

Top ten reasons to upgrade to Femap

White Paper

Industry pressure to reduce costs and improve quality is driving growth in the use of digital simulation throughout the product lifecycle. Choosing the right tools is key to achieving the business benefits of digital simulation.

www.siemens.com/plm

Contents

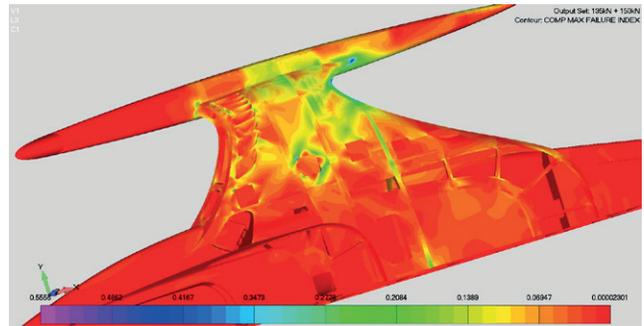
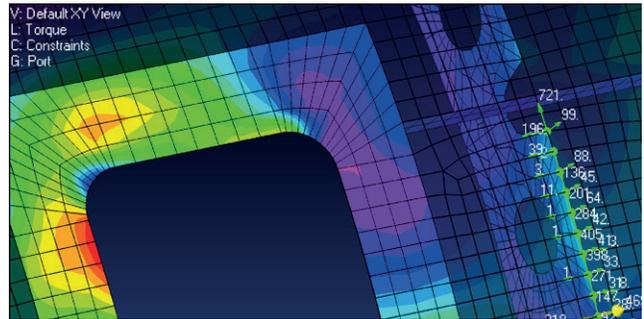
Top ten reasons to upgrade to Femap	3
1. Product quality.....	4
2. User interface	4
3. CAD access	5
4. Geometry preparation tools.....	5
5. Visualization tools.....	6
6. Preprocessing.....	6
7. Meshing	7
8. Solver support.....	7
9. Postprocessing	8
10. Customization	8

Top ten reasons to upgrade to Femap

This white paper presents just a sample of the many technical and commercial reasons for investing in Femap™ software that clearly show why Femap is the leader for standalone FEA pre- and postprocessing in many markets including aerospace, defense, heavy industry and shipbuilding.

For more information on Femap go to:
www.siemens.com/plm/femap

This document is intended to help you understand the strengths of Femap. The following section lists the top ten differentiators that distinguish Femap and its capabilities.



1. Product quality

The Femap development team has remained constant for over 25 years, and the future functionality development is subject to a consistent planning process that follows a well defined roadmap. The Femap product releases regularly every few months and contains powerful new functionality that is guided largely by the customer base.

Unique functionality added to Femap in the last couple of releases includes the following:

- Postprocessing analysis studies to aid results data organization
- Geometry update tools allowing on-screen direct interaction with geometric entities
- Intelligent mid-surface extraction methods that can handle complex variable geometry
- Attachment to external results files for increased efficiency
- Recreate geometry from legacy FE models
- External superelement support
- Redesigned XY plotting and charting capability
- Advanced postprocessing capabilities including determination of free bodies, interface loads and model section cuts
- Graphics performance improvements taking advantage of graphics card GPU memory

With a consistent development team committed to high quality product advancement through the provision of robust functionality, Femap is set to have a very strong future.

Competitive advantages

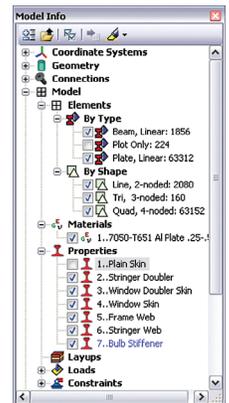
- High value for maintenance fees with consistent, ongoing product functionality improvements
- Commitment to ongoing product development and enhancements in support of customer requests
- Commitment to quality assurance
- Development team continuity

“A user-friendly environment was important to us because the engineering work at RUAG Aerospace Sweden involves different duties and we don't work 100 percent of the time with one single software. It is possible to come back to Femap after weeks of not using it and work very efficiently with it again.”

*Jan-Erik Larsson
Head of Engineering
RUAG Aerospace Sweden Mechanical Products Division*

2. User interface

Designed specifically as a native Windows application, Femap offers comprehensive analysis functionality that is easy to use and quick to learn. Key features that promote usability and efficiency include dynamic viewing, color and screen management, multiple model access, multiple undo steps – all within an intuitive user-friendly interface based on the familiar Windows look and feel. User interface panes include Model Info and Entity Editor that allow direct access to analysis modeling data without having to navigate a menu system. Similarly the Data Table pane allows direct access to post-analysis results and facilitates data exchange with third party products such as Excel and Word. Also available is a comprehensive help menu and online help resources including direct access to the Femap online community.



