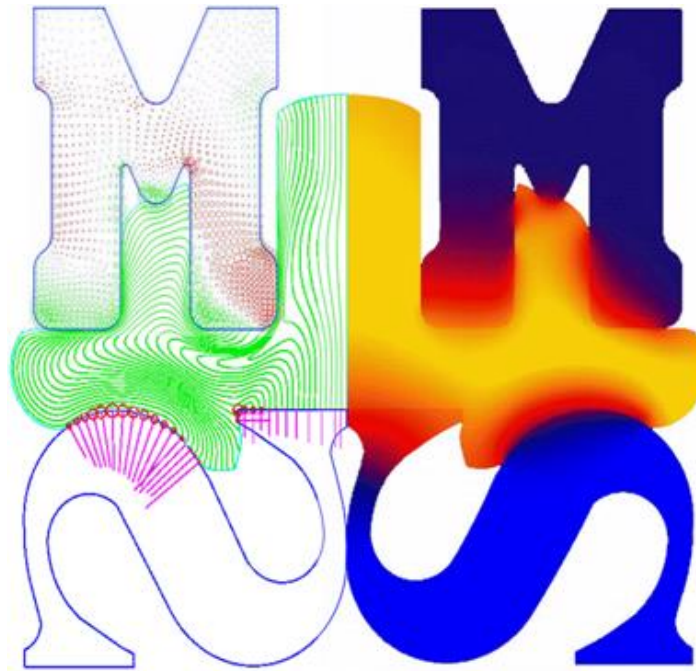


Intelligent Metal Forming Simulation

AFDEX V20R01 Release notes

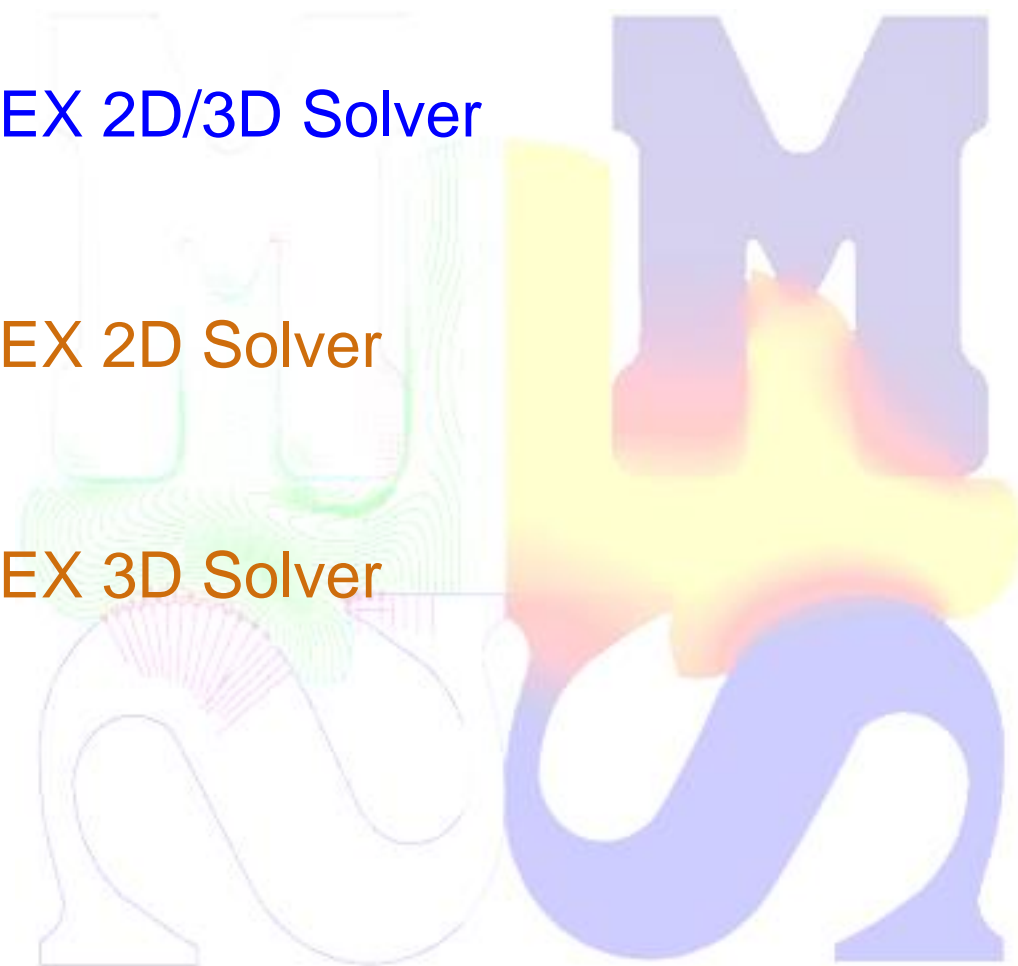


1. AFDEX 2D/3D Solver

2. AFDEX 2D Solver

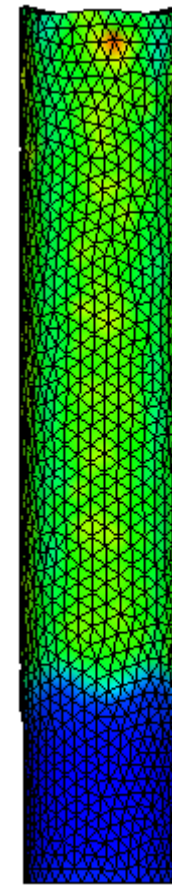
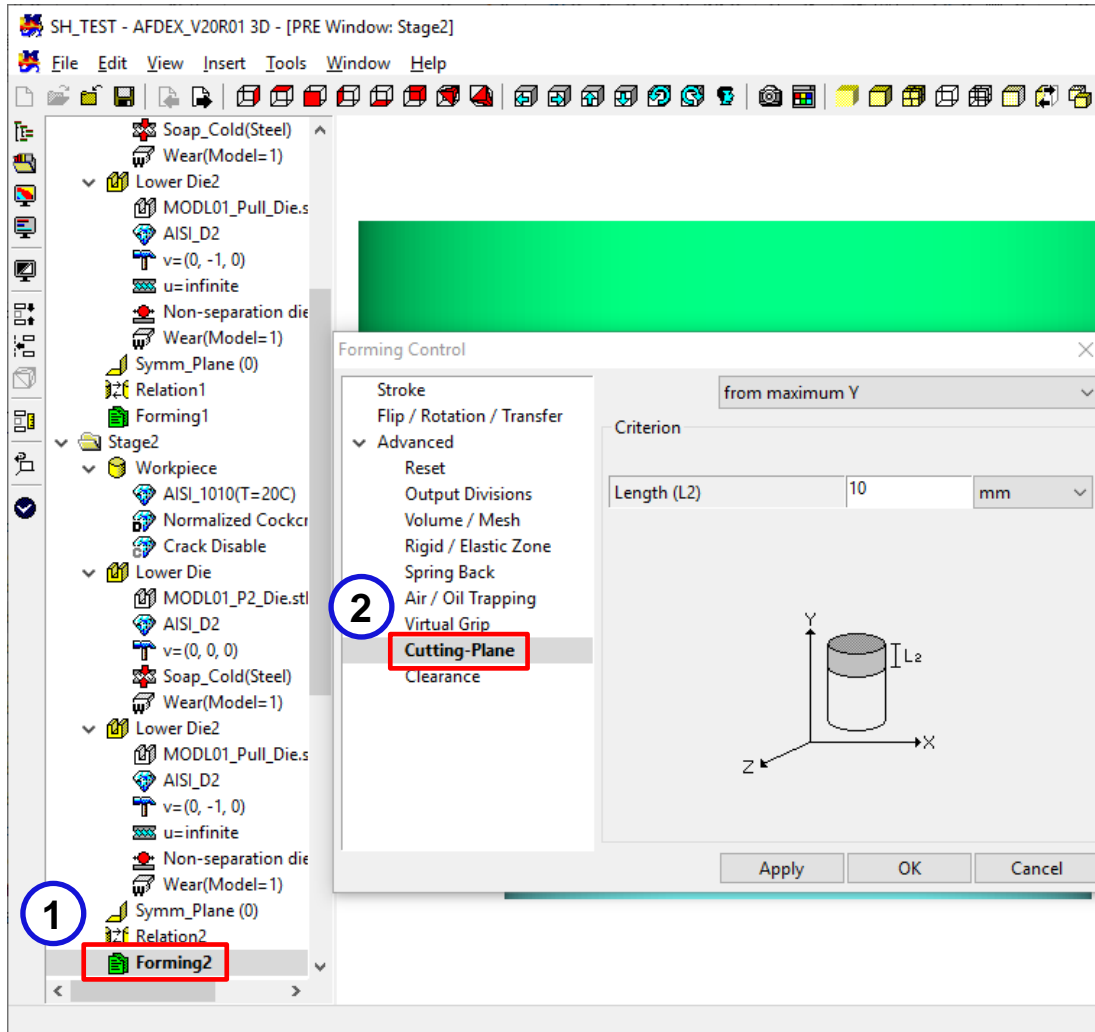
3. AFDEX 3D Solver

4. GUI

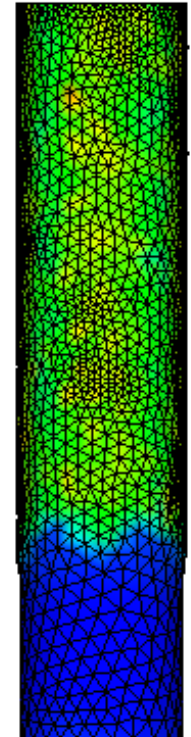




1. Improved cutting-plane



Stage 1 last step



Stage 2 first step

- 2D: Improved the feature and a change in terminology (Trimming -> Cutting-plane).
- 3D: Added



2. Improved crack analysis

The screenshot displays a 2D finite element analysis (FEA) software interface. The main window shows a stress-strain plot with a color gradient from blue (low stress) to red (high stress). The plot shows two vertical bars, one on the left and one on the right, with a horizontal bar connecting them at the bottom. The stress is highest at the bottom of the vertical bars, indicated by the red color. The plot is labeled with 'DEX' and 'STRAI' on the y-axis, and 'E+001' on the x-axis.

