

Machinery Health Training and Certification

- *Defined skill paths guide you to expertise across multiple technologies*
- *Lab work provides hands-on opportunity in each course*
- *Certification testing available for most technologies*
- *Additional instruction available through books, charts, pocket guides, and eLearning courses*



Personalized instruction and hands-on lab work with other trainees at your skill level creates the ideal learning environment.

Overview

Companies today rely on fewer people to do more work. That's why the need for training is more critical than ever to achieve and maintain cost-effective maintenance programs.

Emerson helps maximize the return on your investment in technology and people. Every year, more than 1,500 individuals receive training from Machinery Health Management classes across the country.

Our instructors share their own real-world experiences and guide classes through hands-on exercises that reinforce the lesson.

Emerson's Machinery Health Management strategy includes training courses designed to help you start up and maintain your mechanical equipment. Our goal is to provide you with the knowledge to keep your plant running smoothly.

Paths to Success

Pick the curriculum of your choice or let us help guide your technicians on a path to certification. All training uses the latest equipment

Choose and Complete Your Machinery Health Training Path to Success						
Category I Vibration Analyst Path	Category II Vibration Analyst Path	Category III Vibration Analyst Path	Lubrication Analyst Path	Online Monitoring Path	Reliability Management Path	Complementary PdM Technology
Course 2069 Fundamentals of Vibration Analysis	Course 2074 Intermediate AMS Machinery Manager	Course 2070 Advanced AMS Machinery Manager	Course 2082 Lubrication Level 1 and Level 2 with Certification Exam	Course 2088 On-line Prediction Operation & Maintenance	Course 2093 Maintenance Best Practices	Course 2015 Balancing Theory and Applications with CSI 2130
Course 2072 Fundamentals of CSI 2130	Course 2032 Intermediate Vibration Analysis	Course 2033 Advanced Vibration Analysis	Course 2084 Wear Debris Analysis Workshop	Course 2080 On-line Protection Operation & Maintenance	Course 2053 Root Cause Failure Analysis	Course 2092 Laser Alignment with CSI 2130
Course 2068 Introduction to AMS Machinery Manager	Course 2022EX Category II Exam	Course 2023EX Category III Exam	Course 2083 Oilview for AMS Machinery Manager	Course 2089 Turbo Machinery Diagnostic		Course 2067 Basic Ultrasonic Theory and Techniques
Course 2031 Basic Vibration Analysis	Optional course highly recommended Course 2091 CSI 2130 Advanced Functions	Optional course highly recommended Course 2035 & 2075 PeakVue Mystery and Autocorrelation				Course 2019 IR Thermography Level 1
Course 2021EX Category I Exam						Course 2018 IR Analysis for AMS Machinery Manager
						Course 2081 Electric Motor Diagnostics and Basic Motorview

- Category I Vibration Analyst Path introduces students with no prior experience in vibration monitoring and analysis to the theories of vibration data and basic operation of the CSI 2130 Machinery Health™ Analyzer and AMS™ Suite: Machinery Health Manager
- Category II Vibration Analyst Path is for experienced students who are familiar with vibration data collection and want to advance their knowledge and ability to diagnose machinery issues.
- Category III Analyst Path teaches students the advanced power of PeakVue and root causes of machine problems.
- Lubrication Analyst Path explores lubrication analysis and its importance to a complete reliability program. Lubrication analysis is often the easiest way to diagnose common machine problems.
- Online Monitoring Path is for students with the CSI 4500, XP32, CSI 6500 or CSI 6000 systems. Explore the benefits of continuous monitoring of critical machinery and how to integrate with operational plant control architecture.
- Complementary PdM Technology instruction rounds out a full reliability program with Infrared Thermography, Ultrasonic, Balancing, Alignment and Electric Motor Diagnostic courses.

Vibration Courses

Fundamentals of Vibration Course 2069

2 days

This vibration training course is for those with no prior experience in vibration analysis. The class prepares participants for the Basic Vibration Analysis course. Students learn about causes of vibration and methods of measurement. Although the training course does not provide instruction on Emerson's CSI technologies, the course will use them to demonstrate vibration principles.

Topics covered include:

- Introduction to vibration
- Components of a predictive maintenance program
- Basic fault identification
- Vibratory fault characteristics and patterns
- Information to help start a vibration program

Basic Vibration Analysis Category I Compliant Course 2031

4 days

This course complies with Category I Vibration Analyst per ISO standard 18436-2: Vibration condition monitoring and diagnostics.

