Seminar Summaries

Universal Technologies' Training Seminar Summaries

Universal Technologies has extensive experience in professional training programs, presentation design and development. The following outlines the current portfolio of individual seminars and specified training program tracks for the following different work groups:

- **Management, Engineering and Procurement - MEP**
- **Operations – OPS**
- **Mechanical - MECH**
- **Instrument and Electrical Technicians – IAE**
- **PdM Technicians – PdM**

Management, Engineering and Procurement

MEP-301: Managing Machinery Reliability

Suggested For: Plant Management
Course Length: .5- 2.5 Days
Recommended Prerequisite: None

Designed specifically for plant management personnel involved with budget responsibility and implementation of Machinery Reliability programs, this seminar increases awareness of the need for a "precision" approach through use of extensive case histories and success stories. It also provides information on proven methods for justifying the investments in tools, time and training, as well as setting up the organization and implementing machinery reliability programs.

MEP-302: Procurement and Engineering Roles in Machinery Reliability

Suggested For: Plant Management
Course Length: 1- 3 Days
Recommended Prerequisite: None

Implementation of a machinery reliability program should include engineering and procurement personnel. This course introduces maintenance philosophies, fundamental concepts of precision maintenance, and emphasizes the key role of engineering and procurement in precision maintenance efforts. Particular attention is paid to balancing and alignment standards and tolerances for in-house and vendor personnel, and component and equipment specification procedures.

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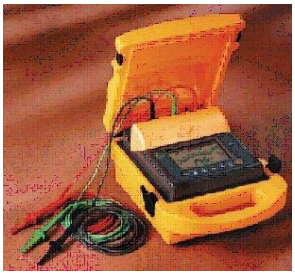
Seminar Summaries

MEP-401: Managing Mechanical Reliability using PdM Technologies

Suggested For: Management, Planners, Supervisors and Engineers
Course Length: 5 Days
Recommended Prerequisite: None.

Designed specifically for those who have management or supervisory roles within the organization, this seminar prepares management personnel to manage mechanical machinery reliability and PdM programs. A goal of this course is to provide information on the application, capabilities and limitations of the various PdM technologies in use today. Through the use of hands on demonstrations and extensive case histories and success stories, attendees come away with the knowledge needed to support and manage the use and implementation of PdM technologies in their facilities. It also provides information on proven methods for justifying the investment in PdM tools, time and training, as well as setting up the organization and implementing machinery reliability programs.



MEP-402: Managing Electrical Reliability with PdM Technologies

Suggested For: Mechanical Maintenance Personnel
Course Length: 3-5 Days
Recommended Prerequisite: None

Designed specifically for those who have management or supervisory roles within the organization, this seminar prepares management personnel to manage electrical equipment reliability and PdM programs. A goal of this course is to provide information on the application, capabilities and limitations of the various PdM technologies in use today. Through the use of hands on demonstrations and extensive case histories and success stories, attendees come away with the knowledge needed to support and manage the use and implementation of PdM technologies in their facilities. It also provides information on proven methods for justifying the investment in PdM tools, time and training, as well as setting up the organization and implementing machinery reliability programs.

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Seminar Summaries

Operations/Process Personnel

OPS-101: Basic Operator Care for Machinery Reliability

Suggested For: Operation Personnel
Course Length: 1-2.5 Days
Recommended Prerequisite: None

In order to successfully implement machinery reliability programs, it takes a total team approach. One key organizational entity is Operations/Production. This seminar provides the Operator with an overview of the maintenance approaches, equipment failure modes, and predictive technologies that are available. A sound understanding of the principles of operation of the general types of machinery and equipment with which the operators work on a daily basis is essential, as well as an awareness of common problems and operator troubleshooting processes for each. This ***Activity Based Training™*** shows how operators can assist in condition-based maintenance, including use of various inspection tools integrated with the application of the visual, audible, and tactile techniques for machinery inspection.

OPS-201: Advanced Operator Care for Machinery Reliability

Suggested For: Operation Personnel
Course Length: 1 - 2.5 Days
Prerequisite: OPS-101

This ***Activity Based Training™*** builds on the information presented and lessons learned in OPS-101. This is a highly customized class that deals with the operation, inspection and reliability of specific equipment that is typically unique to the plant or to a particular area of operations within a plant.

