



PREDICTIVE AND PROACTIVE MAINTENANCE **TRAINING COURSES**

PDM Technologies offers a variety of training courses in the fields of Predictive and Proactive Maintenance. Every course is built with a modular approach that allows for customization for our clients specific needs. Due to this innovative design, our clients often ask for specific topics from each course and from the list of machinery specific modules to create their own customized courses. Advice and recommendations on customized course content is gladly provided, simply provide a general idea of the background of the participants, the topics of interest, and the course length desired and we will design the course for you.

VIBRATION ANALYSIS 1 (VA1) *(Fundamentals of Vibration)*

This course will introduce the fundamental theory behind vibration analysis, how it works and how to apply it in the real world. There are three main modules in this course; Basic Vibration Theory, Data Collection & Measurement, and Understanding Common Vibration Problems. Each module's topics are listed below.

Basic Vibration Theory

- Vibration Analysis as a predictive maintenance tool
- Definitions and Terminology
- Vibration Fundamentals – Frequency and Amplitude
- Introducing the Frequency Spectrum
- The “Language” of Vibration Analysts

Data Collection & Measurement

- Transducer Mounting Techniques
- Measurement Locations
- Trend Analysis
- Effective Measurement Set-up
- Alarm Types and Uses

Understanding Common Vibration Problems

- Imbalance
- Misalignment
- Mechanical Looseness
- Rolling Element Bearing Faults
- Belt Drive Problems
- Additional topics as time & interest permit

Interactive demonstrations and hands-on exercises, including review “quizzes” are used throughout this course. Handouts and a Course Manual are included. Recommended class size is 4-6 participants (note: additional charges apply to class sizes greater than 6 participants).

Course Length: 2 days

Course Cost: _____ by Quote

VIBRATION ANALYSIS 2 (VA2) *(Advanced Vibration)*

Vibration Analysis 2 will build on the theory and knowledge developed in Vibration Analysis 1. More emphasis is placed on understanding and diagnosing more complex vibration and machinery problems. The main modules in this course are; Advanced Vibration Theory, Understanding Complex Vibration Problems, and Equipment Specific Vibration Analysis. Each module's topics are listed below.

Advanced Vibration Theory

- Understanding Data Acquisition
 - Sampling, Averaging, & Windows
- Averaging Techniques
- Applying the Time Domain
- Phase Analysis - Collecting and Understanding Phase Angles
- Performing Advanced Diagnostic Testing
 - Impact Tests
 - Run-up / Coast Down
 - Point-Point Amplitude Plotting

Understanding Complex Vibration Problems

- Review of VA1 Problems
- Resonance
- Interference
- Rolling Element Bearing Faults

Equipment Specific Vibration Analysis

- AC Motors
- DC Motors
- Pump Vibration and Monitoring
- Gear Monitoring & Analysis

Course Manuals are included. Recommended class size is 4-6 participants. Participants should have completed Vibration Analysis 1 and have a minimum of 2 years vibration experience (note: additional charges apply to class sizes greater than 6 participants).

Course Length: 2 days

Course Cost: _____ by Quote

PARTICIPANTS ARE REQUIRED TO BRING THEIR OWN VIBRATION ANALYSERS FOR HANDS-ON EXERCISES.



CMVA CERTIFICATION PREP – CAT II *(“Cat II” Certification Preparatory Course)*

The Canadian Machinery Vibration Association (CMVA) is a non-profit association whose primary field of interest is machinery vibration analysis. The CMVA offer four categories of Certification as part of its mandate to “recognize a need and a desire for a national certification program for individuals working in the area of machinery vibration measurement, condition monitoring and predictive maintenance”.

Category II Certification is considered to be the most versatile and applicable certification for an individual working in the field of vibration analysis to carry.

This preparatory course will cover all topics related to this 3 hour exam as a means to review and clarify items covered in the course manual (“Basic Machinery Vibrations”, R. Eshleman). As a preparatory course, there is a significant amount of self-study and preparation required by each individual prior to taking this course.

