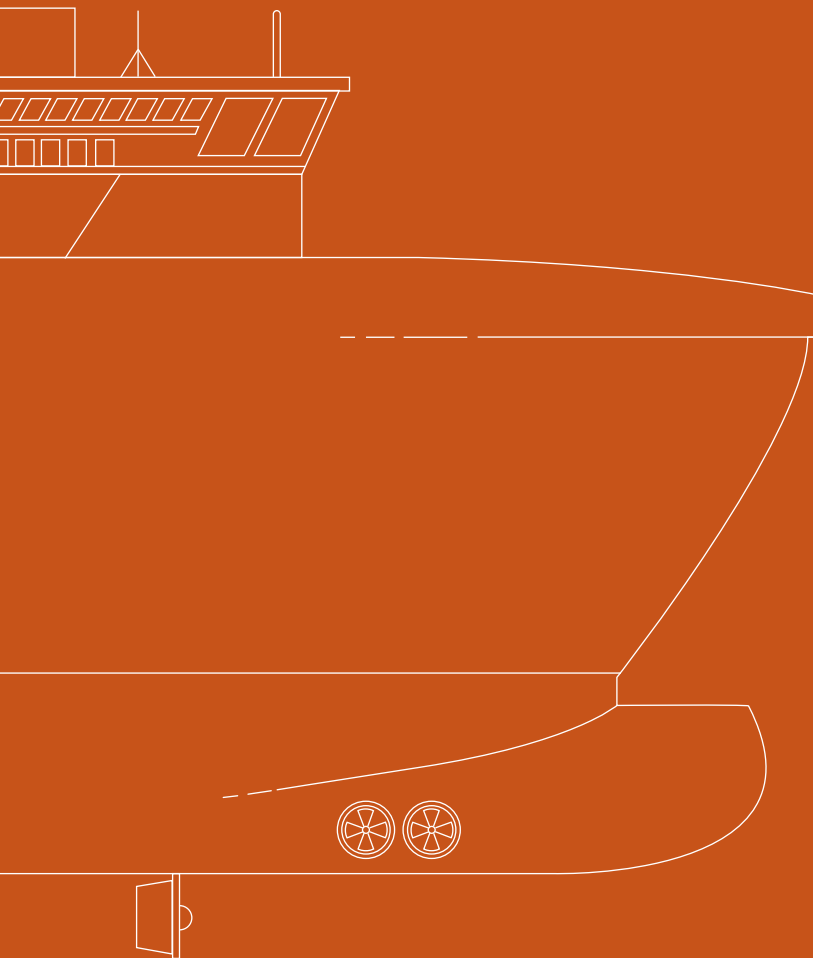




SUBSEA TECHNOLOGY

SHIP SYSTEMS POSITION, TRACK NAVIGATE, PROTECT COMMUNICATE



**POSITIONING
NAVIGATION
COMMUNICATION
MONITORING
IMAGING**

OUR COMPANY

WE POSITION WE NAVIGATE WE TRACK WE SECURE

MORE THAN 300 COMMERCIAL, SCIENTIFIC, NAVAL AND PRIVATE VESSELS RELY ON OUR MARINE TECHNOLOGIES TO POSITION, NAVIGATE, TRACK, COMMUNICATE AND PROTECT. WHETHER YOU ARE A VESSEL OWNER, FLEET OPERATOR, SHIPYARD, BRIDGE INTEGRATOR OR NAVAL ARCHITECT, OUR ACOUSTIC, SONAR, INERTIAL AND OPTICAL TECHNOLOGIES CAN HELP EXTEND YOUR VESSEL'S CAPABILITY, IMPROVE ITS EFFICIENCY AND REDUCE YOUR OPERATIONAL RISK.

LOW RISK. HIGH RELIABILITY. FIT FOR PURPOSE

From our origins in the North Sea in the early 1970s, innovation and performance have maintained our reputation for technical leadership. Today, we have an unrivalled portfolio of vessel-based and complementary sub-surface technologies that can support many different types of operation.

Our capabilities include acoustic and inertial position reference sensors for vessel dynamic positioning (DP) systems, high-grade gyrocompasses, imaging sonars for detecting navigation hazards and underwater intruders and systems for tracking and communicating with subsea vehicles and instruments deployed from the surface.

EVERYTHING UNDER ONE ROOF

We are a vertically integrated company with research, manufacturing, testing, compliance, distribution and support all under one roof.

