KONGSBERG

K-SIM®
CARGO & BALLAST

Simulator system maximizing performance

kongsberg.com

MAXIMIZING PERFORMANCE PROVIDING

The full picture

OUR MISSION

We shall earn the respect and recognition for our dedication to provide innovative and reliable marine electronics that ensure optimal operation at sea. By utilising and integrating our technology, experience and competencies in positioning, hydroacoustics, communication, control, navigation, simulation and automation, we aim to give our customers The Full Picture.

The Full Picture yields professional solutions and global services that make a difference enabling you to stay ahead of the competition.

OUR PHILOSOPHY

Our success depends on the success of our customers. Actively listening to our customers and truly understanding their needs and then translating these needs into successful products and solutions is central to achieving our goal.

Our people are the key to our success and we empower them to achieve. Working together in a global network of knowledge, guided by our values, engenders innovation and world class performance.

Every day we have to think a little differently, because every client is unique. We aspire to translate the imagination and dedication of our staff into successful technologies and solutions. Our commitment is to add value to your operations by providing you with The Full Picture.

KONGSBERG DIGITAL AS
MARITIME SIMULATION
K-SIM CARGO BROCHURE

JANUARY 2020

Content

Students exercising on K-Sim Cargo, desktop version, at Chalmers University of Technology, Sweden

Maximizing performance

Competence saves money & the environment

KONGSBERG's cargo and ballast handling simulators, K-Sim Cargo and K-Sim Ballast, enable high quality training in every aspect of complex load and discharge operations, from single sub-systems to the overall running of the operation.

Compared to conventional training, simulators offer a more structured method of building high levels of competence. During simulation training, one can isolate and freeze each sub-system to understand and acquire knowledge, perform critical operations repeatedly to train skills and test and develop attitudes by training in situations that demand complex decision making.

Through ordinary and extraordinary training situations, students and crews are given the opportunity to experience daily operational requirements and learn the vital skills for dealing with emergency conditions.

Proper simulator training is an effective way to build crew competence, and provide confidence and relevant experience. Simulators can maximize performance and lead to enhanced operational safety and efficiency.

K-Sim Cargo, full mission version with operational panels and consoles for hands-on experience

Leading simulation technology

KONGSBERG's solution

As a major world-wide supplier of ship automation and control systems, KONGSBERG has a thorough understanding of the industry's training needs and detailed knowledge of the systems used on board. To meet the present and future training needs in the maritime industry, we have developed an extensive range of K-Sim simulator systems, which are the result of detailed studies that have defined the optimum solution.

