## 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 or CSI 2140 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 or CSI 2140 Advanced Function
- 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**
- CSI Online Prediction Operation and Maintenance
- CSI Online Protection Operation and Maintenance

**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
- 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

## eLearning: Fundamentals of Vibration

### Course e2069 CEUs: 0.2

**Overview**

This e-course provides instruction to individuals with no prior experience in vibration analysis. The course introduces the technology of vibration analysis by explaining what vibration analysis is and how it plays a critical role in any predictive maintenance program. Students are led through a self-paced discussion on how vibration analysis works with many examples of the types of faults that can be detected. Students will also gain an understanding of where and how vibration is measured with an emphasis on good data collection techniques. Students will learn important terminology that will be critical to their success as they progress to the next level of training in vibration analysis; Emerson's Basic Vibration Analysis course.

**Topics to be covered include:**

Chapter 1: Fundamentals of Vibration
Chapter 2: How is Vibration Measured?
Chapter 3: Understanding the Vibration Signal
Chapter 4: Vibration Units
Chapter 5: Analysis Parameters
Chapter 6: Data Analysis: Where to begin?

**Note:** Typical duration of course access is 3 months. Contact education@emerson.com to request an extension.

## 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 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.

## 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.

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**Topics**

- Equipment Testing and Diagnostics
- Reference Standards
- Reporting and Documentation
- Fault Severity Determination
- Analyzer Averaging Techniques
- 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.

## 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 AMS™ 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 Specifications for Vibration Levels and Acceptance Criteria for New Machinery
- Measure and Analyze Basic Operational Deflection Shapes (ODS)
- Measure and Analyze PeakVue® Measurements
- Slow Speed Technology (SST®)
- Zoom Analysis / Transient Techniques
- Dual Channel Machinery Analyzer Features
- Triggered Data Capture/Resonance Detection

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

## PeakVue™ Mystery and Autocorrelation

### Course 2035 CEUs: 2.1

This 3-day course provides insight into advanced functionality of Emerson's unique 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.

For MHM training information please refer to the appropriate contact on page 118.
For regional training center contacts refer to pages 116-117.
Visit: www.emersonprocess.com/education for current dates, locations and enrollments.

## 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

## 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

## ISO 18436-2 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

### 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.

### 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.

## 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

eLearning Course Available

## Fundamentals of the CSI 2130 Machinery Health Analyzer

### Course e2130 CEUs: .6

Emerson's Machinery Health 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

## Fundamentals of CSI 2140

### Course 2076 CEUs:1.4

**Overview**

This 2-day hands-on course focuses on the basic operation of the CSI 2140 Machinery Health Analyzer. Students collect data on lab machines. This course is designed for personnel with little or no experience with CSI analyzers, but who are experienced in the field of vibration data collection and analysis.

**Prerequisites**

Understanding of vibration analysis. Familiar with basic vibration collection principles

**Topics**

- Analyzer/Computer Communication
- Predefined Route Data Collection
- Job Data Collection and Setup
- Manual Mode Measurements
- Introduction to CSI 2140 Analysis Expert Functions

Note: You may take with Fundamentals of Vibration as a 4-day course.

## Fundamentals of CSI 2140 Machinery Health Analyzer

### Course e2140 CEUs:.6

Emerson's Machinery Health training n
includes the Fundamentals of the CSI 2140
eLearning course, designed to provide you with the tools you need to perform data collection using the CSI 2140 Machinery Health Analyzer. 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 data as well as specialized data, and then dump that data back into the computer for further diagnostic analysis.

**Topics**

- Analyzer/Computer Communication
- Predefined Route Data Collection
- Job Data Collection and Setup
- Manual Mode Measurements
- Introduction to CSI 2140 Analysis Expert Functions

## 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

For MHM training information please refer to the appropriate contact on page 118.
For regional training center contacts refer to pages 116-117.
Visit: www.emersonprocess.com/education for current dates, locations and enrollments.

## Advanced CSI 2140

### Course 2094 CEUs: 2.1

**Overview**

This 3-day course is intended for personnel 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, 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 Time Waveform Capture and Analysis
- CSI 2140 Analysis Experts Functions

## Introduction to AMS™ Suite: Machinery Health Manager

### Course 2068/V 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 machinery analyzer is used to demo the process of loading routes for data collection. This course will also include a basic overview of the vibration plotting application and reporting functions.

