

A wide-angle photograph of a modern engine room simulator. On the left, there is a curved console with three digital displays and control panels. In the center, two large vertical touchscreens are mounted on white cabinets, displaying 3D engine models. To the right, a curved desk is equipped with multiple computer monitors and a green office chair. The room has large windows on the left wall and a tiled floor.

Engine Room

A photograph of a full mission marine simulator. The left side features a large, curved wall of control panels with numerous analog gauges, switches, and digital readouts. In the center, there are smaller digital displays and a control console. On the right, a large vertical touchscreen is mounted on a white cabinet. A green line-art map of the world is overlaid in the center of the image. The room has large windows and a tiled floor.

Full Mission Marine Simulators

PANGAEA R&D

INTERACTIVE FULL MISSION SIMULATORS FOR EDUCATION

SYSTEM OVERVIEW

Simulator with touchscreens is a significant innovation in the development of full mission engine room simulators. This new feature reduces the main disadvantage of full mission engine room simulators in hardware version with realistic consoles and panels that consisted in the inability to adapt to various modern solutions applied in engine rooms unless expensive hardware changes were implemented. Hence, as a result of the introduction of touchscreen monitor technique, the simulators are much more flexible and lead to quicker and cheaper adaptation to the fast-changing reality of engine rooms. The simulator provides a realistic, ship-like environment based on real hardware consoles and high quality 3D presentation. The systems include vital components, such as main engine local and remote control, engine telegraphs, engine room local panels, integrated automation system, etc.

All simulators are designed and produced in accordance with the requirements of IMO(model course 2.07, 7.02, 7.04, 7.08), STCW 2010 (regulation I/12 and code A / Table A-III) - MARPOL and SOLAS too. The content of the simulator provided, including multimedia presentations, exercises and simulations, is adapted to the standard local educational curriculums while following the above international training standard guidelines, recommendations and regulations.

The simulators are designated for training students of maritime academies, as well as for different types of marine vocational training centers. The simulators have universal features and may be used both for training merchant and navy fleet crew.

The system provides the classroom Debriefing module, installed in the Instructor's workstation, connected to the LAN, and also connected to an interactive board via HDMI interface. The projector for the debriefing station display can also be selected, as per client request.



SYSTEM OVERVIEW

The simulations are designed and based on scientific mathematical models which apply to the marine and electromechanical engineering, for creating a high precision image and operational simulation. Additionally, all simulated equipment are developed with close cooperation and verified data from the original equipment manufacturers.

All solutions for the ER simulators are based on real equipment and have been thoroughly verified by the engine's manufacturers.

The simulator is suitable for training personnel at all levels (familiarization, operation and management). At each level, learning trainee objectives can be realized, recorded, analyzed and assessed.

The classroom network system offers the capability for Remote Software Application downloading and Remote Version upgrading to licensed users.

As part of the training process (theory delivery and simulation practice), assessment tests take place in order to ensure that the students comprehend and perform the tasks correctly. This step-by-step process of performance evaluation covers the whole didactic content. The system includes a set of automatic tests that are used to assess the competences of students.

An e-learning platform is offered (optionally), via internet, for remote training as separate service. This is an optional alternative to Classroom solution, in case the client requests such service.

The curriculum is separated into **Standard mode** of operational training level and **Advanced mode** of operational training level in a sequence of appropriate theory, simulation process practice and testing through problem solving procedures.



SIMULATION FEATURES

3D Modeling

The ER simulators introduce a “state-of-the-art” 3D modeling of the Engine Room, based on the real equipment. The engine simulations were built in collaboration with the engine manufacturers to depict the real performance and the characteristics of the engines.

The 3D model includes very realistic, animated, virtual controls like switches, gauges and lamps, ensuring the realism of engine room operation and familiarization of the trainers in the ER environment. The systems’ design offers a high degree of 2D and 3D visual effects and behavioral realism of the simulators, which allows and makes available to the instructor and the trainees a digital state-of-the-art training facility.

Training is achieved by integrating a very realistic mathematical model and high-fidelity 3D presentation.

Virtual Reality

The program interface has been designed in such a way as to enable efficient and effective navigation around the engine room. At the same time, ER navigation provides the simulator exercises realism very close to reality.

The simulator uses an original navigation technique, based on the Zoom utility in the 3D environment and dedicated navigation maps in the Engine room site. The students can be zoomed and directed to the proper location in the engine room to operate.

