COURSE OVERVIEW EE0691
Maintenance of Marine Electrical Plants, Equipment, Instrumentation & Control Devices

Course Title
Maintenance of Marine Electrical Plants, Equipment, Instrumentation & Control Devices

Course Date/Venue
January 26-30, 2025/Meeting Plus 2, City Centre Rotana Doha, Doha, Qatar

Course Reference
EE0691

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 one of our state-of-the-art simulators.

This course is designed to provide participants with a detailed and up-to-date overview of Maintenance of Marine Electrical Plants, Equipment, Instrumentation & Control Devices. It covers the marine electrical systems, safety procedures and regulations and basic electrical principles; the electrical distribution systems and power generation on marine vessels; the common electrical equipment covering transformers, switchboards and circuit breakers; and the routine maintenance practices, electrical systems troubleshooting and motors and drives maintenance.

Further, the course will also discuss the battery systems and UPS maintenance, electrical insulation testing and electrical documentation and reporting; the types of instrumentation used in marine electrical plants including its basic principles and applications; the control systems and automation, calibration of instruments, sensors and transducers; and the process control and monitoring and maintenance of control panels.

During this interactive course, participants will learn the advanced troubleshooting techniques, predictive maintenance methods and maintenance of navigation and communication systems; the electrical power quality management, marine electrical system upgrades and environmental considerations in maintenance; the emerging technologies in marine electrical maintenance including regulatory compliance and standards; the electrical emergencies and response plan; and the emergency shutdown and isolation procedures.

Course Objectives

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

- Apply and gain an in-depth knowledge on maintenance of marine electrical plants, equipment, instrumentation and control devices
- Discuss marine electrical systems, safety procedures and regulations and basic electrical principles
- Recognize electrical distribution systems and power generation on marine vessels
- Identify the common electrical equipment covering transformers, switchboards and circuit breakers
- Carryout routine maintenance practices, electrical systems troubleshooting and motors and drives maintenance
- Apply battery systems and UPS maintenance, electrical insulation testing and electrical documentation and reporting
- Identify the types of instrumentation used in marine electrical plants including its basic principles and applications
- Recognize control systems and automation, calibration of instruments, sensors and transducers
- Employ process control and monitoring and maintenance of control panels
- Perform advanced troubleshooting techniques, predictive maintenance methods and maintenance of navigation and communication systems
- Apply electrical power quality management, marine electrical system upgrades and environmental considerations in maintenance
- Discuss the emerging technologies in marine electrical maintenance including regulatory compliance and standards
- Develop electrical emergencies and response plan including emergency shutdown and isolation procedures

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 provides an overview of all significant aspects and considerations of maintenance of marine electrical plants, equipment, instrumentation and control devices for electrical engineers, instrumentation and control engineers, project engineers, maintenance engineers, power system protection and control engineers, building service designers, ship officers, marine engineers, data systems planners and managers as well as electrical, instrumentation and control technical staff.

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: -

- 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.

