



DELTA JS AG

**Rotor Dynamics**

Software \* Consulting \* Engineering

## Consulting and Engineering Services by Delta JS

DELTA JS, developer of the leading rotordynamic software MADYN 2000, also offers consulting and engineering services for its customers, which naturally complements the software development. Its staff for these services is characterised by an excellent scientific education and many years of practical experience to identify and analyse problems and to provide solutions.

### Consulting and Engineering Services

- ◆ Design verification (3<sup>rd</sup> party review of critical machinery)
- ◆ Design specification (support to design new machines)
- ◆ Troubleshooting

### Clients

DELTA JS provides services to world market leaders in their field. Clients are among the following industries:

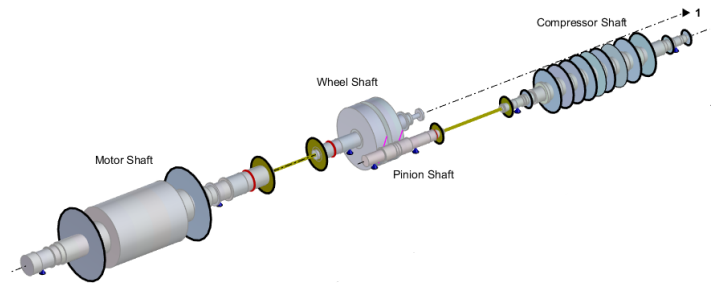
- ◆ Manufacturers of turbines, compressors, motors and generators
- ◆ Pump manufacturers
- ◆ Gear manufacturers
- ◆ Industrial gas manufacturers
- ◆ Plant engineering companies (contractors)
- ◆ Energy utilities (power generation, oil and gas)
- ◆ Automotive industry
- ◆ Aeroengines

### MADYN 2000, the Engineering Tool for Rotordynamics

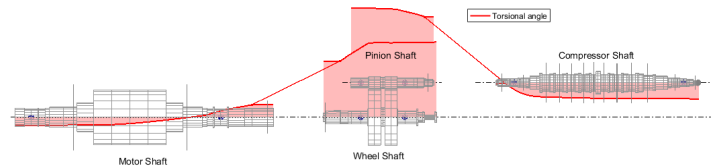
DELTA JS uses its proprietary software MADYN 2000 to provide rotordynamic engineering services. It covers all requirements to perform comprehensive analyses with utmost efficiency:

- ◆ Bearing types: Rolling element bearings, fluid film and magnetic bearings
- ◆ Consideration of dampers
- ◆ Analysis of seal characteristics (labyrinths, plain seals)
- ◆ Lateral, torsional, axial and coupled analyses
- ◆ Consideration of complex support structures
- ◆ Extensive nonlinear capabilities
- ◆ Hot spot stability (among others Morton effect)

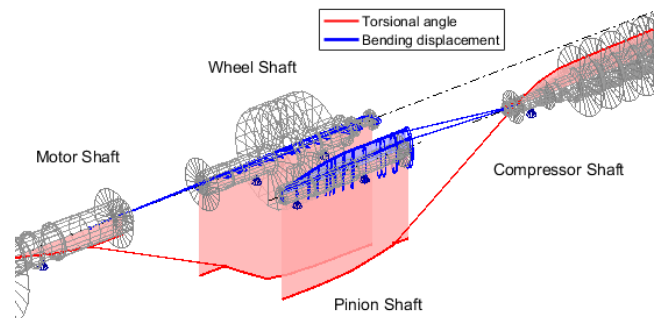
### Extracts from Engineering Projects of DELTA JS



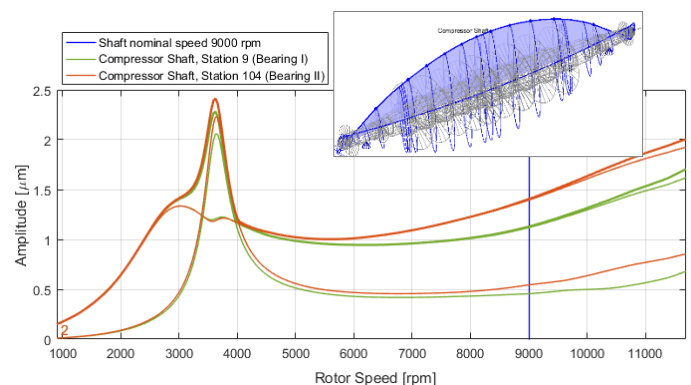
*System consisting of a motor, gear and compressor*



