



KONGSBERG

NAVAL TRAINING

www.kongsberg.com

WORLD CLASS

- through people, technology and dedication

Kongsberg Gruppen ASA (KONGSBERG) is an international technology corporation that delivers advanced and reliable solutions that improve safety, security and performance in complex operations and during extreme conditions.

KONGSBERG is a customer-focused organization with a worldwide performance culture. KONGSBERG works with demanding customers in the global defence, maritime, oil and gas and aerospace industries.

Complete Warship Training	4
KONGSBERG INTERACT	5
PROTEUS Naval Training Solutions	6-7
POLARIS Ship's Bridge Simulator	8-9
NEPTUNE Engine Room Simulator	10-11
Customized Solutions	12-13
Support	14



Photo: ABIS Alan Lancaster/ Commonwealth of Australia

NAVAL SIMULATION & TRAINING

- Maximize performance in extreme operations

The need for efficient and effective high-quality training of armed forces personnel will continue to increase over the next decade as operational requirements and equipment capabilities continually evolve. Real-life training using operational equipment often presents too many challenges: risks to personnel safety and equipment damage; the risk of compromising operational security; and limited access to over-stretched operational platforms for training. Everywhere budgets are being squeezed, with naval forces being required to provide increased effectiveness for less money. Fortunately, at the same time, simulation technology has evolved to a level where highly-realistic scenarios can be used to meet key requirements including: training;

decision making; development of strategy, tactics and procedures; formulation and validation of concepts of operations; mission rehearsal; and after-action review.

As real shipboard equipment and simulator platform technologies converge, so do the shipboard and simulator training environments. Simulator training in highly-realistic operational scenarios presents a shorter route to competency and force readiness. Trainers and scenarios can be specifically tailored to allow warfighters to prepare for every situation from important procedural training to challenging, high-stress, combat missions where learned reactions are critical to survival. Such exercises using validated tactics

and procedures can be rerun many times to develop, build and maintain core skills in a safe training environment.

Simulation is highly responsive to the demands of the operational requirement and can be customized to provide on-demand training ranging from dedicated, single-operator, part-task training, through team and sub-team training and up to large fleet and task force synthetic training in a live, virtual and constructive (LVC) environment.

KONGSBERG has been dedicated to quality training for the past four decades

KONGSBERG INTERACT - Integrated Training Environment

For successful naval operations it is crucial that warfighters perform to their best ability. To achieve optimal performance in real-world operations, crews must develop both excellent situational awareness and learn to function as an integrated team. Realistic simulated training scenarios are the most cost-effective and proven way forward to develop these skills so they become second nature in a highly stressful operational situation.

KONGSBERG INTERACT (Integrated Naval Training Environment for Resource management And Crew Teamwork) provides a federated simulation environment, into which any of the PROTEUS tactical and POLARIS bridge training software solutions can be linked. Legacy stand-alone trainers may also be integrated into the KONGSBERG INTERACT federated system of systems to provide added cost effectiveness. This unique federation of hardware and software creates a joined up solution for optimal training where individual, team, crew and force-level skills can be developed, honed to perfection and maintained.

KONGSBERG INTERACT provides a flexible environment that allows users to create any training scenario they need. For example, a swarm attack is a realistic operational threat that is highly stressful and requires an immediate coordinated and coherent response, without which it would be difficult for the ship to survive. KONGSBERG INTERACT is easily tailored to create an environment where effective counter-swarm tactics can be developed and validated. At the same time, individual operators can learn core skills, such as using correct communications procedures whilst operating under combat stress. Such training is valid for the whole crew, from the young lookout correctly identifying and reporting threats and their attack posture, to the Commanding Officer's total situational awareness and chosen course of action under the applicable Rules of Engagement. One KONGSBERG INTERACT system can be scaled up to represent several ships and thus train individual Commanding Officers to work together as a fleet.

KONGSBERG INTERACT's flexibility can be used in a wealth of applications including federating appropriate trainers for crews to practice Anti-Submarine Warfare (ASW), area access / area denial and naval or maritime security forces protection of Economic Exclusion Zone (EEZ) and maritime infrastructure operations. KONGSBERG INTERACT is an ideal tool for developing and validating doctrine, from high level strategy down to individual tactics, concept of operations, mission rehearsal and after action review.

