ABB Marine Academy
Complementary range of learning solutions
Introduction

With direct ABB presence in over 100 countries, qualified personnel and dedicated Marine Service Centers strategically positioned throughout the world, we are committed to providing lifecycle service and support wherever your business takes you.

Our commitment continues through ABB Marine Academy, offering you a complementary range of learning solutions. Our solutions are designed to give the necessary technical understanding and working skills to guarantee full functionality of your ABB installation. Competence is a key factor in smooth and safe sailing. ABB Marine Academy provides in-depth hands-on experiences with our well-equipped worldwide training centers, interactive on board training sessions, and the just-in-time competence delivery of ABB’s eMST® learning solution. With these elements we can guarantee pleasant, target-oriented learning experiences for crew members from vessels of all kinds!

See you on our courses!

Global ABB Marine Academy Team
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Our training course portfolio is designed to cover general, safety and advanced system training. The target groups are technical crew and deck crew as well as other Marine professionals. We divide the technical crew into electrical engineers and mechanical engineers, thereby highlighting the courses’ focus on technology. We also provide dedicated courses for deck officers.

The general courses introduce the ABB on board system as a whole, with the contents tailored according to the actual customer installation. The advanced courses deepen the customer’s knowledge by focusing on one sub-system at a time. We also provide safety courses for marine high voltage systems and Azipod confined spaces. The objective in safety courses is to provide knowledge and skills for managing risks and adapt safe working methods of high voltage environments and confined spaces. The contents of safety courses are in accordance with accepted standards, rules and regulations. We are continuously building up new hands-on learning environments in order to maximize learning with the best available learning methods. Currently we are able to deliver hands-on training on all of the existing marine drive types, DEGOs, switchgear equipment, full-size large Azipod hydraulic steering unit, Azipod C systems, Marine automation and diesel electric Azipod vessel operation. Our full-time, pedagogically and technologically competent marine instructors are committed to fulfilling your learning objectives by the most effective and enjoyable means.

Take a new course!
Course venue and duration
Helsinki, Finland (ELE10)
Singapore (ELE11)
5 days

Description
An overview of ship electrical power systems and electrical propulsion systems based on ABB technologies. Theory and exercises on the sub-systems.
ELE10 Cruise, ferry, ice-going
ELE11 LNG

Student profile
Marine electricians and engineers as well as other ship technical staff.

Prerequisites and recommendations
None. Recommended for cadets and officers new to ABB systems.

Course objectives
Upon completion of this course the participants will:
• Have an understanding of power generation and distribution on board
• Have an understanding of the ABB electrical propulsion system
• Have an understanding on basic maintenance tasks
• Be able to communicate on effective interactive terms relating to the system

Main topics
• Power plant and switchboards
• Power plant regulation principles
• Power quality and harmonics
• Pre-magnetization transformer (if applied)
• Propulsion remote control systems
• Propulsion system hydrodynamics
• Propulsion control system
• Frequency converter technology
• Motors and generators
• Azipod (if applied)
• Occupational safety and risk assessment
General course for deck staff
DEC10

Course venue and duration
Helsinki, Finland
4 days (to be renewed in 2010)

Description
General principles of mechanical, hydrodynamical and electrical technologies. Overview on Azipod electrical propulsion system. Practical exercises with EMRI joystick/DP console simulator.

Student profile
Ship deck staff.

Prerequisites and recommendations
None.

Course objectives
Upon completion of this course the participants will:
• Be able to communicate effectively with the involved engineering/electrical personnel
• Understand fundamental open sea operation
• Be able to use the Azipod as the maneuvering device in near-alongside operation
• Effectively use backup functions in abnormal equipment states
• Perform user operations and settings with the joystick/DP facility

Main topics
• Terminology, and the evolution of Azipod propulsion
• Azipod mechanic overview
• Frequencyconverter propulsion with power plant overview
• Azipod user recommendations
• Steering gear mechanics and hydraulics. Alarm conditions
• Emergency actions (pod room)
• Bridge operator safeties and alarms
• Remote control units and operation
• Bridge backup/emergency operation
• Maneuvering and hydrodynamics
• Joystick / DP operation on the ABB training simulator console
• Occupational safety
Course venue and duration
Helsinki, Finland
5 days

Description
Condensed lessons on the large Azipod followed by hands-on exercises done on the most specific systems of the large Azipod: Propeller command system, power and data transmission, air seal unit and hydraulic steering gear with servo control.