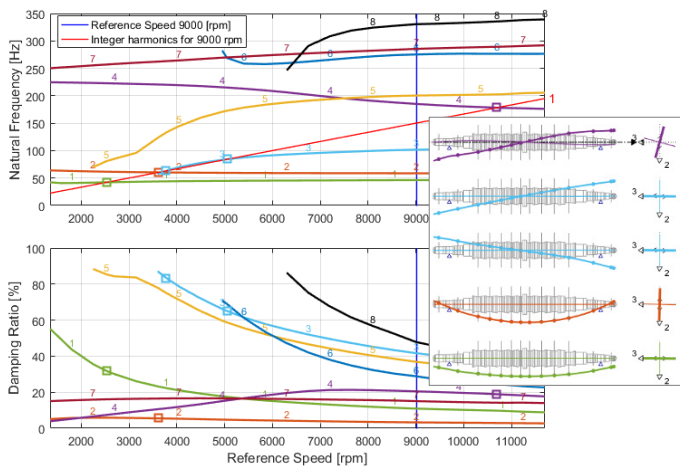
*Torsional natural vibration mode*



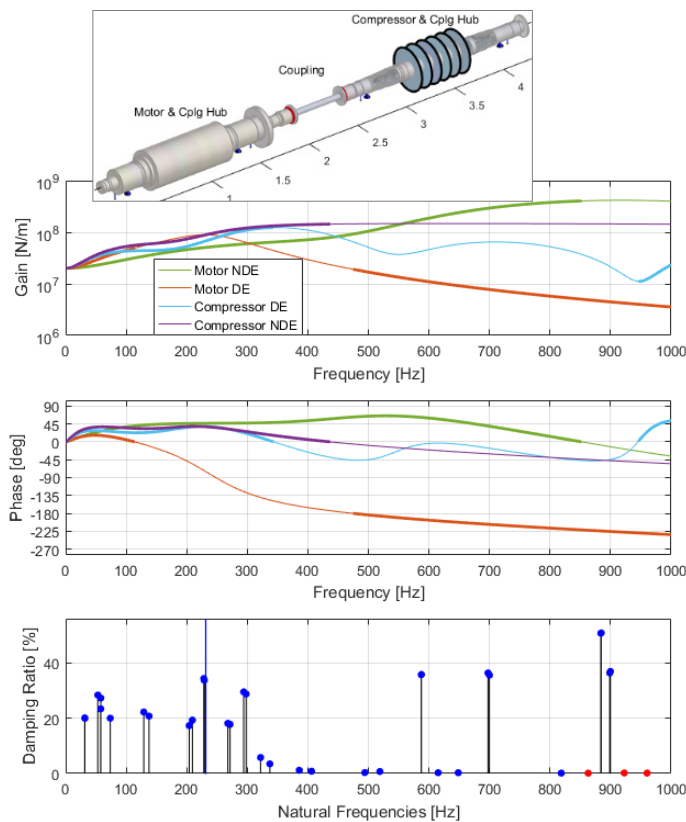
*Torsional vibration mode with lateral coupling in the gear*



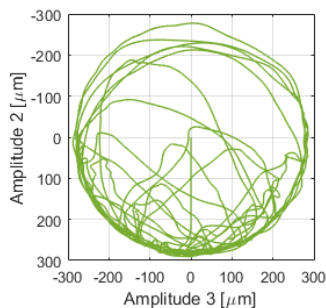
*Lateral unbalance resonance curves with shape in resonance*