This course is intended to enable students to operate single channel machinery analyzers, dump and load routes, recognize the difference between good and bad data, and compare vibration measurements against pre-established alert settings.

Although this training course is not product specific, students will use Emerson's CSI technologies for demonstration purposes. The class shows the student how to use the vibration analyzer in conjunction with Emerson Machinery Health Management supported software to analyze basic vibration defects.

Prerequisites: Fundamentals of Vibration or up to six months of vibration experience is recommended.

Topics covered include:

- Principles of vibration
- Data acquisition and signal processing
- Condition monitoring and corrective action
- Equipment knowledge
- Acceptance testing
- Basic analyzer functions
- Recognition of machine defects, including:
 - Unbalance
 - Shaft misalignment
 - Looseness
 - Rolling element bearing defects
 - Gear problems
 - Resonance
 - Introduction to electrical defects

Intermediate Vibration Analysis
Category II Compliant
Course 2032

4 days

This course complies with Category II Vibration Analyst per ISO standard 18436-2: Vibration condition monitoring and diagnostics.

In addition to topics covered in this course, Category II vibration analysts are expected to select appropriate vibration measurement techniques, set up instruments for basic data collection, perform basic spectrum analysis and maintain database. Analysts will perform a variety of standard tests, evaluate results, and recommend corrective actions accordingly.

This course also features the use of the CSI 2130 Machinery Analyzer in conjunction with advanced machinery analysis techniques. Discussions of case histories on machinery faults are one of the focal points of this course.

Prerequisites: Basic Vibration Analysis course and a cumulative 18 months of field experience are recommended

Topics covered include:

- Equipment testing and diagnostics
- Reference standards
- Reporting and documentation
- Fault severity determination
- Analyzer averaging techniques
- Slow speed applications using Slow Speed Technology (SST®)
- Sensor selection guidelines
- Introduction to demodulation and PeakVue™
- Advanced waveform analysis
- Sideband analysis
- Rolling element bearing failure modes
- Advanced electrical analysis techniques
- Pump/fan vibration
- Phase analysis using single and dual channel
- Basic single-plane field balancing

Advanced Vibration Analysis
Category III Compliant
Course 2033

4 days

This course complies with Category III Vibration Analyst per ISO standard 18436-2: Vibration condition monitoring and diagnostics.

This course expands on the subjects covered in the Intermediate Vibration course (Category II), especially in the areas of fault analysis and corrective actions. The class details advanced analysis techniques. The dual channel machinery health analyzer features are introduced, including the use of AMS™ Suite: Machinery Health Manager to set up the advanced analyzer features and powerful downloadable programs for data collection. Transient machinery health analyzer capabilities are covered, including long-term time waveform. The class covers advanced resonance detection using a variety of testing methods, such as triggered data collection.

Prerequisites: Intermediate Vibration Analysis course and a cumulative three years of field experience are recommended.

Topics covered include:

- Appropriate vibration instrumentation hardware and software for both portable and permanently-installed systems
- Spectrum and time waveform analysis under both steady-state and unsteady operating conditions
- How to establish vibration monitoring programs
- Specifications for vibration levels and acceptance criteria for new machinery
- Measurement and analysis of basic operational deflection shapes
- Use of other condition monitoring technologies, such as ultrasonics, infrared thermography, and oil analysis
- Measurement and analysis of PeakVue measurements
- Machinery condition reports
- How to instruct and direct vibration trainees
- Slow Speed Technology (SST)
- Zoom analysis
- Transient techniques
- Dual channel machinery analyzer features
- Triggered data capture
- Resonance detection
- Basic single-plane field balancing

PeakVue Mystery and Autocorrelation Courses 2035 and 2075

3 days

The combination of these courses provides insight into advanced functionality of Emerson's patented PeakVue technology and autocorrelation.

PeakVue technology provides early, accurate and trendable roller bearing and gearbox anomaly detection unmatched by all other bearing health tools on the market. PeakVue's patented method of processing preserves the peak amplitude of the stress wave emitted from a bearing or gear defect. Preserving this peak amplitude allows trendable bearing health diagnostics.

The autocorrelation section of the course will teach the power of the autocorrelation coefficient function for the analysis of vibration induced time waveform data. The autocorrelation function data generally are computed from the same time waveform data used to compute the spectrum. The strength of autocorrelation data is complementary to the strength of spectral data.

