

K-SIM® ENGINE LNG



MEETING THE TRAINING DEMAND FOR LNG

Because of stricter environmental requirements for sulphur emission in shipping, LNG is increasingly used as a clean fuel alternative, specifically for vessels operating in Emission Control Areas (ECA). The 2020 global sulphur limit at 0.5%, will increase the use of LNG as a fuel worldwide. According to IMO's IGF Code of January 2017 personnel working on vessels using gases or other low- flashpoint fuels must be properly trained. These training requirements are further addressed through STCW regulations, section A-V/3 paragraph 1 and 2. Kongsberg Digital's latest K-Sim Engine model, Diesel Electric Dual Fuel Cruise Ferry, enables safe, realistic and efficient training on LNG-bunkering procedures for engineering

LNG-FUELLED MARINE VESSEL TRAINING SYSTEM

K-Sim® Engine LNG Bunkering

IGF Code and STCW regulations

Based on IMO's IGF Code the STCW requirement raises the bar for the education of students and seafarers responsible for safety duties, as well as masters, engineer officers and other personnel with direct responsibility for the care and use of LNG-fueled systems on a vessel. In order to satisfy section A-V/3 paragraph 1 of the STCW requirements, basic training is required for all seafarers responsible for designated safety duties related to the care and use of LNG fuel in addition to emergency response on board ships subject to the IGF code. Whilst for section A-V/3 paragraph 2, advanced training is required for masters, engineer officers and personnel with immediate responsibility for the care and use of fuels and fuel systems on the ships.

Sophisticated LNG-bunkering simulator fulfils the training requirement

Kongsberg Digital provides a range of K-Sim Engine simulator models enabling engineers to learn and practice daily procedures while gaining vital skills crucial for operational safety. To support proper training regarding sulphur emissions, the latest engine simulation model, K-Sim Engine DEDF42 Cruise Ferry, provides both basic and advanced training for LNG bunkering operations. It provides a cost-efficient and safe way to build knowledge and test procedures, while fulfilling IMO's IGF Code and the STCW requirements in addition to being certified for training by DNV GL.

LNG Bunkering Training System

The new DEDF42 CF model is provided as a PC desktop system for student training. It is based on a dual fuel diesel electric configuration with the engine room systems on board a cruise ferry. In addition to training on operating a medium speed, dual fuel (gas and diesel oil) engine, the K-Sim Engine DEDF42 model's main purpose is to facilitate training courses that comply with STCW.

Main training elements:

- Characteristics of LNG (low flashpoint fuels quality)
- Safe working practices with LNG equipment
- LNG bunkering operation procedures
- Fire prevention
- Emergency procedures
- Operational principles of dual fuel generator installations
- Fuel oil and LNG supply system for diesel generators

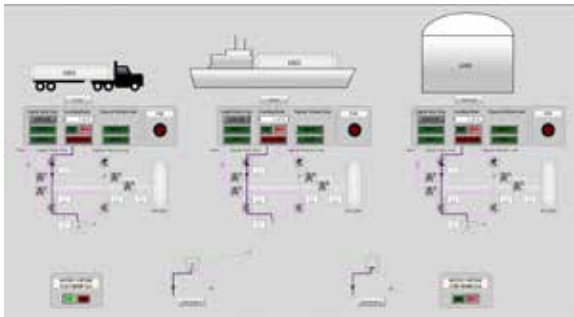
In addition, the simulator includes sufficient control relevant for the particular ship type enabling the realistic simulation of the ship/truck/shore to ship interface and the required checks and operations.

- Shore side mimic: selection of barge, tank and truck, including fuel quality, methane number, Wobbe Index and density

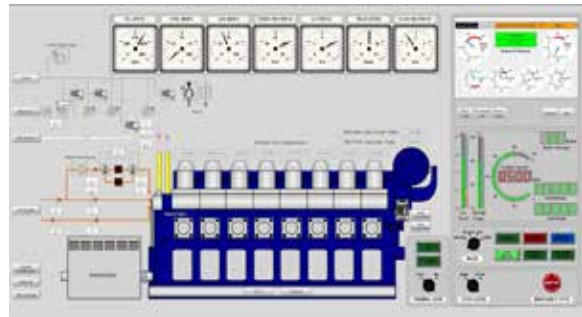
- Connection/disconnection of shore/ship/truck interface (LNG)
- Flow rate control
- Emergency shutdown implementation
- Purging control
- Simulate effects of excess line pressures and resulting action
- Onboard LNG storage and bunkering system
- LNG monitoring system for bunker operation
- LNG emergency shutdown
- Gas heating

Dependent on background knowledge and experience of the trainee, the simulator provides training for system familiarization, operations and procedures for:

- Propulsion plant Integrated Automation System (IAS)
- Alarm and Safety Warning System (ASWS)
- Power Management System (PMS)
- Propulsion Control System (PCS)
- Dual fuel diesel generator sets and support systems
- Electric power supply incl. switchboards and distribution centre
- Ventilation control system in machinery space



LNG supplier



Dual fuel generator



Photo: Screen dump of the mimic diagram presenting the high voltage switchboard

Instructor control & assessment

Kongsberg Digital Engine Room and Cargo Handling simulators have a state-of-the-art Instructor, Monitoring and Assessment system. In close cooperation with experienced worldwide instructors, the Norwegian Maritime Directorate and DNV GL, Kongsberg Digital has designed and developed a user-friendly and efficient approach that enables instructors to optimize the pedagogical value of exercises for students.