The World's most advanced simulator

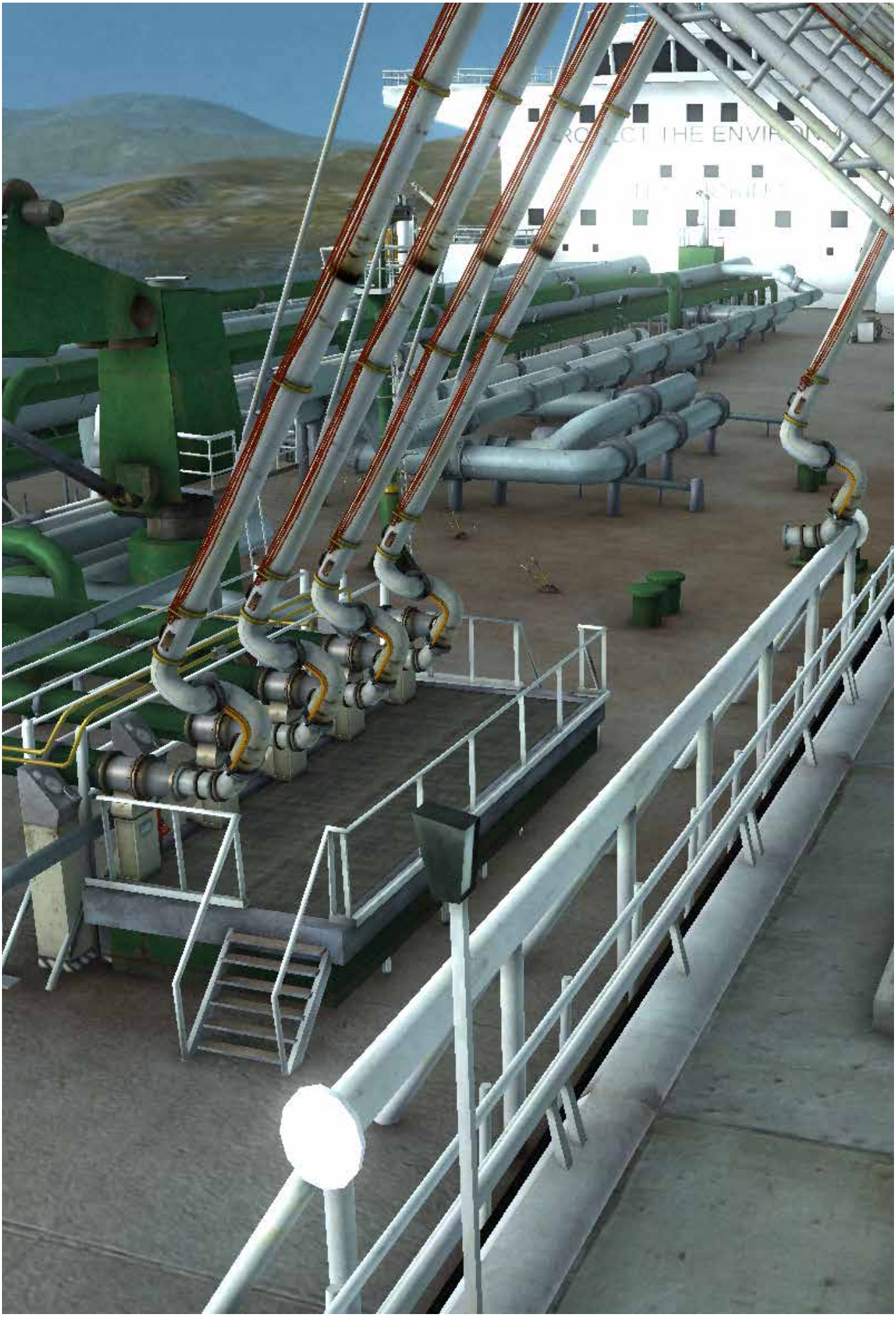
Our market leading K-Sim Cargo and Ballast simulators provide high fidelity real-time simulation, enabling unique training and education possibilities. Behind the K-Sim Cargo and K-Sim Ballast simulators lies an investment of more than 140 person-years of development. This major investment has resulted in the most advanced cargo and ballast handling simulators available in the market today.

Key features

Through the use of physical models, real-time simulation models are completely integrated to produce a 'domino effect' on adjacent subsystems. Faults and alarms will have cascading effects throughout the system if not acknowledged properly. In addition to an extremely high level of realism, the K-Sim Cargo and K-Sim Ballast simulators offer user-friendliness and flexibility, key features for providing high levels of instructor control and greater variety of course offerings – capabilities demanded by shipowners and training institutes worldwide.

Fulfilling the requirements

K-Sim Cargo and K-Sim Ballast exceed requirements in the STCW convention, Regulation 1/12 and DNV GL's standard DNVGL-ST-0033 for Maritime Simulator Systems..



Optimize the learning experience

Solutions for any budget

KONGSBERG is dedicated to making K-Sim available to as many users as possible. K-Sim Cargo & Ballast simulators are extremely flexible and can be configured from a PC desktop system to an operational full mission simulator using custom panels and ship equipment for the ultimate familiarization.

While our desktop system is ideal for operation and process studies, the full mission system offers a physical familiarity with the real shipboard environment, and includes a cargo control room, cargo handling room and an instructor room.

