

Machinery Health™ Management

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 1500 individuals receive training from Machinery Health Management classes around the world. 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

Emerson Training is a proven means for acquiring confidence and experience in the technologies associated with industrial maintenance. Our alumni are considered valuable assets to their organizations, and can tell of the recognition and job promotions they've received from plant management. Attending Emerson Training is an investment in your career and the efficient and competitive operation of your facility. More than simply a catalog of courses, Emerson Training is an educational path that leads to full mastery of the knowledge and skills necessary in a Machinery Health program. These "Paths to Success" are outlined for you here. They include both theory and application classes that are required for certification as well as product-specific classes for getting the most out of your existing hardware/software tools. These same hands-on, application-intensive courses offered in our own classroom environment can also be taught in your facility. For a calendar schedule of courses along with course descriptions and registration information, go to: www.assetweb.com/mhm.

Category I Vibration Analyst Path to Success

- Fundamentals of Vibration Analysis
- Fundamentals of CSI 2130 Machinery Health Analyzer
- Introduction to AMS Machinery Manager
- Basic Vibration Analysis
- Category I Vibration Analyst Certification Exam

Category II Vibration Analyst Path to Success

- Intermediate AMS Machinery Manager
- CSI 2130 Advanced Function with PeakVue™
- Intermediate Vibration Analysis
- Category II Vibration Analyst Certification Exam

Category III Vibration Analyst Path to Success

- Advanced AMS Machinery Manager
- PeakVue™ Mystery and Autocorrelation
- Advanced Vibration Analysis
- Category III Vibration Analyst Certification Exam

Online Monitoring Path to Success

- On-line Prediction (CSI 4500/6500/XP32) Operation and Maintenance
- On-line Protection (CSI 6000/6500) Operation and Maintenance
- Turbo Machinery Diagnostic

Lubrication Analyst Path to Success

- Lubrication Level 1 & 2 with Certification exam
- Wear Debris Analysis Workshop
- OilView® for AMS Machinery Manager

Reliability Management Path to Success

- Root Cause Failure Analysis

Adding other Technologies to your Credentials

- Laser Alignment
- Balancing Theory & Application
- Basic Ultrasonic Theory & Technology & Level 1 Certification Exam
- Electric Motor Diagnostics & Basic MotorView
- IR Thermography & Level 1 Certification Exam

Fundamentals of Vibration

Course 2069 CEUs: 1.4

Overview

This 2-day 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 class will use them to demonstrate vibration principles.

Prerequisites

None

Topics

- Introduction to Vibration
- Components of a Predictive Maintenance Program
- Basic Fault Identification
- Vibratory Fault Characteristics and Patterns
- Information to Help Jump Start a Vibration Program

Price \$1,150

Location

Knoxville, TN

San Diego, CA
Austin, TX

Start Date 2012

1/9, 2/6, 3/12, 4/16, 5/7, 6/4,
7/23, 8/13, 9/10, 10/8, 12/3
3/19, 11/12
4/10, 8/13



Basic Vibration Analysis/Category I Compliant

Course 2031 CEUs: 2.8

Overview

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

- Principles of Vibration
- Data acquisition & Signal Processing
- Condition monitoring & Corrective Action
- Equipment Knowledge
- Acceptance Testing
- Basic Analyzer Functions
- The Class Shows Students How to Recognize Machine Defects such as:
 - Unbalance
 - Shaft Misalignment
 - Looseness
 - Rolling Element Bearing Defects
 - Gear Problems
 - Resonance Introduction to Electrical Defects
 - Introduction to Electrical Defects

Participants will receive a complimentary copy of the Pocket Vibration Analysis Trouble-Shooter Guide.

Price \$2,000

Location

Knoxville, TN

San Diego, CA
Austin, TX

Start Date 2012

1/23, 2/20, 3/26, 4/30, 6/18,
8/6, 9/24, 10/22, 11/12,
12/17
4/9, 8/13
4/23, 8/27

Intermediate Vibration Analysis/Category II Compliant

Course 2032 CEUs: 2.8

Overview

This course complies with Category II Vibration Analyst per ISO standard 18436-2: Vibration condition monitoring and diagnostics. Category II vibration analysts are expected to be able to select appropriate vibration measurement techniques, set up instruments for basic resolution of amplitude, frequency, and time, perform basic spectrum analysis, maintain a database of results and trends, perform single-channel impact tests, classify, interpret, and evaluate test results in accordance with applicable specifications and standards, recommend minor corrective actions, and understand basic single plane field balancing concepts.