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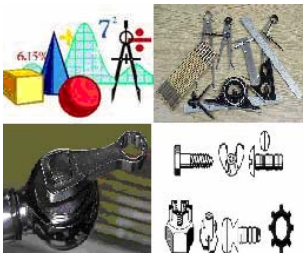
Seminar Summaries

Mechanical



MECH-100 : Fundamentals of Precision Maintenance

Suggested For: New Hires, Mechanical, Electrical and Instrumentation Technicians
Course Length: 40 hours
Recommended Prerequisite: None

Before embarking to enhance technician's knowledge and skills of precision maintenance, it first necessary to close existing gaps in common background topic areas that serve as the foundation for many more progressive tasks. This seminar addresses many of those fundamentals, including:
Basic Shop Math
Basic Industrial Science
Metallurgy for Maintenance Personnel
Drawings and Print Reading
Basic Measuring Instruments
Precision Measuring Instruments
Fasteners and Torquing

MECH-101 : Precision Maintenance Skills

Suggested For: Mechanical Technicians, Planners or Supervisors
Course Length: 4-5 Days
Recommended Prerequisite: None

This foundational seminar addresses fundamentals skills required for technicians to perform "precision repairs" on rotating equipment. Some sample questions answered in this seminar include the following:
What are precision maintenance, its benefits, and requirements?
How does precision maintenance effect vibration?
How do you determine the correct dimensions, tolerances, and fits for component parts of rotating machinery?
The proper use of precision measuring instruments such as dial indicators and 1/10,000th inch or 0.002 millimeters?
What is the difference between random assembly and precision assembly?
In addition to good alignment tools, what other alignment processes are needed to eliminate misalignment-related failures?

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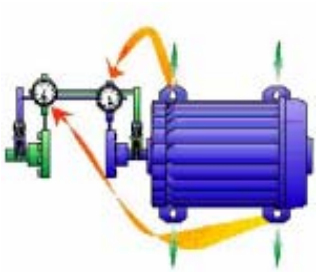
Seminar Summaries



MECH-201 : Precision Shaft Alignment …using dial indicators

Suggested For: Mechanical Technicians, PdM Technicians, Planners or Supervisor
Course Length: 3-5 Days
Recommended Prerequisite: MECH-101 or similar training

This ***Activity Based Training™*** seminar focuses on the fundamental skills required to perform precision alignment tasks. The importance of proper shaft alignment is emphasized, including the adverse effects of misalignment on bearing life and electrical energy consumption. Types and terms of misalignment and other basic concepts are discussed and re-enforced through numerous group activities. Graphical and calculation/computer solutions for simple and complex alignment problems are provided. Proper use of various rim-face and reverse dial indicator alignment processes are addressed based on client needs.

MECH-202: Precision Shaft Alignment…using rotalign laser systems

Suggested For: Mechanical Technicians, PdM Technicians, Planners or Supervisors
Course Length: 3-5 Days
Recommended Prerequisite: MECH-201

This seminar focuses on competent performance of shaft alignment tasks using the Rotalign Laser system. Extensive hands-on activities emphasize not only how the laser system works, but also how to combine the system with sound precision alignment processes to truly resolve misalignment related failures. ***More than one laser system tool can be address with prior arrangements.***

MECH-203: Precision Shaft Alignment…using rotalign pro laser systems

Suggested For: Mechanical Technicians, PdM Technicians, Planners or Supervisors
Course Length: 3-5 Days
Recommended Prerequisite: MECH-201

This seminar focuses on competent performance of shaft alignment tasks using the Rotalign Pro. Extensive hands-on activities emphasize not only how the laser system works, but also how to combine the system with sound precision alignment processes to truly resolve misalignment related failures. ***More than one laser system tool can be address with prior arrangements.***

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Seminar Summaries

MECH-204: Precision Shaft Alignment…using optalign laser systems

Suggested For: Mechanical Technicians, PdM Technicians, Planners or Supervisors
Course Length: 3-5 Days
Recommended Prerequisite: MECH-201

