Brüel & Kjær Vibro

ISO18436-2

Vibration condition monitoring and diagnostics

Training Introduction

Vibration Institute

INTERNATIONAL REPRESENTATIVE

KOREA & SINGAPORE

01 Introduction

Vibration Institute Training Courses provide unique opportunities to study vibration principles in a way that goes beyond the textbook and provides real world applications. In addition to understanding theories and techniques our courses:

- provide procedures to add to your practical knowledge of machines;
- offer case studies to help analyze various types of equipment;
- include demonstrations and workshops that illustrate methods to solve vibration problems;
- have been developed using the body of knowledge compliant with ISO18436-2 Vibration Condition Monitoring and Diagnostics; and
- follow ISO 18436-3 Requirements for Training Bodies and the Training Process which defines the requirements for bodies operating training programs in the non-intrusive machine condition monitoring, diagnostic and correction technologies.

■ Which course is best for you?

Vibration Analyst Category	ISO 18436-2 Required Experience for Exam Eligibility	IMV	BMV	MVA	AVA
Category I	≥ 6 months	O			
Category II	≥ 18 months		O		
Category III	≥ 3 years			O	
Category IV	≥ 5 years				O

• ISO18436-2 : Condition monitoring and diagnostics of machines – Requirements for qualification and assessment of personnel, Part 2: Vibration condition monitoring and diagnostics
• IMV : Introduction to Machinery Vibration • BMV : Basic Machinery Vibration • MVA : Machinery Vibration Analysis
• AVA : Advanced Vibration Analysis

■ Training Examinations

- In accordance with ISO 18436-3 the Vibration Institute offers a training examination on the course content on the final afternoon of the class. These examinations are designed to help assess your knowledge and understanding of the training and course materials.
- Each participant is given a score and a performance evaluation study guide on the training examination immediately after it is administered, in addition to a class review of the training exam. This information is intended to serve as an indicator of your technical strengths and areas for improvement. Please note that completion of the training exam in no ways qualifies the candidate for the Vibration Analyst Certification Exam. This is meant solely as a review of the materials covered during the training course. A combination of education, training and experience are recommended for a student to sit for a Certification Exam.

02 Training Courses

■ Introduction to Machinery Vibration (IMV, Category I)

Monday	• Vibration: Sources, Uses, Effects – Definitions, sources, effects, uses, predictive maintenance, measurement concepts, equipment. – Workshop I: Vibration Demonstrations and Workshop Questions • Introduction to Machinery Vibrations I – Units, properties, measurement conventions, amplitude, frequencies, time, frequency – Workshop II: Definitions, Terminology, Measurements, Demonstrations
Tuesday	• Introduction to Machinery Vibrations II – Measures, conversions, analysis, excitation, natural frequencies, resonance, and critical speeds. – Workshop III: Measure Analysis, Natural Frequencies, and Demonstrations • Introduction to Data Collection – Sensors, frequency spans, measures, triggering, sensor mounting and location, instruments. – Workshop IV: Data Collection Demonstration and Workbook Questions.
Wednesday	• Introduction to Machine Knowledge – Fault sources, frequencies, design and function of machines. • Introduction to Vibration Testing – Periodic and permanent monitoring, machine analysis (fault and condition), acceptance testing. – Workshop V: Vibration Testing • Introduction to Spectrum Analysis – Frequency identification and matching and procedures. – Workshop VI: Spectrum Analysis and Demonstrations • Introduction to Common Machine Faults – Mass unbalance, misalignment, looseness, bearing defects, and electrical defects. – Workshop VII: Fault Analysis
Thursday	• Introduction to Vibration Severity – Criteria, procedures, charts on housings, shafts, and bearings. – Workshop VIII: Vibration Severity • Course Review • Training Examination on Course Content (One hour) – Training Examination Review
Friday	• Category I Exam

03 Training Courses

■ Basic Machinery Vibration (BMV, Category II)

Monday	• Basic Machinery Vibrations I – Period, frequency, amplitude, phase, measures, conversions. • Basic Machinery Vibrations II – Analysis, units, natural frequencies, forcing frequencies, resonance, critical speeds, damping.
Tuesday	• Workshop I: Machinery Vibrations – Workshop II: Basic Vibrations • Basic Data Collector Setup I – Measure selection; frequency spans; time, frequency, orbital displays. • Transducers – Proximity probes, accelerometers, optical pickups, selection, location and mounting. – Workshop III: Data Acquisition
Wednesday	• Basic Data Collector Setup II – Data sampling, triggering, window selection, resolution, dynamic range, averaging. • Basic Analysis Techniques – Orders, spectrum analysis – direct frequency, side bands. – Workshop IV: Data Processing • Evaluation of Machine Condition – Measures, procedures, severity charts, and alarm settings. – Workshop VI: Condition Evaluation
Thursday	• Analysis of Operating Speed Faults – Orders, mass unbalance, misalignment, looseness, distortion, rubs, resonance, bearing wear • Gear and Bearing Analysis – Measurement methods, frequencies, analysis techniques, and case histories. • Motors, Fans, and Pumps – Basics, frequencies, techniques, and analysis. • Workshop V: Fault Analysis
Friday	• Machine Testing – Test plans, impact testing, and acceptance testing. • Periodic Monitoring – Screening, alarm setup, frequency of measurement, trending, and reports. • Balancing – Fundamental aspects of single-plane balancing. – Workshop VII: Machine Analysis • Course Review • Training Examination on Course Content (1.5 hours) – Training Examination Review
Sat.	• Category II Exam

