

# Vibration Analysis Distance Learning

## ISO Cat II & ASNT Level II Vibration Analysis

Mobius Institute offers distance learning courses for vibration analysis at the Category I, II and III level, identical to the instructor-led courses we teach globally. You can learn at your own pace, with assistance from an instructor, and optionally take a certification examination at the end of the course.

This 32 hour course is intended for people who have mastered the basics, but who need to be able to take good data (and decide how the data collector should be set up); analyze a range of fault conditions; and understand balancing and alignment. The course exceeds the ISO 18436-2 Category II standard and meets the ASNT Level II Recommended Practice.

Do you already have an understanding of vibration fundamentals and want to become more confident and accurate in your diagnoses? As a Category II analyst you are expected to know how to test machines correctly, how to diagnose faults accurately (and perform additional tests to verify your diagnosis), how to set vibration alarm limits, and how to correct certain types of faults. Now it is time to fully understand what those analyzer settings mean so that you can take the best measurements. Now it is time to understand why the vibration patterns change the way they do – and how to use time waveform analysis and phase analysis to verify the fault condition.

We are offering you the opportunity to not only learn these topics, but to truly understand the analyzer and machine so that you feel confident in the decisions you make.

### *Distance Learning benefits*

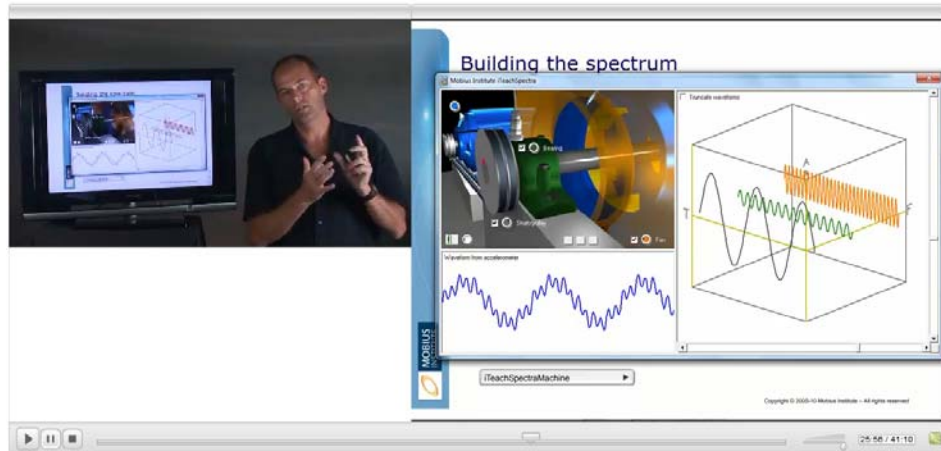
If the high cost of travel and accommodation and the time away from your family and work has stopped you from receiving the training that you need, then you should consider our distance learning courses.

At the time and pace that works best for you, you can take our lessons and learn in a very similar way to attendees of our classroom courses. This approximately four day course is available for three months online from the time you register.

### *Video lessons*

Each video has been carefully created and edited so that you receive the full benefit exactly as you would in a live class – without the distractions. You will see the instructor talking and see the presentations, 3D animations and simulators being used in high resolution. You can pause, replay or forward the video so that you can

review any topic as many times as you need. All you need is a good Internet connection and monitor (1024x768 or better) and you will be ready to start learning.



In addition to the lessons, we present hands-on videos that show a variety of vibration analyzers being used to perform a range of tests.

Mobius makes learning about vibration analysis unique. We use 3D animations, Flash simulations, and numerous software simulators that completely demystify vibration analysis. While vibration training courses have traditionally been very theoretical, difficult to understand, (and boring), you will be captivated by the Mobius Training methods, and you will enjoy our practical approach. You will take away skills that you can immediately apply to your job, and you will truly understand what you are doing. When senior vibration analysts attend our classes they often say "if only I could have learned this way when I got started" – well, now you can!

## Certification

The course follows ISO 1836-2 and ASNT SNT-TC-1A Recommended Practice for training and certification of Category II or Level II vibration analysts.



Examinations for certification are offered as an option at the end of the course. All Mobius certified analysts receive personalized logos with their certification number and name for their own professional use. Mobius Institute also maintains a listing of all certified analysts on [mobiusinstitute.com](http://mobiusinstitute.com) and provides each analyst with a personal webpage.