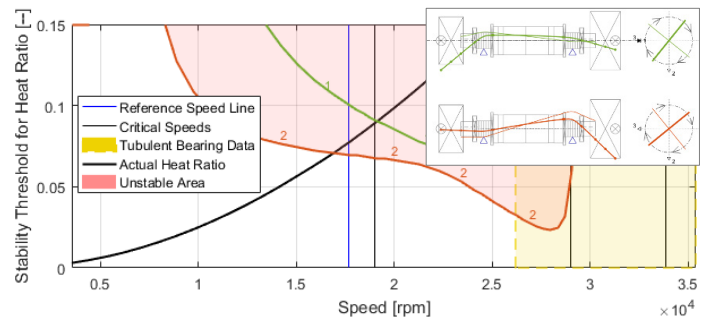
Lateral Campbell diagram (natural frequencies and damping ratios as a function of speed) with shapes in critical speeds



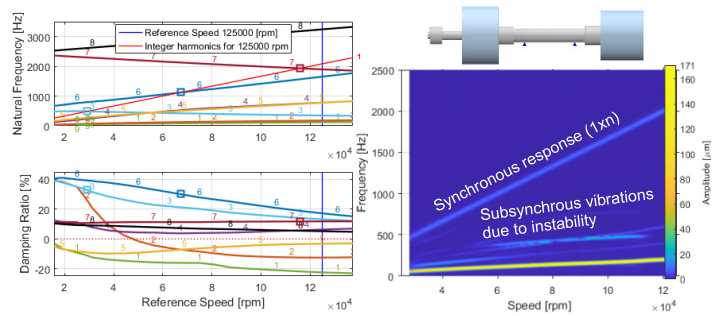
System with magnetic bearings, transfer functions and eigenvalues (frequency and damping) to assess the stability for controller design



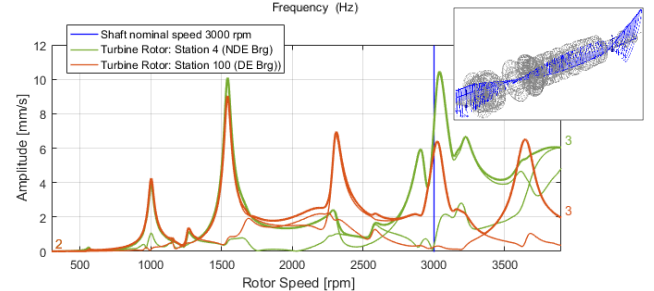
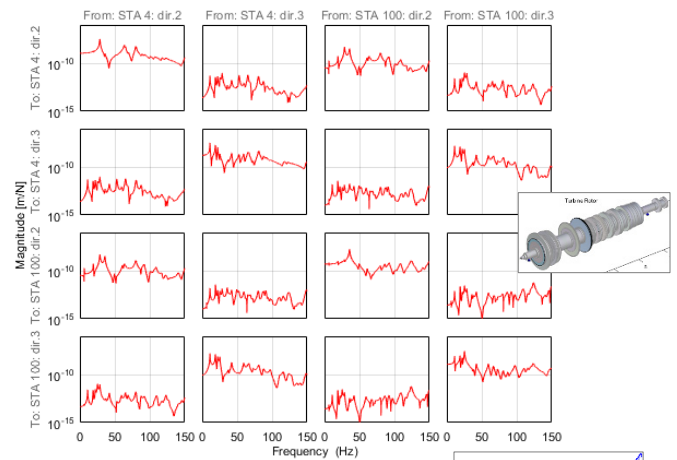
Whirling orbit in case of a drop into the back up bearings of magnetic bearings



Hot spot stability chart with shapes to check dangerous regions for thermally induced synchronous instability (Morton effect)



Campbell diagram of a turbocharger with unstable modes (damping ratio < 0), spectrum during run up with limit cycles



Coupled rotor casing analysis: Casing transfer functions from imported state space FE model, casing response (velocity) to unbalance

**How to contact Delta JS:**

Delta JS AG  
 Technoparkstrasse 1  
 CH 8005 Zürich  
 Switzerland

Phone: +41 44 445 3130  
 E-mail: [contact@delta-js.ch](mailto:contact@delta-js.ch)  
 Homepage: [www.delta-js.ch](http://www.delta-js.ch)