Student profile
Ship engineers and electricians working specifically with large Azipod propulsion.

Prerequisites and recommendations
Previous completion of the General course (ELE10) is advisable. Alternatively experienced technical staff with an equivalent level of experience is qualified to participate.

Course objectives
Upon completion of this course the participant will be able to:
- Monitor the state of the propeller shafting system
- Understand the Azipod data transmission system
- Repair and adjust the steering gear servo system
- Evaluate the condition of the steering hydraulics

Main topics
- Terminology and evolution of Azipod propulsion
- Slipring unit maintenance
- Power and data transmission descriptions
- Data system amplification
- Azimuthing hydraulic steering gear
- Hydraulic pump and motor fault procedures and adjustments
- The ASU360 servo unit settings
- Steering angle feedback assembly
- Interfacing connections to the steering angle and propeller speed command systems
- Basics of confined space safe work principles
- Air seal unit hands-on (when applicable)
Course venue and duration
Helsinki, Finland
3 days

Description
Operation of a twin Azipod®-vessel with emphasis on pilot voyage and harbour maneuvers. Training consists of practical lessons on diesel electric Azipod propulsion and bridge simulator exercises. The course has been developed in cooperation with Aboa Mare Maritime Institute.

Student profile
On board and onshore operational and technical personnel. Pilots and personnel of maritime authorities and classification societies.

Prerequisites and recommendations
Experience or knowledge of Azipod®-propulsion

Course objectives
After completing this training the participants will be
• Familiar with the operational principles of diesel electric (DE) Azipod propulsion systems taking into account
  - Passenger safety and comfort
  - Environmental requirements
  - Economical requirements
• Able to utilize the flexibility of the DE propulsion system
• Able to identify the potential malfunctions of the propulsion system and to cope with them without sacrificing passenger safety
• Able to communicate about the different aspects of the propulsion system in a clear and concise manner

Main topics
• Diesel-electric Azipod®-vessel system functionalities
  - Power plant, distribution and propulsion drives
  - Azipod®-thrusters
  - Propulsion control
• Diesel-electric Azipod®-vessel operation with emphasis on pilot voyage and harbor maneuvers
  - Azipod®-operations
    - Speed control
    - Transverse thrust
    - Station keeping
    - Control of pivot point
    - Crabbing / side stepping,
    - External forces
  - Special conditions
• Power plant behavior in different load conditions
  - Optimizing power plant loading
  - Reverse power
  - Increase/decrease-function
• Effects of power plant and propulsion system malfunctions
Course venue and duration
Turgi, Switzerland
5 days

Description
In-depth theory and various exercises of control and hardware devices. Functions between the propulsion control and the drive control units. Hardware structure and software principles, including different test modes exercised with demo cycloconverter.

Student profile
Marine electricians or electrical engineers

Prerequisites and recommendations
ELE10 General course in ABB propulsion or similar knowledge is advisable.

Course objectives
Upon completion of this course the participants will be able to:
• Safely operate ACS6000c
• Understand the drive system topology
• Understand the functioning of propulsion and drive control
• Make necessary measurements
• Run different test modes
• Find alarm and fault messages
• Find and fix basic faults

Main topics
• Cycloconverter operation principle
• Using control panels
• Different drive modes
• Control concept and principle
• Propulsion control software
• Different test modes and measurements
• Cooling principle
• Thyristor replacement
• Fiber optic preparation
• Troubleshooting
• Maintenance
Course venue and duration
Turgi, Switzerland
Singapore
5 days (DNV Certified)

Description
In-depth theory and exercises of control and hardware devices. Functions between the propulsion control and the drive control units. Hardware structure and software principles. Hands-on training with demo inverter unit.

