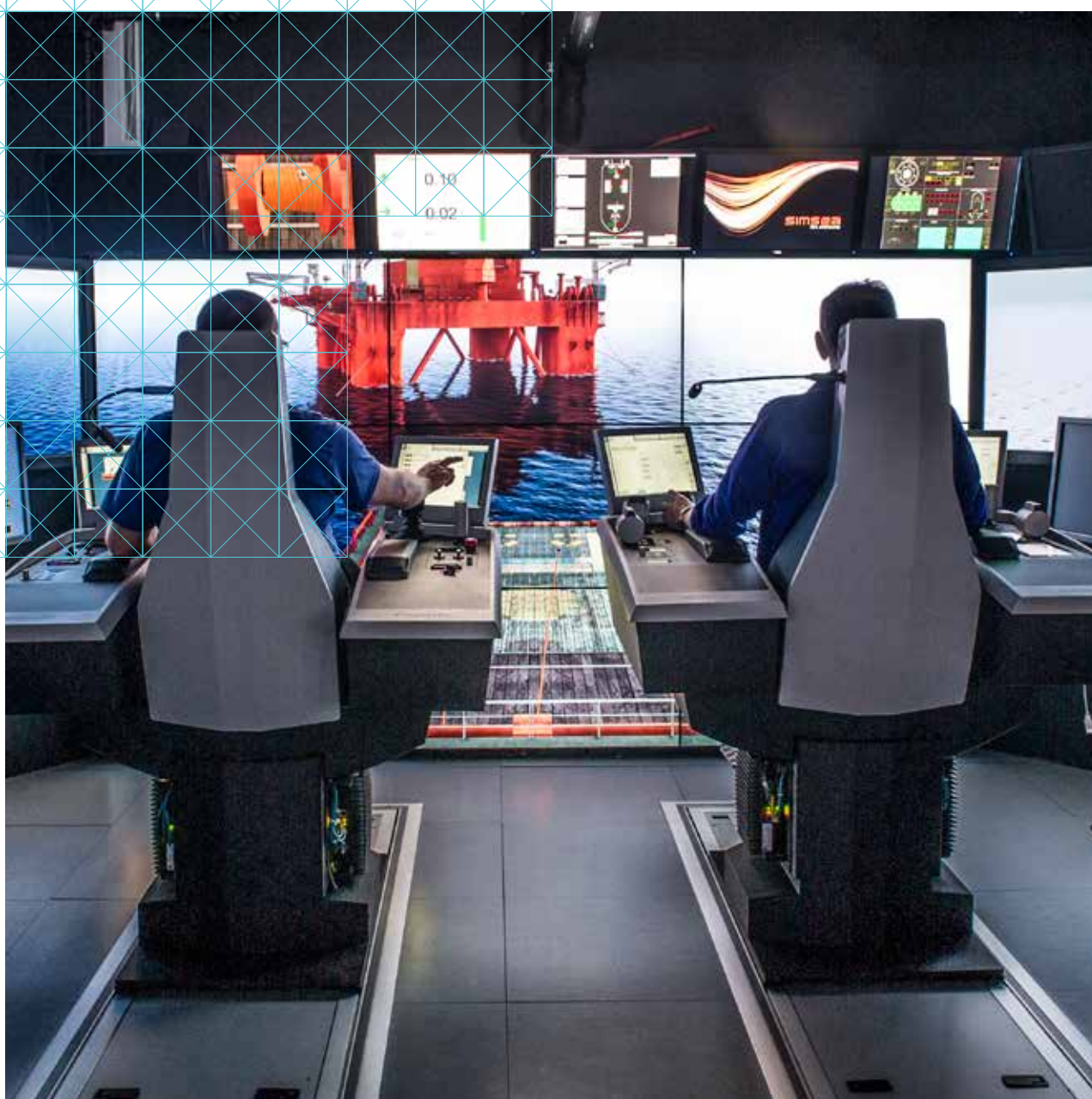




KONGSBERG

K-SIM[®] OFFSHORE

Simulator system maximizing performance



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 OFFSHORE BROCHURE

JANUARY 2020
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Maximizing performance

Competence reduces costs and environmental impact

The search for oil and gas drives the industry into deeper waters and harsher environments. This increases the need for specialised knowledge to promote safety and secure profitability in operations. To build high levels of competence, the use of simulators has become a vital aspect of any training regime. Simulators offer an efficient and structured method of building sea skills in a controlled and safe environment.