- 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(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Mr. William Hardi (**Willem Gerhardus Pretorius**) is a **Senior Electrical Engineer** with almost **35** years of extensive experience within the **Oil**, **Gas**, **Petrochemical**, **Refinery** & **Power** industries. His expertise widely covers in the areas of **Power System Analysis**, **Power System Generation and Distribution**, **Electric Power System** Design, Maintenance, Testing & Troubleshooting, **Transformer Protection**, **Transformer** Problem and Failure Investigations, **Power System Operation and Control**, Fault Analysis in **Power Systems**, **HV/MV Cable Splicing**, **Cable & Over Head Power Line**, **HV/MV Switchgear, HV Cable** Design, **Cable** Splicing & Termination, **High Voltage Electrical Safety**, **Medium & High Voltage Equipment**, **High Voltage Circuit Breaker** Inspection & Repair, **High Voltage Power** System, **HV Equipment** Inspection & Maintenance, **HV Switchgear** Operation & Maintenance, Resin / **Heat Shrink & Cold Shrink** Joints, **HV/LV Equipment**, **LV & HV Electrical System**, **LV**, **MV & HV Cable** Installations & Properties, ORHVS for Responsible and Authorized Person **High Voltage Regulation**, **Transformers** Maintenance, inspections & repairs, Commissioning of **LV & HV Equipment**, Oil Purification and **High Voltage Maintenance**, HT Switch Gear -Testing, Safe Operating, Maintenance, Inspection & Repairs on **LV & HT Cables** - Testing (Pulse & Megger), Line Patrol in **Low Voltage & Distribution**, **Transmission**, **Operating Principles up to 132KV**, Abnormal Conditions & Exceptions, Commissioning & Testing, **Transformer Inspections & Repairs**, **Live Line Work up to 33KV**, **Basic Power System Protection**, **High Voltage** Operating Preparedness Phasing (**110V to 132KV**), **HV Operating & Fault** Finding (up to 132KV), Maintenance & Construction Supervision, Line Construction & Maintenance up to **132KV**, **VSD/VFD** Installations & Testing, **Electrical Panel Design**, **VSD/VFD Installations & Testing**, Instrument Installation and wiring, Programmable Logic Controller (**PLC**), **PLC for Process Control & Automation**, **ABB Drives and other PLC Starters**, **PLC** Starters – Commissioning & fault-finding, , **AC/DC Supplies & Change Over Systems**, **AC & DC Winders** and VLF Testing, Soft Starters – **VSD's** etc.,

During Mr. Hardi career life, he has gained his practical experience through several significant positions and dedication as the **Branch Manager**, **Maintenance Manager**, **Project Manager**, **Site Superintendent**, **Construction Supervisor**, **Shift Supervisor**, **Maintenance & Production Shift Supervisor**, **HT Specialist, Electrical & Instrumentation Supervisor**, **High Voltage Specialist & Commissioning Supervisor**, **Electrical Supervisor**, **Principal Technical Official**, **Winder & Conveyor Technician** and **Instructor/Trainer** from various companies, like the Armcoil Africa, JR Compressors, ELGER Electrical, Saaiplaas 3 Shaft, ESCOM and Target Mining.

Mr. Hardi is a **Qualified Electrician** certified by the Engineering Trades Training Board. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership and Management** (**ILM**) and has delivered various trainings, seminars, conferences, workshops and courses globally.

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$ 6,000 per Delegate. This rate includes H-STK® (Haward 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: ***Sunday, 26th of January 2025***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0900	***Introduction to Marine Electrical Systems*** *Overview of Marine Electrical Systems and their Importance in Petroleum Operations ● Key Components and Configurations*
0900 – 0930	***Safety Procedures & Regulations*** *Marine Electrical Safety Standards ● Personal Protective Equipment (PPE) and Safety Protocols*
0930 – 0945	*Break*
0945 – 1130	***Basic Electrical Principles*** *Understanding Voltage, Current, Resistance, and Power ● Ohm's Law and its Applications in Marine Settings*
1130 - 1230	***Electrical Distribution Systems*** *Types of Distribution Systems in Marine Environments ● Single-Line Diagrams and Schematics*
1230 – 1245	*Break*
1245 – 1320	***Power Generation on Marine Vessels*** *Types of Marine Generators and Their Operation ● Generator Control and Synchronization*
1350 - 1420	***Common Electrical Equipment*** *Transformers, Switchboards, and Circuit Breakers ● Basic Operation and Maintenance Practices*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2: Monday, 27th of January 2025

0730 – 0830	***Routine Maintenance Practices*** *Scheduled Maintenance Routines ● Preventive Maintenance Strategies*
0830 – 0930	***Troubleshooting Electrical Systems*** *Common Electrical Faults and Troubleshooting Techniques ● Use of Diagnostic Tools and Equipment*
0930 – 0945	*Break*
0945 – 1130	***Motors & Drives Maintenance*** *Types of Motors Used in Marine Applications ● Maintenance of AC and DC Motors, Including Drives*
1130 – 1230	***Battery Systems & UPS Maintenance*** *Types of Marine Battery Systems ● Maintenance Procedures for Batteries and Uninterruptible Power Supplies (UPS)*
1230 – 1245	*Break*
1245 – 1330	***Electrical Insulation Testing*** *Importance of Insulation in Marine Environments ● Methods of Testing Insulation Resistance*
1330 - 1420	***Electrical Documentation & Reporting*** *Keeping Accurate Maintenance Records ● Importance of Documentation for Compliance and Future Maintenance*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3: Tuesday, 28th of January 2025

