EDF

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

OPERATIONS & MAINTENANCE SUPPORT
Evaluating the performance of turbine bearings

YOUR STAKES

- Control and secure the operation of the bearings in all circumstances
- Diagnose vibration problems
- Optimize the maintenance strategy in degraded mode

OUR OFFER

The offer consists in:

- Analyze the behaviour of supports and seals under degraded conditions
- Justify the choices of repair or non-repair, if applicable

The offer can be detailed as follows:

- Methodological advice and expert opinion
- Advanced studies on the basis of numerical simulation: unbalance, lineage defect, bearing instability, hot spots, friction, lubrication defect, balancing aid

**A unique expertise in turbine systems**

- Thanks to our experience as an operator of power generation units, we rely on state of the art and on high-performance multi-domain numerical simulation tools (fluid, structure, thermal)
- These digital tools can be used to evaluate key parameters (maximum allowable pressure, skid and fluid temperature, minimum allowable lubricant thickness, dynamic coefficient and stability) in complex situations (non-linear and non-stationary calculation)

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

Scratches on bearings
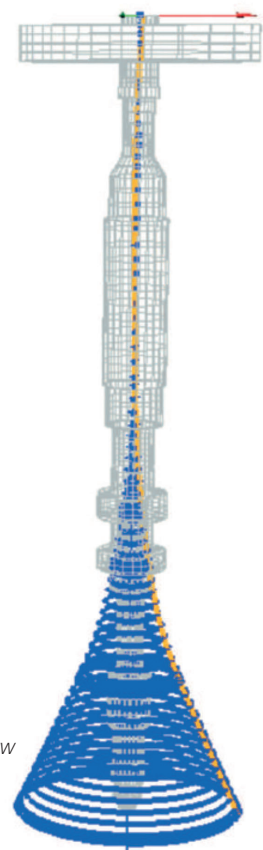
GMPP 900 MW

Evaluating the performance of turbine bearings

OUR ASSETS

■ An expertise in tribology and lubrication for the study of rotating machine support components.

■ IT development skills allowing for total mastery of industry standards and codes.

■ A panel of complete digital tools developed by EDF R&D in fluid dynamics (Legos Code and Groove Code), shaft line dynamics (MT_Tool) and structural mechanics (Aster_Code) interconnected and thus allowing to obtain highly accurate digital models for bearings

- Legos code: advanced study software for components such as bearings or stops with fixed or oscillating skids. This code has a solver to solve the TEHD equations of the bearings and a business interface for fast data entry and post-processing.

- Code Groove: software for solving bulk flow equations in smooth and grooved joints under static and/or dynamic conditions. Leakage rate, forces and dynamic coefficients are thus obtained.

- Outil_MT: proven calculation tool for studying the behaviour of the shaft line under non-linear conditions (large displacements).

- Code_Aster: Free reference software in structural mechanics, it has 400 types of finite elements, 100 laws of behavior, complete manuals under quality assurance. Multiphysics, multi-scale, parallel computing.

	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)

code_aster

SATISFIED CLIENTS

■ Nuclear, thermal and hydraulic power stations

■ Ongoing partnerships: IREQ, Design Departments

A RICH HISTORY

■ Study of Turbo-Alternator Group (TAG) bearing units containing a large number of scratches owing from extended use

■ Assessment of misalignment and stress using temperature measurements in the bearings

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