This course does not include the writing of the certification exam as this must be done in compliance with CMVA rules which require an independent proxy to administer the exam. Please contact PDM for further details on this issue.

Course Length: 2 days

Course Cost: by Quote

INTERACTIVE VIBRATION ANALYSIS *(Case-Based Vibration Analysis Course)*

Interactive Vibration Analysis is a one day course for individuals who want to hone their analysis skills through Case-Based Learning. This method is learner-centered, and involves interaction between the participants. The instructor's role is that of a facilitator and the participants work collaboratively to reach a conclusion.

Five real case studies are examined with machinery data provided and observed information presented. Participants collect real (recorded) vibration data at various locations and evaluate the readings. Group observations are made and additional data may then be acquired. A final group discussion yields a conclusion and recommended actions.

Participants should have completed at least VA1 (VA2 is preferred) and have a minimum of 3 years vibration experience.

Course Length: 1 day

Course Cost: by Quote

FIELD BALANCING *(Balancing Theory & Application)*

Field Balancing introduces participants to the practical application of performing dynamic balancing in real world environments. This course will cover the fundamental theory behind balancing and provide for adequate practice on an in-class simulator. This course is not specific to any instrument manufacturer's equipment. Participants must bring their own balancing equipment for hands-on sessions.

Balancing Theory

- Review of Imbalance Theory
- Recognizing different types of Imbalance
- Collecting and Understanding Phase Angles
- Balancing Techniques
- Using Vectors to Solve Imbalance
- Balancing Tolerances

Hands-On Balancing – Single Plane

- Review of Balancing Equipment Features
- Preparing to Balance
- Single Plane Balancing Procedure
- Hands-On Single Plane Balancing
- Locating Weights, Do's and Don'ts
- Case Histories – Single Plane Balancing

Hands-on exercises are used throughout this course. Handouts are included.

Course Length: 2 days

Course Cost: by Quote

OPTIMIZING VIBRATION DATABASES AND PREDICTIVE PROGRAMS

The most common obstacle to the success of a Predictive Maintenance Program is the system's database. Most often these are built in haste in order to “get the program running” and rarely are updated or modernized as the equipment, software and technology evolve. This course focuses on teaching and clarifying the details of today's technologies and how to most effectively apply them to the plant environment.

Topics Include

- Optimizing the Data Quality : Data Collection Time Ratio
- Proper Measurement Point Set-up for Most Effective Data Acquisition
- Clearing Out Ineffective Data Points
- Establishing Effective Alarm Values and Types for Machinery
- Efficient Database Structures for Machines, Points, and Routes

Course Length: 1 day

Course Cost: by Quote

PARTICIPANTS ARE REQUIRED TO BRING THEIR OWN VIBRATION ANALYSERS FOR HANDS-ON EXERCISES.



ADASH VIBRIO M & DDS

This course will introduce the Vibrio M data collector and Digital Diagnostic System software. There are two main modules in this course; Basics of the Vibrio M, and using the DDS Software. Each module's topics are listed below.

Basics of Vibrio M

- Instrument Overview including Connections and Batteries
- Using the Meter, Strobe, and Temperature functions
- Collecting Vibration Measurements – Proper Technique for Best Results
- Using FASIT and Understanding the Results
- Operating the Vibrio M in Route Mode

DDS Software

- System Overview including User and Global Preferences
- Creating Measurement Points, Machines, and Routes
- Transferring Routes to the Vibrio M and Transferring Data back to the DDS Software
- Trend Analysis using Alarms and Analysis Tools

Handouts and a Course Manual are included.
Recommended class size is 4-6 participants.

Course Length: 2 days

Course Cost: _____ by Quote

SHAFT ALIGNMENT

(Dial & Laser Alignment)

Laser Alignment is an integral part of any Proactive Maintenance Program. This course is designed to take the student from a basic level to an advanced level of knowledge. Practical, hands-on exercises will include the use of alignment demonstrators. This course is not equipment specific so Participants must bring their own alignment equipment for hands-on sessions.

