

# COMPREHENSIVE SOLUTIONS FEATURES GRID

MATERIALS DATABASE		CL	DT	MP	EIE
OUTPUTS	Fatigue life	X	X		
	Critical plane normal, load history on critical plane	X	X		
	Crack open / close state history	X	X		
	Crack length history	X	X		
	Rainflow counting with time indices preserved for event identification	X	X		
	Critical plane life sphere	X	X		
	Cavitation / wrinkling detection	X	X		
	Safety factor	X			
	Haigh diagram	X			
	Cure / age equivalent exposure time		X	X	
	Residual life / residual strength		X		
	Stiffness evolution due to cycles and / or ageing		X		
	Volumetric heat rate			X	
	Oxidation rate			X	
	Ahagon diagram			X	
	Interpolated strain history				X
	Transform to reduced coordinates				X
	Boundary condition solution path for map precompute				X
MATERIAL MODELS	Hyperelastic laws: neo-Hookean, Arruda-Boyce, Mooney-Rivlin, reduced polynomial, Van der Waals, Ogden, hyperfoam, Marlow	X	X		
	Mullins effect	X	X		
	Crack growth rate laws: Thomas, Lake-Lindley, table lookup	X	X		
	Crystallization laws: Paris (no crystallization), Mars-Fatemi, table lookup	X	X		
	Ozone attack, creep crack growth	X	X		
	Temperature dependent stress-strain and fatigue laws	X	X		
	Arrhenius model for curing and ageing (1 parameter ageing model)		X	X	
	Cyclic softening		X		
	Hysteresis / self-heating: powerlaw, Kraus, table lookup, WLF			X	
	Thermal runaway			X	
	Basic auto-oxidation scheme			X	
	Aerobic and anaerobic material property evolution (2 parameter ageing model)			X	
	Materials database	X	X	X	
PROCEDURES	Critical plane method	X	X		
	Infinite life / safety factor analysis	X			
	Safe life analysis	X			
	Damage tolerant analysis		X		
	Block cycle generation from road loads	X			X
	Rolling structures (ie tires) with axi- or cyclic- symmetry	X	X		
	Periodic results transfers for tires	X	X		
	Accelerated strain history generation / signal defeaturing	X			X
	Structural cosimulation		X		
	Block cycle schedules / multi-step protocols / sequence effects		X		
	Restart capability		X		
	Damage extrapolation		X		
	Thermal cosimulation			X	
	Diffusion cosimulation			X	
	Nonlinear precomputed FE results map, up to 6 channels				X
	Mapping methods: case vectors, spiral grid, user-defined				X
	Strain history interpolation				X
	Channel reduction				X
FE CODES	Abaqus	X	X	X	X
	Ansys	X	X	**	X
	Marc	X	X		X
	fe-safe/Rubber	*	X	X	X
LICENSING	Node-locked	X	X	X	X
	Network floating	X	X	X	X
	Annual lease	X	X	X	X
	Perpetual	X	X	X	X
	Maintenance and support	X	X	X	X
	Single zone, regional, global	X	X	X	X
	multi-threading / parallel processing	X	X	X	X

\* DT, MP and/or EIE add-ons include a CL license when purchased for fe-safe/rubber \*\* Partial integration available

## C-SUITE INSIGHTS

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### DURABILITY WINS NEW BUSINESS

Show your customer who is the boss of durability. Let us help you win their business.

### RIGHT THE FIRST TIME SAVES BIG

Missing the durability qualification resets your development cycle and puts you back big time. Let us support your people with our tools and expertise.

### GET THERE FIRST

Getting design decisions right for durability will get you to market faster.

### START WITH QUALITY

Don't let poor durability turn into costly reliability or warranty issues.

### FUTURE PROOF YOUR BUSINESS

Ask about our Digital Twin capabilities. Get durability online for your IoT and Big Data applications.



**Endurica LLC**  
219 West Main Cross St., Suite 201  
Findlay, Ohio 45840 USA  
+1 419.957.0543

**Endurica Europe S.à r.l.**  
9, avenue des Hauts-Fourneaux  
L-4362, Esch-sur-Alzette Luxembourg  
+352 691 398 233

email: info@endurica.com

# ENDURICA PRESENTS RUBBER FATIGUE SIMULATION SOFTWARE

Endurica's fatigue solvers show how your design will endure in specific application scenarios within all three major nonlinear finite element codes: Abaqus, Ansys and Marc.

Endurica's software is the first (and only) commercial FEA software to predict when and where cracks will show up in an elastomer product with complex loading history and geometry. Endurica's methods are in use across the globe by virtually all industry sectors.

## BENEFITS

- Save the costs of build and break experiments for well-qualified designs.
- Quickly see how changes to material behavior, part geometry, or load history influence fatigue life.
- Inform design decisions with a patented tool that has been continuously developed for more than a decade, and successfully validated against a wide range of benchmarks and real-world problems.
- Find out where your part might develop a crack, how long it can be expected to endure, which events are damaging and which are harmless.
- Communicate effectively about durability issues with realistic, physics-based presentation of simulation results.

**Endurica CL**<sup>TM</sup>  
Fatigue Analysis Software

**Endurica DT**<sup>TM</sup>  
Incremental Fatigue Analysis

**Endurica EIE**<sup>TM</sup>  
Fast Loads Processing

**Endurica MP**<sup>TM</sup>  
Temperature | Diffusion | Oxidation

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