

What's New in Simcenter Femap – 2022.2



Simcenter Femap Roadmap – Updated Release Cadence



Feature Release Every Six Months Database Change, UI Updates including Localization, Licensing Updates – January & June

Maintenance Release 1 Database, UI, Licensing Unchanged Bug Fixes/Critical Updates Only

Maintenance Release 2/3 – If Required Database, UI, Licensing Unchanged Bug Fixes/Critical Updates Only





Xcelerator Share



Xcelerator Share, Siemens next-generation, cloud-based collaboration solution, is now integrated with Simcenter Femap 2022.2.

- Instantly, securely, and easily collaborate with colleagues, partners and customers
- Xcelerator Share is the first cloud component of our Xcelerator as a Service (XaaS) subscriptions
- Not a standalone product. It's also not a replacement of the stand-alone Simcenter Femap product.
- Simcenter Femap XaaS brings everything familiar about Simcenter Femap, with the benefits of cloud services through a SaaS subscription option – making Xcelerator more accessible, flexible and scalable.





Domain specific Xcelerator desktop software



Cloud-based collaboration across portfolio

Domain specific Xcelerator desktop software



Cloud-based collaboration across portfolio

Domain specific Xcelerator desktop software



Cloud-based collaboration across portfolio



Xcelerator Share – Femap Workflow

Import Simcenter Nastran input file from Share project directly into Femap





Xcelerator Share – JT File Export from Femap (enhanced for v2021.2)

JT visualization files can be exported using the File->Picture-Save JT command

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Xcelerator Share – JT Files

JT files can be visualized in Xcelerator Share, JT2Go desktop, or JT2Go mobile app



Xcelerator Share – Femap Neutral Output Export

To reduce size and/or create a high-performance output file, which can potentially be used with Xcelerator Share, Femap Neutral Output files (*.FNO) can now easily be generated by Femap

- File->Export->Femap Neutral Output command
- Direct Output To section Specify location and File Name
 - Option to Include Neutral File containing only entities which correspond to an exported *.FNO file
- Export Options section 3 Options control how much of model is exported for selected output vectors
 - Full Model Output is exported for entire model
 - Select Group(s) Output is exported for nodes and/or elements found in any number of selected groups
 - Select Elements Output is exported for selected elements and nodes associated with those elements

Export Femap N	eutral Output		×
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Laminates Enhancements



Laminate Enhancements – Overview

Several enhancements have been implemented for creation and modification of laminates in Femap 2022.2:

- Model->Laminates submenu replaces Model->Layup
- Layup Manager
 - User-Friendly and More Intuitive
 - Powerful New Capabilities
 - Promotes Re-use of Data (Layups and Ply Layups)
- Ply Material Manager New for 2022.2!
 - Ply Material entities which ensure Thickness, Material, and Failure Theory on a predefined ply.
 - Any Number can be Referenced within a Layup
- MultiLayup Editor New for 2022.2!
 - Allows Multiple Layups to be viewed side-by-side
 - Helpful to add, delete, or insert a ply into multiple layups





Laminate Enhancements – Layup Manager – General

- Icons Across Top Row
 - Opens Ply Material Manager
 - Creates Material
 - Opens Global Ply Manager
 - Copy/Paste Options section
 - Send to Excel
 - Layup Viewer
 - Compute Laminate Properties
 - Clear All Column Filters
- Icons Down Left Side
 - Insert Ply at Top/Above Selected/Bottom
 - Move Plies Up/Down
 - Delete Plies

🔳 Lay	up Manager				-		×
_			Copy / Paste Options				
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₽							
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Laminate Enhancements – Layup Manager – Individual Cells

- Cells Text can be edited, or available options/entities selected via drop-down in each individual cell
- Cells Context-Sensitive menu
 - Set as Default or No Default Row
 - Edit Selected Values updates any number of cells in the same column with the entered value
 - Remove Global Ply ID removes the global ply from the row of the highlighted cell
 - Show Selected Plys highlights all elements which use the selected plies in graphics window





Laminate Enhancements – Layup Manager – Ply Types

Enhancements to Layup Manager:

- Ply Type can now be specified
 - Ply
 - Ply Material (predefined ply)
 - Layup
 - Layup Symmetric (ply order of layup reversed)
 - Layup Anti (angles of layup reversed)
 - Layup Anti-Symmetric (ply order and angled or layup reversed)
- Matched Plies new ply can be linked to an existing ply of any type