The zoom facility submerges the users to a Virtual reality environment and familiarizes them to the Engine room installation and main equipment into a “next to real” visual experience. The program interface has been designed in such a way as to enable efficient and effective navigation around the engine room.





SIMULATION FEATURES

Sounds

Multichannel 3D digitized sound provides a very realistic engine room feel. The sound effects include engine sound correlated with engine speed. The intensity of other system sounds (alarms, valves, generator, etc.) depends on the space location – proximity of the equipment.

Auxiliary subsystems

The system provides training and simulation on all the vital auxiliary systems in each Engine Room mentioned above. It also provides to the students a coursework for a vast number of auxiliary systems beyond and above the ones that are included in the provided ER engine type simulation.

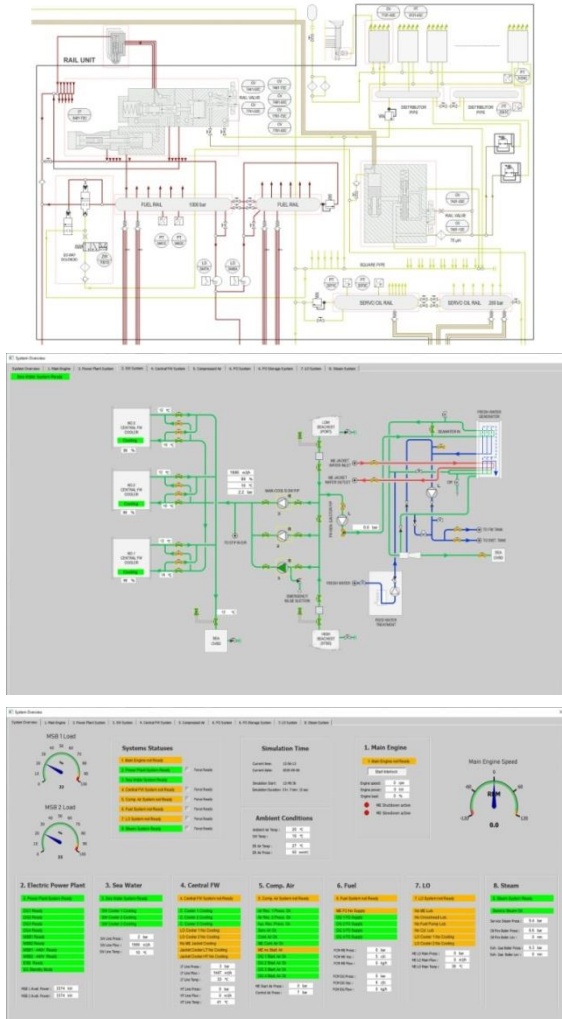
Controls

- Simulates control from the bridge.
- ER control room for remote control.
- Local control.

Scenario editor

The simulator provides the scenario editor mode for setting the simulation training in various realistic operating or emergency procedures, with various levels of difficulty, subject to the trainers' decision.

The overview windows on the simulation enable a quick overview of the situation in the engine room. The green color means "ready for the operation" while orange means "not ready for the operation". The particular statuses are displayed for the whole subsystems and the individual equipment (coolers, generators).



Engine Room Simulator with touchscreen solution



In the engine room simulator with touchscreen solution, the following configuration is applied:

- Hardware console with 6 touchscreen monitors (22") for engine control room visualization;
 - Set of 5 touchscreen monitors (43") in vertical position for electrical switchboard simulation;
 - One big touchscreen monitor (65") for engine room components' 3D visualization, together with additional touchscreen monitor (22") for proper navigation through different engine room sub-systems.
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- A typical configuration of the Engine Room Simulator with touchscreen solution offers the flexibility in applying different configurations of engine rooms starting from low speed main engine (with conventionally and electronically controlled solutions), through medium to high main engines.



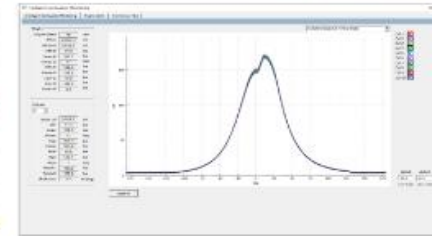
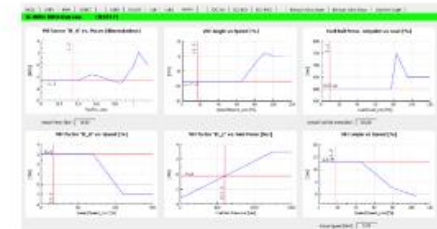
The following UNITEST engine room simulators with 3D visualization can be applied on touchscreen version:

- Low Speed Engine Room Simulator LER3D based on MAN DIESEL (B&W) LMC engine;
- Low Speed Engine Room Simulator LER3D-EC based on MAN DIESEL ME engine;
- Low Speed Engine Room Simulator W-Xpert electronically controlled based on WinGD W-X35, Win-GD RT-flex 50DF, WinGD W-X62, WinGD W-X92 ;
- Medium Speed Engine Room Simulator MED3D based on MAK engine;
- Medium Speed Engine Room Simulator MER3D based on Rolls-Royce (Bergen Diesel) engines;
- Medium Speed Engine Room Simulator PSV3D (Platform Supply Vessel) based on Rolls-Royce (Bergen Diesel) engines;
- LNG Diesel Electric Engine Room Simulator LNG-DE3D based on typical solutions and presently used in LNG diesel electric engine rooms;
- High Voltage Diesel Electric Engine Room Simulator HV-DE3D based on typical solutions and presently used in diesel electric Platform Supply Vessels engine rooms.



The simulator is divided into the following modules:

- Bridge
- Diesel Generator
- Emergency Generator
- Main Engine
- Compressed Air System
- Cooling System
- Lubricating System
- Fuel System
- Steam System
- Ballast System
- Steering Gear System
- Bilge System
- Steering Gear
- CO2 Fire Extinguishing System
- FW & Sanitary Water System
- Bilge System
- Stern Tube Seal
- Sewage Treatment Plant
- Refrigerating Plant
- AC Plant
- Incinerator



SINGLE CONSOLE ENGINE ROOM SIMULATOR

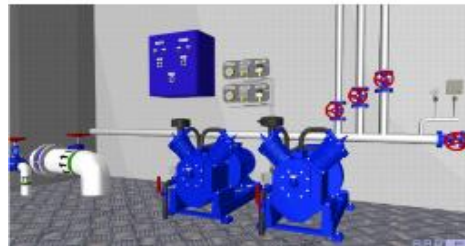
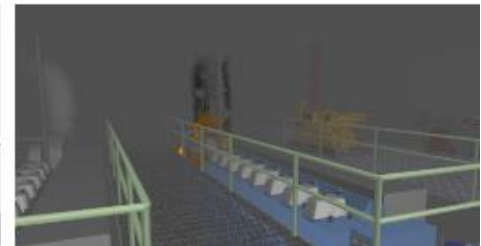
- The desktop hardware console combines features and benefits of a hardware simulator (real levers, gauges, lamps and pushbuttons) with a very compact size. It can be used in normal PC-classrooms as a multiple installation in different configurations.
- We offer the single console simulator in two (2) versions. In one version, the console is dedicated to medium speed engine room (MER3d, MER2 software) with two (2) main engines, reduction gear and controllable pitch propellers. The second version is dedicated to low-speed engine room (ERC software).



The UNITEST single console is an engine room simulator with a single desktop hardware console.

The simulator is divided into the following modules:

- **Fuel System**
- **Cooling & Fire System**
- **Lubricating System**
- **Compressed Air System**
- **Power Plant**
- Emergency Generator
- **Sanitary Water System**
- **Bilge System**
- **Steering Gear**
- **Sewage Treatment Plant**
- Air Conditioning Plant
- **Water Mist System**
- **CO₂ System**
- Reverse osmosis system
- Hot water boiler
- Refrigerating Plant



Details - Software Specification

LNG-DE3D - Diesel Electric Engine Room Simulator

LNG-DE3D Engine Room Simulator is based on engine room equipped with diesel electric dual fuel propulsion system powered by Liquefied Natural Gas and Diesel Oil. This type of propulsion is widely used in modern propulsion systems on various types of vessels. The simulator is based on a ferry vessel used for carrying vehicles and passengers. Generally, the propulsion system includes three DF Diesel Generators 3 x 1489 kW and two Azimuth Thrusters 2 x 1750 kW.

The operator can go through LNG bunkering and supply process, choose between different tank filling options (top filling, bottom filling, top and bottom, auto pressure control filling).

The following procedures can be trained:

- inerting of gas/vapour return hose,
- inerting and pre-cooling of LNG hose,
- hose leakage test,
- hose leakage test and ESD Valve test.