0730 – 0830	***Basics of Marine Instrumentation*** *Types of Instrumentation Used in Marine Electrical Plants ● Basic Principles and Applications*
0830 – 0930	***Control Systems & Automation*** *Overview of Marine Control Systems ● Introduction to PLCs and SCADA Systems*
0930 – 0945	*Break*
0945 – 1130	***Calibration of Instruments*** *Importance of Calibration in Maintaining Accuracy ● Procedures for Calibrating Common Marine Instruments*
1130 – 1230	***Sensors & Transducers*** *Types of Sensors Used in Marine Environments ● Maintenance and Troubleshooting of Sensors and Transducers*
1230 – 1245	*Break*
1245 – 1330	***Process Control & Monitoring*** *Basics of Process Control in Marine Electrical Systems ● Monitoring Techniques and Equipment*
1330 - 1420	***Maintenance of Control Panels*** *Components of Control Panels ● Routine Checks and Maintenance Procedures*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4: Wednesday, 29th of January 2025

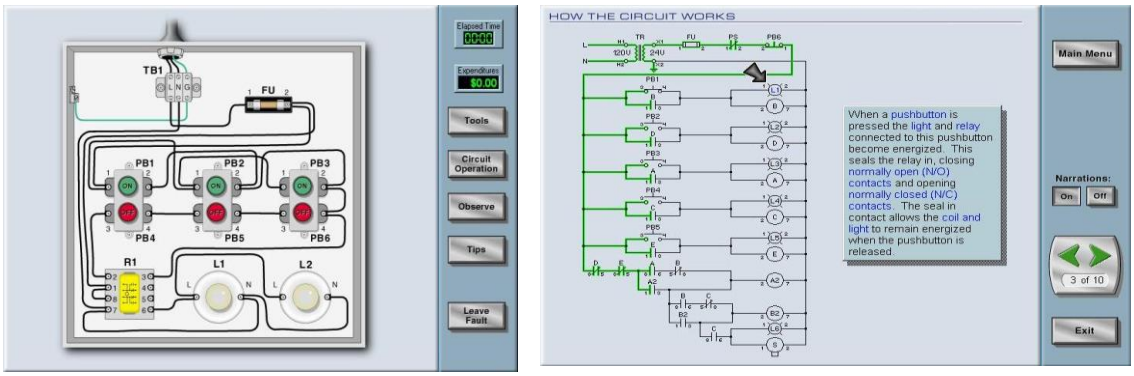
0730 – 0830	***Advanced Troubleshooting Techniques*** *Diagnostic Tools for Complex Electrical Faults ● Case Studies and Practical Troubleshooting Scenarios*
0830 – 0930	***Predictive Maintenance Methods*** *Condition Monitoring and Predictive Maintenance ● Vibration Analysis, Thermography, and Other Predictive Techniques*
0930 – 0945	*Break*
0945 – 1130	***Maintenance of Navigation & Communication Systems*** *Overview of Marine Navigation and Communication Equipment ● Maintenance Procedures and Troubleshooting*
1130 – 1230	***Electrical Power Quality Management*** *Importance of Power Quality in Marine Applications ● Identifying and Mitigating Power Quality Issues*
1230 – 1245	*Break*
1245 – 1330	***Marine Electrical System Upgrades*** *Planning and Executing System Upgrades ● Challenges and Best Practices*
1330 - 1420	***Environmental Considerations in Maintenance*** *Impact of Marine Environment on Electrical Systems ● Corrosion Prevention and Control Techniques*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5: Thursday, 30th of January 2025

