

Fatigue life prediction made easy



What is **FATIQ**

Stress – Life method	
Palmgren-Miner rule	
Time domain	Frequency domain
Input 🥢	Input 🏾
Pseudo - static	FRF
Transient	PSD Stresses
Cycle Counting	Cycle Estimation
Rainflow	Dirlik
NON WARMAN	Rayleigh
4.4	Rice
	Powell

Mean stress correction

- Goodman
- Gerber
- Soderberg

What is **FATIQ**

Strain – Life method

Palmgren-Miner rule

Time domain

Input Pseudo - static Transient

Cycle Counting Rainflow



Mean stress correction

Smith-Watson-Topper Morrow





Goals



User-friendly for all levels of expertise



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Streamline analysis setup with reusable workflows

Interactive and comprehensive results overview



Rapid and reliable results





Workflow set-up

- Set up your analysis in a stepwise manner.
- Suitable from novice to expert users.
- Minimize user-imposed errors.





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Workflow set-up

• Set up multiple analyses for the same model





Workflow set-up

• Set up workflow tasks with different models in a single session.

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			Calculation Method	DHk	- 4 3
			Mean Stress Correction	No	Y.
			Calculation Type	Absolute Max Principal	93
			PE Results		
			Туре	Stresses	
			Solution Location	Element Centroid	- 24
			Shell Layer	Top and Bottom	- 75
			%& Advanced options	Close	ave

Workflow set-up

• Set up the analysis workflow with the aim of the Analysis Configurator



Interface

- Reads FE results from NASTRAN, ABAQUS, ANSYS and METADB.
- Saves workflow templates in XML format.
- Saves the complete Preand Post Processing work in a project.
- Pack and Go option to compress project in a single file.
- Runs in batch mode

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Load database

• Load definition *Frequency*

- PSD
- Sine
- Sine Sweep
- Narrow Band

Time

- Time Series
- Amplitude Blocks
- Sine
- Sine Sweep
- Reading load curves from various solver formats.

422.0.0

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Load assignment

• Duty cycle overview.

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• Set up of many parallel or serial events with just few clicks.

C Loads					- ¤ ×
Loads Database	Assign Loads				
Vibration loads					
	Event 1	Event 2	Event 3	Event 4	Event 5
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Combination of random with deterministic loads

Vibration loads							
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1920	Assign Multi PSD						
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		Subcase 5	Anufeug	_SD(csd Left Rear over I	SD(csd Right Rear ove		
			Red	D(csd Left Rear over Lef)(csd Right Rear over L	r)(csd Right Front over L/	PSD(Left Front)*(1.4
		Subcase 4	Amußeu	CSD_(csd Left Rear over	ISD(csd Right Rear ov	r :SD_(csd Right Front ove	

Load assignment

• Intuitive set up of multiple - correlated input.



Material database

- Internal database of more than 80 fatigue materials for metals and alloys.
- Open format to read external material databases
- User defined materials



Material database

- Material data type according Basquin or MMPDS equation or as data table.
- Support of multi curve materials.



Material database

• Support of E-N properties in version 24.0.0



Material assignment

 Sophisticated rules for material filtering and assignment facilitates the set-up especially on large and complicated models.





Hot spot filtering

Filtering of hot spots to narrow analysis in critical areas.



Interactive postprocessing

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- Dedicated plots such as, PSD plots, Event graphs, Rainflow matrices and 3D fringes.
- Interactive Properties for the selected plots



Interactive postprocessing

- Dedicated plots such as, PSD plots, Event graphs, Rainflow matrices and 3D fringes.
- Easy handling and plot overview through the Post Processing Tasks

Nodes	Excitations	Responses	Boundary Conditions	Response Prequency 5	obceses			
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Tools

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Modal response builder
enhanced tool

Performance



Frequency domain – PSD Load

- Stress evaluation: Von Mises
- Fatigue life estimation method: Dirlik
- Solution location: element corners
- Artificial mean stress correction effect from equivalent static loading

Toot Coooo		
TESIGASES	Mean Stress Correction	Material Type
Run1	-	Basquin
Run 2	Goodman	Basquin
Run 3	Goodman (Only Tension)	Basquin
Run 4	Gerber	Basquin
Run 5	Gerber (Only Tension)	Basquin
Run 6	-	tabular data
Run 7	Goodman	tabular data
Run 8	Goodman (Only Tension)	tabular data
Run 9	Gerber	tabular data
Run 10	Gerber (Only Tension)	tabular data



Performance



Time domain – Pseudo static

- Stress evaluation: Signed Max Principal
- Cycle counting: *Rainflow*
- Solution location: element corners

Mean Stress Correction	Material Type
-	Basquin
Goodman	Basquin
Goodman (Only Tension)	Basquin
Gerber	Basquin
Gerber (Only Tension)	Basquin
-	tabular data
Goodman	tabular data
Goodman (Only Tension)	tabular data
Gerber	tabular data
Gerber (Only Tension)	tabular data
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Performance



Time Domain - Transient

- Stress evaluation: Signed Max Principal
- Cycle counting: *Rainflow*
- Solution location: *element centroid* (15 elements)

rest Cases	Mean Stress Correction	Material Type
Run1	-	Basquin
Run 2	Goodman	Basquin
Run 3	Goodman (Only Tension)	Basquin
Run 4	Gerber	Basquin
Run 5	Gerber (Only Tension)	Basquin
Run 6	-	tabular data
Run 7	Goodman	tabular data
Run 8	Goodman (Only Tension)	tabular data
Run 9	Gerber	tabular data
Run 10	Gerber (Only Tension)	tabular data



Future development







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