

## COURSE OVERVIEW EE0416-3D Induction Motor & Its Control

### Course Title

Induction Motor & Its Control

### Course Date/Venue

November 17-19, 2024/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

### Course Reference

EE0416-3D

### Course Duration/Credits

Three days/1.8 CEUs/18 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 AC Induction Motor Troubleshooting. It covers the basic principles of AC induction motors and the common problems that occur with AC induction motors; the troubleshooting techniques and overvoltage and undervoltage protection; the power supply issues, power quality issues, voltage drops and phase imbalances; the motor circuit issues, motor circuit faults, protection systems for motor circuits and motor starter failures; and the mechanical issues, bearing failures, shaft misalignment and excessive vibration.

During this course, participants will learn the rotor bar and end-ring failures, rotor eccentricity and broken rotor bars; the stator winding failures, insulation breakdown and core failures; the control system issues and faults in the motor control system; the control system troubleshooting techniques; the thermal issues covering overheating, insufficient cooling and thermal overload protection; the miscellaneous issues comprising of environmental factors, electrical noise and load-related issues; and the common AC induction motor problems and solutions.



### Course Objectives

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

- Apply and gain an in-depth knowledge on AC induction motor troubleshooting
- Discuss the basic principles of AC induction motors and the common problems that occur with AC induction motors
- Carryout troubleshooting techniques and overvoltage and undervoltage protection
- Identify power supply issues, power quality issues, voltage drops and phase imbalances
- Recognize motor circuit issues, motor circuit faults, protection systems for motor circuits and motor starter failures
- Determine mechanical issues, bearing failures, shaft misalignment and excessive vibration
- Identify rotor bar and end-ring failures, rotor eccentricity broken rotor bars, stator winding failures, insulation breakdown and core failures
- Recognize control system issues and faults in the motor control system as well as apply control system troubleshooting
- Explain thermal issues covering overheating, insufficient cooling and thermal overload protection
- Discuss miscellaneous issues comprising of environmental factors, electrical noise and load-related issues
- Identify the common AC induction motor problems and solutions

### 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**.

### Who Should Attend

This course provides an overview of all significant aspects and considerations of AC induction motor troubleshooting for all managers, supervisors, electrical engineers, automation or controls technicians, industrial maintenance technicians, motor technicians and electricians.

### Course Fee

**US\$ 3,750** per Delegate + **VAT**. 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


Certificates are accredited by the following international accreditation organizations: -

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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 **1.8 CEUs** (Continuing Education Units) or **18 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.

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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.



### Course Instructor(s)

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



**Mr. Ahmed Abozeid** is a **Senior Engineer** with over **25 years** of **Onshore & Offshore** experience within the **Oil & Gas** and **Power** industries. His wide expertise covers **Transformer Operation**, Maintenance, Diagnosis, **Testing & Lifetime**, **Electrical** Inspection and **Testing** Extension, **Electrical** Maintenance and **Troubleshooting**, **Power Generation** Operation & Control, **Switchgear Operation & Maintenance**, Process Control, **Instrumentation**, **Safeguarding & Security**, **Advanced**