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

- 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
- Perform Basic Single-Plane Field Balancing

Students will receive a complimentary copy of the Simplified Handbook of Vibration Analysis, Volume I, by Art Crawford.

Price \$2,000

Location	Start Date 2012
Knoxville, TN	1/23, 3/5, 4/16, 5/21, 7/16, 8/27, 10/8, 11/5, 12/17
San Diego, CA	4/30, 10/15
Austin, TX	5/14, 10/8
Edmonton, AB	2/6

Advanced Vibration Analysis/Category III Compliant

Course 2033 CEUs: 2.8

Overview 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 AMST™ Suite: Machinery Health Manager Software to set up the advanced analyzer features and the powerful downloadable programs for data collection. The transient machinery health analyzer capabilities are covered such as long-term time waveform. The class covers advanced resonance detection using a variety of testing methods, including triggered data collection.

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

Topics

- Specify Appropriate Vibration Instrumentation Hardware and Software for both Portable and Permanently Installed Systems
- Perform Spectrum and Time Waveform Analysis Under both Steady-State and Unsteady Operating Conditions
- Establish Vibration Monitoring Programs
- Establish Specifications for Vibration Levels and Acceptance Criteria for New Machinery
- Measure and Analyze Basic Operational Deflection Shapes (ODS)
- Understand and Direct the use of Other Condition Monitoring Technologies (such as Ultrasonics, Infrared Thermography, and Oil Analysis)
- Measure and Analyze PeakVue® Measurements
- Prepare/Submit Machinery Condition Reports
- Provide Instruction and Technical Direction to Vibration Trainees
- Slow Speed Technology (SST®)
- Zoom Analysis / Transient Techniques
- Dual Channel Machinery Analyzer Features
- Triggered Data Capture/Resonance Detection

Price \$2,000

Location	Start Date 2012
Knoxville, TN	1/30, 3/19, 7/23, 11/12
San Diego, CA	9/17
Austin, TX	10/29

Electric Motor Diagnostics and MotorView®

Course 2081 CEUs: 2.8

The MotorView course is designed for students who are experienced in vibration analysis and diagnostics, and focuses on the theoretical concepts of motor diagnostics.

Overview

This 4-day course uses labs and case histories to demonstrate the functionality of the MotorView software in determining rotor bar defects using current and flux data. This course is designed for mechanical and electrical skilled personnel who may not have a background in motor theory, operation and construction.

Topics

- Basic electrical principles
- AC/DC motor theory and design
- Variable frequency drives
- Data collection methods
- Current spectra and waveform analysis
- Flux spectra analysis and data evaluation
- Temperature data
- Shaft current
- Analysis of case histories
- Windows configuration for MotorView Operation

Price \$2,000

Location	Start Date 2012
Knoxville, TN	7/16

To enroll in Machinery Health Management courses please call 800-675-4726 or 865-675-2400. For additional contact information refer to the appropriate contact on page 107. Updated dates & locations are available on our website at www.emersonprocess.com/education.

ISO Compliant Vibration Certification Exams

Course 2021EX

Overview

Category I exam, 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 (hours): 32
- Recommended Minimum Duration of Cumulated Experience (months): 6

Price \$250

Location	Start Date 2012
Knoxville, TN	1/27, 2/24, 3/30, 5/4, 6/22, 8/10, 9/28, 10/26, 11/16, 12/21
San Diego, CA	4/13, 8/17
Austin, TX	4/27, 8/31

Course 2022EX

Overview

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

Price \$250

Location	Start Date 2012
Knoxville, TN	1/27, 3/9, 4/20, 5/25, 7/20, 8/31, 10/12, 11/9, 12/21
San Diego, CA	5/4, 10/19
Austin, TX	5/18, 10/12

Course 2023EX

Overview

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

Price \$350

Location	Start Date 2012
Knoxville, TN	2/3, 3/23, 7/27, 11/16
San Diego, CA	9/21
Austin, TX	11/2

Fundamentals of CSI 2130 Machinery Health Analyzer

Course 2072 CEUs: 1.4

Overview

This 2-day hands-on course focuses on the basic operation of the CSI 2130 Machinery Health Analyzer. Students will collect data on lab machines. This course is designed for students with little or no experience with CSI analyzers, but who are experienced in the field of vibration data collection and analysis.

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

Prerequisites Understanding of vibration analysis.

