



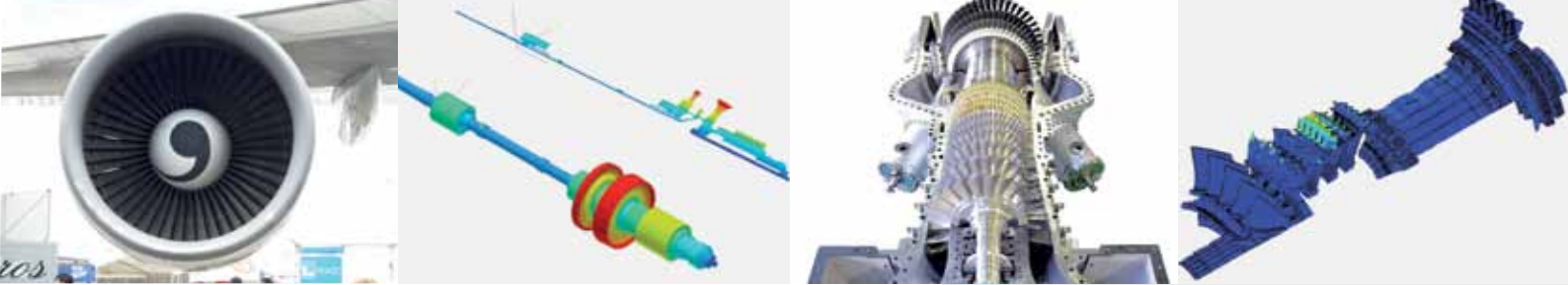
LMS Samtech

# SAMCEF Rotors

Software Platform for  
Rotors Simulation

 **LMS**<sup>®</sup>

A Siemens Business



**“Design better and faster” is the concept driving most new developments and ideas in today’s high speed rotating machines sector. Enhancing products and processes is a challenge faced every day in this industry.**

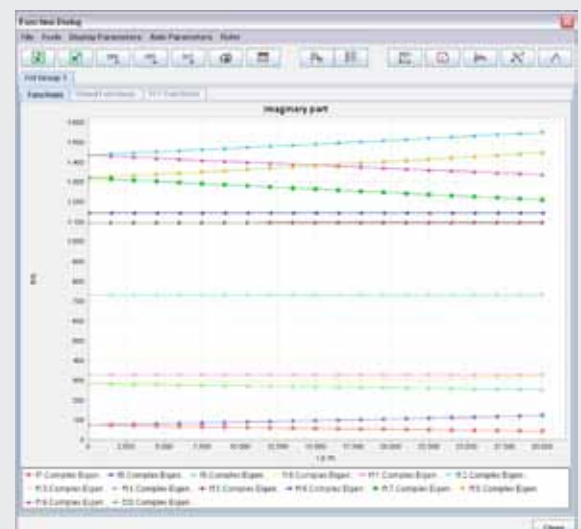
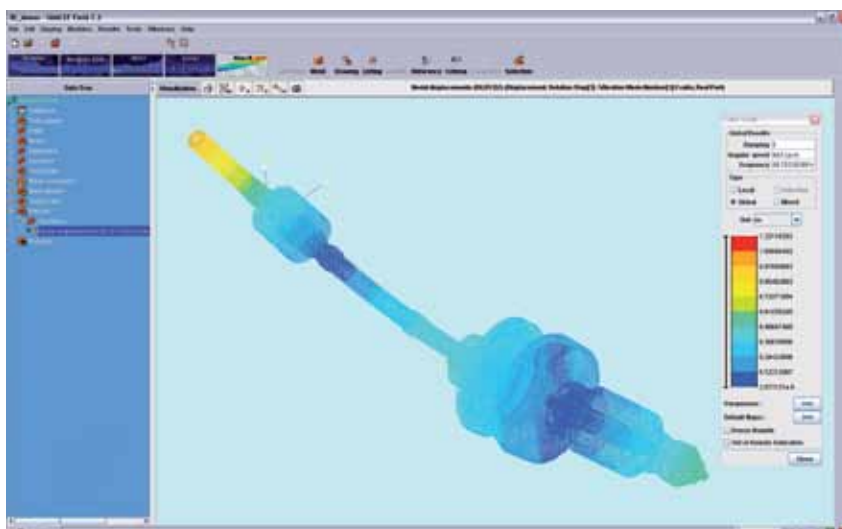
SAMCEF Rotors has been developed to address this complex challenge. We provide a professional solution specifically dedicated to rotor dynamics specialists and more generally to engineers focusing on global dynamics of rotating machines.

SAMCEF Rotors is a top-of-class package in terms of both results accuracy and user friendliness. The long list of international companies all over the world using SAMCEF Rotors on a daily basis is a testimony to this.