In a simulator, crew and operators are able to:

- test scenarios prior to a mission
- learn and practice daily procedures
- develop attitudes & best practice
- enhance team skills & understanding
- gain vital skills crucial for handling emergencies



Enhance skills with K-Sim® Offshore

The market-leading offshore vessel simulator, K-Sim Offshore, is the perfect tool to build required competency. K-Sim Offshore provides a virtual, yet fully realistic training environment, where mistakes can become lessons learnt without risking damage to people, vessels, equipment and the environment.

Built on KONGSBERG's more than 50 years' experience in the development of advanced simulators, K-Sim Offshore stands out as a robust and reliable training solution for advanced offshore operations. K-Sim Offshore's design, advanced hydrodynamic vessel modelling and integration of a sophisticated physics engine, ensures maximum realism in training scenarios. This is extremely important for making competence training adaptable to real life operations.

Compliant with standards & regulations

K-Sim Offshore is certified according to DNV GL and fulfils maritime training standards such as:

- International Convention of Training, Certification and Watchkeeping for Seafarers (STCW, regulation 1/12)
- DNV GL's standard DNVGL-ST-0033:2014-08 Maritime simulator systems
- Nautical Institutes (NI) standards for Dynamic Positioning training
- IMCA Guidance of the Use of Simulators; C 014 Rev.2

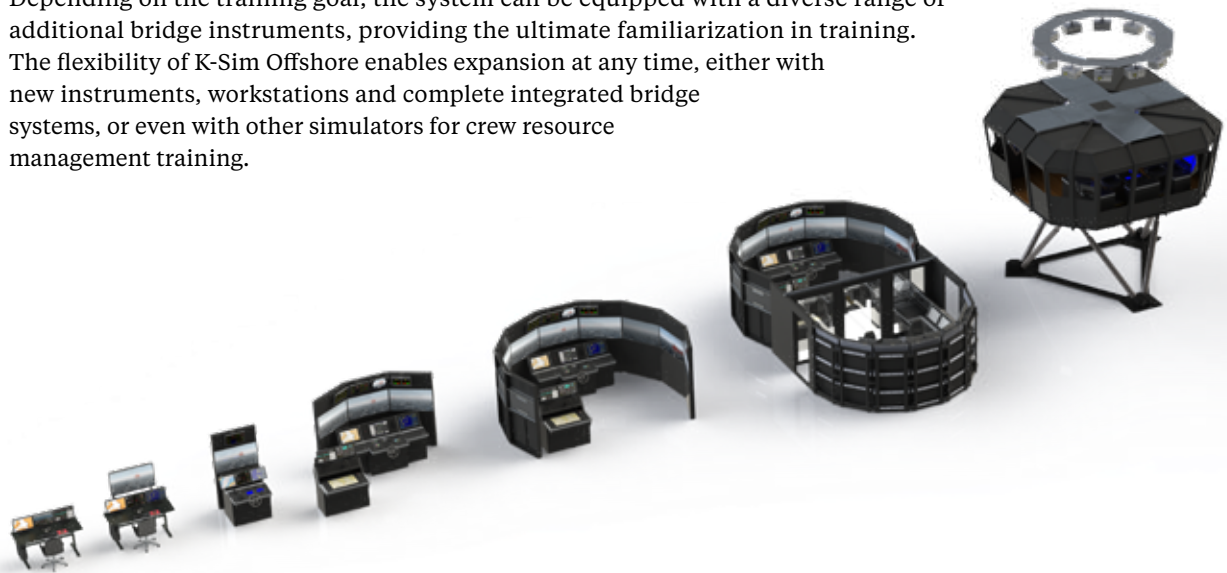
Illustration of a full mission, DNV GL class A, K-Sim Offshore simulator configured as an aft bridge for anchor handling operation training

Optimize the learning experience

Customized to meet specific training goals

K-Sim Offshore offers a fully scalable range of modern bridge designs to meet every training requirement and budget. It can be delivered from a PC based desktop system through to a fully equipped aft and forward bridge, optionally on a six degrees of freedom motion platform.

Depending on the training goal, the system can be equipped with a diverse range of additional bridge instruments, providing the ultimate familiarization in training. The flexibility of K-Sim Offshore enables expansion at any time, either with new instruments, workstations and complete integrated bridge systems, or even with other simulators for crew resource management training.



A full mission K-Sim Offshore installation can be customized to an aft or forward bridge with additional instruments depending on training and familiarization needs. It can also be configured as a rig control room, or any specified vessel.

