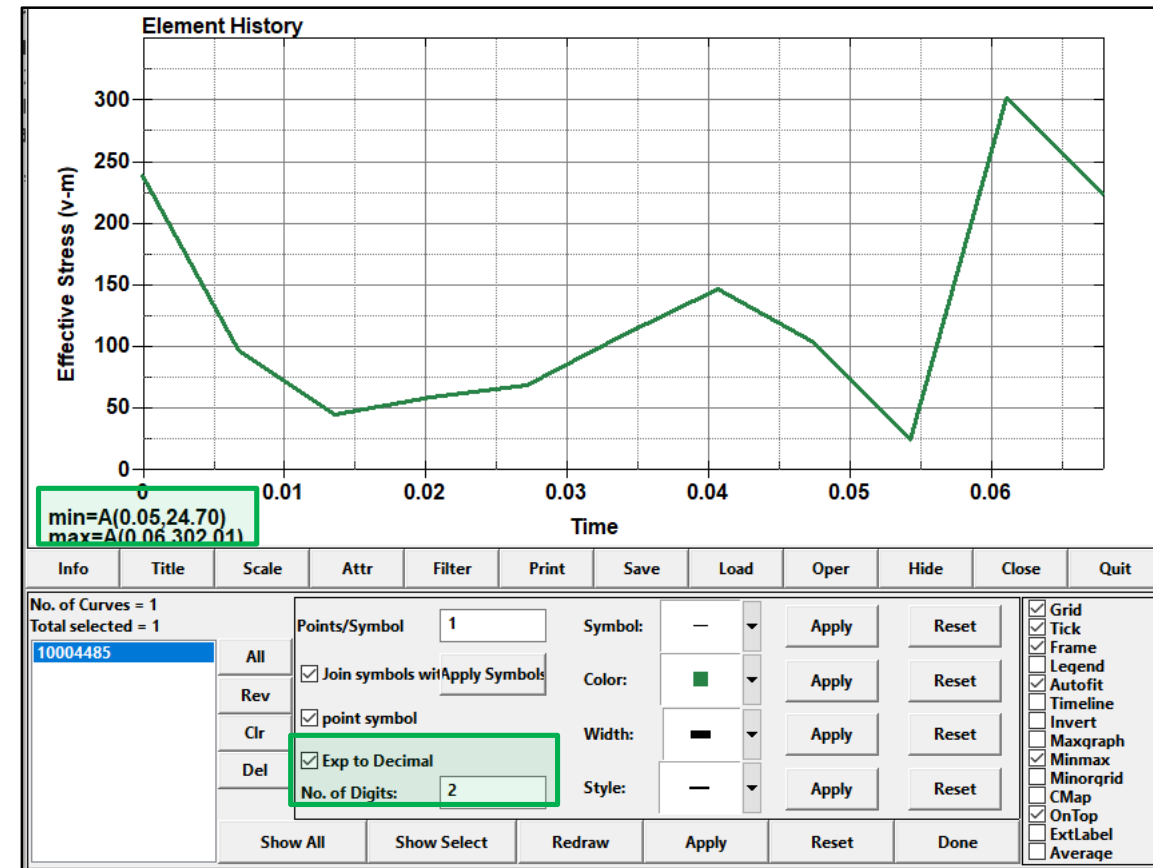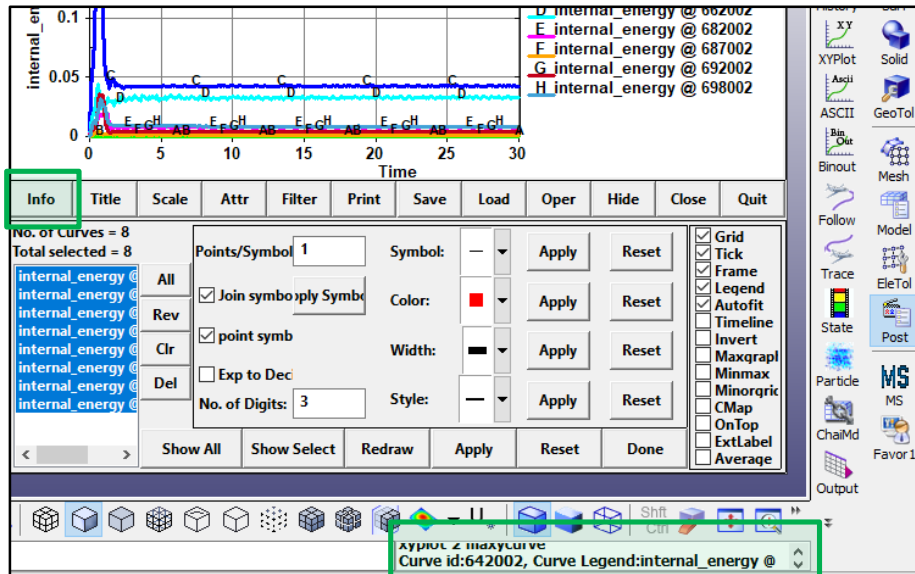
„New" 2D curve plot manager

- 2 start options for new plot manager:
  - Bottom toolbar icon "Plot Manage"
  - "Main" option in curve selection interfaces