This seminar focuses on competent performance of shaft alignment tasks using laser Optalign Laser. Extensive hands-on activities emphasize not only how the laser system works, but also how to combine the system with sound precision alignment processes to truly resolve misalignment related failures. ***More than one laser system tool can be address with prior arrangements.***

MECH-205: Precision Shaft Alignment…using optalign plus laser systems

Suggested For: Technicians, PdM Technicians, Planners or Supervisors
Course Length: 3-5 Days
Recommended Prerequisite: MECH-201

This seminar focuses on competent performance of shaft alignment tasks using Optalign Plus Laser. Extensive hands-on activities emphasize not only how the laser system works, but also how to combine the system with sound precision alignment processes to truly resolve misalignment related failures. ***More than one laser system tool can be address with prior arrangements.***

MECH-206: Precision Shaft Alignment…using combi laser systems

Suggested For: Technicians, PdM Technicians, Planners or Supervisors
Course Length: 3-5 Days
Recommended Prerequisite: MECH-201

This seminar focuses on competent performance of shaft alignment tasks using combi laser. Extensive hands-on activities emphasize not only how each the system works, but also how to combine the system with sound precision alignment processes to truly resolve misalignment related failures. ***More than one laser system tool can be address with prior arrangements.***

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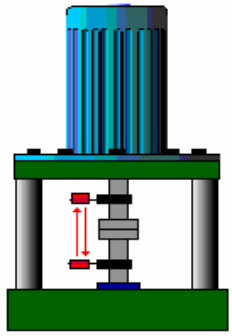
Seminar Summaries



MECH-207: Precision Shaft Alignment…vertical machines

Suggested For: Technicians, PdM Technicians, Planners or Supervisors
Course Length: 3-5 Days
Recommended Prerequisite: MECH-201

This seminar focuses on the special techniques and various methods used to perform precision shaft alignment tasks on vertical machines of many types, especially including vertical pump and motor alignment. Extensive hands on exercises on in-plant machinery are performed during this seminar.

MECH-301: Advanced Precision Shaft Alignment

Suggested For: Technicians, PdM Technicians, Planners or Supervisors
Course Length: 3-5 Days
Recommended Prerequisite: MECH-201

At every industrial facility, there exist machines and situations where achievement of precision shaft alignment is unusually challenging. This seminar provides solutions to those difficult tasks, such as machine train alignment, various methods of measuring and compensating for dynamic movement due to thermal growth, pipe strain, etc., and even how to perform precision geometric measurements where needed, including straightness, parallelism, flatness, and perpendicularity. Detailed procedures on each subject and how to apply specific alignment methods and instruments make this seminar truly unique.

MECH-302: Bearing Root Cause Failure Analysis

Suggested For: Mechanical Technicians
Course Length: 3 Days
Recommended Prerequisite: MECH-101

This seminar provides practical, easy-to-implement techniques for not only detecting that a bearing is about to fail, but more importantly, finding and correcting the ROOT CAUSE OF FAILURE. The seminar emphasizes root cause failure analysis processes and focuses on visual inspection of rolling element bearings, including failure terminology, analysis techniques and shows how combining these processes with vibration analysis procedures help get to the true root cause of the problem. This class involves 50% hands-on bearing failure analysis.

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Seminar Summaries

MECH-303: Gaskets, Packing and Mechanical Seal Failure Analysis

Suggested For: Mechanical Technicians
Course Length: 2-3 Days
Recommended Prerequisite: MECH-101

Preventing unexpected mechanical seal failures and unplanned outages saves hundreds of thousands of dollars throughout industry on a daily basis. This seminar provides practical, easy-to-implement techniques for finding and correcting the ROOT CAUSES OF SEAL FAILURE. The seminar reviews the basics of mechanical seals, including types of seals, proper installation, seal lubrication methods, etc. Emphasis is placed on failure analysis processes, how to accurately identify and evaluate the physical symptoms of mechanical seal failures that result from inadequate design/application, improper installation and assembly, adverse operating conditions/process problems, and adverse environmental conditions.

MECH-401: Applied Precision Maintenance Skills

Suggested For: Mechanical Technicians
Course Length: 4-5 Days
Prerequisite: MECH-101, MECH-302 and MECH-303

This ***Activity Based Training™*** seminar allows mechanical technicians to gain additional knowledge and skills by applying the fundamentals of precision maintenance while repairing specific types of equipment, including **pumps, fans/blowers, gearboxes, and compressors**. The intensively hands-on curriculum includes activities during which attendees will follow step-by-step procedures while inspecting, evaluating, and assembling each of these machines.