K-Sim Connect - training anytime and anywhere

In addition, we provide a cloud-based training solution through our K-Sim Connect portal enabling students to get access to simulators for training anytime and anywhere.

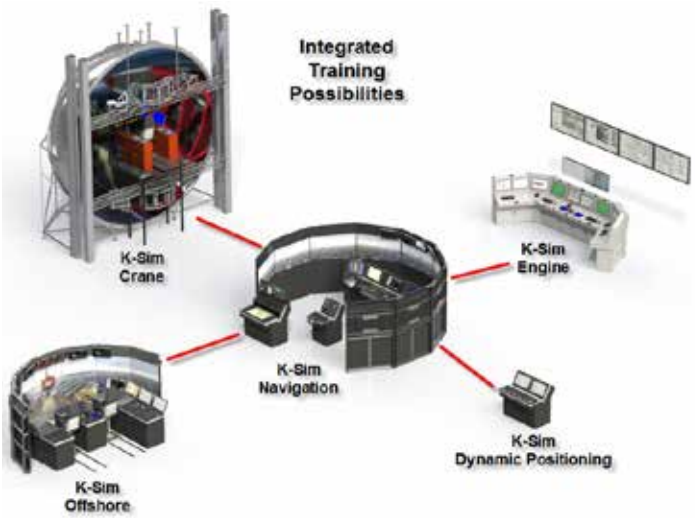
With a full range of simulation systems available, we have a cost-effective solution to fit every requirement and budget.

Maximum configuration flexibility

The flexibility in K-Sim Cargo makes different simulator configurations possible. The cargo control room may be represented by any combination of interactive mimic panels, operational panels/consoles or desktop stations. Our concept allows individually laid out control rooms to meet exact customer requirements. The system can be upgraded or expand at any time during its life span.

Realistic training environment

The K-Sim architecture is extremely flexible, and can be used across a range of different interfaces offering benefits in value, flexibility and realism. In addition, we are able to integrate our K-Sim Cargo and K-Sim Ballast simulators with our real automation system, K-Chief. This gives a new level of realism, as crew can train on the identical equipment that they will later operate onboard ships.



CCTV - Surveillance

A Closed Circuit TV surveillance camera function can be integrated into the K-Sim Cargo and Ballast simulators, giving students a more complete training scenario. As in real cargo operations, the CCTV mode provides the student/operator a view of the deck and manifold areas to monitor loading arm conditions and detect oil or gas leaks.

K-Load

A standalone K-Load Dry Cargo Load Calculator is available as a supplement to our liquid cargo simulators. The K-Load Dry Cargo Load Calculator enables users to define their own cargo, bulk cargo, solid cargoes or containers, and check the loading condition versus loading and discharge rotation, and versus damage stability for all ports in the rotation.

The interface features a graphical view showing how the loaded vessel sits in the water, and a graphical view for filling grades in each cargo and ballast hold/tank.

It is possible to generate reports including loading reports, container reports, ballast & consumables report and water ballast exchange report

Extensive model library

K-Sim Cargo and K-Sim Ballast offer a wide range of highly realistic models of different vessel types. All models are developed based on actual ship specifications and performance data. Various cargo system configurations and load conditions can be simulated through 'reality-based' exercises.

Through the realism of K-Sim, 'Learning by Doing' can be accomplished, which results in improved competence to perform safe, sustainable and competitive cargo operations on board. The model library currently includes the following models:

Cargo Handling Models:

- Product Tanker
- Chemical Tanker
- LPG/Ethylene Tanker
- LNG Tankers (Membrane and Spherical)
- Suezmax Tanker
- Very Large Crude Carrier (VLCC)

Ballast Handling Models:

- Mobile Offshore Drilling Unit (MODU)
- Heavy-Lift Ship Float-On/Float-Off (FOFO)

