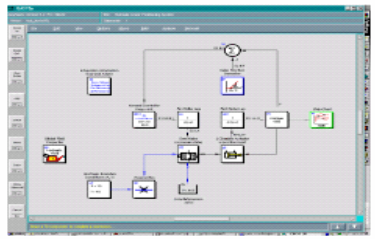
MSC.Marc 2005 What's New

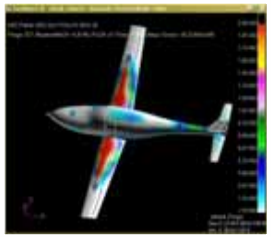
Dan Wolf
MSC.Marc Product Manager
MSC.Software Corporation

MSC.Marc in the SimOffice Product Line

MSC.ADAMS

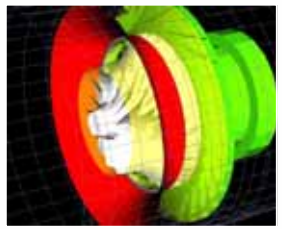


MSC.Patran

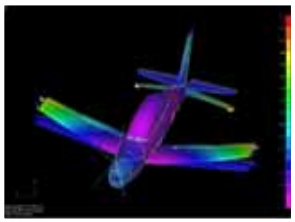


Virtual Product Development

+ Many More Product Families…

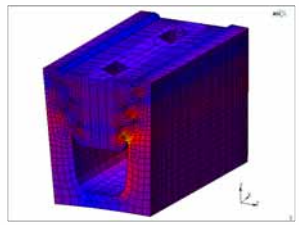


MSC.Nastran



MSC.Marc

MSC.Dytran



What's New in MSC.Marc 2005

General Enhancements:

- Contact and Friction Improvements
- Table Input
- Global-Local Analysis
- Global Remeshing
- Update ACIS and ITI libraries for Mentat

Manufacturing Capabilities:

- Machining Phase II
- Pre-State
- Welding
- Parallel Adaptive Meshing

Performance Enhancements:

- Scalability Improvements in Parallel
- Parallel Processing Single Input File
- Parallel with Adaptive Meshing

Power Train Capabilities:

- Bolt Modeling

Materials Support:

- Generalized Strain Energy
- Shape Memory Alloys

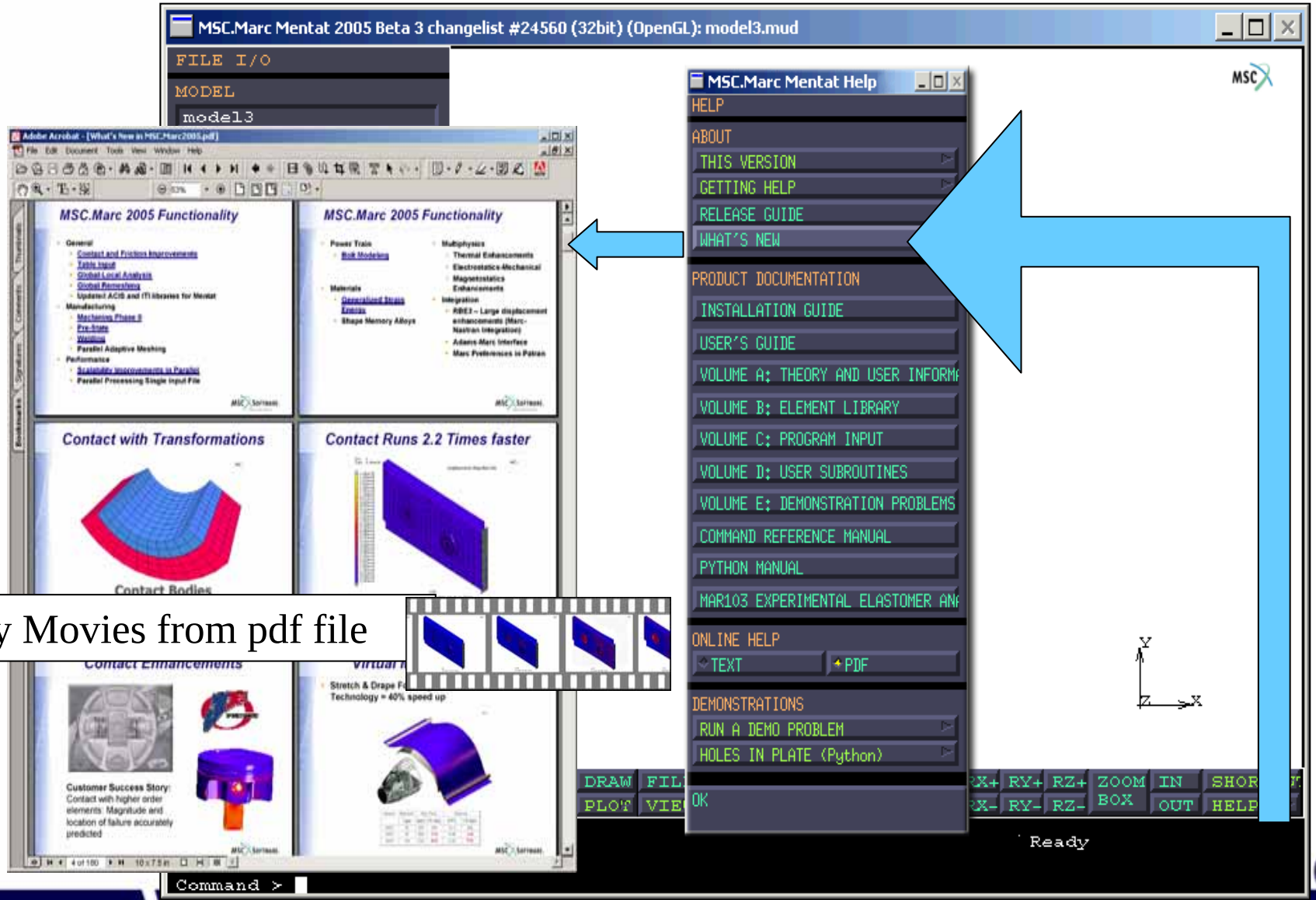
Multiphysics Support:

- Thermal Enhancements
- Electrostatics-Mechanical
- Magnetostatics Enhancements

Integration Capabilities:

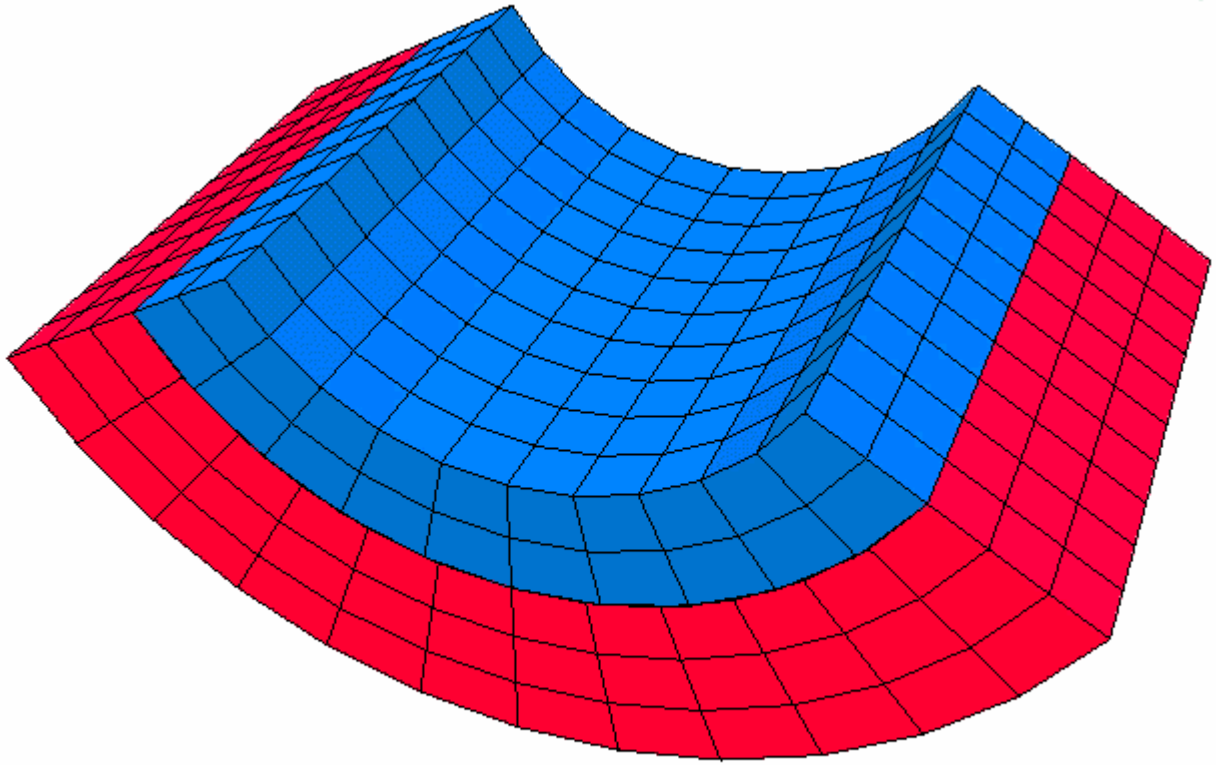
- RBE3 – Large Displacement Enhancements (Marc-Nastran Integration)
- ADAMS-Marc Interface
- Marc Preferences in Patran

