

STEAM TURBINES LIFETIME OPTIMIZATION

WHY?

- The shift to energy transition is leading power plants to operate more flexibly.
- Increased starts and stops is accelerating steam turbine rotor wear due to thermo-mechanical fatigue.
- Recent incidents in different designs emphasize a growing general concern.
- Managing this risk is crucial, given future power plant operation needs.
- Numerous cracked steam turbine rotors have been detected, resulting in costly repairs and downtime.

WHAT WE BRING

The perfect tool to check batch compliance

LABORELEC developed a fleet risk management program using custom numerical models and expertise to assess critical rotor areas and lifetime consumption, as well as providing for risk mitigation actions.

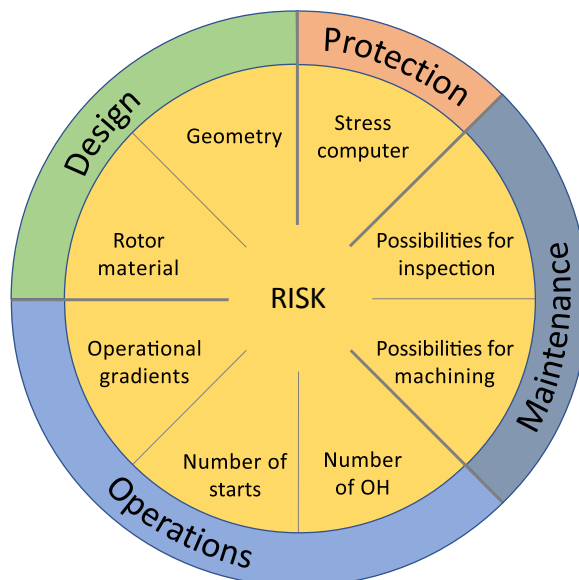
HOW DOES IT WORK

STEP 1: YOUR ASSET BENCHMARKED AGAINST THE ENGIE FLEET

ASSESSMENT OF 4 GROUPS OF PARAMETERS

Design: thermal inertia is determined for the specific rotor type (drum versus disk). Stress raisers and rotor material are considered as well.

Operations: operational profile and frequency of start/stop significantly influences lifetime consumption.



Protection: Steam turbine rotors are safeguarded by a rotor stress evaluator to prevent excessive thermal stress. However, malfunctioning evaluators are frequent.

Maintenance: crack detection through inspection during minor or major overhauls. LABORELEC designed UT inspection tools to detect cracks without blade removal.

STEP 2: REMAINING LIFETIME DETERMINATION

- Setup of 1D and 2D models to determine creep-fatigue lifetime consumption
- Estimation of remaining lifetime based on future forecast (starts + operating hours)

STEP 3: RISK MITIGATION ACTIONS

- Determination and support in implementation of risk mitigation actions (e.g. operation gradient reduction, rotor stress evaluator modifications, specific inspection guidelines, rotor machining)

YOUR BENEFITS

Laborelec experts have developed numerous methods and approaches to enhance steam turbines lifetime and availability. Studies have been performed on many different steam turbine rotor designs and our methodology is validated based on actual cracked rotors



Figure 1

After machining, which was done in agreement with the OEM, the ST rotor life was extended by at least 10 years.

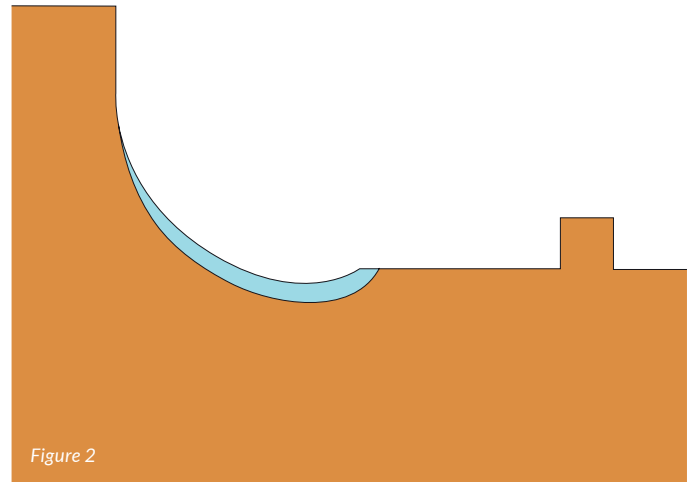
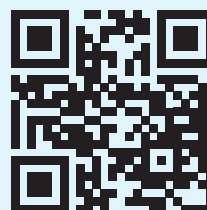


Figure 2

Laborelec can determine the critical positions and required extent of surface machining enabling to remove the accumulated fatigue damage

WHY CHOOSE LABORELEC?

- ✓ **Link with research and development:** our activities range from research and innovation to field services, allowing to ensure most recent technologies are proven and used
- ✓ **Independency:** we are independent from manufacturers and OEM, and aim at reducing total cost of ownership for our customers.
- ✓ **Worldclass expertise:** from chemistry, to mechanics and electricity, our high level expertise is recognized in by the academic world, and often results in long term collaboration with universities and institutes
- ✓ **Multidisciplinarity:** we propose multi-métier solutions based on our internal expertise diversity
- ✓ **Experience:** the more than 60 years old experience on resolving electricity generation and distribution issues for worldwide operators is key to enable assessment of assets and systems



WOULD YOU LIKE TO KNOW MORE?

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