EXPECTATIONS OF AN OPERATOR ON GT COMPONENTS LIFE ASSESSMENT

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UNEXPECTED FINDING DURING A ROUTINE BOROSCOPIC INSPECTION

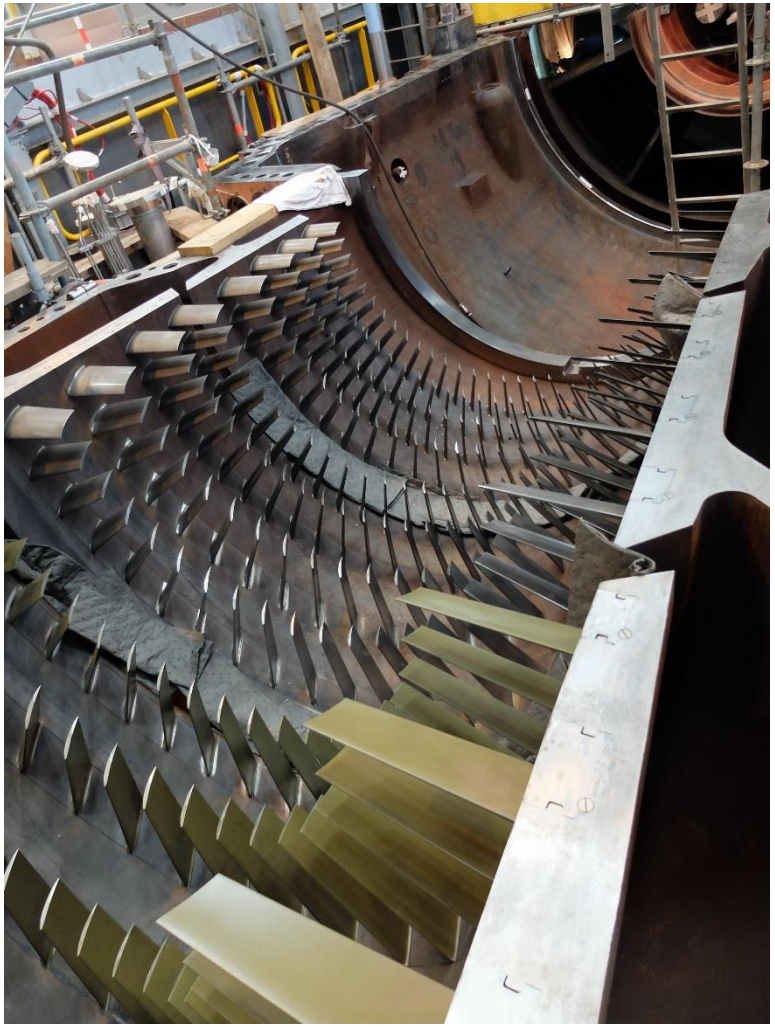
- **F-class unit operated in base load (6000-7000 hours/year)**
- **vibrations trends modifications observed on GT bearings by EDF e-monitoring center**
- **turbine first stage bucket issue (tip cap loss) observed during a boroscopic inspection**
- **next planned outage : HGPI in around 3500 hours**
- **do the first stage buckets need to be replaced before restarting the unit ?**
- **<u>very</u> limited time to make a decision (a few hours)**

UNEXPECTED FINDING DURING A PLANNED OUTAGE

- **F-class unit operated in cycling mode (4000 hours/year & 80-100 starts/year)**
- **unit opened for compressor upgrades**
- **significant cracks observed on turbine second stage nozzles**
- **next scheduled outage : HGPI to be made two years later**
- **do the second stage nozzles need to be replaced before restarting the unit ?**
- **limited time to make a decision (a few days)**

EXTENDING THE MAINTENANCE INTERVALS

- **EDF is operating in peak load a fleet of five GE GT13E2 on two sites**
- **commissioning dates of the five units are quite close**
- **added value of an extension of the maintenance interval between two major inspections (C type) :**
  - to avoid the purchase of some new parts
  - to better manage parts repairs
  - to save money in a short/mid term
- **are the design margins of some parts limiting the opportunities of maintenance interval extension ?**
- **weeks/months to make a decision**



EXPECTATIONS ON COMPONENTS LIFETIME ASSESSMENT ?

- **the ideal answer would be a 3D modeling tool which could assess the residual life time of a part based on damage configurations and operation parameters, but**
  - this would need a detailed knowledge of the parts design and flow characteristics, which :
    - ✓ is difficult (impossible ?) for a non-OEM entity to access
    - ✓ will need a lot of time (and money) to be developed for a single component
  - it will need specific skills to be used properly

- **another answer could be <u>operational</u> guidelines, which could be used by an engineering team on site, and which would allow to :**
  - point out the risks associated with typical damages and operation modes (peaking, cycling and base load)
  - have some generic figures on the tolerances and remaining life of the gas turbine main components for typical damages (cracks, creep, oxidation, ,,,)
  - ask the good questions in order to make the right decision at the right time

- **proposal for parts to be assessed first :**
  - F-class turbine first stage bucket
  - F-class compressor first rotating blade

MANY THANKS FOR YOUR ATTENTION

ANY QUESTIONS ?