Pictures below shows various simulator configurations including aft and forward bridge and an offshore crane simulator cabin



Training possibilities

The rapid development of the offshore industry, particularly in advanced technical fields, puts high demand on the skills and competence of the workforce.

K-Sim Offshore is specially designed to train in best practice and to test and build competence even for the most critical operations. It provides training for a wide range of operations, including:

- vessel manoeuvring in an offshore environment
- multiple vessel scenarios (Simops)
- rig move, tugging and towmaster training
- anchor handling
- offshore supply in close proximity
- dynamic positioning modes
- offshore loading (buoy and tandem)
- winch handling
- crane handling and lifting
- subsea operations incl. overboarding
- heavy lift and pipe laying
- rig operations
- ballast handling and stability
- wind farm installation
- seismic vessel streamer handling
- deck operations
- accommodation units with gangway
- power management
- rig control room
- riser management
- response & communication in emergency situations
- ice navigation/ice management
- well containment
- crisis management

Research & development

In addition to standard and special task training, K-Sim Offshore enables testing and R&D for:

- engineering studies
- fast prototyping
- concept testing and verification
- procedure development & testing
- vessel behaviour studies
- fuel economy studies
- crew competence screening
- operator fatigue studies

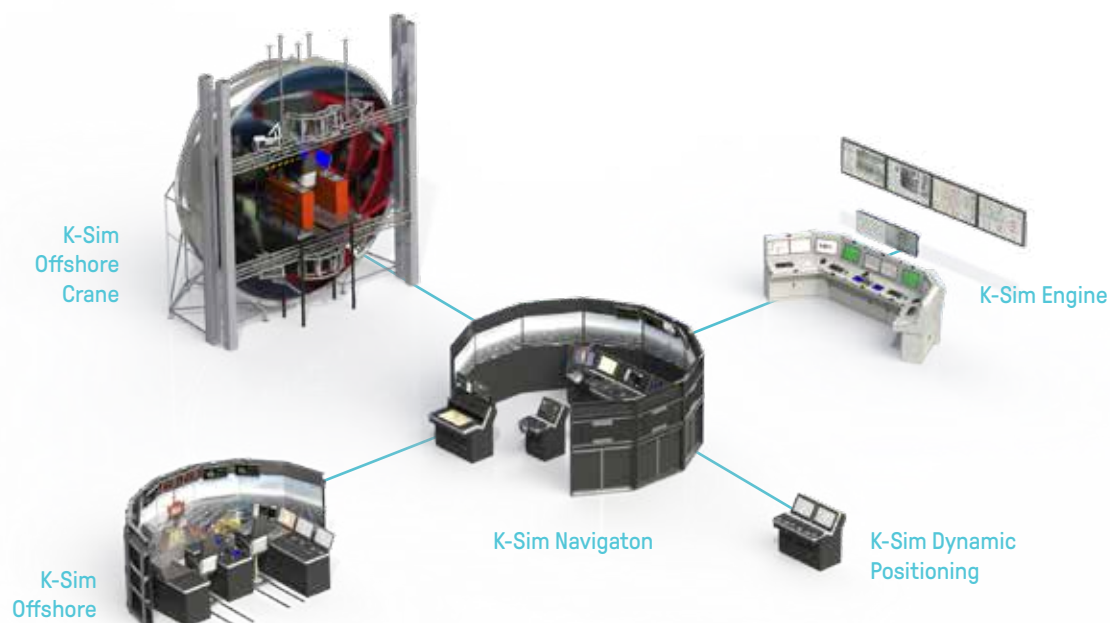
Integrated team training

For operations in environments where human error can have devastating effects, it's often required to train essential crew in the same exercise. K-Sim Offshore supports interdepartmental crew training through interface to other K-Sim simulators, including: Navigation, Offshore Crane, Engine and Dynamic Positioning. The integrated solution enables focus on vital human factors such as:

- situational awareness
- interaction and team-work
- interpersonal communication
- leadership and decision making

K-Sim Offshore enables a vast amount of training possibilities and customized course offerings according to international standards, including Bridge Resource Management (BRM) and Crew Resource Management (CRM).