Skills transfer

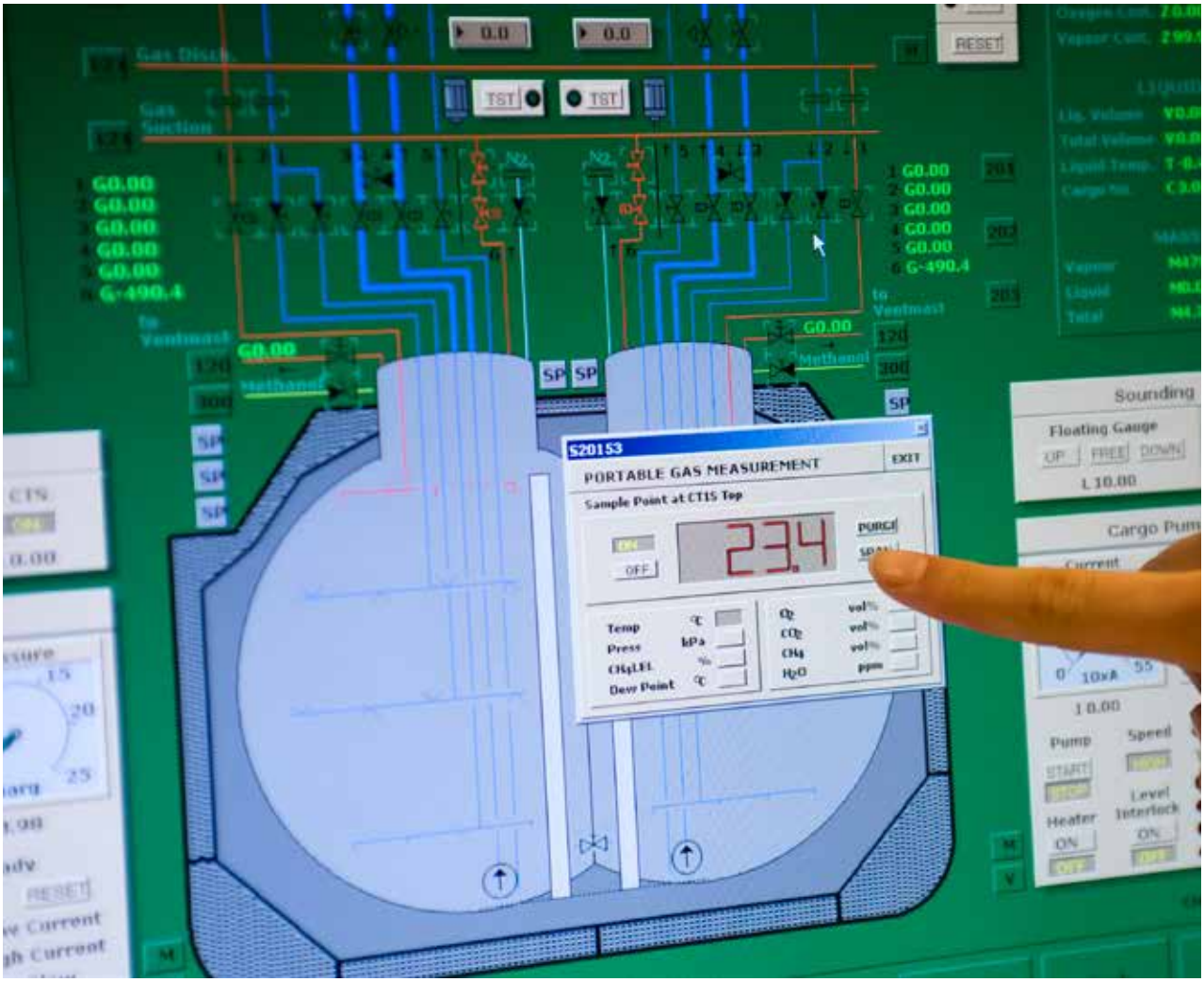
Skills transfer

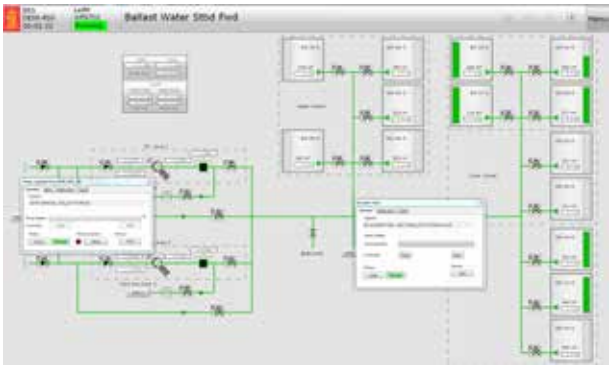
The learning objective is to understand and operate the entire cargo and ballast handling system in a safe, timely and cost-effective manner.

Whether you choose a K-Sim Cargo full mission or desktop system, your students or employees will learn a vast array of skills thanks to the pedagogical values and high fidelity realism that K-Sim Cargo offers.

Typical training applications includes:

- Routine and emergency procedures
- Familiarization with all parts of the cargo system
- Planning of cargo loading and discharge
- Use of loading computer
- Line up for loading and ballasting
- Line up for discharge
- Stripping of tanks - vacuum and ejector systems
- Topping up and finalising loading
- Aeration, inerting and nitrogen supply
- Compressor systems, heaters and boosters on LPG/E tankers
- LNG tankers with compressor systems and boil off
- Mulitple loading/discharge operations with flexible connections on chemical tankers
- Discharge pump operation with dynamic pump and system performance curves
- Flow control in relation to stability and mechanical forces
- Communication to terminal, deck and cargo control room