**Instrumentation & Control**, Process Control & **Mechanical Engineering**, **Installation**, **Calibration** and Maintenance of Electronic Instruments, **Firefighting System** Operation & Maintenance, **Water Based Systems**, **Hydraulic**, **Fire Pump Set**, **Fire Alarm System**, **Stand Pipe System**, **Hose Reel & Landing Valve**, **Fire Hydrant System**, **Deluge Foam System**, **Electrical Hazard Protection**, **Maintenance Planning & Scheduling**, **Shutdown & Turnaround**, **Spareparts & Inventory Management**, **Pump Selection**, **Gas Turbine Failure Analysis**, **Rotating Equipment Failure Analysis & Reliability** Optimization, **Reactive & Proactive** Maintenance, **Vibration Condition Monitoring & Diagnostics** of Machines, Pressure Safety Valve (**PSV**), Pressure Relief Valve (**PRV**), **Safety Relief Valves**, **Relief Valve** Theory & Maintenance, **Security Valves**, **PRV & POPRV** Operation, **PRV** Repair & Disassembly, **Valve** Components, **Valve** Troubleshooting, **Valve** Actuators, **Valve** Seals & Packing, **Control Valves**, **Pumps**, **Compressors**, **Turbines**, **Motors**, **Turbo-expanders**, **Gears**, **Steam Turbine**, **Heat Exchanger**, **Variable Speed Drives**, **Seals**, **Advanced Valve** Technology, **Dry Seal**, **Fired Heaters**, **Air Coolers**, **Crude Desalter**, **Process Vessels & Valves**, **Piping**, **Pipelines**, **Valves**, **Lubrication** Technology, **Vibration Analysis**, **Power System Hydraulics**, **Security Detection** Systems & Operation, **Process Plant** Equipment and Troubleshooting **Process Operations**. Further, he is also well-versed in **Smart Meters**, **Fiber Optic**, **Protective Relaying** Systems, **Process Control & Instrumentation**, **PID Controller**, Distributed Control Systems (**DCS**), Programmable Logic Controllers (**PLC**), **ABB PLC & DCS System**, **Electrical** Standards, **Electrical** Power, **Electrical** Wiring, **Transformers**, **Electro-Mechanical** Systems, **Automation & Control** Systems, **Power** Distribution, **Transformers**, **Diesel Generators**, Uninterruptible Power Systems (**UPS**), **Battery Chargers** and **AC & DC** Transmission. He is currently the **Project Manager** wherein he manages, plans and implements projects across different lines of business.

Mr. Ahmed worked as the **Electrical Manager**, **Electrical Power & Machine Expert**, **Electrical Process Leader**, **Team Leader**, **Electrical Team Leader**, **Technical Instructor**, and **Instructor/Trainer** from various companies such as the Lafarge Nigeria, Egyptian Cement Company, ECC Training Center, Alrajhi Construction & Building Company and Ameria Cement Company, just to name a few.

Mr. Ahmed has a **Bachelor's** degree in **Electrical Engineering**. Further, he is a **Certified Instructor/Trainer** and has delivered numerous trainings, seminars, courses, workshops and conferences internationally.



**Accommodation**

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

**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 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, 17<sup>th</sup> of November 2024**

0730 – 0800	<i>Registration &amp; Coffee</i>
0800 – 0815	<i>Welcome &amp; Introduction</i>
0815 – 0830	<b>PRE-TEST</b>
0830 – 0930	<b>Introduction to AC Induction Motor Troubleshooting</b> <i>Basic Principles of AC Induction Motors • Common Problems that Occur with AC Induction Motors • Troubleshooting Techniques</i>
0930 - 0945	<i>Break</i>
0945 – 1100	<b>Power Supply Issues</b> <i>Power Quality Issues • Overvoltage &amp; Undervoltage Protection • Voltage Drops &amp; Phase Imbalances</i>
1100 – 1215	<b>Motor Circuit Issues</b> <i>Motor Circuit Faults • Protection Systems for Motor Circuits • Motor Starter Failures</i>
1215 – 1230	<i>Break</i>
1230 – 1330	<b>Mechanical Issues</b> <i>Bearing Failures • Shaft Misalignment • Excessive Vibration</i>
1330 – 1420	<b>Recap</b>
1430	<i>Lunch &amp; End of Day One</i>