Integrated Training Possibilities



Leading simulation technology

The worlds most advanced simulator

K-Sim Offshore is specially designed to train in best practice and to build competence even for demanding operations. It integrates an advanced physics engine, which in addition to advanced hydrodynamic modelling, allows vessels, objects and equipment to behave and interact realistically, improving the quality of training significantly. Together with a state-of-the-art visual system and the many integration possibilities with additional equipment and simulators, K-Sim Offshore has been recognized as the most advanced simulator within offshore vessel operation training.

Fully equipped training environment

K-Sim Offshore's full mission bridge includes instrumentation that looks, functions and feels like the real equipment used on-board offshore vessels. It is delivered with a set of standard instrument panels and bridge equipment complete with controls and functions necessary to train operations such as ship handling, tugging, anchor handling and offshore supply. To optimize the learning experience further, and achieve full familiarization with the real ship, all K-Sim Offshore bridges are adaptable to various offshore vessel types.

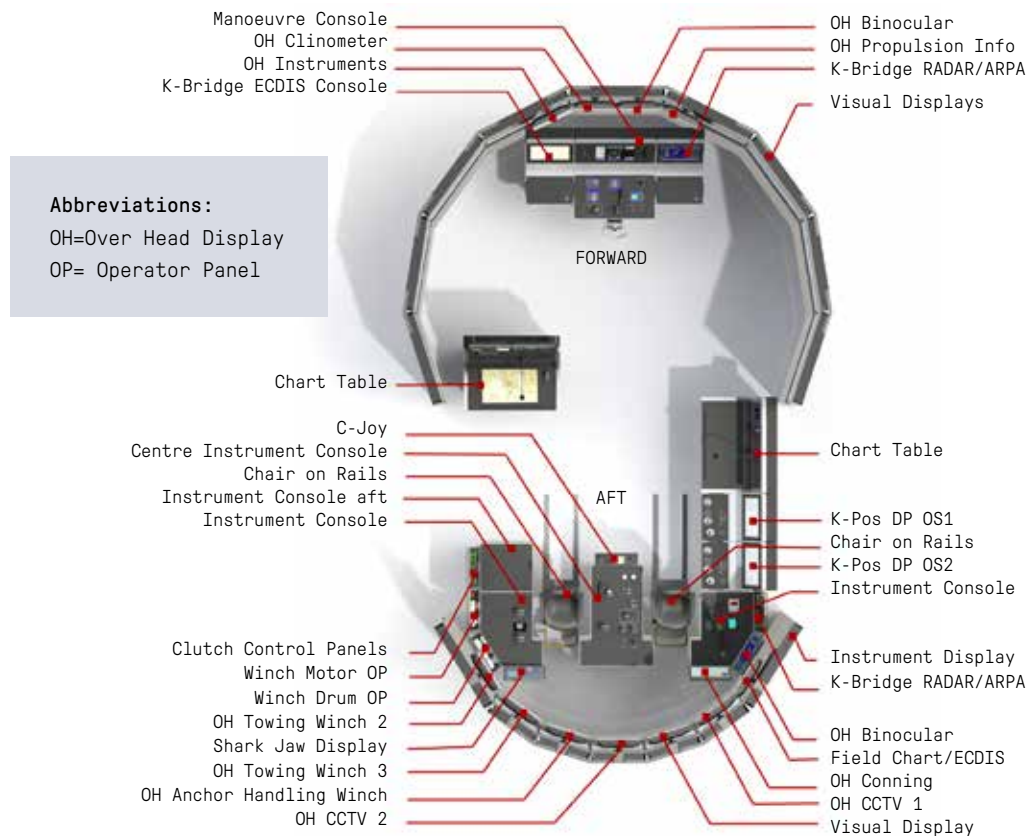
Dynamic Positioning

K-Sim Offshore integrates with KONGSBERG K-Pos Dynamic Positioning (DP) systems. The training solution supports DP training on all levels, including operator training according to DNV GL and Nautical Institute's standards. K-Sim Offshore with DP also includes interface to a range of absolute and relative reference systems based on different principles like; DPS/DARPS, HiPAP, HAIN and RADIUS.

Power Management System

Knowledge and operational experience of the Power Management System (PMS) is vital for Dynamic Positioning Operators (DPO). A comprehensive PMS is available for advanced offshore vessel and rig models. Here the DPO can monitor vessel systems and practice how to take appropriate action during power failures.

By integrating K-Sim Offshore with K-Sim Engine, it is possible to run a complete exercise and include marine engineers, who can experience high voltage switchboard configurations with realistic scenarios related to the Diesel Generators (DG) and Switchboard behaviour.