How to Access What's New



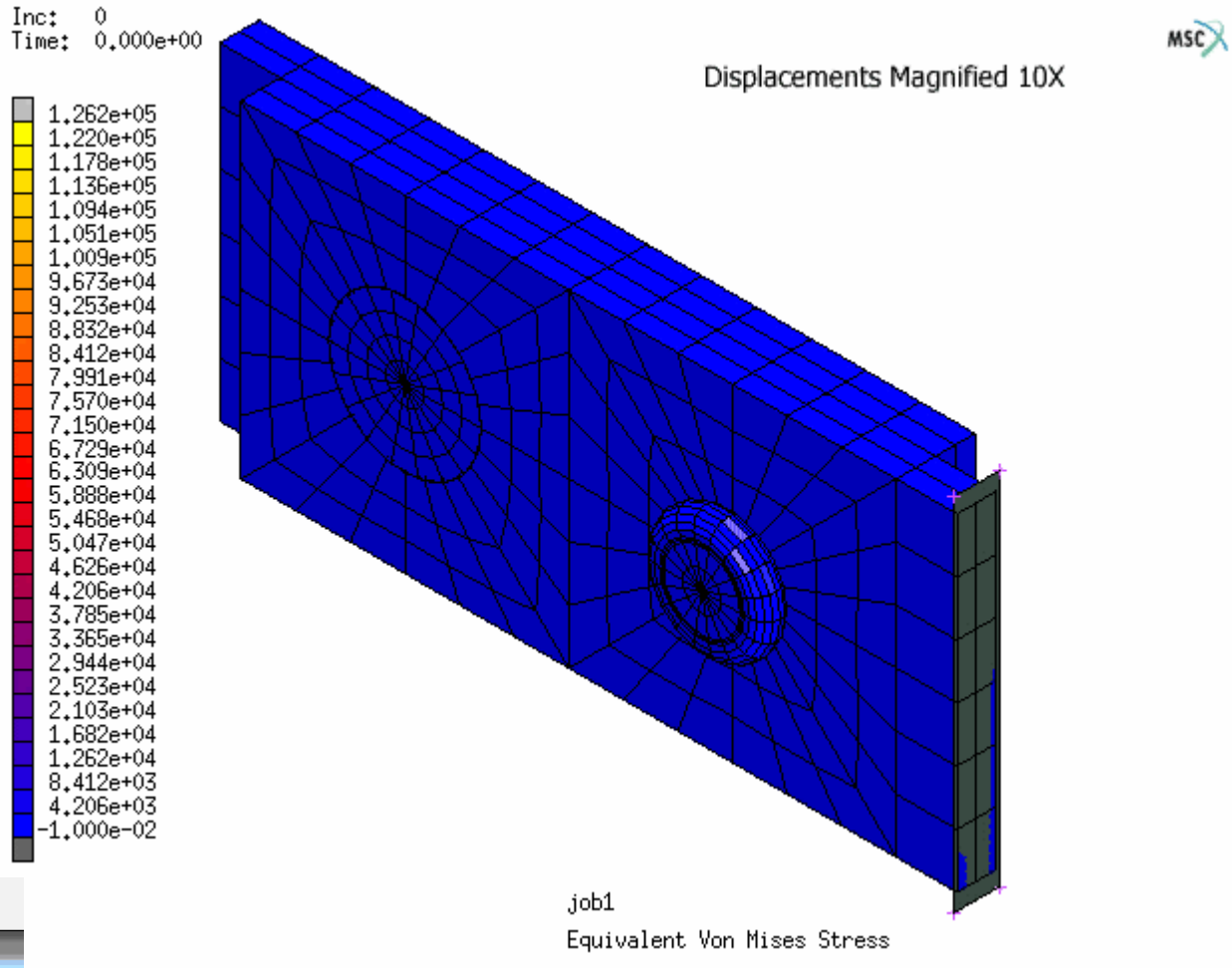
Play Movies from pdf file

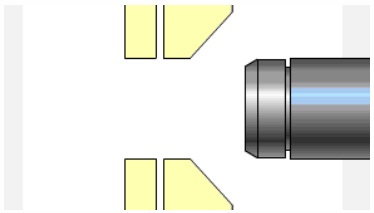
Contact with Transformations



Contact Bodies

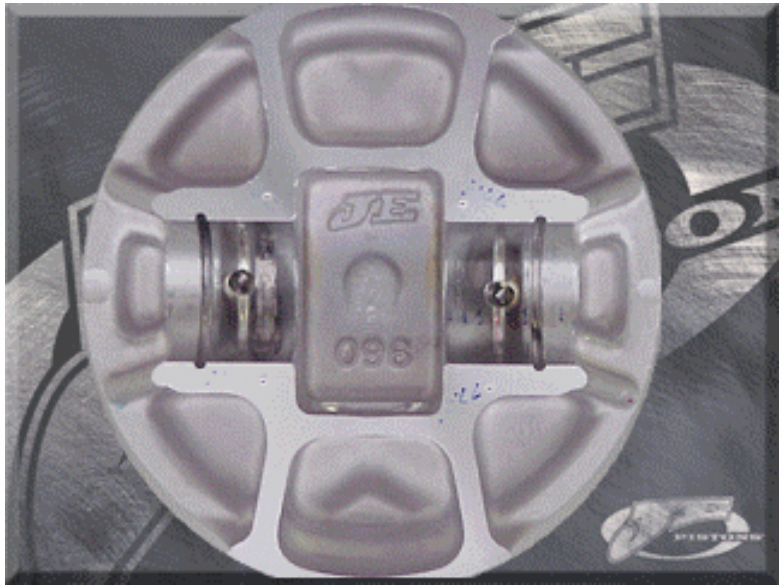
Contact Runs 2.2 Times faster

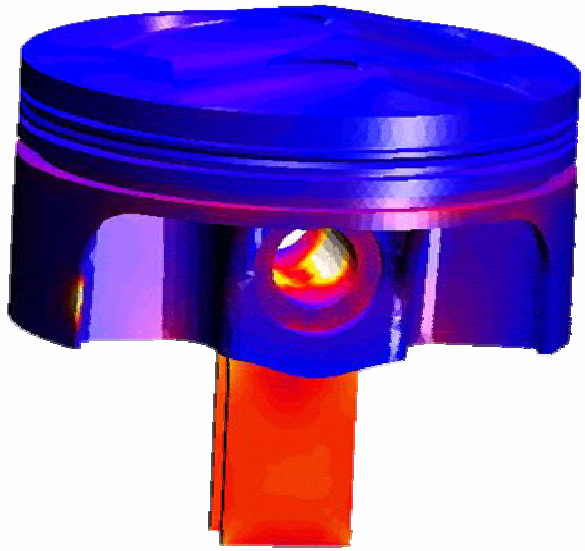




With Better Control Of Separation

Contact Enhancements

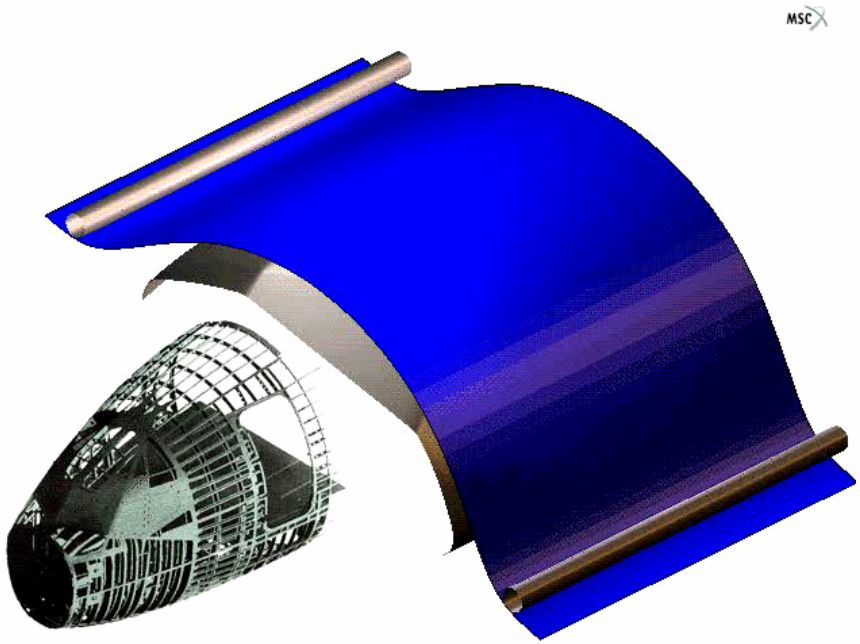




Customer Success Story:
Contact with higher order elements: Magnitude and location of failure accurately predicted

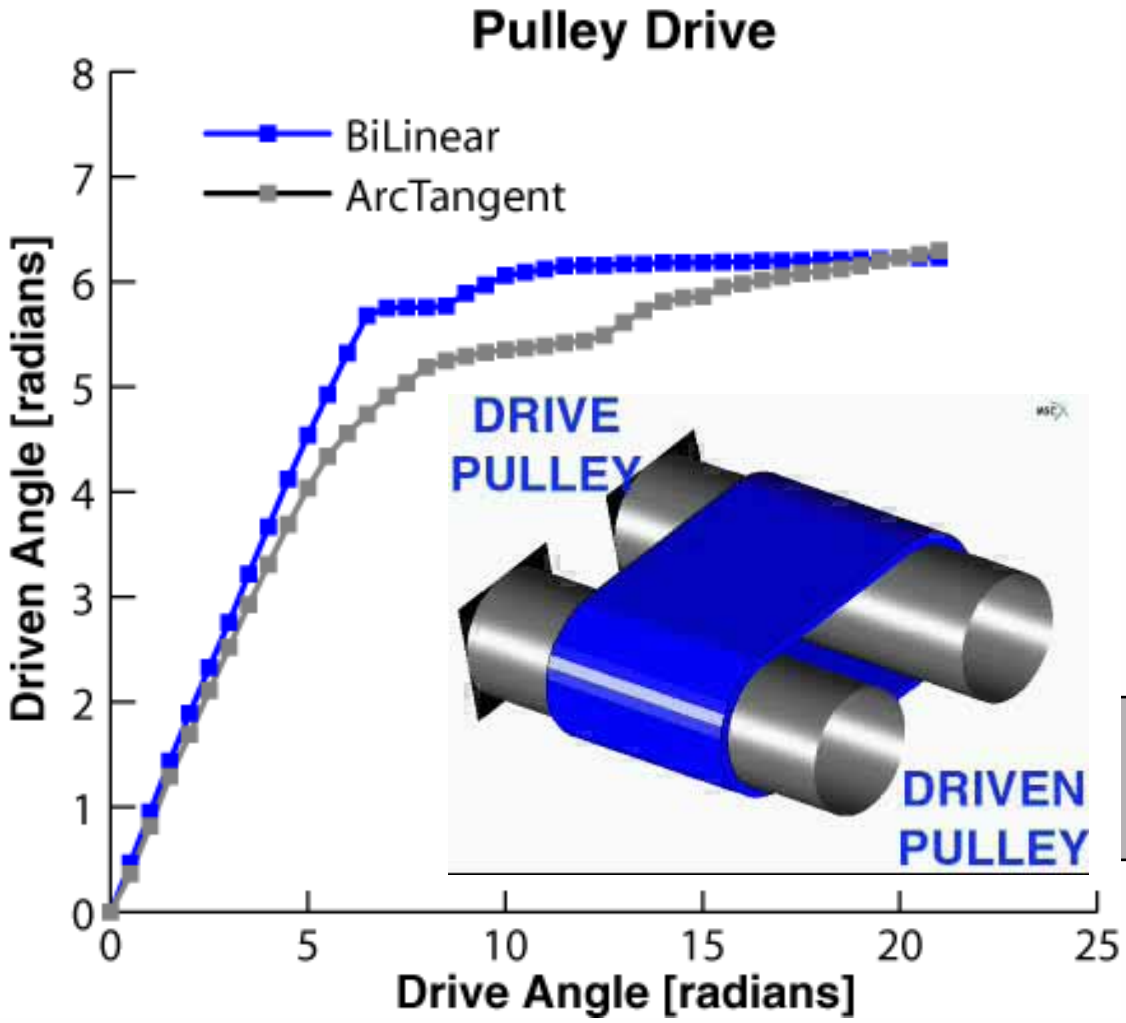
Virtual MFG Advances

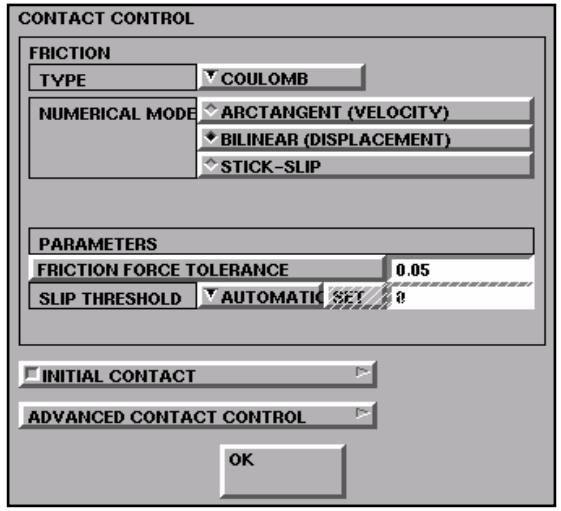
Stretch & Drape Forming: New Element Technology = 40% speed up

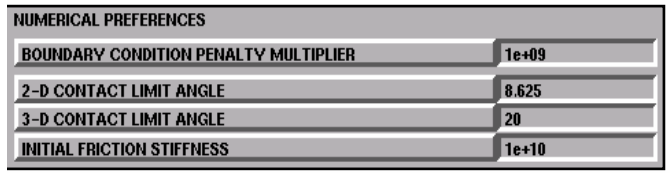


Version	Element	Run Time		Memory	
	Type	(sec)	(% less)	(MW)	(% less)
2001	75	337	0%	11.1	0%
2003	75	265	27%	9.80	13%
2003	140	231	**46%**	6.50	**71%**

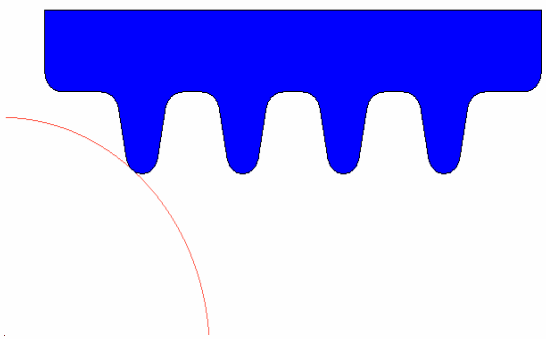
Friction Modeling Improvements

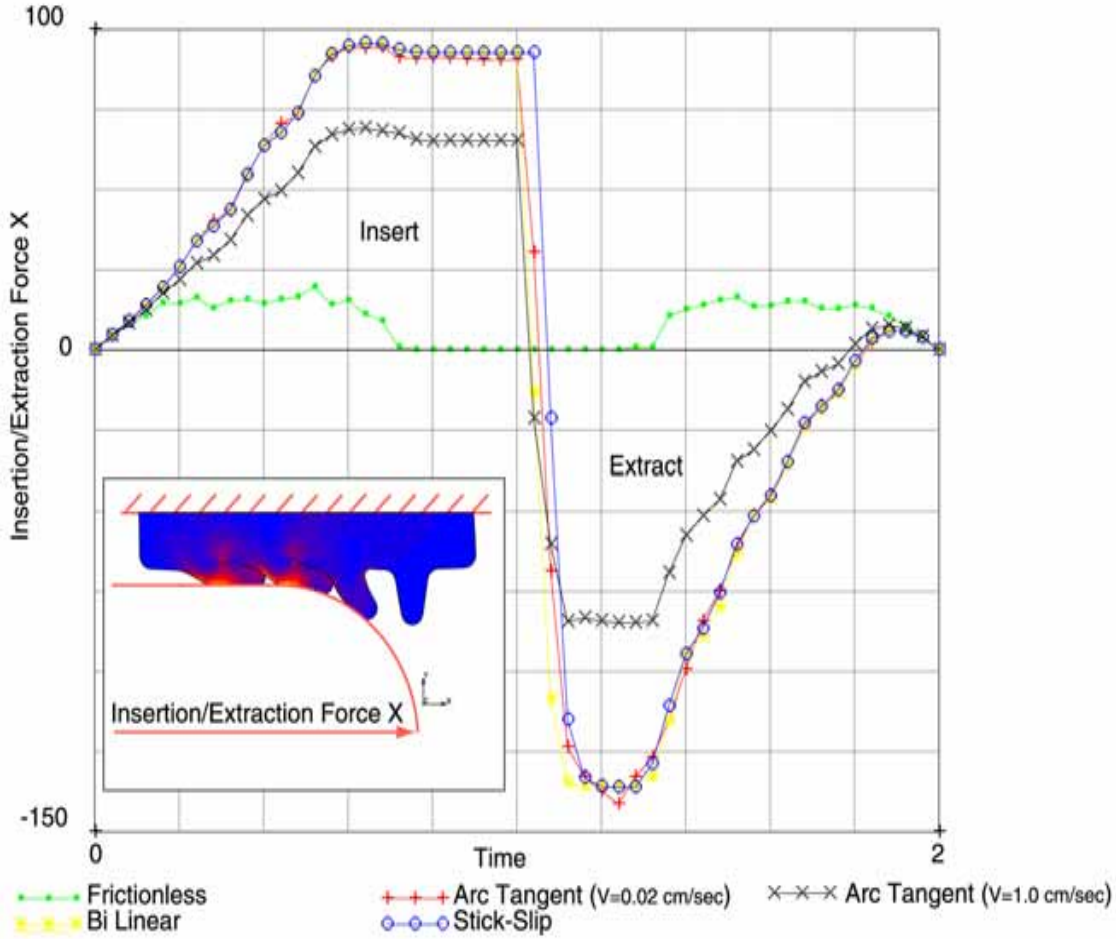






Friction Modeling Improvements





Multivariable Table Input

Improves the ease of use

Increases the product capabilities

Improves the accuracy by allowing continuous functions

Reduces the size of the input file

Minimizes the need for user subroutines

Improve compatibility with CAD programs

Improves compatibility with Patran and Mentat

Improve compatibility with MSC.Nastran TABLE* BDF

Allows parametric input (not in Mentat)

