



July 23, 2004

Applied Vibration Analysis – Dynamic Balancing Category IV

Follows Category II-IV 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:	Candidates should be able to manipulate simple algebraic equations, use a basic scientific calculator, and be familiar with the operation of personal computers.
ISO Certification	Requires this course plus the Category One, Two and Three courses, Category III Certification, 60 months experience, and examination
Course Length	24 Hours
Certification Exam	20 questions, 2 hours time limit, closed book but a summary sheet of formulae is provided, passing score is 75% correct
Maximum # Students:	15

Course Objectives

Students who successfully complete this course will be able to:

- **conduct basic two-plane field balancing**
- **recommend advanced two-plane influence coefficient or static/couple balancing**
- **interpret and evaluate published ISO codes of practice, International Standards and specifications**



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Syllabus and Seminar Schedule

Day One

8:00AM – 9:50AM	Unbalance Diagnosis <i>Terminology, Sources of Vibration , Unbalance vs Misalignment Diagnosis, Spectrum, Phase</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	Unbalance Intro <i>Types of Unbalance, Measuring Unbalance...oz in g mm g ins, Force of Unbalance....centrifugal force calculations , Single vs Two plane balancing, Shop vs Field Balancing...deciding which approach is best, Unbalance standards...ISO, VDI, API *</i>
<i>2:50PM – 3:10PM</i>	<i>Break</i>
3:10PM – 5:00PM	Practice Problems and Exercises

Day Two

8:00AM – 9:50AM	Unbalance Fundamentals / Single Plane Balancing <i>Vector Math, Single Plane Vector method, Single Plane Program, Estimating Trial Weight Amount</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 – 1:50PM	Multiple Plane Balancing / and Special Situations <i>Two Plane Program, Multi-Plane Program (Static/Couple Derivations), Overhung, Time Waveform Balancing Procedures, Lag Angle</i>
<i>1:50PM – 2:10PM</i>	<i>Break</i>
2:10PM – 5:00PM	Practice Problems and Exercises



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Day Three

8:00AM – 9:50AM

Balancing tips, tricks and precautions

Estimating Trial Weight Angle, Changing Weight Radius, Vector Split and Combine, Measuring Accurate Anglesclinometer, measuring tape procedure etc.

9:50AM – 10:10AM

Break

10:10AM – 12:00PM

Balancing tips, tricks and precautions

Weight Removal and Addition Procedures...procedure for calibrating welding rods...procedure for finding CG of correction weight., Using Record Sheets, Calculating Residual Unbalance, Major Manufacturer Overview

12:00PM – 1:00PM

Lunch

1:00PM – 2:50PM

Practice Problems and Exercises

2:50PM – 3:00PM

Break

3:00PM – 5:00PM

Certification Examination