Overlaid on the main window is a 'Crack...' dialog box. The dialog box has a 'Crack' tab and a 'Kill Element' dropdown menu. The 'Crack Criterion' section contains two rows: 'Critical Crack' with a value of 0 and 'Critical Normalized Stress' with a value of 0 and a unit of 'MPa'. The 'Crack Weights' section contains five rows: 'Weight (W1)', 'Weight (W2)', 'Weight (W3)', 'Weight (W4)', and 'Weight (W5)', all with a value of 0. The 'Advanced' section contains four rows: 'Remove Pierced / Trimmed Part' with a value of 'No', 'Pierced / Trimmed Part is' with a value of 'Moving', 'Crack Surface Smoothing' with a value of '%', and 'Piercing / Trimming Direction' with a value of 'Y-axis'. The dialog box has 'OK' and 'Cancel' buttons at the bottom.

In the background, a tree view on the left shows the model structure. The 'Crack Disable' option is highlighted with a red box. The tree view includes the following items:

- Cold_Normal_tub
- Wear(Model=1)
- Symm_Axis (1)
- Relation2
- Forming2
- Stage3
 - Workpiece
 - AISI_1010(T=20C)
 - Normalized Cock
 - Crack Disable**
 - Upper Die
 - MODL05_2D_ex0
 - ToolSteel8
 - v=(0, -1, 0)
 - Cold_Normal_tub
 - Wear(Model=1)
 - Lower Die
 - MODL06_2D_ex0
 - ToolSteel9
 - v=(0, 0, 0)
 - Cold_Normal_tub
 - Wear(Model=1)
 - Symm_Axis (1)
 - Relation3
 - Forming3

- Check 2D tutorial part2 ex04

1. AFDEX 2D/3D Solver

2. AFDEX 2D Solver

3. AFDEX 3D Solver

4. GUI





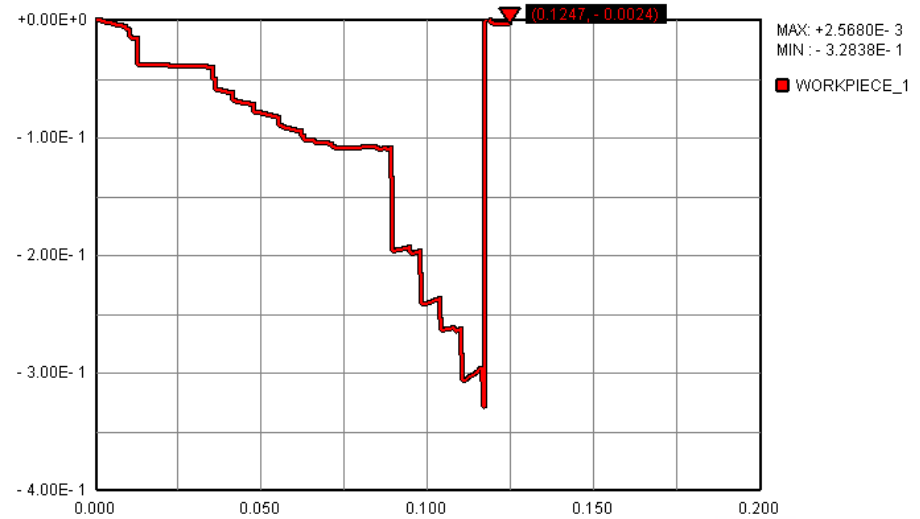
1. Fix volume graph error in Piercing/Trimming

2D_Part1_ex04

V19R02

VOLUME CHANGE vs. TIME

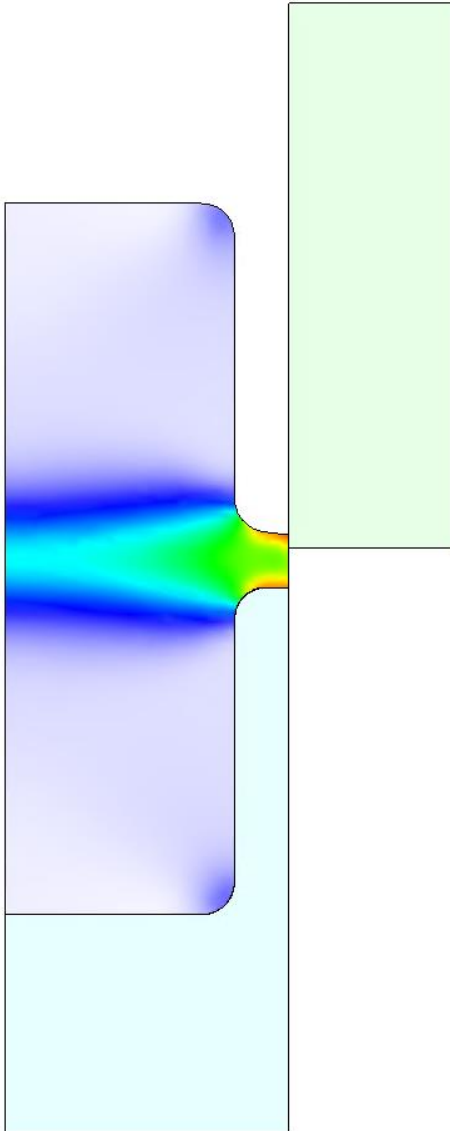
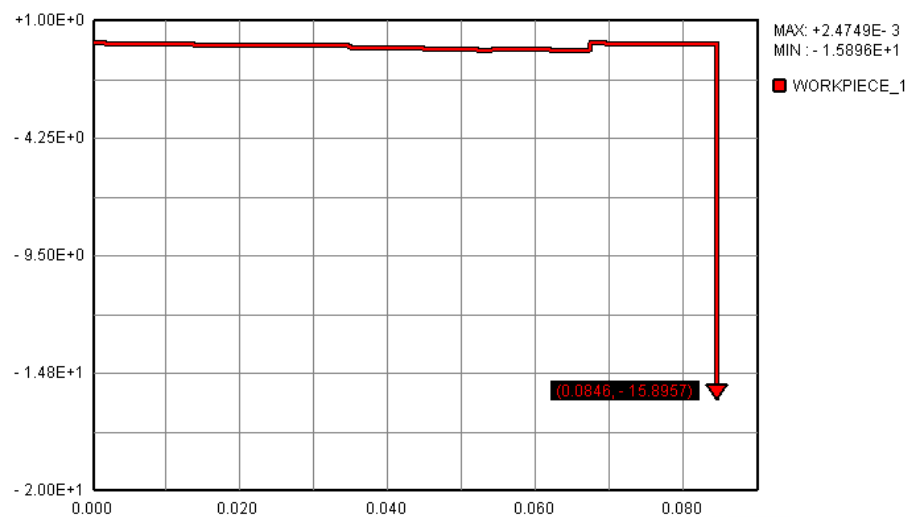
UNIT: % vs. s



