



ermes

ELECTROTECHNICS AND MECHANICS OF STRUCTURES
R&D EXPERTISE AT THE SERVICE OF INDUSTRY

FIELD
EXPERTISE

TESTING AND
MEASUREMENTS

NUMERICAL
SIMULATIONS

PROTOTYPED
PRODUCT

MARKET-READY
PRODUCT

PROJECT MANAGEMENT ASSISTANCE

Validating the design and the commissioning of turbines

YOUR STAKES

- Re-evaluate the design proposed by manufacturers
- Assist in the commissioning process

OUR OFFER

The offer consists in:

- Optimize bearing sizing and balancing, in compliance with specifications
- Simulate adverse operation conditions

The offer can be detailed as follows:

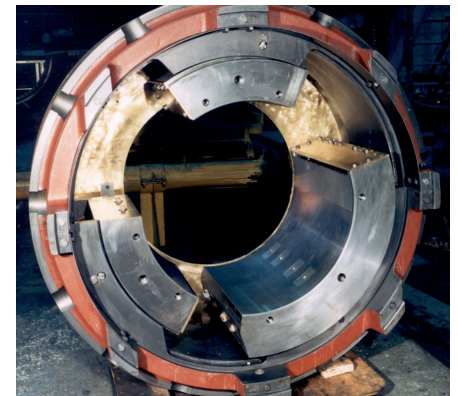
- Advanced studies based on numerical simulation:
 - rotor dynamics calculation (evaluation of critical speeds and stresses on the shaft line)
 - calculation of the bearing resistance during operation and in the event of heavy unbalance
 - coating resistance and performance
- Testing and validation on our test bench EURoPE
- Expert counsel on exploitation and maintenance

A unique expertise in turbine systems

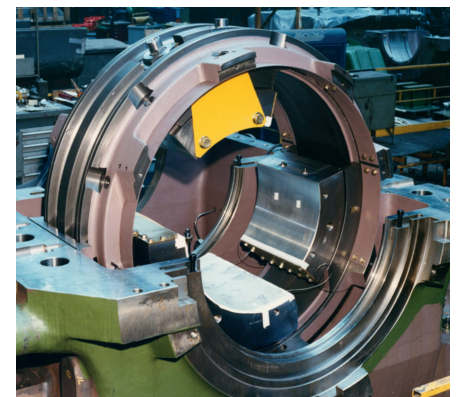
- Thanks to our experience as an operator of several power generation units, we rely on state of the art and on powerful multi-domain numerical simulation tools (fluid, structure, thermal) to build our solutions.
- We have a unique test facility in Europe, allowing us to study the vibration behaviour of the shaft lines of large rotating machines. It is possible to reproduce the phenomena observed on the machines in order to validate physical and numerical models.

SECTORS OF APPLICATION

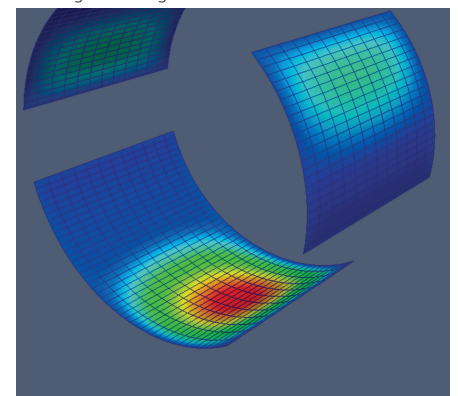
- Electricity power plants.
- All types of industrial operations employing rotating machinery, wherever the dynamic behaviour of bearings, stops or seals of turbine shaft lines, compressors, pumps and motors are subjected to particular conditions



Oscillating Skid bearing



Oscillating Skid bearing



Pressure fields in the oil flow

Validating the design and the commissioning of turbines

KEY FIGURES:

EUROPE TEST BENCH:

- 40 tons of concrete bedding
- Metal frame of 10 tons and 10 meters long
- 66 kW motor with variable speed from 0 to 3000 rpm
- Total length of shaft: 3.2 meters
- Extensible test bench; up to 10 meters
- Time to set up a model : 1 day
- Calculation time of a modal non-linear

OUR ASSETS

- Expertise in shaft line dynamics, lubrication and rotating machine metrology
- IT development skills allowing a total mastery of industry standards and codes
- A panel of complete digital tools developed by R&D in fluid dynamics (Legos Code and Groove Code), shaft line dynamics (MT_Tool) and structural mechanics (Aster_Code) coupled together to obtain a highly accurate digital model of the rotor-bearing system
- A test bench configuration unique in Europe, modular and of significant size (EUROPE bench). New bench designs can easily be considered to adapt to other shaft line dynamics study issues.
- A network of university partners with test resources that can be mobilized if necessary
- Bespoke solutions



	ISOT	THD	TEHD	DCC	NL
Circular bearings grooved	●	●	-	●	●
Skid bearings oscillating	●	●	●	●	●
Skid bearings stationary	●	●	-	●	●
Hydrostatic bearings	●	-	-	●	●
Shoe stops fixed or grooved	●	●	-	●	-
Smooth joints and grooved	●	-	-	●	-

ISOT: Isothermal Analysis
THD: Thermal-hydrodynamic analysis (3D thermal field)
TEHD: Thermo-elasto-hydro dynamic analysis (THD + elastic deformation of solid parts)
DCC: Calculation of dynamic coefficients (direct and cross-dynamic stiffness and damping)
NL: Non-linear analysis (coupling between fluid forces and rotor dynamics)

SATISFIED CLIENTS

- Nuclear, thermal and hydraulic power stations
- Ongoing partnerships: IREQ, Design Departments

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A RICH HISTORY

- Counter-expertise and retrofits carried out for the EDF Group's nuclear fleet: study of the effect of the oil injection lifting regime on GTA's behavior.
- Evaluation of the bearing behaviour following the loss of a terminal fin.
- Reduction of the size of a stopper by using a polymer coating.
- Evaluation of a bearing technology for the new turbine generation.