### *Who should attend?*

If you have been performing vibration analysis for more than six months, and feel

that you have a good understanding of the fundamentals, then you are ready to step up to the Category II course. (Note that 18 months experience is required to be certified.) Anyone who wants to be capable of confidently diagnosing a wide range of fault conditions, correcting certain conditions, and taking accurate measurements needs to take this course. Many plant sites require contractors to be certified and many employers require employees to be certified. The Mobius Institute course and certification program follows the ISO 18436-2 standard and the ASNT Recommended Practice SNT-TC-1A.

You will come away from the course with a solid understanding of:

- How a well designed program and the reliability centered maintenance approach (with precision balancing, alignment, lubrication and resonance control) will improve the OEE and therefore the bottom line.
- The condition monitoring technologies: acoustic emission, infrared analysis (thermography), oil analysis, wear particle analysis, motor testing – via supplementary training
- How machines work – via supplementary self-study using the “Equipment Knowledge” section
- How to select the correct measurement location and axis, and collect good, repeatable measurements
- What the Fmax, resolution, averaging and other analyzer settings mean, and how to select the optimum settings for a wide variety of machine types
- How to analyze vibration spectra, time waveforms, envelope (demodulation), and phase measurements
- How to diagnose a wide range of fault conditions: unbalance, eccentricity, misalignment, bent shaft, cocked bearing, looseness, rolling element bearings faults, journal bearing faults, gearbox faults, resonance, and other conditions
- How to set alarm limits manually and with statistics
- How to balance and align a machine, and correct a resonance condition

## Course Description

Duration: 3 months covering 32 hours of Cat II / Level II instruction, Optional Certification Examination: 4 hours, Invigilation required, 70% Passing Grade

The Intermediate Vibration Analysis course is intended for personnel who have at least twelve months vibration analysis experience and a thorough understanding of vibration theory and terminology. Eighteen months of vibration analysis experience is required for Category II or Level II certification. The course provides an in-depth study of machinery faults and their associated spectrum, time waveform and phase characteristics.

A Category II analyst is expected to know how to test machines correctly, how to diagnose faults accurately, perform additional diagnostic tests for verification, how to set vibration alarm limits, and how to correct certain types of faults. You need to understand what your analyzer settings mean so that you can take the best measurements. You also need to

understand why the vibration patterns change the way they do and how to use time waveform analysis and phase analysis to verify the fault condition. Topics covered include:

**Review of maintenance practices**

**Review of condition monitoring technologies**

**Principles of vibration**

- Complete review of basics
- Waveform, spectrum (FFT), phase and orbits
- Understanding signals: modulation, beating, sum/difference

**Data acquisition**

- Transducer types: Non-contact displacement proximity probes, velocity sensors, and accelerometers
- Transducer selection
- Transducer mounting and natural frequency
- Measurement point selection
- Following routes, and test planning
- Common measurement errors

**Signal processing**

- Filters: Low pass, band pass, high pass, band stop
- Sampling, aliasing, dynamic range
- Resolution, Fmax, data collection time
- Averaging: linear, overlap, peak hold, time synchronous
- Windowing and leakage

**Vibration analysis**

- Spectrum analysis
  - Harmonics, sidebands, and the analysis methodology
- Time waveform analysis (introduction)
- Orbit analysis (introduction)
- Phase analysis: bubble diagrams and ODS
- Enveloping (demodulation), shock pulse, spike energy, PeakVue

**Fault analysis**

- Natural frequencies and resonances
- Imbalance, eccentricity and bent shaft

- Misalignment, cocked bearing and soft foot
- Mechanical looseness
- Rolling element bearing analysis
- Analysis of induction motors
- Analysis of gears
- Analysis of belt driven machines
- Analysis of pumps, compressors and fans

**Equipment testing and diagnostics**

- Impact testing (bump tests)
- Phase analysis

**Corrective action**

- General maintenance repair activities
- Review of the balancing process
- Review of shaft alignment procedures

**Running a successful condition monitoring program**

- Setting baselines
- Setting alarms: band, envelope/mask, statistical
- Setting goals and expectations (avoiding common problems)
- Report generation
- Reporting success stories

**Acceptance testing**

**Review of ISO standards**

**Registration**

To register for a Mobius Institute course, go to our website at [www.mobiusinstitute.com](http://www.mobiusinstitute.com) to see the current calendar of courses and dates online, or just call one of our sales representatives in N. America at 877.550.3400.

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