V20R01

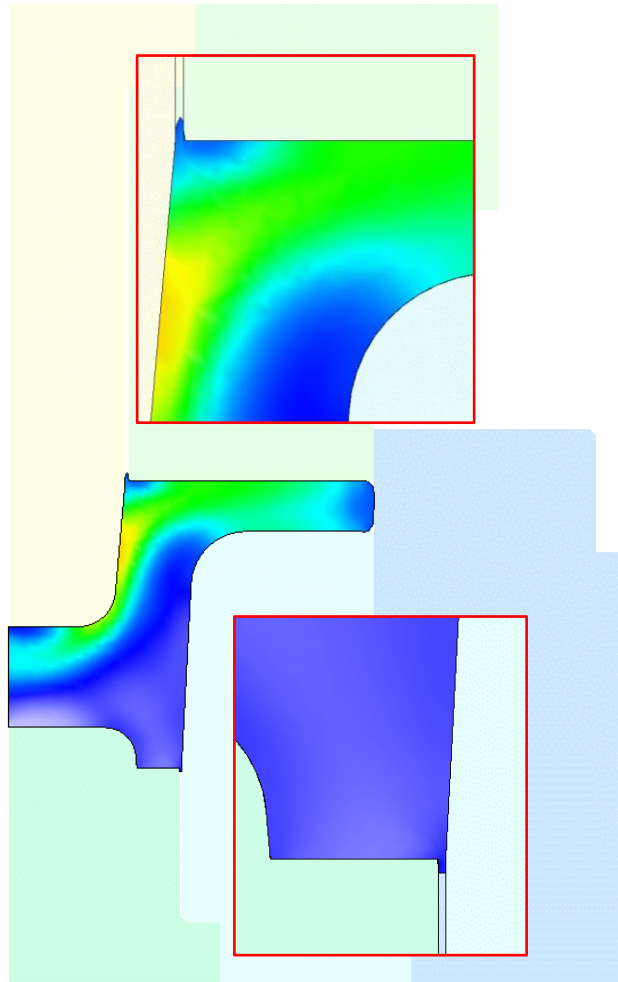
VOLUME CHANGE vs. TIME

UNIT: % vs. s

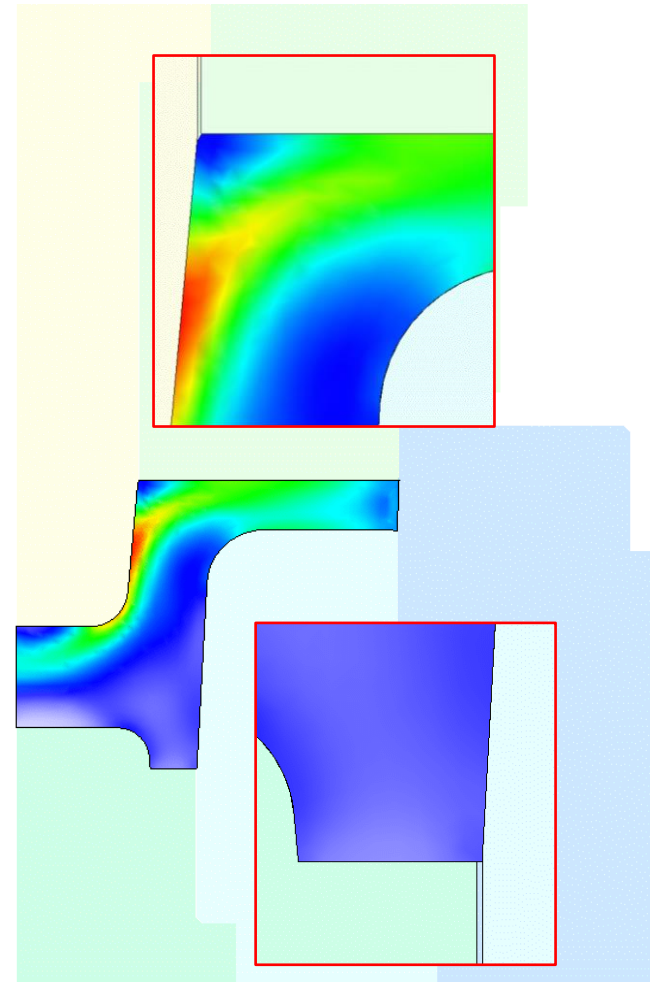




2. Improve treatment of gap flow of material between die parts



Allow gap flow
I default (56) = -1



Allow gap flow
I default (56) = 1

- I default (55) for gap flow control in V19R02
- Improved gap flow control. Change to I default (56) in V20R01 the same as 3D



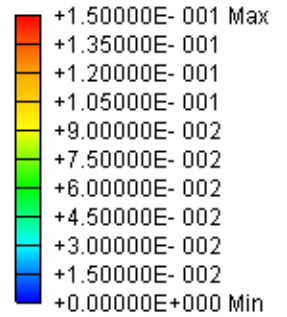
3. Improved die wear calculation

MFRC IAFDEX V20R01

TIME: 4.000000E+01

DIE WEAR

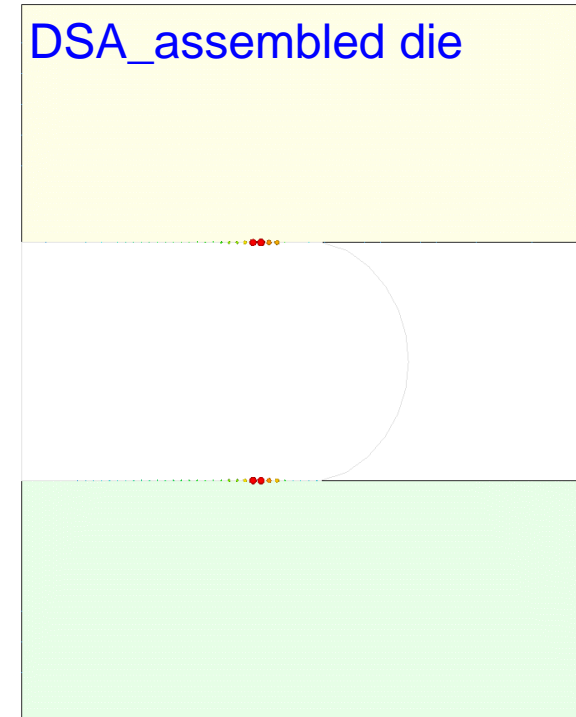
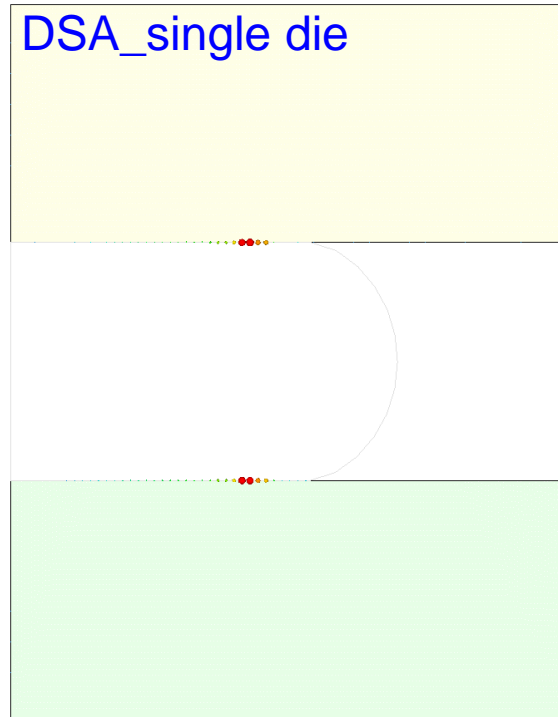
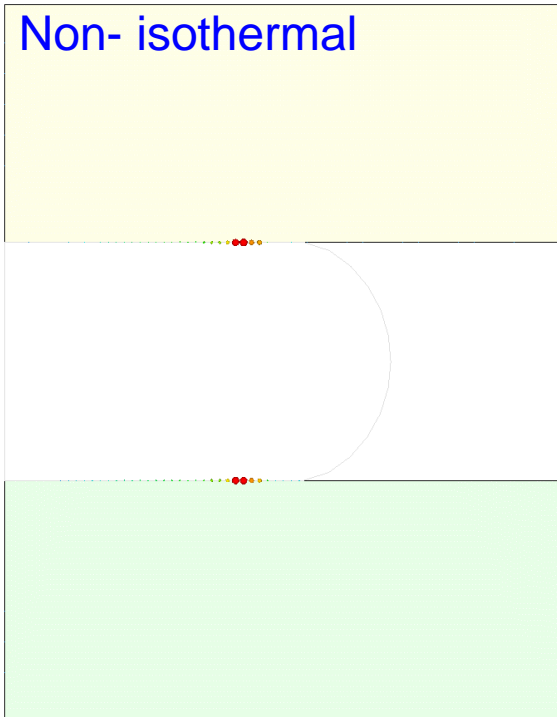
[mm] X 10,000 blow



Non- isothermal

DSA_single die

DSA_assembled die



- Reduced the error having different results of non-isothermal and DSA in V19R02

The logo for AFDEX is displayed in the background. The letters 'A', 'F', and 'D' are rendered in a light blue, semi-transparent font. The letters 'E', 'X', and 'M' are rendered in a solid purple font. A heatmap is overlaid on the 'M' and 'S' (part of 'AFDEX') area, showing a color gradient from yellow to red to purple, indicating a numerical or physical property distribution.

1. AFDEX 2D/3D Solver

2. AFDEX 2D Solver

3. AFDEX 3D Solver

4. GUI



1. Added multi-stand rolling

Process Information

Title & File Information

Title	Process
File	

▼ Bulk Forming

- Forging
- Drawing
- Extrusion
- Plate Forging
- Self Piercing Riveting
- Flow Forming
- Multi-stand Rolling**

+Forming Cold Hot

+Simulation

+System of U

+Analysis

+Material Mo

+Flash

Save as Default Value



2. Improved automation of open-die forging

Dialog

Stage
Stage 1

Pass

Pass information
Symmetrical process Num. manipulator: 1 Set

Period of blow 0 Dwelling time 0

Anvil information
Automatic generation 30 Target height 0
Upper die velocity 0 Lower die velocity 0

Stroke
Non-forming length 0
Distance From min 0 From max 0

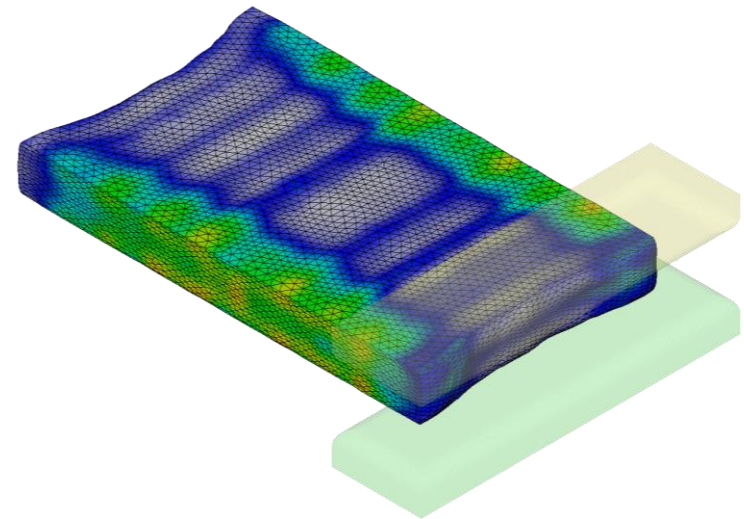
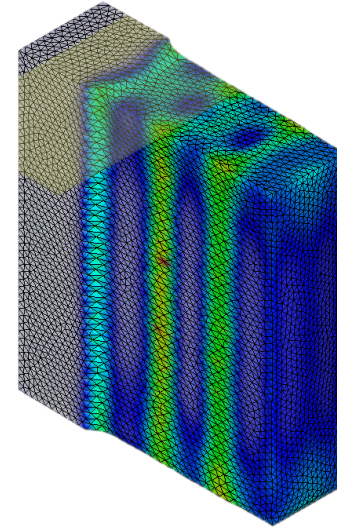
Workpiece option
Blow X-axis Rotation 0 Translation 0
Pass X-axis Rotation 0 Translation 0
None Rotation 0 X-coord. 0 Max