Laminate Enhancements – Layup Manager – Columns

Enhancements to Layup Manager:

- Columns Context-Sensitive menu
 - Show Ply On/Off Column
 - Show Global Ply ID Column
 - Show Ply Failure Column
- Columns On/Off Column
 - When column is visible, items in list can be toggled On/Off
 - Only items which are On will be exported to analysis input file
- Columns Filter Rows based on Material, Global Ply, Thickness, and/or Angle using Numerical Value (Above, Below, Equal, Outside, Between) or Contains (Text)

🔳 La	ayup Manager									×
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×				Contains						
	Bottom of Layup	Load From Library Save To Library				ОК		Ca	ancel	

Laminate Enhancements – Layup Manager – Rows

- Rows Context-Sensitive menu
 - Set as Default or No Default Row
 - Show Selected Plys highlights all elements which use the selected plies in graphics window
 - Reverse reverses order of selected plies (only available when multiple plies are selected)
 - Rotate changes Angle by value
 - Remove Link removes reference for 'matched' plies or layups
 - Convert to Plys converts a referenced layup into individual plies

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+8		Show Selected Plys	•	iss/EP, Jones p. 70			0.1			0.
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e		Rotate								
		Remove Link								
~		Convert to Plys								
		Convert to Ply Material								
		Save and Convert to Layup								
		Convert Referenced Layup	•							
		Insert Layup	•							
		Сору		rary Save To Library			ОК	0	Cancel	
		Paste	•							



Laminate Enhancements – Layup Manager – Rows (continued)

- Rows Context-Sensitive menu
 - Convert to Ply Material saves the selected plies as new Ply Material(s) or updates plies to existing Ply Material(s) which have matching Material and Thickness values
 - Save and Convert to Layup saves the selected plies as a layup and converts them to Layup in current layup
 - Convert Referenced Layup converts an existing layup into another type of layup





Laminate Enhancements – Layup Manager – Rows (continued)

- Rows Context-Sensitive menu
 - Insert Layup Inserts a Layup At Top, Above Selection, Below Selection, or At Bottom
 - Copy Copies selected rows to the clipboard
 - Paste Pastes rows on clipboard into the layup with options
 - As Matched Plys if on, pasted Plies, Ply Materials, or Layups are 'linked' to original entities
 - Inserts plies at a specified location using Matched Order, as Symmetric, or as Antisymmetric





Laminate Enhancements – Layup Manager – Example

Layup Manager populated with a Ply, "Matched Ply", referenced Ply Material, and referenced Layups

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-	12		Ply		1Glass/EP, Jones p. 70		0.1		45.
+8	11		Ply		1Glass/EP, Jones p. 70		0.1		90.
	10		Ply		1Glass/EP, Jones p. 70		0.1		-45.
	9		Ply		1Glass/EP, Jones p. 70		0.1		0.
CE	8		Linked	6Ply 6	1Glass/EP, Jones p. 70	0	.15		45.
68	7		Ply Material	1Ply Material 1	1Glass/EP, Jones p. 70	0	.05		90.
	6		Ply		1Glass/EP, Jones p. 70	0	.15		45.
	-	Ģ	Layup	1Layup to Reference					
E.	5	11	Ply		1Glass/EP, Jones p. 70		0.1		0.
	4	11	Ply		1Glass/EP, Jones p. 70		0.1		-45.
	3	11	Ply		1Glass/EP, Jones p. 70		0.1		90.
	2	11	Ply		1Glass/EP, Jones p. 70		0.1		45.
	1	14	Ply		1Glass/EP, Jones p. 70		0.1		0.
			Bottom of Layup	Load From Library Save To Library		ОК	(Cancel	



Laminate Enhancements – Ply Material Manager

New entity type for Femap 2022.2!

- Model->Laminates->Ply Material Manager or Ply Material Manager icon in the Layup Manager opens Ply Material Manager
- Creates and edits Ply Materials
- Specify ID, Title, Material, Thickness, and optionally Ply Failure Theory
- Unique icons for Ply Material Manager
 - Renumber one Ply Material at a time
 - Show Ply Material highlights elements which use selected Ply Materials in the graphics window
- Similar icons to Layup Manager for Copy/Paste (no options), Send to Accel, Add Ply (always at bottom), and Delete



Laminate Enhancements – Global Ply Manager

New look and feel for Femap 2022.2!