0700 – 0830	***Hands-on Maintenance Activities*** *Practical Exercises on Maintenance Tasks ● Use of Tools and Equipment in a Controlled Environment*
0830 – 0930	***Case Studies & Real-world Scenarios*** *Analysis of Real-World Maintenance Scenarios ● Group Discussions and Problem-Solving Activities*
0930 – 0945	*Break*
0945 – 1130	***Emerging Technologies in Marine Electrical Maintenance*** *Introduction to New Technologies and their Applications ● Future Trends in Marine Electrical Maintenance*
1130 – 1230	***Regulatory Compliance & Standards*** *Understanding Marine and Petroleum Industry Standards ● Ensuring Compliance Through Proper Maintenance Practices*
1230 – 1245	*Break*
1245 – 1345	***Emergency Procedures & Response*** *Electrical Emergencies and Response Plans ● Training on Emergency Shut-Down and Isolation Procedures*
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 one of our state-of-the-art simulators “Simutech Troubleshooting Electrical Circuits V4.1”, “Allen Bradley SLC 500”, “AB Micrologix 1000 (Digital or Analog)”, “AB SLC5/03”, “AB WS5610 PLC”, “Siemens S7-1200”, Siemens S7-400” “Siemens SIMATIC S7-300”, “Siemens S7-200” “GE Fanuc Series 90-30 PLC”, “Schneider Electric Magelis HMISTU”, “Siemens SIMATIC Step 7 Professional Software”, and “HMI SCADA”.



Simutech Troubleshooting Electrical Circuits V4.1

Allen Bradley SLC 500 Simulator

Allen Bradley Micrologix 1000 Simulator (Digital)

Allen Bradley Micrologix 1000 Simulator (Analog)

Allen Bradley SLC 5/03

Allen Bradley WS5610 PLC Simulator PLC5

Siemens S7-1200 Simulator

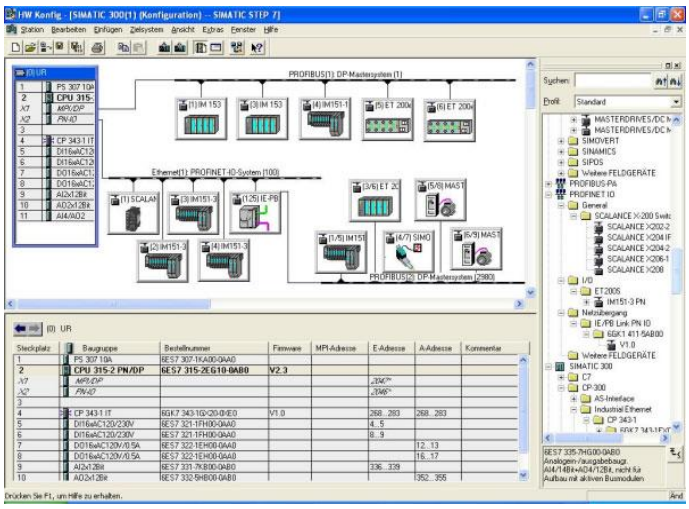
Siemens S7-400 Simulator

Siemens SIMATIC S7-300

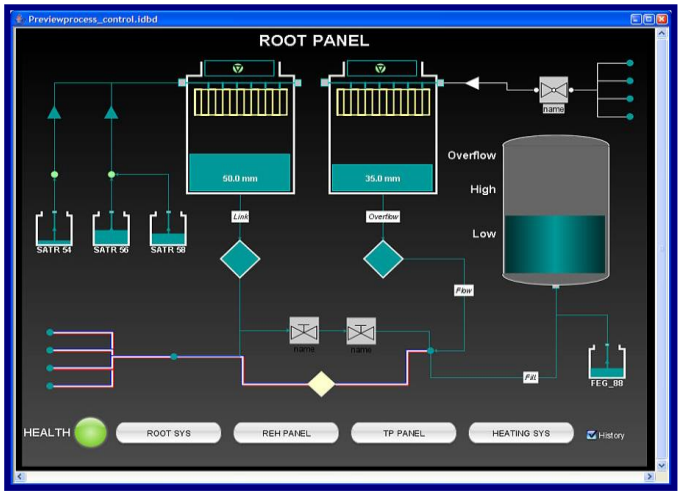
Siemens S7-200 Simulator

GE Fanuc Series 90-30 PLC Simulator

Schneider Electric Magelis HMISTU



Siemens SIMATIC Step 7
Professional Software



HMI SCADA

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