



COURSE OVERVIEW EE0133

Basic Functions of AC Motor Controllers

Course Title

Basic Functions of AC Motor Controllers

Course Date/Venue

Session 1: May 11-15, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

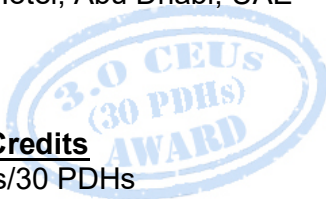
Session 2: October 13-17, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference

EE0133

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.

It is estimated that electrical drives and other rotating equipment consume about 50% of the total electrical energy consumed in the world today. The cost of maintaining electrical motors can be a significant amount in the budget item of manufacturing and mining industries. This course gives you a thorough understanding of electrical motor's control system, operating, maintenance and failure modes and gives you the tools to maintain and troubleshoot electrical motors.



You will gain valuable insight into the selection of the protection necessary to ensure your motors are protected against fault conditions, so as to ensure reliability and long life. You will gain a fundamental understanding of the installation, operation and troubleshooting of electric motors. Typical applications of electric motors in mining, manufacturing, materials handling and process control are covered in detail. You will learn the basic steps in specifying, installing, wiring and commissioning motors.



Further, attendance on this course will help all delegates identify, prevent and fix common electrical equipment and control circuits. The focus is "outside the box". The emphasis is on practical issues that go beyond typical electrical theory and focus on providing those that attend with the necessary tool-kit of skills in solving electrical problems, ranging from control circuits to motors and variable speed drives. Furthermore, this course focuses on the main issues of troubleshooting electrical equipment and control circuits of today to enable you to walk onto your plant or facility to troubleshoot and fix problems as quickly as possible.

Course Objectives

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

- Apply and gain a basic knowledge on functions of AC motor controller
- Employ the AC motor operation and construction and specify, select and install motors
- Specify protection requirements for motors and speed control requirements for motors
- Install and commission motors and fix faults on motors
- Interpret motor performance curves and interface control circuits of motors with PLC's/DCS's
- Reduce downtime on electrical motors and improve plant safety
- Improve plant throughput and reduce your spares usage and requirements
- Diagnose problems "right-first-time" and eliminate expensive trial and error approach
- Carryout specific techniques to troubleshoot control circuits

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 is intended to those associated with the use of electrical motors in the industrial or automation environment. The course will also benefit those working in system design as well as site commissioning, maintenance and troubleshooting.

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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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.

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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 **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.

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. Ahmed Abozeid is a Senior Electrical & Instrumentation Engineer with over 30 years of Onshore & Offshore experience within the Oil & Gas and Power industries. His wide expertise covers HV Cable Design, Cable Splicing & Termination, Cable Jointing Techniques, High Voltage Electrical Safety, HV/MV Cable Splicing, High Voltage Circuit Breaker Inspection & Repair, High Voltage Power System Safe Operation, High Voltage Safety, High Voltage Transformers, Safe Operation of High Voltage & Low Voltage Power Systems, Electric Distribution System Equipment, ABB 11KV Distribution Switchgear, Rotork Operation & Maintenance, Power System Protection and Relaying, Electrical Motors & Variable Speed Drives, Motor Speed Control, Power Electronic Converters, Control Valve, Flowmetering & Custody Transfer, Meters Calibration, Installation & Inspection, Crude Metering & Measurement Systems, Flow Meter Maintenance Troubleshooting, AC Converters Section, Electromagnetic Compatibility (EMC), Motor Failure Analysis & Testing, Machinery Fault Diagnosis, Bearing Failure Analysis Process Control & Instrumentation, Process Control Measurements, Control System Commissioning & Start-Up, Control System & Monitoring, Power Station Control System, Instrumentation Devices, Process Control & Automation, PID Controller, Distributed Control Systems (DCS), Programmable Logic Controllers (PLC), ABB PLC & DCS System, Gas Analyzers, Simulation Testing, Load Flow, Short Circuit, Smart Grid, Vibration Sensors, Cable Installation & Commissioning, Calibration Commissioning and Site Filter Controller. Further, he is also well-versed in Fundamentals of Electricity, Electrical Standards, Electrical Power, PLC, Electrical Wiring, Machines, Transformers, Motors, Power Stations, Electro-Mechanical Systems, Automation & Control Systems, Voltage Distribution, Power Distribution, Filters, Automation System, Electrical Variable Speed Drives, Power Systems, Power Generation, Power Transformers, Diesel Generators, Power Stations, 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, Certified TQUK Level 3 Vocational Achievement (RQF) Assessor** and has delivered numerous trainings, seminars, courses, workshops and conferences 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\$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Howard Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation

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

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 & Coffee
0800 - 0815	Welcome & Introduction
0815 - 0830	PRE-TEST
0830 - 0915	Introduction and Outline of Course Objectives Fundamentals of Motor Technology Basic Principles of Rotating Electric Machines • Fundamental Principles of Speed Control • Efficiency, Torque, Inertia, Horsepower/Power Factor
0915 - 0930	Break
0930 - 1100	Fundamentals of Motor Technology (cont'd) Torque-Speed Curves • How the Motor Produces Torque • Types of Motors
1100 - 1215	AC Motor Theory, Construction and Maintenance Basic Construction and Physical Configuration, Windings • Principles of Operation and Performance
1215 - 1245	Break
1245 - 1430	Three Phase AC Induction Motors Components • Theory of Operation • Induction Motor Design
1430	Lunch & End of Day One



Day 2

0730 - 0915	Three Phase AC Induction Motors (cont'd) Duty Cycles • Insulation and Cooling Requirements • Starting Methods • Selecting Motors • Maintenance of AC Machines • Types of Faults, Fault Finding and Testing of AC Machines • Testing Instrumentation
0915 - 0930	Break
0930 - 1100	Protection of AC Motors Protective Devices
1100 - 1215	Protection of AC Motors (cont'd) Protection Settings
1215 - 1245	Break
1245 - 1430	Speed Control of AC Motors Introduction to Variable Speed Drives or Power Electronic Converters • Types, and Designs of Variable speed drives
1430	Lunch & End of Day Two

Day 3

0730 - 0915	Protection of AC Convertors and Motors Frequency Converter Protection Circuits • Protection Settings
0915 - 0930	Break
0930 - 1100	Control Systems for AC Variable Speed Drive's Control Theory of VSD's Explained
1100 - 1215	The selection of AC Convertors for Variable speed drive applications Selection Procedure • Nature of the Load • Selection of Correct Size Motor and Converter
1215 - 1245	Break
1245 - 1400	Installation and Commissioning of AC Variable Speed Drives General Installation and Environmental Requirements • Electrical Connections and Earthing Requirements • Control Wiring and Pre-Commissioning • Commissioning Tests
1400 - 1430	New Technologies and Development
1430	Lunch & End of Day Three

Day 4

0730 - 0900	Devices, Symbols and Circuits Devices and Symbols • Language of Control Circuits • Reading and Understanding Electrical Drawings & LadderLogic • Wire and Terminal Numbering
0900 - 0915	Break
0915 - 1000	Basic Principles in Troubleshooting
1000 - 1100	Basic Principles in Using a Drawing and Meter in Troubleshooting Circuits Circuits & Equipment
1100 - 1215	Troubleshooting AC Motors and Motor Starters Fundamentals of AC Motors & Types of AC and DC Motors Used • Motor Terminal Identification and Connection Diagrams • Identification and Construction • Connecting up a Multiple Speed Motor • Connection of Dual Voltage Motor