Table Input - Contact

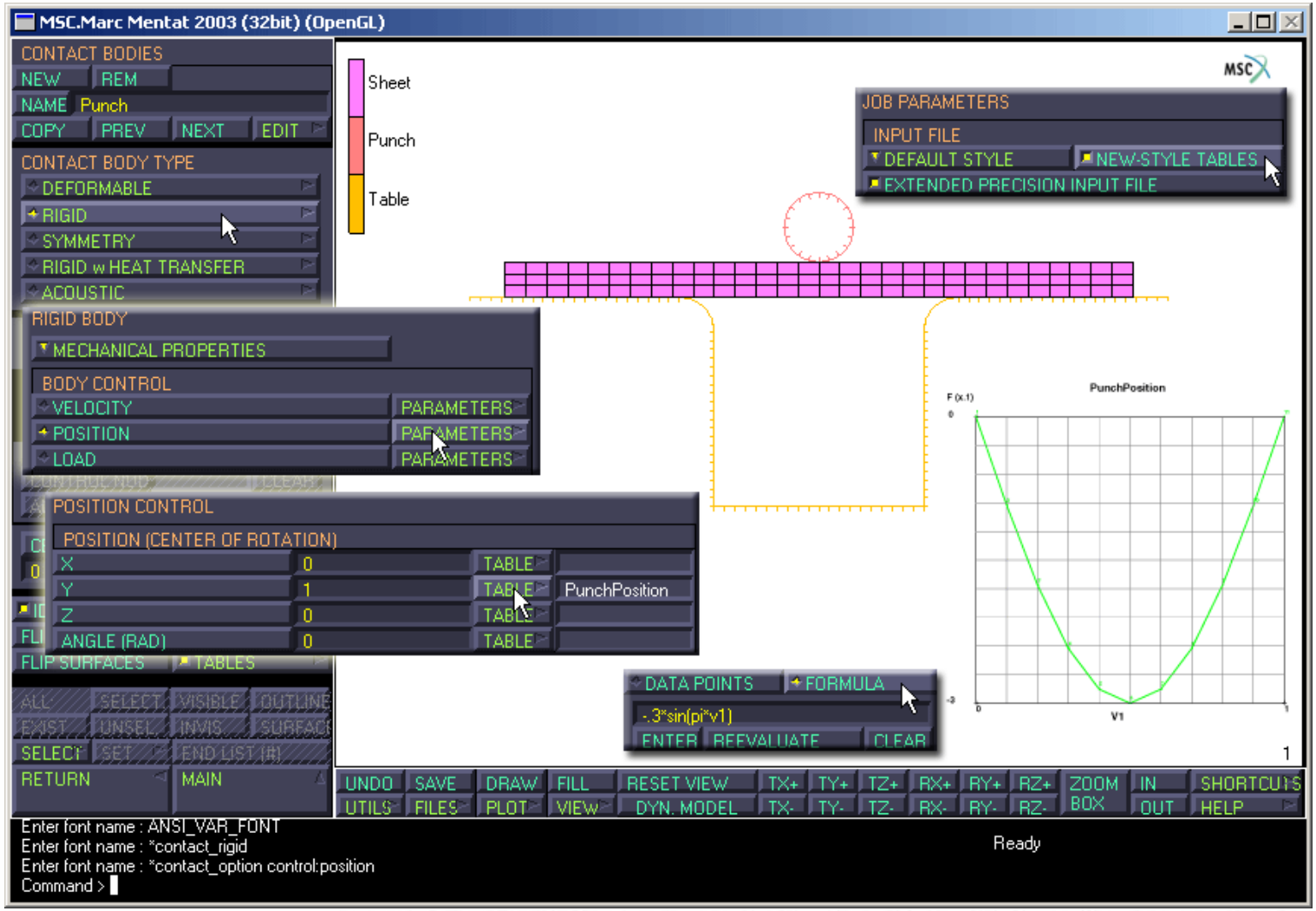
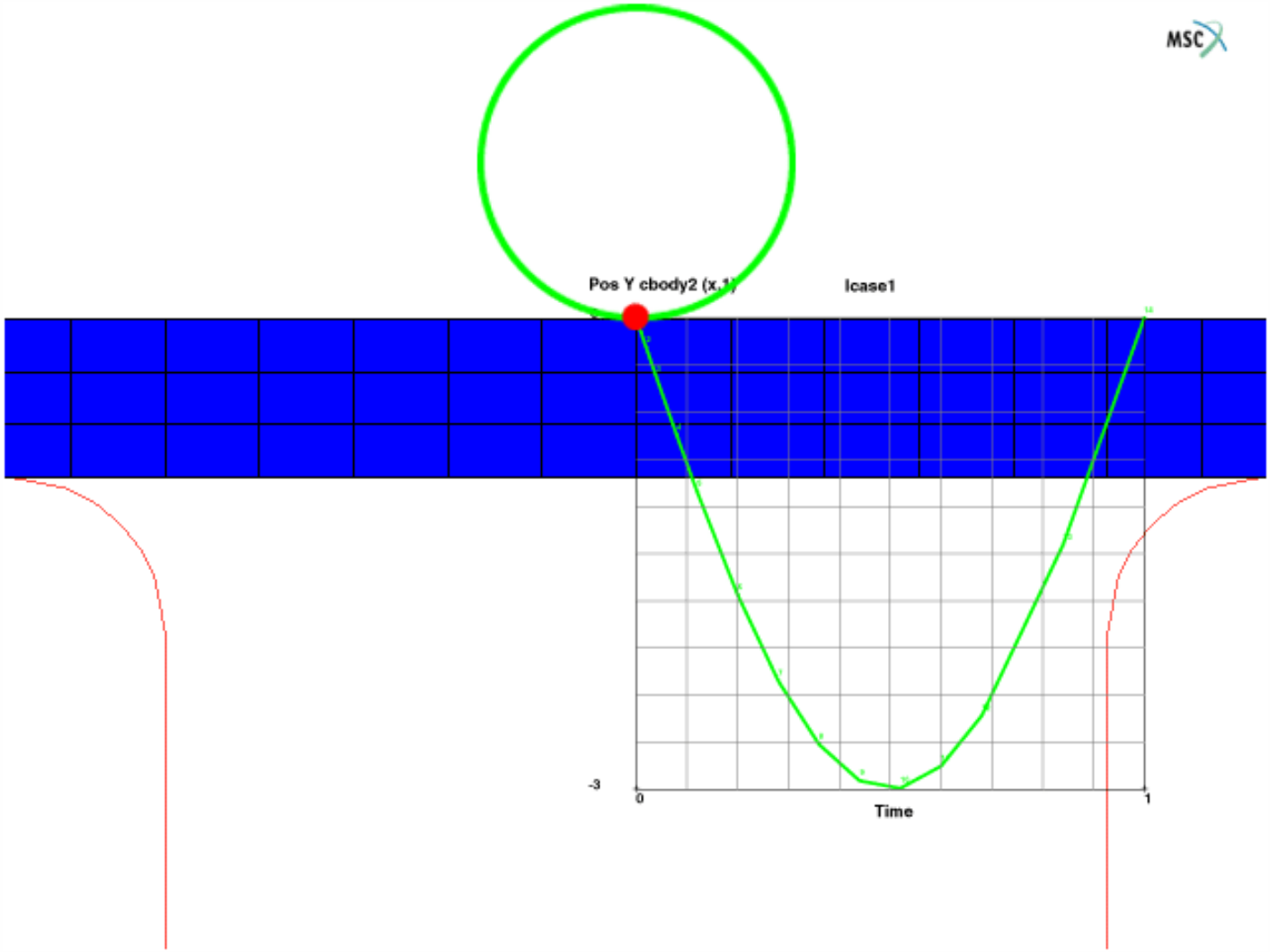
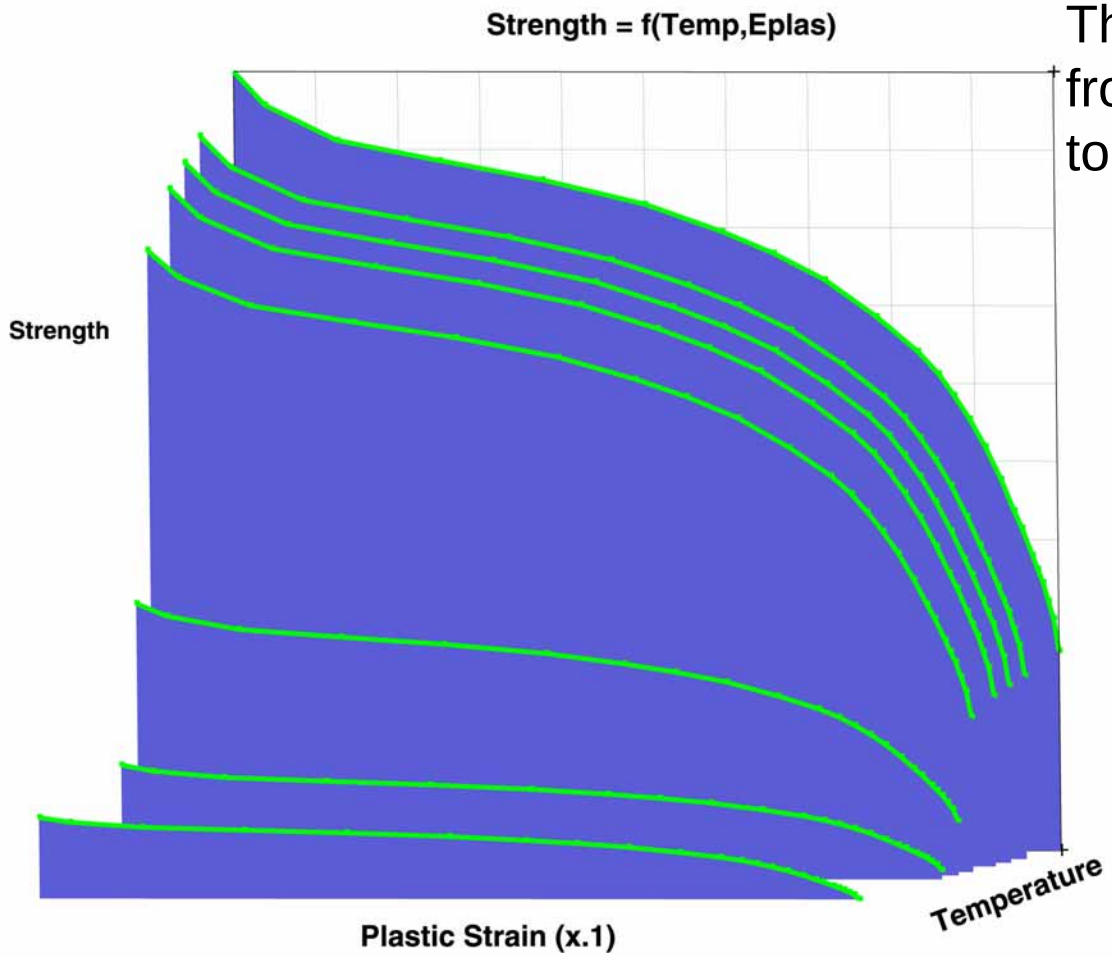


Table Input - Contact

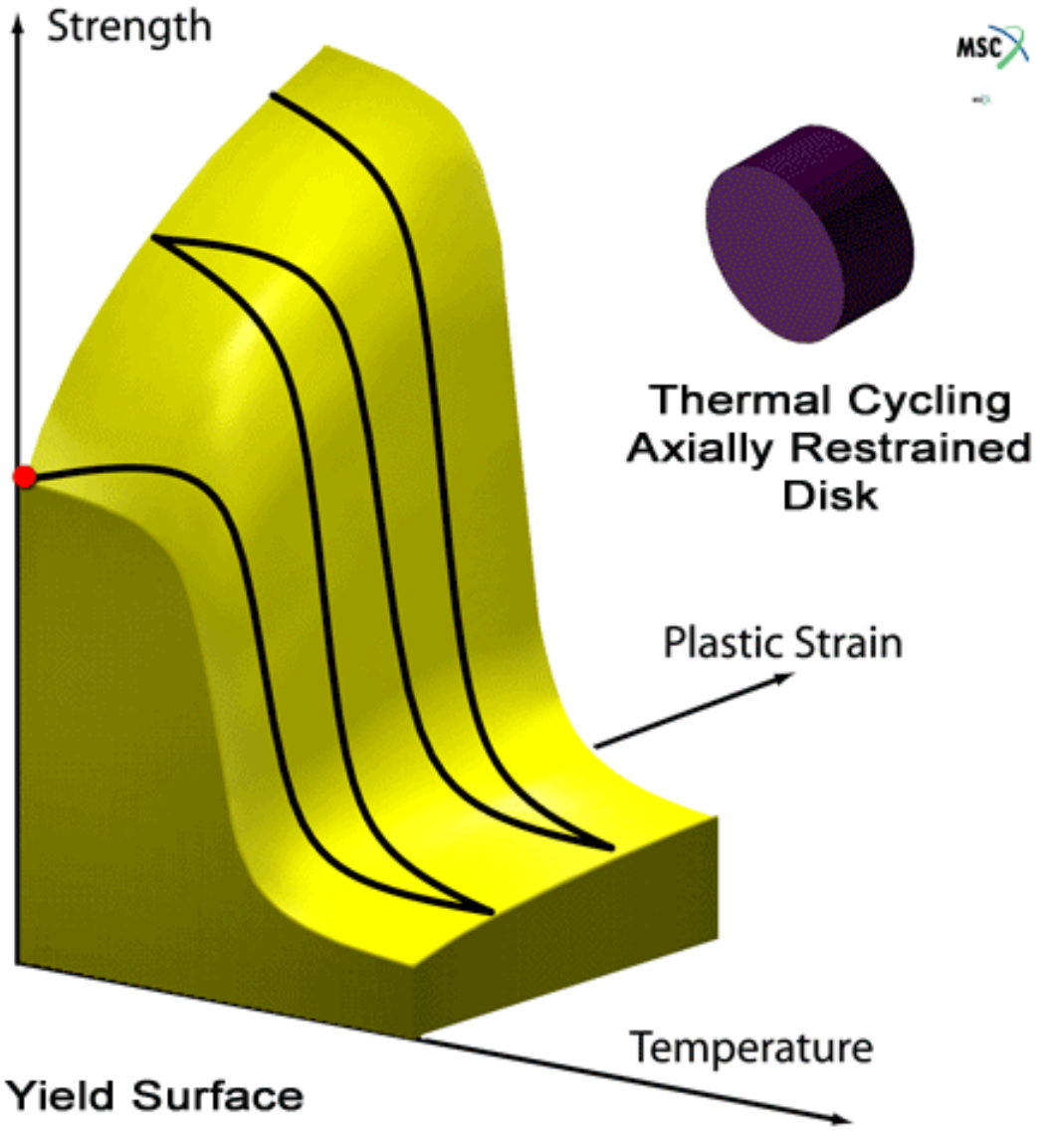


2D Table For Yield Surface



The yield surface is created from two curves multiplied together

2D Table For Yield Surface



During plastic flow every integration point must be on the yield surface (follow the red dot)

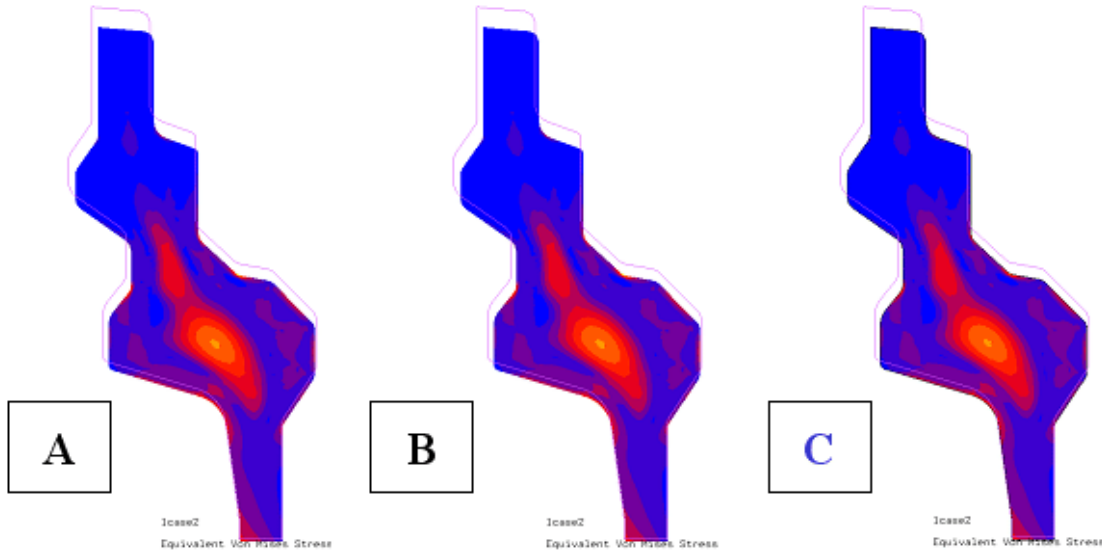
The disk is cycled from cold to hot two times

Disk Quench @ Pratt & Whitney

Quenching Simulation using User Sub Wkslp Versus New Table Input for Stress(plastic strain, strain rate, temperature) Data