Topics

- Analyzer/Computer Communication
- Predefined Route Data Collection
- Off-Route Data Collection and Setup
- Monitor Mode Measurements
- Peak and Phase Measurements

Price \$1,150

Location	Start Date 2012
Knoxville, TN	1/11, 2/8, 3/14, 4/18, 5/9, 6/6, 7/25, 8/15, 9/12, 10/10, 12/5
San Diego, CA	3/21, 11/14
Austin, TX	4/12, 8/15
Edmonton, AB	11/5

eLearning Course Available

eLearning: Fundamentals of the CSI 2130 Machinery Health Analyzer

Course e2130 CEUs: .6 3 Months Unlimited Access



Emerson's Machinery Health Management training now includes a Fundamentals of the 2130 eLearning course, designed to provide you with the tools you need to perform data collection using the CSI 2130 Machinery Health Analyzer.

Overview

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. Learn how to load a pre-defined route into the CSI 2130, gather general data as well as specialized data, and then interface the data back with a computer for further diagnostic analysis.

Topics

- Analyzer-Computer Communication
- Predefined Route Data Collection
- Off-Route Data Collection and Setup
- Monitor Mode Measurements
- Peak and Phase Measurements

Online training puts the information in your hands at your convenience.

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

Price \$299

To Register

To register call 800-675-4726 or www.emersonprocess.com/education

Advanced CSI 2130 with PeakVue

Course 2091 CEUs: 2.1

Overview

This 3-day course is intended for students with single-channel vibration analysis experience and little or no multi-channel experience. This class covers advanced signal processing using Emerson's patented 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

- PeakVue
- Resonance Detection
- Dual Channel Data Collection
- Fundamentals of Cross-Channel Data Collection
- Introduction to Coherence and Cross-Channel Phase
- Orbit Data Collection
- Introduction to Operating Deflection Shape (ODS) Testing Methods
- Introduction to Modal Analysis Testing Methods
- Advanced Two-Channel DLP
- Zoom Analysis, Cascade and Overall
- Transient Wave Form Capture and Analysis
- CSI 2130 Analysis Experts

Price \$1,600

Location	Start Date 2012
Knoxville, TN	2/7, 6/26, 9/5, 11/28
Austin, TX	5/22
Edmonton, AB	11/7

Mystery PeakVue™ and Autocorrelation

Course 2035/2075 CEUs: 2.1

This 3-day course provides insight into advanced functionality of Emerson's patented PeakVue™ technology and Autocorrelation. Machine vibrations generate both macro and microscopic vibrations, and microscopic vibrations generate stress waves that have frequency ranges determined by the mass of the impacting object. The properties of these stress waves will be explained.

Overview The Autocorrelation section of the course will teach the power of the autocorrelation coefficient function for the analysis of vibration induced time wave form data. The autocorrelation function data generally are computed from the same time wave form data used to compute the spectrum. The strengths of the autocorrelation data are complimentary to the strengths of the spectral data. This course makes use of both case studies from real-life examples of common faults and live demonstrations illustrating specific mounting procedures to reliably detect certain faults. 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 Software.

Topics

- Proper PeakVue™ Set-Ups for all Speeds (as Low as 1 rpm)
- Sensor Selection and Sensor Mounting
- Setting Alarm Levels
- Choosing Trend Parameters
- Analyzing PeakVue™ Spectra and Waveforms
- Uses of the Circular Waveform Plot
- Introduce the Autocorrelation Coefficient
- Demonstrate the Computation of the Autocorrelation Coefficient Data from the Time Wave form Data
- Highlight the Strengths of the Autocorrelation Coefficient Function Data/Spectra Data
- Demonstrate the use of the Autocorrelation Coefficient Data as a Diagnostic Tool to Support the Spectra Data for Vibration Analysis Through Several Case Studies
- Identify Unique Patterns of the Autocorrelation Function Data for Certain Classes of Bearing Faults, Gearing Faults, etc.

Price \$1,600

Location	Start Date 2012
Knoxville, TN	2/21, 6/12, 10/16
Austin, TX	9/25
San Diego, CA	10/2
Edmonton, AB	5/22

Introduction to Windows-Based ODS/Modal

Course 2039 CEUs: 2.8

Overview

This 4-day course is designed to teach Operating Deflection Shape (ODS) and Modal Analysis software. This course uses the CSI 2130 single- and dual-channel Machinery Health Analyzers to teach the practical concepts of ODS/modal measurement techniques and display options. The modal course is introductory and will not cover theory or mathematical background.

Prerequisites

Knowledge of dual-channel analyzers and at least one year of full-time vibration analysis experience is recommended.