Manipulator option
Automatic generation
Left (-x direction) Ratio 0
Right(+x direction) Ratio 0

Mandrel option
Blow X-axis Rotation 0 Translation 0
Pass X-axis Rotation 0 Translation 0

Initialize state variables
 Initialize

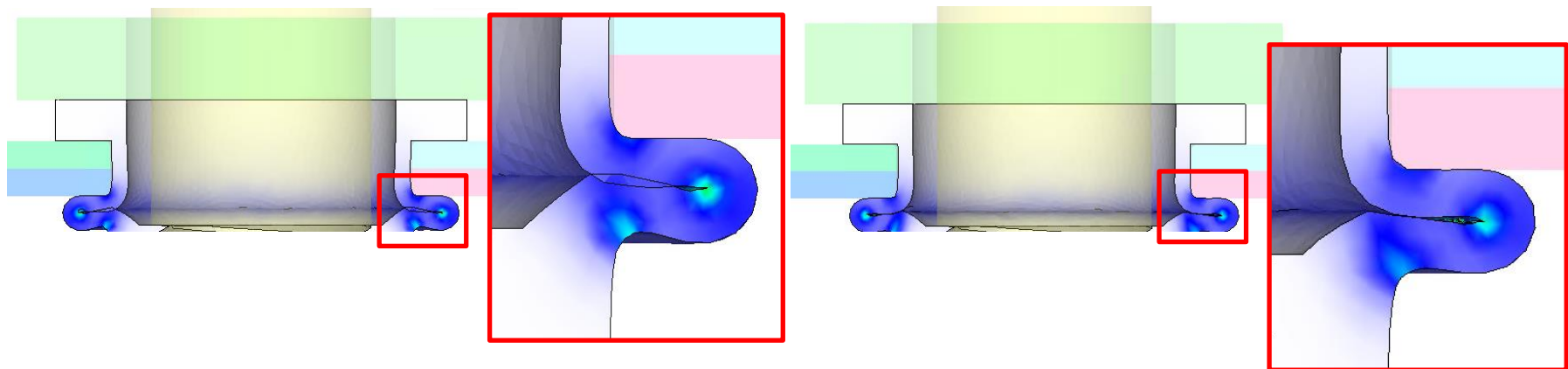
Close



- Check 3D tutorial Part 2 ex16



3. Improved calculation for material-material contact



With material-material contact function

Without material-material contact function

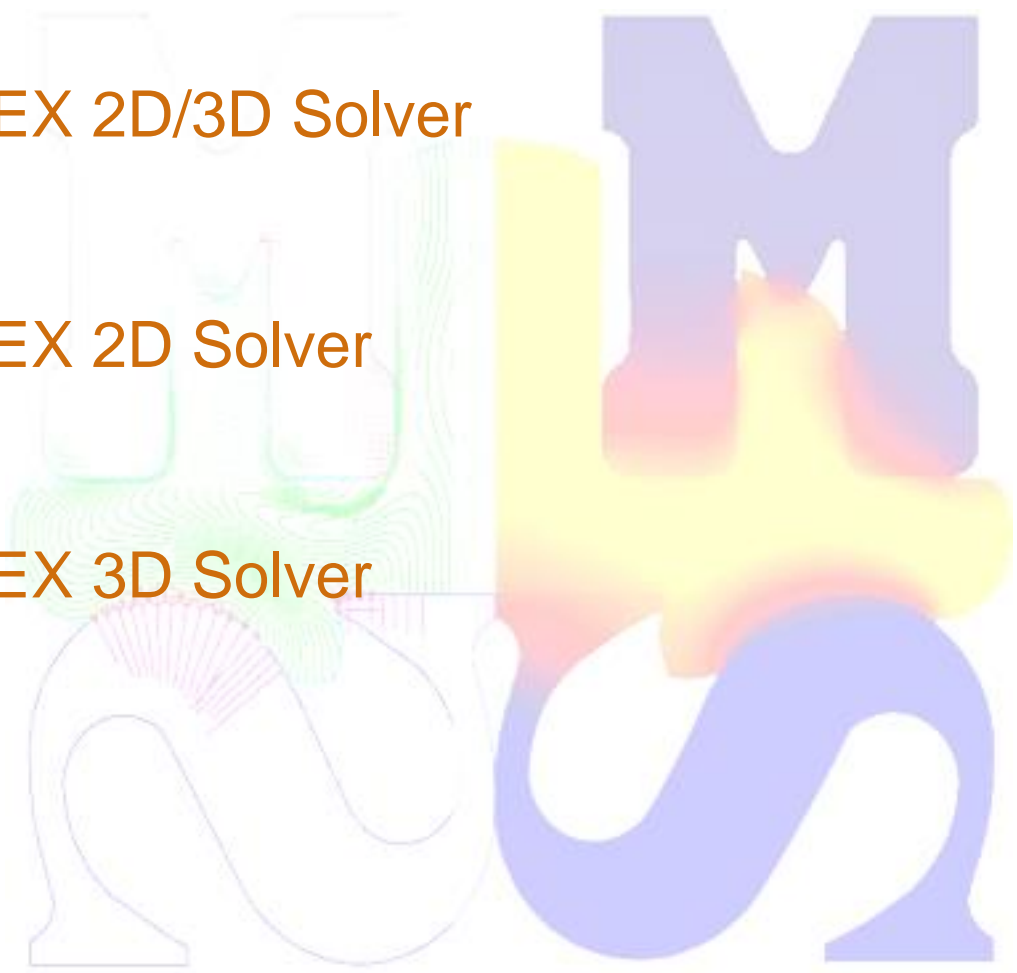
- Check UI for checking 3D folding / self-intersection on p. 23