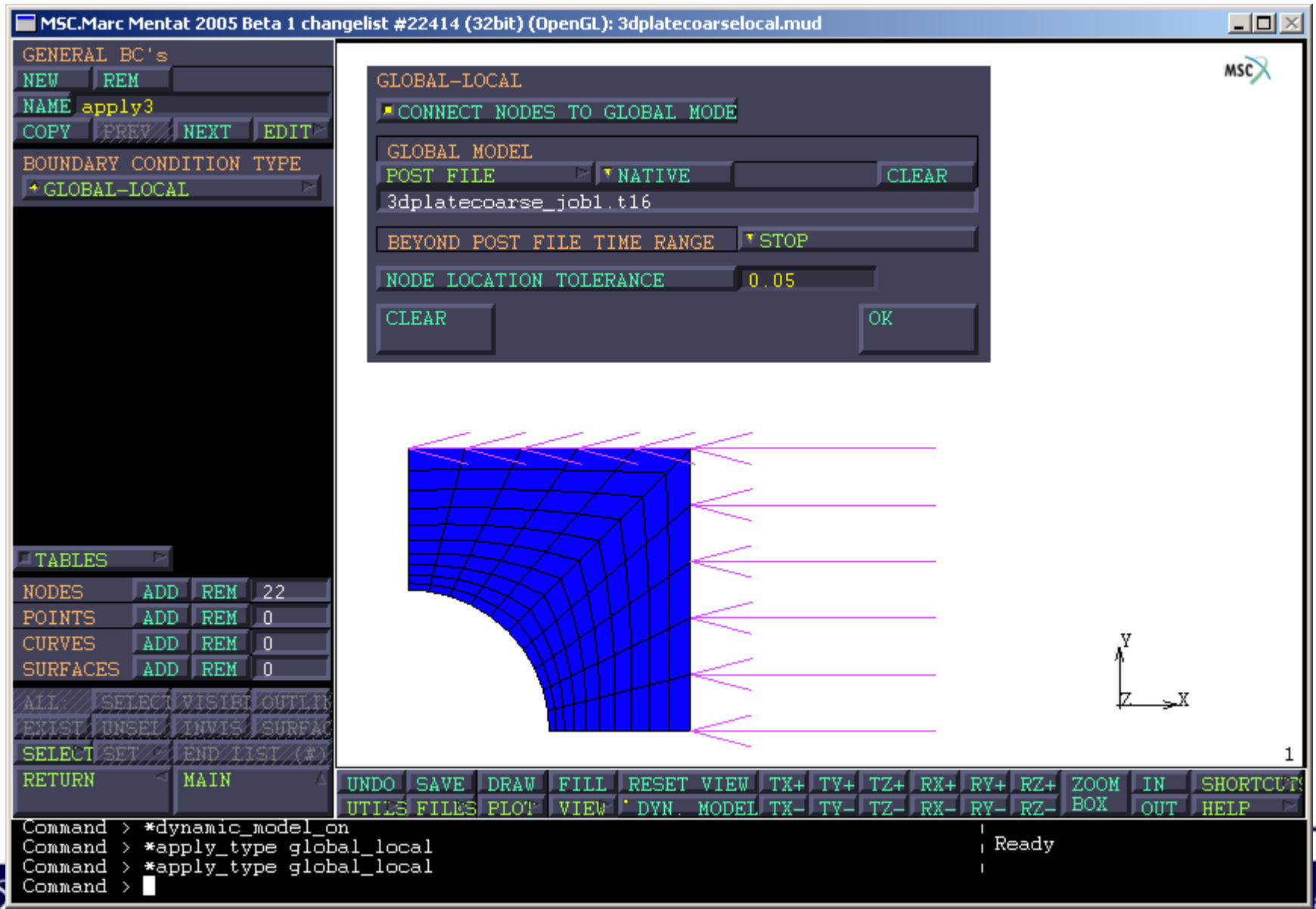
	MSC.Marc 2001 WKSLP Simulation A		MSC.Marc 2001 AF_flowmat Simulation B		MSC.Marc 2003r2 New Table Input Simulation C	
	wall time	cpu time	wall time	cpu time	wall time	cpu time
total time for input:	1.43	1.18	1.81	1.14	3.12	2.15
total time for stiffness assembly:	853.33	809.39	740.63	722.20	632.68	603.78
total time for stress recovery:	805.06	769.54	714.99	700.82	589.32	567.55
total time for matrix solution:	167.69	149.39	164.97	148.59	172.81	150.07
total time for output:	304.51	284.40	58.70	48.46	56.20	46.73
total time for miscellaneous:	109.15	86.03	112.22	88.74	118.91	85.34
----------						
total time:						

Run time for C was significantly faster due to faster stiffness formation and stress recovery by using the new table input, and other performance enhancements in Marc2003