- Model->Laminates->Global Ply Manager or Global Ply Manager icon in the Layup Manager opens Global Ply Manager
- Creates and edits Global Plies
- Specify ID, Title, Material, and Thickness
- Option to Validate Global Ply assignment
- Unique icons for Ply Material Manager
 - Renumber one Global Ply at a time
 - Show Global Ply highlights elements which use selected Global Plies in the graphics window
- Similar icons to Layup Manager for Copy/Paste (no options), Send to Accel, Add Ply (always at bottom), and Delete

🔳 G	ilob	oal Ply Manager		—	
Ply (II M	Opt) ate	ions 4 Title Middle of Layups rial 1Glass/EP, Jones p. 70 ∨ GU	Thickness 0.1		1
		Title	Material	Thickness	Validate
3	1	Middle of Layups	1Glass/EP, Jones p. 70	0.1	
Æ¥	2	One from Bottom	1Glass/EP, Jones p. 70	0.1	
8	3	One from Top	1Glass/EP, Jones p. 70	0.1	
*					
	•			OK	Cancel



Laminate Enhancements – MultiLayup Editor – General

New command for Femap 2022.2!

- Model->Laminates->MultiLayup Editor
- Allows any number of layups to be compared to one another side-by-side
- Two modes available, both automatically update all layups needed for update
 - Set Global Ply ID
 - Insert a Ply, Ply Material, or Layup
- Icons for both modes
 - Add Layup adds layup(s) to editor
 - Toggle between one or two lines of text
 - Toggle between Global Ply/Insert modes
 - Copy to Clipboard
 - Send to Excel

II N	lulti-	Layup Editor			— 🗆	×
4		Global Ply ID	Layup 1 Layup to Reference	Layup 2	Layup 3 Symmetric Layup	- ^
1	0		E Ply 5: 0.1 1Glass/EP, Jones p. 70	Ply 6: 0.15 1Glass/EP, Jones p. 70	 Layup Angle:0. 1Layup to Reference 	
X	1		N Ply 4: 0.1 1Glass/EP, Jones p. 70	Layup Angle:0. 1Layup to Reference	E Ply 13: 0.1 1Glass/EP, Jones p. 70	
9	2		Ply 3: 0.1 1Glass/EP, Jones p. 70	≡ Ply 5: 0.1 1Glass/EP, Jones p. 70	Ply 12: 0.1 1Glass/EP, Jones p. 70	
	3		Ply 2: 0.1 1Glass/EP, Jones p. 70	N Ply 4: 0.1 1Glass/EP, Jones p. 70	III Ply 11: 0.1 1Glass/EP, Jones p. 70	
	4		E Ply 1: 0.1 1Glass/EP, Jones p. 70	Ply 3: 0.1 1Glass/EP, Jones p. 70	N Ply 10: 0.1 1Glass/EP, Jones p. 70	
3	5			Ply 2: 0.1 1Glass/EP, Jones p. 70	I≡ Ply 9: 0.1 1Glass/EP, Jones p. 70	
	6			E Ply 1: 0.1 1Glass/EP, Jones p. 70	Ply 8: 0.15 1Glass/EP, Jones p. 70	
	7				III Ply 7: 0.05 1Glass/EP, Jones p. 70	~
					Done	

Laminate Enhancements – MultiLayup Editor – Set Global Ply ID

Set Global Ply ID mode

- Can only be used successfully when only Plies and/or Ply Materials are highlighted in all selected layups
- Global Ply IDs can be assigned one at time, unassigned in bulk, or automatically created using a user-specified increment
- Unique Icons for Set Global Ply ID Mode
 - Add or Update Global Ply
 - Remove Global Ply
 - Fill Selected Plies to Create New Global Plies
 - Global Ply Manager
 - Show Global Ply Highlights elements which use global plies in graphics window

