

Attachments

Annex A - Instructor Station

1. Must be able to monitor and control the students in the classroom such as start, run, pause and set up groups for team training
2. Must be able to create an exercise structure that comprises initial conditions and scenario modules which, dependent on type of exercise, may include triggers, electronic messaging to trainees, set actions and malfunctions, and assessment systems
3. Must be able to access the control configuration tool which will be used by the Instructor to configure the various student stations to fit the various exercises. This should include
 - level of information visible in the various system diagrams
 - level of information that is possible to may be accessed
 - System(s) to be accessible from various stations
 - Access level regarding alarm system
 - Access level regarding access to variable and malfunction pages
4. Assessment system can display the users state (active and Inactive) and all overview of what is carried out
5. Logic Block Based editor is used to build triggers which again is used to activate messages, actions, malfunctions and assessments. Building blocks are based on Boolean algebra (logic).
6. Capable of coach messaging that shall be able to simulate as the master, engineer or instructor himself
7. Capable to edit the actions to be carried out such as delay, ramping and reset value criteria
8. Assessment System must be able to
 - Calculate the total score
 - Capable for positive and negative deductions
 - Capable to the type of error, critical or non-critical (must be achieved to pass)
 - time used from fault appear to proper action is taken
 - rate of score/penalty points, discrete or integrating
 - system can manipulate when to freeze/start/stop the assessment
 - must be able to create and print the assessment
9. must be able to automatically start the recording the exercise system
10. replays from any point in time for the purpose of training
11. recording of unlimited lengths can be saved and stored for later use
12. speed of the simulation can be changed based on the exercise to ensure delivery

Annex B - Software Specifications

No. 1 Vessel Specific: Cargo Handling Simulator LNG Software

The Cargo Handling LNG membrane model must be based on a real LNG tanker. A compressor room is fitted with two high-duty compressors and two low-duty compressors. Several Cargo heaters/vaporizers must be fitted in the compressor room. A separate ballast system is fitted, and a nitrogen generator as well as an inert gas generator with dryer system. The cargo temperature and environment data may be set individually. Tank atmosphere and temperature data is calculated continuously. Boiling off operation must be part of the scenario. The model must be certified by DNV GL according to their latest Class A-Standard for Certification of Maritime Simulators No.DNVGL-ST-0033 January 2017. This Standard is based on requirements in the STCW Convention, regulation I/12.

The following software mimic diagrams must included as part of scope of work simulation model:

- Cargo and Ballast Tank Overview
- Bunker/Consumables
- Shear Forces, Bending Moment and Deflection
- Stability
- Ship/Shore Connection
- Manifolds
- Deck Lines
- Cargo Tanks
- Cofferdams
- Insulation Sp. Pressure Control
- Compressor Room
- Low and High Duty System
- Vaporizers
- Boil-off and Vapor Gas (BVG) Management
- Nitrogen Plant
- Inert Generator
- Ballast Tanks Ballast Pump Room
- H/D Spray Control Panel
- Cargo Control Panel 1-4
- Fixed Gas Detection System
- Shore Tanks
- Load Calculator – Cargo and Ballast Tank Overview
- Load Calculator – Bunker/Consumables
- Load Calculator – Shear Forces, Bending Moment and Deflection
- Load Calculator – Stability

No. 2 Vessel Specific: Crude Carrier Software

The liquid cargo handling simulator should simulate a Suezmax crude oil carrier with cargo tanks and slop tanks. The vessel is equipped with an inert gas plant, which cleans the flue gas and replaces the combustible gases in the cargo tanks with low- or non-flammable gases. The pump configuration has a typical crude oil carrier with three cargo pumps, two ballast pumps, three oil/gas separators, stripping pump and ejector. The cargo handling simulator models of tanks and ballast system is based on a real Suezmax Crude Carrier. The simulator has a sophisticated integrated automation system in order to do the CCR operations. There are additional process mimics for operation of the systems outside of the CCR. The model contains a CCTV system with 3 camera views, both manifolds and a 3rd camera with view from the jetty. Additionally, a Loading calculator is integrated in the model. The loading program uses the various tank levels and the corresponding specific gravity and calculates hydrostatic conditions, intact stability, longitudinal strain, relative tank content and damage stability. It can also produce ullage reports, loading reports, ROB/OBQ reports, ballast/consumable reports and water ballast exchange reports. The model must be certified by DNV GL according to their latest Class A-Standard for Certification of Maritime Simulators No.DNVGL-ST-0033 January 2011. This is based on requirements in the STCW Convention, regulation I/12.

The following cargo handling software models will be provided:

- Integrated Automation System:
 - Alarm Handling
 - Trend Systems
 - Remote operation Valves and Pumps
 - Tank Monitoring
- Shore tanks
- Cargo System:
 - Cargo Pumps with vacuum Separators
 - Cargo Eductors
 - Stripping Pump
 - Cleaning Heater
- Cargo System:
 - Cargo Bottom Lines with valves
 - Cargo Tanks and Slop tanks with:
 - Ullage and Pressure
 - Average Temp, Top, Middle and Bottom temp
 - Heating Coil and PV Valve
- Deck Lines
- Cargo Pumps
- Cargo Cleaning System with Heater
- ODME
- Inert Gas System with Distribution
- Ballast System include lines, tanks, 2 pumps and ejector
- AUS- Automatic Unloading System
- High and High-High Level Alarms

- Intact Stability
- Longitudinal Strength – Bending Moment and Shear Forces
- Offline Load Calculator
- CCTV

Visualization and 3D Animation:

The System must have Virtual 3D application, comprising an interactive virtual animation of the entire cargo deck. This allows the students move around on deck in a virtual world and operate the equipment locally. The system must ideal with the familiarization and gives the user an understanding of the complexity and layout of the tank deck and the challenges of finding the correct equipment in a real tank deck environment.

The DeckView must be enabled so the students is allowed to zoom in and interact with valves, flanges, cargo tank hatches, pressure vacuum valves and crude oil washing (COW) machines for local operation. Visual effects such as leaks and loading arm connections are included to add even more realism, contributing further to the quality of training available for general and hazardous cargo operations.

The Deckview must include the following local operations:

- Cargo Tank Hatches
- Manifold Flanges
- Manual Drain Valves
- Manual Inert Gas Lines valves
- Manual valves to the Deck Water Seal
- Manual Cleaning Line Valves
- P/V Valves pressure side manual test
- Operation of Driving Units for Crude Oil
- Washing (COW)

Annex C Dry Cargo Loading Computer Integrated Loading Calculator – which must communicate with the Simulator for Liquid Cargo and can stand alone for General Cargo Carrier stability calculation.

No. 3 Vessel Specific: Loading Computer

The vessel calculation must be based on a three-dimensional (3D) geometric model of the hull and its inner structure. The model display view shows the floating position of the vessel. When configured to be transparent, the model gives a clear and lucid overview of the dead weight items. Tanks and compartments are displayed with the grade colour of their contents and the exact filling levels are shown. The position of the camera can be easily changed using the mouse and scroll wheel.

The modular software system must consist of a wide range of function modules that can be assembled with great flexibility. This modular approach ensures that system solutions can be tailored to the requirements of each particular vessel type. Features must include:

- Calculation of dead weight and displacement
- Calculation and monitoring of floating position
- Calculation and monitoring of intact stability
- Calculation and monitoring of longitudinal and local strength
- Calculation of damage stability
- Extensive cargo calculations
- Extensive reporting functionality
- Planning whilst running the online condition continuously in the background
- All calculations carried out on the basis of a 3D geometric model of the hull and its inner structure
- User manual is embedded in the software