  Open the 2D Graphics Viewer and plot the curve also in the GUI main window
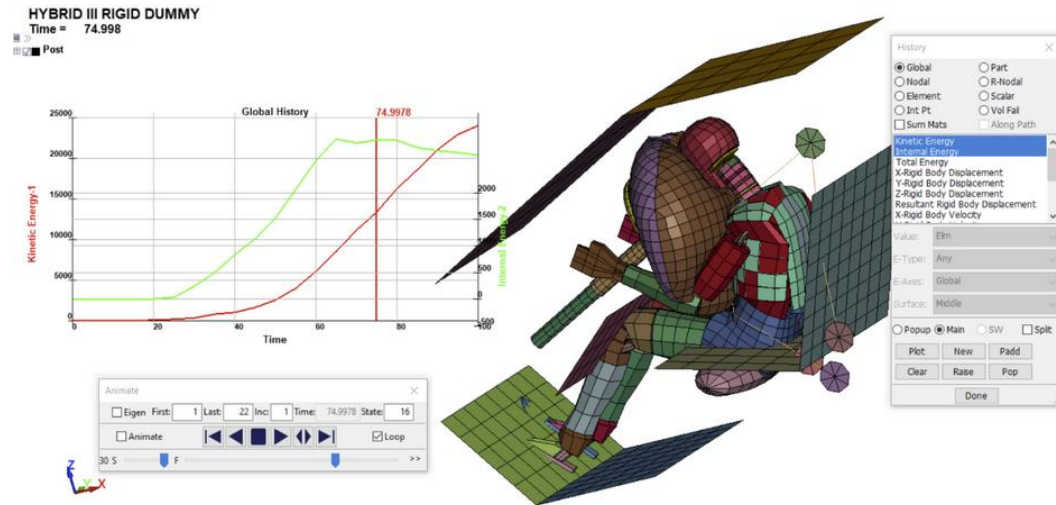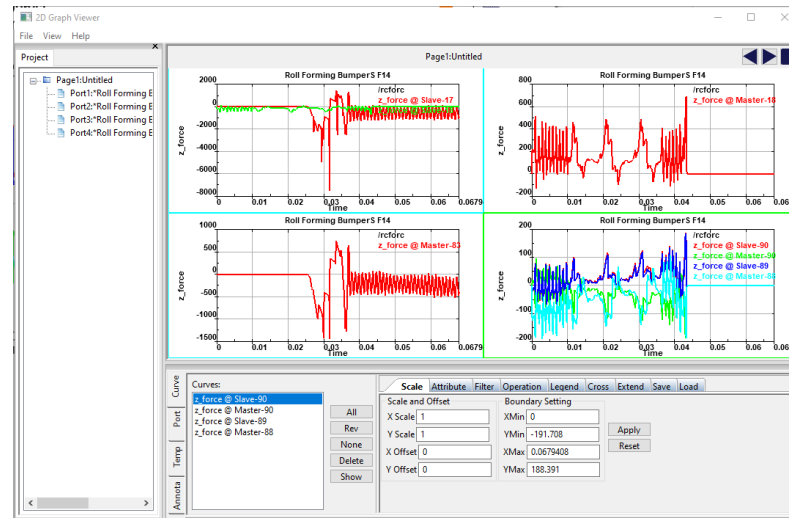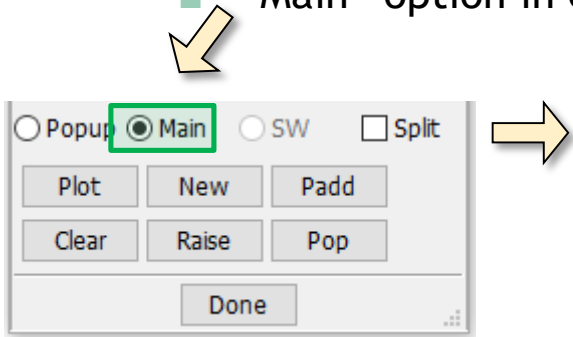
- The (new) XYPlot frame can …
  - show multiple ports of the 2d curves page by page
  - Modification of legend position
  - Cross panel for crossing plotting of curves (2D/3D)
  - "Template" option to save curve plot settings ("LineColor", "LineStyle" and "Name")

Tip

- Support for timeline on the multiple view
- Support for no graphics mode
- Support for DEM pattern post processing

New
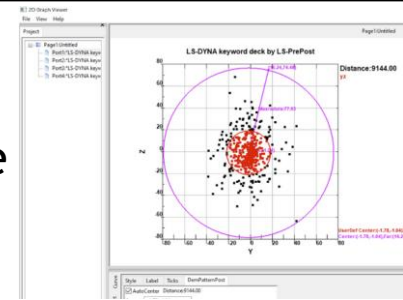
Movie Output

Main menu "File" → "Movie"

■ LS-Prepost 4.9 support create a movie at background. It is more quickly to avoid freezing main window. Also, fps works for the new movie format(MP4, H264)

Movie Dialog	✕
Format	MP4/H.264 ⌄
Repeat	1 ⌄
Size	Current Viewport ⌄
Window size(WXH)	
1430 X	778
FPS: 5.5	
File Path Browse	
D:\testdata\ball_plate	
File name	
movie_000	
Gamma(0.5-2.0) dark-light	
1.0	
☑ Create Movie background	
☐ Use Playback File ...	
D:\testdata\ball_plate	
Start Cancel	
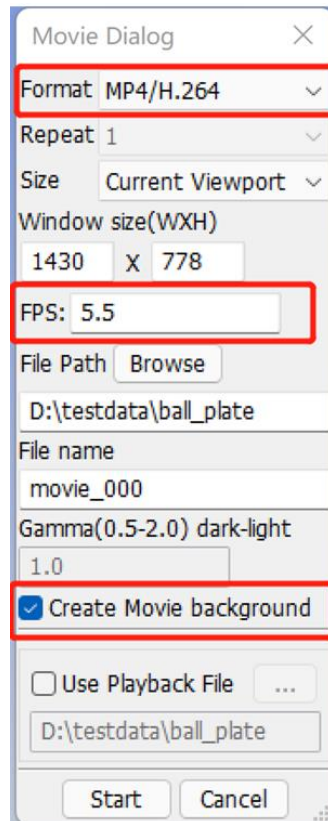
Data output

Post → Output

■ Suppress output of the *INITIAL_xxx keyword cards of rigid parts

```
*INITIAL_STRAIN_SHELL
$#      eid     nplane    nthick
2595,0,0
$#    epsxx    epsyy     epszz     epsxy     epsyz     epszx
0.0,0.0,0.0,0.0,0.0,0.0
$#    epsxx    epsyy     epszz     epsxy     epsyz     epszx
0.0,0.0,0.0,0.0,0.0,0.0
2610,0,0
0.0,0.0,0.0,0.0,0.0,0.0,0.0
0.0,0.0,0.0,0.0,0.0,0.0,0.0
```

Agenda

- **LS-PrePost – The Team**
- **LS-PrePost - Version Overview**
- **Recent Developments**
  - Pre-processing
  - Post-processing
  - Miscellaneous
- Conclusions