Topics

- Building of the Wireframe Model
- Measurement Considerations
- Collecting ODS Data With and Without a Tachometer Reference
- Utilizing an Impact Hammer with the CSI 2130 Advanced Dual-Channel DLP
- Interpretation of Results

Price \$2,000

Location	Start Date 2012
Knoxville, TN	11/27

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Introduction to AMS™ Suite: Machinery Health Manager

Course 2068 CEUs: 2.8

Overview

This 4-day course was 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 Analyzer 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 Basic Vibration are recommended.

Topics

- Navigation
- Database Creation
- Data Collection
- Basic Analysis and Reporting
- Link to RBMview®

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, CSI On-Line Machinery Health Monitor and Oilview modules are covered in other course offerings and are not part of this course.

Price \$2,000

Location	Start Date 2012
Knoxville, TN	1/16, 2/13, 3/19, 4/23, 6/11, 7/30, 9/17, 10/15, 12/10
San Diego, CA	3/26, 9/10
Austin, TX	4/16, 8/20

Intermediate AMS™ Suite: Machinery Health Manager

Course 2074 CEUs: 2.8

Overview

This 4-day course was 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 Health Manager Course

Topics

- Vibration Analysis Module
- Export
- PeaVue Technology
- RBMview
- PlotData

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, CSI On-Line Machinery Health Monitor and Oilview modules are covered in other course offerings and are not part of this course.

Price \$2,000

Location	Start Date 2012
Knoxville, TN	1/16, 2/27, 4/9, 5/14, 7/9, 8/20, 10/1, 12/10
San Diego, CA	5/7
Austin, TX	5/7, 10/1
Edmonton, AB	9/10

Advanced AMS™ Suite: Machinery Health Manager

Course 2070 CEUs: 2.8

Overview

This 4-day course is the third in our series of AMS Machinery Manager courses. Gain hands-on experience through the creation of a class database with example machines and collecting vibration data for problem analysis and reporting. Students learn to use the advanced analysis and reporting functions of AMS Machinery Manager.

Prerequisites

Intermediate AMS Machinery Health Manager Course. Intermediate Vibration or one year vibration analysis experience. Experience with the Windows operating system is recommended.

Topics

- Advanced Analysis Features in Diagnostic Plots
- Problem Reporting
- Status-at-a-Glance Operation and Reporting
- Nspectr®
- Wizard - Reporting Techniques and Modification/Addition of Setup Information
- Austostat
- DButly
- DBZip
- NetAdmin
- 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. Infrared Analysis, Motorview, CSI On-Line Machinery Health Monitor and Oilview modules are covered in other course offerings and are not part of this course.

Price \$2,000

Location	Start Date 2012
Knoxville, TN	3/12, 7/16, 11/5

Vibration Analysis Module AMS Machinery Manager (V5.2 or Higher)

Course e2074V CEUs: 0.1
3 Months Unlimited Access



Overview

This e-course provides thorough introduction on the Vibration Analysis module in the V5.2 or higher AMS Machinery Manager software. The interface of the Vibration Analysis module is much more user intuitive. With the V5.2/V5.3 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 Software

Topics

- Introduction of the New Vibration Analysis Module (V5.2/V5.3)
- Learn to Display Spectra, Waveform, and Trends
- Use the Toolbar for Data Manipulation

Price \$50

On-Line Prediction (CSI 4500/6500/XP32) Operation and Maintenance

Course 2088 CEUs: 2.8

Overview

This 4-day course best suits those who have a CSI 4500, CSI 6500 or XP32 system installed and operational prior to attending the course.

The course is designed for:

- system users or analysts
- personnel using the CSI 4500, CSI 6500 or XP32 daily
- those responsible for configuring databases and analyzing data

Prerequisites

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

Topics

- Vibration Basics and Terminology Relating to the CSI 4500, CSI 6500 or XP32
- System Overview: Functionality and System Components
- Online Watch - used to Monitor the System Daily
- Online Config - Adding a New Machine to an Existing Database
- Vibration Analysis Module - Spectrums, Waveforms and Trend Data
- PeakVue Processing
- Transient Setup and Capture Evaluation
- Review of Customer Databases

Price \$2,000

Location

Knoxville, TN
 Edmonton, AB

Start Date 2012

2/6, 5/7, 8/6, 11/12
 3/19

On-Line Protection (CSI 6000/6500) Operation and Maintenance

Course 2080 CEUs: 1.4

Overview

This 2-day 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

- Overview of Hardware Components
- Rack Configuration
- Operator Display Software
- Data Acquisition Software
- Interface with the CSI On-line Prediction System
- System Troubleshooting and Maintenance

