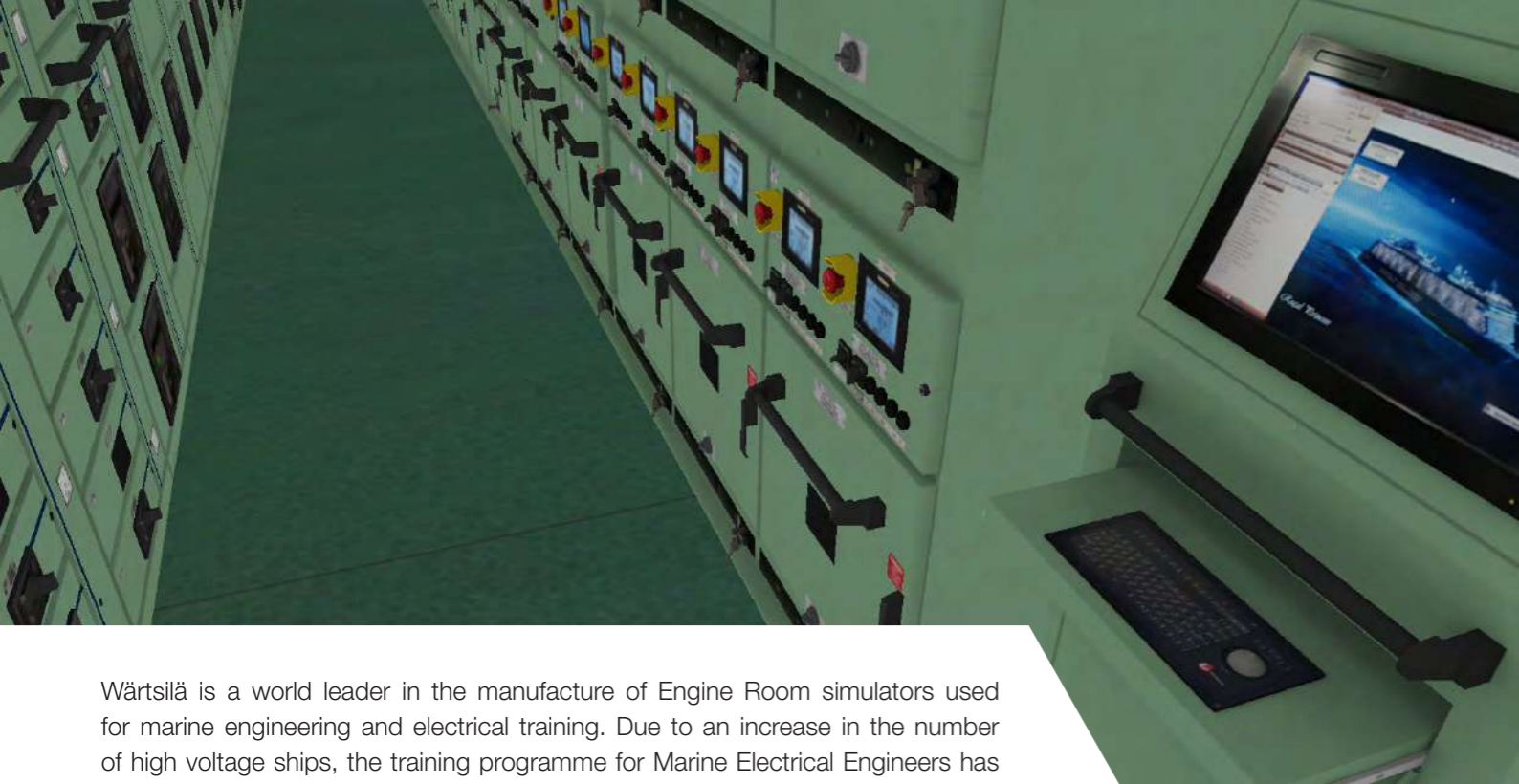


High Voltage Training Breaker

ERS 5000
Techsim





Wärtsilä is a world leader in the manufacture of Engine Room simulators used for marine engineering and electrical training. Due to an increase in the number of high voltage ships, the training programme for Marine Electrical Engineers has made high voltage training mandatory. A practical element of training has been introduced requiring safety training using real equipment. This does not necessarily have to be live equipment.