Realism in simulated vessel models

K-Sim Offshore provides simulation of a range of hydrodynamic vessel and rig models with six degrees of motion, giving an excellent level of vessel motion accuracy. This is particularly important in advanced training scenarios, such as close proximity offshore operations, towing and search & rescue operations. Also important for enhanced realism, is that all simulator vessel models have dynamic loading, ballast control and possible integration to load calculators.

Use of a sophisticated physics engine supports full interaction including 3D hull collision detection with shore and maritime based objects and vessels. It provides high realism in lines, wires and chains behaviour, and calculates in detail the winch load and line forces, for instance, in tug and mooring exercises.

Sophisticated visual system

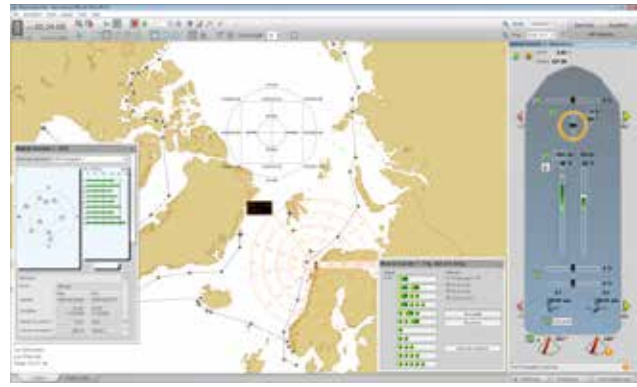
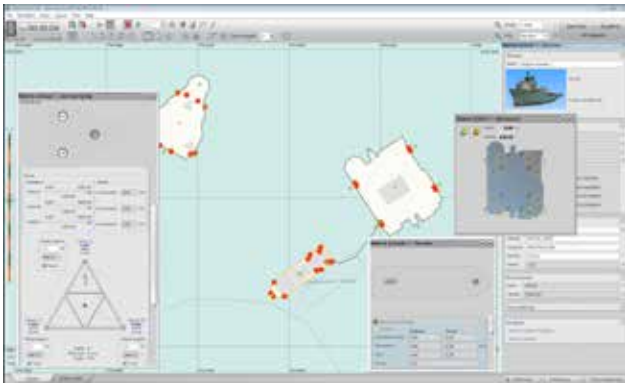
K-Sim Offshore's sophisticated SeaView visual system is recognised for its very high degree of realism in details, depth perception and motions. Vessels and objects in all possible weather conditions are brought to life in training scenarios. A range of geographical sailing areas are available to accommodate different training objectives.

Detailed exercise areas

To ensure realistic, quality simulation training, it is necessary to have geographical exercise areas that correspond exactly to the environments one will experience in real life. K-Sim Offshore offers a wide library of exercise areas that include radar, depth, buoy, chart and visual files. By using the Student Field Chart, exercise areas such as oil fields can be created to fit local requirements for DP and anchor handling.



The picture on top shows students exercising in the K-Sim Offshore simulator at Ocean Rig's Training Center, Athens, Greece. The next picture shows the visual system in the K-Sim Offshore simulator at Simsea, Norway, and the following displays an example of an arctic exercise area.



K-Sim Offshore Instructor system provides an efficient and user-friendly tool for basic and advanced training scenarios

Powerful instructor system

Intuitive & efficient pedagogical tool

K-Sim Offshore Instructor System is designed with the user experience firmly in focus. The award winning* instructor system provides the instructor with a powerful and efficient tool to design, control and assess customized exercises for individuals and teams.

Capabilities:

- customization of menus and pages for enhanced flexibility and user experience
- modified ECDIS chart as starting point for easily creating a geographical area for the exercises
- intuitive drag & drop function for choosing ship models and all other variables to create the exercise
- advanced Seagen GIS (Geographical Information System) tool for simple importing of third party environmental data such as current, tide, wave and wind to create optimum realism
- control of the student station configuration to define what information should be accessible and visible to students
- control of simulator actions derived from input variables and malfunctions, that can be initiated instantaneously, or pre-programmed as part of the exercise, e.g., extreme weather conditions, power blackout, or loose/ stuck wire in the winch

- guidance and feedback possibilities through triggers and e-coach messages during the exercise
- control of men on deck as well as the ability to play the role of a tow master, winch- or crane operator to accommodate enhanced team and communication training
- underwater view to observe the realistic behaviour of chains, wires and anchor below the water to monitor the student's performance
- stop, go back and resume simulation for guidance
- automatic recording of the simulated scenario and all parameters for full replay

Evaluation & assessment system

Evaluation of students can be incorporated as part of the exercise with trigger events, e-coach messages and scores drawn from performance. The entire simulated scenario with all variables is automatically recorded during the exercise. Review and debriefing can include replay of the entire exercise, or a selected segment from any point in the exercise in order to focus on a specific learning objective. The instructor system also features an advanced assessment system for ensuring optimal training and feedback standards.

