



February 28, 2006

Applied Vibration Analysis - Intermediate Category II

Follows Category II Guidelines Established by ISO 18436-2, "Condition monitoring and diagnostics of machine – Requirements for training and certification of personnel – Part 2: Vibration condition monitoring and diagnostics"

Prerequisites:	High School Education Diploma is recommended.
ISO Certification	Requires 70 hours of formal training or independent study, 18 months experience, and examination
Course Length	40 Hours
Certification Exam	100 questions, 3 hours time limit, closed book but a summary sheet of formulae is provided, passing score is 75% correct
Maximum # Students:	15

Synopsis

Students who successfully complete this course will be able to:

- select the appropriate machinery vibration measurement technique
- maintain a database of results and trends
- establish and implement general overall level alarms
- set up instruments for the basic resolution of amplitude, frequency and time
- perform basic vibration analysis of machinery and components, such as shafts, bearings, gears, fans, pumps and motors, using spectrum analysis



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(Objectives continued)

- classify, interpret and evaluate the test results in accordance with applicable specifications and standards
- understand basic single plane balancing concepts
- be aware of some causes and effects of bad measurement data
- perform basic bump tests to determine natural frequencies
- recommend minor corrective actions

Syllabus and Seminar Schedule

Day One

8:00AM – 9:50AM	Principles of Vibration <i>Basic motion, period, frequency, amplitude, units, time and frequency domains, phase, natural frequency</i>
<i>9:50AM – 10:10AM</i>	<i>Break</i>
10:10AM – 12:00PM	Practice Problems and Exercises
<i>12:00PM – 1:00PM</i>	<i>Lunch</i>
1:00PM – 2:50PM	Data Acquisition <i>Instrumentation, transducers, sensor mounting, proximity sensors conventions, collection locations, data formats, recognition of poor data</i>
<i>2:50PM – 3:10PM</i>	<i>Break</i>
3:10PM – 5:00PM	Practice Problems and Exercises



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Day Two

8:00AM – 9:50AM

Signal Processing

Basic analog and digital sampling with an introduction to: FFT application, time windows, filters, anti-aliasing, bandwidth and resolution, spectral averaging, dynamic range

9:50AM – 10:10AM

Break

10:10AM – 12:00PM

Practice Problems and Exercises

12:00PM – 1:00PM

Lunch

1:00PM – 2:50PM

Condition Monitoring

Equipment evaluation and prioritization, program design, baseline assessments, route planning

2:50PM – 3:10PM

Break

3:10PM – 5:00PM

Practice Problems and Exercises

Day Three

8:00AM – 9:50AM

Fault Analysis

Spectrum analysis, harmonics, sidebands, unbalance, misalignment, mechanical looseness, resonance, bearing defects, gearbox frequencies

9:50AM – 10:10AM

Break

10:10AM – 12:00PM

Practice Problems and Exercises

12:00PM – 1:00PM

Lunch

1:00PM – 2:50PM

Corrective Action

Shaft alignment, field balancing, basic maintenance action



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2:50PM – 3:10PM

Break

3:10PM – 5:00PM

Practice Problems and Exercises

Day Four

8:00AM – 9:50AM

Equipment Knowledge – Machine Assemblies

Electric motors, pumps, fans, compressors, turbines, , reciprocating machines, machine tools, rolling element and journal bearings, gear analysis, shaft problems, couplings and belts

9:50AM – 10:10AM

Break

10:10AM – 12:00PM

Practice Problems and Exercises

12:00PM – 1:00PM

Lunch

1:00PM – 2:50PM

Acceptance Testing and Equipment Testing

Procedures, specs and standards, reporting, bump testing

2:50PM – 3:10PM

Break

3:10PM – 5:00PM

Practice Problems and Exercises

Day Five

8:00AM – 9:50AM

Fault Severity Determination

Statistical and General Overall level alarms and spectral band alarms

9:50AM – 10:10AM

Break

10:10AM – 12:00PM

Reporting, Documentation and Reference Standards

Condition monitoring reports, vibration diagnostics reports ISO, IEC, API, other national standards



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12:00PM – 1:00PM

Lunch

1:00PM – 1:50PM

Review

1:50PM – 2:10PM

Break

2:10PM – 5:10PM

Certification Examination