IN THIS WEBINAR:

• Summary of new features in v11.4
• Demonstration of some new features
• Available resources and support information

PRESENTED BY:

David Cross, Ph.D.
Senior Aerospace Stress Engineer
Structural Design and Analysis
david@structures.aero
**FEMAP Direction**

Maximize efficiency of FEA tasks
- Efficient creation of high fidelity FE models that accurately represent real-world engineering problems
- Intuitive interpretation of analysis results to improve the design and performance of engineered products

Build upon strong FEMAP capabilities
- Geometry idealization and processing for FE models
- Powerful meshing, model creation and interactive editing
- In-depth support for industry standard solvers
- Flexible customization tools to streamline analysis processes
Visualization

• Show Entities / Autoscale
• Facilitates locating and visualizing model entities particularly in complex models
• Can Autoscale around one or multiple entities
• Accessible in other highlight locations including: Model Info, Data Table, and Connection Editor
Visualization

- Draw Erase on previous selection vs. entire model
- New “Draw Mode Select from All” option
- Easier to refine entity selection for Draw Erase

Workflow:
- Select elements to draw (from entire model)
- Deselect Draw Mode Select From All
- Go back into Draw Erase element selection – entity selection is now based on previous selection instead of entire model
Geometry Manipulation

- Geometry Break at All Intersections
- Automatically splits curves at any and all intersections
Meshing

- Meshing Toolbox: auto update of rigid elements

- Completes typical shell-meshing workflow:
  - Create initial mesh
  - Fine tune with Meshing Toolbox
  - Any rigid ‘spiders’ present will update automatically
Meshing

- Meshing Toolbox: auto update of rigid elements
- For rigid elements connected to geometry that is being re-meshed:
  - If all the nodes on a curve or surface are associated with each rigid element, then that element is updated to the new nodes generated
  - If some nodes are left out, the intent of the rigid element update is not clear, a warning message is issued (example):
    Potential rigid disconnect at Element 17920 and Curve 805
    It is up to the analyst to reconnect as desired
Saved Vectors and Planes

- Vectors and planes can now be saved to the model
- Vector and plane managers for creation and management
- Any vector or plane in the previous section can be saved
Saved Vectors and Planes

• Using Saved Vectors and Planes

• Added Saved method for both vectors and planes

• Saved vectors and planes persist with the model and can be referenced at any time

• Running list of previous vectors and planes is kept so they can be easily referenced without having to save them
Function/Table Editor

• Table Pane for creating and editing both functions and tables

• Function Types
  • Time
  • Temperature
  • Stress/Strain
  • Frequency Dependent/Dynamics
  • Thermal/Flow
  • Other

• Table Types
  • Load Set Combination
  • Result Set Processing
  • Thermal/Flow Vector Table
Function/Table Editor

- New GUI based tools in Function/Table Editor
- Copy/paste cell to cell
- Fill down, Fill right
- Series: Constant, Linear, Growth
- Adjust highlighted cells with scale + factor
- Ramp, Equation and From Data Series
Data Mapping

- High performance data mapping

- New performance algorithm for extracting data from Output Map Data Surfaces and Model / Load / Map Output from Model (direct model to model)

- 1,000x faster!

- Added Data Conversion method for Source model
  - From View – uses current settings in Active View
  - Specified option – Average, Maximum, or Minimum (Centroid Only or with corner data)

- Ongoing development on new source options, matching Criteria Plots and Contour Plot options
Data Mapping

Data mapping speed improvement example

Source model: 1,000,000 elements with nodal data distribution

Mapping times

- V11.3.2 > 5 hours
- V11.4 < 1 minute
Charting

- Chart Data Series dialog redesigned to show only the most relevant information
- Use Type drop-down to select type of data series
  - Data tab dependent on option selected in Type drop-down
  - Style tab consistent for all data series types
- Clutter is reduced and options are easier to find
Charting

- Simultaneous plotting of real and complex data
- Dual plots can simultaneously show real / imaginary or magnitude / phase data
- Expansion is done automatically; no additional complex data series need to be specified
- New chart data series type – Complex Expansion
- Magnitude / phase data is expanded at user-defined interval
Charting

- Real-time output processing
- Processing is done on-the-fly by the charting pane – manual processing is no longer required
  - Transform
  - Nodal / elemental data conversion
  - Complex phase synchronization
Nastran Solver Support

- Nastran enhancements
- Param, POST, -2: reads nodal output in the basic coordinate system
- Strain Curvature output support
- Performance enhancements for reading large Nastran input files with many DMIG entries
- Read, keep and cycle CELAS1 entries in lieu of auto-converting to CELAS2 entries
- ZTOL entry support for Nastran radiation analysis
Solid Centerline Finder

- Solid centerline finder – available via API only
- `feSolidExtractCenterlines`
- Pass in one or more solids
- In this example: one single solid
Solid Centerline Finder

- FEMAP extracts centerlines/arcs
- Assigns property/material
- For solid tubes – FEMAP circular bar property is created
- For hollow tubes – FEMAP circular tubes are created
- Within a single call to command, properties are reused if they match
Solid Centerline Finder

- Non-circular cross sections
- Lines/arcs created at neutral axis of section
- Property is assigned to each curve, including reference point and orientation so they are fully ready to be meshed
- No attempt to consolidate, each curve assigned a new property
Solid Centerline Finder

• For tubular models, individual or connected components are handled in a similar manner

• Model 1 – 69 solids

• Model 2 – 1 solid
Solid Centerline Finder

- Current limitations

- For non-circular cross section, algorithm creates the cross section based on the longest curve on the solid

- For any straight or circular beam-like section, works great

- For multiple curvature ones, it does not
Additional Resources

• Download Femap 11.4: http://download.industrysoftware.automation.siemens.com

• Femap Tutorial: https://structures.aero/femap-tutorial/

• Femap Webinars: https://structures.aero/webinar/#femap

• Femap Training: https://structures.aero/femap-training
Structural Design and Analysis (Structures.Aero)

Structural Analysis Software from the Engineers Who Use It
Questions?

For questions on the material covered today, please contact David Cross.

David Cross, Ph.D.
Senior Aerospace Stress Engineer
david@structures.aero
703-673-1125

For questions about pricing, or to see a demo, please contact Marty Sivic.

Marty Sivic
Director of Sales
msivic@structures.aero
724-382-5290