*Award for Design Excellence from the Norwegian Design Council (2011)



Customer statement:

“At our K-Sim Offshore, our students have broken equipment worth almost 180 million US Dollars during the last 10 years. If we have prevented just 5% of these accidents from happening in real life, we still will have saved Maersk Supply Service millions and millions of dollars,”

- Tonny Moeller, Global Asset Manager, MAERSK Training Centre, Denmark

An ocean of training possibilities

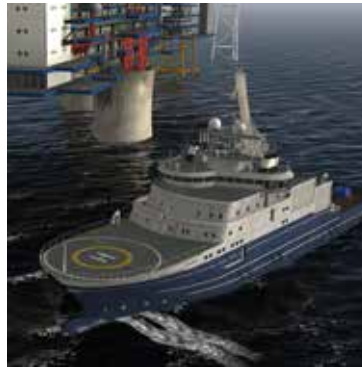
With a multitude of vessels, rigs, objects, equipment and geographical areas with all possible weather conditions, K-Sim Offshore enables a vast amount of training possibilities.





Navigation & ship handling

Configured as a forward bridge, K-Sim Offshore facilitates training in navigation and maneuvering in various sea and weather conditions in an offshore environment. The K-Sim Offshore simulated forward bridge may be equipped with all necessary instrumentation and controls found onboard an offshore vessel. Additional bridge equipment and K-Pos DP system can be added and integrated at any time for extension of the training possibilities. K-Sim Offshore is also delivered with communication systems for practising effective communication, which is an important skill for safe navigation



Dynamic positioning

Most Offshore Vessels have a Dynamic Positioning system onboard. By integrating K-Sim Offshore with KONGSBERG K-Pos DP system, it's possible to conduct seetime reduction DP operator training according to DNV GL and Nautical Institute (NI).

Typical DP training scenarios are:

- instrument & panel familiarization
- maneuvering according to current, wind and waves
- automatic station keeping
- independent joystick control
- failures on DP reference systems
- thruster performance and monitoring, power failure



Platform support

Operation of platform- and offshore support vessels in close proximity of offshore installations are demanding, and collisions may have severe consequences. K-Sim Offshore provides ship handling training for critical operations inside the safety zone, developing skills during:

- transfer of control between forward and aft bridge
- switch between DP mode, joystick control and manual control
- failures on DP reference systems
- changes in current, wind and waves

By including the platform crane operator in the scenario, full CRM training with focus on communication and human factors can be performed.



Rig move: towing & tugging

K-Sim Offshore can be configured to support ocean towing and installation of floaters on location. The towing scenario can include one or multiple towing vessels, towlines and bridles for towing floaters; ship-shaped, semi-submersibles and jack-ups.

In addition to individual competency training, one can conduct CRM training involving vessel master, tow master, winch- and crane operator, offshore installation manager and company representatives. This allows crew to conduct:

- cost-efficient mission planning
- risk-analysis
- procedural and mission rehearsal
- emergency response and preparedness



Anchor handling

K-Sim Offshore enables procedure development and realistic training on critical anchor handling operations, with focus on navigator and winch operator roles.

Typical training scenarios are:

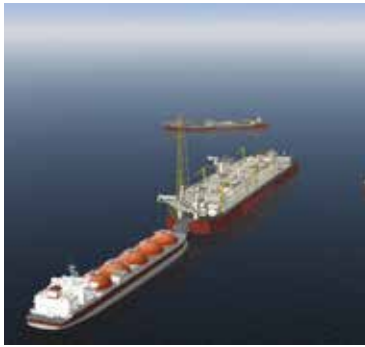
- electric- and hydraulic winch operation
- operation of various anchors and deck equipment incl. shark jaw
- anchor handling with permanent chaser pendant
- anchor handling of pre-laid systems
- J-hook and grapple operations
- deep water anchor handling – tandem operations with load-sharing
- safe operation on deck; insert wire, move equipment, make up hybrid systems (chain/wire/rope)