Both courses make use of case studies from real-life examples of common faults and live demonstrations illustrating specific mounting procedures. The difference between PeakVue techniques and demodulation will also be demonstrated.

Prerequisites: Students should be familiar with vibration data collection and analysis techniques and the use of AMS Machinery Manager.

Topics covered include:

- Proper PeakVue set-up for all speeds (as low as 1 rpm)
- Sensor selection and sensor mounting
- Setting alarm levels and choosing trend parameters
- Analyzing PeakVue spectra and waveforms
- Uses of the circular waveform plot
- Autocorrelation coefficient and how it relates to time waveform and spectral data
- Unique patterns of autocorrelation function data for certain classes of bearing faults, gearing faults, etc.

ISO Compliant Vibration Certification Exam

Category I Exam

Course 2021EX (available at the end of course 2031)

Test Format: Written exam

Duration: 2 hours

Passing Grade: 75%

Eligibility for Examination:

- Recommended Minimum Duration of Cumulated Training : 32 hours
- Recommended Minimum Duration of Cumulated Experience: 6 months

Category II Exam

Course 2022EX (available at the end of course 2032)

Test Format: Written exam

Duration: 3 hours

Passing Grade: 75%

Eligibility for Examination:

- Recommended Minimum Duration of Cumulated Training : 70 hours
- Recommended Minimum Duration of Cumulated Experience: 18 months
- Passing Category I exam is NOT a prerequisite for taking Category II exam.

Category III Exam

Course 2023EX (available at the end of course 2033)

Test Format: Written exam

Duration: 4 hours

Passing Grade: 75%

Eligibility for Examination:

- Recommended Minimum Duration of Cumulated Training : 110 hours
- Recommended Minimum Duration of Cumulated Experience: 36 months
- Has taken and passed the Category II exam.

CSI 2130 Machinery Health Analyzer Courses

Fundamentals of CSI 2130 Course 2072

2 days

This hands-on course focuses on the basic operation of the CSI 2130 Machinery Health Analyzer. Students will collect data from machines similar to those found in plants. The course was designed for students with little or no experience with CSI analyzers, but who are experienced in the field of vibration data collection and analysis. If you also need to learn vibration analysis skills, we recommend taking the Basic Vibration Analysis course.

Prerequisites: Understanding of vibration analysis.

Topics covered include:

- Analyzer/computer communication
- Predefined route data collection
- Off-route data collection and set up
- Monitor mode measurements
- Peak and phase measurements

Note: You may take this course with Fundamentals of Vibration as a four-day course.

eLearning: Fundamentals of CSI 2130 Course e2130

3 months (unlimited access)

The Fundamentals of the CSI 2130 eLearning course is designed to provide you with the tools you need to perform data collection using the CSI 2130. This course provides guided demonstrations through the processes of installing necessary drivers, uploading updated firmware, and loading updated or newly purchased programs necessary for data collection.

The course leads you through a basic introduction of the analyzer, including panel descriptions and reviews of the purpose and function of all connectors, ports, slots, keys, indicators, and buttons. The user learns how to load a pre-defined route into the analyzer, take general and specialized data, and then load data back into a computer for further diagnostic analysis.

- Analyzer-computer communication
- Predefined route data collection
- Off-route data collection and setup
- Monitor mode measurements
- Peak and phase measurements

Advanced CSI 2130 with PeakVue Course 2091

3 days

This course is intended for students with single-channel vibration analysis experience and little or no multi-channel experience. It covers advanced signal processing using PeakVue technology for slow-speed analysis, transient capabilities, coherence and cross-channel phase, Operating Deflection Shapes (ODS), modal analysis, and other advanced techniques.

Prerequisites: Single-channel vibration analysis experience is required.

Topics covered include:

- PeakVue analysis
- Resonance detection
- Dual channel data collection
- Fundamentals of cross-channel data collection
- Introduction to coherence and cross-channel phase
- Orbit data collection
- Introduction to ODS testing methods
- Introduction to modal analysis testing methods
- Advanced two-channel downloadable program
- Zoom analysis, cascade, and overall
- Transient time waveform capture and analysis

AMS Suite: Machinery Health Manager Courses

These courses are based on the current mass release of the AMS Machinery Manager software. Students can call to verify if the course is appropriate to the version they are using. Subject matter for infrared thermography, motor analysis, online monitoring, oil analysis, and wireless technology is covered in other course offerings and is not part of AMS Machinery Manager course materials.