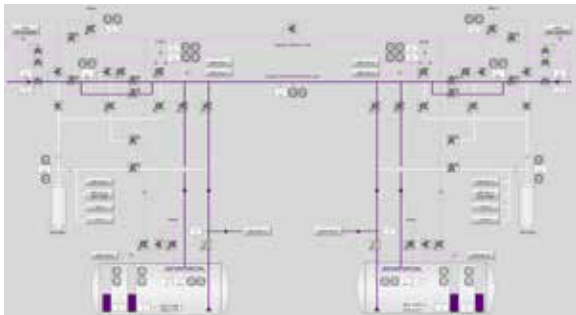
The Instructor can easily configure each Student Station to define what information shall be accessible and visible, including defining which subsystems apply to each station, and indicators that should be viewed.

Instructors have access to a unique tool that allows the assessment of students on all levels, from support to management. This allows the Instructor to monitor, and use for assessment, not only alarms, but any of the available variables in the simulation model.

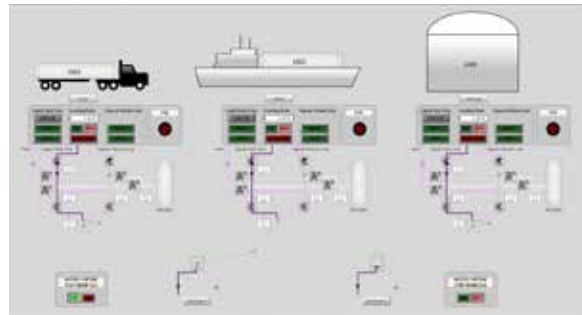
The assessment can be performed during simulations where the Instructor is absent. The instructor has the possibility to print out assessment reports for each individual student reflecting his performance, including pass or fail. The Instructor, Monitoring and Assessment system also has an intuitive and use-friendly feature for Recording and Replay, allowing full debrief after simulator exercises.

“We are pleased with the LNG bunkering solution delivered by Kongsberg Digital. The system enables us to offer advanced training for ships subject to the new IGF code, including simulated training scenarios. The simulation training is provided in a safe and realistic environment, where students and professionals can learn to better understand the complexities, risks and hazards of working with LNG”

- Joep Bonten, Project Manager, STC Group, Rotterdam. The Netherlands

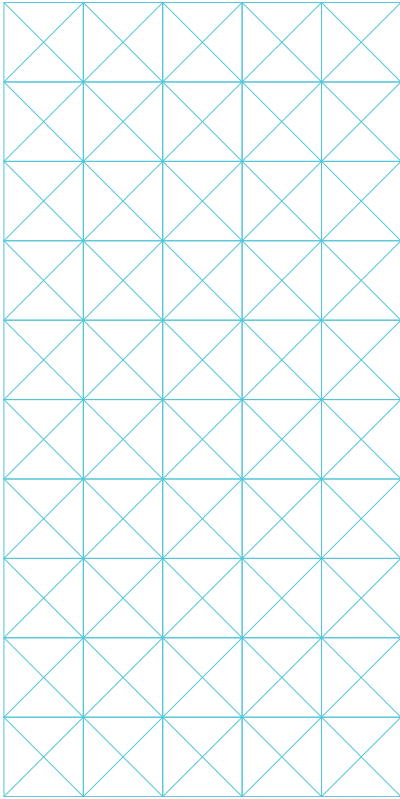


LNG bunkering system



LNG monitoring system





Model description

The simulated vessel model, K-Sim Engine DEDF42 Cruise Ferry is based on a cruise ferry with four (4) dual fuel diesel generators.

Vessel's Main Particulars

Length:	218.00	m
Breadth:	31.80	m
Draught, Moulded:	24.40	m
DWT, Scantling:	55.00	mt
Speed	23.0	knots

Diesel Generator Engines

Four (4) four-stroke medium speed dual fuel diesel engines with all vital subsystems such as rpm governor, cooling water, lubrication oil, starting-air, turbo charger, air cooler and fuel oil.

Engine type:	Wärtsilä 8L50DF	
Engine rating:	7600	kW
Cylinder bore:	50	cm
Number of cylinders:	8	
Number of air coolers:	1	
Number of turbochargers:	2	
Speed:	500	rpm

Simulated Systems

- Integrated Automation System - standard KONGSBERG IAS
 - Alarm and Safety Warning System (ASWS)
 - Power Management System (PMS)
 - Propulsion Control System (PCS)
 - Trend log system
- Dual fuel diesel generator sets and support systems
- Electric power supply including switchboards and distribution centre
- Ventilation control system in machinery spaces
- Gas Detection System
- Onboard LNG storage and bunkering system
- Shore side mimic: Selection of barge, tank and truck
- LNG monitoring system for bunker operation
- LNG Emergency Shut Down (ESD) System
- Gas Heating System
- Gas trip, engine protection system
- Fuel oil and gas supply system for diesel generators
- Propulsion control panel

DNV GL compliance

In addition to meeting the STCW requirements based on the IMO IGF Code, the K-Sim Engine DEDF42-Cruise Ferry model has achieved DNV GL Statement of Compliance as a Class S simulator. This is based on latest DNV GL Standards for Certification of Maritime Simulators that addresses specific requirements for simulators used for training ship's officers using LNG as fuel.

The DNV standard is based on the requirements of the STCW convention which requires the approval of simulators when used for mandatory simulator-based training, or when used to demonstrate competence.

