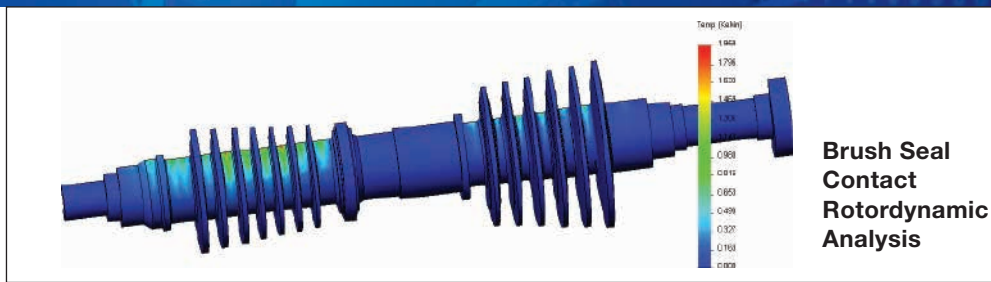




Photo courtesy of Alstom



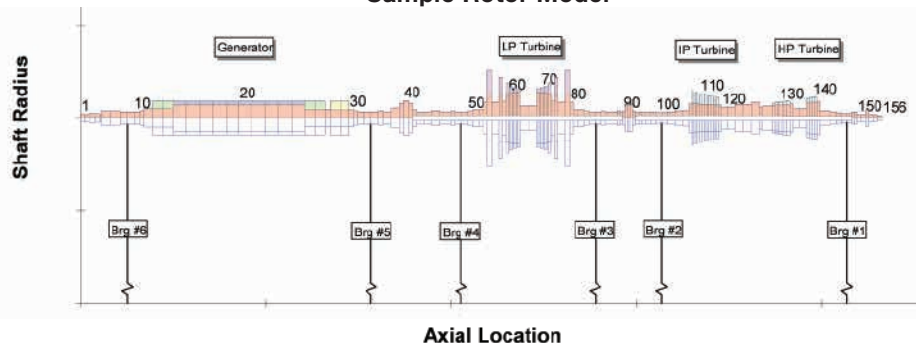
## Rotordynamic Analysis

Waukesha Bearings® and Bearings Plus™ (BPI®) offer unmatched technical support and analytical capabilities for OEMs and end users seeking to improve the reliability, efficiency and service life of their rotating equipment. The expert engineers at Waukesha Bearings and BPI can provide comprehensive rotordynamic analysis to validate original builds for OEMs or to diagnose problems and propose the right solutions for end users.

### BEARING AND SEAL EXPERTISE

Along with the rotor, the bearings and seals are the most influential components in rotating equipment vibrations. Therefore, the accuracy of a rotordynamic analysis relies on the analyses of the bearing and seal characteristics. As global leaders in the engineering and manufacturing of bearings and seals, Waukesha Bearings and BPI have the most reliable and accurate tools to perform those analyses.

Sample Rotor Model



With 65 years in the industry, Waukesha Bearings and BPI have upgraded numerous bearings and seals via rotordynamic analysis and offer proven solutions to improve stability, control vibrations, reduce power loss, eliminate pivot wear and address a myriad of other challenges.

Proprietary product solutions include:



ISFD® technology



Maxalign® bearings



Flexure Pivot® bearings



Damper seals

### THE WAUKESHA BEARINGS/ BEARINGS PLUS ADVANTAGE

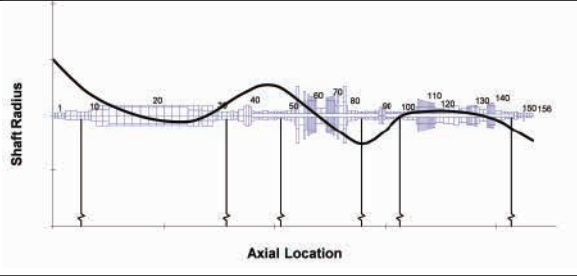
- The most comprehensive analytical capabilities in the industry
- Wide and deep knowledge of bearings and seals
- Accurate in-house tools for bearing and seal analysis
- Accurate rotordynamic analysis and predictions
- Proven engineered solutions
- The right solutions, available at the right time
- Fast turnaround times based on skilled expertise
- Continuous research and development of new technologies