KONGSBERG INTERACT's exercises can be competitive, where appropriate, to promote discussion and innovation, or scripted to meet specific team and procedural training needs. Automatic recording and playback of simulation exercises enables assessment of individual, team, crew and force-level performance and thereby increase overall effectiveness.



EXTREME PERFORMANCE FOR EXTREME CONDITIONS

FEATURES

- Proven in operational training
- KONGSBERG INTERACT provides a low-risk, cost-effective training solution.
- Can be tailored to meet each user's specific training requirements.
- Runs on COTS PCs.
- HLA evolved compliant (IEEE1516.2010).
- Provides a federated environment, into which any other PROTEUS tactical and POLARIS bridge training system can be connected.
- The KONGSBERG INTERACT federation can also incorporate third party legacy trainers using either an HLA or DIS interface.
- Long-term follow-on support agreement available.

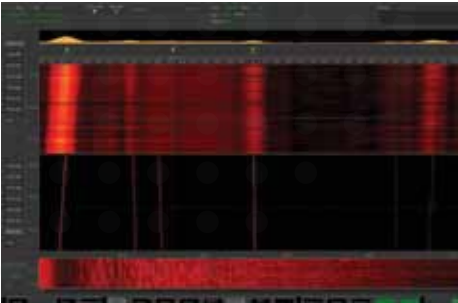


PROTEUS NAVAL TRAINING SOLUTIONS



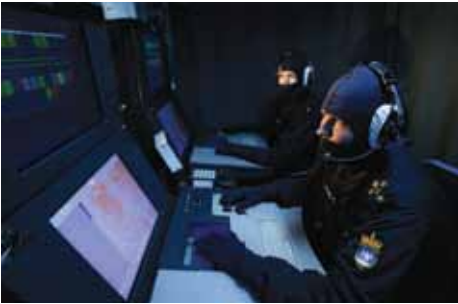
ACTION SPEED TACTICAL TRAINER (ASTT)

The PROTEUS ASTT prepares crews to operate in the complex 21st century naval environment. PROTEUS ASTT cubicles may be configured to represent ship CICs, ASW or anti-ship helicopters, maritime patrol aircraft, UAV or ROV control stations, and submarines. The PROTEUS ASTT can be linked to other HLA-compliant simulators, including any of the PROTEUS training solution systems, and KONGSBERG's POLARIS Naval Bridge and desktop trainers. The PROTEUS ASTT is in service with a number of navies worldwide.



SURFACE WARSHIP COMMAND TACTICAL TRAINER (CTT)

PROTEUS Surface Warship CTTs utilize PROTEUS training solution software to provide high quality training with low development risk. Each PROTEUS Surface Warship CTT is configured to represent the functionality and layout of the consoles in the CIC of a specific class of vessel. To provide realistic Command Team Training in larger taskforce-level exercises, the PROTEUS Surface Warship CTT can be networked with the generic multi-cubicle PROTEUS ASTT.



SUBMARINE COMMAND TEAM TRAINER (SCTT)

PROTEUS Submarine CTTs benefit from KONGSBERG's considerable experience in ASW and sonar simulation and stimulation gained through its close relationship with the Royal Norwegian Navy's Ula Class submarine and other projects making it unique and world-leading training solution. The PROTEUS Submarine CTT may be configured to represent the operations room in any class of submarine and can be linked to the PROTEUS Periscope simulator, and other HLA-compliant simulators such as the PROTEUS ASTT to create a realistic and challenging training environment.



SONAR AND ANTI-SUBMARINE WARFARE (ASW) TRAINER.

The PROTEUS Sonar and ASW Trainer provides simulations of various sonar types including: hull-mounted; variable depth; active towed array; and dipping sonars; plus air-dropped sonobuoys. The PROTEUS Sonar and ASW Trainer can be configured for training sonar operators on any ASW platform, including submarines, ASW frigates and helicopters, and Maritime Patrol Aircraft (MPA).

PASSIVE SONAR TRAINER

The PROTEUS Passive Sonar Trainer provides highly realistic sonar operator training by stimulating the hydrophone output of real sonar systems with a wide variety of computer-generated noise, such as propulsion systems, gearbox, shaft and various types of propeller noise, auxiliary machinery, active sonar, and narrow and broadband noise including biological marine noise. The system can also exploit recordings of actual vessel sounds, if available.