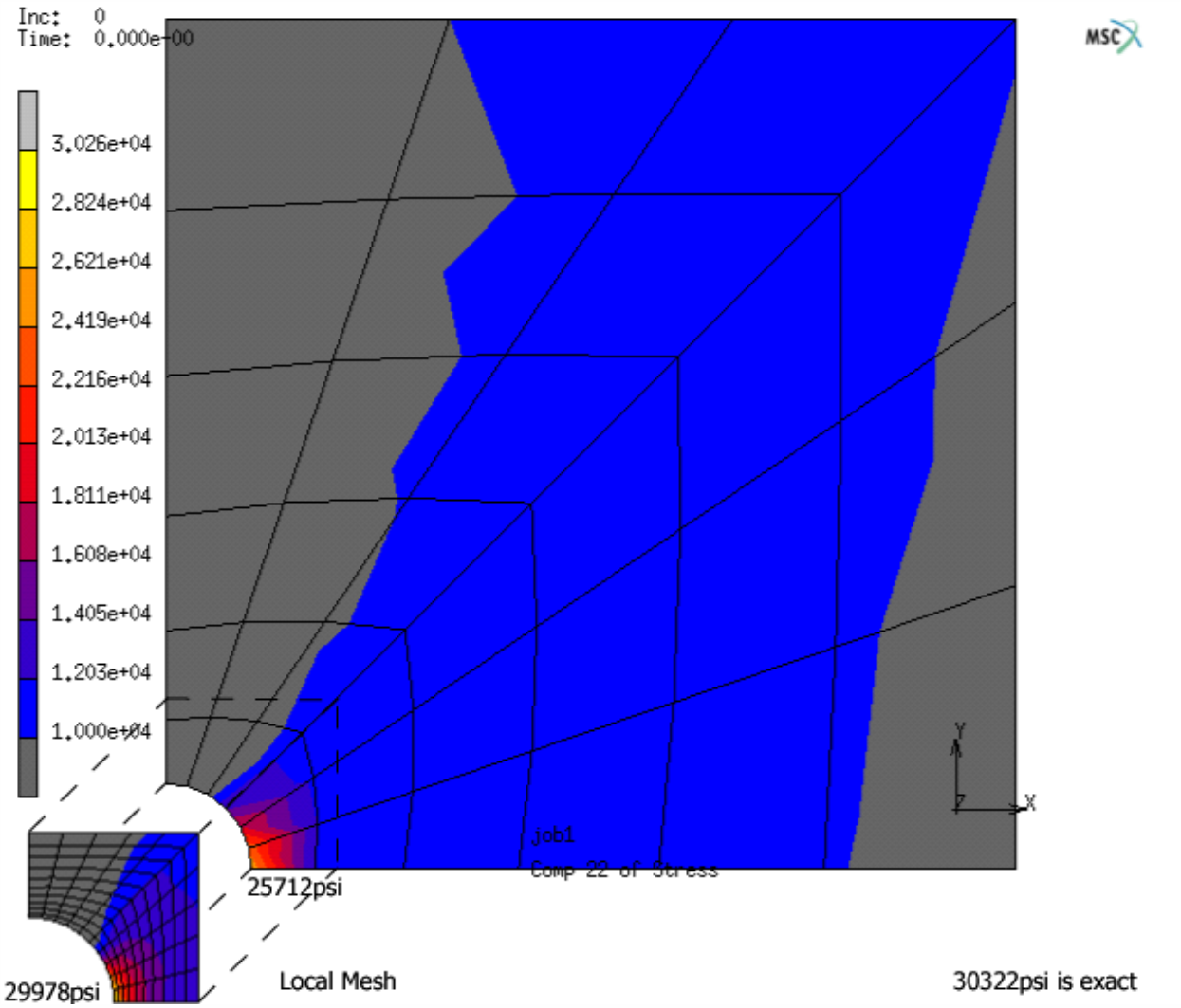


- Upcoming Release

Global Local Zooming

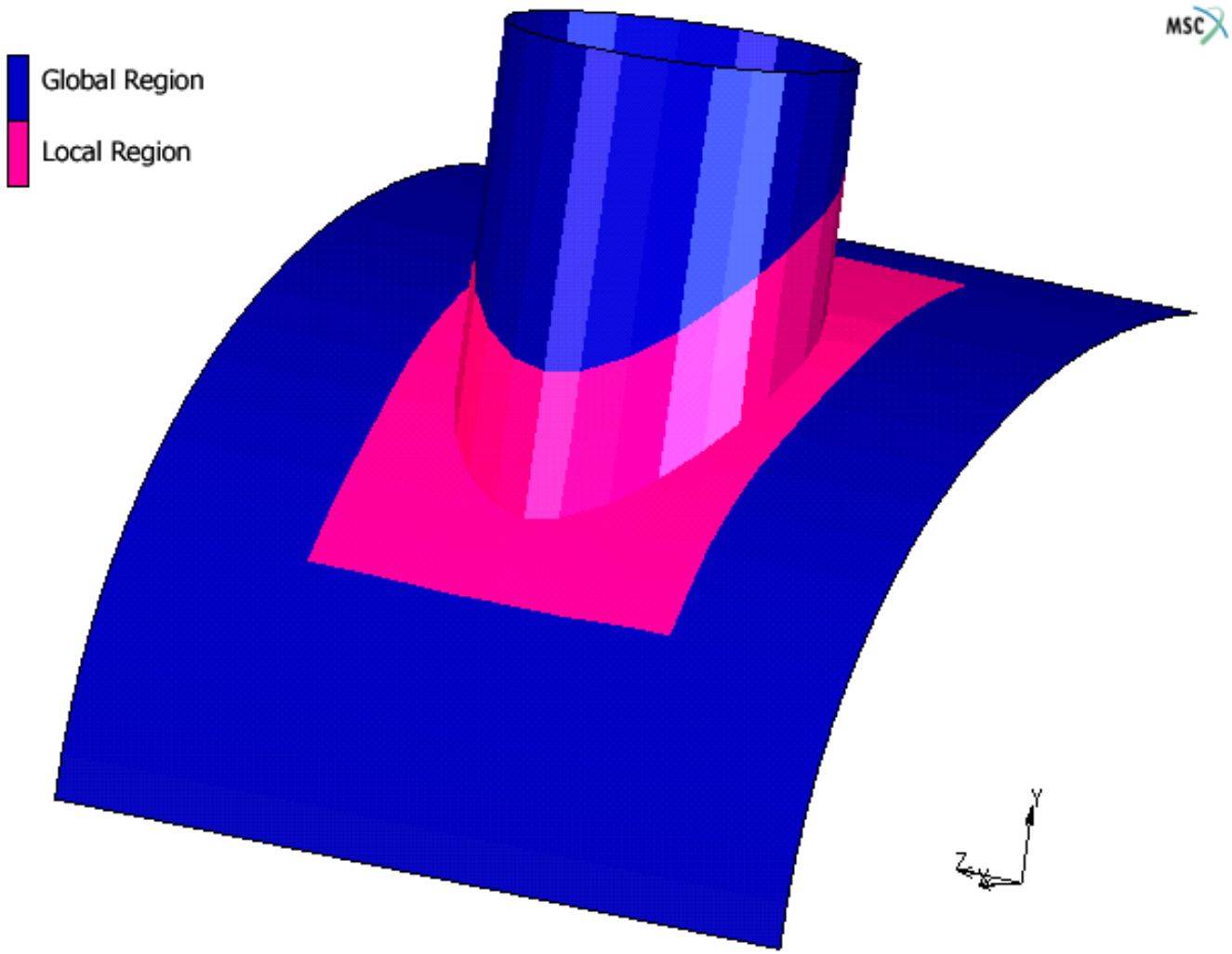


Global Local Zooming

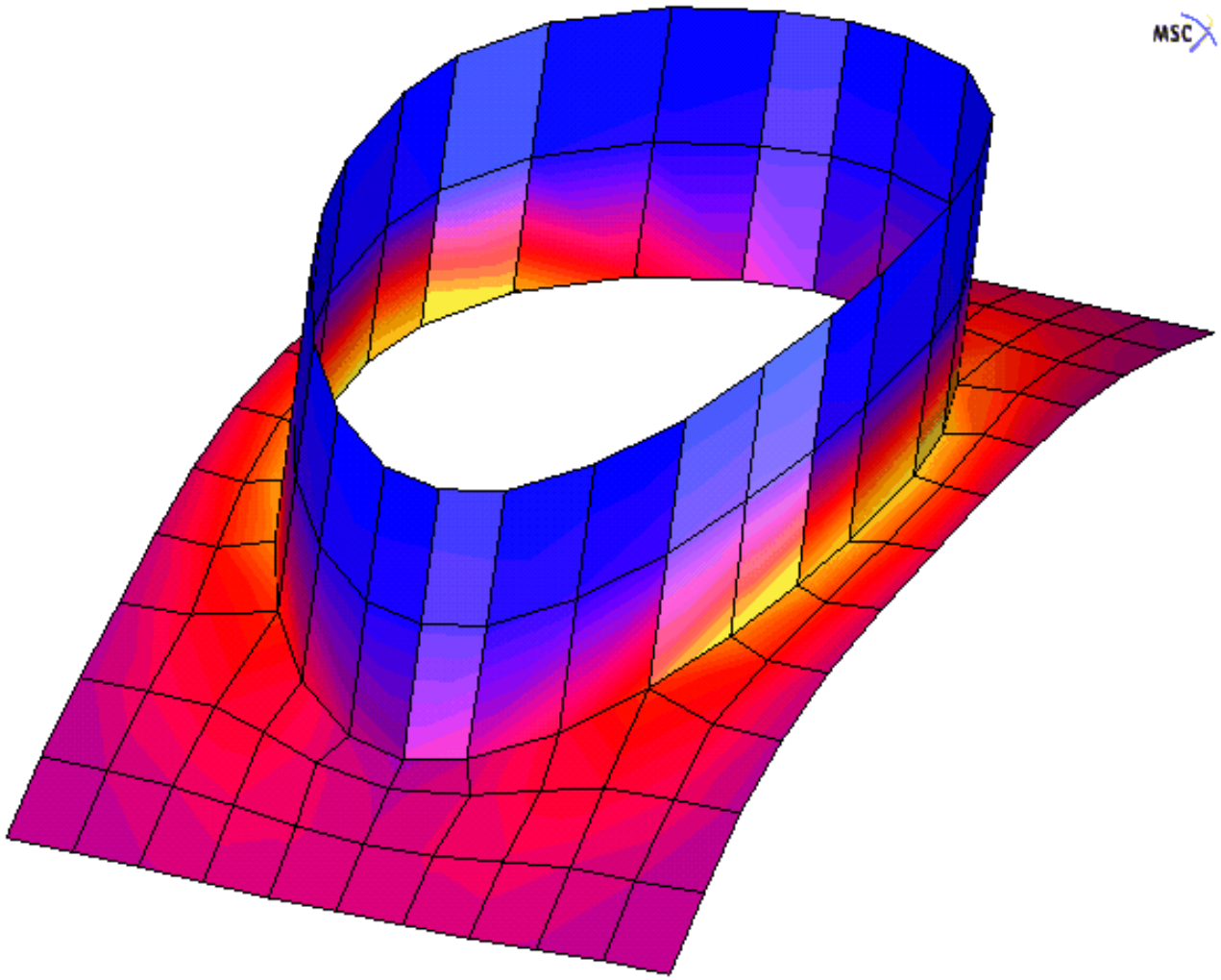


More…

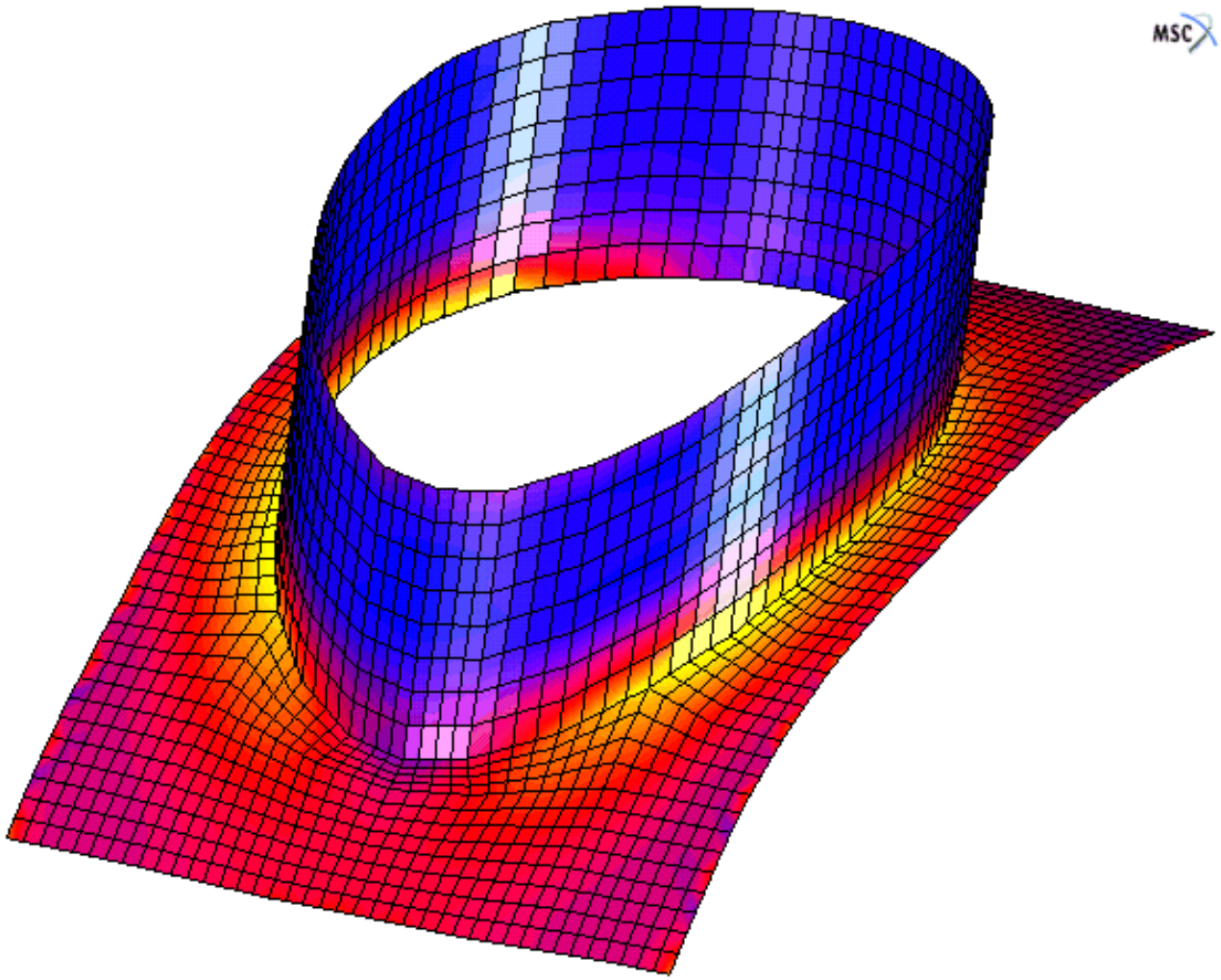
Global Local Zooming



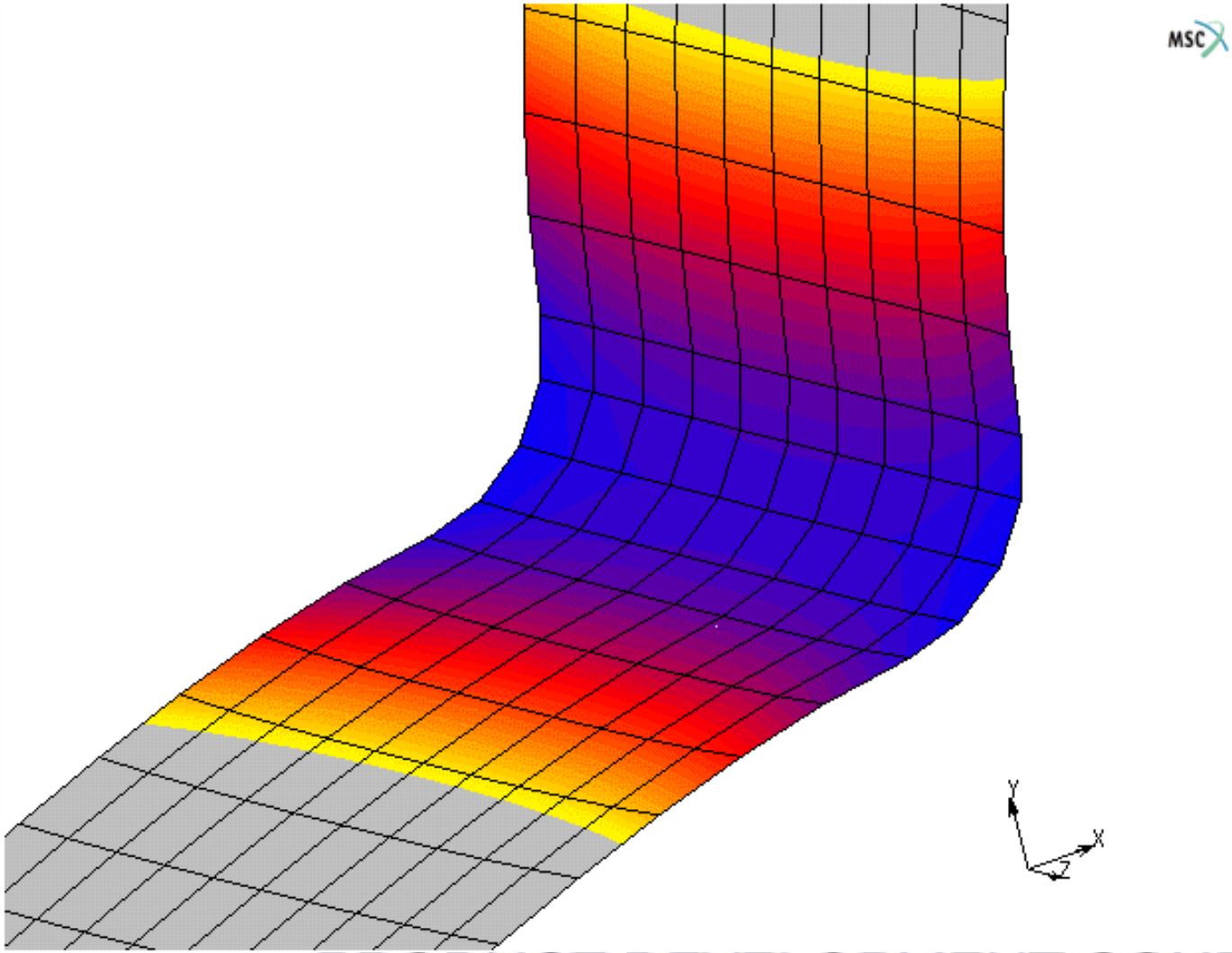
Local Region of Global Mesh



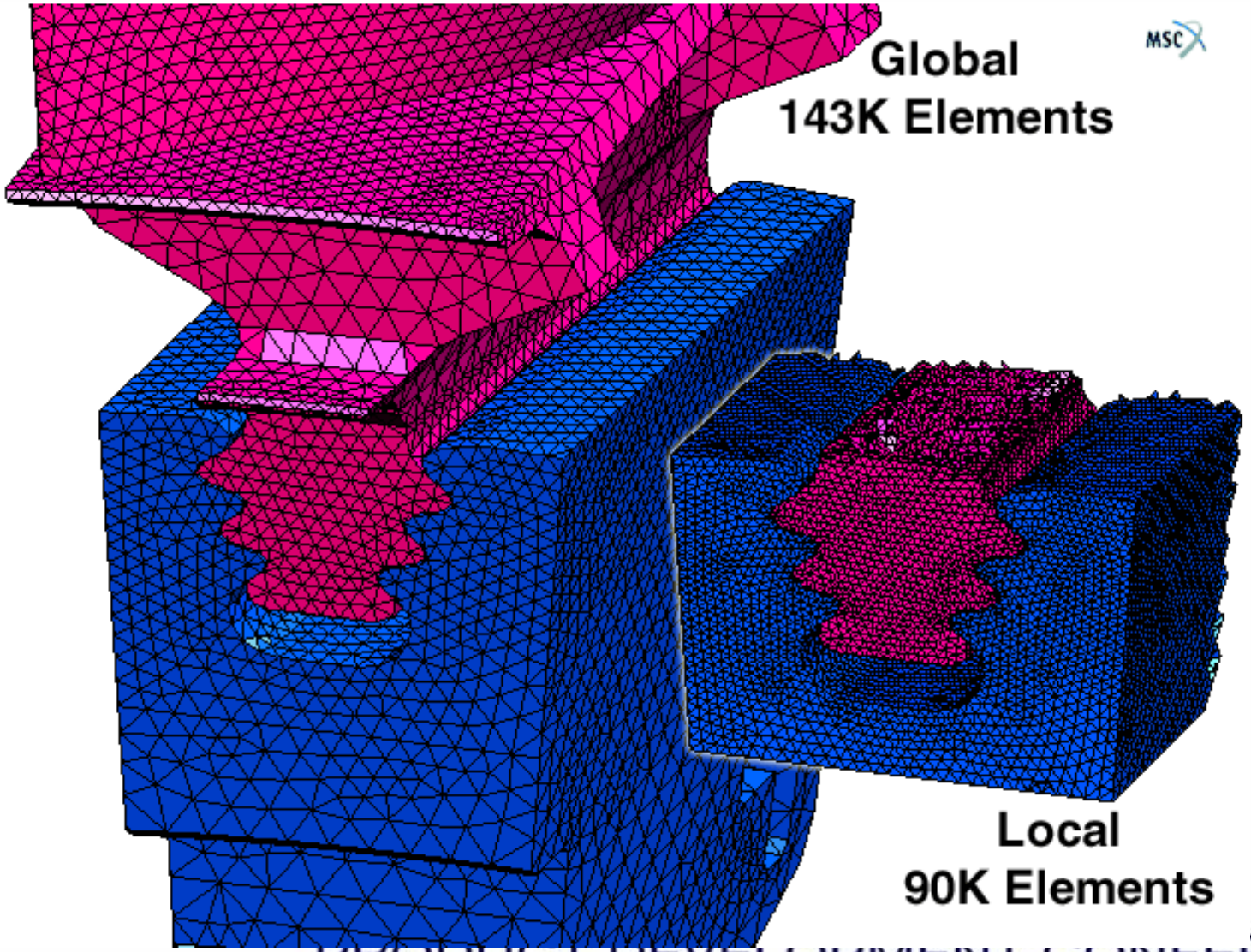
Local Mesh



Shell 2 Brick Zoom

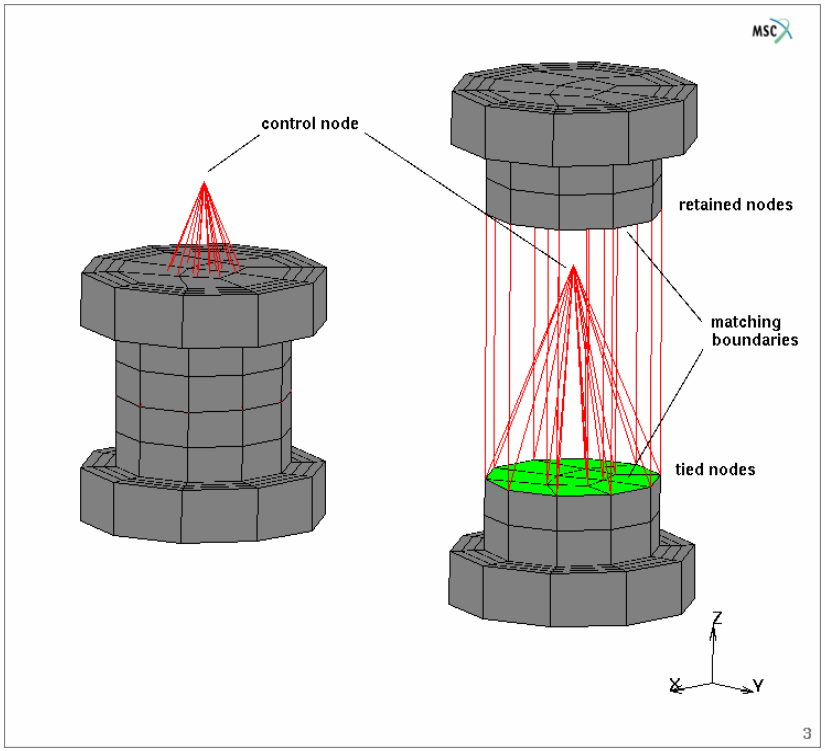