To meet this new training requirement, we have developed a real hardware high voltage generator breaker cabinet in conjunction with power technology specialist ABB.

Training Objectives

- Realistic hands-on training in high voltage switchboard operations
- Understanding safety as a personal responsibility
- Electricity and work planning
- Identification of hazards
- Emergency procedures and contacts/location of emergency gear
- Knowledge of circuits/power feeds/emergency shutdown and isolation devices
- Familiarisation with company protocols
- Isolation of breakers in ships' electrical systems
- Use of high voltage test equipment
- Use of high voltage Personal Protective Equipment (PPE)
- Definition and identification of circuit condition/energised work conditions
- Practical assessment of personnel and assignment of work/qualification of a worker.

Designed to meet the training requirements set out in Section A-III/1, A-III/2, A-III/6 & B-III/2 of the STCW Code 2010 (Manila Amendments).



Real ABB Breaker

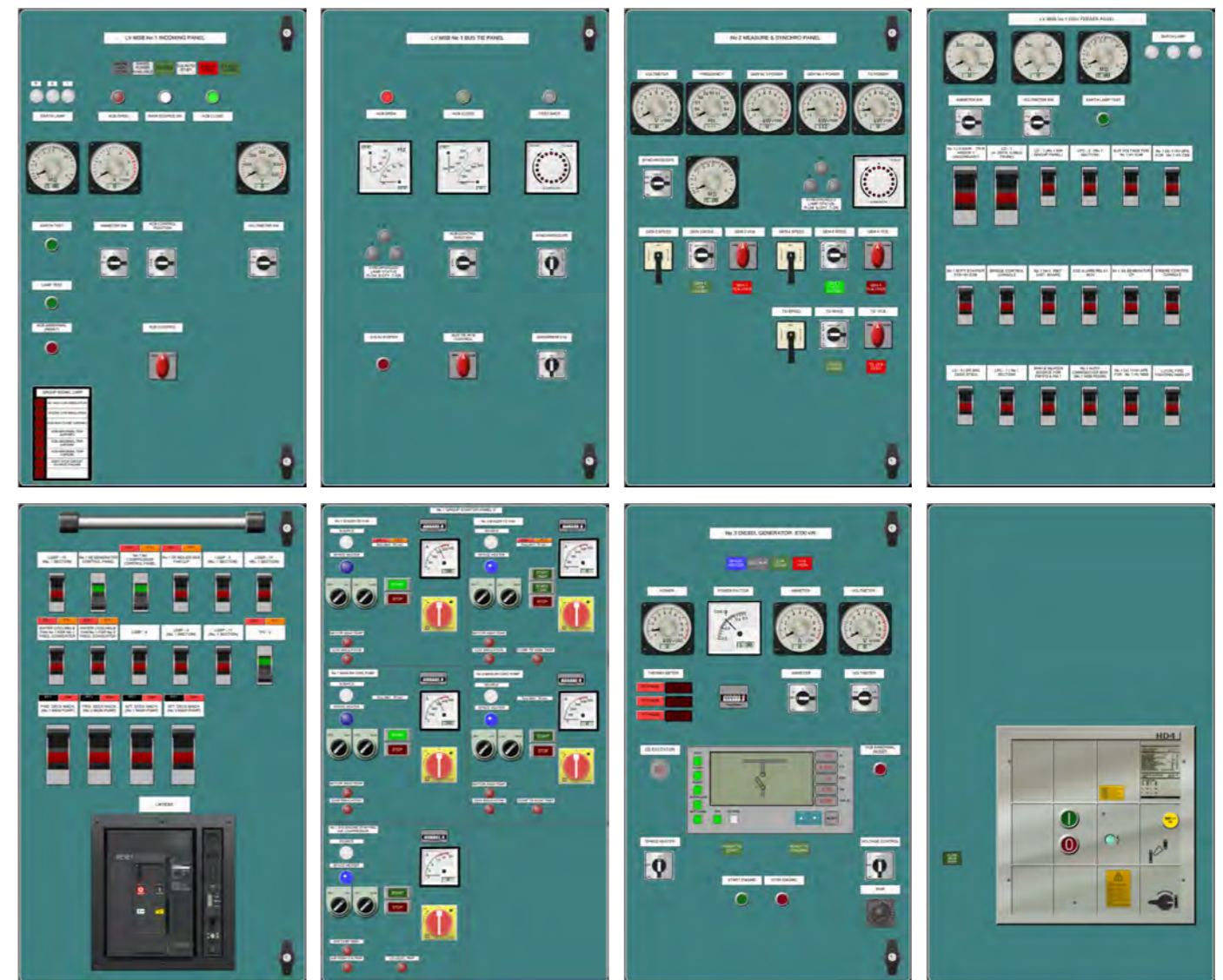
Equipment Supplied

The breaker is compatible with the existing TechSim simulators with high/medium voltage systems. High voltage distribution systems can be used in several ship types:

- DE Cruise ship
- Steam Turbine LNG Carrier
- DE LNG Tanker.

Connection to Existing Simulator

The breakers are supplied by the following manufacturers: ABB, Hyundai, Siemens and Mitsubishi. The breakers are fitted with 'earthing' arrangements and safety interlocks. We offer interconnection between the TechSim simulator and any of the above high voltage breakers.



Existing MSB Touch Screens

Simulator Interface

The lower part of the breaker comprises a real breaker operated by the simulator electrical system mathematical model. The upper panel contains the instruments and controls for a typical high voltage generator. The controls and instruments are connected to the simulator model via a digital analogue interface.

To simulate LCD type Power Management System controllers, a precisely developed small touch screen display simulates the controller functionality.

The simulator is connected to the breaker using a Wago COTS automation interface which may also be used for automation training.



The bus ties and generator breakers are installed in the main switchboard and are normally 'front loading' Vacuum Circuit Breakers. The electrical systems are of common design and operate at the following voltages:

- Up to 6600 V
- 3 phase
- 60 Hz
- Generators 3350 to 4000 kW

A complete safe removal and replacement procedure may be conducted for training and assessment. This includes both the mechanical and electrical isolation of the generator system prior to the start of work. All tools, test equipment and personal protective equipment required to carry out the operation are supplied with the breaker. This includes a breaker cart.

Test Equipment

For safety reasons high voltages are not used within the training breaker. The presence of high voltages is simulated using low powered radio signals. An adjusted high voltage probe signals the presence of voltage on the bus bars using a specially adapted test probe.



Personal Protective Equipment (PPE)

High voltage PPE is supplied as a part of the training breakers equipment.

