



VA ISO 18436 Category IV

Master Vibration Analyst Training & Certification

CAT - IV

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The Master Vibration Analyst course is intended for personnel who have at least five years vibration analysis experience, with a senior role in the condition monitoring team and be able to understand the measurements associated with critical turbomachinery and other fluid-film bearing machines.

The course provides an in-depth study of advanced signal processing, cross channel measurements, dynamics (mass/stiffness/damping, natural frequencies, modes), resonance testing (run-up/coast down tests, impact tests, ODS, modal analysis), corrective action (flow control, resonance correction, isolation and damping), proximity probe and casing measurements, orbit and centreline plot analysis, rotor dynamics (natural frequencies, modelling), journal bearings (design, fluid film instabilities), torsional vibration and flexible rotor balancing.

This course will take a practical approach to these subjects. Animations and software simulations will be used to make these topics easier to understand. Mathematics and theoretical derivations will be kept to an absolute minimum. Utilizing advanced 3D animations and software simulations, topics that were possibly beyond the reach of many vibration analysts will be far easier to understand. The aim is to provide the level of knowledge that enables the vibration analyst to understand these topics to a high degree, with the expectation that if advanced analysis, design modification or modelling is required, a specialist in those areas will be called-in.

Course Information:

Course Format: 4-day Public classroom (and live stream) courses in Nærum (Denmark) or Darmstadt (Germany). Private and on-site courses for a single company (min. 5 students) are available.

Optional: Certification examination, 5 hours, 60 multiple-choice questions, 70% passing grade. Can be taken online or in the classroom.

Certification Prerequisite: Prior CAT-III certification by a MIBoC approved training centre and 60 months experience in vibration measurement is required for certification. Full training course completed including Part1 (e-learning) around 45h.

The certification scheme is compliant with ISO 18436 and ISO/IEC 17024.

Detailed topic list:

Principles of vibration

- Vectors, modulation
- Phase
- Natural frequency, resonance, critical speeds
- Force, response, damping, stiffness
- Instabilities, non-linear systems
- Torsional vibration
- Instrumentation
- Proximity probe operation, conventions, glitch removal
- Shaft and casing measurements

Signal processing

- RMS / peak detection
- Analog/digital conversion
- Analog sampling, digital sampling
- FFT computation
- Filters: low pass, high pass, band pass, tracking
- Anti-aliasing

- Bandwidth, resolution
- Noise reduction
- Averaging: linear, synchronous time, exponential
- Dynamic range
- Signal-to-noise ratio
- Spectral maps

Fault analysis

- Spectrum analysis, harmonics, sidebands
- Time waveform analysis
- Orbit analysis
- Shaft centerline analysis
- Transient analysis
- Unbalance, bent shaft, cracked shaft, eccentricity, rubs, instabilities
- Resonance and critical speeds
- Turbomachinery



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Phase analysis

- Transient analysis
- Enveloping
- Electric motor defects
- Flow-induced vibration, aerodynamics, and liquids
- General fault recognition

Rotor/bearing dynamics

- Rotor/bearing dynamics
- Rotor characteristics
- Rotor modeling (rotor, wheels, bearings, aerodynamic effects)
- Bearing characteristics (fluid film bearings, housing, and supports, seals, couplings)

Corrective action

- Flow control
- Isolation and damping
- Resonance control
- Low and high-speed shop balancing
- Field balancing (single plane, two-plane, static/couple, flexible rotor)

Equipment testing and diagnostics

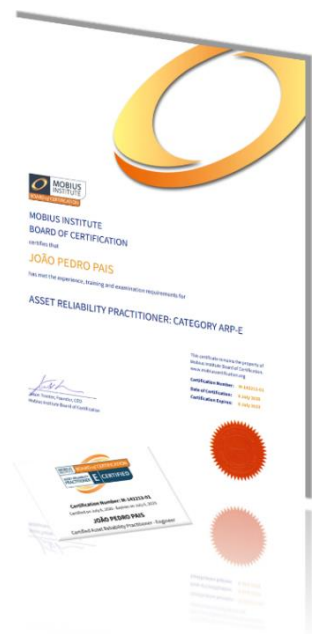
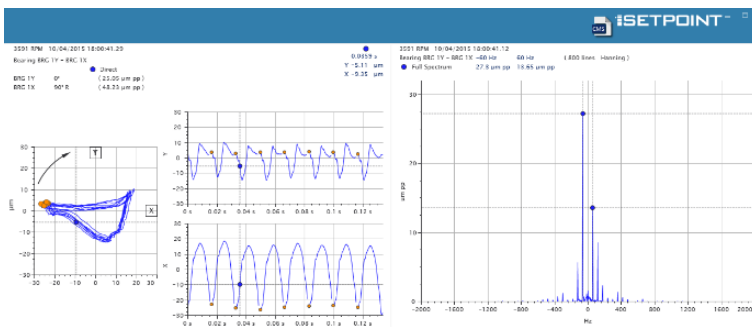
- Impact testing
- Forced response testing
- Transient analysis
- Transfer functions
- Damping evaluation
- Cross channel phase, coherence
- Operating deflection shapes
- Modal analysis

Fault severity determination

- Spectrum analysis
- Time waveform analysis, orbit analysis
- Severity charts, graphs and formula

Reference standards

- ISO / IEC
- Relevant national standards



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