Low Speed Engine Room W-Xpert W-X72 Simulator

W-Xpert W-X72 Engine Room Simulator is based on typical solutions and presently used in medium engine rooms such as Suezmax tankers, Capesize bulk carrier as well Panamax and Sub-Panamax container vessel. The propulsion machinery is based on Electronically Controlled Winterthur Gas and Diesel W-X72, low speed, 6 cylinder configuration, 2-stroke, turbocharged and reversible diesel engine. The electric power plant includes three (3) Diesel Generator and one (1) emergency generator.

The simulator is designated for training all Marine Engineers, students of maritime academies as well as for different types of marine vocational training centres. The simulator introduces 3D model of Engine Room, has universal features and gives realistic hands-on experience in ship environment. All diesel generator engines, propulsion plant and equipment behaviours are based on real respond.

Winterthur Gas & Diesel W6X72 Main Engine top view

Model description

W-Xpert simulator offers detailed simulation of X-engine behaviour in regards to operational aspects, its functionality and performance. The simulator includes the following systems: Power Management System which contains all standard functions, such as load dependant start/stop, load sharing, synchronising, and load shedding.

The Alarm and Monitoring System allows the operator to control all propulsion system equipment parameters. The Intelligent Combustion Monitoring system for continuous pressure measurement and analysis of NOx emission level and FOC (Fuel Oil Consumption) with primary features includes: graphic presentation of PT, PV and Balance Diagrams, together with Mean Indicated Pressure and Maximum Pressure deviation limits. Calculated values of Effective Power, Mean Indicated Pressure p_i, Compression pressure p_{comp}, Maximum pressure p_{max} and Scavenge pressure p_{scav} include values for fuel injection and exhaust valve adjustment.
The simulation and scenario editor mode for training emergency operating procedures when faults occur on low-speed main engine, supporting systems and auxiliary machineries.

The main purpose of the simulator is the practical preparation of the trainee for engine room operation, and more particularly:
- familiarization with electronically-controlled common-rail technology and flexibility of the fuel injection and exhaust valve operations
- familiarization with the engine room installation (electric power plant system, compressed air system, fresh and sea water cooling system, lubricating and fuel oil system);
- acknowledgment with diesel generators and auxiliary equipment starting procedure;
- propulsion system manoeuvring;
- power management system operation PMS.

To meet the requirements

W-Xpert W-X72 engine room simulator has been developed to comply with STCW Code:
Section A-1/12 and Section B-1/12
ISM Code: Section 6 and Section 8
Plants overview

All operations in W-Xpert simulator can be done in specific system installation and compartments. Each system is presented as a real vessel’s schematic drawings/compartment with ability to control on screen. The most important components of the scheme can be zoomed and directed to a proper location in Engine Room to operate.
SW Cooling System diagram and its connection to 3D action screen by selecting a component

General Fuel System Plant Overview

Bilge System

Fresh Water Generator

Steam System

Lubricating System
Sanitary Water System
Sewage Treatment Plant
Water Mist System
Bridge
Refrigerating Plant
AC Plant
Fuel Oil Purifiers
Fuel Oil Condition Module
Main Engine plant overview includes five (5) different sections:

- ME Cylinder Lub. Oil Sys. diagram and its connection to 3D action screen by selecting a component
- ME Compressed Air Sys. scheme
- ME Fuel Oil System scheme
- ME Cooling System scheme
- ME LO/Servo Oil System scheme
W-Xpert WX72 main features:

- Highly realistic simulator for engine room training. All engines and propulsion plant behaviours are based on real respond. In order to create the impression of working in the real environment, it provides 3D sound which can be listened to on 2, 4 or more speakers.
- Familiarization with electronically-controlled common-rail technology and flexibility of the fuel injection and exhaust valve operations which allow users to improve the combustion process in various revolution ranges.
- The thermodynamic model offers visualisation of cylinder pressures, sfoc and emissions depending on virtual operating conditions.

Example view of the virtual Intelligent Combustion Monitoring interface- the situation shows one cylinder not firing. Barographs are visualising calculated by the thermodynamic model specific fuel consumption and NOx emission deviation in relations to the reference conditions.

- The mathematical model simulates ship’s main propulsion plant, low speed, 6 cylinder, 2-stroke, turbocharged and reversible diesel engine.
• All vital auxiliary systems have been implemented.
• The user interface includes virtual controls and alarms that create a very realistic environment. The 3D virtual reality with active valves, tank level indicators and selected digital gauges enable comfortable engine room operation and monitoring. Zoom function allows navigation in 3D environment and easy access to details.
• Multichannel digitized sound provides a very realistic engine room feel. The sound effects include: engine sound correlated with engine speed, the sound of a diesel generator starting and running sound, alarm and machine telegraph buzzers. Emergency procedure training includes fire simulations.
• Operations related to drivers subsystems including valves operations and all auxiliary equipment (pumps, coolers, purifiers, etc.).
• Drives operations from following the stations:
  Control from bridge: Navigation bridge console panels allow for operating propulsion plant.
  Engine Control Room: Water mist system, Control of propulsion plant.
  Local Control of Engine Room equipment: Main Engine and Diesel Generator Local Operation Panels, Starting and Control air compressors, Fuel filters, Electric motors and Fan starters, Boiler and more.
• Learning engine room typical operating routines.
• Engine room operation training. The user will have the possibility to accomplish any operational task starting from different set-ups, both pre-prepared and saved by the user.
• Corrective action learning when faults occur. Different faults can be simulated and mixed in the run-time or loaded from disk.

Main Engine Data
Type: Winterthur Gas & Diesel W6X72
Cylinder bore: 720 mm
Piston stroke: 3086 mm
Stroke/ bore: 4.29
No. of cylinder: 6
No. of air coolers: 2
No. of Turbochargers: 2
Engine Speed 66-89 RPM
Mean effective pressure: 20,5 bar
Rated power: 21660 kW
Brake specific fuel consumption: Standard tuning 167g/kWh.