In many cases, vessels, underwater systems and operating environments are unique. So where standard off-the-shelf equipment is not suitable, we have the know-how and in-house resources to design, test and manufacture highly reliable, fit-for-purpose customised solutions on time and on budget. Then, we're there around the clock to install, train and maintain.



WHY INVEST IN SONARDYNE?

- Our track record spans more than 45 years and hundreds of successful installations
- Our products improve the operational capabilities of any type of vessel: station keeping, navigation, tracking and security
- We deliver standard or custom engineered solutions on time and budget
- We offer global support to your business, shipyard, crew, captain and owner around the clock
- Our company is committed to maintaining a safe, healthy and sustainable working environment, with a goal of zero harm





DYNAMIC POSITIONING REFERENCE

RANGER 2 MARKSMAN

DYNAMIC POSITIONING SYSTEMS NEED REFERENCE DATA THAT'S ACCURATE AND REPEATABLE, SO THAT A VESSEL CAN RELIABLY HOLD STATION WHEN CRITICAL SUBSEA AND MANEUVRING OPERATIONS ARE UNDERWAY. DEVELOPED TO MEET THE REQUIREMENTS OF CLASS 2 AND 3 RULES, OUR ACOUSTIC SYSTEMS ARE COMPATIBLE WITH ALL DP SYSTEMS AND OFFER YOU THE INDEPENDENCE TO CONTINUE WORKING EVEN WHEN OTHER SENSING TECHNOLOGIES BECOME UNAVAILABLE.

RANGER 2 USBL FOR RELIABLE DP

Ranger 2 USBL (Ultra-Short BaseLine) works with any make of DP system including GE, Kongsberg, MT, Navis, Rolls-Royce and Wärtsilä. Arrive on location, deploy an acoustic beacon onto the seabed and get to work – confident in the knowledge that the Sonardyne Wideband® 2 signal architecture inside Ranger 2 USBL will help keep you where you want to be, time after time.

A popular choice for new-build offshore, research, exploration and naval vessels, Ranger 2 can also be retrofitted to older vessels as a cost-effective upgrade to acoustic reference systems from other manufacturers. If your vessel undertakes complex station keeping activities, such as offshore construction or deepwater salvage, Ranger 2 can be configured to operate in LUSBL (Long and Ultra-Short BaseLine) mode, which uses a seabed network of beacons to offer enhanced levels of system integrity. With LUSBL, more acoustic ranges means more redundancy in the solution for the DP desk.

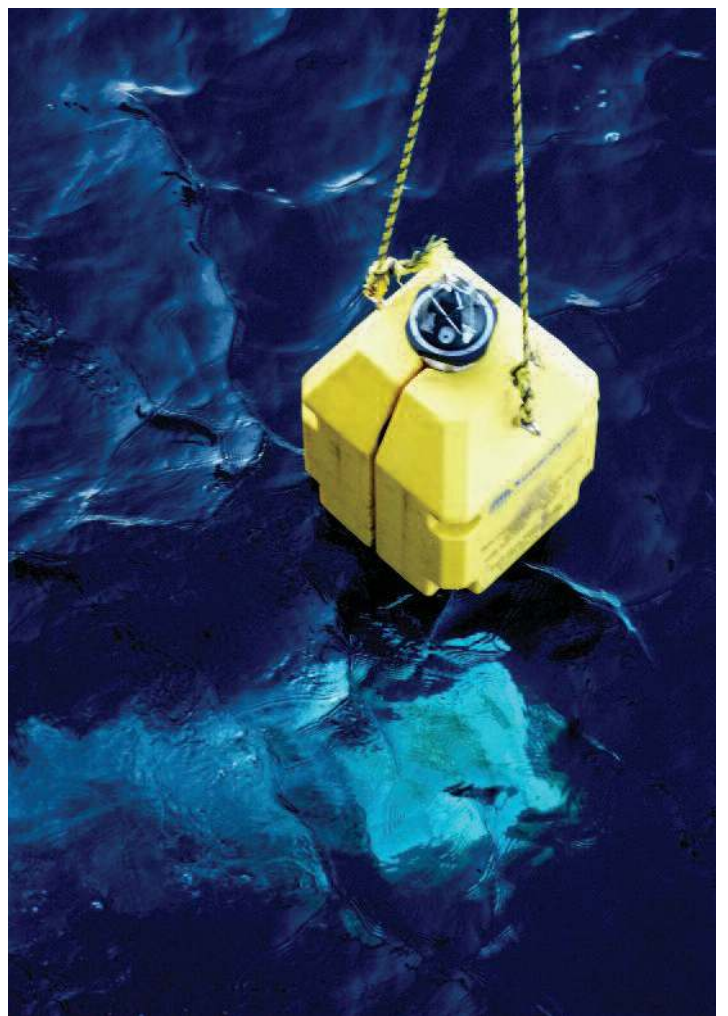
MARKSMAN FOR MOBILE DRILLING AND PRODUCTION UNITS