ELECTRONIC WARFARE (EW) TRAINER

The PROTEUS Naval EW Trainer provides a realistic EW environment with multiple emitters for operators to analyze and identify. Having identified threat emitters, EW personnel can practice passive fixing techniques to locate their origin. When appropriate EW operators can employ defensive countermeasures, decoys and offensive EW systems. The PROTEUS Naval EW Trainer can be configured to represent EW equipment on any naval platform.

HELICOPTER CONTROL OFFICER (HCO) TRAINER

The PROTEUS HCO Trainer provides HCOs with appropriate training for monitoring launch and recovery procedures; VERTREP (Vertical Replenishment); and HIFR (Helicopter In Flight Refuelling) operations. The trainer incorporates a generic or emulated SHOLDS (Ship Helicopter Operational Limits Display System) to teach HCOs how to calculate a course and speed to ensure the ship's motion and relative wind over the deck are kept within safe launch and recovery limits.

PERISCOPE TRAINER

The PROTEUS Periscope Trainer simulates the functionality and human interface of a real periscope. The periscope optics display high-fidelity targets for the user to practice search routines to locate targets, recognize them by type and identify them by class. Once the operator has visually identified the target, they use the periscope optics to measure its range, bearing and the angle on the bow. Coastal and other navigation features are included, along with environmental conditions. The KONGSBERG Periscope Trainer can be configured to represent the periscope on any class of submarine.

LOOKOUT TRAINER

The PROTEUS Lookout Trainer provides high fidelity target and traffic vessels for lookouts to detect, recognize, identify by class and report. The 3D models provide realistic visual stimuli, such as opening missile launch tubes or opening torpedo tube doors prior to a vessel attacking.

NAVAL WEAPON TRAINER (NWT)

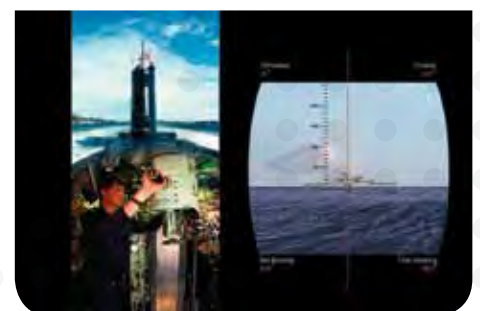
The PROTEUS Naval Weapon Trainer (NWT) provides operator-in-the-loop training for CIWS (Close-In Weapon Systems), such as remotely operated and crew-served guns, and short range SAMs. The NWT has a high-fidelity display that enables the operator to identify and visually engage targets. If required, the weapon system can be mounted on a motion platform. The PROTEUS Naval Weapon Trainer is in service with the Royal Norwegian Navy as the PROTEUS Mistral Simbad Trainer.

COMMUNICATIONS TRAINER

The PROTEUS Communications Trainer enables personnel to practice correct terminology and procedures when operating radio, voice and data systems. Instructors are provided with a powerful monitoring tool that records all transmissions, shows who made them, and when they were transmitted. It also allows transmissions to be replayed whilst the training is in progress or for post-exercise debriefing. Civil marine radio procedures can be practiced, including the use of GMDSS systems.



Photo: Bjørn Inge Sørensen



EXTREME
CONDITIONS
HUMAN PERFORMANCE

POLARIS SHIP'S BRIDGE SIMULATOR

- Market leading system enhancing skills for extreme operations

Recognised as the world's most advanced Ship's Bridge Simulator, POLARIS is engineered to train best practices and build competencies even for the most demanding operations. The simulator offers safe, professional and highly realistic training, covering everything from basic ship handling and navigation skills to advanced integrated team training, preparation for combat, anti-piracy or other extreme scenarios where instinctive reaction is crucial.

The simulator system exceeds the existing IMO STCW requirements and is approved by Det Norske Veritas' (DNV) Standard for Certifications No. 2.14, Maritime Simulator Systems, January 2011. POLARIS is today used and highly valued by more than 600 customers worldwide, including all major navies.



CONFIGURED TO YOUR NEEDS

KONGSBERG is dedicated to making simulation products available to as many users as possible. Widely recognized as the world's most flexible simulators that can be configured from a PC desktop solution to full mission tactical simulators. With a full range of simulation systems available, KONGSBERG has cost-effective solutions to fit every requirement and budget. Systems have the embedded capability to be expanded at any time, with additional instruments, workstations or real ship equipment. POLARIS can also be equipped with a motion platform to support stress training and to simulate small boats (RHIBs) in high seas and severe weather.