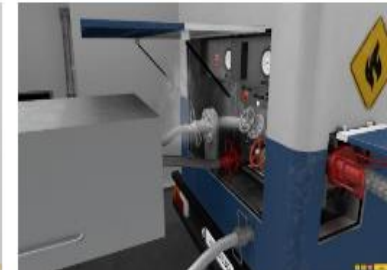
The most of the control of LNG bunkering valves is done through automatic control sequences. The operator has the opportunity to go through all the procedures in the manual mode.

Starting the gas supply to the engines and boiler in automatic and manual mode.

Depending on the state of LNGPac and pressure build up evaporator, the operator can start the procedure of supplying gas to DG. The System includes Process Stop and Sequence Overview to understand and acquire knowledge.

The simulator is divided into the following modules:

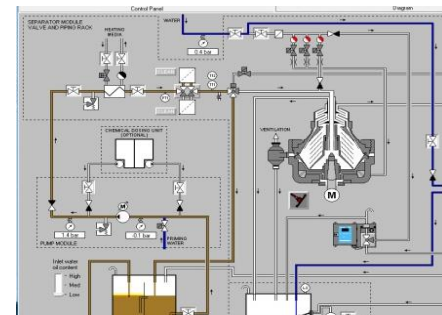
- Bridge
- Diesel Generator
- Emergency Generator
- Main Engine
- Compressed Air System
- Cooling System
- Lubricating System
- Fuel System
- FW & Sanitary Water System
- Sewage Treatment Plant



VIRTUAL ENGINE ROOM – CBT Computer based training

This additional computer-based training module provides a comprehensive training and simulation of more than 45 vital auxiliary systems found in marine power plants. The module provides theory and description, operational training, assessment tests and simulation, performance, control, operation and fault fixing for most of the auxiliary systems. This application familiarizes the students with all the electro-mechanical auxiliary equipment and system prior to operating the engine simulation as a complete operational system. It simulates the **following individual auxiliary systems**:

- Marine Diesel Engine Monitoring Systems
- Marine Heat Exchangers
- Marine Hydraulic Machinery
- Marine Pumps
- Oily Water Separator
- ORCA offshore
- ORCA offshore
- PureBallast Treatment System
- PureBilge – Bilgewater Cleaning System
- R.C.S. for MAN B&W LMC engines
- R.C.S. for SULZER RTA Engines
- Refrigeration Plant
- Refrigeration Plant 3D
- Reverse Osmosis Desalination System
- Rotary Vane Steering Gear
- Steam Boilers (steam production)
- S-type Separation System
- Variable Delivery Pump Steering Gear
- Alfa Laval Pure-Ballast 3
- Alfa Laval -Bilgewater Cleaning System
- Fixed Firefighting Systems
- Diagnostics of Modern Marine Diesel Engines.
- ALFA Laval ORCA Offshore.
- ALFA Laval Steam Boilers
- Alfa Laval Fuel Conditioning System (FCM 1.5).
- DESMI Compact Clean.
- DESMI OptiSave
- Air Conditioning Plant 3D
- Auxiliary Steam Boiler Installation
- Biological Sewage Treatment Plant
- C.P.Propeller Installation
- Comb. Oil Fired and Exhaust Gas Boiler
- Diagnostics of Modern Marine Diesel Engines
- Diesel Engine Generators
- Diesel Engines
- EcoStream
- Emergency Power Plant 3D
- Electric Power Plant
- Fixed Delivery Pump Steering Gear Inst.
- Fixed Fire Fighting System
- Freshwater Generator
- Freshwater Generator 3D
- Freshwater Generator 3D AQUA Type
- Fuel Conditioning Module 3D
- Fuel Oil Treatment Plant
- Gas Turbine
- Hydrophore Installation
- Hydrophore Installation 3D
- Marine Compressors
- Marine Diesel Engine Monitoring Systems
- Marine Heat Exchangers
- Marine Hydraulic Machinery
- Marine Pumps
- Oily Water Separator





Installation Training and Support

- **Installation** and **commissioning** of the simulator systems will be performed by a certified (of the simulators manufacturer) territorial integrators **POLYTECH SA** and **PANGAEA R&D**
- Prior to any installation, a detailed **study of requirements** will be provided for the network and power facilities for each site of delivery.
- **Training the trainers:** Simulator operation training and instructor certification for training completion will be provided by a manufacturer's certified instructor, after installation is completed per site.
- With each system, a complete **3 set of documents** will be delivered in electronic form, containing all the appropriate technical, operational and didactic material for each simulator system and its components.
- Assigned, certified system integrator for the territory of Greece: POLYTECH S.A.