Developed specifically for DP drillships, semisubmersible drillrigs and floating production vessels, Marksman builds upon the performance of Ranger 2 LUSBL by adding support for dual or triple independent hardware configurations. This allows subsea operations to continue if any part of the acoustic hardware on the vessel becomes unavailable. Marksman also supports acoustic riser angle monitoring, back-up acoustic control of blow out preventers (BOP) and acoustic command, control and data recovery for instruments used to monitor riser integrity.

WHY RANGER 2 & MARKSMAN ARE RIGHT FOR YOUR VESSEL

- Fully compatible with all makes of DP system
- Cost effective for owners and shipyards; quick to install
- Easy to learn, easy to use
- Suitable for all vessel types; new build or retrofit
- Less wiring, fewer components and smaller gate valve than comparable systems
- More than just DP; can track underwater targets at the same time





NAVIGATION

LODESTAR DP-INS SYRINX

FIT OUR COMBINED GYROCOMPASS AND ATTITUDE HEADING REFERENCE SYSTEM (AHRS), INERTIAL NAVIGATION SYSTEM (INS) OR DOPPLER VELOCITY LOG (DVL) TECHNOLOGIES TO YOUR VESSEL TO BENEFIT FROM CONTINUOUSLY AVAILABLE, SURVEY-GRADE DATA TO AID NAVIGATION. THESE SYSTEMS HAVE BEEN DESIGNED TO SUPPORT A WIDE VARIETY OF VESSEL OPERATIONS FROM DEEP WATER DP REFERENCE TO SHALLOW WATER MANOEUVRING. ALL OFFER LOW MAINTENANCE, HIGH MEAN TIME BETWEEN FAILURE AND SIMPLE OWNERSHIP LOGISTICS THANKS TO THEIR CALIBRATION-FREE DESIGN AND UK MANUFACTURE.

LODESTAR AHRS

Lodestar is a high-performance, north-seeking gyrocompass and AHRS that replaces the need for a separate motion reference unit (MRU) and gyro. It uses the same ring laser gyros (RLG) and accelerometers fitted to most commercial airliners and space exploration platforms so you can be assured of class-leading levels of performance and reliability with low service intervals.

When used with our Ranger 2 system, Lodestar will improve overall system performance by optimising motion compensation – a configuration known as optimised USBL.

DP-INS

Uses an acoustically derived position from your Ranger 2 USBL or Marksman system, from a single transponder or an array, to aid the INS. The high-grade internal sensors within the INS allow it to ride through acoustic disruption and Global Navigation Satellite Systems (GNSS) derived instability. This makes it the ideal position reference input for DP operations.

DP-INS is built around the same hardware platform as Lodestar and can support dual operating modes; AHRS and acoustically-aided INS.

SYRINX DVL

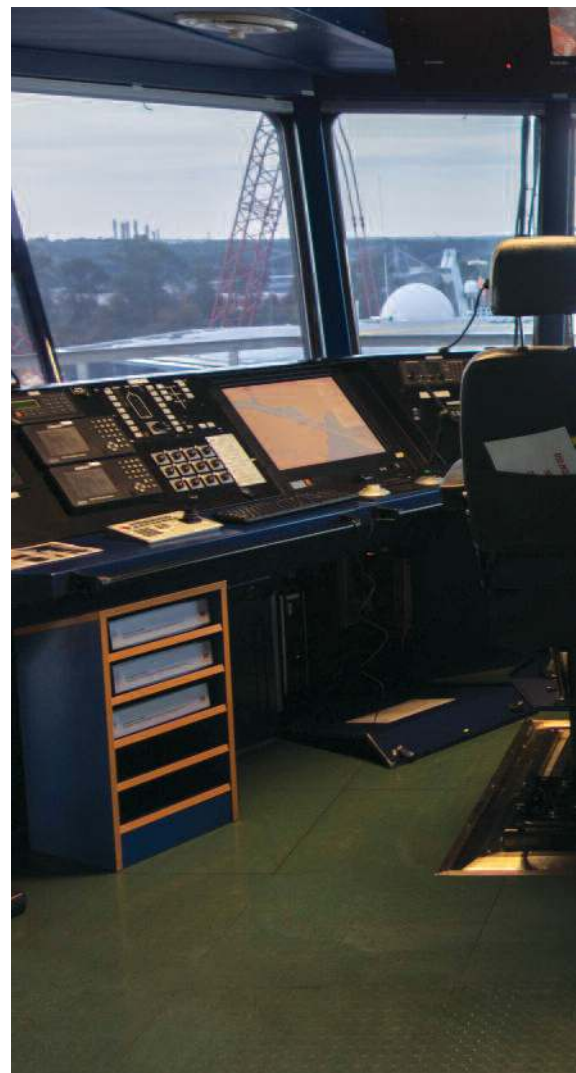
Our hull-mounted Syrinx DVL accurately calculates seabed-referenced velocity and is suitable for use on vessels operating in continental shelf waters. Combined with DP-INS, it provides reliable vessel positioning, even when in GNSS denied environments. DVL and INS combined are extremely precise, making them ideal for manoeuvring at slow speed (e.g. docking) when other navigation sensors become less effective. In addition to measuring speed over ground, Syrinx also measures current speed and direction through the water column to help optimise fuel efficiency.