04 Training Courses

■ Machinery Vibration Analysis (MVA, Category III)

Monday	• Time and Frequency Analysis I – Display, use, and analysis of time domain, FFT analysis, modulation, clipping, pulsation, beats, – side bands, spectrum shape, synchronous and nonsynchronous signals, case histories. • Phase and Orbit Analysis – Phase measurement and analysis, orbit evaluation, loop rules, orbit analysis, case histories. – Workshop I: Machinery Vibration Analysis Techniques
Tuesday	• Resonance and Critical Speed Testing – Interference diagrams, analyzer setup for impact and transient tests, test procedures, – Bode/polar plot evaluation, case histories. • Machine Condition Evaluation – Criteria, levels, maintenance actions, standards, evaluation of overall band, spectral, orbital, – time waveform, setting alarms, and examples.
Wednesday	• Basic Vibration Control – Isolation, damping, resonance elimination, concepts, hardware, foundations, and pedestals. – Workshop III: Vibration Control and Correction • Field Balancing Techniques – Single-plane, trial weight size and location, balance sensitivity, and phase lag. – Workshop II: Balancing Exercises
Thursday	• Condition Monitoring – Objectives, program development, permanent and periodic monitoring, alternative techniques. • Rolling Element Bearing Analysis – Analytic techniques, identification of defects on balls/cages/races, corrosion, fatigue, – excessive clearance, lack of lubrication, demodulation methods, condition evaluation. • Operating Speed Diagnostics – Unbalance, sub-synchronous instability, coupling problems, misalignment, oil whirl/whip, – mechanical looseness, rubs, rotor bow, resonance, fluid-film bearings, condition evaluation. • Pumps, Fans, Blowers, and Compressors – Pump impeller/casing/piping vibrations, natural frequencies, clearances, re-circulation, cavitation, – performance curves, impellers, casings, shafts, foundations, isolated bases, piping, ducting – Workshop IV: Machine Analysis
Friday	• Motor and Generator Diagnostics – Mechanisms, vibration/current measurements, stator/rotor faults, shorted end rings, – broken rotor bars, air-gap variation, and variable-speed motors. • Gears and Gearboxes – Measurement and analysis, gear mesh, cracked/broken/chipped teeth, gearbox evaluation. – Workshop V: Fault and Condition Exercises • Course Review • Training Examination on Course Content (2 hours) – Training Examination Review
Sat.	• Category III Exam

International Representatives

Vibration Institute
INTERNATIONAL REPRESENTATIVE

The Vibration Institute is a global organization that works with International Representatives to offer the Institute's training and certification programs to individuals and organizations within their region(s). International Representatives have entered into an agreement with the Institute to conduct training, education and certification utilizing the Institute's materials and follow established Institute policies and procedures.

International Representatives are listed in alphabetical order by country.

If you are interested in becoming an International Representative of the Vibration Institute, please contact us at information@vi-institute.org or (630) 654-2254.

SINGAPORE

BK VISION

BK VISION
No.313 PILOT PLANT BLD.
12 GETPEARL-RO YEONSOO-GU
INCHEON, SOUTH KOREA

Contact : ELLIE YANG
P: +82-32-831-8211
info@bkvision.co.kr
www.bkvision.co.kr

BK Vision is a Korean partner of Bruel & Kjaer Vibro, the world's leading company of vibration business. We supply vibration monitoring systems and trouble shooting services to nuclear power plant, chemical, iron, heavy industry, etc. BK Vision provides not only the total solutions for rotating machinery, but also specialized consulting services for various areas such as structural dynamics, FEM analysis, and environment noise. BK Vision is also a certified training body (ISO18436-2) of KCI-MD (Korean Certification Institute for Machine Diagnostics) and has provided the vibration training of category I and II since 2007. In 2009, we added the category III course in our curriculum, which is educated by category IV certified instructor. More than 900 vibration analysts have been trained by BK Vision and we are proud of being the leader of vibration training in Korea. Based on our successful business performance and plenty of technical know-how and experience, we aspire to extend our service to overseas markets including southeast Asia.