Student profile
Marine electrical engineers.

Prerequisites and recommendations
ELE10 General Course in ABB propulsion or similar knowledge is advisable.

Course objectives
Upon completion of this course the participants will be able to:
- Safely operate ACS6000SD/AD
- Understand the drive system topology
- Understand the functioning of propulsion- and drive control
- Make necessary measurements
- Find alarm and fault messages
- Find and fix basic faults
- Carry out preventive maintenance

Main topics
- DC bus configuration
- Medium voltage safety requirements
- Functions of components and PCB’s
- Hardware schematics and electrical drawings
- PCB settings and configurations
- Water-cooling system
- Preventive maintenance
- Energizing and de-energizing the converter
- Start / stop sequence
- Using local control panels
- Inverter and excitation software concept
- Interpretation of alarm and fault
SAMI MEGASTAR marine drive course
ELE23

Course venue and duration
Vaasa, Finland
4 days

Description
In-depth theory and exercises of control and hardware devices. Hardware structure and software principles.

Student profile
Marine electrical engineers.

Prerequisites and recommendations
ELE10 General course in ABB propulsion or similar knowledge is advisable.

Course objectives
Upon completion of this course the participants will be able to:
• Safely operate and maintain SAMI MEGASTAR
• Trace and correct faults using documents and tool programs
• Make necessary measurements

Main topics
• Introduction of the drive panel
• General explanation about PWM and NPC
• Application programs of the drives
• Fault and alarm lists, troubleshooting principles, trend loggers
• Troubleshooting exercises
• Relationship between SW and HW
• Local panel operations
Stadt marine drive course
ELE24

Course venue and duration
Ulsteinvik, Norway
Singapore
4 days

Description
In-depth theory and exercises of control and hardware devices. Hardware structure and software principles.

Student profile
Marine electrical engineers.

Prerequisites and recommendations
ELE10 General course in ABB propulsion or similar knowledge is advisable.

Course objectives
Upon completion of this course the participants will be able to:
• Safely operate and maintain Stadt drive
• Trace and correct faults using documents
• Make necessary measurements and maintenance actions

Main topics
• Introduction of the drive panel
• Basic frequencyconverter theory
• Hardware and firmware description
• Operation & maintenance actions
• Troubleshooting and repairs
• Diode and IGBT maintenance
• Water cooling unit
**Course venue and duration**
Turgi, Switzerland
3 days

**Description**
In-depth theory and various exercises of control and hardware devices. Functions between the propulsion control and the drive control units. Hardware structure and software principles, including different test modes, maintenance and troubleshooting.

**Student profile**
Marine electricians or electrical engineers working on board PSR-cycloconverter ships

**Prerequisites and recommendations**
Basic knowledge on synchronous motors and drive systems is advisable.

**Course objectives**
Upon completion of this course the participants will be able to:
- Understand the safety requirements of PSR-cycloconverter operation
- Understand the drive system topology
- Understand the functioning of propulsion and drive control
- Operate the drive
- Carry out preventive maintenance
- Perform basic troubleshooting tasks
- Locate and replace faulty hardware components

**Main topics**
- Cycloconverter operation principle
- Control hardware
- Power hardware
- Propulsion control software
- Cooling principle
- Thyristor replacement
- Fiber optic preparation
- Troubleshooting
- Maintenance
- Life cycle information and upgrade possibilities
Drilling drives system course (jack-ups)
DRL10
Drilling drives system course (semi-subs and drillships)
DRL11

Course venue and duration
Singapore
5 days (DNV Certified)

Description
This course provides working knowledge of ABB electric drilling drive systems based on ABB technologies. The training covers both drives and control systems. Hands-on exercises ensure balanced learning.

Student profile
Electrical staff operating, servicing and maintaining ABB electric drilling drives system.

Prerequisites and recommendations
Previous knowledge of electricity.