4		Global Ply ID	Layup 1 Layup to Reference	•	Layup 2 Layup to use for Symmetric	•	Layup 3 Symmetric Layup	- /
	0		Ply 5: 0.1 1Glass/EP, Jones p. 70		// Ply 6: 0.15 1Glass/EP, Jones p. 70		Layup Angle:0. 1Layup to Reference	
Ĩ.	1		N Ply 4: 0.1 1Glass/EP, Jones p. 70		Layup Angle:0. 1Layup to Reference		E Ply 13: 0.1 1Glass/EP, Jones p. 70	
₽	2	1Untitled	IIII Ply 3: 0.1 1Glass/EP, Jones p. 70		Ply 5: 0.1 1Glass/EP, Jones p. 70		Ply 12: 0.1 1Glass/EP, Jones p. 70	
D	3		// Ply 2: 0.1 1Glass/EP, Jones p. 70		RIV 4: 0.1 1Glass/EP, Jones p. 70		Ply 11: 0.1 1Glass/EP, Jones p. 70	
ŧ	4		E Ply 1: 0.1 1Glass/EP, Jones p. 70		Ply 3: 0.1 1Glass/EP, Jones p. 70		Ply 10: 0.1 1Glass/EP, Jones p. 70	
ì	5				Ply 2: 0.1 1Glass/EP, Jones p. 70		Ply 9: 0.1 1Glass/EP, Jones p. 70	
2	6				I≡ Ply 1: 0.1 1Glass/EP, Jones p. 70		Ply 8: 0.15 1Glass/EP, Jones p. 70	
	7						III Ply 7: 0.05 1Glass/EP, Jones p. 70	



Laminate Enhancements – MultiLayup Editor – Insert Ply, Ply Material, or Layup

Insert Ply, Ply Material, or Layup mode

- Will only insert Ply, Ply Material, or Layup at specified location for layups which have specific plies highlighted in the table
- Unique Icons for Insert Ply, Ply Material, or Layup Mode
 - Add item at Top of each qualified layup
 - Add item Above Selected row of each qualified layup
 - Add item at Bottom of each qualified layup
 - Delete highlighted plies When an entire row is highlighted, everything highlighted in the table will be deleted

I N	1ulti	-Layup Editor					— 🗆	×
6		Global Ply ID	Layup 1 Layup to Reference	•	Layup 2 Layup to use for Symmetric	•	Layup 3 Symmetric Layup	- ^
1/1	0		Ply 5: 0.1 1Glass/EP, Jones p. 70		Ply 6: 0.15 1Glass/EP, Jones p. 70		Layup Angle:0. 1Layup to Reference	
X	1		N Ply 4: 0.1 1Glass/EP, Jones p. 70		Layup Angle:0. 1Layup to Reference		Ply 13: 0.1 1Glass/EP, Jones p. 70	
+8	2	1Untitled	IIII Ply 3: 0.1 1Glass/EP, Jones p. 70		Ply 5: 0.1 1Glass/EP, Jones p. 70		Ply 12: 0.1 1Glass/EP, Jones p. 70	
7∎	3	2Untitled	Ply 2: 0.1 1Glass/EP, Jones p. 70		IN Ply 4: 0.1 1Glass/EP, Jones p. 70		Ply 11: 0.1 1Glass/EP, Jones p. 70	
+8	4	3Untitled	■ Ply 1: 0.1 1Glass/EP, Jones p. 70		Ply 3: 0.1 1Glass/EP, Jones p. 70		Ply 10: 0.1 1Glass/EP, Jones p. 70	
K	5				Ply 2: 0.1 1Glass/EP, Jones p. 70		Ply 9: 0.1 1Glass/EP, Jones p. 70	
	6				Ply 1: 0.1 1Glass/EP, Jones p. 70		Ply 8: 0.15 1Glass/EP, Jones p. 70	
	7						Ply 7: 0.05 1Glass/EP, Jones p. 70	~
R							Dor	ie

Simulation Entities



Kinematic Joints – Overview

1D Connection Entities that allow for analysis of Flexible Multi-Body Dynamic Systems in SOL402 and ANSYS (future support planned for ABAQUS)

- Aerostructures
- Gas turbines
- Industrial Robots

Joint Definition

- Connect two nodes
- 6 relative Degrees-Of-Freedom (DOF)
- Kinematic constraints imposed on displacement and rotational DOF to create different joint types
 - Revolute, Slider, Universal, etc.
- Local CSys Definition at nodes

	auc Joint Manager			- 0 ×
Available K	inematic Joint(s)			New Joint
ID	Title	Type	Behavior	
1	NASTRAN CJOINT	Joint	Revolute	New Connection
2	NASTRAN CJOINT	Joint	Slider	E da Calanda
3	NASTRAN CJOINT	Joint	Slider	Edit Selected
4	NASTRAN CJOINT	Joint	Constant Velocity	Expand
5	NASTRAN CJOINT	Joint	Constant Velocity	
6	NASTRAN CJOINT	Joint	Universal	Delete
				Delete All
				Copy
				luucs
itle Filter			Σ _Q Monitor P	oints outs
ītle Filter			Σ Monitor P [:::] Matrix Inp ∑ Design Eq	oints outs uations
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Kinematic Joints – Simcenter Femap Interface