**Prerequisites**

Computer experience with the Windows operating system and some vibration analysis experience 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 Online Machinery Health Monitor and Oilview modules are covered in other course offerings and are not part of this course.

## Intermediate AMS™ Suite: Machinery Health Manager

### Course 2074 /V CEUs: 2.8

**Overview**

This 4-day course teaches some of the more advanced machinery analysis techniques available in AMS Suite Machinery Health Manager Software. This course focuses more on analysis and reporting with the use of Vibration Analysis module, Reporting module, Exception Analysis, PeakVue and full version of RBMview.

**Prerequisites**

Introduction to AMS Machinery Health Manager, course 2068, Basic Vibration Analysis course or 6 months vibration analysis experience are recommended.

**Topics**

- PeakVue™
- Vibration Analysis module
- Reporting Module
- Exception Analysis
- Nspectr
- BMview

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 Online Machinery Health Monitor and Oilview modules are covered in other course offerings and are not part of this course.

## Advanced AMS™ Suite: Machinery Health Manager

**Course 2070/V CEUs: 2.8**

### Overview

This 4-day course is the third in our series of AMS Machinery Manager courses. Its focus is on the management, modification and optimization of the existing AMS Machinery Manager database. Students will learn how to modify existing Wizard configurations, add and edit users, statistically adjust alert and fault levels, make global database changes, and many other very useful database functions. This course is intended for the advanced user who has already created a machinery database and has been acquiring, storing and analyzing data for six months or more.

### Prerequisites

Intermediate Vibration (course 2032) or one year vibration analysis experience are recommended. Experience with the Windows operating system is recommended.

### Topics

- Advanced Analysis Features in Vibration Analysis Module
- Problem Reporting
- Status-at-a-Glance Operation and Reporting
- Nspectr®
- Wizard - Reporting Techniques and Modification/Addition of Setup Information
- Austostat
- Database Utility
- Database Zip Utility
- Network Administration
- 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 Online Machinery Health Monitor and Oilview modules are covered in other course offerings and are not part of this course.

## AutosStat for AMS™ Suite: Machinery Health Manager

**Course 2070A or 2070CV CEUs: 1.4**

AustoStat is included in the standard curriculum of the 4-day Advanced AMS Machinery Manager, course 2070. This 2-day session only covers AutoStat in the AMS Machinery Manager software.

Alarms are an important part of any analysis program. Properly setting alarms allows the user to quickly identify an abnormal machine condition and reduces time spent analyzing machines that are running in acceptable or "normal" condition.

AMS Machinery Health Manager provides the user the ability to create up to 12 parameter bands with alarms in addition to the Overall value. Calculating ideal alarm values for these parameters can be very complicated. Autostat uses statistical analysis to provide limit values for the individual parameter bands by analyzing the data associated with similar pieces of equipment.

### Overview

This 2-day session is designed for students have a basic understanding of AMS Machinery Health Manager and will guide these user's through the process of using Autostat for the generation of both Analysis Parameter sets and Statistical narrowband Envelope generation.

### Topics

- Analysis Parameter Alarms vs/ Narrowband Alarms – What's the Difference?
- Database Setup Requirements and Reports
- Creating and Editing Analysis Groups
- Modifying and Creating New Parameter Alarms
- Creating and Editing Statistical Envelopes
- Using these Alarms within the Vibration Analysis Plotting Application

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

**Course e2074V CEUs: 0.1**

### Overview

This eLearning 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

For MHM training information please refer to the appropriate contact on page 118.
For regional training center contacts refer to pages 116-117.
Visit: www.emersonprocess.com/education for current dates, locations and enrollments.

## Online Prediction Operation and Maintenance

### Course 2088 CEUs: 2.8

**Overview**
This 4-day course best suits those who have a CSI 4500, CSI 6500, CSI 2600 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, CSI 2600 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, CSI 2600 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

## Online Protection Operation and Maintenance

### Course 2080 CEUs: 2.8

**Overview**
This 4-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 Online Prediction System
- System Troubleshooting and Maintenance

## CSI 6300 SIS Operations and Maintenance

### Course 2087 CEUs: 2.1

**Overview** This 3-day course is designed for System Users, Projects, Services and Support personnel for Emerson and its representatives. This course offers a Q&A section, practical exercises and troubleshooting.