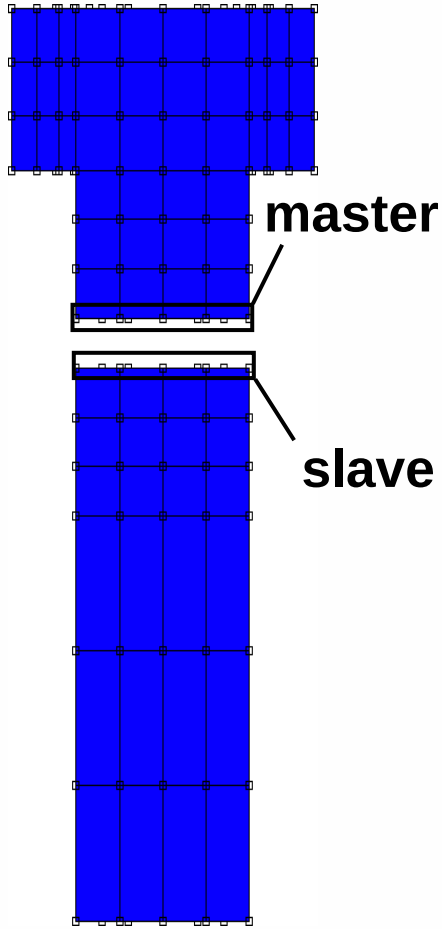
Zoom In On Existing Models

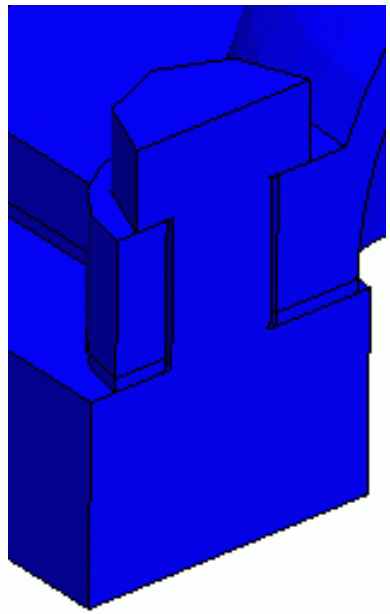


Bolt Modeling - Engine

Automatically splits into two parts and generates constraints

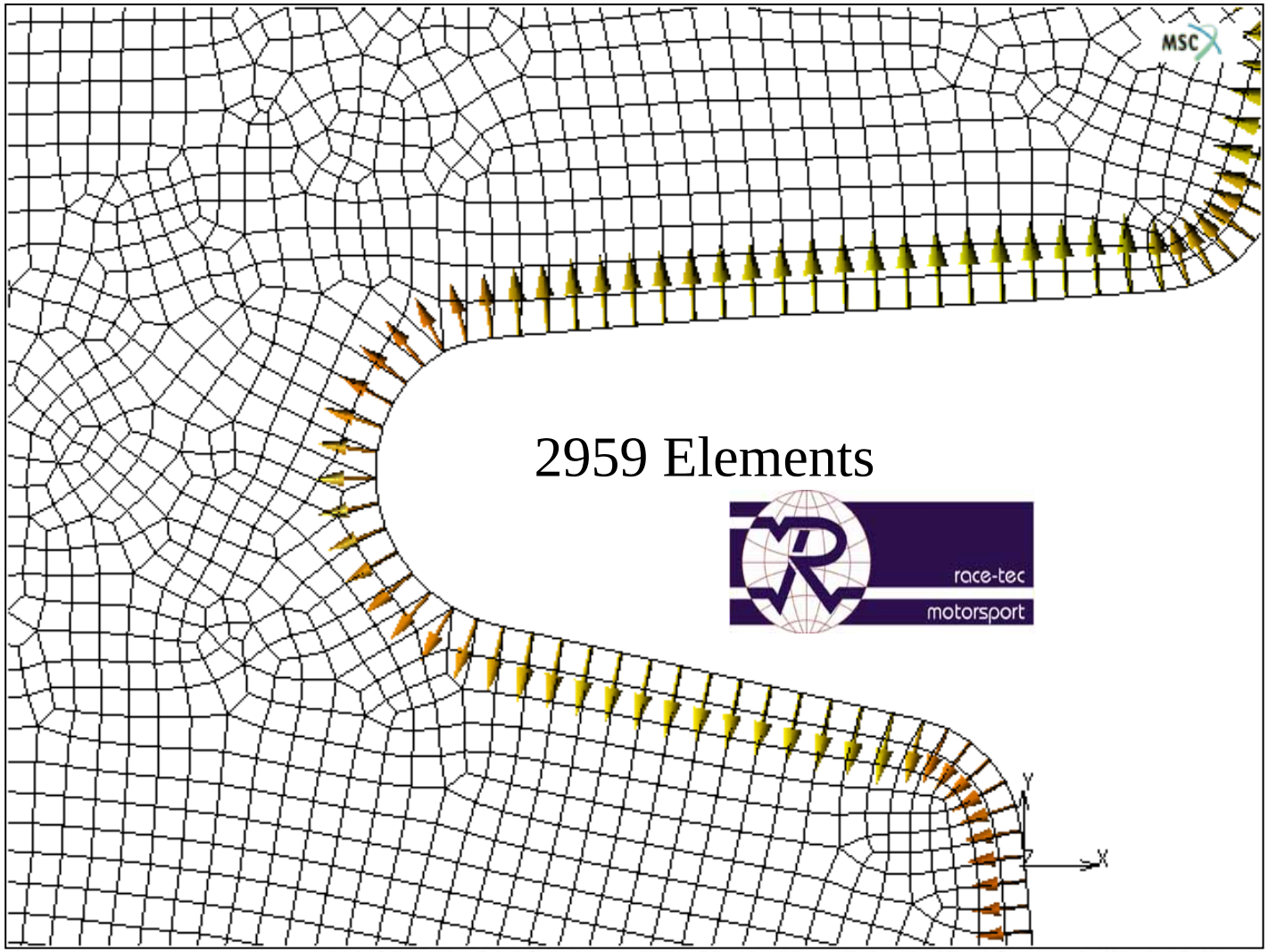




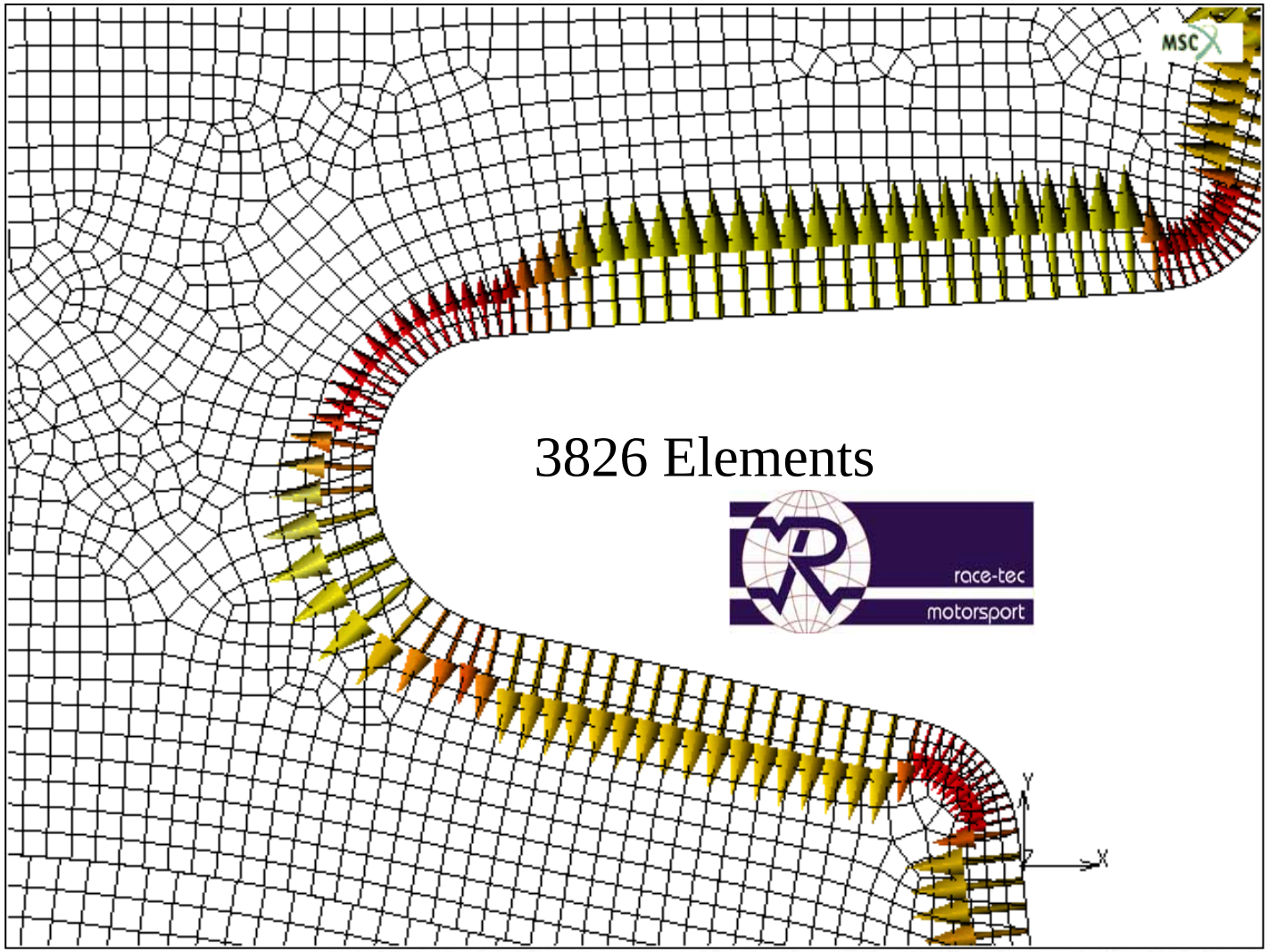


More…

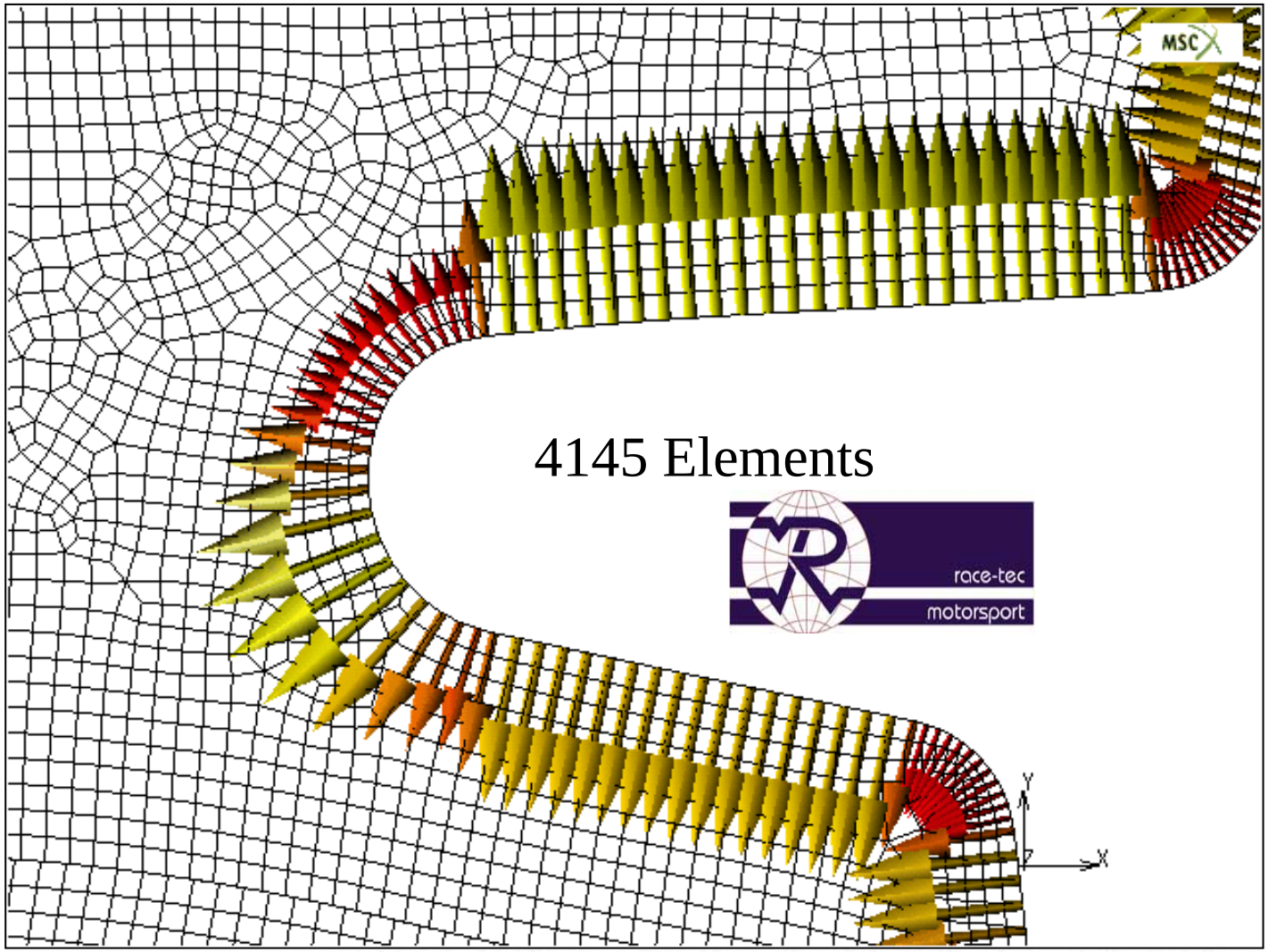
Remeshing With Pressure BC



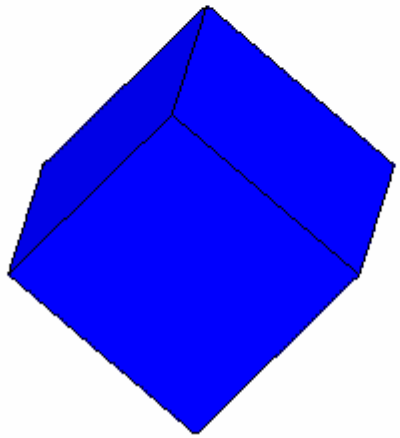
Remeshing With Pressure BC



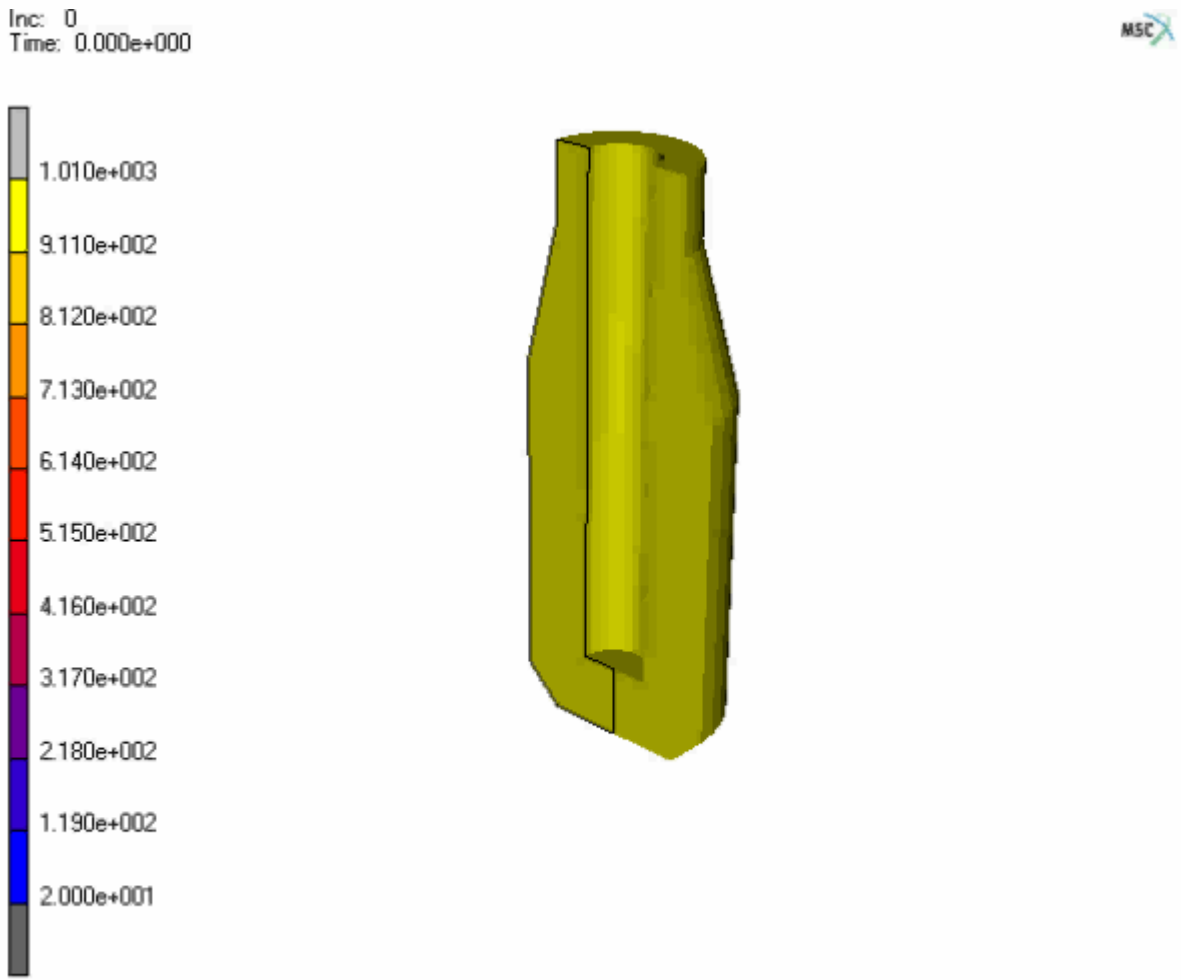