MECH-402: Precision Pump Repair

Suggested For: Mechanical Technicians
Course Length: 8 Days
Prerequisite: MECH-101, MECH-302 and MECH-303

In this seminar, attendees gain additional knowledge and skills by applying the fundamentals or precision maintenance to tasks involving various types of horizontal and vertical pumps. The intensively hands-on curriculum includes activities during which attendees will follow step by step procedures while disassembling, inspecting, evaluating, and assembling pumps.

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Seminar Summaries

Instrument and Electrical Technicians

IAE-101: Electrical Fundamentals for Non-Electrical Personnel

Suggested For: Mechanical Maintenance Personnel
Course Length: 5 Days
Recommended Prerequisite: None

This seminar addresses cross-over of responsibility for certain electrical tasks by mechanical maintenance personnel. The seminar begins with fundamentals skills, including the proper and safe use of electrical measuring and test instruments and hand tools, such as multi-meters, meggers, and ammeters, wire strippers and crimpers, just to name a few. Safe and proper instruction is conducted in electrical troubleshooting and repair or replacement of industrial electrical motors, motor starters and associated I/O (input/output) devices.

Throughout this seminar, instructor demonstrations are combined with emphasis on safety and extensive student hands-on activities to drive home the key points.

The overall seminar provides safe and practical techniques to ensure that proper electrical maintenance tasks are performed *confidently and correctly the first time.* Root Cause Failure determination processes consistently demonstrate that human error in basic electrical skills is too often the source of a problem.

IAE-102: Precision Maintenance Skills for Electricians

Suggested For: Mechanical Maintenance Personnel
Course Length: 5 Days
Recommended Prerequisite: MECH-101

This course addresses fundamentals skills required for electrical technicians to perform “precision repairs” on rotating equipment. The scope of this class is reduced from the Mechanical version to accommodate the types of tasks that electricians perform including bearing installation and failure analysis, machine base preparation etc. Some sample questions answered in this seminar include the following:
What are precision maintenance, its benefits, and requirements?
How does precision maintenance effect vibration?
How do you determine the correct dimensions, tolerances, and fits for component parts of rotating machinery?
How do you properly use the precision measuring instruments such as dial indicators and 1/10,000th micrometers?
What is the difference between random assembly and precision assembly?
In addition to good alignment tools, what other alignment processes are needed to eliminate misalignment-related failures?

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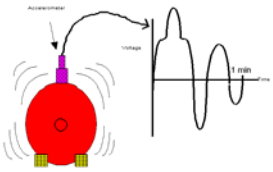
Seminar Summaries

PdM Technicians



PdM-101 : Introduction to Vibration and Detection Analysis

Suggested For: All Plant Personnel
Course Length: 2.5-3 Days
Recommended Prerequisite: None

Designed as an introduction to vibration analysis, this seminar creates a strong understanding of the terminology, capabilities and limitations of vibration data collection and analysis programs. It is designed for personnel who play the vital supporting roles in effective machinery reliability programs. The seminar focuses on the practical application of vibration detection, vibration analysis and correction techniques.

PdM-102: Vibration Analysis Level 1 Plus

Suggested For: PdM Technicians
Course Length: 2.5-3 Days
Recommended Prerequisite: None

The ***Level 1 Plus*** ™ concept addresses this issue by teaching the attendee "how to" as well as preparing the candidate for level 1 **certification.** This seminar aims to first qualify individuals to perform vibration data collection and analysis tasks associated with ASNT vibration level 1 certification, and then certify them to ASNT level 1. The result of this approach is that individuals who successfully complete the seminar will be qualified to perform level 1 vibration tasks.

PdM-201 : The Practical Vibration Analyst

Suggested For: PdM Technicians
Course Length: 5 Days
Recommended Prerequisite: None

A primary goal of modern condition-based maintenance programs is to maximize machinery reliability. A key component of extending machinery life is effective analysis of the root cause of machinery failure, and using this knowledge to prevent recurrence of the failure. **This seminar focuses on the use of practical vibration analysis and correction techniques.** Using our unique ***Activity Based Training*™** format, analysts do not just learn the concepts of analysis, but receive detailed information on how to implement these concepts as a part of an effective machinery reliability program. Upon completion of the course each attendee will have a set of detailed set up procedures customized to their instrument for all primary vibration analysis techniques.