EM Electromagnetic forming problem
Time = 0.00010001

conductor
Temperature
1.125e+02
1.071e+02
1.017e+02
9.630e+01
9.089e+01
8.548e+01
8.007e+01
7.467e+01
6.926e+01
6.385e+01
5.844e+01
5.304e+01
4.763e+01
4.222e+01
3.681e+01
3.140e+01
2.600e+01
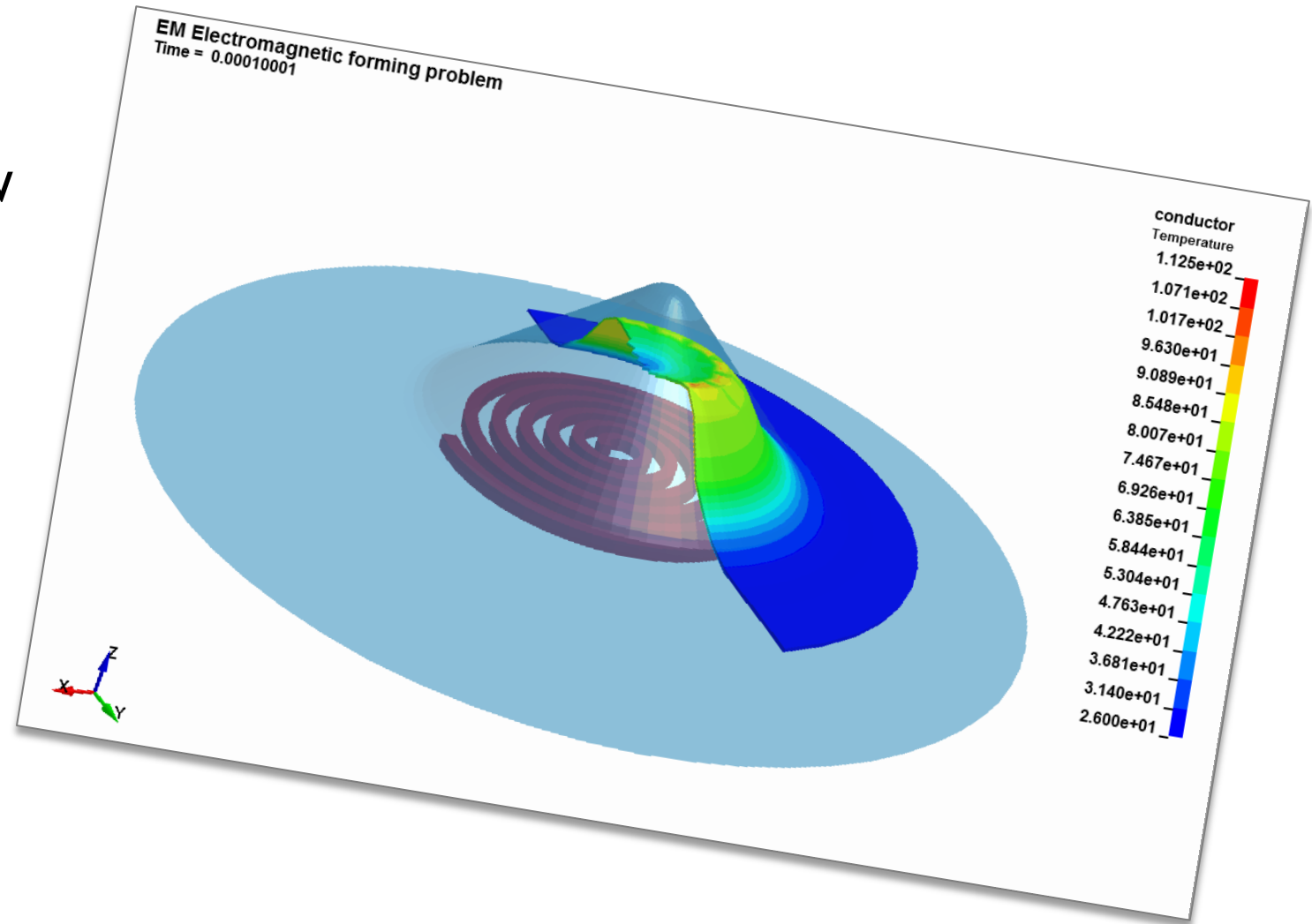
Misc.

- „Double precision" version now is available
  - Both pre-processing input deck and post-processing result can be handled
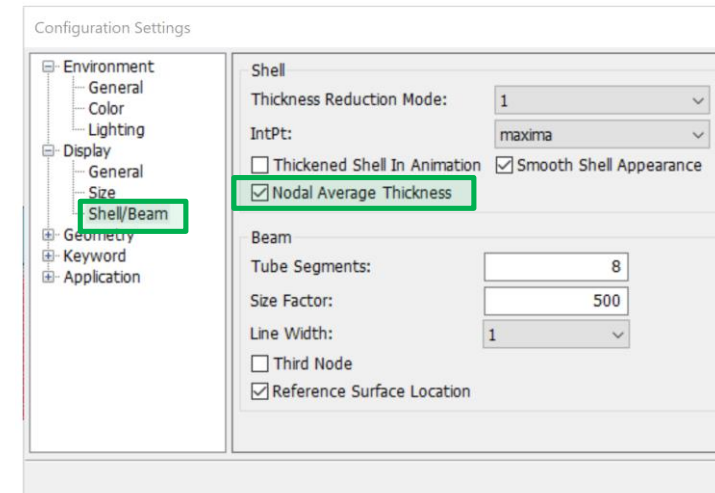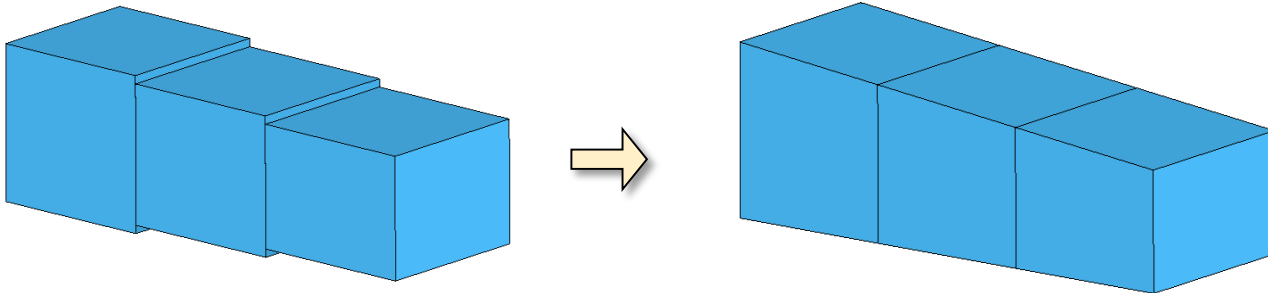
- *Misc.→Moldex3D*
  - Mapping fiber orientation tensor, volume fraction and residual stress

- Femzip file import
  - Improve efficiency of animation with fringing at 1st time
  - Support for loading 8 nodes shell model

- Nodal average and non-average thickness option for beams and shells:
  Settings→*Configuration*→*Display*→*Shell/Beam*→*Nodal average Thickness*

Misc.