1215 - 1245	Break
1245 - 1430	Troubleshooting AC Motors and Motor Starters (cont'd) Motor Name Plate Information • Operating a Motor for Forward and Reverse Operation • Motor Braking Methods • Test Equipment to Check Motor Operation • Why Motors Fail and How to Extend Life • Troubleshooting of Motors
1430	Lunch & End of Day Four

Day 5

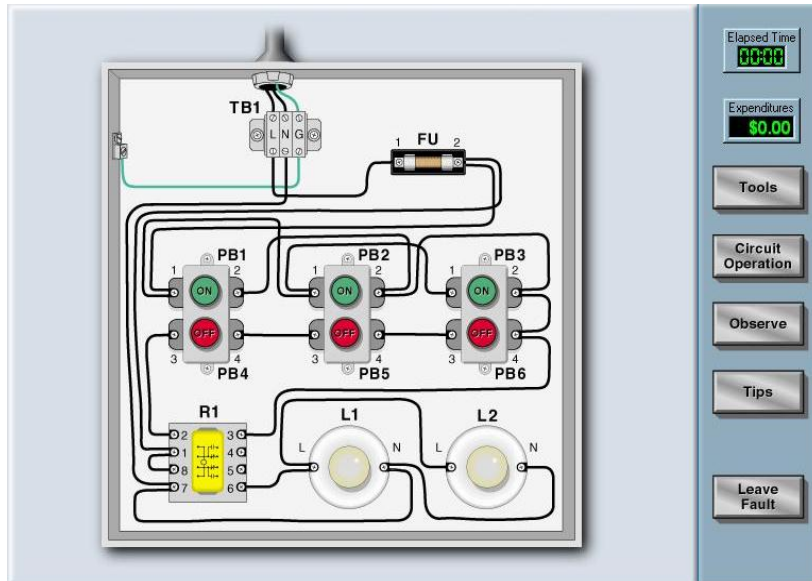
0730 - 0815	Motor Circuit Breakers and Switchboards Purpose and Duty • Clearance Times & Types
0815 - 0915	Troubleshooting Variable Speed Drives Fundamentals of Variable Speed Drives • Problems Associated with Variable Speed Drives • Terminology Used • Manufacturer's Literature – What They Don't Tell You • Minimization of Equipment Failure & Troubleshooting Tricks
0915 - 0930	Break
0930 - 1100	Troubleshooting Control Circuits Basic Control Circuits • Ladder Logic Circuits • Troubleshooting Strategies • Two-Wire Control and Hands-Off/Auto • Overload Protection & Three-Wire Control – Start/Stop
1100 - 1215	Troubleshooting Control Circuits (cont'd) Jog/Inch Circuits • Sequence Start and Stop • Automatic sequence Starting • Reversing Circuits & Plug Stop and Anti-Plug Circuits • Two Speed Motor Control & Reduced Voltage Starting Circuits
1215 - 1400	Summary & Open Forum
1400 - 1415	POST-TEST
1415 - 1430	Presentation of Course Certificates
1430	Lunch & End of Course



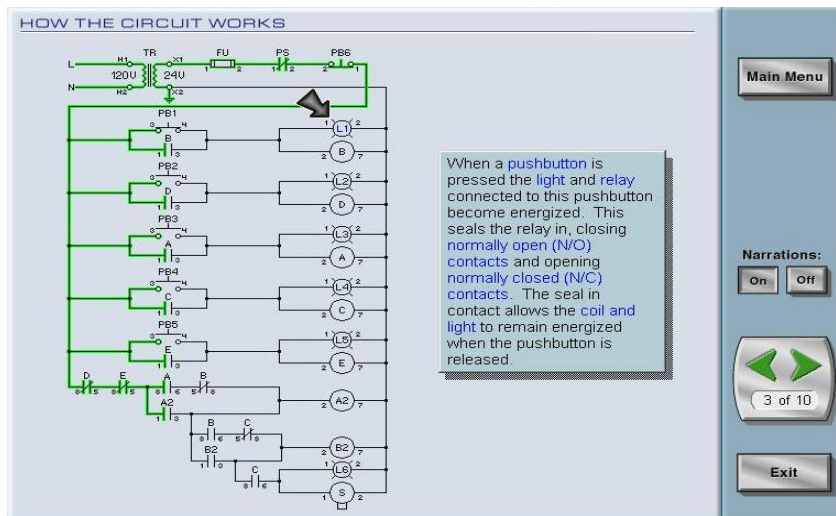


Simulators (Hands-on Practical Sessions)