The system's unique modular design allows expansion, with additional instruments, panels and workstations at any time. Integrating POLARIS with the NEPTUNE Engine Room Simulator, Radar/ARPA, ECDIS, Dynamic Positioning, Communication simulators and PROTEUS tactical trainers for complete naval team

training is proven and affordable. The interface possibilities with the PROTEUS tactical trainer through DIS or HLA, enables integrated warship training enhancing combat skills, naval warfare tactics and decision making vital for naval crews preparing for extreme operations.

THE PERFECT LEARNING ENVIRONMENT

POLARIS is designed to provide incredibly realistic physical behaviour and ultimate accuracy in all aspects of navigation, ship handling and tactical operations. Lessons learned on the simulator are transferrable to situations in real life. An extensive library of detailed geographical training areas and advanced hydrodynamic own ships, target vessels and objects are available to create the perfect learning environment. The advanced 3D visual system presents the most realistic visualisation of exercise areas and vessel behaviour as well as sea state and weather conditions. The realism, detail, depth perception, motion and ability to recreate all conditions

experienced at sea both day and night, makes POLARIS ideal for training as well as for R&D studies in vessel design and port development.

COMPLETE CONTROL

To prepare, control and monitor the exercise, POLARIS is provided with a user-friendly instructor system. The POLARIS Instructor Station offers complete control of the students' environment. It controls and monitors a wide range of parameters, including: time of day, wind conditions, fog, rain, snow, sea state, machinery/sensor faults, alarms and worst-case scenarios, programmed repeatable series of events and on-the-fly stressors. During simulation training, the instructor can isolate and freeze scenarios for replay and debrief to train skills, test and develop attitudes by training in situations that demand complex decision making. In this way, the training will focus on bringing out the best in each student.

TRAINING SCENARIOS

Through configuration flexibility and software options, POLARIS offers a wide range of training possibilities, including navy specific scenarios, like for example:

- Port Security

Exercises in POLARIS can be tailored to deal with a full range of potential maritime threats varying from a single small craft, to hijacked commercial vessels and well-coordinated, simultaneous attacks on multiple vessels or port facilities. The system allows naval crews to practice and optimise all manoeuvring and communication procedures necessary to conduct their duties.

- Piracy and Boarder Protection

The increase in piracy activities has become a considerable threat to all maritime traffic. To train on anti-piracy scenarios, POLARIS is provided with a full

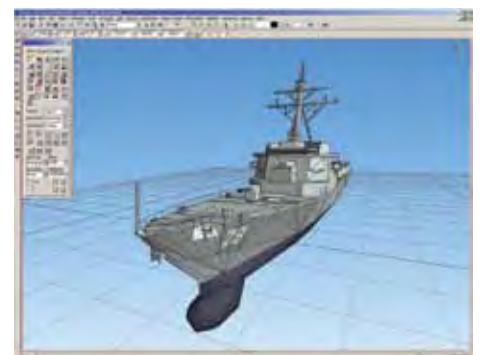
set of equipment and instrumentation for radar and visual detection, alerting and intervention. In addition, POLARIS includes piracy objects such as Dhow models, RHIB launch, flare effects and advanced tracking devices. Exercise control with objective assessment enables full scenario control and replay of any advanced tactical training.

- Search and Rescue (SAR)

POLARIS facilitates realistic Search and Rescue (SAR) operations including launch and recovery of helicopters from support vessels. A full range of targets such as: damaged ships, aircraft, oil slicks, life buoys and life rafts, man overboard, buoyant smoke and various other objects can be delivered to conduct SAR training scenarios with maximum realism.

- High Speed Manoeuvring Training

Configured as a RHIB, a Corvette or any other fast craft vessel, POLARIS is able to recreate the real motion of a fast boat in various sea states and trim conditions. The simulator facilitates realistic and safe training in full speed operations enabling crew to develop situation awareness and strong boat handling skills which are keys to mission success.



