


Turbomachinery engineering seminar series



Sulzer is your global partner with reliable and sustainable solutions for your key operations. We offer repair and maintenance services for turbines, compressors, pumps, generators and motors. We also offer OEM and aftermarket parts. With one of the largest service networks in the industry, we are close to our customers with over 180 production facilities and service centers worldwide. Our cutting-edge engineering services provide unique and innovative solutions customized to your equipment needs.

Location: Sulzer Turbo Services Houston Inc.
(La Porte, TX, USA)

Equipment: Primarily directed at rotating equipment (steam and gas turbines, hot gas expanders, centrifugal compressors) running on hydrodynamic fluid film bearings with proximity probe measurements and monitoring systems.

Boost your expertise with firsthand knowledge from industry experts 

Part 1 – Dynamic motion, transducers, measurements, monitoring, data processing, and alignment (4 days)

Section 1: Dynamic motion fundamentals

- Motion fundamentals and vector manipulation
- Undamped and damped mechanical vibration
- Forced lateral vibration
- Introduction to torsional vibration

Section 2: Transducer characteristics

- Dynamic signal attributes
- Proximity probe configuration, and application
- Velocity coils and accelerometers
- Vibration severity
- Specialized transducers and applications

Section 3: Dynamic signal evaluation

- Analog and digital filters
- Time and orbital domain
- Time and frequency domain
- Signal interaction and modulation

Section 4: Data acquisition, display and monitoring

- Monitoring system components
- Acquisition of machinery data
- Steady state and transient data formats
- Specialized data formats

Section 5: Machinery alignment

- Position measurement tools
- Shaft alignment offsets
- Dial indicator and laser alignment
- Alignment tracking and retention

Part 2 – Machinery mechanical characteristics and modeling, common and unique malfunctions, and balancing (5 days)

Section 6: Machinery mechanical characteristics

- Calculated and measured rotor mode shapes
- Inertia, stiffness and damping considerations
- Critical speed explanation
- Journal and thrust bearing characteristics,
- Shaft seals and coupling characteristics
- Influence of individual machine elements on overall train response

Section 7: Machinery modeling

- Building a rotor, support and bearing model
- Common rda mechanical predictions
- Methods to validate rotor model accuracy
- Conversion from lateral to torsional model
- Identification of other rotor resonances
- Api 684 definitions and requirements

Section 8: Common malfunctions

- Diagnosis of multiple 1x malfunctions
- Identification and correction of shaft preloads
- Identification and correction of resonance and stability problems
- Differentiation between looseness and rubs
- Identification and correction of foundation issues

Section 9: Unique malfunctions

- Identification of shaft cracks
- Characteristics of gearboxes
- Fluid excitations, and calculations,
- Electrical excitations including electrostatic shaft voltage discharge

Section 10: Effective rotor balancing

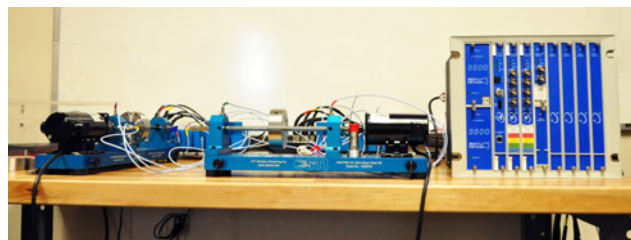
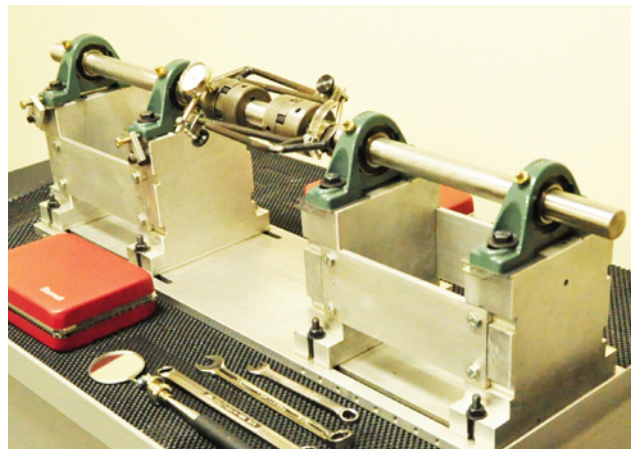
- Preparation and fundamental rules
- Balancing using mode shapes, orbits, and spreadsheets
- Balancing using bode and polar plots
- Low and high speed shop balancing
- Precautions and discipline required for field balancing at rated conditions

Part 3 – Rotor modeling workshop (2 days)

Combination of presentations, plus demonstrations of proper setup and utilization of XLRotor. The instructor will be running the full version of XLRotor and sharing various displays on the main presentation screen. Attendees may download a demonstration version and follow along with the explanation of the various windows, data entry and overall model construction.

Engineering services capabilities/ service offering:

- Alignment tracking
- Machinery diagnosis
- Field balancing
- Performance rerates
- Technical upgrades
(blade design improvements)
- Root cause failure analysis
- Rotordynamic analysis
- Turbomachinery engineering seminar series



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