Wärtsilä/ABB Training Breaker

Cut Away Side Panels with internal lighting for demonstrations



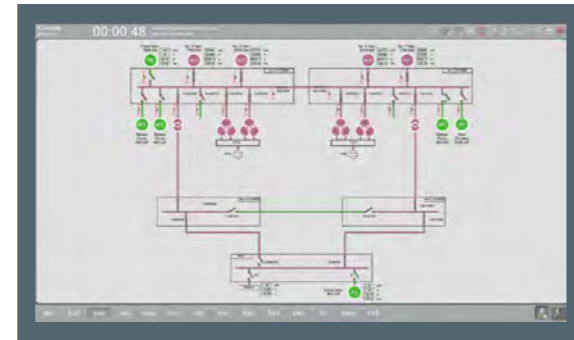
Simulated Generator Instrumentation

Breaker Automation and Protection LCD Touch Screen

Full Set of Mechanical and Electrical Breaker Interlocks

Training Process

Real
ABB Breaker



Large touch screen MIMIC for instruction and demonstration



Student operator station



Instructor station

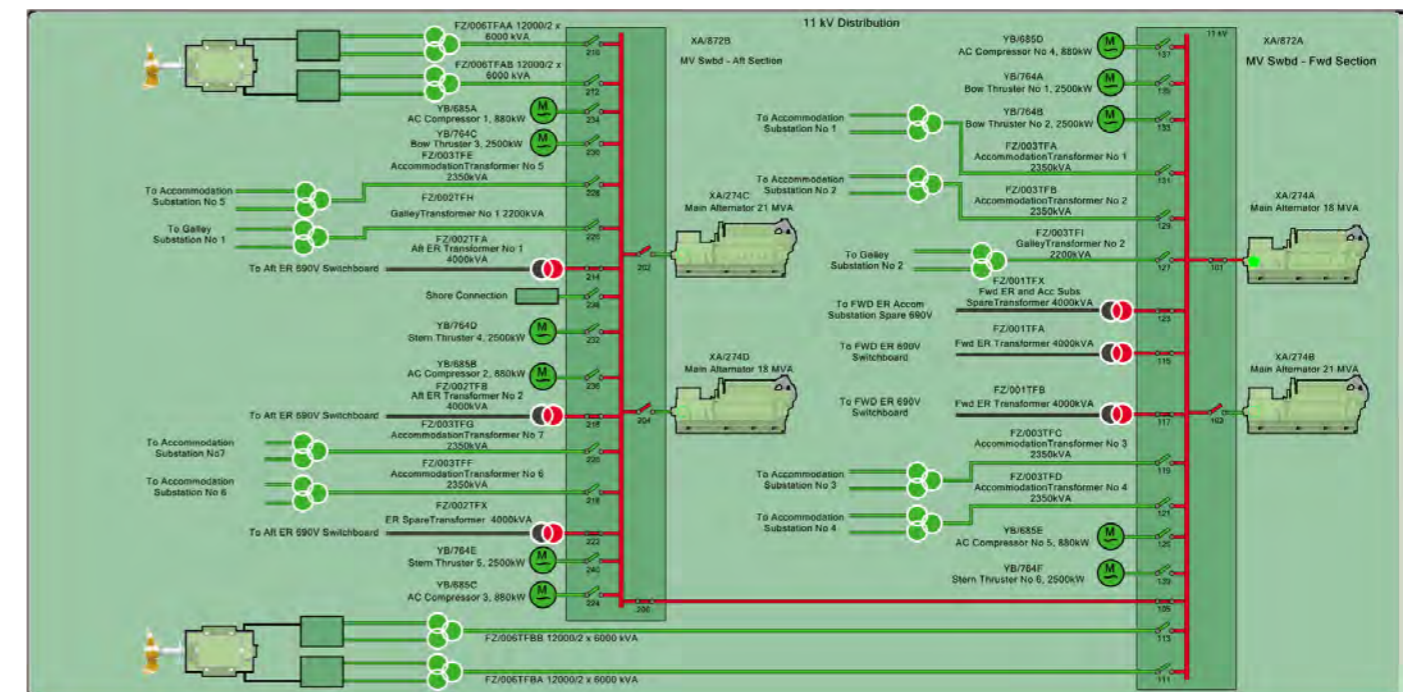
Training Applications

Breaker

- Breaker construction
- 'Earthing' arrangements
- Breaker safety interlocks
- Isolation testing
- Breaker removal
- Insulation Testing
- Breaker replacement
- Setting to work

Simulator

- Marine high voltage system instruction
- Electrical isolation planning
- Prime mover (generator) mechanical isolation
- Power management system



Wärtsilä is a global leader in smart technologies and complete lifecycle solutions for the marine and energy markets. By emphasising sustainable innovation, total efficiency and data analytics, Wärtsilä maximises the environmental and economic performance of the vessels and power plants of its customers.

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