1. AFDEX 2D/3D Solver

2. AFDEX 2D Solver

3. AFDEX 3D Solver

4. GUI

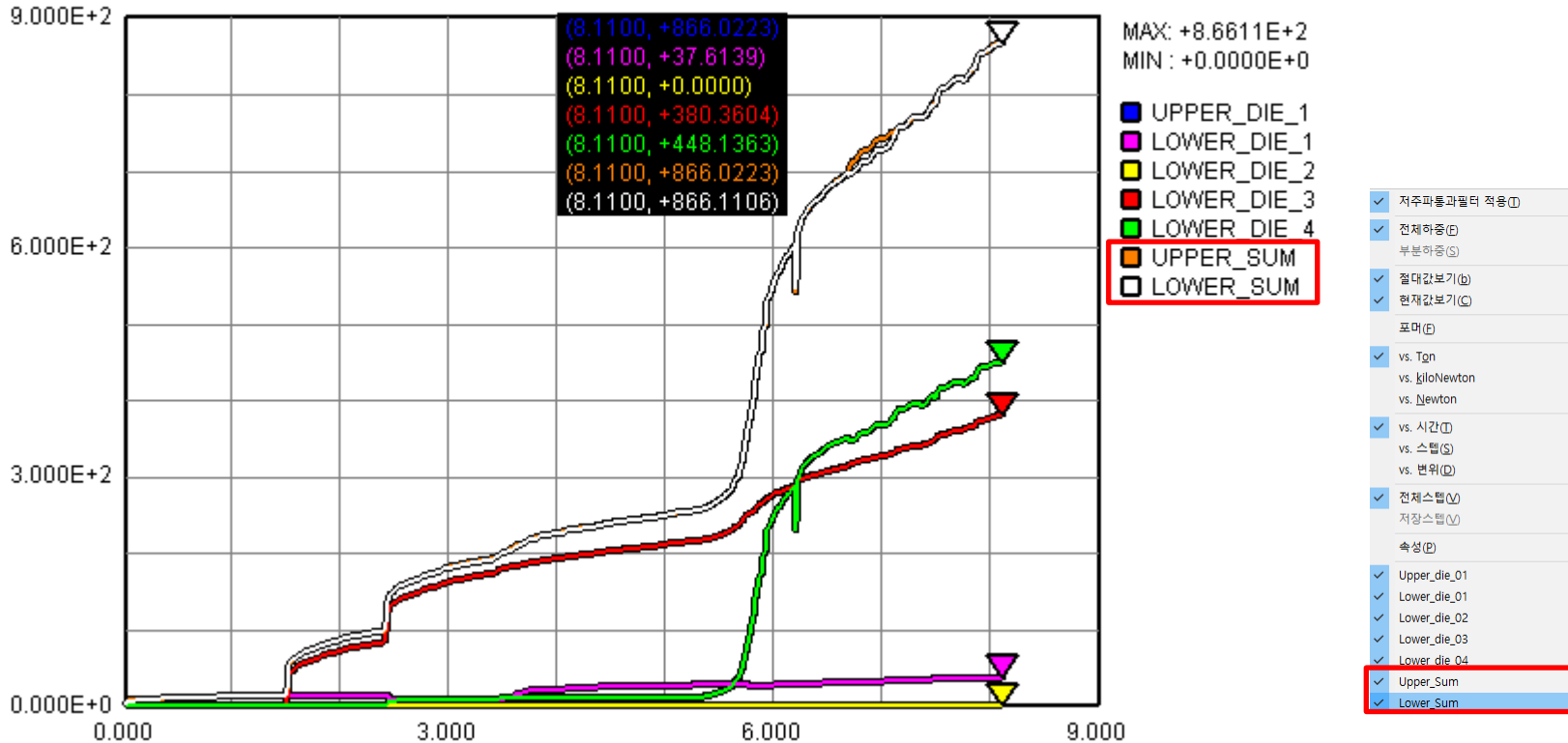




1. Add accumulating feature of forming load of Upper/Lower dies

LOAD vs. TIME: Y

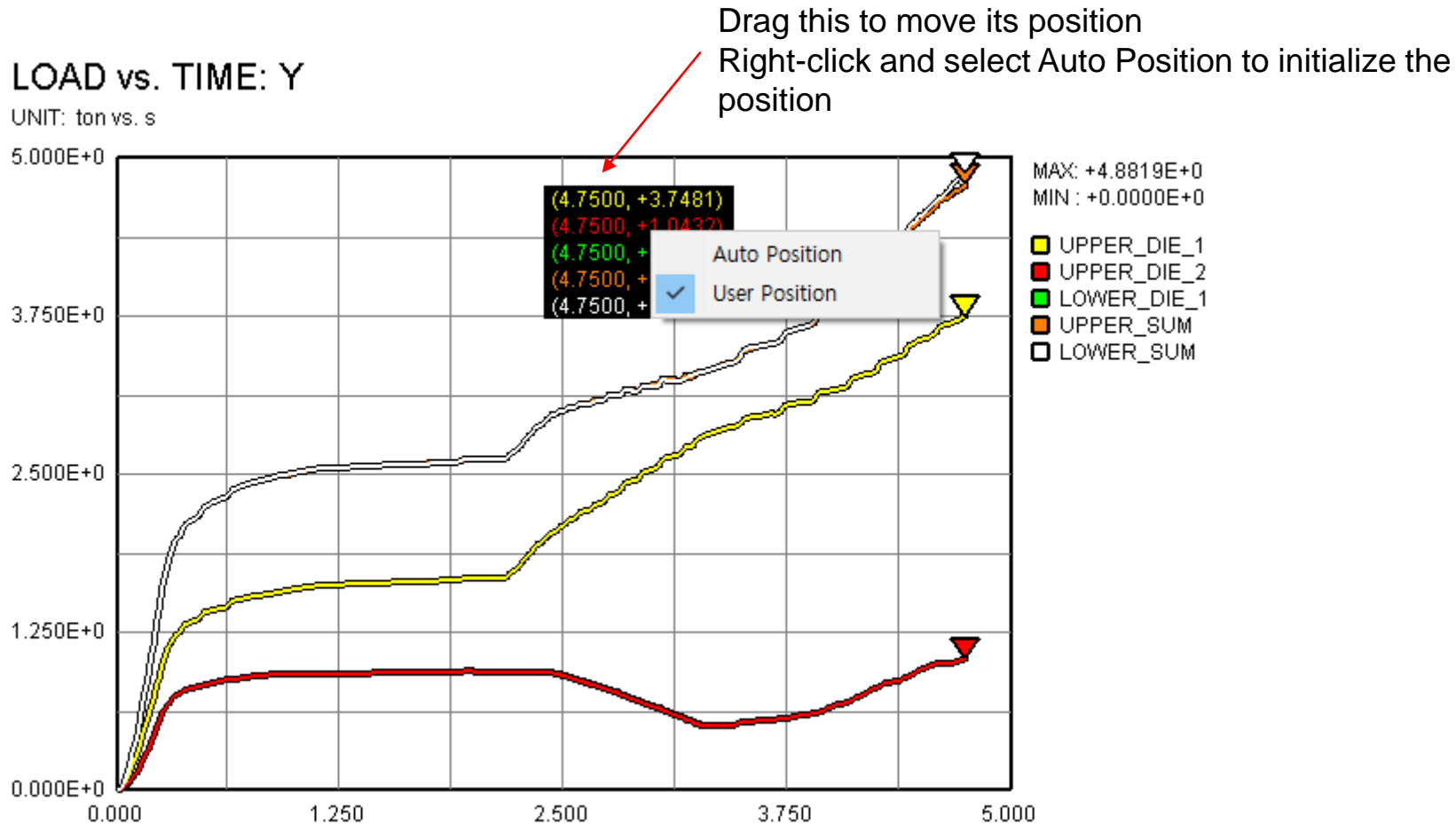
UNIT: ton vs. s



- Right-click on the graph and choose Upper_Sum / Lower_Sum



2. Add feature of moving current value in the display box

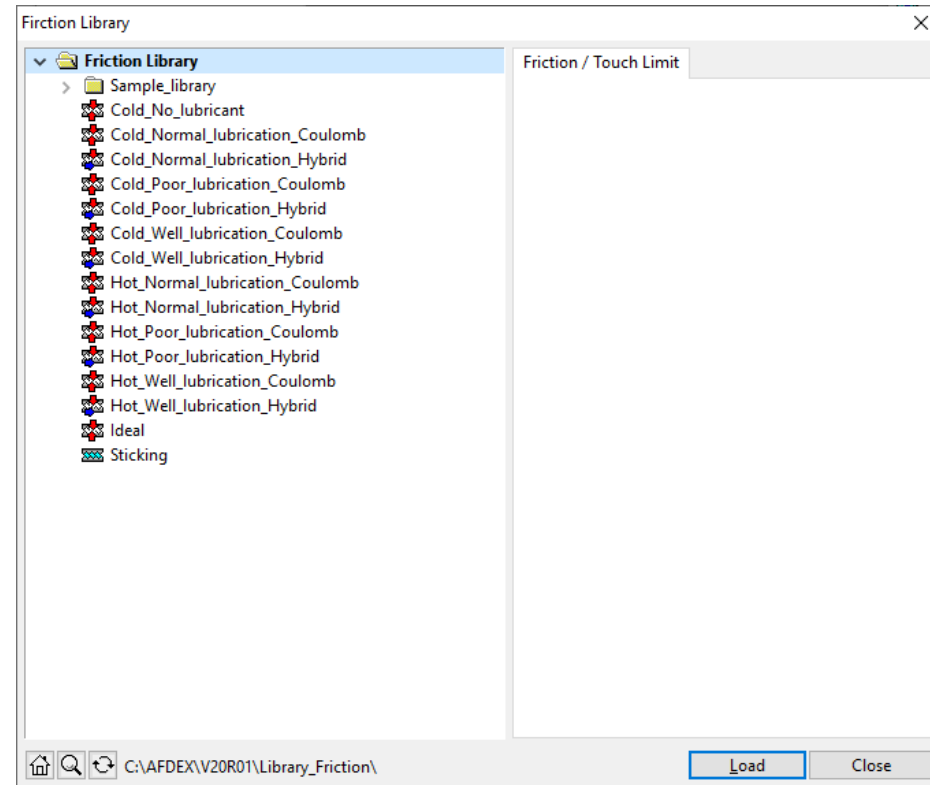
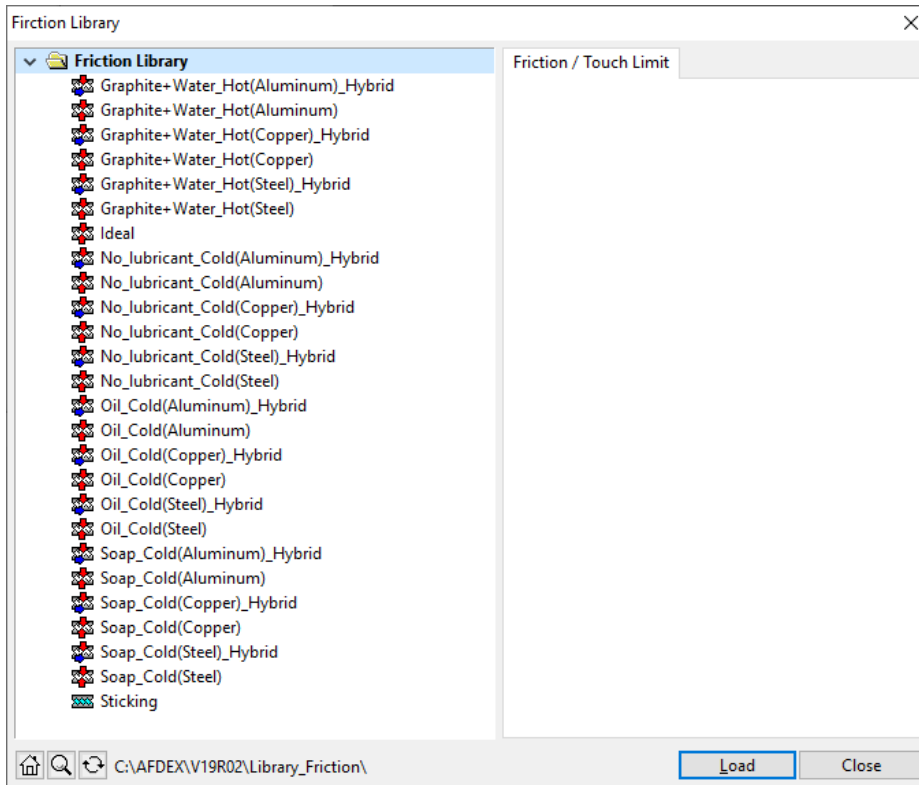




3. Modify friction input library

V19R02

V20R01



- Friction inputs of V19R02 are in sample library folder in V20R01.