- Add compare of d3hsp option in
  Misc. →D3hsp View
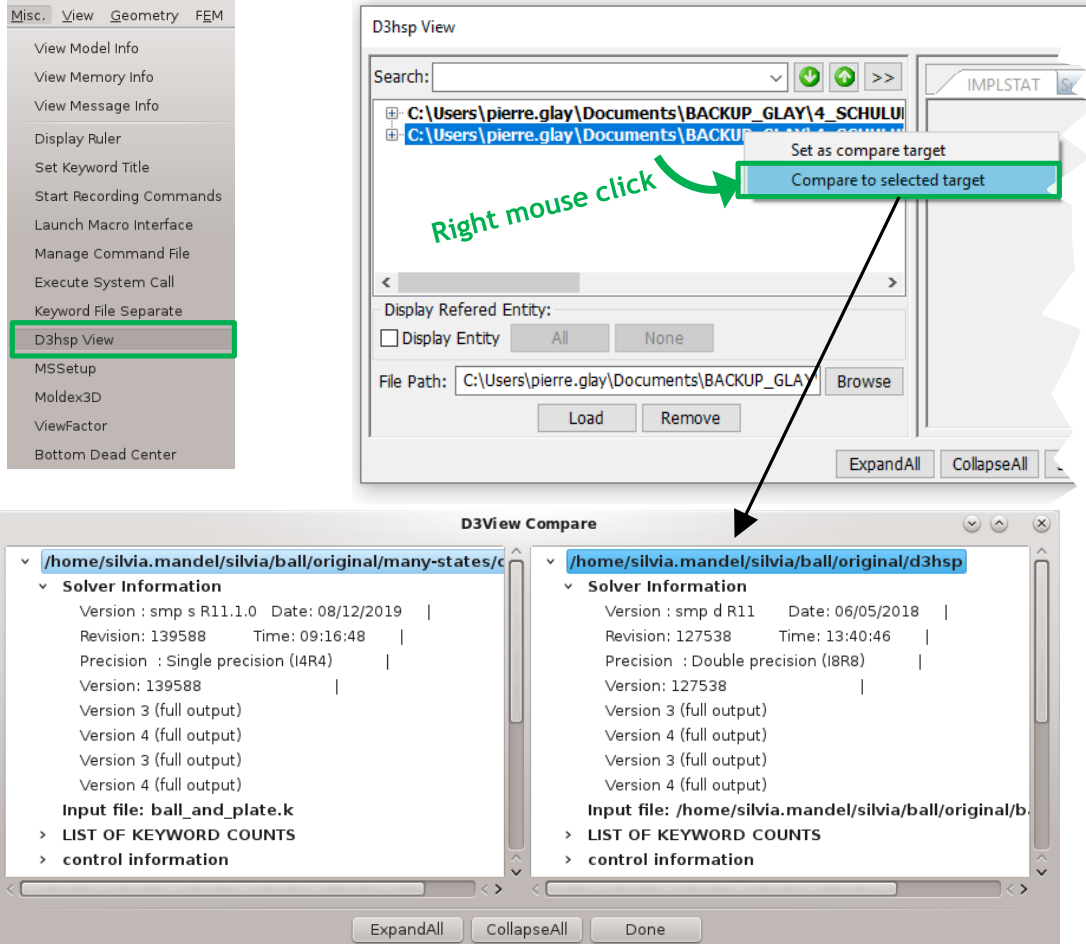
- Binary d3lsda file in Windows version:
  - Support to import and export
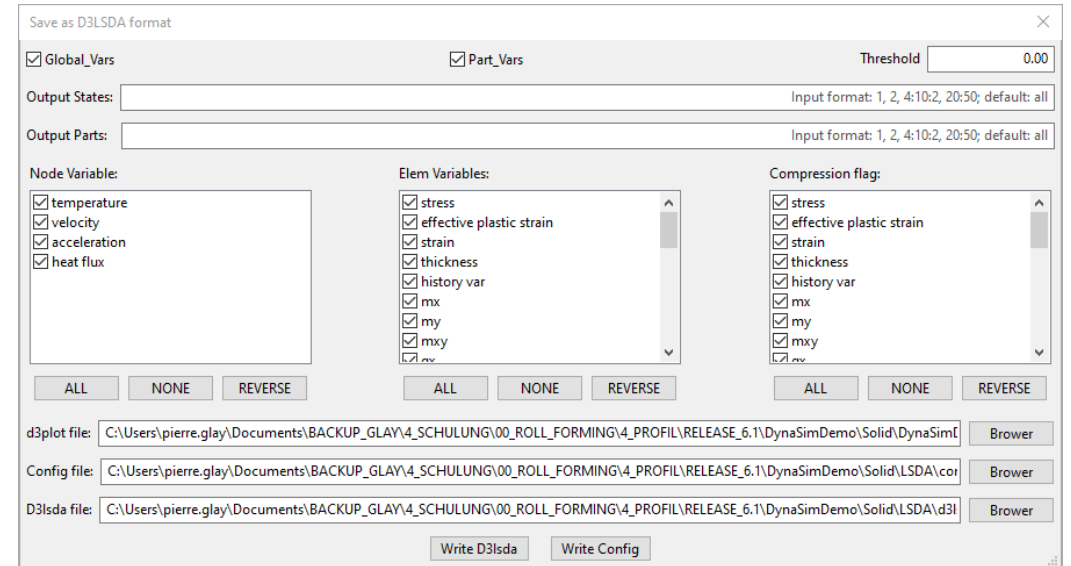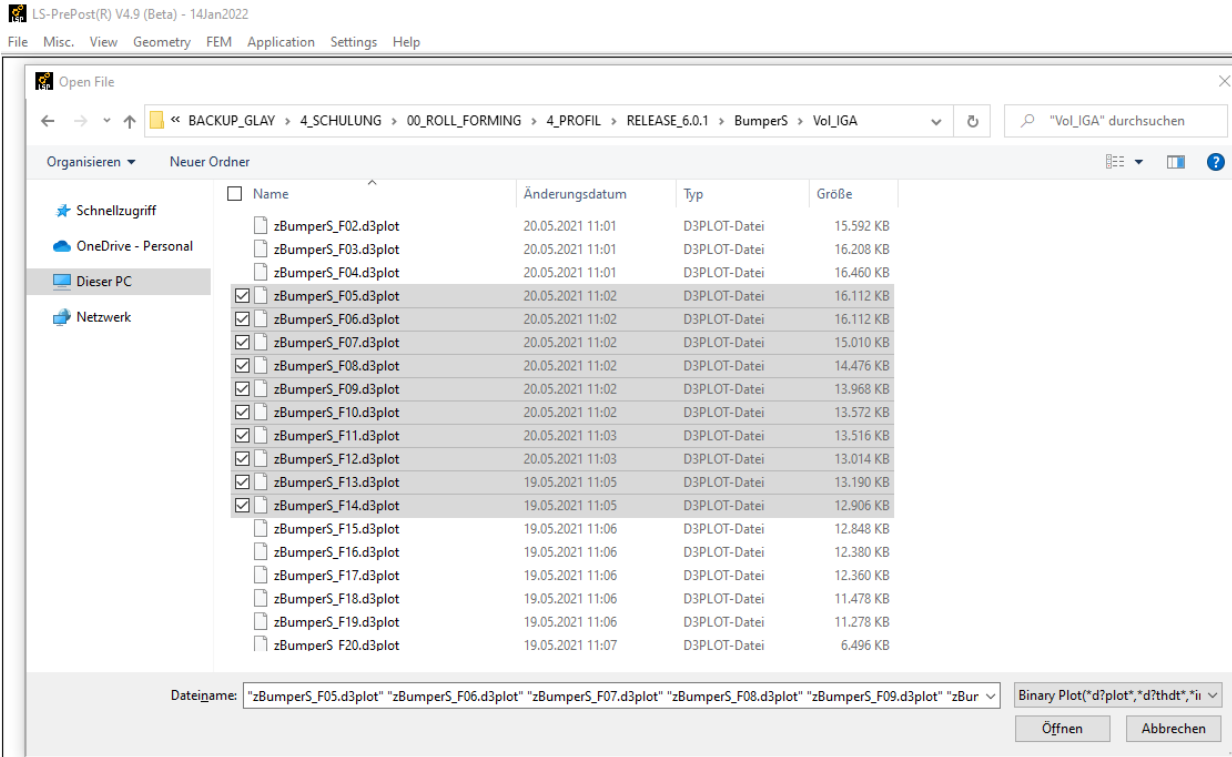 - Support to set the output (such as compress, output variables, threshold…)
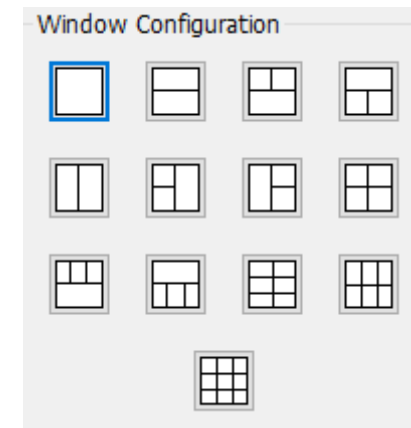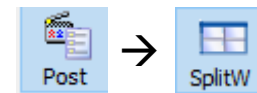 - Support binout for lsda fringe

Misc.