**Day 2: Monday, 18<sup>th</sup> of November 2024**

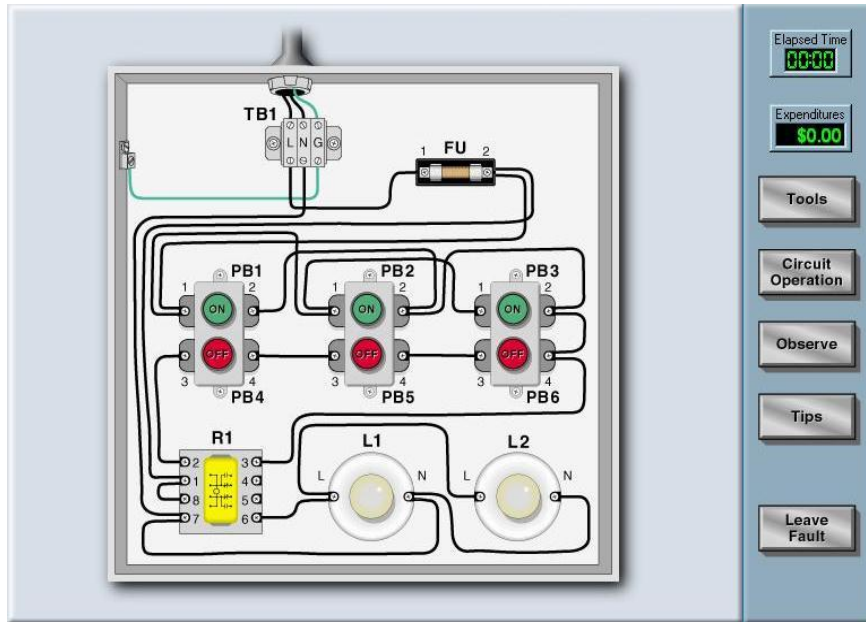
0730 - 0930	<b>Rotor Issues</b> <i>Rotor Bar &amp; End-Ring Failures • Rotor Eccentricity • Broken Rotor Bars</i>
0930 - 0945	<i>Break</i>
0945 - 1100	<b>Stator Issues</b> <i>Stator Winding Failures • Insulation Breakdown • Core Failures</i>
1100 - 1215	<b>Control System Issues</b> <i>Faults in the Motor Control System • Control System Troubleshooting Techniques</i>
1215 - 1230	<i>Break</i>
1230 - 1420	<b>Control System Issues (cont'd)</b> <i>Control System Protection Devices</i>
1420 - 1430	<b>Recap</b>
1430	<i>Lunch &amp; End of Day Four</i>

**Day 3: Tuesday, 19<sup>th</sup> of November 2024**

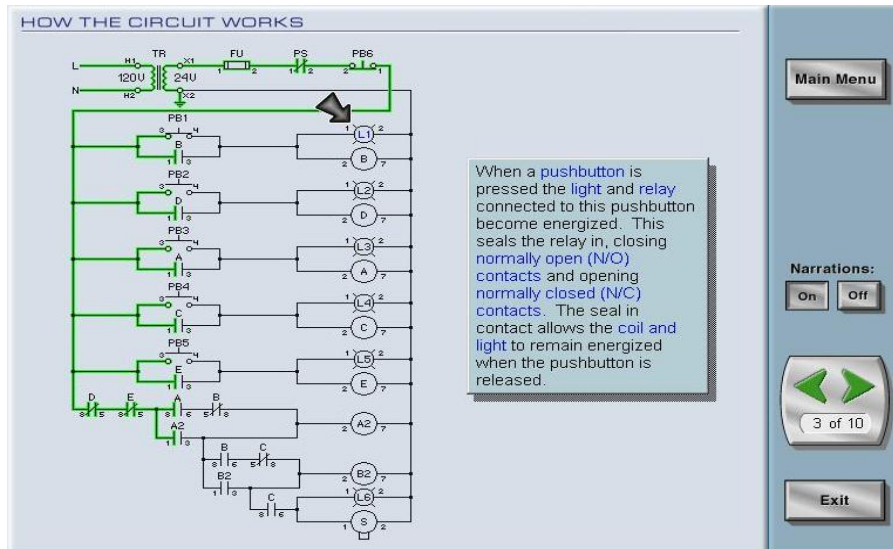
0730 - 0930	<b>Thermal Issues</b> <i>Overheating • Insufficient Cooling • Thermal Overload Protection</i>
0930 - 0945	<i>Break</i>
0945 - 1045	<b>Miscellaneous Issues</b> <i>Environmental Factors • Electrical Noise</i>
1045 - 1215	<b>Miscellaneous Issues (cont'd)</b> <i>Load-Related Issues</i>
1215 - 1230	<i>Break</i>
1230 - 1345	<b>Wrap-Up &amp; Review</b> <i>Review of Troubleshooting Techniques • Common AC Induction Motor Problems &amp; Solutions</i>
1345 - 1400	<b>Course Conclusion</b>
1400 - 1415	<b>POST TEST</b>
1415 - 1430	<i>Presentation of Course Certificates</i>
1430	<i>Lunch &amp; End of Course</i>

**Simulators (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 our state-of-the-art “Haward Troubleshooting”.



**Basic Techniques**



**Basic Control Circuits**



**Motor Control Techniques**

**Course Coordinator**

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