4. Add input library for Crack/Damage/Die wear analysis

V19R02



- Model >
- Material >
- Press >
- Friction >
- Heat >
- DieType >
- Force >
- Mesh Density >
- BCs >

V20R01

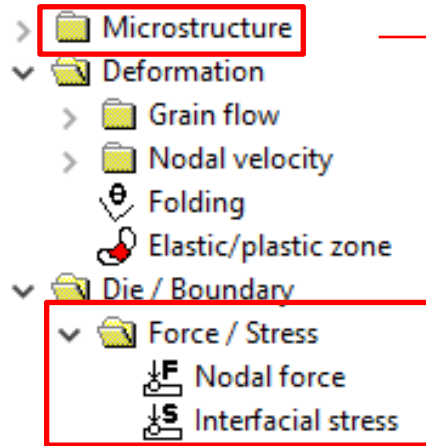


- Model >
- Material >
- Press >
- Friction >
- Heat >
- Damage >
- Crack >
- DieType >
- DieWear >
- Force >
- Mesh Density >
- BCs >

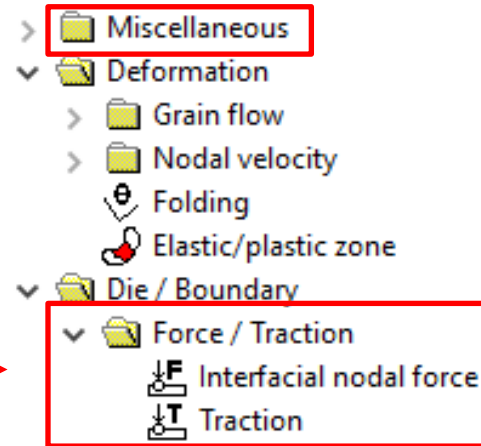


5. Change the names of stage variables in post-processing menu

V19R02



V20R01



V19R02	V20R01
Microstructure	Miscellaneous
Force / Stress	Force / Traction
Nodal force	Interfacial nodal force
Interfacial stress	Traction



6. Add UI for materia-material contact (friction) in multi-body analysis

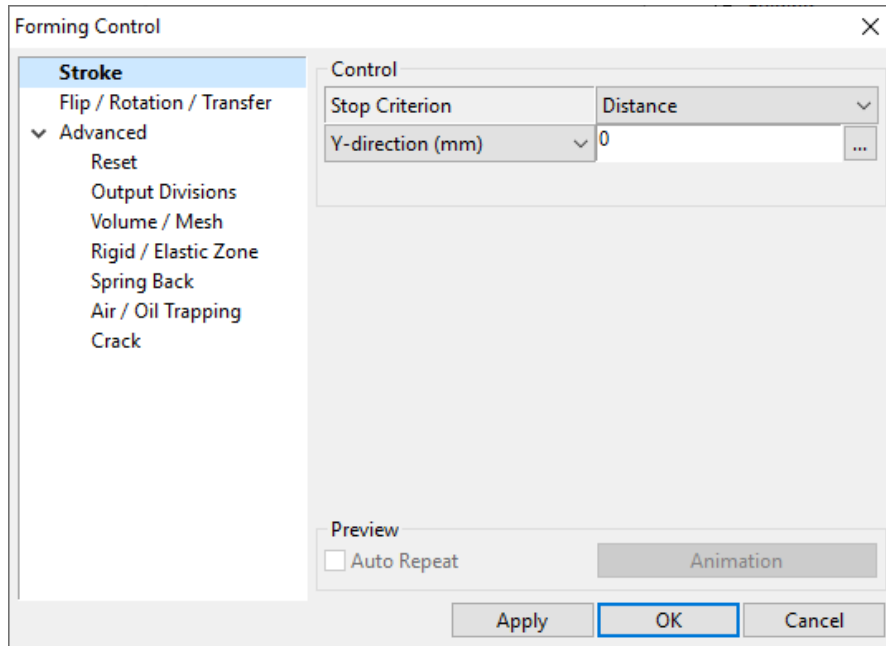
The screenshot shows a software window titled "ex14 - AFDEX_V20R01 2D - [PRE Window: Stage1]". A dialog box titled "Interface information between bodies" is open, displaying an "Interface list" table. The table has columns for "Body1", "Body2", "Friction model", "Frictional coefficient", "Normal stress (MPa)", and "Tangential stress (MPa)". The first row is highlighted, showing "1" for Body1, "2" for Body2, "Coulomb" for the friction model, "0.10000" for the frictional coefficient, "0.00000" for normal stress, and "0.00000" for tangential stress. To the right of the table are buttons for "Insert", "Add", and "Delete". At the bottom of the dialog are "Reset", "OK", and "Cancel" buttons. In the background, a tree view on the left shows a "Relation1" entry highlighted with a red box.

Body1	Body2	Friction model	Frictional coefficient	Normal stress (MPa)	Tangential stress (MPa)
1	2	Coulomb	0.10000	0.00000	0.00000