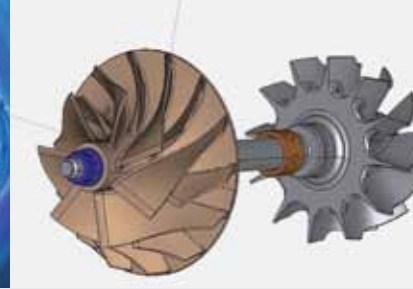
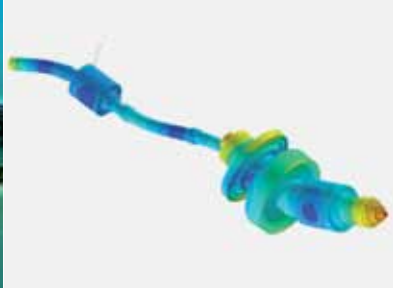
Accurately simulating the behavior of high speed rotating machines is among the most complex numerical simulations. With SAMCEF Rotors, you harness 30 years of experience in this field. SAMCEF Rotors is the right tool for your job.

## BENEFITS

- Your Rotor models are easily built in a user friendly environment
- Better understanding of the dynamic behavior of your rotating machine
- Reduce the vibration level and avoid harmful resonances by predicting them
- Build the best model to your specifications thanks to a large library of elements (1D, 3D, 2D Fourier multiharmonics, cyclic symmetry...)
- Reduce your costs thanks to a faster design cycle
- Dedicated post-processing tools according to industrial standards
- Reduce your design cycle thanks to reduced need for physical testing
- Take advantage of LMS Samtech’s 45 years of expertise in FEA and 30 years in Rotor Dynamics analysis
- Reduce your maintenance and warranty costs thanks to increased reliability
- One simple but powerful user oriented software to develop your expertise and take advantage of your industrial know-how at simulation level
- Using SAMCEF Rotors in combination with unique LMS testing capabilities will bring you to top-of-class simulation and testing technologies







## MODEL YOUR ROTOR ACCORDING TO YOUR NEEDS

From predesign to verification, you choose the type of model you want to build according to your goals:

- Simple models made of beams and lumped masses are well suited to assess the global dynamic behavior of your rotor with short computation time.
- 3D models can be built very easily and produce accurate results since they naturally include all details of the rotor.

Beside these rather classical approaches, SAMCEF Rotors features several unique modeling techniques.

- One of them is called “2D Fourier multiharmonics”. For axisymmetric structures, full 3D results can be obtained by running analyses on 2D models for various values of the azimuth angle. The 2D multiharmonics technique combines the ease of building models and results accuracy with reduced computation times.
- Another unique way to build an accurate model of a rotor is by taking advantage of the cyclic symmetry of rotors to model only one angular sector of it. Obtained results can then be extrapolated to the whole structure. This technique can even be used for rotors featuring several stages with different angular sizes. Special elements are available to take the junction between the stages into account.

These different modeling techniques include the requested features to build rotor dynamics models: an extended library of bearings (dry rollers and balls, hydrostatic, hydrodynamic), squeeze film dampers, gears and so on.

The same model can be used to run stability analyses, response to harmonic forces or transient analyses.

SAMCEF Rotors is delivered with SAMCEF Field, a state of the art Graphical Users Interface including all classical Finite Elements Analysis features as well as a driver dedicated to Rotor Dynamics analyses. SAMCEF Field makes rotor model building so easy that you will be able to fully focus on your engineering work.

All this makes SAMCEF Rotors a perfect solution to better understand the behavior of your rotating machine and control the vibration level during its use.



## KEY FEATURES

- Large library of Finite Elements available:
  - Beams and lumped masses (for simple models)
  - Volume and shell elements (for 3D models)
  - 2D multiharmonic volumes and shells
- Several models for bearings and seals:
  - Dry rollers and balls bearings
  - Hydrostatic bearings
  - Hydrodynamic bearings potentially including multi lobes and tilting pads
  - Squeeze film dampers potentially including end seals and leakage
  - Generic stiffness and damping definition via 6x6 potentially speed dependent matrices
- Gear elements and macros to build complete reducer stages
- Free orientation of rotation axis in space
- Several rotors with different rotation speeds can be modeled
- Non-rotating parts (stators and casings) can be taken into account
- Critical speed computation, energies distribution mode shapes and display
- Response to a harmonic force (linear or non-linear)
- Loads:
  - Synchronous or not asynchronous
  - Forces, Moments
  - Manoeuvres
- Transient analysis
- Dedicated post-processing tools including several types of diagrams:
  - Campbell
  - Nyquist
  - Black Nichols
  - Critical damping
  - Loss factor
  - Log decrement
  - Quality factor
- Driven by SAMCEF Field, a state of the art FEA GUI including a dedicated driver for Rotor Dynamics



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## Leading partner in Test & Mechatronic Simulation

LMS is a leading provider of test and mechatronic simulation software and engineering services in the automotive, aerospace and other advanced manufacturing industries. As a business segment within Siemens PLM Software, LMS provides a unique portfolio of products and services for manufacturing companies to manage the complexities of tomorrow's product development by incorporating model-based mechatronic simulation and advanced testing in the product development process. LMS tunes into mission-critical engineering attributes, ranging from system dynamics, structural integrity and sound quality to durability, safety and power consumption. With multi-domain and mechatronic simulation solutions, LMS addresses the complex engineering challenges associated with intelligent system design and model-based systems engineering. Thanks to its technology and more than 1250 dedicated people, LMS has become the partner of choice of more than 5000 manufacturing companies worldwide. LMS operates in more than 30 key locations around the world.



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