

Life Cycle Management Services

Patented Technology: CA 2604118/20, US 8,116,990 B2

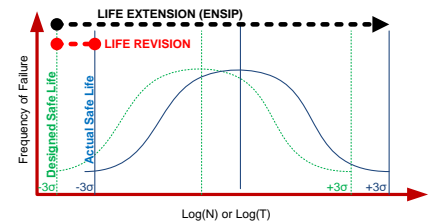


Predictive Analytics

LPTi employs Prognostics Health Management (PHM) technologies to simulate the structural integrity of failure critical parts in complex engineering systems using actual system operating conditions. This provides condition based maintenance capability using Predictive Analytics as well as provide customized life cycle management strategies for parts operating in aerospace, power generation, marine and oil & gas industries.

Life: Review, Revision and Extension

- Customized services for life review, revision and extension through actual usage based residual life analysis (RLA) and reliability analysis, providing a quantitative basis for the life cycle management of parts
- Scenario analysis where the effects of key variables such as operating conditions, part material are analyzed on design life or RLA under actual usage conditions.
- Reliability and risk assessment for known uncertainties rather than 'worst case assumptions'
- Useful for life extension and selecting optimal inspection strategies and solutions are also provided

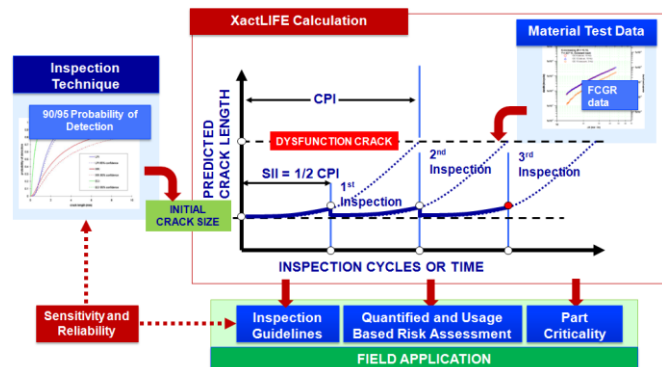


Safe Life

- Safe life is a life prediction approach in which life-limited parts are designed, manufactured, substantiated, and maintained to have a specified service life where 1 in 1000 components is expected to initiate a crack
- LPTi predicts "actual" safe life limits under actual operating conditions for life review and RLA, as well as opportunity for life revision as an alternate to conservative safe life limits

Damage Tolerance Assessment

- Damage tolerance is the ability of the parts to resist failure (existing or induced), for a specified period of unrepaired usage using fracture mechanics analysis and non-destructive inspection strategies
- LPTi predicts "actual" crack propagation intervals and safe inspection intervals assuming a crack has been missed during inspection
- ENSIP (MIL-HDBK-1783B) based life extension opportunity beyond the conservative life safe limits imposed at design



Design Modification and Qualification

- Assessment of part design modifications and material changes using validated procedures and technologies
- Reduce the design effort and dramatically saves time and cost for emerging OEMs and third-party parts manufacturer
- Experience in qualification of design modifications and repairs and provide consulting on testing and analysis requirements based on established standards

Training

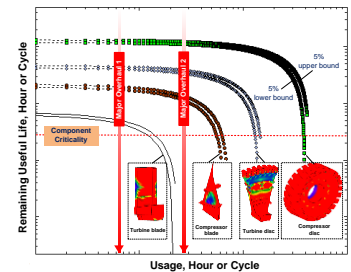
- Short courses on Life Cycle Management, Repairs and Coatings (3 days)
- Gas Turbine Part Failure Analysis (2 days)
- XactLIFE Software Training

Industries Served

1. Aerospace
2. Power Generation
3. Oil and Gas
4. Avionics
5. Marine or Nuclear

Predictive Maintenance

- Estimate engine maintenance schedules and inspection guidelines using prognostics to predict crack initiation and propagation times
- Quantitative prediction and tracking the change in residual life of critical parts under actual usage conditions
- Enable informed decision making and risk management for continuing to use service exposed and/or design live expired parts



Failure Assessment

Plant inspection and engine assessment

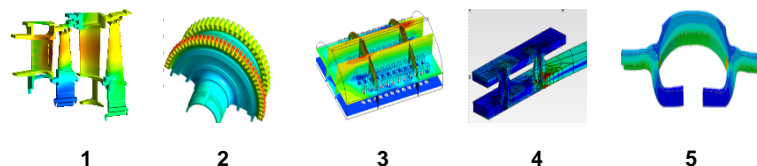
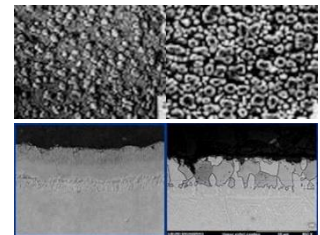
- LPTi and its partners around the globe offer in-plant inspection services for engines as well as their control systems
- On-site boroscopy examination of the parts used to assess the physical state of components and supported with usage based RLA
- Recommendations are then made for the most cost effective approach for plant maintenance and overhaul along with maintenance cost projection

Life Assessment

- Life cycle management (LCM) strategies are designed on the basis of predictive analytics with actual usage and uncertainty, and know-how of inspection technique
- The predictive analytics results are generated using different physics based simulations and usage scenarios typical to the system
- Recommendations for inspection intervals, inspection locations and details of the inspection technique are provided

Metallurgical Assessment

- On and off-site metallurgical assessment techniques including replica methods and hardness testing
- Off-site metallurgical assessment is carried out using world class microscopy facilities available in Canada
- Quantitative microstructural data is used for RLA using the patented XactLIFE Prognostics system



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