Syrinx is easy to install and interface with existing bridge navigation systems thanks to its use of industry standard survey telegrams. Unlike many DVLs, Syrinx's signal processing technique can continue to output high precision speed over ground in water depths ranging from less than 1 m to 175 m. Speed through the water can be measured in any water depth.



HOW LODESTAR, DP-INS AND SYRINX AID YOUR VESSEL

- Added integrity during critical stages of vessel manoeuvring
- DP-INS provides a third independent DP reference source
- Lodestar and DP-INS use high-grade Honeywell RLGs
- All instruments output industry standard telegrams
- Performance levels to match simple to complex operations





TRACKING AND COMMUNICATIONS

RANGER 2 AVTRAK 6 HPT MODEM

WHEN YOU DEPLOY DIVERS, INSTRUMENTS OR UNDERWATER VEHICLES, WE PROVIDE THE CAPABILITY TO TRACK THEIR EVERY MOVE, COMMUNICATE WITH THEM AND EVEN RECEIVE DATA BACK FROM THEM – ALL WIRELESSLY. THE HARDWARE IS EASY TO INSTALL AND USE, THANKS TO OUR DIGITAL WIDEBAND SIGNAL TECHNOLOGY, IT WILL WORK RELIABLY IN ALL OPERATING ENVIRONMENTS – DEEP OR SHALLOW.

MINI-RANGER 2 AND RANGER 2

Whether you're operating far offshore or just off the coast, commercially or for pleasure, our family of Ultra-Short BaseLine (USBL) acoustic tracking systems, Mini-Ranger 2 and Ranger 2, provide you with the capability to know exactly where multiple underwater targets are relative to your vessel's position. Sail to a location, attach acoustic beacons to vehicles and divers, deploy them and track them. USBL is fast and efficient, so your vessel's operations will be as well.

Mini-Ranger 2 has an operating range of 995 m (extendable to 4,000 m) and is ideal for temporary or permanent installation on smaller vessels or private yachts. Ranger 2 can track targets to beyond 7,000 m and has the added capability of providing position reference data for vessels equipped with dynamic positioning systems.