- D3plot: *File→Open* to load multiple sets of d3plot files simultaneously.

- **Tip**

- Interesting functions for multiple d3plot import:

  - Chaining the models to one model view:

  - Split option for the main window to show multiple d3plot models:
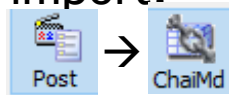
"Diff Parts" option in compare function of keywords models

- Model → MSelect (Model Selection)
  → Compare: Diff Parts View

  - Diff Parts option available to color parts with differences between the two compare models.

  - Parts are automatically saved in the LS-PrePost selection buffer → Follow-on processes with these detected parts are possible

Subsystem Manager

- Support multiply models on "Subsystem Manager" dialog and copy keyword between models

- ⭐ Tip
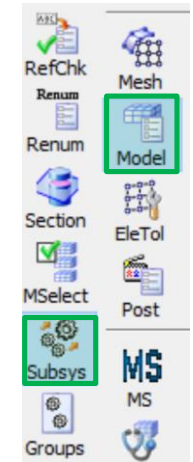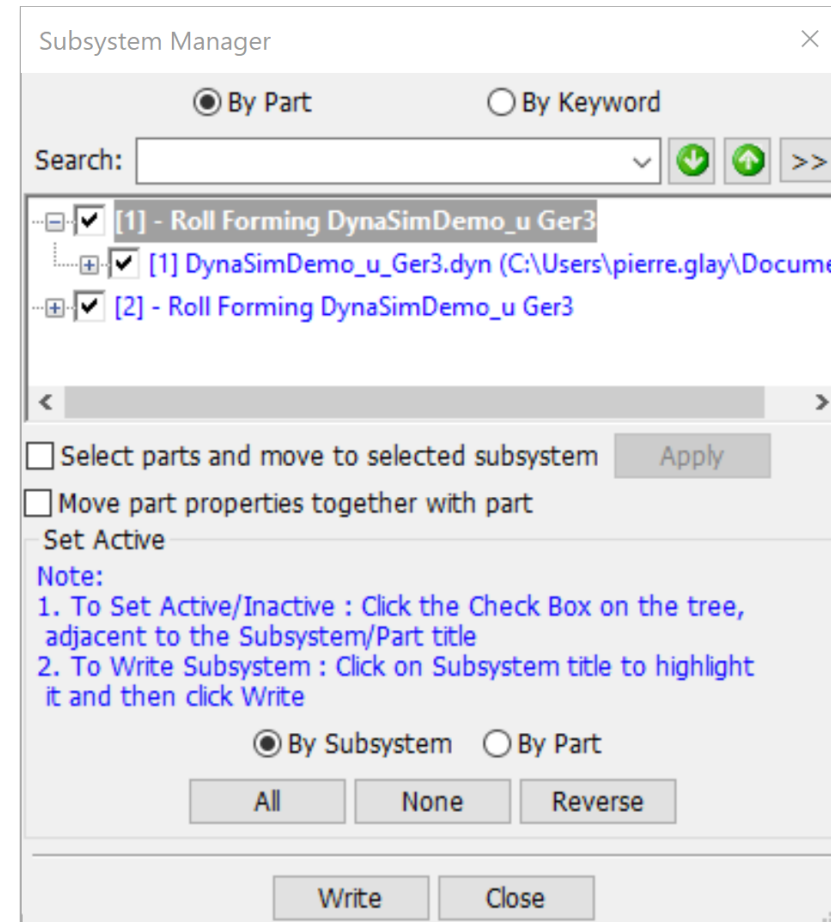
- The so-called "Subsystems" in LS-PrePost means the separate keyword files which are used in a LS-DYNA keyword model by using the *INCLUDE keyword.

Change background colors

■ **Legends and Title get some background colors (backdrop) for better visualization**

    ■ This feature can be activated by: *Settings→Configuration Settings→Display→Test backdrop*

    ■ The background colors can be changed by using following command backdropcolor R G B A where the parameters [R]ed [G]reen [B]lue and [A]lpha can have values from 0. to 1. Alpha=0.0 is fully transparent. The default values are [0.8 0.8 0.8 0.8]
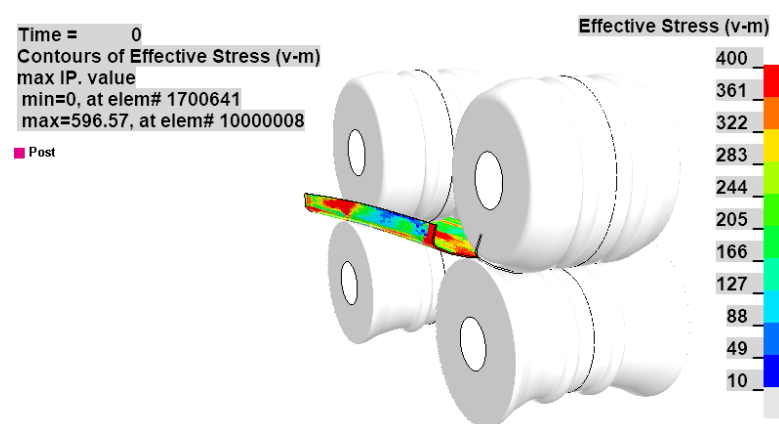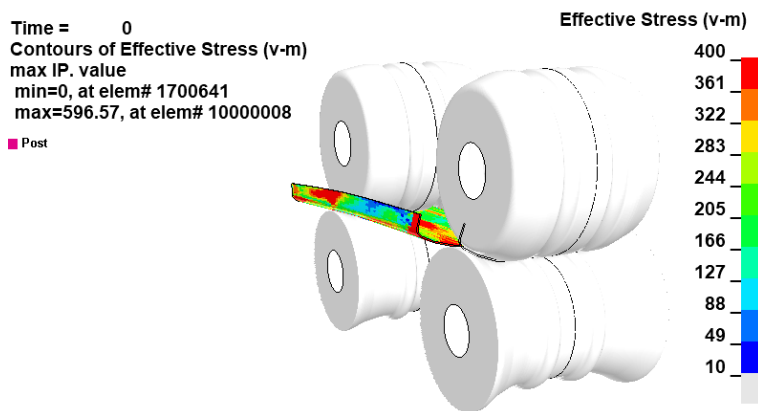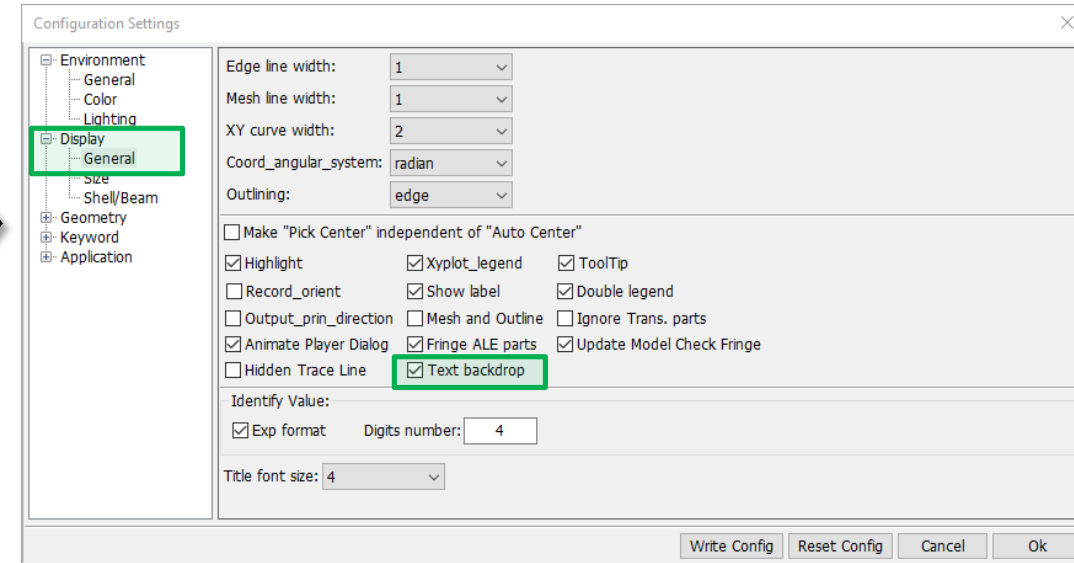
Measure Separation Geometry

