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Automation, Electronics and Electrical Training

Course Content:

MARINE ELECTRICAL POWER SYSTEMS

- AC power fundamentals
- Electrical safety and personal protective equipment
- Basic concepts of marine electrical power systems – typical for product tanker
- Class requirements, marine industry standards for electrical equipment – short introduction
- Electrical design: short circuit current calculation and load flow analysi – short introduction
- Electromagnetic compatibility and power quality
- AC generators, motors and transformers
- Diesel-generator power capability limit and transient stability limit – short introduction
- Synchronisation and load sharing between generators
- Governors and automatic voltage regulators (frequency and voltage regulation) – woodward UG 25+
- Switchboards and power distribution
- Bus-bars
- Grounded and ungrounded systems
- Electrical power cables – short introduction
- Switching equipment (Circuit breaker, MCCB, contactor, disconnector switch, …)
- System protection and protection coordination
- Shore connection
- Load shedding
- Emergency generator and emergency switchboard
- Power management system (PMS) – typical on Scorpio fleet DEIF PPU3
- UPS systems
- Lighting system
- Cargo handling equipment and winches – FRAMO submerged cargo pumps
- HVAC systems – few words about compressor pressure switches and LO differential switch
- Electrochemical batteries
- Electrical equipment for hazardous areas – important for tankers
- Technical documentation and electrical drawings – typical documentation provided
- Electrical system maintenance and fault analysis
- Power electronics (semiconductor switches, rectifiers, DC-DC converters, Switched mode power supply, Inverters, Frequency converters, Electronic ballasts, soft starters,…)
- Variable frequency drives – to highlight issues: low power factor at low load
- Cycloconverter, Load commutated inverter (Synchroconverter), PWM converters – short introduction
- Vacuum and SF6 circuit breakers

AUTOMATION

- Signal processing basics
- Flowcharts and algorithmic structures in automation
- Transfer functions and block diagrams
- Control system basics
- Sensors and measurement converters (pressure, temperature, level, flow, etc.)
- Actuators
- Controllers
- PID controller tuning
- Current and voltage control loops)
- Power supply for automation systems
- Class requirements for automation systems
- Automation of diesel-generator
- Automation of main engine – to be specific for MAN engines ME-B and ME-C
- Automation of electrical power plant
- Automation of auxiliary systems – Aalborg and Saacke burners, IGS

Venue:
Faculty of Maritime Studies Rijeka

Teaching aids:

- Laboratory for Process Measurements
- Laboratory for Guidance and Control
- Laboratory for Marine Electrical Machines and Systems
- GMDSS Laboratory - Radio Station
- Laboratory for Electronics
- Laboratory for Applied Computing
- Laboratory for Electrical Measurements and Instrumentation
- High Voltage Laboratory

Course duration:

5 days (30 hours)

Course certificate:
A course certificate specifying the training details will be issued by the Faculty of Maritime Studies Rijeka to each participant upon successful completion of the course.