

Life evaluation of gas turbine casings

Customer Case Study – Oil & Gas

Customer

Headquartered in Florence, Italy, the company is part of a diversified advanced technological group. It is a leader in the development and delivery of advanced product and service offerings for the global oil and gas industry. With a workforce of over 10,500 people, it operates across 70 countries with a turnover ~\$6 billion.

Requirements

- To evaluate the life of the exhaust casing
- Thermo-mechanical behavior of the exhaust casing to be estimated
- High thermal stresses near the lifting lug region of gas turbine exhaust casing were estimated

QuEST approach

- The assembly components were gauged to analyze the flow behavior and thermal characteristics
- HPT-LPT casing, diffuser & exhaust casing considered to be part of assembly
- 3D and FE models developed from 2D inputs
- Flow parameters (main & secondary flow thermal loads) and heat transfer coefficients studied
- Transient thermal analysis, mechanical analysis and structural integrity of the component analyzed

Results

- Temperature distribution across the turbine operation cycle
- Deflection and stress levels predicted the life of the casing
- Stress levels and casing loading conditions validated for structural integrity

Impact

- Effect of radiation considerably effecting the design parameters
- Stresses near the lifting lug region exceeding the allowable limits
- LCF analysis not confirming to the standards due to radial thermal growth in the adjacent casing

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