GeoTol (Geometry Tools) → Measure

- Measure Separation of Faces-to-Faces
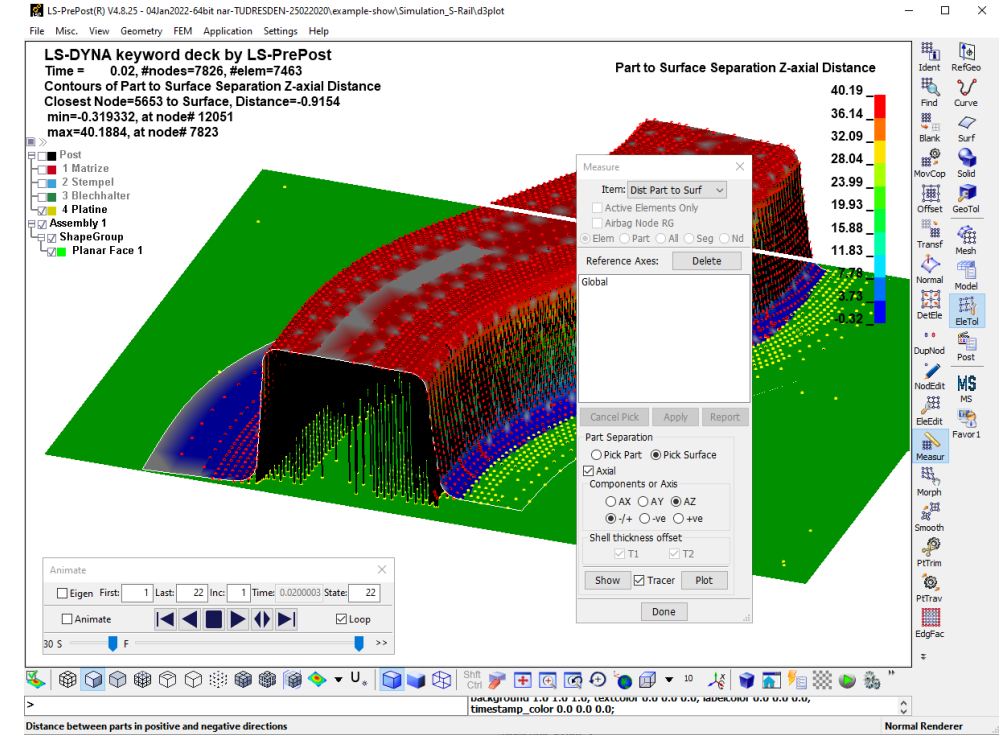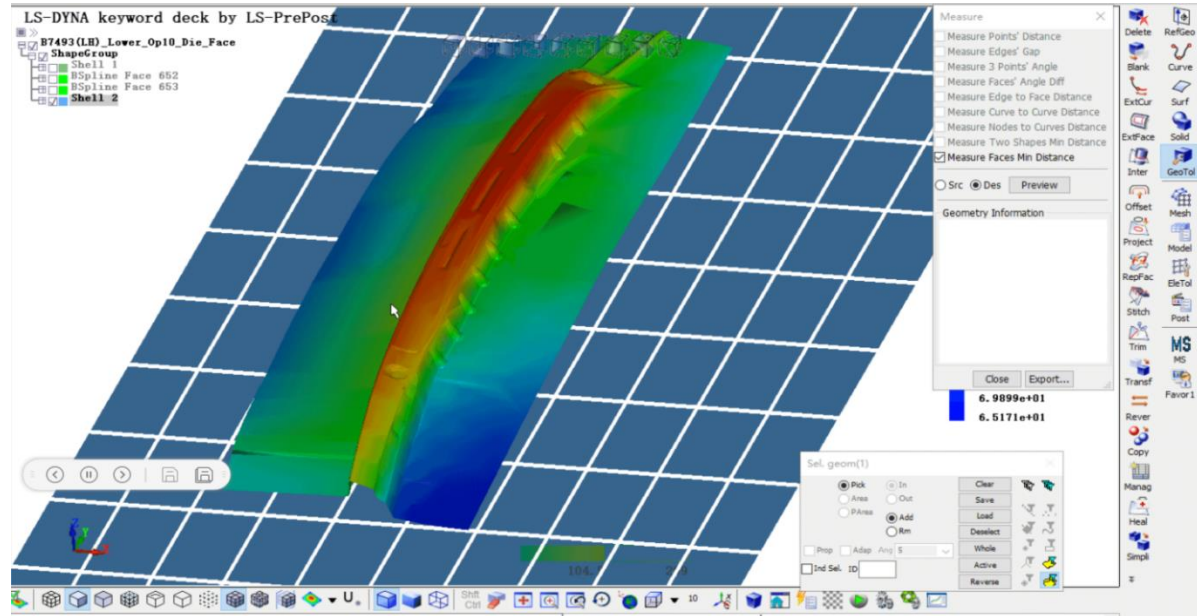
- LS-PrePost offers many different kind of separation measure tools, for example in EleTol>Measure >"Separation" or "Dist Part/Node to Surface":

Tip

Misc.