### ROTORDYNAMIC ANALYSIS FOR YOUR APPLICATION

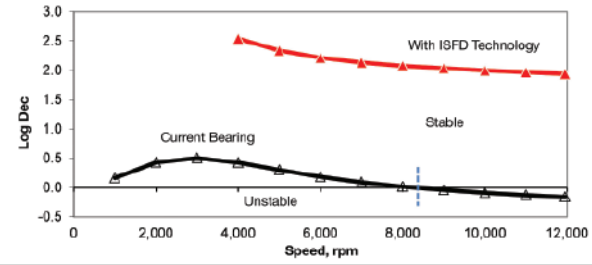
- Compressors
- Steam and gas turbines
- Expanders (radial turbines)
- Turbochargers
- Microturbines
- Motors
- Generators
- Pumps
- Gearboxes
- Propulsion shafts
- Blowers
- Fans



**Mode Shape Analysis**



**Stability Analysis**



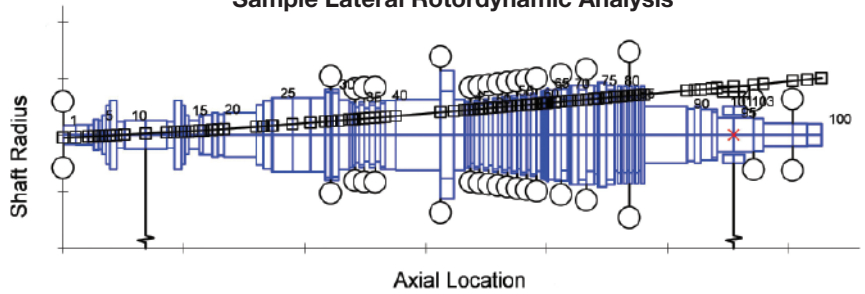
**ACCURATE, COMPREHENSIVE REPORTS**

Upon receipt of the relevant rotor and coupling information, Waukesha Bearings and BPI engineers build a rotor model and then analyze the bearings and seals using proprietary codes. The customer receives a comprehensive report of the findings to include the following, based on the type and scope of analysis performed.

**Lateral Rotordynamic Analysis**

- Undamped critical speed (UCS) analysis
- Damped critical speed analysis
- Eigenvalue analysis (mode shapes)
- Unbalance response analysis
- Stability analysis (level I and II)
- Bearing and seal optimization
- ISFD optimization, if needed
- Brush seal contact-induced stability and unbalance analysis, if needed

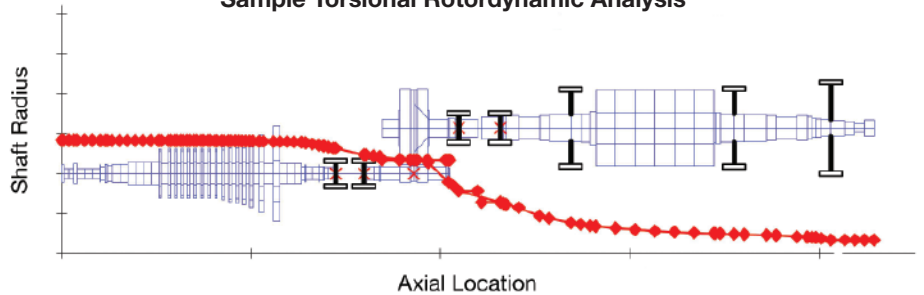
**Sample Lateral Rotordynamic Analysis**



**Torsional Rotordynamic Analysis**

- Torsional natural frequencies (TNF)
- Eigenvalue analysis (mode shapes)
- Damped torque or stress response analysis, if needed
- Transient analysis for start-up or short circuit analysis for motor or generator trains
- Transient torsional stress analysis on critical points (e.g., coupling, rotor)

**Sample Torsional Rotordynamic Analysis**



**Our Promise:**

Only Waukesha Bearings® has the culture, commitment and entrepreneurial spirit to drive technological breakthroughs and operational excellence that exceed our customers' expectations globally.



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