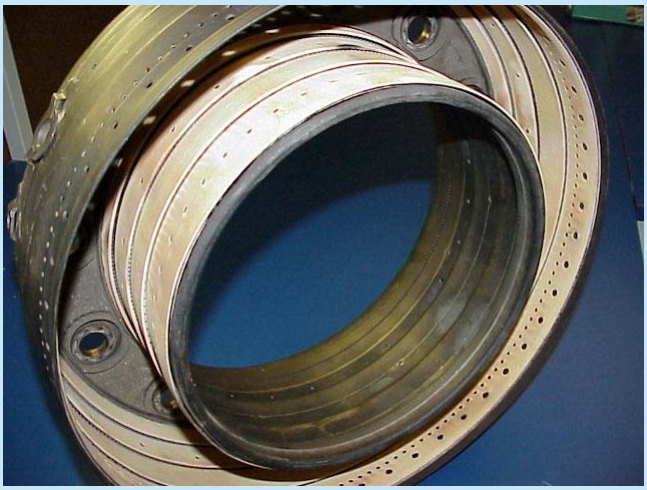
MATERIALS & CORROSION

Service for the Gas Turbine Industry

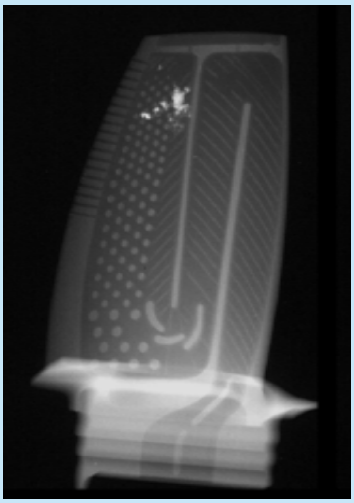
Gas turbine components are subject to extreme conditions in service which result in degradation of the base materials and coatings. This degradation can take many forms, the most common ones being environmental damage (oxidation, hot corrosion, erosion), creep (deformation and rupture), thermal mechanical fatigue, high cycle fatigue and wear. Understanding how the component changes under these conditions is essential to anticipating the life span of the component, avoiding catastrophic failure and improving its performance in the future. OEM life guidelines can be non-specific and often exclude proven after-market life extension techniques in favor of component replacement. Therefore, it is often up to the operator to explore opportunities for cost savings. When faced with multi-million dollar hot section replacement costs, materials engineering is a worthwhile investment. To this end, Levelton Consultants offers a range of materials engineering services.

Consulting Services

- On site condition assessments – determine component health through various nondestructive examination (NDE) techniques and advise remedial actions.
- Specification writing – defining new inspections and/or repairs based on specific component requirements.
- Qualification of repairs and new products – independent assurance of component quality.
- Opinions on OEM upgrades – determine whether new technologies properly address component deficiencies.
- Review of overhaul proposals – ensure contracted work is justified based on component condition.
- Component life modeling – predict how changes in operating conditions will impact component life.
- Litigation, insurance claim support.



Service exposed, annular combustor



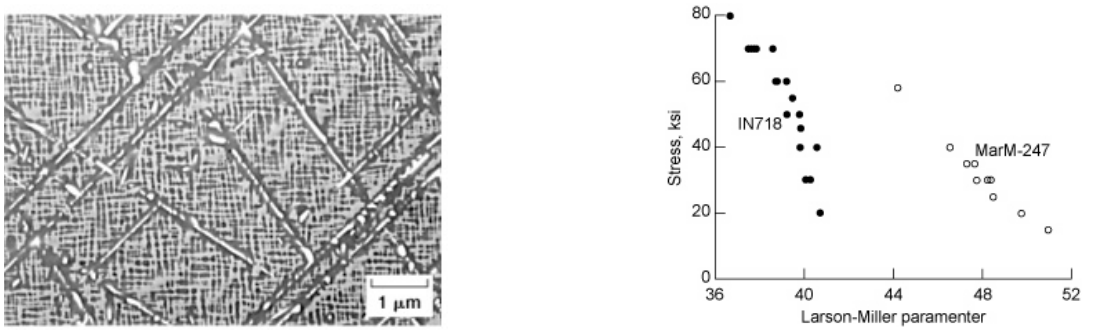
Radiographic inspection of a turbine blade

LEVELTON

Component Health Monitoring –

Metallurgical analysis of a service exposed component can:

- Determine whether the component's repair and retirement life cycles are appropriate.
- Determine whether the component's design features are appropriate for the operating conditions.
- Identify opportunities for component life extension and avoid costly component replacements by proper selection of protective coatings, repair materials and restorative heat treatments.

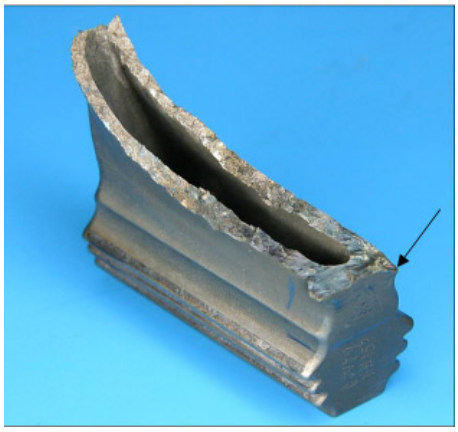


Changes in the superalloy microstructure (left) result in a degradation in material strength (right)

Failure Analysis –

Determining the root cause of a component failure can:

- Eliminate the risk of costly failures in the future through implementation of corrective actions.
- Identify opportunities for compensation.
- Determine whether other engine components are at risk.



Blade failure by high cycle fatigue; arrow indicates origin

Levelton Consultants Ltd.

150 – 12791 Clarke Place Richmond, B.C. V6V 2H9
Tel: 604.278.1411 Fax: 604.278.1042
Email: info@levelton.com www.levelton.com

ABBOTSFORD 604.855.0206 CALGARY 403.269.4141 COURTENAY 250.334.9222 KELOWNA 250.491.9778 NANAIMO 250.753.1077 SURREY 604.533.2992 VICTORIA 250.475-1000