- Unicode is supported and needed by most platform
  - Without Unicode, some Unicode characters and Unicode path or model name couldn't be loaded correctly

- Compile with GTK3 on Linux
  - LS-Prepost 4.9 now is built in a special GTK3 version too.

- AUI framework (Currently only in special version 4.9)
  - New GUI are created with AUI framework. Toolbars and panels could move and float and dock.
  - The new framework makes the development more convenient and flexible, more compatible with wxWidgets.
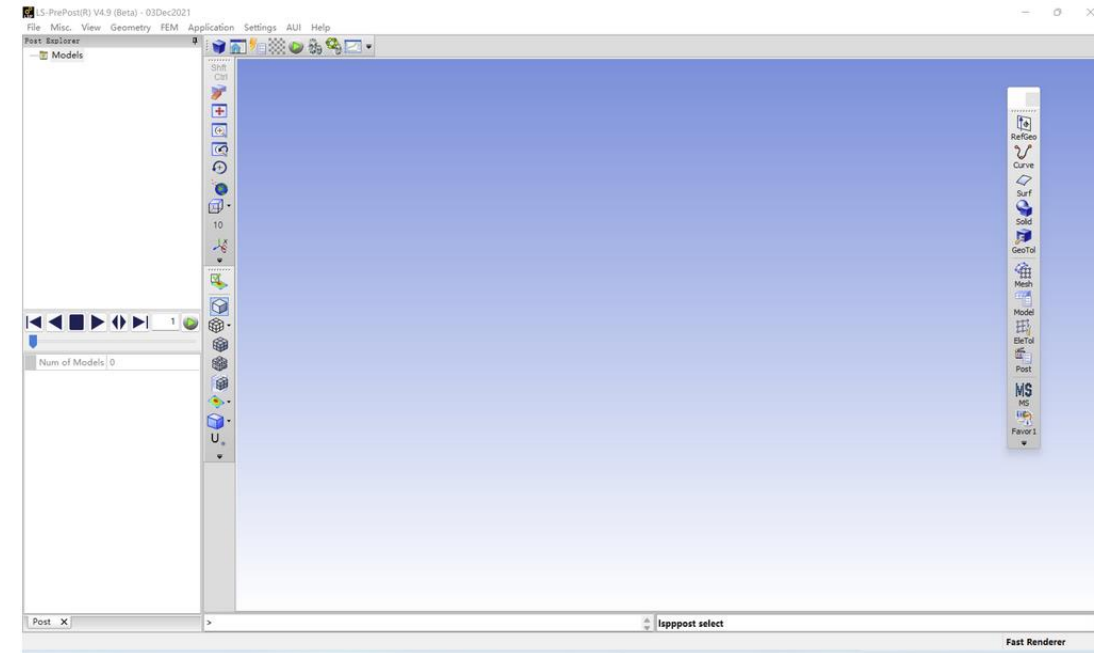
- **Tip** Many nice options to modify your GUI toolbar are possible in Settings → Toolbar Manager (e.g. user macro script as a separate icon, delete unnecessary default icons, move icons from right toolbar to bottom toolbar ,…)

VIEW → MSPost Explorer (ICFD post processing module)

■ Functions of the „MSPost Explorer" are continuously in an extension/optimization process. Following main functions are available: Section Plane, ISO Surface, Stream Line, Vector Plot, Fringe Level Set, Data Extraction, Line Integral Convolution(LIC), Attached/Separated Line, Vertex Core
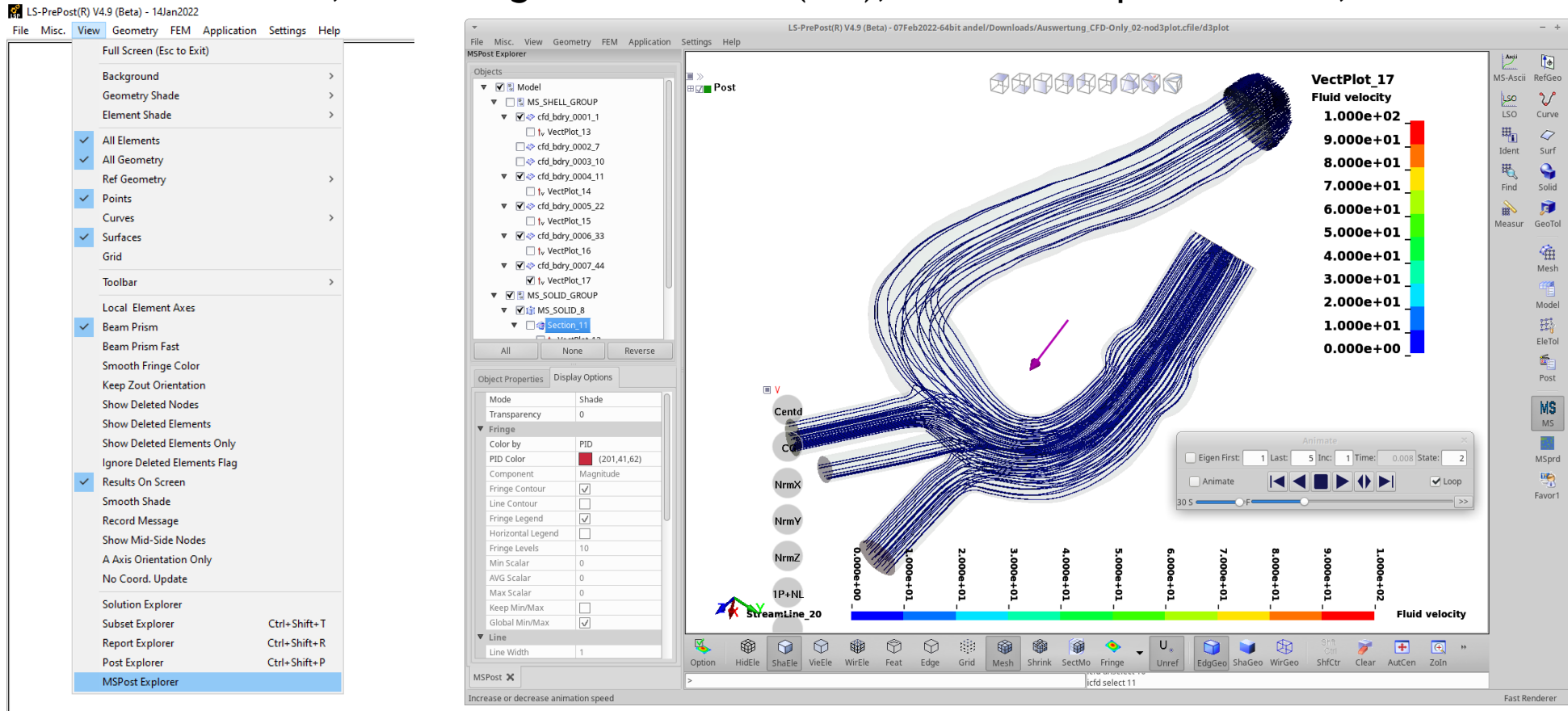
Courtesy of BioCardioLab, Italy.
http://bcl.ftgm.it/