An efficient onscreen working environment minimizes training overhead and allows engineers to maintain maximum productivity even when Femap is being used on an occasional basis. The learning curve for Femap is very short.

Engineers can become productive in the use of the software after only two days training.

Competitive advantages

- User-friendly, Windows native, command and menu system based on the familiar Windows style user interface that is easily customizable
- Superior color, model entity visualization and group display control
- Fast learning curve that minimizes time investment before productivity returns can be gained – typically a two-day training course is all that is required to instruct FEA savvy engineers to become proficient in using Femap

- The quick-to-learn user interface promotes maximum productivity, even with occasional use
- Unique specialized display panes – such as the Model Info Tree and Data Table – allow direct access to analysis modeling data, and provide rapid creation and editing of models and results review

“With its user friendliness, Femap stands out among all other solutions on the market. The user interface to this solution is amazing, it is so simple; at the same time it enables you to model complex 3D geometry with no support.”

*Roberto Nascimbene
Structural Analysis Sector Coordinator
Eucentre*

3. CAD access

Femap offers neutral CAD support that enables analysts and engineers to import many kinds of CAD data from various sources. Femap leverages the Parasolid® modeling kernel that allows direct access to Parasolid data for surface and solid modeling, and provides robust advanced geometric tools necessary to access non-Parasolid geometry. In addition, Femap is associative with Solid Edge® software.

Competitive advantages

- Robust CAD import functionality
- Ability to import CAD data from just about any source into Femap for modeling and analysis
- CAD-independent solution with most CAD access available in the base module
- Extensive geometry export options

“Using Femap, we can import geometry from any 3D format, helping us quickly switch from a virtual prototype to the FEM model with a consistently accurate import process.”

*Paolo Lazzarini
System Engineer
ADS International*

4. Geometry preparation tools

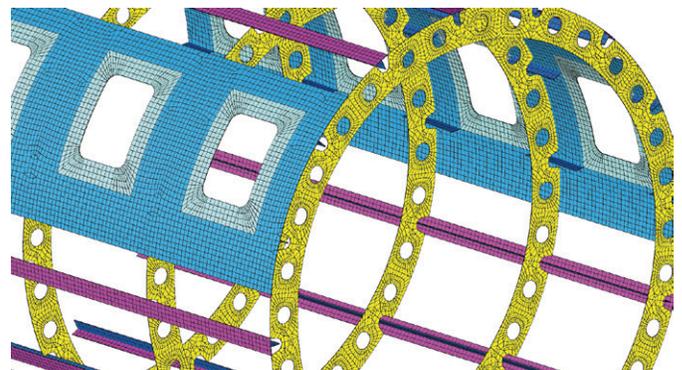
Preparation of geometry in readiness for finite element model creation and meshing is typically the most time consuming and laborious task facing FE analysts today. Femap works well with imported CAD data. Numerous tools are available to identify, locate, and clean up potentially problematic geometry and remove unwanted detail, such as small surfaces, edges and slivers. In addition, Femap offers a meshing toolbox that incorporates a variety of capabilities to interactively modify and prepare the geometry for meshing, including surface splitters, offset curve pad and washer, combination curves and surfaces and mesh splitting. Femap also supports unique functionality such as solid stitching and manual and automatic feature suppression for model preparation.

Competitive advantages

- Geometry update tools that allow direct interaction with geometric entities
- Easy identification of potentially problematic geometry
- Powerful geometry handling and cleanup tools
- Complete geometry preparation toolbox to prepare

“There are two types of preprocessors: those that are good at generating a mesh top down from CAD (computer-aided design) geometry or those that are good at generating a mesh from the bottom up. Most preprocessors are strong in either one capability or the other. Having both capabilities in one package – as Femap does – is pretty rare. We actually need both, so Femap works very well for us.”