TRAINING PROVIDED

The POLARIS simulator enables training at any level both for cadets and officers. Whether training a group of individuals into a cohesive team or existing teams from various agencies into a coordinated force, POLARIS provides instructors with the tool to reach their training objectives for scenarios such as:

- Basic and Advanced Ship Handling
- Tactical Manoeuvres
- Navigation including ECDIS
- Tactical Communication
- Search & Rescue
- Replenishment at Sea
- Formation Sailing/Convoy
- Anti-Piracy
- Basic and Advanced Riverine Interception
- Border Patrol
- Combat Tactics
- Team Tactics and Firearms Proficiency
- Mission Planning
- Stern Door 'Marriage'
- Flag Signalling
- RHIB Launch and Recovery
- Towing
- Celestial Navigation

NEPTUNE ENGINE ROOM SIMULATOR

- The world's most comprehensive engine room simulator

Over the past four decades, KONGSBERG has supplied world navies with high-fidelity engine room simulators to Naval customers all over the world. The portfolio ranges from generic engine room models for understanding system functions and operations, to customised replicas of propulsion plants in specific navy vessels, offering 1:1 familiarisation for naval engineers.



Photo: Canadian Coast Guard

COMPREHENSIVE TRAINING

In order to teach engineers the complex behaviour of an engine, NEPTUNE simulators enable high quality training in every aspect, from single sub- and auxiliary systems to the overall running of the entire engine room. Covering both ordinary and extraordinary training situations, naval engineers are given the possibility to learn and practice daily procedures, economy optimising and vital skills crucial for handling abnormal situations and emergencies.

DYNAMIC REAL-TIME PROCESS SIMULATION

All NEPTUNE engine room simulator models are dynamic real-time process simulators of high fidelity, built on real engines physics.

This means that all sequences will automatically be in proper order and duration, regardless of the operational condition, which is important to gaining a real understanding of the processes.

CONFIGURATION FLEXIBILITY

The NEPTUNE simulator can be delivered as a customized full mission operational simulator, or installed on PC desktops for classroom training. While the desktop system is ideal for engineering and process studies, the full mission system supports team- and operational training by offering the physical familiarity of an Engine Room, an Engine Control Room and an Instructor Room.

NEPTUNE has a unique modular design enabling expansion of the system at any time, with additional engine room models, fixed or touch screen panels and displays, workstations and complete integrated engine rooms. Additionally NEPTUNE can be integrated to the POLARIS ship's bridge simulator for complete team training or connected to KONGSBERG's real vessel control systems, which gives a new level of realism.

ADVANCED 3D TECHNOLOGY

KONGSBERG's latest innovation within NEPTUNE, is the cost-effective BigView system, a software-based schematic mimic display with 3D pop-up windows on touch screens. BigView provides full size simulation with the flexibility to mimic many engine room configurations and to easily work throughout the engine room and operate the equipment within a virtual environment.

INSTRUCTOR SYSTEM

The monitoring, assessment and configuration tool for our NEPTUNE simulator has been designed to enhance the quality of simulation training by providing complete, intuitive and user-friendly control of exercises. It enables the instructor to develop customised exercise modules for individuals or teams and to monitor, review and fully control the exercise before replay, debrief and assessment of the exercise.



Photo: Christian Pearson



Photo: Christian Pearson



Photo: Christian Pearson



TRAINING PROVIDED

NEPTUNE simulators enable training at any level both for beginners and experienced specialists. Crew and officers can learn a vast array of skills thanks to the pedagogical values and high fidelity realism available in the system.

Basic Operational Training:

- Preparing for getting underway
- Manoeuvring to open sea
- Steady steaming
- Approaching harbour
- Finished with engine
- Operation of auxiliary boilers

Advanced Operational Training:

- Failures, diagnosis and emergencies
- Team training
- Crisis management
- Restoring the engine to normal operation

Economy and Optimisation Studies:

- Judging performance of various components
- Combustion performance
- Control loop optimising
- Heat balance/recovery
- Sub systems influence on fuel economy
- Variable pitch
- External conditions

CUSTOMISED SOLUTIONS

- Meeting Exact Training Requirements

KONGSBERG's range of simulator systems is based on in-depth understanding of the learning process. All simulators provide highly realistic training scenarios and can be customised to fulfil specific training requirements.

CUSTOMISED BRIDGE SIMULATOR

ROYAL NORWEGIAN NAVY DELIVERY

KONGSBERG has a long relationship with the Royal Norwegian Naval Academy and the Royal Norwegian Navy establishment. One of the latest deliveries is a specially designed 1:1 simulator replica of the tactical bridge system on board the Skjold class Corvette. As one of the fastest warships in the world, with a capability of speeds above 60 knots, they are subject to very strict requirements for safe navigation.