Remeshing With Pressure BC



Remeshing Cube Crush



Remeshing Glass Forming



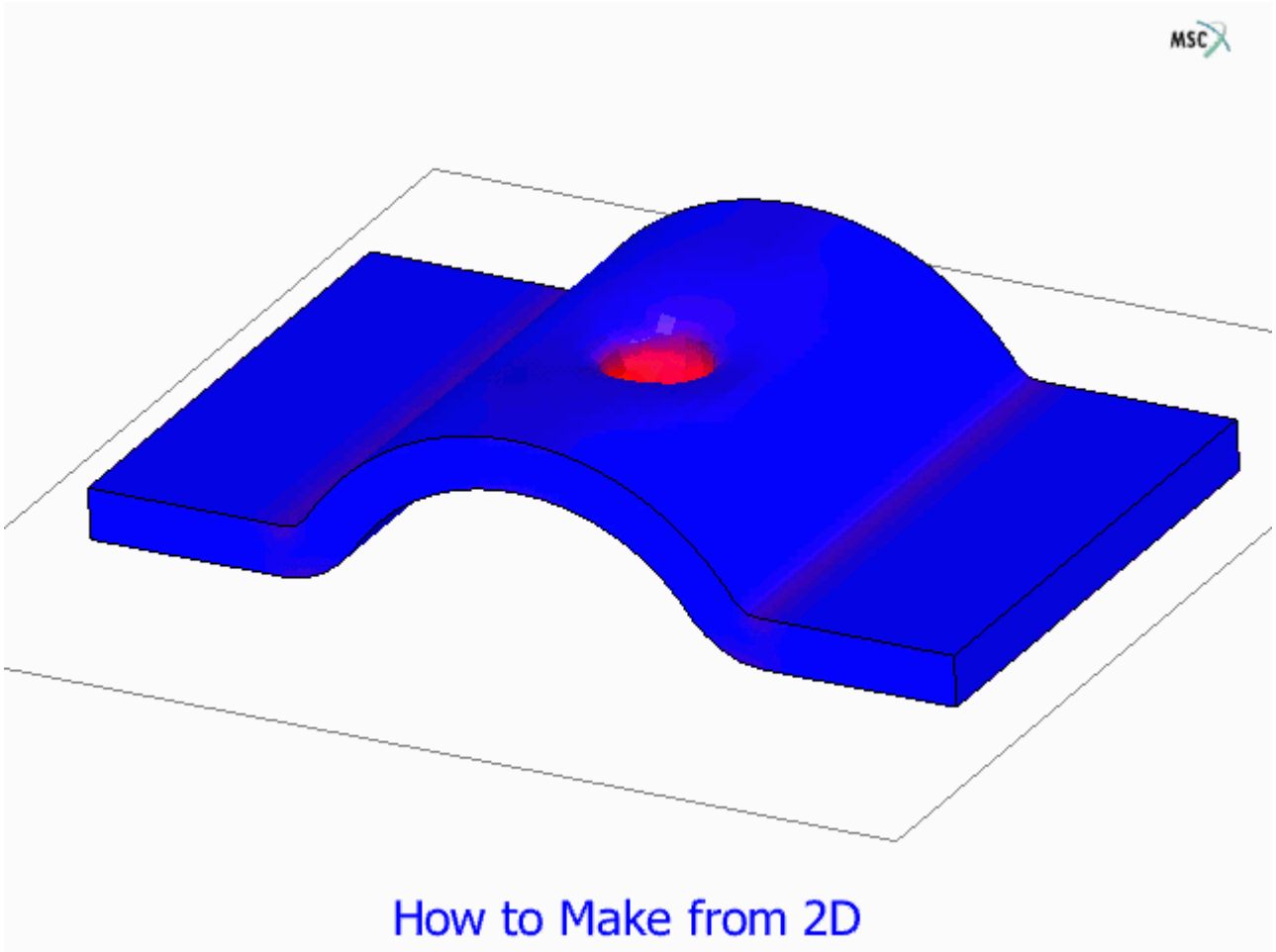
Pre-State Option

Prior Results Transfer as Initial Conditions in a New Model which includes:

- 2D to 2-D
- 2-D plane strain to 3-D
- 2-D axisymmetric to 3-D
- 2-D generalized plane strain to 3-D
- 3-D to 3-D

Pre-State Option

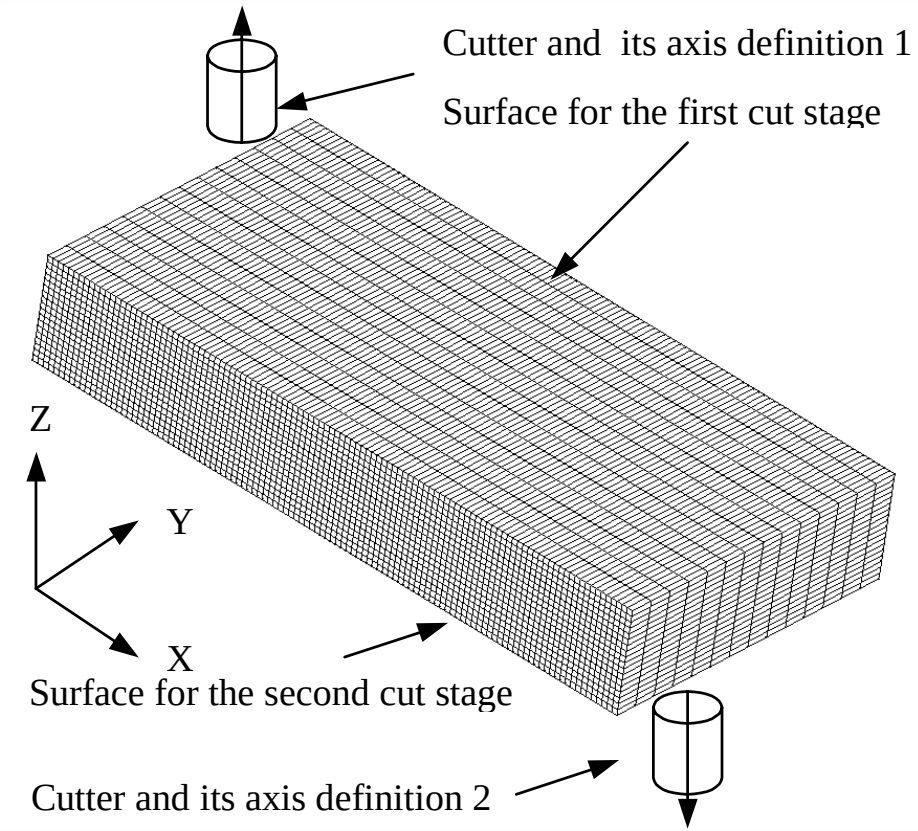
Pre-State Option = Past Residuals Become Initial State