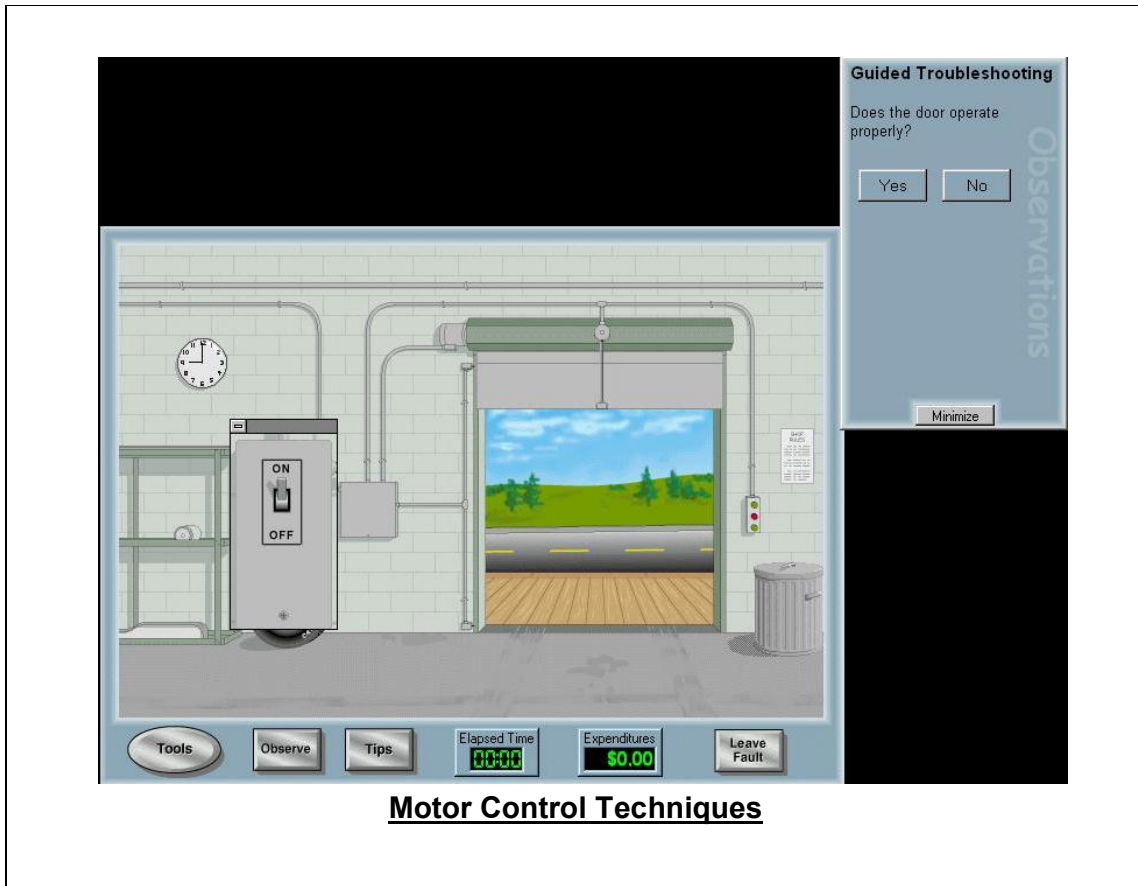
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art “Haward Troubleshooting”.



Basic Techniques



Basic Control Circuits



Course Coordinator

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