

GE  
Oil & Gas

# Strength and endurance

Rotor Life Management to extend the productive life of older gas turbines



## What it is

GE's Oil & Gas research engineers have introduced a new Rotor Life Management inspection service to evaluate the residual life of rotors with more than 150,000 hours of operation.

## How it works

Rotor Life Management employs a combination of traditional and high tech NDE tools and methods to evaluate the mechanical integrity of rotors that have been subjected to high operating hours. RLM can be used to confirm the safety of continued operation or to recommend necessary restoration activities.

## Rotor Life Management

GE's new Rotor Life Management inspection service provides the assurance you need to make an informed decision about the future of your high-service-hours gas turbine rotor.

The structural integrity of rotor materials naturally declines when subjected to the harsh conditions of gas turbine operation. Over the turbine's life, exposure to high temperatures, mechanical stress and start-up/shutdown cycles results in the initiation and growth of flaws that can eventually compromise the machine's safety and integrity. This is why OEMs generally specify the service life of critical components.

But the 'component life' identified by the OEM is a statistical prediction based on an average of a fleet of equipment that may be operated over a broad range of differing conditions. Consequently, at 150,000 hours of operation, one turbine rotor may be ready for retirement, while another may be perfectly fit for years of continued service.

### Use, repair or retire?

Through a quantitative evaluation of the existing flaws, we estimate the remaining life of the rotor as well as the potential need for and viability of repairs. Our results provide the operational and financial information operators need to make sound managerial decisions.

As all rotors approach the OEM's specified average lifetime, they potentially are subject to failure. The important question becomes "is your rotor above or below the fleet average?"

Our RLM inspection will answer this question for you. Our extensive experience with turbine operations, as well as materials and manufacturing expertise, combine to deliver an insightful and comprehensive inspection and interpretation. The results will clearly determine whether your rotor is fit for continued service, in need of repairs, or ready for retirement.

# Stronger for longer

## Superior technology

Non destructive evaluation (NDE) technology has come a long way through the years. In addition to the flaw-detection capabilities of traditional methods, we offer expert application and interpretation of modern NDE technology to identify and quantify flaws – at sizes that previously went unnoticed. Our advanced metallurgical analysis tools include:

- Magnetic Particle Inspection
- Eddy Current Evaluation
- Ultrasonic Testing

## Applicability

Available for MS5001 and MS3002 gas turbines.

## Analysis

Data collection is only half the job – a quality analysis must provide a detailed description of what the data actually means.

We offer additional expertise in interpreting and evaluating test results with computerized defect propagation models developed using Finite Element Models analysis (FEM). Using these advanced techniques, our experts accurately assess and make recommendations on rotor condition.

## Benefits

GE's RLM service can safely extend the life of your rotor, help avoid failures, unplanned outages and emergency maintenance – as well as save you time and money:

- Fit for service – you save because RLM minimizes the downtime required to give your rotor a clean bill of health
- Repairs required – the level of detail enables precise repair strategies that cost significantly less than rotor replacement
- Replacement – if severe, unrepairable damage is found, you will have avoided an unexpected and potentially catastrophic event in your plant

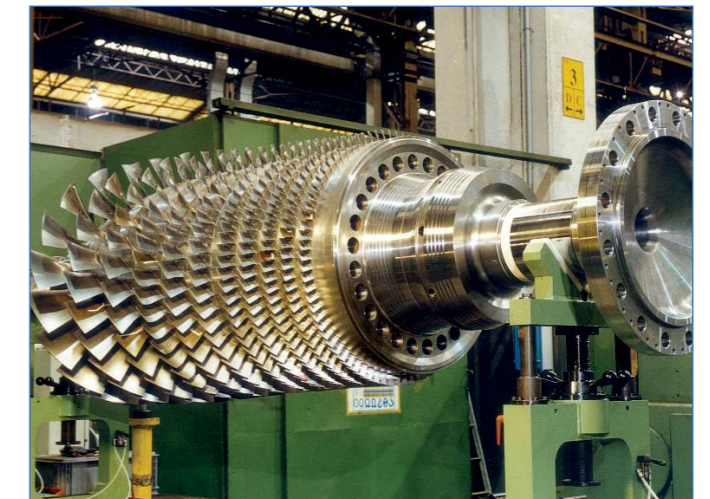
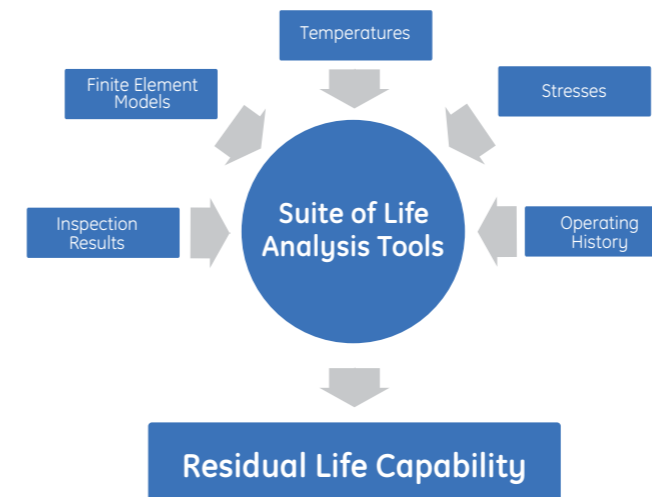
## Case study

GE performed an RLM inspection during a planned major outage on an MS5001P gas turbine installed in the US. The rotor had accumulated over 150,000 fired hours and less than 200 starts under essentially continuous operation.

The scope of the rotor inspection, which took only 9 days, was tailored to meet the outage window established by our customer, and was designed to mitigate risks associated with the life extension of the rotor. Eddy Current, Magnetic Particle, Ultrasonic, Surface Replication and Dimensional inspections showed no limiting indications. However, hardness readings taken on the stage 16 compressor wheel identified an unquantifiable risk in continuing operation through the next major inspection interval.

In this case, we recommended follow-up hardness measurements of stage 16 after an additional 25,000 hours of continuous operation.

As a result of GE's Rotor Life Management inspection, the customer was able to get three more years of service from this rotor before its next inspection.



**Nuovo Pignone S.p.A.**

Via Felice Matteucci, 2  
50127 Florence, Italy  
T +39 055 423 211  
F +39 055 423 2800

[www.ge.com/oilandgas](http://www.ge.com/oilandgas)

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