COURSE OVERVIEW RE0064-3D
ISO 18436 Category III
Advanced Vibration Analyst Training & Certification

Course Title
ISO 18436 Category III: *Advanced Vibration Analyst Training & Certification*

Course Date/Venue
December 22-26, 2024/ Al Aziziya Hall, The Proud Hotel Al Khobar, Al Khobar, KSA

Course Reference
RE0064-3D

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

Course Description

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

This course is designed to provide participants with a detailed and up-to-date overview of advanced vibration analysis in accordance with ISO 18436. It covers the conditions monitoring technologies and ISO standards; the signal processing and data acquisition; the time waveform analysis covering collecting data and diagnosing unbalance, misalignment, bend shaft, eccentricity, cocked bearing, resonance, looseness and other conditions; and the phase analysis through collecting data and bubble diagrams.

During this interactive course, participants will learn the natural frequencies and resonances dynamics covering mass, stiffness, damping SDOF and MDOF; the natural frequencies testing and operating deflection shape (ODS) analysis; the modal analysis and finite element analysis (FEA); correcting resonances; the rolling element bearing fault detection, journal bearing fault detection and electric motor testing; the pumps, fans and compressors; the gearbox fault detection and corrective action; running a successful condition monitoring program by setting baselines, alarms, goals and expectations; and the acceptance testing and ISO standards review.

Course Objectives

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

- Get prepared for the next Vibration Analyst exam and have enough knowledge and skills to pass such exam in order to get certified as *Vibration Analyst: Category III"* in accordance with ISO 18436 standards from Mobius Institute
- Review conditions monitoring technologies and ISO standards
- Discuss signal processing and data acquisition as well as illustrate time waveform analysis covering collecting data and diagnosing unbalance, misalignment, bend shaft, eccentricity, cocked bearing, resonance, looseness and other conditions
- Illustrate phase analysis through collecting data and bubble diagrams
- Interpret natural frequencies and resonances dynamics covering mass, stiffness, damping SDOF and MDOF
- Employ natural frequencies testing and operating deflection shape (ODS) analysis
- Carryout modal analysis and discuss finite element analysis (FEA)
- Identify correcting resonances as well as apply rolling element bearing fault detection, journal bearing fault detection and electric motor testing
- Recognize pumps, fans and compressors and employ gearbox fault detection and corrective action
- Run a successful condition monitoring program by setting baselines, alarms, goals and expectations
- Apply acceptance testing and review ISO standards

Who Should Attend

This course provides an overview of all significant aspects and considerations of ISO Vibration Analysis Category III for those who are confident with spectrum analysis but wishes to push on and learn more about signal processing, time waveform and phase analysis, cross-channel testing, machine dynamics and fault correction. This includes maintenance, reliability, rotating equipment, process, control and instrumentation personnel, engineers, maintenance supervisors, mechanical foremen, specialists and other technical staff.

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, sample video clips of the instructor's actual lectures & practical sessions during the course conveniently saved in a **Tablet PC**.*