Price \$1,150

Location

Knoxville, TN

Start Date 2012

2/13, 5/14, 8/13



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Turbo Machinery Diagnosis with the CSI On-Line System

Course 2089 CEUs: 3.5

Overview

This 5-day course details the operation, maintenance, management, diagnostics and design of rotating machinery using vibration information. Emphasis is placed on interpreting start-up/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. This class is designed for engineers, supervisors, managers, and rotating equipment support professionals responsible for design, operation, and maintenance of rotating equipment

Students receive a copy of Fundamentals of Rotating Machinery Diagnostics, written by vibration monitoring pioneer and rotor dynamics researcher Donald E. Bently.

Price \$2,200

Location Knoxville, TN **Start Date 2012** 11/5

Wireless Self Organizing Network

Course 2375 CEUs: 1.4

This course is intended for technicians, engineers and other plant personnel who need to know how to design, install, setup, configure, maintain and troubleshoot Wireless Self Organizing Networks and their components.

Overview

This 2-day course explains how Self Organizing Wireless Networks function and how they are installed, setup, configured and integrated. It emphasizes planning, proper installation and startup, configuration, maintenance, and integration. The course uses lectures and labs to maximize the hands on experience and teach the students. Students who complete this course will:

- correctly install and setup the 1420 Wireless Gateway
- properly install and configure Wireless Transmitters
- properly integrate Host interfaces to the Wireless Gateway

Prerequisites

Some experience in Networks and Host integration would be helpful.

Topics

- How Self Organizing Networks Function
- Self Organizing Networks Best Practices
- Network Components
- 1420 Installation and Setup
- Network Parameters
- 648 and 3051S Wireless Transmitters Installation, Configuration, Maintenance and Calibration
- Using AMS Device Manager with the 1420 Wireless gateway
- Configuring Wireless Devices with AMS Device Manager
- Modbus Serial Integration
- Modbus TCP Integration
- OPC Integration
- 1420 Advanced Features

Price \$1,350

Location Eden Prairie, MN **Start Dates 2012** 5/8, 8/28, 12/4



Level I Lubrication with Certification

Course 2082A CEUs: 1.05

Overview

This 1.5-day course is designed for individuals who have limited or no oil analysis experience. Guidelines and instruction for starting an oil analysis program will be provided. The course focuses on the basic properties of lubricants and lubricant specifications including additive packages. An overview of laboratory testing methods and interpretation of test data is taught. In addition, instruction is provided on proper storage and handling of new, unused lubricants, as well as sample point identification and best practices for collecting samples from machinery. Basic contamination control and wear debris analysis and identification is covered.

Prerequisites

None.

Topics

- Starting a Productive Lubricant Analysis Program
- Analyzing Oil Data
- Identifying Common Types of Wear Debris, their Origins, and Corrective Actions
- The Importance of Contamination Control
- Designing Sampling, Storage and Handling Procedures

Optional Level I Lubrication Certification is available at no charge

Note: May be taken with Level II Lubrication as a 3-day course.

Price \$900
\$1,600 for Both Level I & Level II Courses

Location	Start Date 2012
Knoxville, TN	1/23, 5/14, 9/17
San Diego, CA	10/22

Level II Lubrication with Certification

Course 2082B CEUs: 1.05

Overview

The focus of this 1.5-day course is 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 introductions 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, as well as managing and enhancing existing lubrication programs.

Prerequisites

Basic understanding of lubrication.

Topics

- The Components of RBM Lubrication Program
- Methods for Extending Machine Life
- The Importance of Wear Debris Analysis and Contamination Control
- Lubricant Consolidation
- Establishing Alarms

Optional CSI Level II Lubrication Certification-no charge

Note: May be taken with Level I Lubrication as a 4-day course.

Price \$900
\$1,600 for Both Level I & Level II Courses

Location	Start Date 2012
Knoxville, TN	1/24, 5/15, 9/18
San Diego, CA	10/23

Oilview® for AMS Machinery Manager

Course 2083 CEUs: 2.8

Overview

This 4-day 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, 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 Trivector Analyzer) for analyzing oil samples onsite, and explains data interpretation and basic reporting.

Prerequisites

None.

