COURSE OVERVIEW ME0200
Bearing Lubrication, Installation, Inspection, Maintenance, Troubleshooting & Failure Analysis
Bearing Root Cause Failure Analysis

Course Title
Bearing Lubrication, Installation, Inspection, Maintenance, Troubleshooting & Failure Analysis: *Bearing Root Cause Failure Analysis*



Course Date/Venue
Session 1: March 21-25, 2027/Meeting Plus 9, City Centre Rotana, Doha, Qatar
Session 2: August 29-September 02, 2027/Meeting Plus 9, City Centre Rotana, Doha, Qatar

Course Reference
ME0200

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Description






This practical and highly-interactive course includes practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

It is an industry recognized fact that in excess of 90% of premature bearing failures can be attributed to lubrication, contamination or installation issues. Determining the true cause of bearing failure, subsequently correcting this problem and then adopting the correct fitting procedures can dramatically increase bearing life and resulting in an overwhelming increase in equipment reliability and a dramatic reduction in unplanned downtime.

This course introduces a maintenance employee to the basic types of bearings and common nomenclature used. Bearing design, installation and maintenance is discussed with a focus on preventing premature failure. The participant is also trained to analyze failed bearings so a similar occurrence will not happen again.

Upon the successful completion of this course, each participant will be able to identify common sources of premature machinery failure and define precision mechanical maintenance practices to improve performance and extend machinery life.

This course is designed to get the most critical part of a Machinery Improvement program into action. Skills and awareness to both maintain and considerably improve your equipment are presented and practiced in an easy-to-understand format. It is also designed in order to make participants familiar with how to remove, inspect, maintain, select, design, handle, install, and troubleshoot bearings according to manufacturers' instructions and best practices. Participants learn how to identify replacement bearings and install and maintain the bearings properly using the right tools.

Course Objectives/Outcomes & Benefits for the Participants

Upon the successful completion of this course, each participant will be able to:-

- Apply systematic techniques on bearing lubrication, installation, inspection, maintenance, troubleshooting and failure analysis
- Identify different bearing components including plain bearing, ball or roller bearings, cage assembly and others
- Estimate the improvement in bearing materials and designs
- Enumerate different bearing types and their applications
- Perform bearing installation and inspect bearing lubrications
- Analyze the lead, speed, life and tolerance of bearings and evaluate the reasons for bearing failure and failures caused by internal radial clearance
- Identify shaft and housing fits of bearings
- Conduct failure analysis, condition monitoring and proper handling to preserve bearing life
- Demonstrate proper precision alignment, mounting and dismounting procedures
- Evaluate the precision balancing and the effect of assembly errors
- Estimate bearing life and identify the causes of immediate bearing failures

Exclusive Smart Training Kit - H-STK®



*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

This course covers systematic techniques and methodologies on the lubrication, installation, inspection, maintenance, troubleshooting and failure analysis of bearings for maintenance and reliability engineers and other maintenance staff.

Course Fee

US$ 6,000 per Delegate. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Haward's certificates are accredited by the following international accreditation organizations:

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



Mr. Karl Thanasis, PEng, MSc, MBA, BSc, is **Senior Engineer** with over **30 years** of extensive industrial experience. His wide expertise includes **Energy Efficient Operation** of **District Cooling Plants**, **Piping & Pipeline**, Maintenance, Repair, **Shutdown**, **Turnaround & Outages**, **Maintenance & Reliability** Management, **Mechanical Maintenance** Planning, Scheduling & Work Control, Advanced Techniques in **Maintenance** Management, **Predictive & Preventive** Maintenance, **Maintenance & Operation Cost Reduction** Techniques, Reliability Centered Maintenance (**RCM**), **Machinery Failure** Analysis, **Rotating Equipment Reliability** Optimization & Continuous Improvement, **Material Cataloguing**, **Mechanical & Rotating Equipment** Troubleshooting & Maintenance, **Root Cause Analysis & Reliability** Improvement, **Condition** Monitoring, **Root Cause Failure Analysis** (RCFA), **Steam Generation**, **Steam Turbines**, **Power Generator Plants**, **Gas Turbines**, **Chiller Equipment**, **Trane Chiller Diagnostics Troubleshooting**, **Combined Cycle Plants**, **Boilers**, **Process Fired Heaters**, Air Preheaters, Induced Draft Fans, All Heaters Piping Work, Refractory Casting, Heater Fabrication, Thermal & Fired Heater Design, **Heat Exchangers**, Heat Transfer, Coolers, **Power Plant** Performance, Efficiency & Optimization, **Storage Tank** Design & Fabrication, **Thermal Power Plant** Management, **Boiler & Steam** System Management, **Pumps & Compressors**, **Pump** Operation & Maintenance, **Chiller & Chiller Plant** Design & Installation, **Pressure Vessel**, **Safety Relief Valve** Sizing & Selection, **Valve** Disassembling & Repair, Pressure Relief Devices (**PSV**), **Hydraulic & Pneumatic** Maintenance, Advanced **Valve** Technology, **Pressure Vessel** Design & Fabrication, **Pumps**, Turbo-Generator, Turbine **Shaft Alignment**, **Lubrication**, Mechanical **Seals**, Packing, **Blowers**, **Bearing** Installation, **Couplings**, **Clutches** and **Gears**. Further, he is also versed in **Wastewater Treatment** Technology, **Networking** System, **Water Network Design**, Industrial **Water Treatment** in Refineries & Petrochemical Plants, **Piping** System, Water Movement, Water Filtering, Mud Pumping, **Sludge Treatment** and **Drying**, **Aerobic Process** of **Water Treatment** that includes **Aeration**, **Sedimentation** and **Chlorination Tanks**. His strong background also includes **Design** and **Sizing** of all **Waste Water Treatment Plant Associated Equipment** such as **Sludge Pumps**, **Filters**, **Metering Pumps**, **Aerators** and **Sludge Decanters**.

