



SC086: Condition Based Monitoring & Maintenance

Training Description:

Modern process industries are seeking to maximize the value of their existing assets by leveraging new technologies to optimize operations and maintenance activities. One of the most successful maintenance strategies is a condition-based approach which utilizes data collected from periodic inspections, testing and predictive maintenance technologies to determine the optimum maintenance requirements.

Contrary to the traditional time-based maintenance approach, Condition Based Maintenance (CBM) is a process, which utilizes monitoring and diagnostic data to drive the maintenance decision process. Condition Based Monitoring (CBM) of power plants can help reduce downtime, increase the safety of plant operations and provide an accurate indicator of impending faults. This can lead to better planned maintenance shutdowns, the avoidance of unplanned shutdowns and a reduction in cost.

Condition Based Monitoring (CBM) primarily involves the continuous analysis of operational equipment and the identification of problems before component breakage or machine failure. CBM has mostly been associated with the analysis of rotating and reciprocating equipment.

Almost any equipment, be it electrical, hydraulic, mechanical, or thermal, generates characteristic signals or 'signature' during optimal performance. A change in this signal, even if marginal, could be an early warning regarding potential equipment failure. The practice of condition-based monitoring and maintenance can be an invaluable tool in improving maintenance efficiency, safety and equipment use. With the proper skills and equipment, plant maintenance technicians not only detect problems before they result in a major machine malfunction or breakdown, but they also perform root cause failure analysis to prevent problems from recurring. Highly trained condition monitoring technicians can have a significant impact on a plant's bottom line profitability.

This intensive training course is designed to provide an insight into Condition Based Monitoring (CBM). It will cover the various methods of maintenance and it will give the participant an introduction to the techniques utilized in Condition Based Monitoring such as Noise & Vibration Measurement, Infrared Thermography, Oil Debris Analysis, Laser Alignment and Balancing. Following this course participants will understand the place of condition monitoring in the maintenance process and will appreciate the implications for maintenance cost saving and improved machine reliability. They will be able to assess plant for the most appropriate monitoring parameter, will learn of the various specialist instruments and methods, be able to plan a monitoring programme and set up measurement rounds.

The course will introduce participants to the dynamic behaviour of machines and discuss appropriate fault detection and diagnostic criteria and schemes for various applications. It will address the more popular techniques which employ dynamic data analysis, including vibration and acoustic emission signals for the recognition of early life failures in machines. Emphasis will be placed on the practical application of tools to identify a wide range of mechanical, electrical and lubrication flaws in machinery and an objective approach to the optimum choice of analysis procedure.

Training Objectives:

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

- ✓ Apply and gain knowledge on condition-based monitoring and maintenance
- ✓ Interpret the role of condition monitoring in the maintenance process

- ✓ Assessing the plant for the most appropriate monitoring parameter
- ✓ Present the various techniques and equipment
- ✓ Plan a monitoring programme and set up measurement rounds
- ✓ Solve maintenance problems using the Root Cause Analysis (RCA) technique
- ✓ Discuss of the various maintenance techniques such as breakdown maintenance, preventive maintenance, predictive maintenance and Reliability Centered Maintenance
- ✓ Employ condition monitoring techniques and implement a CBM Program
- ✓ Discuss monitored parameters and parameter symptom limits
- ✓ Employ proper techniques on thermal monitoring, lubricant monitoring, vibration monitoring and recognize the vibration symptoms and the relationship with machine faults
- ✓ Present the Fault Detection Process and the ISO requirement

Training Designed for:

This course is intended for engineers and other technical staff whose responsibilities require them to be proficient in the set-up and use of condition monitoring systems. This further includes maintenance supervisors, predictive maintenance coordinators, reliability engineers, shop supervisors, advanced mechanics, inspectors and millwrights.

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.”

Practical sessions will be organized during the course for participants to practice the theory learnt. Participants will be provided with an opportunity to carryout various exercises using our state-of-the-art simulator “iLearnVibration”.

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 to CBM
 - Problem Solving Process – Root Cause Analysis, RCA Techniques, Maintain, Breakdown Maintenance, Fixed Time/Regular Preventive, Design-Out Maintenance, Condition Based Maintenance
- ❖ Condition Monitoring
 - Paper Based Systems, Hard Wired Sensors, Portable Data Collectors, Integrated CBM, Systematic Application of CM
- ❖ Recap

DAY TWO:

- ❖ Implementing a CBM Program

- Machine Life Cycle, Warning and Alarm Levels, Monitoring Frequency, System Set-Up, Monitored Parameters, Frequency of Monitoring, Location of Measurement Points
- ❖ **Monitored Parameters**
 - Tactile, Visual and Actual Monitoring, Thermal Monitoring, Lubricant Monitoring, Leak Detection, Corrosion monitoring, Performance Monitoring Vibration Monitoring, Interpretation of Data According to Data Type
- ❖ **Recap**

DAY THREE:

- ❖ **Parameter Symptom Limits**
 - The Role of Symptom Limits, The Bases for Symptom Limit Setting
 - The Accuracy of Conventionally Set Symptom Limits, Statistical Process Control Ideas
 - Achievable Improvements in Accuracy, Adaptive Variations
- ❖ **Thermal Monitoring**
 - Ways of Monitoring Temperature, Sensitivities and Symptom Masking, Fault Detection Capability
- ❖ **Recap**

DAY FOUR:

- ❖ **Lubricant Monitoring**
 - Sources of Wear Debris, The Distinction Between Amount, Size, Shape and Chemical Breakdown, The Condition of The Lubricant Itself, Monitoring and Analysis Techniques, Spectrographic, Spectrometric and Ferrographic Measurements
- ❖ **Vibration Monitoring**
 - Components of a Signal, Vibration Transducers, Overall and Spectral Vibration, Monitoring Point Location and Transducer Mounting, Common Fault Symptoms
- ❖ **Simulator (Hands-on Practical Sessions)**
 - Practical sessions will be organized during the course for participants to practice the theory learnt. Participants will be provided with an opportunity to carryout various exercises using our state-of-the-art simulator "iLearnVibration"

DAY FIVE:

- ❖ **Vibration Symptoms**
 - Machine Faults and The Frequency Range Of Symptoms, Shaft-Related Faults-Looseness, Misalignment And Imbalance, Gearbox Faults – Localised Faults And Distributed Faults, Rolling Element Bearing Faults – Impact Excited Resonance
- ❖ **Fault Detection**
 - Vibration Level Classification, ISO Standards, Peak and rms Levels
 - Dynamic Range, Use of FFT Analysers, Constant Percentage Bandwidth Spectra
- ❖ **Course Conclusion**
- ❖ **POST-TEST and EVALUATION**

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 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 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

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

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