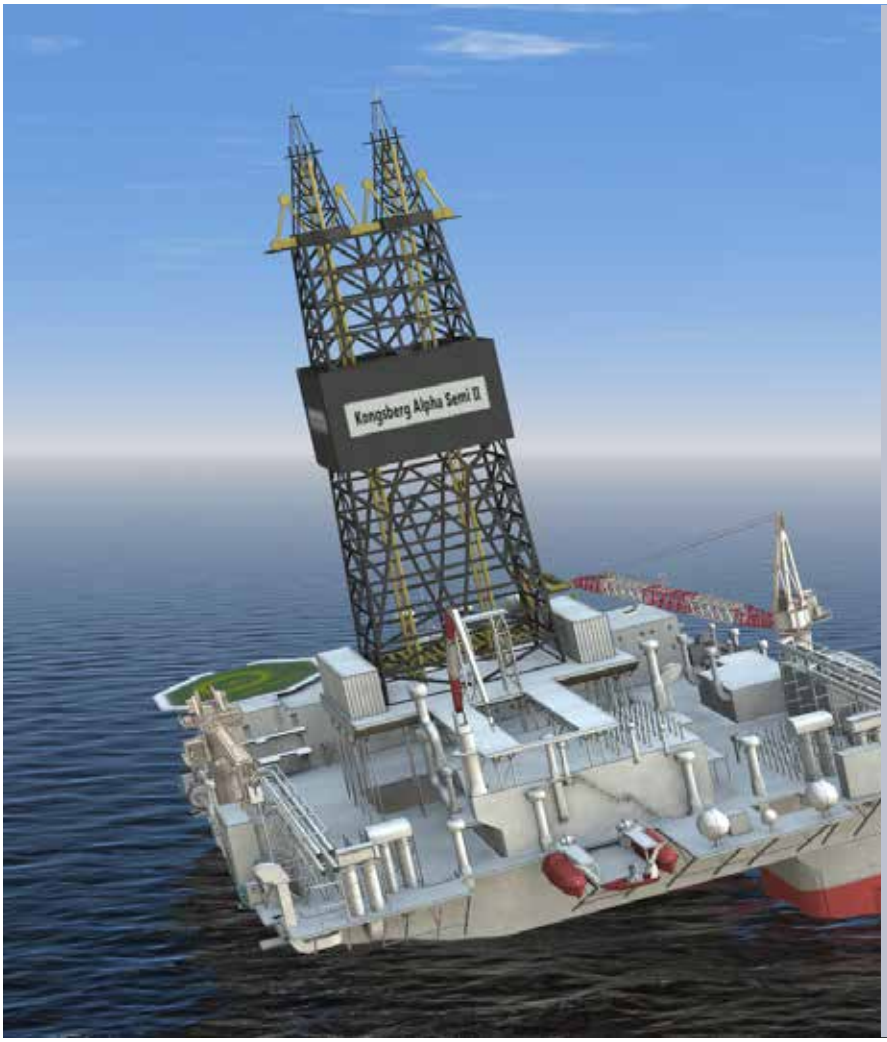


Ballast control

Handling of a Semi-Submersible Platform is a demanding and complex task. Technical, commercial, environmental and safety requirements will always represent important and often conflicting factors that have to be dealt with during the platform operations.

This can put immense pressure on the personnel involved and it raises an unquestionable demand for understanding the systems and operational training.

The purpose of K-Sim Ballast is to provide a training tool that gives a realistic replication of the dynamic behavior of a mobile drilling platform for ballast and position keeping systems. In this manner, knowledge in ballast control can be acquired without hazardous and potentially devastating consequences.



"Co-located with our K-Sim Cargo simulator, the K-Sim Ballast, 2-DOF full mission simulator and related five part task desktop simulators have been in operation since 1994 and have served CMS well. The installed mathematical model of the semi-submersible mobile offshore drilling unit (MODU) forms part of our offshore training.

With instructor control and full remote monitoring of the simulator, the system covers all ballast control room training requirements for our customers."

- Capt. Christopher Hearn, Director, The Centre for Marine Simulation, Fisheries and Marine Institute of Memorial University, Newfoundland and Labrador, Canada

K-Sim instructor system

Designed to enhance training

The monitoring, assessment and configuration tool for our K-Sim training solutions has been designed to enhance the quality of simulation training by providing complete, intuitive and user-friendly control of student exercises. K-Sim Instructor enables the instructor to develop customized exercise modules for individuals, teams or a combination of both from any PC running the application, with fully controllable areas such as:

