LIQUID CARGO HANDLING SIMULATOR
LCHS 5000: PRODUCT TANKER
The cargo and ballast handling simulator LCHS 5000 is specifically designed to train Junior Officers in basic cargo handling operations and emergency situations and to train Senior Personnel in optimal operations during cargo handling. These objectives are achieved by controlled training leading to a better understanding of the cargo operations. The simulator is based on real Product Tanker systems and controls, such as the Inert Gas System, Hydraulics, Ballast, Deck Wash, Fire, and Cargo Heating Systems. The complexity and simulated fidelity of the systems provides a challenging training environment that meets all society and state requirements.

The LCHS 5000 simulator has two modules: ‘Cargo’ and ‘Terminal’. These modules can be run individually or in joint mode for team training. The Cargo console is designed to train the tanker personnel for operation of the vessel cargo system and auxiliaries. The Terminal console is designed to train the shore terminal personnel.

**IS IT REAL OR IS IT LCHS 5000?**

Simulated systems faithfully replicate real equipment onboard:

**TRAINING OBJECTIVES**

Certain training objectives can only be achieved properly by use of the accurate simulation of equipment. The simulator may be used for the following training programs:

- Program of special training of the tanker personnel (officers and ratings) responsible for cargo loading in control of tanker systems (STCW 95 A-V/1 requirements, IMO model course ‘Specialized Training program for oil product tanker’).
- Program of general training of officers of any type of vessel in control of the ship’s ballast system, control of ship stability and stress occurring in the ship’s hull, and protection of environment against cargo leakage pollution (STCW 95, part A-I/1, II/2, III/1, III/2 competence requirements).

Depending on background knowledge and experience of the trainee, the simulator shall be capable of creating situations ensuring appropriate training in familiarisation with the tanker systems and basic procedures, special operations and procedures and cargo and ballast operations.

**COMPLIANCE**

The cargo handling simulator is designed to meet the requirements within the competency framework of STCW’95 Convention (part A, B-V/1), the IMO model course 2.06 and DNV (Det Norske Veritas) latest 2.14 standard requirements for the Class A Simulator: ‘A full mission simulator capable of simulating a complete liquid cargo handling system including all auxiliary equipment and the online stability/stress calculation system’.

The flexible design of the cargo handling simulator allows functionality or equipment to be added at any time to meet individual customer requirements.
**CONFIGURATION**

**Instructor station**
- Instructor software is common for LCHS 5000 and ERS 5000 to allow combined exercises with the Engine Room Simulator
- Slave Monitor duplicates all screens of the selected trainee’s workstation
- e-Tutor evaluation and assessment system

**Networked class**
Up to 12 workstations under supervision of one instructor can include up to four displays, representing:
- Cargo handling console (2D and 3D panels)
- Loading control system (load calculator)
- Closed circuit television

**Full-mission trainee workstation**
The full-mission trainee workplace includes:
- Ballast/Cargo handling operation control console
- Computerized stability calculation system console
- CCTV System
- Control and Monitoring System

The simulator replicates a ship’s cargo control room. The cargo control room panels can be displayed on touch screens. That makes possible running different ship model exercises on the same HW configuration.

The new cargo handling simulator can have real hardware panels integrated in the simulator via standard Universal Hardware Interface tasks and also have imbedded intercom, audio- and video- logger tasks.

**SIMULATED SYSTEMS**
- Cargo handling System
- Deep Well Pumps Control Panel
- Oil discharge monitoring equipment (ODME) System
- Loading control system
- Ballast System
- Deck Wash and Firefighting System
- Gas Detection System
- Tank Heating System
- Crude Oil Washing System
- Inert Gas Systems

**SIMULATOR COMPONENTS**
The cargo control console and terminal control console comprise of:
- Panels, imitating the real equipment of Cargo Control Room of the ship
- Panels, imitating the screens of Cargo Monitoring System software, installed on the ship
- Interactive scalable drawings of the systems and subsystems used in ballast handling operations
- Interactive 3D visualization of the ship with a possibility to control deck equipment
- 3D visualization of the pictures presented by the ship/pier CCTV System cameras
- 3D visualization channels of the view from cargo control room window
- Loading Control System
INSTRUCTOR WORKPLACE
The instructor workplace is an integral part of the simulator. It can be operated in the following modes:
• Online: Conducting lessons and monitoring the execution of exercises by trainees
• Edit: Creating new exercises and editing existing ones
• Debrief: Viewing and debriefing recorded exercises

The instructor workplace software allows combined exercises with the Engine Room Simulator (ERS 5000).

The simulator is provided with a possibility of selecting a work process speed: (normal speed, 5-fold and 25-fold accelerations). This allows student to speed up cargo operation to demonstrate the effects of their actions.

INTERCOM
Intercom provides a possibility to keep a constant contact between the vessel and loading master (trainee and instructor) during cargo operations.

AUDIO AND VIDEO LOGGER
Recording of trainee exchanges during exercise is carried out by Audio Logger module. Audio Logger accepts data from sound card and stores audio log-files on computer.

Video log files in the process of exercise are recorded by Video Logger module. Recording is controlled from the instructor workplace on ‘Video Logger’ panel.

THE TRANSAS EVALUATION AND ASSESSMENT SYSTEM E-TUTOR
The e-Tutor allows objective assessment of an exercise fulfillment by a trainee. The assessment is based on the check of the exercise fulfillment correctness with regards to the selected set of criteria.

INTERACTIVE SCALABLE DIAGRAMS OF THE SYSTEMS
The diagrams represent detailed circuits of the systems built on the basis of real ship systems. There is a possibility to zoom-up parts of interest and move the diagram visible area around the screen.

The diagrams show animated flows through the pipelines at a speed changing in direct proportionate with the flow rate, color changes in accordance with the substance in the pipes.

INTERACTIVE 3D VISUALIZATION OF SHIP DECK
The CCTV system provides a 3D visualization of the ship representing its draught, trim and heel in real time dependant on load and distribution. The system includes a function which allows the possibility of arbitrarily shifting the viewpoint.

3D-visualisation displays cargo leakage from manifolds, spills on cargo deck, deck fires and sprays of firefighting system.

To provide situational awareness training systems can be controlled from the 3D visualization. Clicking and object on deck will active a 2D control for the item of equipment selected. When an object is selected on the 2D diagram, the respective one in the 3D diagram is highlighted in color, the camera automatically focusing on it.

3D VISUALISATION OF THE PICTURES PRESENTED BY THE SHIP/PIER CCTV SYSTEM CAMERAS
The system provides a means of performing visual monitoring of the key elements of the cargo system and the ship deck using video cameras.

JOINT OPERATION WITH ENGINE ROOM SIMULATOR
• Power generation \ consumption
• AUX machinery and subsystems
• Heat supply (steam) for cargo system
• Fire Fighting system

DEVELOPING NEW MODELS ON REQUEST
Specific oil, chemical and product carriers DNV class A simulators based on customer’s prototype data can be developed on request within 3-4 months.

CREATE AND EDIT YOUR OWN MODELS
The simulator has a built-in editor that enables user create and edit own models.