Course objectives
Upon completion of this course the participants will be able to:
• Understand drilling drive system topology
• Understand drilling drive system functions
• Safely operate ABB drilling drive equipment
• Perform basic troubleshooting
• Carry out preventive maintenance

Main topics
ABB drilling drives
• ACS800¹ start-up, maintenance and service
• Locating and identifying terminals, boards and other components
• Component and board functions
• Reading and interpreting circuit diagrams
• ACS800 standard application program
• Control panel functions
• DriveWindow commissioning and maintenance tool operations

Drilling drive control system
• Interfaces to other systems
  - Drilling Control System DCS
  - Power Management System PMS
• System and safety functions
• System hardware
• Drilling Drive Human System Interface HIS
  - Control and maintenance panels
  - Process panel
  - Assignment panels
• Preventive maintenance
• Troubleshooting & documentation
Marine high voltage safety course
HV10

Course venue and duration
Helsinki, Finland
Singapore
Skien, Norway
Rotterdam, Netherlands
Beijing, China
5 Days (DNV Certified)

Description
This safety course, certified by Det Norske Veritas and approved by Sjøfartsdirektoratet (Norwegian Maritime Directorate), is the first step for safe work with high voltage systems on board seafaring vessels and off-shore installations. Following a methodological approach, it is interactive, with group works and case studies present throughout the course; the contents take a look at current international safety standards, rules, regulations. The equipment related hands-on skills are continued in ELE31 Marine switchgear course.

Student profile
The course is intended mainly for marine engineers, electricians, electrical superintendents and safety officers but it is applicable also for all company staff who wish to have a basic understanding of safe working practices with marine high voltage systems.

Course objectives
HV10 course participants learn how to manage risks and develop safe working practices. At the end of the course the participants will be aware of the risks of working with high voltage equipments on board, the dangers of electrical hazards, how to avoid them and how to minimize the consequences of electrical accidents.

Main topics
• Role of safety culture in accident prevention
• Fundamentals of electricity and power
• Safety rules on marine HV environment according to current regulations and recommendations (STCW’95, SOLAS, IMO, IMCA, OSHA, DNV, etc.)
• Safety procedures for marine HV-installations: LOTO and EPTW
• Special considerations for off-shore electrical installations
• Dangers of electricity and arc-faults in switchgears
• Personal protective equipments
• Hazardous (Ex) locations
• Risk management
• Accident analysis workshop
• First aid in electrical injuries
• Practical exercises

Please ask also for shorter non-certified Course availability “Introduction to marine high voltage safety” (HV11 2 days)!
Course venue and duration
Helsinki & Lohja, Finland
3 days (DNV Certified)

Description
Lectures and practical exercises on occupational risk in the large Azipod, safe entry precautions, entry and rescue equipment, rescue plan and evacuation procedures.

Student profile
Ship engineers and electricians working specifically with large Azipod propulsion. Deck officers in charge of safety issues on board Azipod vessels.

Prerequisites and recommendations
Sufficient health conditions to work inside confined space.

Course objectives
After this course the participant will be able to:
• Identify the different risks involved when working in Azipod
• Enter and work safely inside the Azipod
• Assist other entrants for normal entry and during emergency situation

Main topics
• Azipod as an engineering system
• Occupational risks with Azipod
• Confined space regulation
• Duties of involved personnel
• Typical Azipod entries and entry procedures
• Traumatology and emergency actions
• Rescue operations
• Using personnel protective equipments required for safe entry
• Entering an Azipod mock-up
• Evacuating an injured person from the Azipod mock-up
• Typical emergency action plan
Course venue and duration
Dalmine, Italy
5 days (DNV Certified)

Description
Introduction to marine power distribution system. Overview on different device generations. In-depth theory and various hands-on exercises of switchgear, breakers, and relays.

Student profile
Marine electrical engineers.

Prerequisites and recommendations
ELE10 General course in ABB propulsion or similar knowledge is advisable.