Exam Eligibility & Structure

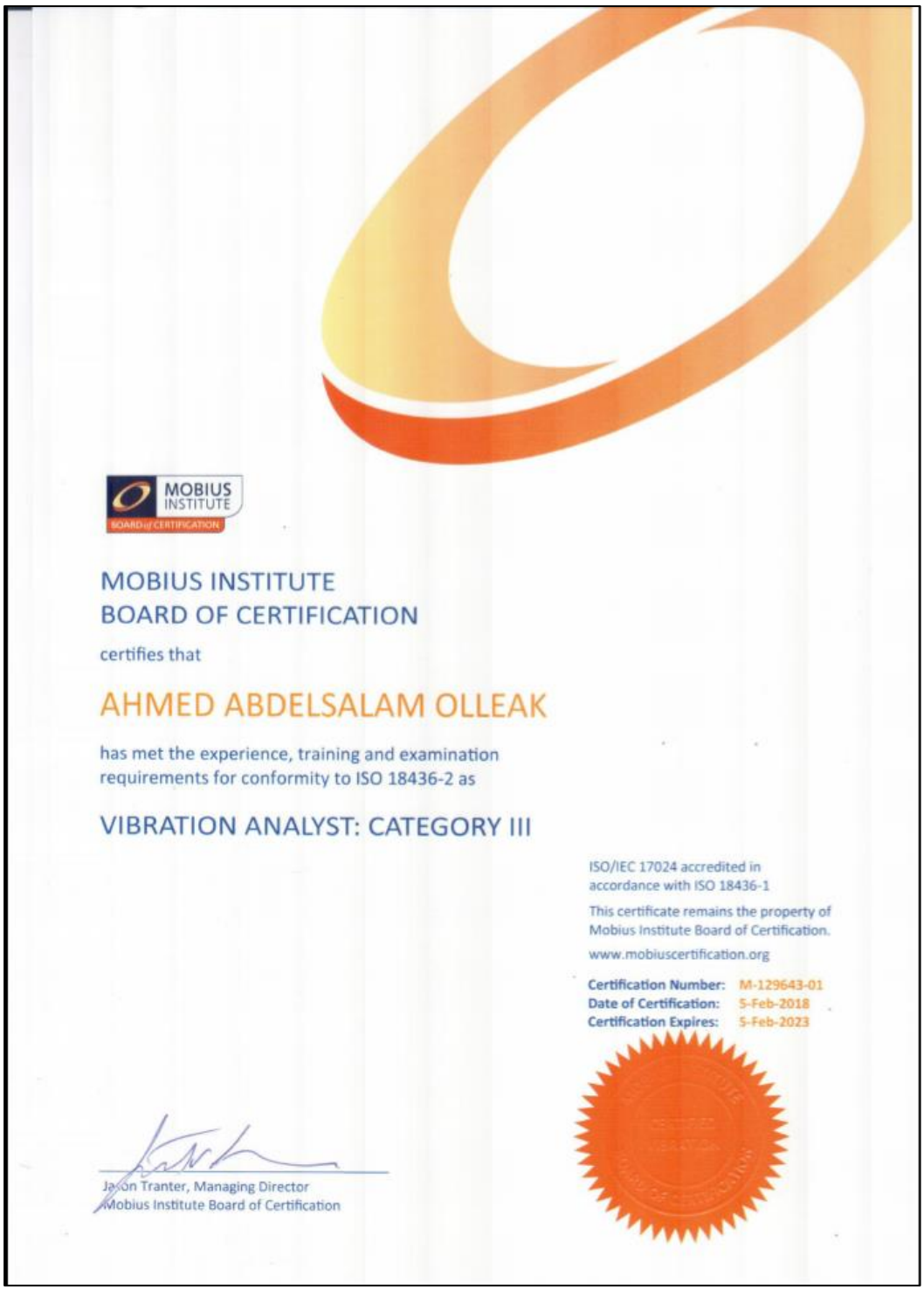
Exam candidates shall have the following minimum prerequisites:-

- 36 months of experience in Vibration Analysis and should hold CAT-II or Level II certificate

Course Certificate(s)

(1) Internationally recognized certificates will be issued to all participants of the course.

(2) Mobius Institute will certify the participants who will pass the examination for ***Vibration Analyst: Category III***.



MOBIUS INSTITUTE
BOARD of CERTIFICATION

MOBIUS INSTITUTE
BOARD OF CERTIFICATION

certifies that

AHMED ABDELSALAM OLLEAK

has met the experience, training and examination requirements for conformity to ISO 18436-2 as

VIBRATION ANALYST: CATEGORY III

ISO/IEC 17024 accredited in accordance with ISO 18436-1

This certificate remains the property of Mobius Institute Board of Certification.

www.mobiuscertification.org

Certification Number: M-129643-01
Date of Certification: 5-Feb-2018
Certification Expires: 5-Feb-2023

Jason Tranter, Managing Director
Mobius Institute Board of Certification

(2) Official Transcript of Records will be provided to the successful delegates with the equivalent number of ANSI/IACET accredited Continuing Education Units (CEUs) earned during the course.

