TOSHIBA Engineering Services

TOSHIBA is one of North America's leading turbine/generator service providers. Qualified and reliable engineering analysis of equipment and operational dynamics helps deliver quality and add value to any project. Extensive in-house engineering capabilities include turbine and generator condition assessments, failure analysis and material evaluation, fatigue and fracture testing, positive material identification and non-destructive examination (NDE).

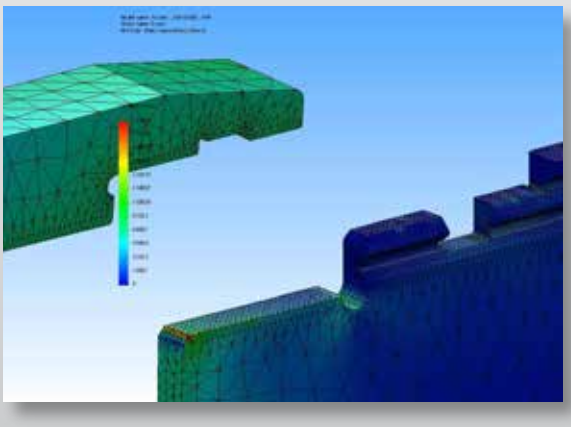
When you need the right answers.

Toshiba's highly-skilled and experienced engineering team has the analytical tools to provide:

- ***Equipment condition assessment***
  - *Bored rotors, shrunk-on disks, blade attachment dovetails, steam path components, unit life extension studies*
- ***Failure analysis***
  - *Fatigue, brittle fractures, corrosion, stress corrosion, wear, deformation, embrittlement, creep/stress rupture*
- ***Modeling and vibration analysis***
- ***Fracture toughness testing—K_{IC} and J_{IC}***
- ***Positive material identification***

Turbine/Generator Materials Analysis

- ***Finite element analysis (thermal and mechanical)***
- ***Fatigue and fracture mechanics analysis***
- ***Cumulative damage analysis***
- ***Mechanical and chemical testing per ATSM standards***
- ***Non-destructive examination (NDE)***



Extending Equipment Life Options

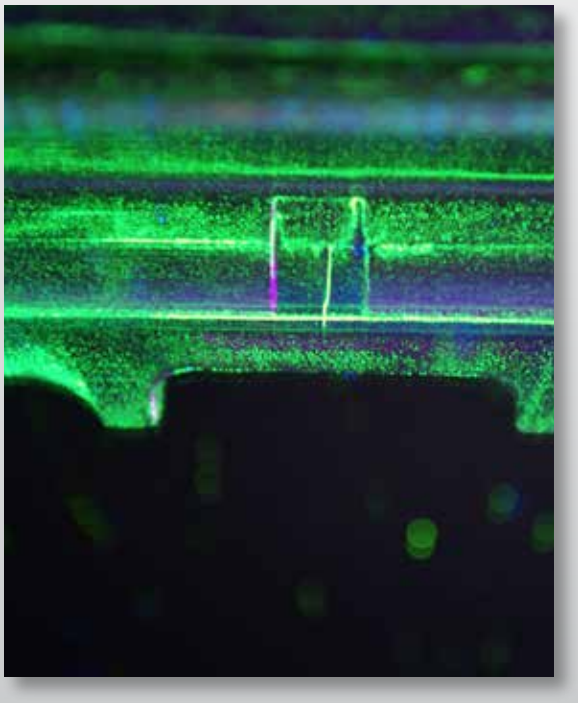
- *Reducing rotor preheating requirements*
- *Designing new generator rotor windings*
- *Retaining ring and forging modification to mitigate tooth top cracking*
- *Reverse engineering turbine and generator components*
- *Engineering permanent turbine casing weld repairs*

Non-Destructive Examination (NDE)

Utilizing an array of testing and inspection techniques, Toshiba's level I, II and III-certified inspectors evaluate various properties of materials, components and systems.
Tests include:

- *Positive material identification*
- *Ultrasonic inspection*
- *Eddy current testing*
- *Magnetic particle inspection*
- *Liquid penetrants testing*
- *Visual (borescope) inspection*

Toshiba's engineers use their years of experience to craft the correct solution for your equipment needs and take into account specific unit configurations and mechanical properties.



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