Mr. Thanasis has acquired his thorough and practical experience as the **Project Manager**, **Plant Manager**, **Area Manager - Equipment Construction**, **Construction Superintendent**, **Project Engineer** and **Design Engineer**. His duties covered **Plant Preliminary Design**, **Plant Operation**, **Write-up** of **Capital Proposal**, **Investment Approval**, **Bid Evaluation**, **Technical Contract Write-up**, **Construction** and **Sub-contractor Follow up**, **Lab Analysis**, **Sludge Drying** and **Management** of **Sludge Odor** and **Removal**. He has worked in various companies worldwide in the **USA**, **Germany**, **England** and **Greece**.

Mr. Thanasis is a **Registered Professional Engineer** in the **USA** and **Greece** and has **Master** and **Bachelor** degrees in **Mechanical Engineering** with **Honours** from the **Purdue University** and **SIU** in **USA** respectively as well as an **MBA** from the **University of Phoenix** in **USA**. Further, he is a **Certified Internal Verifier/Trainer/Assessor** by the **Institute of Leadership & Management** (**ILM**) a **Certified Instructor/Trainer** and has delivered numerous trainings, courses, seminars, workshops and conferences worldwide.

Training Methodology

Our courses employ an interactive, learner-centred methodology that integrates theoretical knowledge with practical application. The training is delivered through a suitable combination of some or all of the following methods, selected according to the course content and learning objectives:

- Instructor-led presentations and facilitated discussions
- Practical workshops and participant presentations
- Hands-on exercises and real-world case studies
- Equipment demonstrations and technical drawings
- Hardware- and software-based simulations
- Gamification & Role Play in soft-skills courses only
- Virtual Reality (VR) and Augmented Reality (AR)
- Instructional videos and other relevant training resources

This blended approach encourages active participation, strengthens practical skills and supports the effective application of acquired knowledge in the workplace.

Learning Design & Customization

This course can be customized to the exact requirements of clients. Haward Technology is so proud of our huge capabilities in tailoring our courses to the training needs of our valued clients.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 – 0800	*Registration and Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction*** *The Bearing Equation ● Improvements in Bearing Materials and Design ● Dynamic Load Ratings of Bearings Versus Actual Forces*
0930 – 0945	*Break*
0945 – 1100	***Bearing Components*** *Plain Bearings ● Ball or Roller Bearings ● Cage Assembly ● Seals, Shields, Snap-Rings and Bearing Hardware*
1100 – 1230	***Bearing Types & Applications*** *Types of Radial Ball Bearings and Their Uses ● Types of Radial Roller Bearings and Their Uses ● Pre-Mounted Bearings (Flange, Pillow Block, etc.) ● Understanding Manufacturers Identification Numbers*
1230 – 1245	*Break*
1245 – 1420	***Bearing Types & Applications (cont'd)*** *ABMA Identification ● Identifying Bearing Hardware ● Internal Clearance and Bearing Application ● ABEC and RBEC Tolerances*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Bearing Installation*** *The Importance of Cleanliness ● Mounting Tapered Shaft Bearings ● Proper Bearing Fits and Methods to Correct Loose Fits*
0930 – 0945	*Break*
0945 – 1100	***Bearing Installation (cont'd)*** *Proper Bearing Installation Using Heat, Force and Other Methods ● Classroom Exercise*
1100 – 1230	***Bearing Lubrication*** *Purpose of Lubrication in Bearings ● When to Use Oil vs. Grease ● Lubrication Methods and Frequency*
1230 – 1245	*Break*
1245 – 1420	***Bearing Inspection*** *Proper Disassembly and Cleaning for Inspection ● Common Failure Modes ● Classroom Inspection and Analysis Exercise*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***Bearing Maintenance*** *Overview of Precision Maintenance and Why it Contributes to Bearing Life ● Understanding Proactive Rather than Reactive Maintenance Philosophy*
0930 – 0945	*Break*
0945 – 1100	***Tolerance*** *Examining Bearing Tolerance and the Reason for Them*
1100 – 1230	***Shaft & Housing Fits*** *What & Why Bearing Fit has an Effect on Bearing Performance and Life*
1230 – 1245	*Break*
1245 – 1420	***Internal Radial Clearance*** *A look at Why Internal Clearances can Cause Failure*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 – 0930	***Failure Analysis & Condition Monitoring*** *Overview of Vibration Sources and Effects*
0930 – 0945	*Break*
0945 – 1100	***Failure Analysis & Condition Monitoring (cont'd)*** *Effects of Balance on Vibration Analysis*
1100 – 1230	***Proper Handling*** *How Handling Preserves Bearing Life and Ease of Installation*
1230 – 1245	*Break*
1245 – 1420	***Mounting & Dismounting*** *Common Errors in Bearing Removal and Installation*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

0730 – 0930	***Vibration Terminology & Analysis*** *Understanding Vibration Causes, Effects and Remedies*
0930 – 0945	*Break*
0945 – 1100	***Precision Alignment Fundamentals*** *What it Takes to Perform Precision Alignment*
1100 – 1230	***Precision Balancing & the Effect of Assembly Errors*** *Why Balancing Effects Maximum Bearing Life*
1230 – 1245	*Break*
1245 – 1345	***Bearing Life & Why Bearings Fail Early*** *Typical Causes of Bearing Failure and How to Avoid Them*
1345 – 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulator (Hands-on Practical Sessions)

Practical sessions 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".



iLearnVibration Simulator

Course Coordinator

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