*Dr. Akinori Yoshimura
Innovative Materials Section Researcher
JAXA*

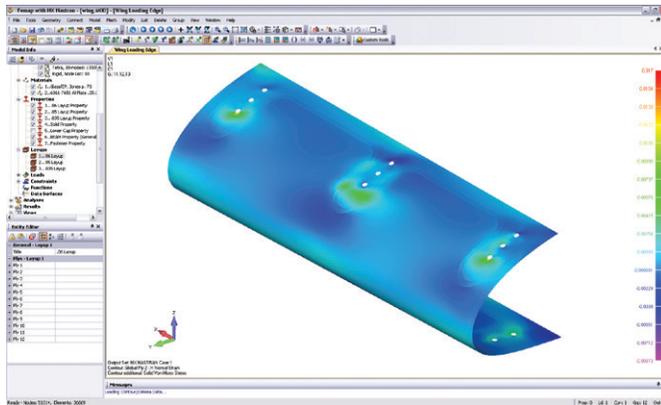


5. Visualization tools

With complete exposure to all finite element entities and data, the need to effectively control entity display and graphics visualization is paramount. Femap includes a wide array of visualization tools to aid solid geometry manipulation, FE model creation, geometry idealization entity selection and verification prior to analysis. Femap provides dynamic viewing functionality and allows full color and interactive display control for FE entities, groups, materials and properties. Full transparency visualization and control is available and helps you view only those entities you need to work on within a complex model.

Competitive advantages

- Easier-to-use visualization management and viewing tools
- Interactive group entity and model visualization control
- Full color definition control
- Transparency visualization



“Another thing I like about Femap is that it’s very visual. It’s so easy to make an error in a finite element model. Using Femap, you can view your model in a lot of different ways, and turn different elements and geometry on and off. This helps us double-check and catch mistakes.”

*Eric Lewis
Senior Staff Engineer
Lockheed Martin Space Systems*

6. Preprocessing

Femap provides a wide variety of modeling tools to help prepare geometry and finite element meshing. Unique model creation tools are available that allow 3D hex meshing and multi- and mid-surface modeling and meshing. The depth of the model setup tools allows for intuitive boundary condition creation, including support for complex loading definitions required by more advanced types of analyses such as heat transfer and dynamics. Femap also provides more advanced equation-based and function-based methods of defining loads.

Femap modeling capabilities support the creation of weldment models, and include powerful mid-plane extraction functionality that can easily turn thin-walled solid structures into shell type finite element meshes for accurate and efficient solutions. For assembly models automatic contact detection is available that can quickly and easily determine all contact areas which may then be defined to be simply in contact or glued together.

Data surfaces and data mapping functionality is also available in Femap that can be used to set up more complex loading conditions and transfer results efficiently from one analysis into loading functions for a subsequent analysis.

Femap also provides powerful beam modeling capabilities, including a beam cross-section tool, 3D visualization and full results output and viewing.

Competitive advantages

- Easy model setup for material and property definitions, as well as loads and boundary conditions
- Versatile loading definition for advanced analyses
- Advanced load definition methods that can be equation- or function-based
- Efficient data surfaces and data mapping capabilities
- Efficient mid-plane extraction of solid thin-walled structures for plate model creation
- Beam modeling and cross-section tool

“Femap allows us to create complex finite element models, with high quality meshes over a very short period of time. We can use Femap for all our modeling and post-processing needs, while using various solver codes.”

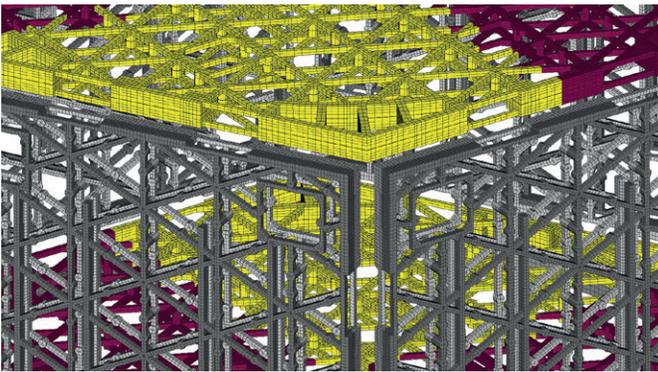
*Pier-Olivier Duval
FEA Specialist
Creaform*

7. Meshing

Femap incorporates powerful 3D solid and surface meshers capable of producing high quality meshes the first time.

A comprehensive meshing toolbox enables meshes to be updated and improved interactively, while simultaneously providing live element quality feedback. Use of these tools allows efficient and accurate meshes to be created quickly and easily.

Custom toolbars in the Femap user interface allow easy modification of the mesh with fewer clicks.