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

**Topics**
- How to Implement the CSI 6300, and Use the Manuals for Integration
- System Safety Philosophy
- Overall Safety Calculations of the Complete Chain
- A Basic Explanation about SIL (why is it Done, What are the Reasons for Doing It, History, What Do the Different Safety Related Numbers Mean)
- A Description of:
  - HW Components;
  - Sensors; - Configuration SW;
  - Different System Variations;
  - Measurement and Safety Functionalities;
  - System Configuration;
  - Sensor and System Installation;
  - Implemented System and Safety Routines;
  - In & Output Functionalities;
  - Machinery Requirements

## 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
- Wireless Transmitters Installation, Configuration, Maintenance and Calibration
- THUM Installation, Wiring and Configuration
- Integrating and operating AMS Device Manager with the 1420 Wireless Gateway
- Operation of AMS Wireless Snap-On
- Modbus Serial Integration
- Modbus TCP Integration
- OPC Integration

## CSI 9420 Operations and Maintenance

### Course 2025 CEUs: 0.7

**Overview**
This 1-day course is intended for technicians, engineers and other plant personnel who need to know how to setup, maintain, troubleshoot, and view data from the CSI 9420 Wireless Vibration Transmitter. The course uses lectures and labs to maximize the hands on experience for the students.

**Prerequisites**
Course 2375 (Wireless Self Organizing Network) and some experience in Networks and Host integration would be helpful.

**Topics**
- Overview of CSI 9420 Hardware Components
- Vibration Basics and Terminology Relating to CSI 9420
- Import Data into AMS Machinery Manager
- View Data Using AMS Machinery Manager
- Troubleshooting and Maintenance

## 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.

## 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 3-day course.

For MHM training information please refer to the appropriate contact on page 118.
For regional training center contacts refer to pages 116-117.
Visit: www.emersonprocess.com/education for current dates, locations and enrollment.,

## 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.

**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

## OilView® for AMS Machinery Manager

### Course e2083 CEUs: 1.4

**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 -Onsite Analysis Using OilView®
- Importing Laboratory Data
- Basic Wear Debris Analysis
- Data Analysis and Reporting

## 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 2-day 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 IUe 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

## 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

## 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

## Balance Theory and Application for CSI 2130

### Course 2015 CEUs: 2.8

**Overview**
This 4-day course 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 Rechniques in an Industrial Setting

**Note:** May be taken as two 2-day classes

## Balancing Theory and Application for CSI 2140

### Course 2016 CEUs: 2.8

**Overview**

This 4-day class (2 days on Balancing Theory and 2 days on Balancing Applications with CSI 2140) teaches how to perform single- and dual-plane balancing using both graphical and analyzer-based balancing methods. The class uses the CSI 2140 Machinery Health Analyzer on lab machinery.

**Prerequisites**

Understanding of vibration analysis is recommended

**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 Techniques in an Industrial Setting

## 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

## Laser Alignment for CSI

### Course 2096 NEW CEUs: 1.8

**Overview** This 2-1/2 day class is intended for personnel who have limited or no alignment experience. The course provides training on shaft alignment using CSI laser alignment product line with focus on the CSI 2140 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.

**Prerequisites** None

**Topics**

- Alignment: What is it? Why?
- Required Pre-Shutdown Checks
- Pre-alignment Checks and Corrections
- The Science and Art of Alignment
- Tools and Techniques for moving Equipment
- Time-Savers
- User of CSI Laser Alignment Product Line with CSI 2140 Machinery Health Analyzer
- Alignment Information
- Management Systems: Methods and Advantages

## 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

## AMS Machinery Manager: Vibration Analysis Workshop for PDM Professional

### Course 2008B NEW CEUs:1.4

**Overview**

The purpose of this blended learning workshop is to provide the vibration analyst with an interactive learning environment that enhances their understanding of the features of the Vibration Analysis program using Emerson's AMS Machinery Manager Software. This workshop was designed as a self-paced blended learning training experience. The student will be provided with a workbook, access to a Virtual Training Computer and an eLearning module.

The workbook contains eleven topical exercises for use with the Vibration Analysis tab in AMS Machinery Manager. The student will also be given a link to a Virtual Training Computer to complete the exercises using AMS Machinery Manager. If there are questions on how to complete steps in the exercise, an eLearning module will provide assistance to the student.

If questions cannot be answered with the assistance of the eLearning module, students will also be able to email questions to an instructor.

For MHM training information please refer to the appropriate contact on page 118.
For regional training center contacts refer to pages 116-117.
Visit: www.emersonprocess.com/education for current dates, locations and enrollments.