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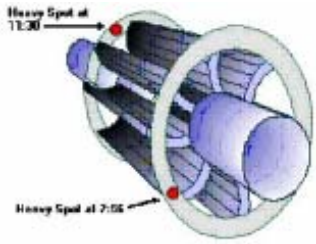
Seminar Summaries

PdM-202: Vibration Analysis Level 2 Plus

Suggested For: PdM Technicians
Course Length: 2.5-3 Days
Prerequisite: PdM-102 or Level 1 certification

Level 2 Plus ™
This seminar aims to first qualify individuals to perform the vibration data collection and analysis tasks associated with ASNT vibration level II **certification**, and then certify them to ASNT level II. The result of this approach is that individuals who successfully complete the seminar will be qualified to perform level II vibration tasks.



PdM-203 : Precision Field Balancing

Suggested For: Mechanical Technicians
Course Length: 3 Days
Recommended Prerequisite: PdM-102 or Pdm-201

Unbalance is recognized as the second leading cause of premature machinery failure. This ***Activity Based Training*** ™ seminar starts with the fundamentals of balancing and progresses to instrument specific processes and procedures for single-plane and two-plane balancing. The course concludes with extensive information and solutions for challenges commonly encountered while performing balancing tasks.

PdM-204: Precision Shop Balancing

Suggested For: Mechanical Technicians
Course Length: 1-3 Days
Recommended Prerequisite: PdM-203

This hands-on seminar quantifies the basics of achieving precision balance according to the API 610 (7th edition) tolerance or the ISO quality grade G1 tolerance. Balancing machine operation and instrument setup are explained and demonstrated including options such as electronic biasing (nulling), impeller indexing, averaging over time and component balancing. Detailed balancing procedures are provided for balancing complete rotor assemblies including their fitments such as couplings, keys and impellers. Tips and tricks of the trade are emphasized throughout, including precautions for adding/removing weight, balancing overhung rotors, dealing with axial thrust, and resolving problems with the accumulation of assembly errors during progressive assembly balancing.

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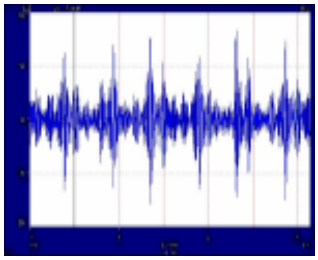
Seminar Summaries

-PdM-301: The Advanced Vibration Analyst

Suggested For: PdM Technicians
Course Length: 5 Days
Recommended Prerequisite: PdM-201 or Pdm-202 and 18 months experience

This seminar is intended for personnel who have at least 18 months of vibration analysis experience and a thorough understanding of the fundamentals of condition monitoring and vibration analysis. The seminar provides an in depth study of various diagnostic techniques including: Time Waveform Analysis, Phase Analysis, Resonance Testing, ODS, Electric Motor Analysis, Special Signal Processing Techniques, Slow Speed Machines, Condition Monitoring Program Management and Communication.



PdM-302: Time Waveform Analysis

Suggested For: PdM Technicians
Course Length: 2-3 Days
Recommended Prerequisite: PdM-201 or Pdm-202 and 18 months experience

This ***Activity Based Training™*** seminar examines the limitations of the FFT process, identifies specific applications where enhancing FFT information with time waveform analysis is appropriate, and discusses the interpretation of time waveform data in those applications. The seminar covers in practical terms detailed information on how to set up your instrument, acquire, manipulate, and analyze time waveform data.

Universal Technologies, Inc. ***Activity Based Training™*** seminars provide practical information as well as procedures that are specific to your tools and instruments that result in immediate transfer of knowledge and skills to the job. All training materials are developed in accordance with current systematic approach to training (SAT) models for accredited training, and are customized based on specific clients needs. Contact our office for more detailed information on how
Universal Technologies, Inc. can assist you with your reliability training initiatives.

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