Introduction to AMS Machinery Manager Course 2068

4 days

This course is based on

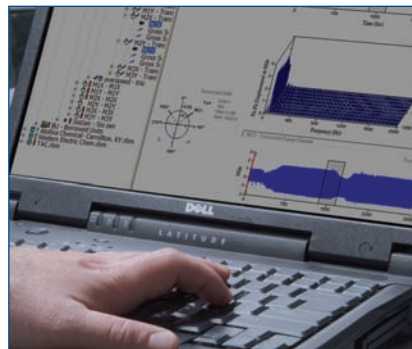
This course is designed for the new users of AMS Machinery Manager. Students learn methods of database creation and vital features of route creation, such as collecting reference data, analyzer/computer communication, and the basic concepts of analysis parameter sets, alarm limit sets, and fault frequency sets. A CSI 2130 will be used to load routes and collect data on lab machinery for basic vibration analysis using export and diagnostic plotting.

Prerequisites: Computer experience with the Windows operating system and the Basic Vibration Analysis course are recommended.

Topics covered include:

- Navigation
- Database creation
- Data collection
- Basic analysis and reporting
- Link to RBMview
- Data locker management

This course is based on the current mass release of the AMS Machinery Manager software. Students can call to verify if the course is appropriate to the version they are using. Advanced Vibration Analysis module, Infrared Analysis, MotorView, online Machinery Health Monitoring, and OilView modules are covered in other course offerings and are not part of this course.



Intermediate AMS Machinery Manager Course 2074

4 days

This course is designed for students who have a basic understanding of AMS Machinery Manager. Students expand their knowledge of machinery analysis techniques, focusing on analysis and reporting using PlotData, Diagnostic Analysis, Export, PeakVue, and the full version of RBMview.

Prerequisites: Introduction to AMS Machinery Manager course, Basic Vibration Analysis course, or 6 months vibration analysis experience is recommended.

Topics covered include:

- Export
- PeakVue
- Vibration Analysis module
- RBMview
- PlotData

Advanced AMS Machinery Manager

Course 2070

4 days

This course expands students' understanding of AMS Machinery Manager. Gain hands-on experience through the creation of a class database with example machines and collection of vibration data for problem analysis and reporting. Students will learn to use the advanced analysis and reporting functions of AMS Machinery Manager.

Prerequisites: Intermediate AMS Machinery Manager course, Intermediate Vibration course, or one year vibration analysis experience is recommended.

Topics covered include:

- Advanced analysis features in Diagnostic Plotting
- Problem reporting
- Status-at-a-glance operation and reporting
- Nspectr® reporting techniques and modification/addition of set up information
- RBMwizard reporting techniques and modification/addition of set up information

This course is based on the current mass release of the AMS Machinery Manager software. Students can call to verify if the course is appropriate to the version they are using. Infrared Analysis, MotorView, online Machinery Health Monitoring, and OilView modules are covered in other course offerings and are not part of this course.

Vibration Analysis Module for AMS Machinery Manager v5.2 or v5.3 e-Learning (CEUs: 0.1) Course E2074V

3 months unlimited access

This ecourse provides thorough introduction to the Vibration Analysis module in AMS Machinery Manager v5.2 and v5.3 software. With this version of the Vibration Analysis module, powerful tools for the analysis and comparison of multiple types of data are right at your fingertips.

Prerequisites: Familiar with the AMS Machinery Manager.

Topics covered include:

- Introduction of the new Vibration Analysis module
- Learn to display spectra, waveform, and trends displays
- Data manipulation

CSI Online Technologies Courses

Online Protection, Operations and Maintenance Course 2080

2 days

This course is a hands-on training for anyone involved with operating and maintaining a CSI 6000/6500 system. Workshops include practice with “live” monitors and racks.

Topics covered include:

- Overview of hardware components
- Rack configuration
- Operator display software
- Data acquisition software
- Interface with the CSI online prediction system
- System troubleshooting and maintenance

Online Prediction, Operations and Maintenance Course 2088

4 days

This course is best suited for those who have a CSI 4500, CSI 6500, or CSI XP32 system installed and operational prior to attending the course.