Competitive advantages

- Easy high-quality mesh creation that ensures accurate results
- Full control over mesh creation and editing
- Meshing Toolbox provides interactive mesh editing tools
- Custom toolbars allow easy mesh modification with fewer clicks
- Live element quality feedback

“The significant meshing enhancements for hexa-elements in Femap helped our productivity to increase by 30 percent or more. Even for difficult shapes, Femap performs well. Without requiring a complicated operation, a good quality mesh can be obtained.”

*Yuka Fukunaga
Assistant General Manager
Sumitomo Electric Industries*

8. Solver support

A major strength of Femap is solver neutrality. Femap offers access to all the main commercial analysis solvers with the ability to handle data peculiarities of the individual solver types easily and efficiently within its database, and without having to manually change solver preferences. Full access to all supported solver types is available within the base Femap module; no purchase of any add-on modules is necessary.

Femap offers extensive integration and support of the Nastran solver, fully supporting dynamics and non-linear solutions including random response, response spectrum, material and geometric nonlinearity with time-dependent loading, and rigid and deformable body contact.

In addition, Femap offers other types of advanced analysis options including advanced heat transfer analysis solutions and 3D computational fluid dynamics.

Competitive advantages

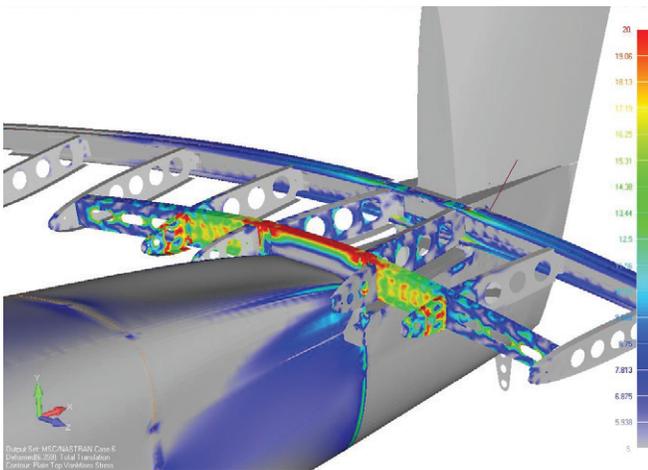
- A very high level of integration with the Nastran solver that enables users to access the power and dependability of the world’s premier solver
- Advanced nonlinear, heat transfer and fluid flow analysis capabilities
- The base Femap module supports access to all main commercial solver preferences

“We have we set ourselves up with an advanced solution that lets us perform a complete range of structural and thermal analyses. With the Siemens [Femap] software, we can handle any analysis application related to space.”

*Nicolas Étienne
Mechanical Group Leader
ABB Bomem*

9. Postprocessing

Post solution, Femap offers a wide variety of results processing tools to enable quick and efficient understanding of the behavior of the system under analysis. Postprocessing tools including time animations, streamlines, dynamic isosurfaces and cutting planes, free-body diagrams, grid point force balance, bar and beam visualization, shear and bending moment diagrams and user-defined reports. Furthermore, Femap offers versatile unique results data processing functionality in the form of the Data Table for assimilating results data after the analysis has completed and data transfer with other external programs such as Word and Excel.



Competitive advantages

- Comprehensive postprocessing display and reporting tools that facilitate faster comprehension of results
- Data manipulation post analysis – unique Data Table functionality
- Versatile results combination functionality
- User-defined report generation
- Beam visualization and results display options
- Dynamic isosurface and cutting plane

“An engineer can easily understand the mathematical results of an analysis conducted with a solver. But visualizing analysis results using Femap is an important benefit, showing you exactly what is going on.”

Mark McGinnis
Group Leader
SGT

10. Customization

Femap offers a comprehensive set of customization tools including a fully featured application programming interface (API) and a facility to record, edit and play user-defined macros. The powerful API capability provides full access to all Femap functionality and allows interaction with external programs.

In addition, macros can be leveraged to record particular processes or workflows and facilitate the automation of repetitive analysis tasks.

Competitive advantages

- Complete programming environment provided within the Femap UI
- Ability to extend Femap capabilities to add new applications
- Interface to other external programs such as Word and Excel
- Direct access to all Femap functionality
- Program using standard visual Basic language or industry standard programming languages – no special programming language knowledge required
- Ability to record, edit, debug and playback user-defined macros directly in the Femap interface

“API scripting has been a real time saver for us, eliminating much of the work of performing an analysis.”

Timo de Beer
Principal Structural Engineer
GustoMSC

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