Solver-Neutral Interface

- Kinematic Joints are a new "Simulation Entity" that provide a single unified interface to the joint elements in SOL402 and ANSYS (future support planned for ABAQUS)
 - SOL402 CJOINT/PJOINT/PJOINT2
 - ANSYS MPC184/SECTYPE,ID,JOINT,(Joint Type)/ SECDATA/SECJOINT/SECNUM/SECLOCK/SECSTOP/ SECJ,TB

Supported Behaviors

- Joints with Coincident Nodes
 - Revolute, Spherical, Fixed, Universal, Constant Velocity
- Slider Joints
 - Inline, Slider, Cylindrical, Slider-Universal, Screw
- General Joints User defines DOF and other options.
 Added for 2022.2, ANSYS only



Kinematic Joints – Benefits of using Joint Connections

- When multiple solvers are supported, provides Solver-Neutral Approach to Defining Joints and attachments to motion bodies via Finite Element Entities, Geometric Entities, or Both
- Connection to motion bodies automatically expanded on export to different solvers (Simcenter Nastran RBE2s or RBE3s, <u>ANSYS – MPC184s</u>, ABAQUS – TBD)



Kinematic Joints – Properties

Additional Joint Properties (General tab - ANSYS)

- Solver Expansion Options Currently not used Additional Joint Properties (ANSYS tab)
- Reference Lengths/Angles Writes values to SECDATA entries
- Locks Writes values to SECLOCK entries
- Stops Writes values to SECSTOP entries
- Misc Data Writes values to SECJ and TB entries

	s (SECDATA)	Locks (SEC		
			Minimum	Maximum
LI (Rer Length in Fx-Ux)	0.		0.	0.
L2 (Ref Length in Fy-Uy)	0.	UY	0.	0.
L3 (Ref Length in Fz-Uz)	0.	UZ	0.	0.
Phi1 (Ref Angle in Mx-Rx)) 0.		0.	0.
Phi2 (Ref Angle in My-Ry)	0.	RY	0.	0.
Phi3 (Ref Angle in Mz-Rz)	0.	RZ	0.	0.
Misc Data (SECJ, TB)		-Stope (SEC		
Screw Pitch	0.	Stops (SEC	Minimum	Maximum
Outer Radius	0.	UX	0.	0.
Inner Radius	0.	UY	0.	0.
Effective Length	0.	UZ	0.	0.
2			0.	0.
Stiffness	0.		0.	0.
Damping	0.	RZ	0.	0.



Monitor Points – Overview

Allow analysts to print labeled output for Integrated Loads on Structural and Aerodynamic models

Model->Simulation Entities->Monitor Points

Creation, editing, previewing, and management via NASTRAN Monitor Point Manager

Available in Simulation Entities branch of Model Info Tree and a symbol is drawn in graphics window at summation point for location-based types

Types Supported in v2020.1 (initial release):

- NASTRAN Aerodynamic Control Monitor Point (MONPNT1)
- NASTRAN Structural Monitor Point (MONPNT3)

New type added for v2022.2!

NASTRAN Element Monitor Point (MONPNT2)



	Туре	Simcenter Nastran Supported SOLs	MSC Nastran Supported SOLs
		144	101, 108, 109, 111, 112, 144,
	NONFINIT	144	146, 200, 400
	MONPNT2	101 102	101, 103, 108, 109, 111, 112,
		101, 103	144, 146, 200
	MONPNT3	101 102	101, 103, 108, 109, 111, 112,
		101, 103	144, 146, 200, 400

Monitor Points – NASTRAN Element Monitor Point (MONPNT2)

NASTRAN Element Monitor Point

- Writes MONPNT2 bulk data entry for Simcenter Nastran and MSC Nastran
- Defines load monitor point at named element and outputs component of stress, strain, or force
- Created and edited using the NASTRAN Element Monitor Point dialog box
- Two Way to Select Output
 - Output Vector Selection choose Femap Output Vector ID from drop-down and table is populated automatically for selected elements
 - Manual Selection choose options using output type, element type, and component drop-downs to populate table for selected elements