Topics

- 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

Price \$2,000

Location	Start Date 2012
Knoxville, TN	1/30, 5/21, 9/24

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Oilview® for AMS Machinery Manager eLearning

Course e2083 CEUs: 1.4
3 Months Unlimited Access



Overview

This internet-based course is ideal for those who have never used Emerson's onsite oil analysis technologies as well as experienced users who wish to learn more about advanced OilView® features in AMS Suite: Machinery Health Manager. 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. Also covered is database creation and modification, Analysis Parameter and Alarm Limit Sets.

Topics

- 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

Price \$499

Location Call to Schedule
Start Date 2012

Wear Debris Analysis

Course 2084 CEUs: 1.4

Overview

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

- Theory Presentation
- Wear Particle Generation
- Tribology, Friction, and Wear
- Lubrication Fundamentals
- Sample Screening: Discussion of how to use 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: Discussion of Sample Preparation for 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 of Wear Debris Using Photographs and/or Live Samples

Price \$1,150

Location Knoxville, TN
 San Diego, CA
Start Date 2012
 1/26, 5/17, 9/20
 10/25

Infrared Analysis Software for AMS Machinery Health™ Manager

Course 2018 CEUs: 2.1

Overview

This 3-day course is designed for maintenance personnel who want to learn how to incorporate infrared-related data into AMS Machinery Manager. Infrared 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 the Windows operating system is recommended.

Topics

- Overview of AMS Machinery Manager
- Thermographic Database Setup Management
- Thermographic Route Management
- File Transfer to/from IR Imager
- IR Event cCollection
- Image Viewing and Event Reporting
- IR Analysis Tools
- IR Reporting
- Case History Compilation

Price \$1,600

Location Knoxville, TN
Start Date 2012
 3/5, 9/17

IR Thermography Level I with Certification

Course 2019 CEUs: 2.8

Overview

This 4-day course 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 may lead to a Level I certification.

Prerequisites

None.

Topics

- 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

Price \$2,000

Location Knoxville, TN **Start Date 2012** 2/27, 9/10

Basic Ultrasonic Theory and Techniques - Level 1

Course 2067 CEUs: 2.1

Overview

This 3-day level I course is a comprehensive course for individuals 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

- Introduction to Ultrasonics
- Basic Principles of Acoustics
- Measurement Techniques
- Testing Methods

Also Available: Ultrasonics Level I Certification Exam.

Price \$1,600

Location Knoxville, TN **Start Date 2012** 6/26

Balance Theory and Application

Course 2015 CEUs: 2.8

Overview

This 4-day 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

- Imbalance Identification
- Use of Vectors
- Calculating Influence Coefficients
- Use of the Auxiliary Analyzer Balance Functions
- Use of UltraMgr Module
- Calculating a System Lag
- Estimate Trial Weights
- Balancing Flexible Rotor Systems
- Balancing Overhung Rotors
- Applying Balancing Reqniques in an Industrial Setting

Note: May be taken as two 2-day classes

Price \$2,000

Location Knoxville, TN **Start Date 2012** 2/20, 6/4, 8/20, 10/22

To enroll in Machinery Health Management courses please call 800-675-4726 or 865-675-2400. For additional contact information refer to the appropriate contact on page 107. Updated dates & locations are available on our website at www.emersonprocess.com/education.

Laser Alignment for CSI 2130

Course 2092 CEUs: 1.8

Overview

This 2-1/2 day 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 Machinery Health Analyzer. This course includes hands-on training with horizontal alignment and vertical alignment demonstrators and covers management of an alignment program using the AMS Machinery Health Manager software.

Topics

- Alignment: What is it? Why?
- Required Pre-Shutdown Checks
- Pre-alignment Checks and Corrections
- The Science and Art of Alignment
- Tools & Techniques for Moving Equipment
- Time-Savers
- Alignment Information Management
- Management Systems: Methods and Advantages

Price \$1,400

Location Knoxville, TN
Start Date 2012 2/28, 6/12, 10/30

Root Cause Failure Analysis

Course 2053 CEUs: 2.1

Overview

This 3-day course provides participants with the tools they need to begin the process of identifying Root Cause Failure Analysis (RCFA). This course was designed for managers, engineers and technicians who want to establish a RCFA program as a way of enhancing an existing predictive/ preventive maintenance program. The course introduces the various facets of benchmark RCFA programs.

Prerequisites

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

Topics

- Failure Definitions and Types of Failure
- Establishing a RCFA Program
- When to Initiate Investigation
- RCFA Investigation Methodology
- Cost/Benefit Evaluation and Performance Metrics
- Review of Machinery and Component Failure Modes
- Case Histories

Price \$1,600

Location Knoxville, TN
Start Date 2012 7/10