Built on the POLARIS ship's bridge simulator technology, the simulator features advanced software that realistically replicates the speed and handling of the Skjold. The simulator provides realistic training scenarios that would have been impossible to carry out because of the high speed and safety procedures of the vessels. This allows the Academy to expose the crew to greater challenges in a safe and cost-efficient environment.

CUSTOMIZED ENGINE ROOM SIMULATOR

ROYAL AUSTRALIAN NAVY/BAE - DELIVERY

A recent example of an extensive customised engine room simulator is the LHD Engineering System Trainer (LEST), delivered to BAE Systems to provide integrated training for the Royal Australian Navy. The simulator is based on the Canberra Class Landing Helicopter Dock

(LHD) vessels. The Engine configuration on the simulated ship is CODAG E, which is a combination of two engines types (2 x MAN medium speed & 1 x GE 2500 gas turbine) connected to generators. The propulsion is driven electrically with two Pods in a diesel-electric configuration. The system supports the full spectrum of engine room main- and subsystems and is based on mathematical physical laws resulting in a factual understanding of engine room processes as experienced in real life operations. The full mission part of the delivery includes control room operator stations with sophisticated IAS (Integrated Automation System) mimics & remote control panels, touch screen based electrical switchboard mimics & panels, local control engine-room mimics and bridge control including steering panels. The new LEST significantly enhances the Navy's ability to train LHD vessel engineering personnel, an important and critical factor in operational availability.

CUSTOMIZED COMMAND TEAM TRAINER - SIMULATION INFRASTRUCTURE

ROYAL AUSTRALIAN NAVY, Australian Air Warfare Destroyer program/ Raytheon Australia/ AWD Alliance. KONGSBERG is supplying the Command Team Trainer Simulation Infrastructure to the Hobart Class Air Warfare Destroyers Command Team Trainer. The Simulation Infrastruc-

ture is based on KONGSBERG's PROTEUS Training solution and will provide the Hobart Class Command Team Trainer (CTT) with exercise control and a common synthetic environment for integration of the Aegis Weapon System and other Hobart class sensors and effectors. The Simulation Infrastructure also provides Link 11/16 and DIS interfaces for external joint collaborative training.

**STRONG
PERFORMANCE
CULTURE**

CUSTOMER STATEMENT

Kongsberg Maritime has provided the Royal Canadian Navy outstanding support to their all important navigation and bridge simulators for the past 20 years. The company's workforce, whether it be from Norway, the USA or locally in Esquimalt and Halifax has been instrumental in providing reliable and modern training systems, that have remained at the leading edge of technology. KMS communicates well with all its customers worldwide, through annual user group conferences, newsletters and directly through their project management teams.

- Directorate of Naval Combat Systems, Royal Canadian Navy



GLOBAL SUPPORT WHEREVER AND WHENEVER IT IS NEEDED

KONGSBERG's customer service organization provides high-quality, 24 hour, global support, wherever and whenever it is needed. KONGSBERG is committed to providing easy access to support and service, and to responding promptly to its customers needs. Support and service activities are supervised from support centres at strategic locations around the globe. For mission-critical operations, Kongsberg Support 24 can be extended to include remote monitoring. It can adapt to the required level of support by offering service agreements, on-site spare part stocks and quick on-site response arrangements.

SOLID COMPETENCE REDUCES COST

KONGSBERG has always recognised the importance of supporting its products and systems with professional training. A wide range of courses are offered to ensure that its customers achieve the goal of full system utilisation with safe and efficient operation.

UPGRADING THAT PAYS

Product and system upgrades can improve your simulator's operations and reduce your overall maintenance costs. KONGSBERG ensures that existing products and systems can be extended or upgraded based on standard upgrade kits.

SUPPORT 24/7

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.



* Kongsberg, Asker, Bergen, Billingstad, Horten, Kjeller, Kristiansand, Oslo, Sandefjord, Sandvika, Stavanger, Stjørdal, Svalbard, Tromsø, Trondheim.

WORLD CLASS

- through people, technology and dedication

Kongsberg Maritime
Simulation & Training
P.O.Box 1009
NO-3194 Horten
Norway

Telephone: +47 815 73 700
Email: km.simulation.sales@kongsberg.com