* Haward Technology * CEUs * Haward Technology * CEUs * Haward Technology * CEUs * Haward Technology *

Haward Technology Middle East

Continuing Professional Development (HTME-CPD)

Page 1 of 1

CEU Official Transcript of Records

TOR Issuance Date: 21-Mar-19

HTME No. PAR182287

Participant Name: Wael Al Hashim

Program Ref.	Program Title	Program Date	No. of Contact Hours	CEU's
RE0801-4D-IH	ISO 18436 Category II: Intermediate Vibration Analyst Training & Certification	March 18 - 21, 2019	22	2.2

Total No. of CEU's Earned as of TOR Issuance Date **2.2**

TRUE COPY

Maricel De Guzman
Academic Director

Haward Technology has been approved as an Authorized Provider by the International Association for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this approval, Haward Technology has demonstrated that it complies with the ANSI/IACET 1-2013 Standard which is widely recognized as the standard of good practice internationally. As a result of their Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for programs that qualify under the ANSI/IACET 1-2013 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 Association 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 is accredited by

P.O. Box 26070, Abu Dhabi, United Arab Emirates | Tel.: +971 2 3091 714 | Fax: +971 2 3091 716 | E-mail: info@haward.org | Website: www.haward.org

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

- 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 **2.4 CEUs** (Continuing Education Units) or **24 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.

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. 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.

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. Riyadh Bsiso, MBA, BSc, ISO-VA, ARP-I, ADNT-NDT, LEEA, is a **Senior Mechanical Engineer** with extensive years of industrial experience within the **Oil & Gas**, **Refinery** and **Petrochemical** industries. His expertise widely covers in the areas of **Machine Reliability**, **Rotating Equipment** Faults & Malfunctions Troubleshooting, **Diagnostic** Techniques, **Vibration** Analysis, **Oil** Analysis, **Boroscopy & Corrective Actions**, Machinery **Balancing**, Machinery **Alignment**, **Vibration** Isolation, Resonance Control, Structural Analysis, **Modal** Testing Techniques, ODS Testing, **Torsional Vibration** Measurements, **Condition Monitoring** Systems, **Machinery** Fault Diagnostics, **Bearing** Technology, Mounting & Dismounting of **Roller Element Bearings** and Machine Diagnostic. He is also well versed in MS Office (Word, Excel, Power Point), AutoCAD, Mechanical Desktop & AutoDesk, Matlab, Ansys, Simulink, Vibration Analysis & Machinery Diagnostics Software - SPM Instruments, GE Scouts, SPM Intellinova, FAG Bearing Analyzer III, Detector III, FAG DetectX1s, FAG ProCheck, FAG Pro Torq, Bearinx - Bearing Calculation Software, ADRETM software (GE Bentley Nevada PL), VB8 – Commtest, and ERP (CRM, Salesforce, Service & Sales Management Modules).

During his career life, Mr. Riyadh has gained his practical and field experience through his various significant positions and dedication as the **Asset Management Specialist**, **Technical Manager**, **Sales & Services Manager**, **Managing Partner**, **Technical/Business Development Manager**, **Mechanical Engineer** - Condition Monitoring & Machine Diagnostic, **Condition Monitoring Engineer** and **Certified Trainer/Instructor** for UPDS, Samir Odeh Engineering Solutions and Schaeffler, just to name a few.

Mr. Riyadh has a **Master's** degree in **Business Administration** (Quality & Innovation Management) from the **University** of **Leicester**, **UK**, a **Bachelor's** degree in **Mechanical Engineering** (**Mechatronics**) and a **Diploma** in **IAM** Engineering Services, Roller Bearing Maintenance & Application Engineering. Further, he is a **Certified Mobius ISO Category I-IV Instructor/Examiner**, **Certified Asset Reliability Practitioner** (**ARP-I**) and has delivered numerous trainings, courses, seminars, conferences and workshops internationally.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Fee

US$ 8,000 per Delegate + **VAT** This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

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: ***Sunday 22nd of December 2024***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Introduction & Welcome*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Review of Conditions Monitoring Technologies & the ISO Standards***
0930 – 0945	*Break*
0945 – 1030	***Signal Processing & Data Acquisition*** *Filters: Low Pass, Band Pass, High Pass, Band Stop • Signal to Noise Ratio • Analog and Digital Integration • Testing Low Speed Machines • Sampling, Aliasing, Dynamic Range • Resolution, Fmax, Data Collection Time • Averaging: Linear, Overlap, Peak Hold, Negative Averaging, Time Synchronous • Windowing and Leakage • Order Tacking • Cross Channel Testing • Correlation & Coherence*
1030 – 1230	***Time Waveform Analysis*** *Collecting Data – Ensuring you have the correct Set Up • When should you Use Time Waveform Analysis • Diagnosing Unbalance, Misalignment, Bend Shaft, Eccentricity, Cocked Bearing, Resonance, Looseness & Other Conditions*
1230 – 1245	*Break*
1245 – 1330	***Phase Analysis*** *Collecting Data • Bubble Diagrams • Diagnosing Unbalance, Misalignment, Bent Shaft, Eccentricity, Cocked Bearing, Resonance, Looseness & Other Conditions*
1330 – 1420	***Dynamics (Natural Frequencies & Resonance)*** *Natural Frequencies & Resonances • Mass, Stiffness & Damping • SDOF & MDOF*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2: ***Monday 23rd of December 2024***