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  - Post-processing
  - Miscellaneous
- **Conclusions**
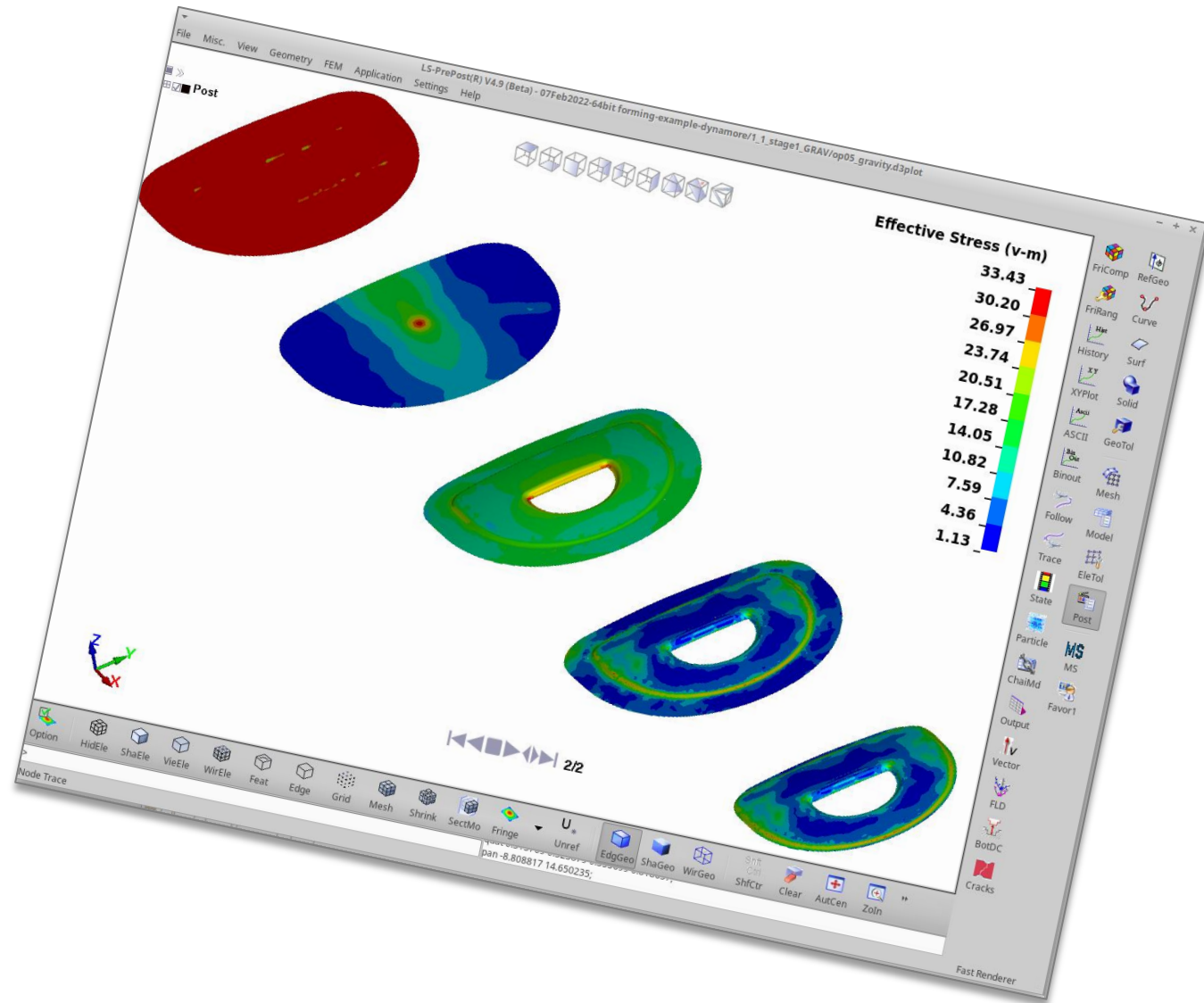
Conclusions

- LS-PrePost has been keeping up with the rapid development of LS-DYNA. LS-PrePost supported the post-processing of results and the pre-processing of input keyword setup for all kinds of LS-DYNA applications (Structure, Thermal, ICFD, ALE, EM,..).

- A main focus of the developers is to provide tools to make it more user friendly and intuitive. Many features and capabilities were implemented based on users' requests and suggestions.

- DYNAmore works directly together with the LS-PrePost developers and customer requests can be discussed very fast with the LS-PrePost developer team.

- DYNAmore and the LS-PrePost developers would like to support our customers by improving and speed up their pre- and post-processes for the LS-DYNA simulations.

- The DYNAmore LS-PrePost support team and the whole team of LS-PrePost developers are open to advice and happy to listen to our customers for their needs.

- Meet Dynamore and developers at the Dynamore conferences. The 16th German LS-DYNA Forum will take place from **October 11-13, 2022** in Bamberg and online. The forum is the main event dedicated to LS-DYNA in Central Europe.

Best Regards,
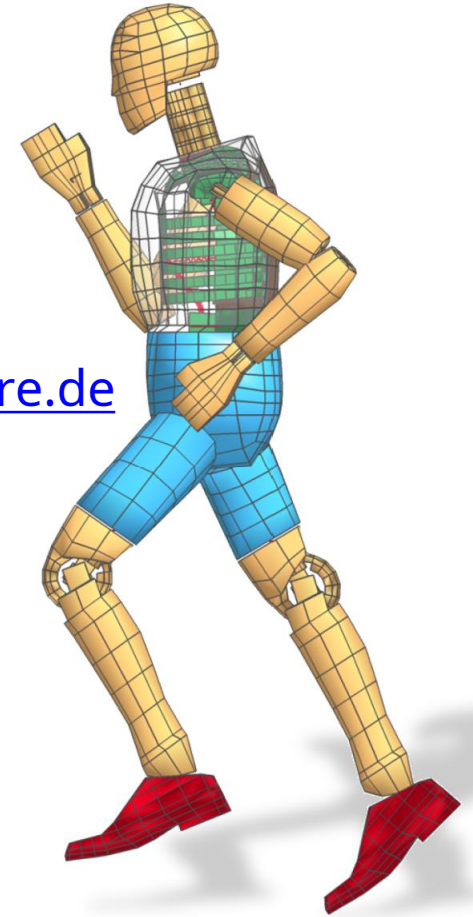*Your Dynamore LS-PrePost support team*

Thank you for your attention!

For the slides, check out
https://www.dynamore.de/en/downloads/infodays
and our **YouTube-Channel for the session recordings**.

If you have questions, feel free to contact us at support@dynamore.de
or take a look at

- LS-DYNA examples (www.dynaexamples.com)
- Papers/Conference proceedings (www.dynalook.com)
- Hints, FAQ,... (www.dynasupport.com)
- Manuals (http://lstc.com/download/manuals)

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