Topics covered include:

- Vibration basics and terminology
- System overview: functionality and system components
- Online Watch — used to monitor the system daily
- Online Config — adding a new machine to an existing database
- Plotdata — spectrums, waveforms, and trend data
- PeakVue processing
- Review of databases

Prerequisites: Knowledge of vibration and industrial machinery is helpful, but not necessary.

The course is designed for:

- System operators or analysts
- Operations personnel using the CSI 4500, CSI 6500, or CSI XP32 daily
- Those responsible for configuring databases and analyzing data

Turbomachinery Diagnostics Course 2089

5 days

This class details the operation, maintenance, management, diagnostics, and design of rotating machinery using vibration information. Emphasis is placed on interpreting startup/shutdown and steady state vibration data plots, understanding the sources of rotating machinery vibration, and recognizing common machinery malfunctions.

This seminar makes extensive use of full-featured field diagnostic equipment to reinforce lecture topics. The class is designed for engineers, supervisors, managers, and rotating equipment support professionals responsible for design, operation, and maintenance of rotating equipment.

Students will receive a complimentary copy of *Fundamentals of Rotating Machinery Diagnostics*, by Donald E. Bently.

CSI Machinery Health Transmitter

CSI 9210 Machinery Health Transmitter Course 2090

2 days

This class is available at our Austin Training Center and is meant for companies with FOUNDATION™ fieldbus and installed CSI 9210 systems. The CSI 9210 monitors any plant asset by providing overall and PeakVue vibration values along with temperature data back to AMS Machinery Manager and/or your control system.

Topics covered include:

- Introduction to the CSI 9210 and vibration analysis
- Commissioning
- Configuring within DeltaV™
- Parameter trending

Wireless Self-Organizing Network Course 2375

2 days

This course is intended for technicians, engineers and other plant personnel who need to know how to design, install, set up, configure, maintain, and troubleshoot wireless Self networks. This course explains how wireless networks function and emphasizes planning, proper installation and startup, configuration, maintenance, and integration. The course uses lectures and labs to maximize the hands-on experience.

Topics covered include:

- Correct installation of the Smart Wireless Gateway
- Proper installation and configuration of wireless transmitters (including the CSI 9420 Wireless Vibration Transmitter)
- Proper integration of host interfaces to the Smart Wireless Gateway

Prerequisites: Some experience in networks and host integration would be helpful.

For training for the CSI 9420 Wireless Vibration Transmitter and other Emerson Smart Wireless products, call: 641-754-3011

Lubrication Courses

(Level I and II Lubrication courses can be taken together as Course 2082)

Level I Lubrication with Certification Course 2082A

1.5 days

This course is designed for individuals who have limited or no oil analysis experience. Guidelines and instruction for starting an oil analysis program are provided. The course focuses on the basic properties of lubricants and lubricant specifications, including additive packages, and gives an overview of laboratory testing methods and interpretation of test data.

In addition, instruction will be provided on proper storage and handling of unused lubricants, sample point identification, and best practices for collecting samples from machinery. Basic contamination control, wear debris analysis, and identification will be covered.

Topics covered include:

- Starting a productive lubricant analysis program
- Analyzing oil data
- Identifying common types of wear debris, their origins, and corrective actions
- Importance of contamination control
- Designing sampling, storage, and handling procedures

Optional Level I Lubrication Certification is available at no additional charge.

Level II Lubrication with Certification Course 2082B

1.5 days

Learn about the use of oil analysis with other predictive technologies to enhance your machinery health program. Machine life extension and reduction of unscheduled downtime will be covered in depth.

Training includes introduction to lubricant engineering, failure concepts, and failure prevention. Information will be provided on greases and synthetic lubricants, including advantages and applications.

Guidelines and step-by-step procedures will be offered for consolidating lubricants, setting alarm limits, and managing and enhancing existing lubrication programs.

Prerequisites: Basic understanding of lubrication.

Topics covered include:

- Components of RBM lubrication program
- Methods for extending machine life
- Importance of wear debris analysis and contamination control
- Lubricant consolidation
- Establishing alarms

Optional Level II Lubrication Certification is available at no additional charge.

OilView™ for AMS Machinery Manager Course 2083

4 days

The course is designed for those who are new to CSI onsite oil analysis instruments and experienced users who wish to use advanced OilView features in AMS Machinery Manager. Students learn database creation and modification, analysis parameter, and alarm limit sets.

The course demonstrates how to set up and configure the OilView software module, discusses calibration and use of OilView instruments (including the CSI 5200) for analyzing oil samples onsite, and explains data interpretation and basic reporting.