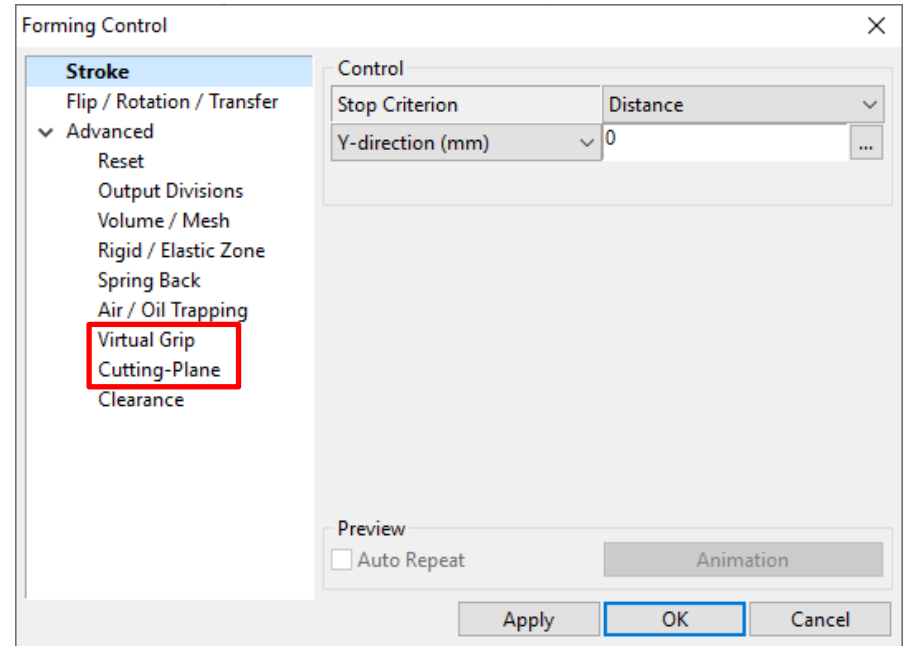


7. Add UI for virtual grip / cutting-plane

V19R02



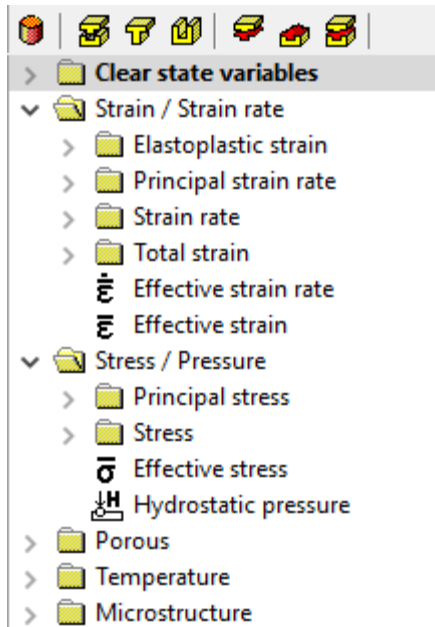
V20R01



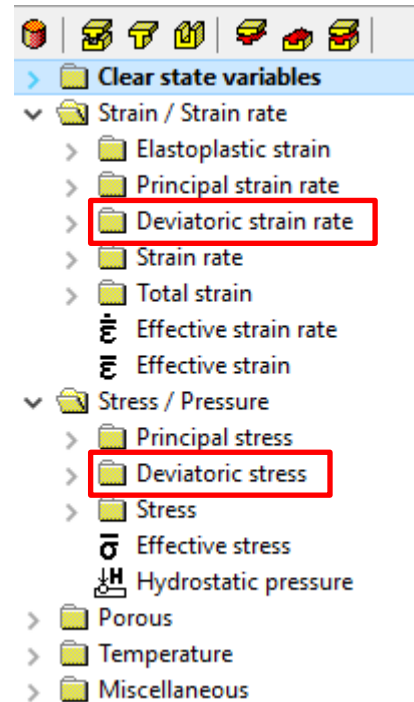


8. Add deviatoric strain rate / deviatoric stress view

V19R02

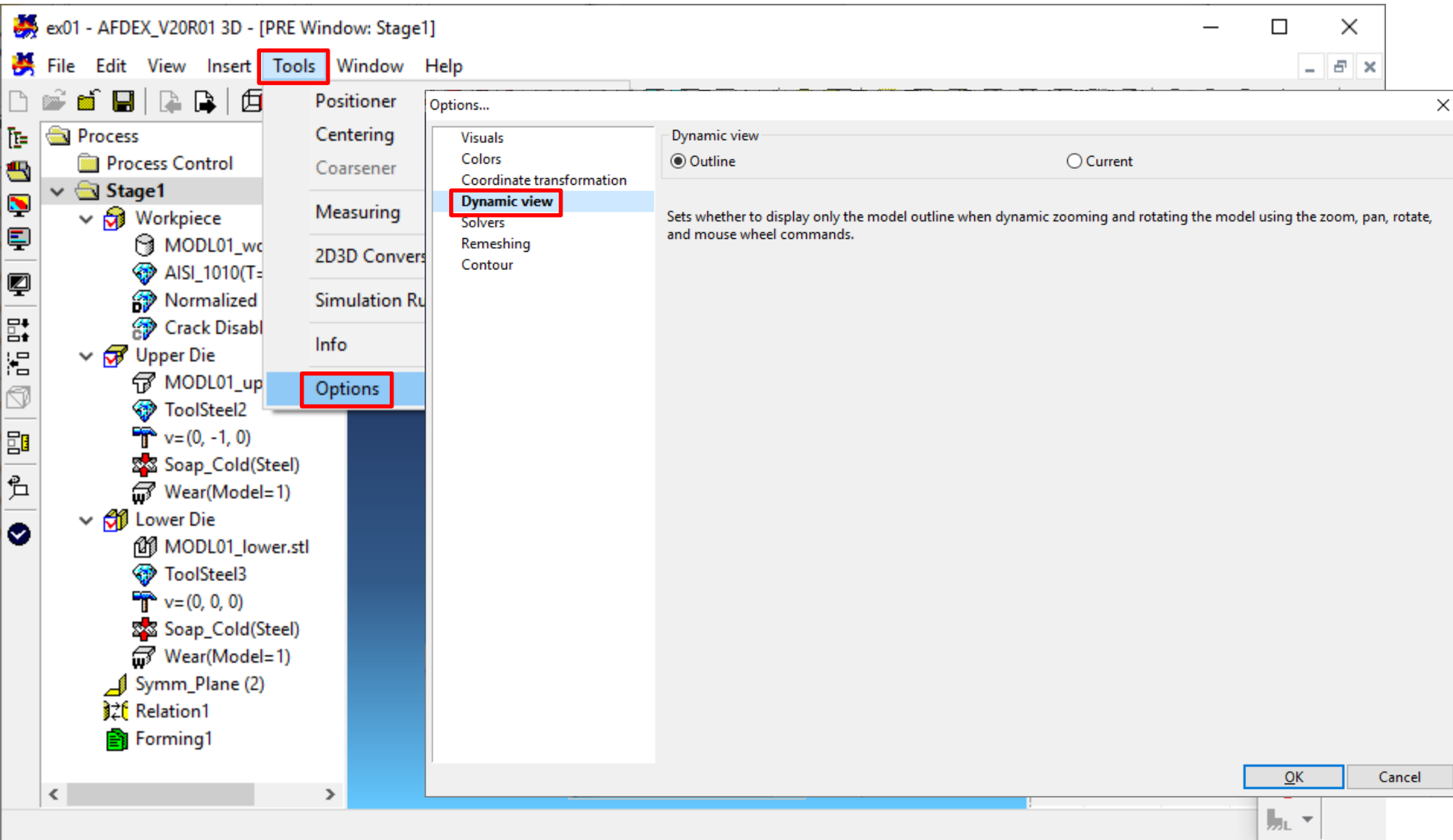


V20R01





9. Add feature of dynamic view



- Add function in Tools -> Options -> Dynamic view
- Choose Outline/Current to display only the model outline or current view when zooming, panning and rotating.



10. Add UI for checking 3D folding / self-intersection

The screenshot shows the 'Process Control' dialog box for the step 'Advancing Front & Delaunay'. The 'Remeshing' tab is active, and the 'Check Folding / Self-Intersection' checkbox is highlighted with a red box. The dialog box contains a table of remeshing criteria and a 'Local Remeshing' section.

Remeshing Criterion	Value	Default
Distortion Angle (°)	(180.0)	180
Relative Distortion	(0.2-0.3)	0.25
Relative Penetration	(0.4-0.6)	0.5
Surface Expansion	(2.0-3.0)	2.5
After Last Remeshing	(50-50000)	50000

Local Remeshing
Number of Local Remeshing: NONE

Check Folding / Self-Intersection
 Save as Default Value

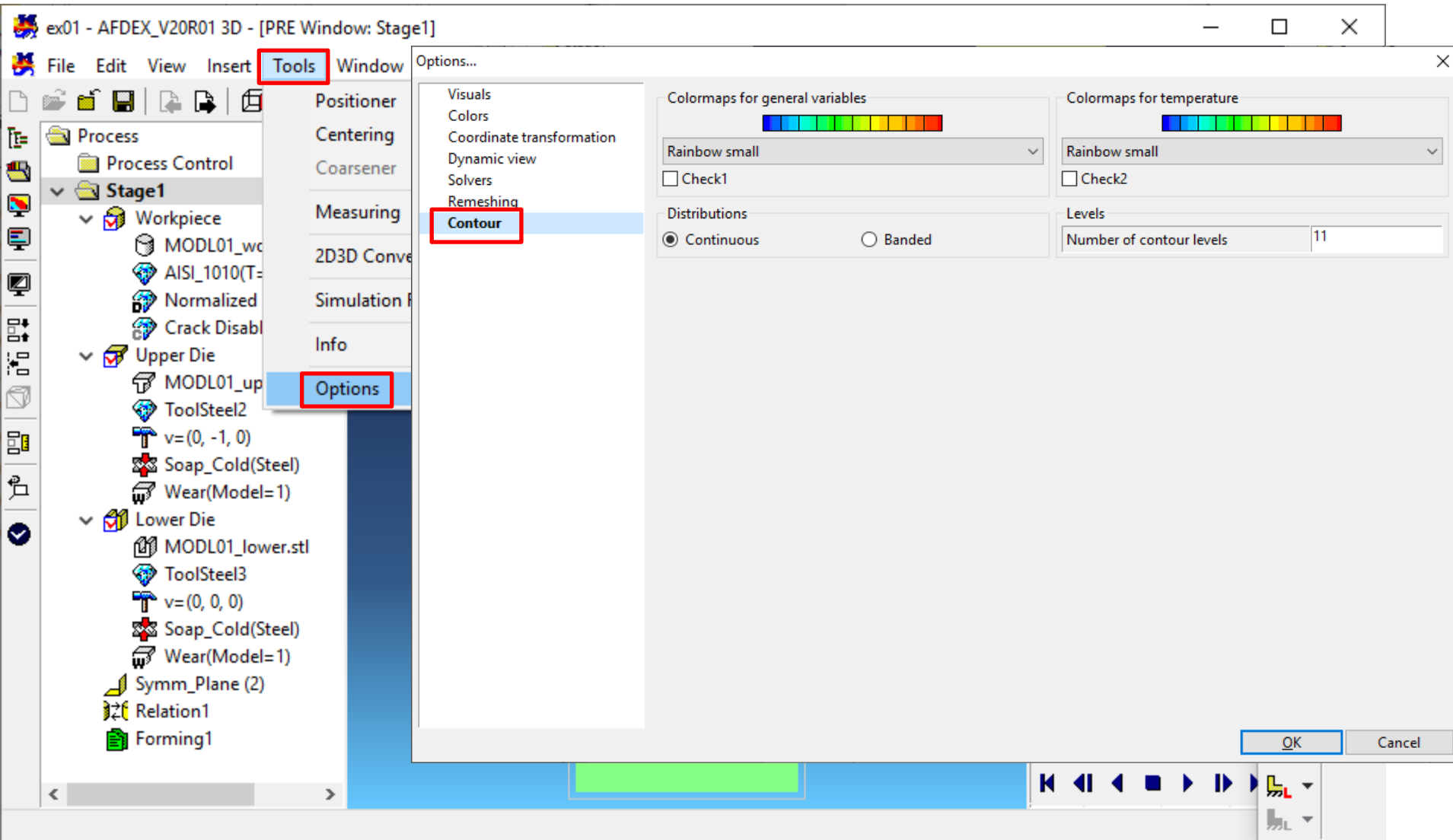
Reset

OK Cancel

- Add UI "Check Folding / Self-Intersection" in Process Control -> Remeshing Tab



11. Add function of contour color change



- Add function in Tools -> Options -> Contour



12. Add stroke information in post-processing

Step: 129, Stage: 1, Blow: 0, Pass: 0
T: 19.01217, R: N/A, H: 6.20000

MFRC IAFDEX V20R01
TIME: 1.901217E+01
EFFECTIVE STRAIN

+4.38878E+000 Max
+3.94991E+000
+3.51104E+000
+3.07217E+000
+2.63331E+000
+2.19444E+000
+1.75557E+000
+1.31670E+000
+8.77836E-001
+4.38968E-001
+1.00000E-004 Min

Color
Redraw
Zoom >
Pan >
3D Views >
3D Orbit >
Display >
Label >
Axis Directions
 Center Line
Scale
 Stroke
Square Grids
Polar Grids
Tool Windows >

ID	Step	Stage	Bl
6	50	1	
7	60	1	
8	70	1	
9	80	1	
10	90	1	
11	100	1	
12	110	1	
13	120	1	
14	129	1	

- T: Time
- R: Radius of material(available in 2D)
- H: Height(based on stroke point inserted by user. It shows N/A if the stop criterion is time.)