Alignment Theory

- General Alignment Theory & Techniques
- Alignment Tolerances
- Soft Foot, Thermal Growth, Bar Sag & Making Moves

Hands-On Alignment

- Pre-Alignment Procedures
- Reverse Dial Theory (Graphical Solution)
- Workshop –Soft Foot Exercises
- Workshop – Thermal Growth Calculations
- Workshop – Laser Alignment

Hands-on exercises are used throughout this course.
Handouts are included. Recommended class size is 6-8 participants

Course Length: 2 days

Course Cost: _____ by Quote

ADASH VA3 & DDS

This course will focus on using the VA3 Vibration Analyzer and Digital Diagnostic System software for Route data collection. This course does not cover the more advanced functions of the VA3 or the optional VA3 programs. There are two main modules in this course; Basics of the VA3, and using the DDS Software. Each module's topics are listed below.

Basics of VA3

- Instrument Overview including Connections and Batteries
- Using the Meter, Strobe, and Temperature functions
- Collecting Vibration Measurements – Proper Technique for Best Results
- Using FASIT and Understanding the Results
- Operating the VA3 in Route Mode

DDS Software

- System Overview including User and Global Preferences
- Creating Measurement Points, Machines, and Routes
- Transferring Routes to the VA3 and Transferring Data back to the DDS Software
- Trend Analysis using Alarms and Analysis Tools

Handouts and a Course Manual are included.
Recommended class size is 4-6 participants.

Course Length: 2 days

Course Cost: _____ by Quote

AN INTRODUCTION TO PREDICTIVE & PROACTIVE MAINTENANCE

This course covers the fundamentals of today's state-of-the-art predictive maintenance technologies. It is designed for Managers, Superintendents, Supervisors, and Engineering personnel who want to explore improved methods of effectively managing their plant reliability. The focus of the course will be to not only educate participants in the technologies and their capabilities, but also on how to effectively implement them into their plant maintenance program.

Topics Include

- Predictive Maintenance Technologies (PdM)
- Implementing a Successful Predictive Maintenance Program (PMP)
- Specifics of PdM Technologies, including:
 - Vibration Analysis
 - Infrared Thermography
 - Oil Analysis

Handouts are included. Recommended class size is 6-8 participants.

Course Length: 1 day

Course Cost: _____ by Quote

PARTICIPANTS ARE REQUIRED TO BRING THEIR OWN VIBRATION ANALYSERS FOR HANDS-ON EXERCISES.



VIBRATION PRODUCT TRAINING

Training on today's latest technologies in the field of Predictive Maintenance is often only available from the systems' vendors. Costs associated with this training are typically extravagant due to their monopoly of supply and often not available on-site at *your* facility. PDM Technologies has experience with most of the major brands of hardware and software that have been on the market over the past 12-15 years, as well as the latest technology. If you want a better solution to your training problems, let us custom design training to suit your needs at a cost effective rate.

Product Knowledge Base:

CSI / Emerson, DLI Engineering, DMSI – Maintelligence, Fixtur Laser, GE / Bentley Nevada, Metrix, Pruftechnik (Rotalign, Optalign, Shaftalign), Rockwell / Entek, SKF Reliability Systems, and many more.

CUSTOM TRAINING MODULES & COURSES AVAILABLE

Custom training modules and course are available for wide variety of Predictive and Proactive Maintenance technologies. These include:

Equipment Specific Diagnostics

- Motors
- Pumps
- Gearboxes
- Fans
- Compressors
- Rolling Mills
- Paper Machines

Technology Specific Modules

- Advanced Vibration Theory
- Infrared Thermography
- Oil and Wear Particle Analysis
- Motor Testing – Electrical
- Implementing a Predictive Maintenance Program
- Improving an Existing Predictive Maintenance Program

For More Information, Contact Us at:

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or

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