Topics covered include:

- Introduction to oil analysis
- Onsite analysis
- Reference oil database management
- Database Construction and Modification
- Analysis parameter sets
- Alarm limit sets
- Best practices for onsite analysis using OilView
- Importing laboratory data
- Basic wear debris analysis
- Data analysis and reporting

Wear Debris Analysis Course 2084

2 days

Wear debris analysis (WDA) is often referred to as the most important form of oil analysis. This course teaches how to apply environmental conditions and other outside factors to make an accurate root cause analysis. Attendees will gain a basic understanding of wear particle generation, sample preparation techniques, and identification of wear particles.

Topics covered include:

- Theory presentation
- Wear particle generation
- Tribology, friction, and wear
- Lubrication fundamentals
- Sample screening: Using preliminary data and equipment type to select WDA candidates and sample preparation techniques
- Interpretation of oil analysis results related to WDA, such as OilView indices and commercial oil laboratory data
- Sample preparation techniques: grease, oil, hydraulic fluid, and synthetics
- Disciplined and systematic approach to WDA: overview of the OilView WDA module
- Particle identification and characterization exercise
- Identification and characterization using photographs and/or live samples

eLearning OilView for AMS Machinery Manager Course E2083

3 months (unlimited access)

The course is designed for those who are new to CSI onsite oil analysis instruments and experienced users who wish to use advanced OilView features in AMS Machinery Manager. Students learn database creation and modification, analysis parameter, and alarm limit sets.

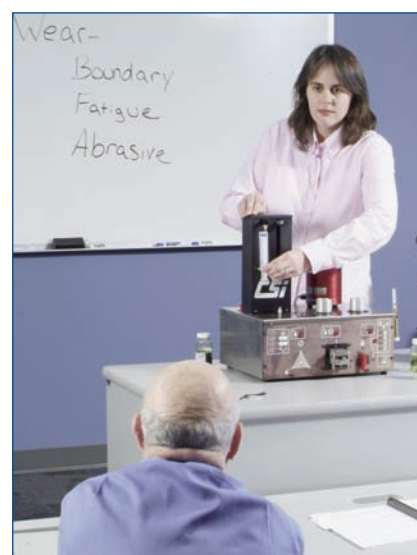
The course demonstrates how to set up and configure the OilView software module, discusses calibration and use of OilView instruments (including the CSI 5200 Machinery Health Oil Analyzer) for analyzing oil samples onsite, and explains data interpretation and basic reporting.

Topics covered include:

- Introduction to oil analysis
- Onsite analysis
- Reference oil database management
- Database construction and modification
- Analysis parameter sets
- Alarm limit sets
- Best practices for onsite analysis using OilView
- Importing laboratory data
- Basic wear debris analysis
- Data analysis and reporting

The eLearning Oilview class does not come with a manual. You may request a manual from the regular course when purchasing the eLearning module.

- Access the eLearning course anytime within 3-months after registration
- Available at your home, office, or anywhere you can access the Internet



Thermography Courses

Infrared Analysis for AMS Machinery Manager Course 2018

3 days

This course is designed for maintenance personnel who want to learn how to incorporate infrared-related data into AMS Machinery Manager. Infrared (IR) Analysis establishes the foundation and provides the tools required for a sound thermography inspection program. It identifies the equipment to be scanned, the monitoring schedule, and other information needed to construct a database that defines the monitoring procedures for your program.

Prerequisites: Computer experience with Windows operating system is recommended.

Topics covered include:

- Overview of AMS Machinery Manager
- Thermographic database set up management
- Thermographic route management
- File transfer to/from IR imager
- IR event collection
- Image viewing and event reporting
- IR analysis tools
- IR reporting
- Case history compilation

IR Thermography Level I with Certification Course 2019

4 days

This class is intended for students who have limited or no experience in infrared thermography analysis and diagnostics. Emerson thermography courses meet or exceed Level 1 ASNTTC-1A recommended practices.

Successful completion of the courses and passing of optional examinations can lead to Level I certification.

Topics covered include:

- Physics of infrared energy
- Components of infrared light
- System components and data collection
- Setting acceptance criteria for electrical and mechanical components
- Data storage, trending, and reports
- System coordination with other PdM technologies
- Built-up roofs

Optional IR Level I Certification Exam is available at no additional charge.