0730 – 0930	***Testing for Natural Frequencies*** *Run-up Coast Down Tests • Bode Plots & Nyquist (Polar) Plots • Impact & Bump Tests • Analysis of Induction Motors*

0930 – 0945	*Break*
0945 – 1030	***Operating Deflection Shape (ODS) Analysis*** *Can we Prove the Existing of a Natural Frequency? • Visualizing Vibration • Setting Up the Job • Collecting Phase Readings Correctly • Interpreting the Deflection Shape*
1030 – 1230	***Modal Analysis & Intro to FEA*** *How Does Modal Analysis Differ from ODS? • How Does Finite Element Analysis (FEA) Differ from Modal Analysis • A Quick Review of the Modal Testing Process*
1230 – 1245	*Break*
1245 – 1315	***Correcting Resonances*** *The Effect of Mass & Stiffness • Beware of Nodal Points • Adding Damping • A 'Trial & Error' Approach • A 'Scientific Approach • Isolation • Tuned Absorbers & Tuned Mass Dampers*
1315 – 1420	***Rolling Element Bearing Fault Detection*** *Why do Bearing Fail? • Cocked Bearing Sliding on Shaft or Inside Housing, Looseness • EDM & DC Motors & VFDs • Bearing Frequencies & What to do when you don't have All the Details • The Four Stages of Bearing Degradation • Ultrasound • High Frequency Detection Techniques • Shock Pulse, Spike Energy, Peak Vue & Other Techniques • Demodulation/Enveloping • Selecting the Correct Filter Setting • Spectrum Analysis • Time Waveform Analysis • Low Speed Bearing*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3: ***Tuesday 24th of December 2024***

0730 – 0930	***Journal Bearing Fault Detection*** *What are Journal Bearings • Measuring Displacement • Introduction to Orbit Plots • Using your Analyzer to Acquire Orbit Plots • Introduction to Centerline Diagrams • Eccentricity Ratio • Glitch Removal • How the Orbit Changes with Pre-load, Unbalance, Misalignment, Instabilities, Oil Whir & Whip*
0930 – 0945	*Break*
0945 – 1230	***Electric Motor Testing*** *How do Motors Work? • Diagnosing a Range of Fault Conditions: Eccentric Rotor, Eccentric Stator, Soft Foot, Phasing, Broken Rotor Bars, Rotor Bar & Stator Slot Pass Frequencies • Motor Current Analysis*
1230 – 1245	*Break*
1245 – 1315	***Pumps, Fans & Compressors*** *Unique Fault Conditions • Flow Turbulence, Recirculation, Cavitation*
1315 – 1420	***Gearbox Fault Detection*** *Spectrum Analysis Versus Time Waveform Analysis • Wear Particle Analysis • Gearmesh, Gear Assembly Phase Frequency (& Common Factors) • Tooth Load, Broken Teeth, Gear Eccentricity & Misalignment, Backlash & More*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4: ***Wednesday 25th of December 2024***

0730 – 0930	***Corrective Action*** *General Maintenance Repair Activities • Review of the Balancing Process & ISO Balance Grades • Review of Shaft Alignment Procedures*
0930 – 0945	*Break*

0945 – 1230	***Running a Successful Conditions Monitoring Program*** *Setting Baselines • Setting Alarms: Band, Envelope/Mask, Statistical • Setting Goals & Expectations (Avoiding Common Problems) • Report Generation • Reporting Success Stories*
1230 – 1245	*Break*
1245 – 1300	***Acceptance Testing***
1300 – 1420	***Review of ISO Standards***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5: ***Thursday 26th of December 2024***

0730 – 0930	***Review & MOCK EXAM***
0930 – 0945	*Break*
0945 – 1100	***Mobius COMPETENCY EXAM***
1100 – 1230	***Mobius COMPETENCY EXAM (cont'd)***
1230 – 1245	*Break*
1245 – 1415	***Mobius COMPETENCY EXAM (cont'd)***
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

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org