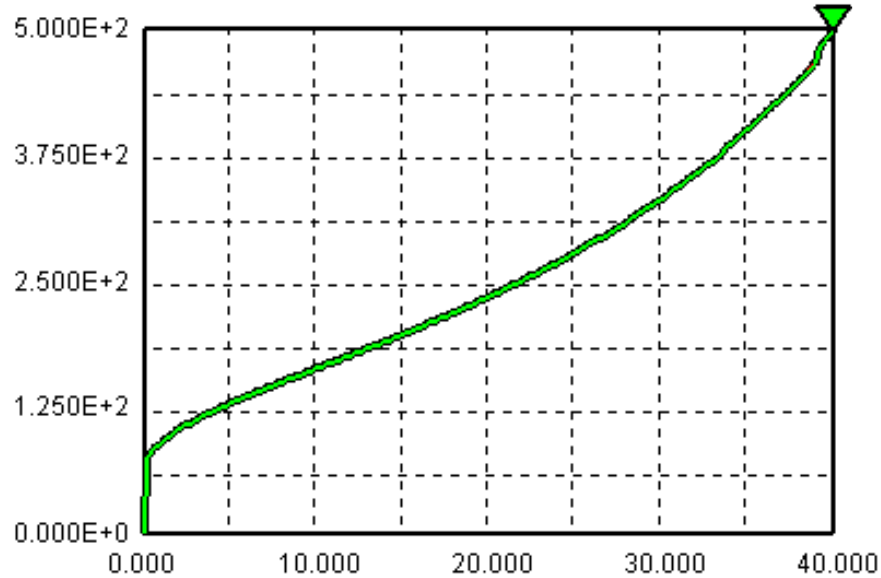


13. Modify graph display

V19R02

LOAD vs. TIME: Y

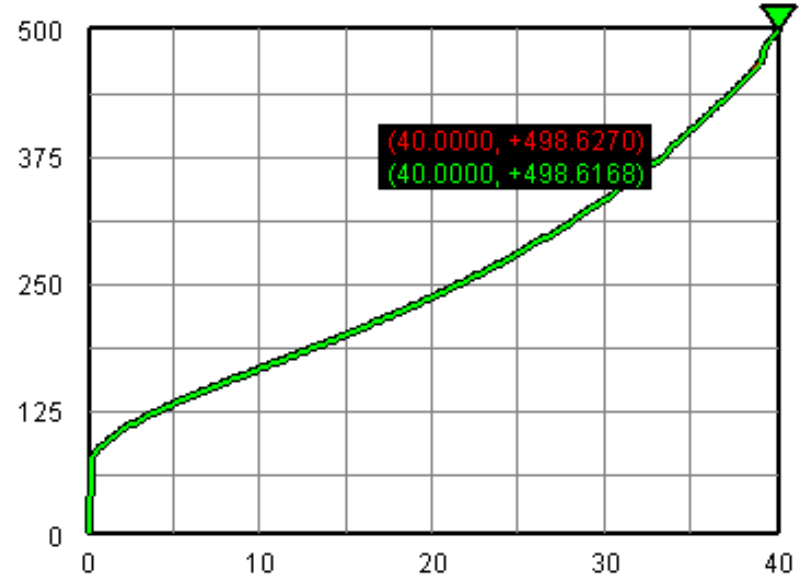
UNIT: ton vs. s



V20R01

LOAD vs. TIME: Y

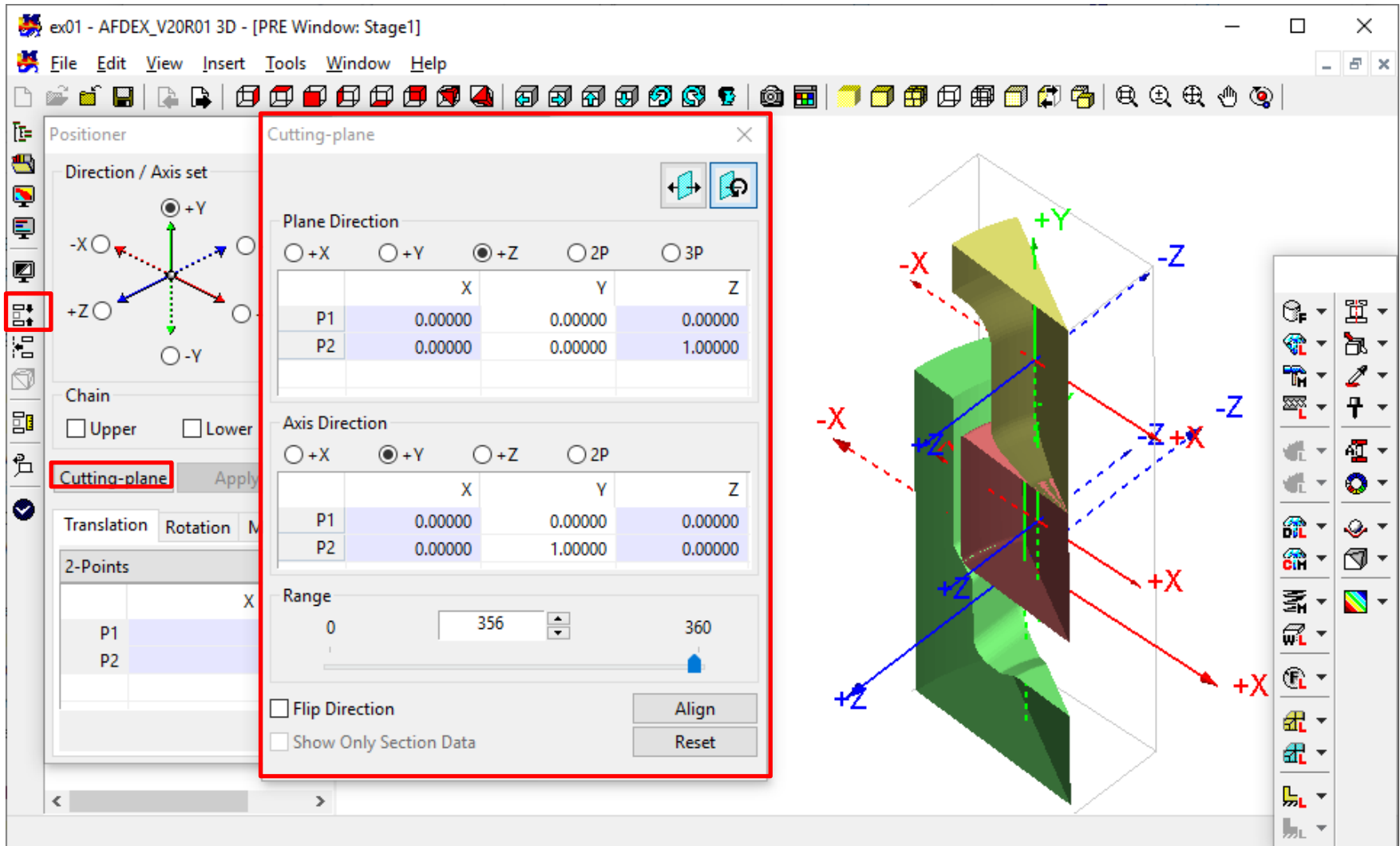
UNIT: ton vs. s



- modify real-> integer



14. Add display function of cutting-plane of modelling



-Add display function in Positioner -> Cutting-plane



15. Add function to notify the finish of the solver

The screenshot shows the software interface with the 'Tools' menu open and the 'Solvers...' dialog box displayed. The 'Solvers' tab is selected, and the 'Enable notification sounds when ending a solver.' checkbox is highlighted with a red box.

Description	Module name	File
2D Isothermal	A2DFS_V20	C:\AFDEX\V20R01\A2DFS_V20R01.exe
2D Non-isothermal	A2DCS_V20	C:\AFDEX\V20R01\A2DCS_V20R01.exe
3D Isothermal	A3DFS_V20	C:\AFDEX\V20R01\A3DFS_V20R01.exe
3D Non-isothermal	A3DCS_V20	C:\AFDEX\V20R01\A3DCS_V20R01.exe
2D Die Structural Analysis	A2DEL_V20	C:\AFDEX\V20R01\A2DEL_V20R01.exe
3D Die Structural Analysis	A3DEL_V20	C:\AFDEX\V20R01\A3DEL_V20R01.exe
3D Model Generator	A2D3D_V20	C:\AFDEX\V20R01\A2D3D_V20R01.exe
2D Tensile Test Analyzer	A2DTS_V20	C:\AFDEX\V20R01\A2DTS_V20R01.exe
2D Elasto Isothermal	A2DEF_V20	C:\AFDEX\V20R01\A2DEF_V20R01.exe
2D Elasto Non-isothermal	A2DEC_V20	C:\AFDEX\V20R01\A2DEC_V20R01.exe
3D Elasto Isothermal	A3DEF_V20	C:\AFDEX\V20R01\A3DEF_V20R01.exe
3D Elasto Non-isothermal	A3DEC_V20	C:\AFDEX\V20R01\A3DEC_V20R01.exe
2D Powder Isothermal	A2DPF_V20	C:\AFDEX\V20R01\A2DPF_V20R01.exe
2D Powder Non-isothermal	A2DPC_V20	C:\AFDEX\V20R01\A2DPC_V20R01.exe
3D Powder Isothermal	A3DPF_V20	C:\AFDEX\V20R01\A3DPF_V20R01.exe
3D Powder Non-isothermal	A3DPC_V20	C:\AFDEX\V20R01\A3DPC_V20R01.exe
3D Open Die Forging	A3DFF_V20	C:\AFDEX\V20R01\A3DFF_V20R01.exe
3D Roll Piercing	A3DRP_V20	C:\AFDEX\V20R01\A3DRP_V20R01.exe
3D Ring Rolling	A3DRR_V20	C:\AFDEX\V20R01\A3DRR_V20R01.exe
3D Roll Forming	A3DRF_V20	C:\AFDEX\V20R01\A3DRF_V20R01.exe
3D Roll Forging	A3DRG_V20	C:\AFDEX\V20R01\A3DRG_V20R01.exe

Create an MS-DOS window when starting a solver.
 Enable notification sounds when ending a solver.

Default

OK Cancel

-Add function to notify the finish of the solver on Tools -> Solvers tab (Only 3D)