



Work Identification

WI304

Advanced Vibration Analysis

Recommended for

Mechanical, maintenance, and machinery engineers involved in design, specification, acceptance, operation, and troubleshooting of industrial process machinery. Plant personnel and others who wish to become experts in diagnosing the behavior of rotating machinery of various types and classifications. Professionals whose primary focus is responsibility for the maintenance of high level performance, reliability, and availability of critical process machinery; including rotating machinery specialists and consultants, advanced mechanics and mechanical engineers, and advanced technicians.

Course objective

An advanced study of machinery vibration diagnostics. Topics include statistical analysis, instrumentation, low-speed and high-speed analysis, advanced machinery commissioning, start-up and coast-down testing, and electric motor current analysis. A survey of experimental multi-channel modal analysis is included. Provides a clear understanding of how vibration analyzers function with approaches to analyzing complex machine trains. Illustrated with real-world case histories.

2009 course schedule

July 13–17	Myrtle Beach, SC
Oct. 5–9	Charlotte, NC

2009 tuition

Public classes	\$1,895
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On-site	Tuition on request based on number of students
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5 days

Course description

- Review of vibration spectrum diagnostics, using the Illustrated Vibration Diagnostics Chart
- Refining narrow band spectral envelope alarms using statistical analysis
- Vibration analysis techniques and instruments required to effectively evaluate low-speed (30 - 300 r.p.m.) and high-speed machines (600,000 - 3,600,000 r.p.m.)
- Vibration diagnostic techniques
- Impulse natural frequency testing
- Start-up and coast-down testing
- Bode and Nyquist plot generation
- Swept-sine variable frequency shaker testing
 - Operating deflection shape analysis
 - Phase analysis to differentiate several problem sources generating similar vibration symptoms
 - Time waveform analysis applications
 - Synchronous time averaging applications
- Motor current analysis testing and presentation of Motor Current Troubleshooting and Severity Chart
- Experimental modal analysis using multi-channel FFT analyzers.
- Machine performance enhancing techniques
 - Dynamic balancing-discussion of important topics
 - Changing frequencies of rotor and/or support frame
- Vibration isolation and damping treatments
- Design and fabricate dynamic vibration absorbers
- What are today's vibration analyzers really doing?
 - Time waveform presentations
 - How far apart must two peaks be for an analyzer to display two separate frequencies
 - Pros and cons of using the various FFT windows
 - Single vs. multiple channel FFT analyzers
 - Overlap processing
 - Diagnosing a bearing, gear, or electrical problem with unknown variables
- Vibration analysis of special machine types – theory, recommended approach, and real-world case histories
 - Horizontal centrifugal and vertical pumps
 - High-speed centrifugal air compressors
 - Centrifugal chillers and fans
 - Roots-type blowers
 - Piping vibration problems
 - Chemical reactors and agitators
 - Paper machines
 - Turbine-driven machinery
 - Single and multi-stage gearboxes
 - DC motors and induction AC motors
 - Machine tools and rotary screw air compressors

Prerequisites

12 to 24 months full-time condition monitoring program experience; SKF courses Vibration Analysis I (WI211) and Vibration Analysis II (WI212) or commensurate field experience; knowledge of basic sensors, monitoring instruments, analysis equipment.