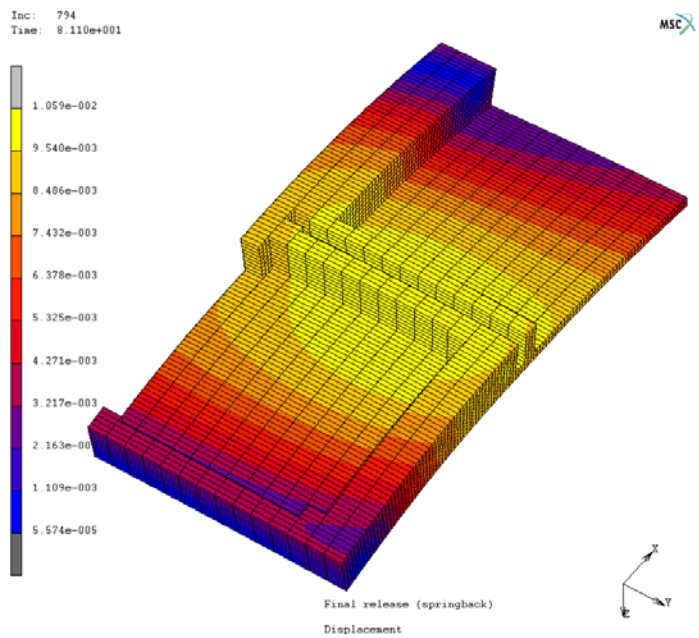


Cutting

Pocket Cutting

- Definition of the Two Cutting Processes





Cutting – 737 Wedgetail

Welding

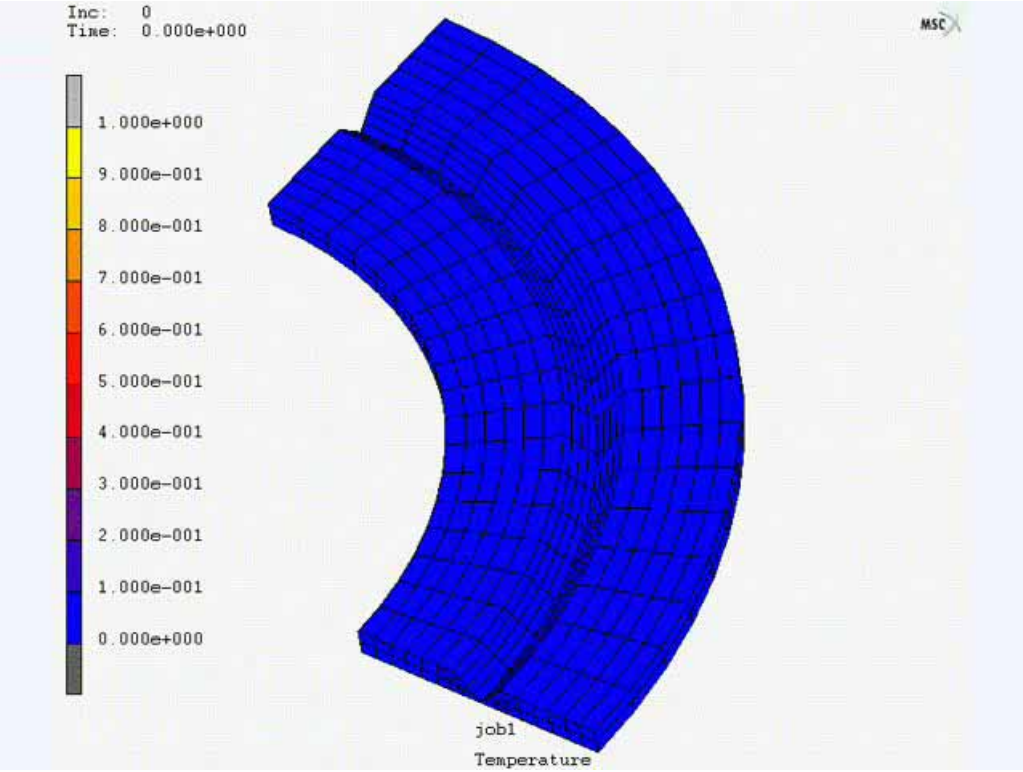
Weld Heat Source Definition

- Size, shape, magnitude, velocity

Weld Heat Source Motion

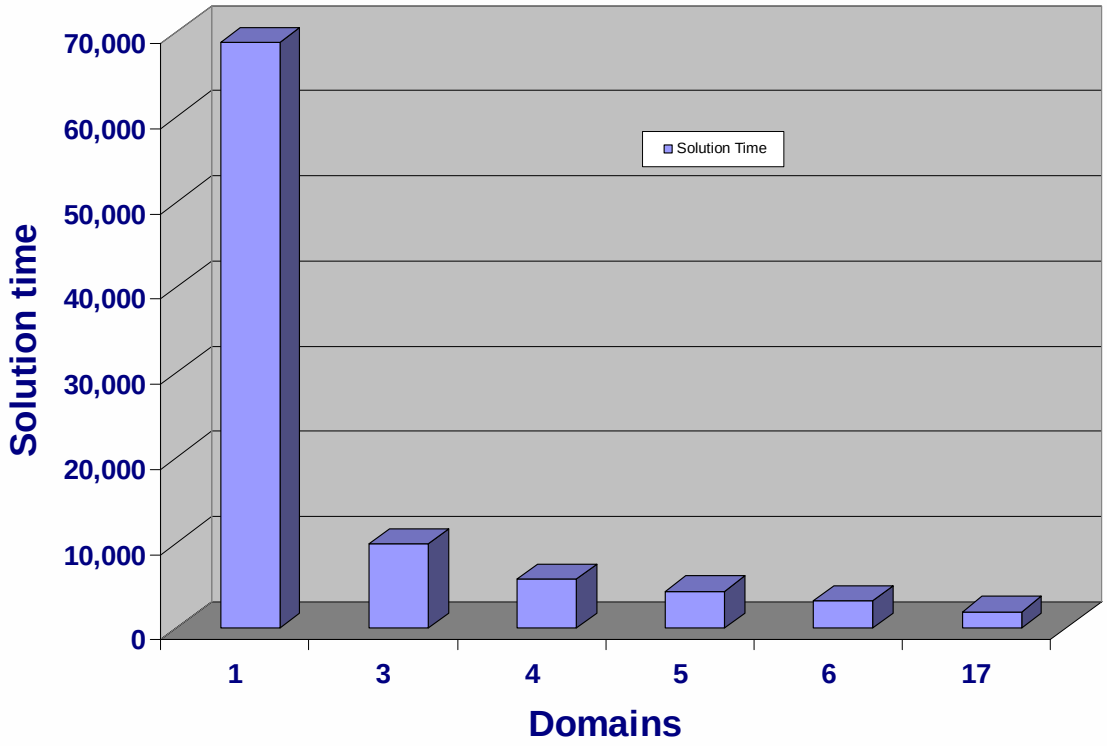
- Path, Orientation

Filler Elements Modeling



Parallel Case Study Results

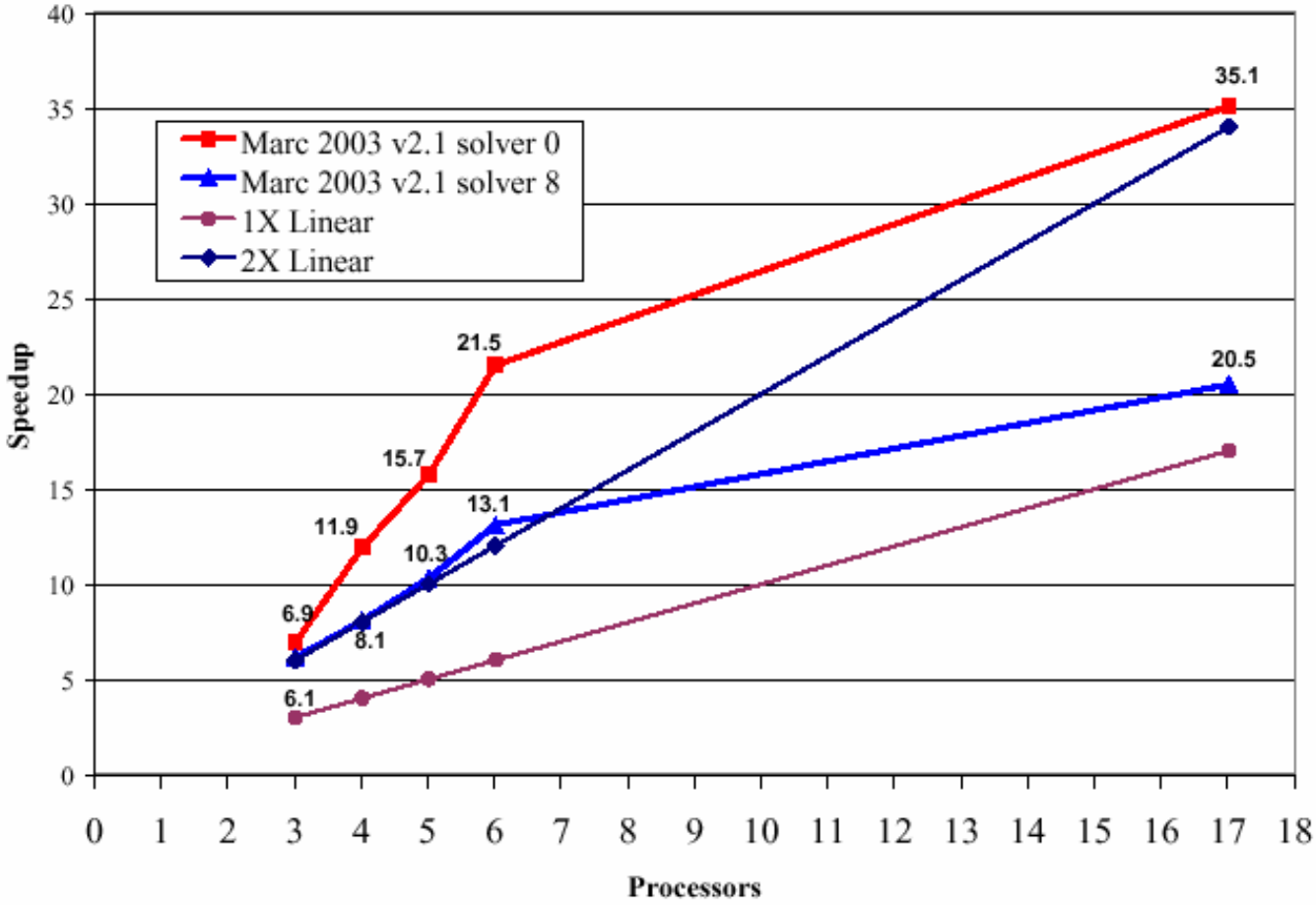
Flexible Bearing Results
Solver 8, Optimize 11



Note: These results reflect the preconditioner improvements as well as the non-linear acceleration procedure

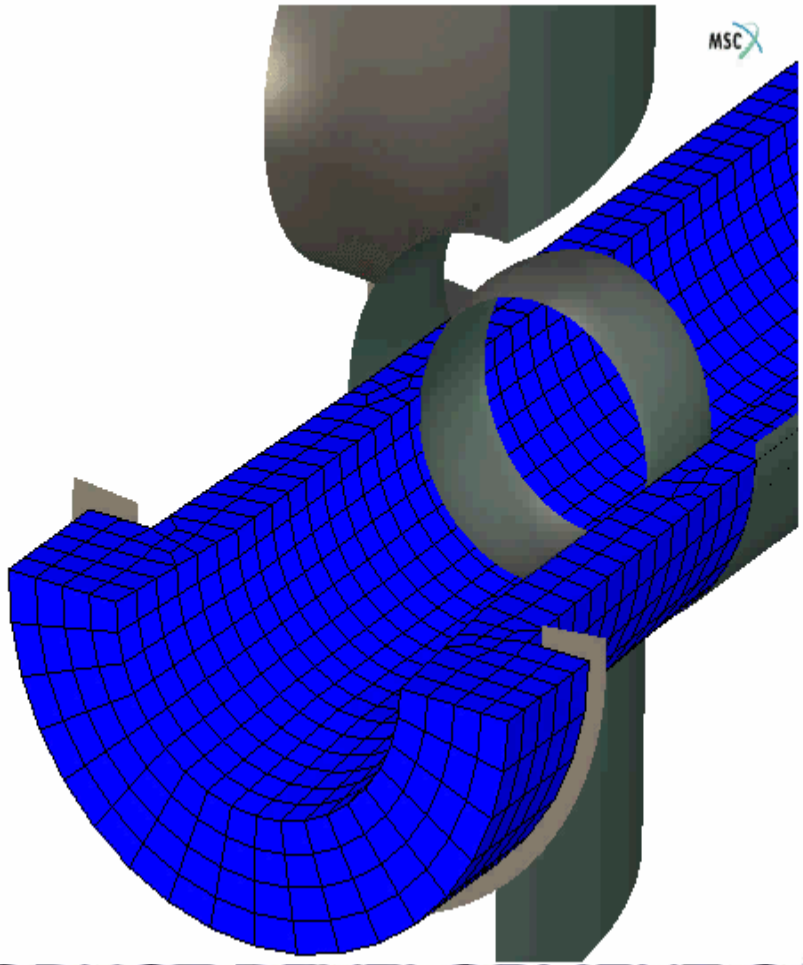
Parallel Case Study Results

(All Objectives met and/or exceeded)

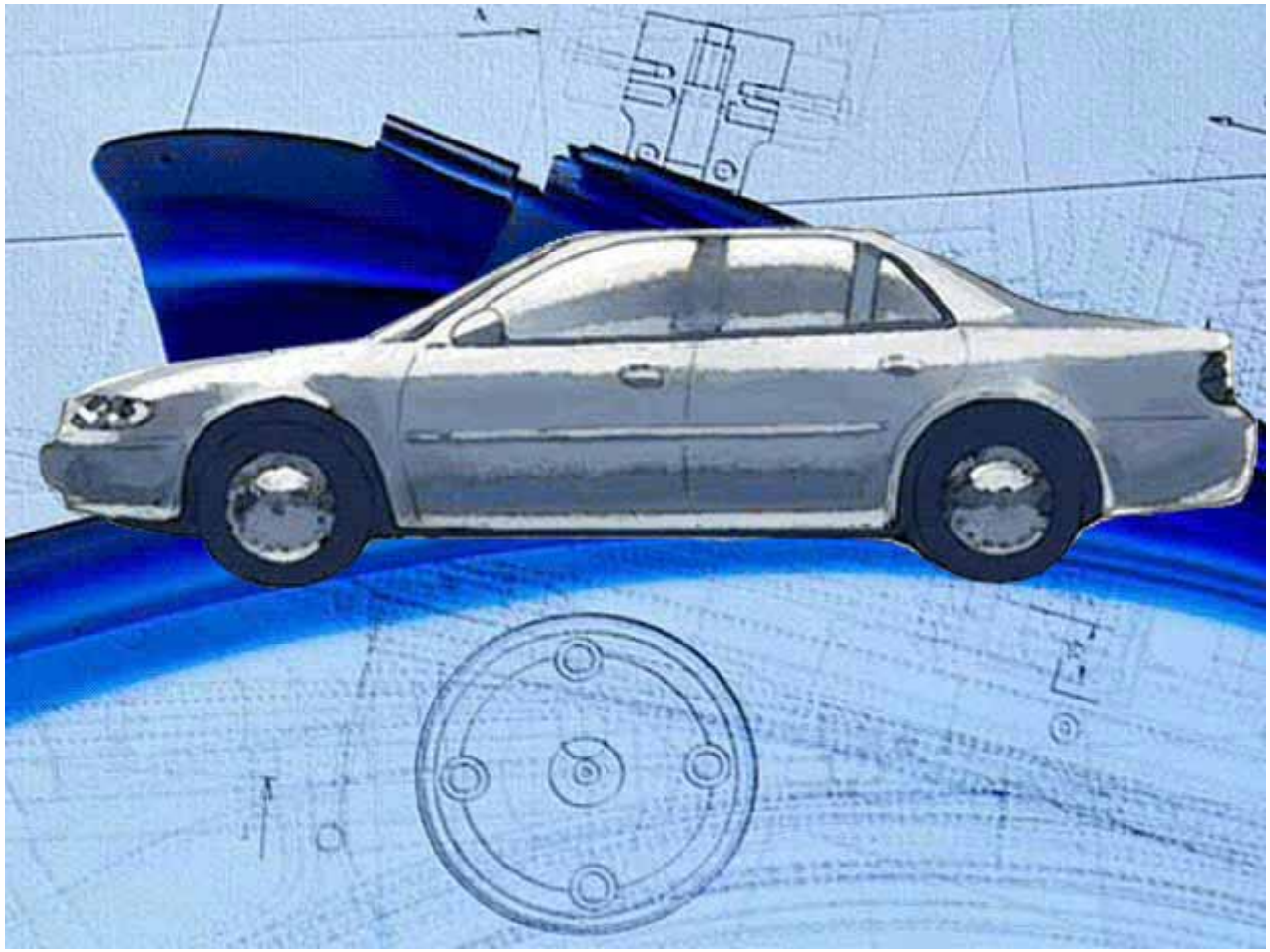


Parallel + Adaptive Meshing

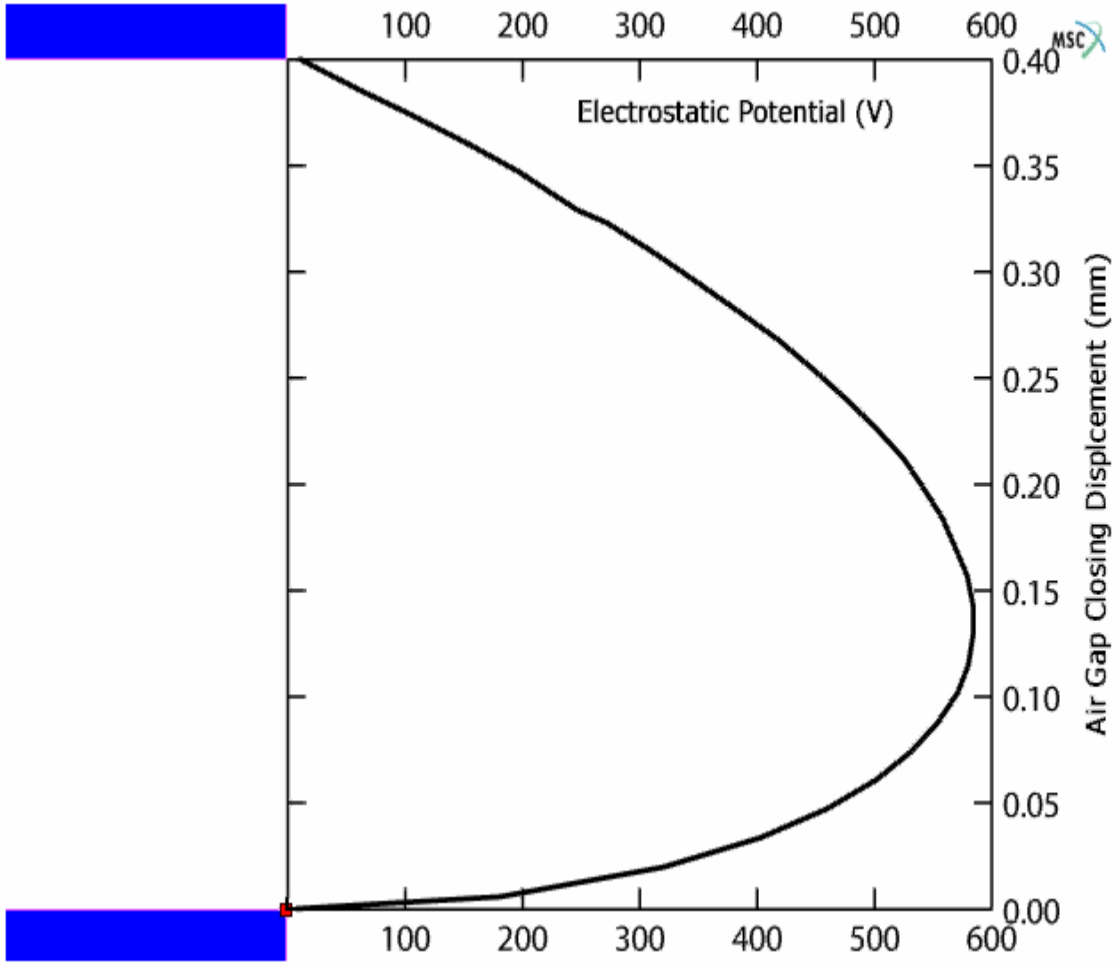
Tube bend with single input file



Generalized Strain Energy



Electrostatic-Mechanical



Solvers Roadmap