Ultrasonics Courses

Basic Ultrasonic Theory and Techniques Course 2067

3 days

This Level I course is a comprehensive course for students with little or no experience in ultrasonic testing. Although introductory, the course offers in-depth coverage of ultrasonic theory and instrument operation. Through lecture and lab exercises, students gain an understanding of technical principles and test procedures.

Topics covered include:

- Introduction to ultrasonics
- Basic principles of acoustics
- Measurement techniques
- Testing methods

Ultrasonics Level I Certification Exam is also available.



Balancing Courses

Balancing Theory and Techniques Course 2015

4 days

(May be taken as two 2-day classes)

This class teaches how to perform single- and dual-plane balancing using both graphical and analyzer-based balancing methods. The class uses the CSI 2130 Machinery Health Analyzer.

Topics covered include:

- Imbalance identification
- Use of vectors
- How to calculate influence coefficients
- Use of the auxiliary analyzer balance functions
- Use of UltraMgr module
- Calculate a system lag
- Estimate trial weights
- Balancing flexible rotor systems
- Balancing overhung rotors
- Balancing techniques in an industrial setting

Alignment Courses

Laser Alignment for CSI 2130 Course 2092

2½ days

This class is intended for students who have limited or no alignment experience. It provides training on shaft alignment using CSI technologies, focusing on the CSI 2130. This course includes hands-on training with horizontal alignment demonstrators and covers management of an alignment program using AMS Machinery Manager.

Topics covered include:

- Alignment
- Required pre-shutdown checks
- Pre-alignment checks and corrections
- Science and art of alignment
- Tools and techniques for moving equipment
- Time-savers
- Alignment information management
- Management systems: methods and advantages

Maintenance Strategy Courses

Maintenance Best Practices Course 2093

2 days

In today's industrial environment, proper installation and maintenance of equipment is essential. This 2-day course will give you the knowledge to correctly identify various types of components, proper installation, and their location on various machines. The course will also discuss safe work practices and safe lock out and tag out. Onsite classes can be adapted for the issues at your plant.

Topics covered include:

- Bearing identification and installation
- Component lubrication
- Mechanical seal identification and installation
- Couplings
- Thread pitch
- Pumps (centrifugal, positive displacement), compressors and turbines
- Gear boxes
- Belt and chain drives (sprockets, sheaves)
- Conveyors
- Lubrication

Root Cause Failure Analysis Course 2053

3 days

This course provides participants with the tools they need to begin the process of identifying Root Cause Failure Analysis (RCFA). The course was designed for managers, engineers, and technicians who are looking to establish a RCFA program to enhance an existing predictive/preventive maintenance program. The course introduces the various facets of benchmark RCFA programs.

Prerequisites: One to two years of experiences with a predictive maintenance program is recommended. No specific knowledge of predictive technologies is required.

Topics covered include:

- Failure definitions and types of failure
- Establishing a RCFA program
- When to initiate investigation
- Investigation methodology
- Cost/benefit evaluation and performance metrics
- Review of machinery and component failure modes
- Case histories

Onsite Training

Training is vital for getting the most out of your reliability program, but traveling to an offsite class can sometimes be an issue for you or your staff. Today we have a solution.

Emerson instructors can bring the benefits of classroom training to your plant. Most Emerson reliability training classes can be held in your facility where more of your reliability staff can learn the most effective techniques using the equipment you have available now. Training can be tailored to your needs to address the issues that affect your operations every day.

Call now to inquire about onsite classes: 800-675-4726.



REGISTRATION FORM

Complete a separate registration form for each class you attend. Deadline for registration is one week prior to start of class.

Please photocopy this form for future use.

Name to appear on class certificate

Name to appear on name tag

Country of Citizenship

Company

Physical or Shipping Address

City/State/Zip

Billing Address

City/State/Zip

Phone

Fax

Email

Course or Certification

Dates of Course or Certification

Course location Knoxville Austin

San Diego

Today's Date - -

FORM OF PAYMENT (MUST BE COMPLETED)

Credit Card

We value your business and the trust you have placed in EMERSON. We take the protection of our customer's information very seriously. Due to the inherent risks associated with the Internet and as part of our ongoing commitment to our customers, we are informing our customers NOT to email or FAX their credit card. There are many risks with sending personal information especially through the internet. Please feel free to contact us if you have any questions or concerns.