NASTRAN Element Monitor Point X							
ID 1 Label MONPNT2 AT WING EL	LEMENT	г		Name	MON2A		
Output Vector Selection 3000Bar EndA Plane 1 Moment	2	Type 0 CBAR	Table STRESS	Component AS	Element ID 15000		
Manual Selection 1STRESS	∃- ≣×						
0Simple beam element (CBAR) ~ 4AXIAL ~	3						
			<u>0</u> K	<u>C</u> a	ncel		



User Interface Updates



Element Update

Modify->Update Elements->Line Element Offsets

- Dialog box reorganized by offset method
 - Allows user to pick exactly how they want to offset line elements which was sometimes not clear in previous versions
 - For some methods, eliminates need to enter values in additional dialog boxes
- Added the ability to offset a specified length along the user-defined vector when using the Around Vector method
 - Can be combined with the Radial Offset value

Vector Offset	O Around Point	
Update EndB=EndA	Radial Offset 0.	
✓ Update End <u>A</u>	O Around Vector	
✓ Update End <u>B</u>	Radial Offset	
O Move To Reference Point	Along Vector 0	
Offset From Reference Point	O Remove Offsets	
Y Offset 0.	Remove End A	
Z Offset 0.	✓ Remo <u>v</u> e End B	

Grouping and Selection

- New Group Commands to include geometric entities in a group based on an associated node or element
 - "Group, Point, From Node"
 - "Group, Point, From Element"
 - "Group, Curve, From Node"
 - "Group, Curve, From Element"
 - "Group, Surface, From Node"
 - "Group, Surface, From Element"
 - "Group, Solid, From Node"
 - "Group, Solid, From Element"
- Similar options added to Method[^] menu in Standard Entity Selection dialog box for Points, Curves, Surfaces, and Solids





Grouping and Selection

API Selections Tools submenu has • been added to Pick[^] menu of the standard entity selection dialog box

Add

ID 149913

- Allows API script to be executed to • add or remove items from the selection while dialog box is open.
- Submenu works like Custom Tools • and User Tools menus directory to store API scripts can be set on the Library/Startup tab of Preferences
- Unique API calls added which should • be in every script used for this purpose
 - feStartSelectionTool
 - feEndSelectionTool
 - feAbortSelectionTool



Contour/Criteria Legend – No Labels Options

Option to no display labels on the Contour/Criteria Legend using either Contour Colors or View Color



Pair either option with new methods on User Defined Graphics API Object to create custom Labels

Analysis Set Manager – Find functionality

Find functionality in Preview Analysis Input File dialog box to search previewed input for text

Preview	Analysis Input	File								_		\times
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+	3108	3110	3141	3168	3188	3245	3254	3255+				
+	3257 3834	3285 3839	3288 3885	3346 3888	3406 3894	3690 3899	3691 3956	3833+ 3960+				
+	4001	4004	4009	4011	4015	4068	4071	4079+				
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Modern Online Help System

- HTML help (implemented v2022.1, improved v2022.2) •
 - Femap can access help on Siemens Support Center
 - Can also be installed locally or on a network server
 - Fully searchable
 - Browser bookmarks
 - Still in legacy format ٠
 - **API** manual
 - **Custom Tools**
 - VisQ
 - More Resources (PDFs)





Proprietary and Restricted Rights Notice

SIEMENS

The What's New section highlights new commands, features and enhancements in Femap for recent versions. For What's New information

The User Guide will help you to setup your computer so that you can immediately begin to explore the many capabilities of Femap. This section contains information specific to getting started on a PC, which includes 64-bit versions for Windows 8, Windows 8.1, and Windows 10. The Femap installer contains only the 64-bit version of Femap, as a 32-bit version is no longer available.

The Commands Guide will help you understand Femap's commands and features, providing detailed descriptions of each setting and option

Solver Support



Solver Support – Nastran Solvers – Aeroelastic Response

Support for Aeroelastic Response (SOL 146)

- Added three new analysis types:
 - 31..Aeroelastic Frequency Response
 - 32..Aeroelastic Transient Response
 - 33..Aeroelastic Random Response
- NASTRAN Dynamic Analysis dialog box is available in all three analysis types to specify options for Modal Transient and Modal Frequency Response
- New options added to NASTRAN Aerodynamic Data dialog box for all three analysis types:
 - Mach Number (MACH)
 - Dynamic Pressure (Q)
 - Gust Load (GUSTAERO)