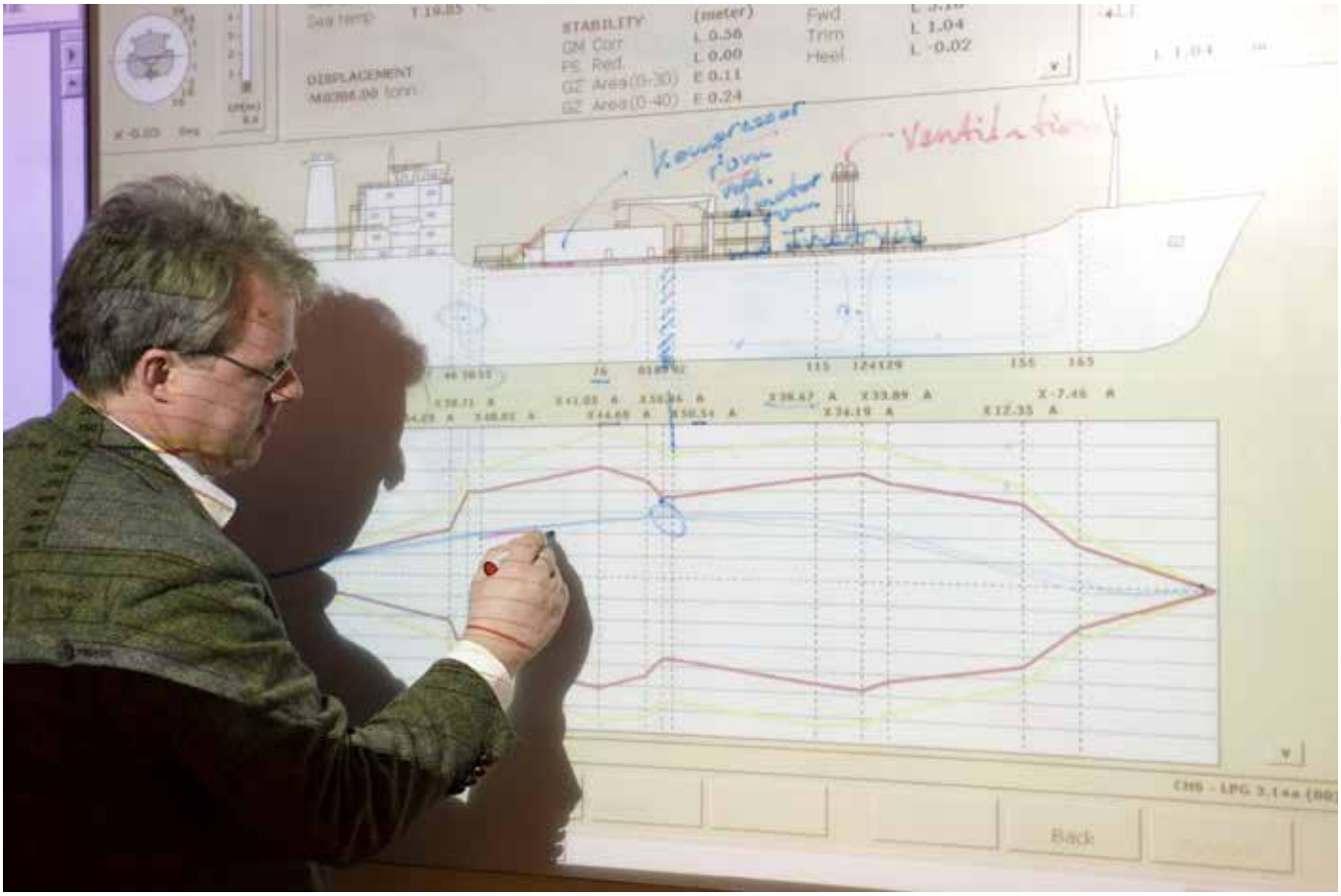
- **Initial Condition** – describes all the variables at the start of the exercise
- **Triggers** – a combination of events that initiate an Action, e-Coach message or Assessment
- **Actions** – derived from Input Variables and Malfunctions, which can be initiated instantaneously, or preprogrammed as part of the exercise
- **e-Coach Messages** – an electronic guidance and performance feedback system
- **Student Station Configuration** – define what information is accessible and visible to students
- **Assessment** – monitor and assess alarms, and any of 6,000 variables in the simulation models

Userfriendly and powerful tool

Recording of all activity during the simulation exercise takes place automatically and review/debriefing can include the replay of parts of or the entire exercise in order to focus on specific learning objectives.

A unique 'resume' functionality also enables an exercise to be stopped and started at will. If a student begins to have problems or fails in a particular operation, the instructor can pause the simulation to give guidance or advice and then resume the exercise. The instructor can also go back to any earlier point in time and restart from there.

With the K-Sim Instructor system, monitoring, assessment and debriefing have never been easier.



Library of approved exercises

KONGSBERG offers a range of DNV SeaSkill approved LNG exercises, covering the basic training requirements for LNG operators.

- Exercise 1: Cargo tank drying
- Exercise 2: Nitrogen purging of Inter barrier spaces
- Exercise 3: Inerting of cargo systems
- Exercise 4: Gassing up of cargo systems
- Exercise 5: Cooling down of cargo systems
- Exercise 6: Commence loading & deballasting
- Exercise 7: Complete loading
- Exercise 8: Loaded and ballast voyage BOG & forced vaporization
- Exercise 9: Ballast voyage tank cooling & BOG man- agement
- Exercise 10: Discharging
- Exercise 11: Boil off and tank warm up
- Exercise 12: Gas freeing
- Exercise 13: Air purge
- Exercise 14: Gas freeing single tank
- Exercise 15: Preparation & manifold connection
- Exercise 16: Use of emergency cargo pump
- Exercise 17: Emergency discharge
- Exercise 18: Partly loading
- Exercise 19: Part discharge
- Exercise 20: Leaking cargo tank