AVTRAK 6

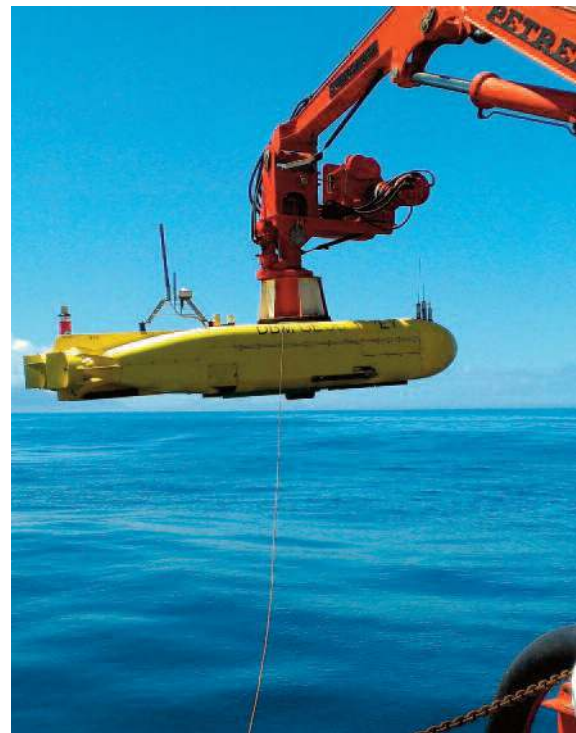
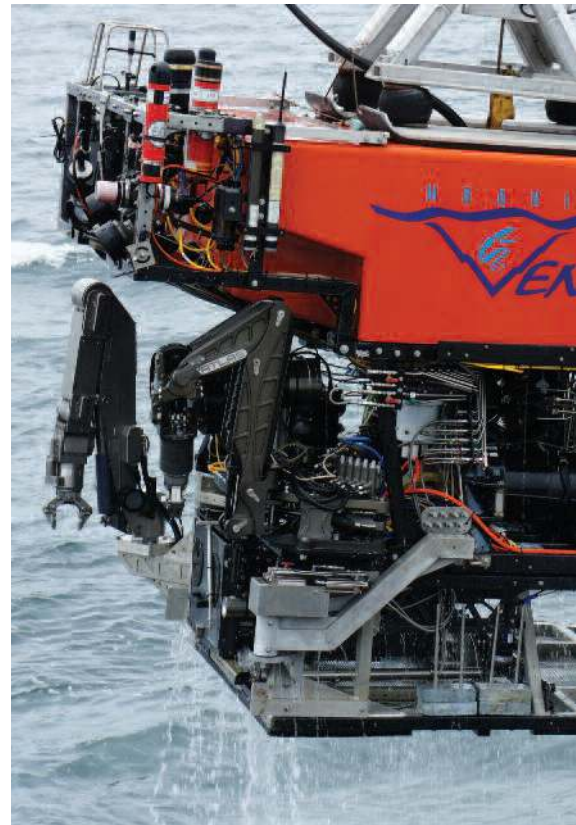
Survey, research and military vessels regularly deploy autonomous underwater vehicles (AUVs) and manned submersibles to support operations, including site inspections, salvage and mine clearance.

Equipping an AUV with AvTrak 6 enables you to track its position and communicate with this valuable asset throughout its mission. It's used in conjunction with a vessel-based Mini-Ranger 2 or Ranger 2 USBL and is available in three different sizes to suit large and small and large vehicles, including man-portable variants. If the vehicle develops a fault, AvTrak 6 can also be used to locate it.

Did you know we also supply inertial navigation, side scan sonars and high-speed optical modems for AUVs? See our Marine Robotics brochure for more details.

HPT MODEM

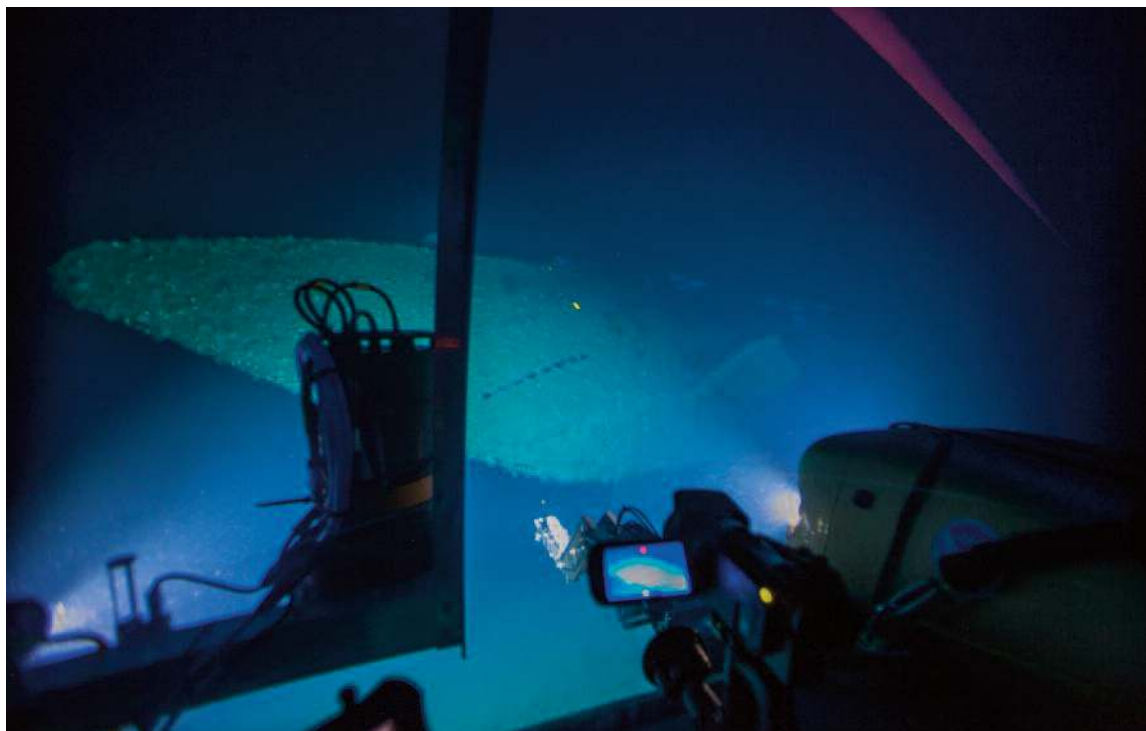
If you need to harvest logged data from Sonardyne-equipped sensors on the seafloor or from underwater vehicles, as long as your vessel is equipped with a Mini-Ranger 2 or Ranger 2 system, then you already have the tool to do the job. That's because HPT, the acoustic transceiver that's used to track underwater targets, can also be used as an efficient and reliable acoustic modem. Versatility and operational efficiency comes as standard with our vessel-based technologies.