NASTRAN Aerodynam	ic Data (AEROx, MKAERO	x)	×				
Aerodynamic Physical D	ata	Symmetry					
Aerodynamic CSys	0Global Rectangular V		XZ XY				
Velocity	0.	Symmetry	0 0				
Ref Length	0.	No Symmetry	•				
Ref Density	0.	Anti Symmetry	0 0				
Mach Number - Frequency Table							
Mach Number Func	0None v	[≴] xy					
Dynamics Options							
Number of Modes	0	Zero Modes Val(FZERO) 1.E-4				
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Highest Freq (Hz)	0.	PARAM OPPHIPA					
Mach Number (MACH)	0.	Gust Load (GUSTAERO)	1Do Not Comp V				
Dynamic Pressure (Q)	0.						
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Solver Support – Nastran Solvers – Aeroelastic Response

Support for Aeroelastic Response (SOL 146)

- Ability to enter Power Spectral Density Factors using Gust PSD Input added to NASTRAN Power Spectral Density Factors (SOL 146) dialog box for Aeroelastic Random Response
- Loads (Aerodynamic) drop-down added to Boundary Conditions dialog box which allows separate loads for the mechanical and aerodynamic portions of the model
 - An Aerodynamic Vertical Gust Load can now be specified as a Body Load in any Load Set which can be specified using this drop-down

NASTRAN Power Spectral Density Factors (SOL146)					
Correlation Table					
Global=>Global	Excited Subcase: Global				
	Load Set: 3Set3				
	Applied Subcase: Global				
	Load Set: 3Set3				
Tabular PSD Input O Gust PSD Input					
Fa	ctor Gust PSD Model				
Table ID 0 1.	x 0von Karman 🗸				
Turbulence Factor 0.	Apply				
Gust RMS Velocity 0.					
Autocorrelation Function Time Lag					
Lag Intervals 0 Starting Lag 0. Max Lag 0.					
Prev Ne <u>x</u> t	<u>O</u> K Cancel				



Solver Support – Nastran Solvers – Aeroelastic Response

Animation of Aeroelastic Transient Response with Gust Load of System-Level Model





Solver Support – ANSYS

Added read and write support for ANSYS MPC184 Joint Elements, including options for SECDATA, SECJ, TB, SECLOCK, and SECSTOP.







API

- For Laminate Updates (Ply Material and Layup Objects):
 - Added Ply Material, along with applicable Properties and Methods, to allow programmatic access to new Ply Material entity added for 2022.2
 - Added OnOff, vOnOff, and IncludeOffPlys Properties to the Layup Object. Also, updated thickness, vthickness, angle, vangle, matID, vmatID, globalply, vglobalply, failuretheory, and vfailuretheory to work with updated Layup Manager dialog box. Finally, added AddPlyMaterialPly, AddLayupPly, AddMatchedPlys, GetPlyInfo, GetAllPlyDefinition, MaterialsUsed, GlobalPlysUsed, and PlyMaterialsUsed Methods to the Layup Object.
- For Nastran SOL 146 Support
 - Added NasAeronPARAMgustaero, NasAerodPARAMmach, and NasAerodPARAMq to Analysis Manager Object. Also, added IsGust, GetCorrelateGust, and PutCorrelateGust methods to the Analysis Manager Object
 - Added BodyGustOn, BodyGustWG, BodyGustX0, BodyGustVelocityOpt, BodyGustVelocity, BodyGustAppliedNode, and BodyGustFunction to the Load Set Object.



API

- For Nastran Elemental Monitor Points:
 - Added NasMonitorElemEnabled to Analysis Manager Object
 - Added NasCaseMonitorElemEnabled to Analysis Case Object
 - Added AddManualContribution, GetElemContributions, SetManualContributions, ClearElemContributions, GetAtIndex, and SetAtIndex to Monitor Point Object.
- For OEM Customers:
 - Added GetAllArray, GetAllAttrArray, PutAllArray, and PutAllAttrArray to the Curve Object
 - Added GetAllArray, GetAllAttrArray, PutAllArray, and PutAllAttrArray to the Surface Object
 - Added GetAllArray and PutAllArray to the Material Object.
 - Added GetAllArray, GetFlagArray, PutAllArray, and Put FlagArray to the Property Object
 - Added SetOpenGLTransformationSpace, GetOpenGLTransformationSpace, CollectorContourLegendText, and CollectorAddTextContourLegendLocations to User Defined Graphics Object.