"STAR Center is pleased to report that K-Sim Cargo has met our high expectations. The years of development work shows in the accuracy and realism of the simulation models. The graphic user interface on the instructor and student stations is very intuitive and easy to use. The instructor system provides significant flexibility in building and running challenging simulation exercises. Unique scenarios can be developed using pre-programmed embedded faults and student performance can easily be monitored and assessed.

The ability to replay the exercises is also a very valuable tool and the e-Coach capabilities are useful for developing tutorials for introduction to certain topics."

- Brian Long, Director, STAR Center, USA

"Not everything is pure mathematics, technology, law or business. When it comes to cargo operations, it is a combination of all."

- Tomas Olsson Neptun, Head of the Cargo Operations Studio at Chalmers University of Technology

Our guarantees

Unique experience

KONGSBERG is the world's leading manufacturer of maritime electronics. We delivered our first simulator in 1972. Since then we have supplied systems ranging from desktop computer based training systems to sophisticated full mission cargo handling simulators, all of which are based on our experience with real ship systems.

Dedication to quality training

KONGSBERG has been an important contributor to the maritime sector for many years. The maritime industry predicts a massive shortage of professional labour in the years to come, but our commitment to the future of the sector is very strong and we are dedicated to developing the necessary technology to fulfil the simulation needs of the industry.

As a manufacturer of real ship systems, we always stay close to reality when developing simulators - our guarantee that the training represents real world scenarios. In short, KONGSBERG provides simulation as it should be.

Innovation that doesn't sleep

Kongsberg Maritime has played an important role in the maritime industry for the last four decades, both as a provider of maritime electronics and as an innovator in the maritime industry. We look beyond conventional approaches and established methods to find new reliable solutions to increase value for our customers. With more than 5,400 employees networked around the globe, our efforts are ongoing, 24-7.

Innovation and development of new and useful technological features are areas of top priority in our work. A minimum of 10 percent of our business turnover is re-invested directly into innovation and research & development each year.

We have delivered high quality cargo- and ballast simulators to the market for decades and take pride in knowing that KONGSBERG will give your training an additional competitive edge.


KONGSBERG

Life cycle support

Designed to purpose – maintained to last

Our life cycle management service will assist our customers throughout all the phases, from design to installation and during the operational life time.

Solid in-house competence, both in system design and user competence enables us to provide solutions that are fit to purpose and thus yields efficiency in operation.

Our system is designed with maximum flexibility, which makes it easy to add new functionality or complete new control segments thus enabling us to offer upgrades step-by-step meeting your changing requirements.

We take pride in knowing that KONGSBERG will give your training an additional competitive edge by:

- Increased system reliability
- Competitive life-cycle support
- Easy upgrade solutions

World-class support program

KONGSBERG's customer support program provides world-class flexible system support to our global simulation system customers. The Long Term System Support Program (LTSSP) consists of two different levels of support: Priority and Premium Customized Care. Each support level offering is designed to address the customer's needs. Investing in an LTSSP ensures that your simulation system is always current and operating at peak capacity; and provides the assistance you need in order to deliver the best simulation training available.

Training

Qualified personnel are one of your major assets in efficient and safe operations. Thus, we offer modular training courses to instructor and technical personnel.

Our systems are easy to install and maintain – supported by professionals either on-site or through remote connectivity. They are designed for optimal operational availability and allow for favourable lifecycle expenditure

WORLDWIDE OPERATIONS

KONGSBERG is an international corporation with strong Norwegian roots. Collaboration with our customers, partners and suppliers, and a commitment to understand the context where our technology is applied, are important driving forces behind the corporation´s international development and growth.

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