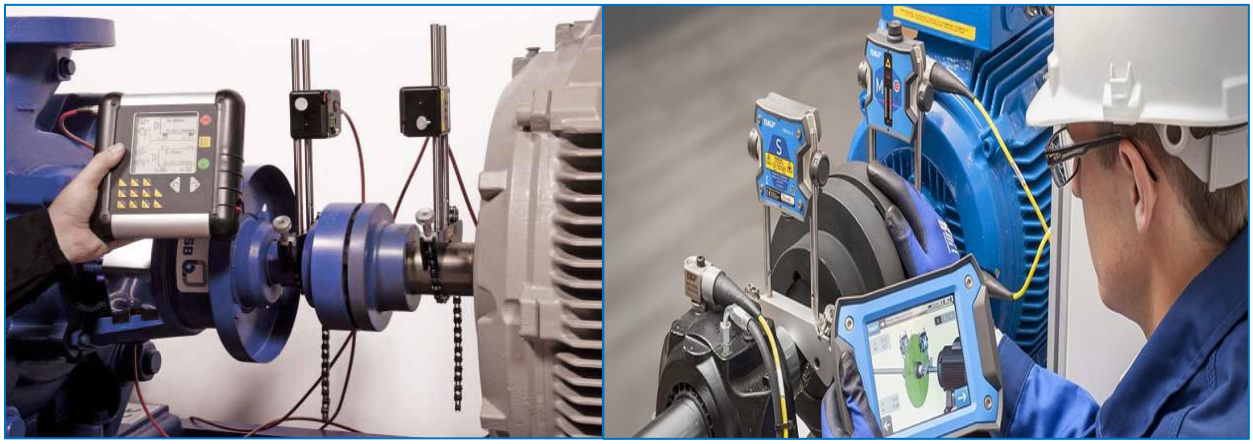
Tel No:+97126654546 | Fax No:+97126654182 | Email: training@cmc-me.com | www.cmc-me.com



ME048:
Mechanical Alignment:
Laser & Dial Indicator Techniques

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Training Description:

This intensive training course is designed to meet the needs required by the industry in providing a comprehensive training in mechanical alignment procedures and tools for a variety of machine couplings, belt pulleys, shafts, etc. It teaches how to align precisely the rotating machinery using laser and dial-indicator techniques that will allow personnel to identify and resolve alignment problems quickly and efficiently.

The course will cover the fundamentals, terminology and principles of machinery alignment; the various types of misalignment which can occur; the concept of desired alignment, hot alignment and plot graphs in order to carry out the procedure; the pre-alignment procedures, soft-foot correction, pipe strain and thermal growth measurements; the rim & face (R&F) and reverse dial indicator (RDI); the proper laser-based machinery alignment techniques; and the alignment workshop including reverse dial indicator and laser based shaft alignment.

Training Objectives:

By the end of the training, participants will be able to:

- ✓ Apply systematic techniques and good working knowledge on mechanical alignment including laser and dial-indicator techniques
- ✓ Discuss machinery alignment fundamentals, terminology and principles
- ✓ Recognize and describe the types of misalignment which can occur
- ✓ Describe the concept of desired alignment, hot alignment and plot graphs in order to carry-out the procedure
- ✓ Employ pre-alignment procedures, soft-foot correction, pipe strain and thermal growth measurements
- ✓ Carry-out rim & face (R&F) and reverse dial indicator (RDI) and implement the proper laser-based machinery alignment techniques
- ✓ Discuss alignment workshop including reverse dial indicator and laser-based shaft alignment

Training Designed for:

This course is intended for Rotating Equipment and OEM Engineers, Precision Maintenance, Supervisors, Managers and other Technical Staff who are responsible for the operation, maintenance and reliability of rotating equipment.

Training Requirement:

"Hand's on practical sessions, equipment and software will be applied during the course if required and as per the client's request."

Contents can be adapted to your specific wishes. It is therefore possible to focus on specific modules of the training course as per client's learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Program:

DAY ONE:

- PRE-TEST
- Introduction
  - What is Misalignment?
  - Why Worry?
  - Symptoms of Misalignment, Types of Misalignment
  - Safety Hazards, Applicable Codes
- Alignment Tools
  - Standard Measuring Tools
  - Dial Indicators
  - Laser Alignment Kits
  - Optical
  - Tooling and Measurements
- Alignment Techniques
  - Overview
  - Rim and Face Dial Indicator
  - Reverse Dial Indicator
  - Laser Alignment (OptAling, RotAling, etc.)
  - Optical Measurements (Cold to Hot Movement)

DAY TWO:

- How to Install and Rough-Align Machinery
  - Pre-Installation Checks (Sag, Soft Foot, Run-Out, Mechanical Looseness, Motor Magnetic Centre, Piping Strain)
  - Acquiring and Plotting Alignment Readings
- Alignment Graphs
  - Prepare Graphs for Cold Reverse Alignment (Plot Vertical Readings, Plot Horizontal Readings)
  - Prepare Graphs for Hot Alignment (Plot Vertical Reading, Plot Horizontal Readings)
  - Performing Cold Graphic Alignment Without Error
- Coupling Alignment
  - Common and Special Couplings
  - Using the Straight Edge and Feeler Gage
  - Method
  - Coupling Alignment with Four Different Couplings
  - Electric Motor and Drive
  - Shaft Alignment
- Video Presentation
  - Vibration Analysis

DAY THREE:

- Vertical Machinery Alignment
  - Considerations

- Dial Indicator and Laser Considerations
- Face-Mounted Motor
- Shim Calculations

❖ Rim and Face Dial Indicator Shaft Alignment
- Review of Technique
- Graphical Layout of Machinery
- Acquiring and Plotting
- Alignment Readings
- What Can Go Wrong?

❖ Alignment Workshop
- Motor-Pump Case History
- Motor-Gearbox-Compressor

❖ Reverse Dial Indicator Shaft Alignment
- Review of Technique
- Graphical Layout of Machinery
- Acquiring and Plotting
- Alignment Readings
- What Can Go Wrong?

DAY FOUR:

❖ Laser-Based Shaft Alignment
- Review of Current Technology
- Operating Procedures
- Coupling Results vs. Feet Movements
- Advantages and Limitations of Laser Technique

❖ Practical Alignment Applications
- Cooling Tower Fan Drives
- Proper Alignment of V-Belt Drives Aligning
- Multiple Machine Cases
- Various Coupling Types Alignment
- Thermal Growth of Different Machine Types

❖ Case History Workshop
- Turbine Generator
- Vertical Pump

❖ Measuring and Correcting Soft-Foot
- Definition
- Types of Soft-Foot
- Measurement Techniques
- Correction Techniques

❖ Video Presentation
- Laser Alignment

❖ Simulator (Hands-on Practical Sessions)
- Practical session will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the state-of-the-art simulator “iLearnVibration”

DAY FIVE:

- Alignment Tolerances
  - Defining Misalignment
  - Tolerance Guidelines
  - Shaft versus Coupling Alignment
- Real-World Conditions
  - Bolt-Bound Machinery Feet
  - Flexible Foundations and Soft-Foot
- Alignment Best Practices
  - Documentation Requirements
  - Safety Considerations
  - When to Stop
- Course Conclusion
- POST-ASSESSMENT and EVALUATION

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Gamification, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

CMCT Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:

TBA as per the course location - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:00	Recess (Prayer Break & Lunch)
13:00 - 14:00	Last Session

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For training registrations or in-house enquiries, please contact:

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