Course objectives
Upon completion of this course the students will be able to:
- Understand the functioning of marine power plant
- Safely operate and maintain following technologies:
  - Circuit breakers (SF6, Vacuum)
  - Contactor (Vacuum)
  - Switchgear
  - Protection relays

Main topics
- Structure of the circuit breakers and switchboard
- Functional characteristics and performance
- Maintenance operations and checks
- Verification of the mechanism
- Find and fix basic faults
- Protection relays
- Protection functions
- Power plant regulation principle
- Overview of transformers, generators and motors in power distribution system
Course venue and duration
Singapore
Dalmine, Italy
4 days (DNV Certified)

Description
Short introduction to marine power distribution system. Theory and hands-on exercises of MV switchgear, circuit breaker, and protection relay.

Student profile
Marine electrical engineers and electricians.

Prerequisites and recommendations
ELE10 General course in ABB propulsion or similar knowledge is advisable.

Course objectives
Upon completion of this course the students will be able to:
- Understand the basic functioning of marine power distribution
- Safely operate and maintain following technologies:
  - Gas and vacuum circuit breaker
  - Vacuum contactor
  - UniGear switchgear
  - Protection relay

Main topics
- Marine HV distribution system
- Powerplant regulation principles
- Functional characteristics and safety features of the UniGear switchboard
- Structure and working principles of gas and vacuum circuit breakers
- Operation of circuit breakers and vacuum contactors
- Operation of protective relays and interface for REM 543 (Relays for Machines) & REF 545 (Relays for Feeders) to computer software (optional)
LV power distribution system course
ELE61

Course venue and duration
Singapore
4 days (in DNV Certification Process)

Description
This course serves an introduction to marine low voltage distribution system with ABB safety and first aid included. It provides an overview on LV switchgears and ABB Softstarter, and in-depth theory on various types of circuit breakers and protections.

Student profile
Marine electrical engineers and electricians.

Prerequisites and recommendations
ELE10 General course in ABB propulsion or similar knowledge is advisable.

Course objectives
Upon completion of this course the students will be able to:

- Understand the functions of various low voltage protection devices
- Safely operate and maintain the following ABB technologies:
  - Circuit breakers
  - Switchgears
  - Protection relays
  - Softstarter
- Manage risk of working with electric switchgear and adopt safe working methods for marine environment

Main topics
- General marine powerplant
- Powerplant regulation principles
- Generators, motors and transformers overview
- LV switchboard MNS
- Air circuit breakers
- Moulded case circuit breakers
- Softstarters
- Low voltage safety and hazards
- Treatment of electrical injuries and first aid
Course venue and duration
Rotterdam, Netherlands
5 days

Description
In-depth theory and various exercises on the DEGO II and III Electronic Governor System. Introduction to troubleshooting, tuning and basic repairs.

Student profile
Marine electricians and engineers as well as other technical staff.

Prerequisites and recommendations
Basic knowledge of diesel engine speed control and power generation gained for example from ELE10 is advisable. Basic electrical knowledge required.

Course objectives
Upon completion of this course students will be able to:
• Understand the DEGO II and III electronic governor system
• (Operate the PC based tool DEGO III AID)
• Identify abnormal behavior of the system
• Locate faults in the different units
• Repair by replacement and perform recalibrations
• Make fine tunings to the system
• Perform basic maintenance and repairs on ASAC actuators

Main topics
• Basic theory of electronic governors
• Propulsion application
• Generator application
• Fuel-rack actuator
• ABB DEGO II and III governor concept
• Trouble shooting techniques and repair
• Practical exercises

Available also separate courses for DEGO II (4 days) and DEGO III (3 days) products.
Course venue and duration
Helsinki, Finland
4 days (Optional day 5 for PC tools)

Description
In-depth theory and various exercises of control and hardware devices. Hardware structure and software principles.

Student profile
Marine electricians, electrical engineers and other technical staff working on Azipod C ships.

Prerequisites and recommendations
None.