Buoy loading

K-Sim Offshore supports training of shuttle tanker/offtake tanker bridge crew and assisting/support vessel crew during buoy loading. The simulator system supports both the option of buoy loading with a DP2 shuttle tanker and the option of using a non DP tanker, where the tanker is assisted by tugs. Typical training scenarios are:

- ship handling, incl. coastal navigation
- berthing and unberthing
- approach, connecting, loading and disconnection
- emergency disconnect and maneuvering
- engine blackout & propulsion failure
- DP failure
- communication



Tandem loading

K-Sim Offshore supports training of shuttle tanker/offtake tanker bridge crew and assisting/support vessel crew during tandem loading. For DP2 shuttle tankers, the simulated bridge is integrated with KONGSBERG K-Pos DP2 system. DP reference systems DARPS, Artemis and RADIUS, signal input and operator stations. For non DP tankers, tanker assist by tugs is supported.

Typical training scenarios are:

- ship handling, incl. DP failure
- berthing and unberthing
- approach, connecting, loading and disconnection
- emergency disconnect & maneuvering
- engine blackout & propulsion failure
- communication



Heavy lift & pipe-lay

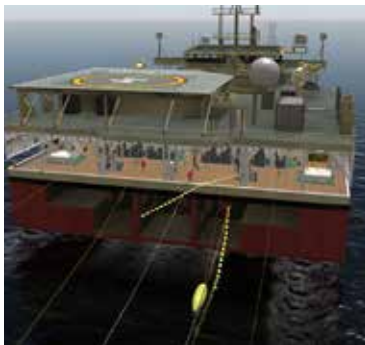
To conduct safe pre-mission planning and rehearsal in complex heavy lift operation projects, K-Sim Offshore provides customized solutions comprising special hydrodynamic vessel models including crane, lifting equipment, pipe-lay equipment and K-Pos DP2/3. K-Sim Offshore integrated with one or more K-Sim Offshore crane and a deck operator trainer is typically included in this simulation system, which facilitates training scenarios such as:

- plan, test and verify procedures prior to mission
- detailed pre-mission training
- improving communication skills and teamwork performance between crane and deck operators



Subsea vessel operations

Subsea vessel operations during construction and IMR (inspection, maintenance and repair) are fully supported by the K-Sim Offshore simulator. Advanced hydrodynamic DP vessel models equipped with subsea AHC (active heave compensation) cranes facilitates typical tasks such as over boarding of subsea structures and equipment from deck to subsea. When interfaced to a third party ROV simulator, the underwater tasks can be carried out by work ROVs and be included in an integrated training scenario. This allows training of the shift supervisor, who can control the complete subsea operation via radio and CCTV and communicate with vessel bridge personnel, crane operator, ROV operators, engineers and deck personnel.



Deck operator training

A special feature in K-Sim Offshore is the possibility to train deck personnel's procedures prior to a mission. Any deck environment can be modelled and visualized with relevant tools and actions allowing the workforce to train demanding procedures step by step with the tools suitable for the purpose. In the simulator, several students can work together and communicate in the same training scenario. An example of such training already implemented in K-Sim Offshore, is the recovery and repair of streamers at the aft deck of a seismic vessel. The training helps to avoid potentially fatal operator error and ensure safer and more efficient live operations.



Windmill installation

For familiarisation and training of bridge crew on jack-up windfarm installation vessels, K-Sim Offshore can offer customized hydrodynamic simulation models with control room instrumentation and integrated KONGSBERG DP2 and jacking system. This solution enables training in:

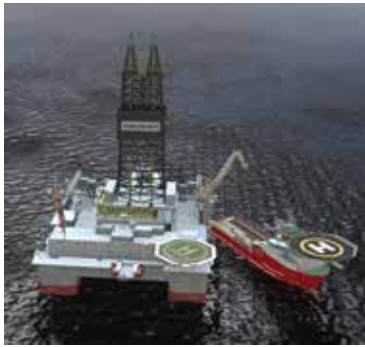
- navigation to location
- manoeuvring on DP
- jacking up on site, jacking control
- pre-loading, stability, leg penetration, leg torsion and inclinometer monitoring
- emergency preparedness and crisis management, e.g. punch-through
- procedure development & review
- communication, pre-simulation, task and equipment familiarization



Rig control room operations

Integrated with K-Sim Engine, KONGSBERG K-Pos DP and K-Sim Offshore Crane, K-Sim Offshore can be configured as a rig control room and enable interdepartmental team training for the crew by allowing for interactions with other operations on the rig. K-Sim Engine emulates and interfaces to KONGSBERG K-Chief automation systems and allows crew to:

- practice power management
- test procedures prior to mission
- develop practical rig control skills
- improve communication skills between crew members and teams
- interact and build more efficient teams
- prepare for unexpected situations and emergencies



Semi-submersible rig operations

Advanced hydrodynamic DP models are available for drilling and accommodation semi-submersibles. These high-fidelity models may include navigation bridge, KONGSBERG K-Pos DP2/3, power management and ballast systems modelled according to the actual rig plans and specifications. Special DP functions such as (RMS) Riser Management and Position Mooring (posMOOR/ATA) are available. Rig bridge, rig control room, engine rooms, cranes and winches can be fully integrated to support team training as well as inter-departmental training. These simulator models are fully dynamic and support various loading conditions and operational modes such as transit, drilling and survival.



Drillship operations

K-Sim Offshore provides training for drillship crew. A configuration of drilling vessel bridge, rig control room, engine rooms and cranes can be fully integrated to support team training as well as inter-departmental training. Advanced hydrodynamic drilling vessel simulator models with DP are available. These high-fidelity models may include navigation bridge, KONGSBERG DP2/3, RMS, power management and ballast systems modelled according to the actual drilling vessel plans and specifications. The training with this solution supports transit voyage, various operational modes and loading conditions.



Jack-up rig operations

K-Sim Offshore facilitates towmaster training for jack-up rig-move and installation on site. An advanced hydrodynamic jack-up model with rig control-room and instrumentation enables training of towmasters and team training with the AHTS vessel master for:

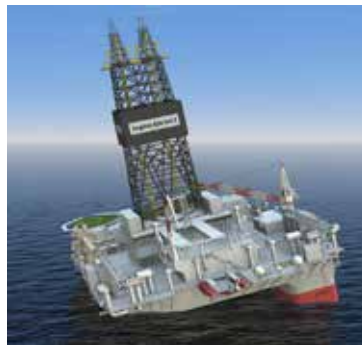
- moving rig into location, positioning of anchors
- jacking control
- stability, leg penetration, leg torsion and inclinometer monitoring
- pre-loading procedures
- emergency preparedness and crisis management
- procedure development & review
- communication, pre-simulation, task and equipment familiarization



Gangway monitoring

For familiarization and training of crew in operation and use of telescopic gangways, K-Sim Offshore provides gangway features, which are available for installation on board the rig or in training centres. Gangway models are typically fitted onto semi-submersible and monohull accommodation vessel models. Typical features:

- gangway can be lifted, extracted and retracted, latched and released
- dynamic behaviour of gangway motion
- sensor data can be interfaced to DP
- gangway status instructor setting
- automatic disconnect
- CCTV



Ballast handling

Handling of a semi-submersible platform is a demanding and complex task. Technical, commercial, environmental and safety requirements will always represent critical, and often conflicting, factors that must be dealt with during the platform operations.

K-Sim Offshore offers ballast handling training that gives a realistic replication of the dynamic behaviour of a mobile drilling platform for ballast and position keeping systems. In this manner, knowledge in ballast control can be acquired without hazardous or devastating consequences



Crisis management

K-Sim Offshore is ideally suited to prepare offshore crew and emergency management personnel for unexpected events. The system provides action planning and training for crises where decision making, quick response, interaction and communication are critical. K-Sim Offshore features a wealth of emergency training scenarios, including multiple vessels scenarios and operations involving the launch and recovery of helicopters from support vessels and rigs. To ensure realistic training, K-Sim Offshore provides a full range of modelled objects, such as: damaged ships, heeling rigs, oil slicks, icebergs, life rafts, man over board, smoke and flares.

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 yield efficiency in simulation training.

Our simulator system is designed with maximum flexibility, which makes it easy to add new functionality or complete new control segments thus enable 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) is our tool for customer collaboration and consists of two different levels of support: Priority and Premium Customized care. Each support level offered is designed to address the customer’s needs.

Investing in an LTSSP ensures that your simulation system always is 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 instructors and technical personnel.

Planning & design	Project engineering & development	Installation & commissioning	Operation & maintenance	Modernisation
		On-line support »		
		Technical support »		
Technical consulting»				
	Design and software engineering»			
			Field service »	
			Repairs and spare parts »	
			Optimization and modernization »	



Supported by professionals

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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