Phone

Fax or email receipt to

Check #

Purchase Order #

Total amount of purchase order

Please make purchase order out to Emerson (to the address below) and **please send a copy with your registration**

Does this P.O. cover more than one registration?

YES

NO

Training Certificate: ACET #:

A copy of your certificate for training must accompany your registration. Please bring the certificate with you to class.

Note: A confirmation will be sent to you to confirm your place in the class within 72 hours of receiving your registration. If you do not receive a confirmation, your space in class is not guaranteed, so please call.

I have the prerequisites for this course. I know the date, starting time and directions to the training facility. I understand the cancellation policies.

Date - -

Signature _____

RETURN TO

Emerson • Attn: Education Services
835 Innovation Drive
Knoxville, Tennessee 37932
Phone: 800-675-4726
Fax: 865-218-1764
mong-ching.lin@emerson.com

www.assetweb.com/mhm


EMERSON
Process Management

Registration Information

Tips for Easy Registration

1. For a list of current class schedules, go to www.assetweb.com/mhm.
2. Make one copy of the registration form for each student.
3. Carefully and legibly complete the registration form(s), including purchase order/check number, credit card information, or certificate. Your registration cannot be processed without this information.
4. Fax the registration form to Emerson Education Services at 865-218-1764. The scanned registration form can also be emailed to mong-ching.lin@emerson.com.
If paying with a PURCHASE ORDER, a copy of the PO is required. If paying with a CERTIFICATE, please include a copy of it with your registration form and bring the original to class.
5. Watch for a confirmation within 72 hours of faxing your registration. If you do not receive a confirmation, please call 1-800-675-4726.
6. Register as early as possible to get into your preferred classes. Payment must be received prior to class.

7. Do not purchase non-refundable airline tickets. If for some reason a class is cancelled, Emerson is not responsible for non-refundable tickets.

8. Take advantage of our money-saving discounts. We offer a 10% discount if you do any of the three things listed below:

- Attend two classes in one week
- Attend two full consecutive weeks of classes
- Submit your complete registration at least four weeks in advance of the class

NOTE: Only one discount per registration.

Education Certificates with Product Purchases

Certificates of attendance are provided with some product purchases. The certificates is included with your product. If you qualify for a certificate and did not receive one, contact your sales coordinator. When you mail or fax your registration form, be sure to include a copy of the certificate and bring the original with you to class.

What to Bring

If you attend IR Thermography Level I, you must bring your own IR camera. We will provide equipment and software needed for all other courses.

When to Arrive

For courses that begin at 8:30AM, the door opens at 8:00AM. For courses that begin at 1:00PM, plan to arrive no earlier than 12:30PM.

Food Arrangements

We provide light breakfast food, such as pastries and juice on all course days that begin at 8:30AM. We also provide lunches on all full course days. If your class begins at 1:00PM or ends at noon, no lunch is provided. Beverages are available throughout the day.

Directions to our training facilities and recommended hotels can be provided upon request. This info is also listed on our website.

Cancellation Policy

If you cancel before the deadline, we will either refund the cost of the course or reschedule at your convenience. The cancellation deadline is no later than one week before the start of the course. If you cancel after the deadline but before the course begins, we will refund 75% of the cost or reschedule at your convenience. If you cancel after the course begins or do not show up, you forfeit the entire cost of the course.

In case of a sudden, serious illness or a death in your immediate family, you or your company must notify us within 24 hours that you cannot attend. This will give another person an

opportunity to attend the course. If you do not notify us within 24 hours after an emergency arises, you must pay the 25% penalty for late cancellation. We will reschedule any late cancellation upon request, but you must first pay any penalty you may owe.

If you register for a course attendance with a certificate, you may cancel before the deadline and reschedule. If you cancel after the deadline but before the course begins, you will owe the 25% cancellation fee. If you cancel after the course begins, however, you forfeit the course attendance. To reschedule a course, you must pay full price.

**Emerson Process Management
Asset Optimization Division**

835 Innovation Drive
Knoxville, TN 37932 USA
T (800) 675-4726
F (865) 218-1764

©2010, Emerson Process Management.

The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. All sales are governed by our terms and conditions, which are available on request. We reserve the right to modify or improve the designs or specifications of our products at any time without notice.

All rights reserved. AMS, Machinery Health, PlantWeb, PeakVue, and OilView are marks of one of the Emerson Process Management group of companies. The Emerson logo is a trademark and service mark of Emerson Electric Co. All other marks are the property of their respective owners.