Course objectives
Upon completion of this course the participants will be able to:

- Have advanced knowledge of Azipod C system
- Understand the functioning of propulsion and drive control
- Operate and maintain ACS800 Azipod C drive system
- Trace and correct basic faults

Main topics
- Basic drive and control system structure
- Drive control & electrical steering gear
- Azipod C propulsion
- Locating and identifying terminals, boards and other components
- Converter and supply unit
- Changing the settings
- Water cooling unit
- Fault tracing methods
- Exchanging the parts and modules
- Theory and exercises on the drive PC tool program (optional 5th day)
- Theory and exercises on the controller PC tool program (optional 5th day)
Course venue and duration
Genova, Italy
3 days

Description
The course goal is to teach students how to operate on the Advant controllers and how to use the Advant operator stations in order to understand system & process alarms and operate properly with the process controls.

Student profile
Marine engineers, workplace operators as well as other ship technical staff.

Prerequisites and recommendations
None. Recommended for cadets and officers new to ABB automation systems.

Course objectives
Upon completion of this course the students will be able to:
- Understand all process alarms and events
- Use alarms as fault tracing
- Use equipment in normal operation
- Understand and control the automation processes

Main topics
- Advant OCS philosophy and products overview
- Hardware basic configuration and systems lay-out
- Connection principles of the Input & output signals with an automation system
- AMPL database for input & output signals
- Operator stations, X-Terminals and process displays handling
Advant automation course for maintenance users
AUT21

Course venue and duration
Genova, Italy
5 days

Description

Student profile
Marine electricians, electronic and service engineers as well as other ship technical staff.

Prerequisites and recommendations
Automation system basic operational and electrical knowledge, experience in operation with IAMCS solutions.

Course objectives
Upon completion of this course the students will be able to:
• Understand all system and process alarms
• Use system alarms as fault tracing
• Perform maintenance operation or solve technical problems on the automation systems

Main topics
• Advant OCS philosophy and products overview
• Systems layout and hardware configurations and setup
• Operator stations, controller systems and networks diagnostic
• Input & output field signals schematics, fault tracing and maintenance
• Systems status, troubleshooting and maintenance operations
PMS800 course for power management system process
AUT31

Course venue and duration
Genova, Italy
2 days

Description
Overview on actual Marine Power plant based on ABB power management system. The goal of this course is to learn PMS functionalities, PMS800 software structure, to use ABB 800 Panel Builder and organize and perform a correct system operation.

Student profile
Marine electricians, electronic and service engineers as well as other ship technical staff.

Prerequisites and recommendations
Basic knowledge of power generation process. ELE10 General course or similar knowledge is advisable.

Course objectives
Upon completion of this course the participants will be able to:
• Explain the system architecture and the function of the different components
• Manage and understanding alarms, events and trends
• Navigate in the PMS process display and functionalities
• Have an understanding of the power management process
• Have an understanding of PMS functionalities
• System and process troubleshooting

Main topics
• Systems layout and hardware configurations and set-up
• Power plant process principles
• Theory and exercises on the PMS sub-systems.
Most of our standard training courses are designed to be delivered in an ABB training center environment. For on board training, the approach is about co-operation and learning together. Those familiar with the actual ABB installation deliver the training. In an on board training session, the ABB Marine field engineer becomes the instructor.

The engineer executes, together with a crew, a list of tasks that has been agreed in advance. Training objectives for the on board session are stated together with the actual crew. To deliver on board training that satisfies pedagogical standards, we have introduced an internal training program, where a selected group of senior field engineers are trained in a wide range of pedagogical skills. This “train the trainers” program has been developed together with carefully selected global partners from the field of educational science.
eMST® – Electronic Maintenance Support Tool is a novel concept enabling just-in-time access to highly pedagogical e-learning material.

eMST® delivers instructions for the daily crew maintenance tasks. eMST® is produced by a specialized ABB organization that includes full-time project management personnel, experienced ABB Marine maintenance specialists, and a complete network of subcontractors from the area of graphical and usability design. The eMST® objectives are always agreed together with the customer, depending on the scope of the ABB equipment, the amount of crew tasks, and the desired competence level of the crew. The learning content is exclusively system specific. It includes photos, videos, animations and instructional texts produced for the actual on board system. The eMST® concept is designed strongly from the pedagogical approach. Instead of dividing information, this concept really delivers competence!
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