BENEFITS OF OUR TRACKING AND COMMS TECHNOLOGY

- Always know where your divers, ROVs, towfish, AUVs etc. are relative to your vessel
- Simple to learn; easy to operate
- Operating range beyond 7,000 m
- Track record of success on all types of vessel
- Support available globally 24/7
- Easy to install on vessels of opportunity





COLLISION AVOIDANCE

NAVIGATION AND OBSTACLE AVOIDANCE SONAR – NOAS

RADAR AND AIS ALERT YOU TO NAVIGATION HAZARDS ABOVE THE WATER, BUT WHAT ABOUT THOSE BENEATH THE SURFACE? POORLY CHARTED WATERS AND SUBMERGED OBJECTS CAN CAUSE YOUR VESSEL TO RUN AGROUND OR HAVE A COLLISION, PLACING EVERYONE ONBOARD AT RISK. INSTALL OUR NAVIGATION AND OBSTACLE AVOIDANCE SONAR AND TRANSFORM YOUR UNDERWATER SITUATIONAL AWARENESS.

SEE WHAT LIES AHEAD

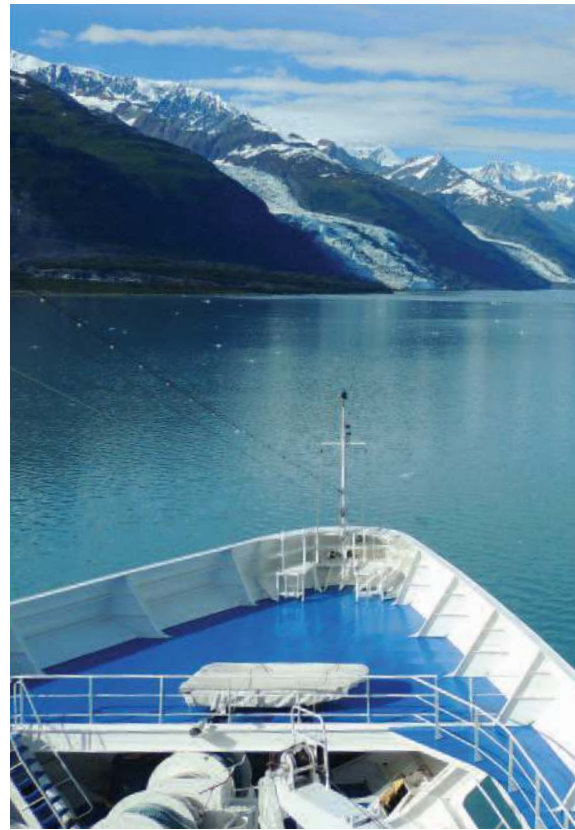
Human and charting errors are the largest causes of vessel groundings and collisions when navigating. That's why, if you're transiting routes, even familiar ones, a forward-looking sonar can help you see what lies ahead under the water and automatically warn you of hidden dangers.

NOAS has been designed in collaboration with ship's officers for large vessels such as passenger ships (including exploration-class cruise liners), naval vessels, research ships, commercial ships (including autonomous ships) and private superyachts.

Using dual sonar transducers installed in the bow of your vessel, NOAS works by scanning the water column at a navigational significant range ahead of the vessel in order to generate a 3D model of the seabed. Displayed relative to the vessel and overlaid on nautical charts in real-time, this model provides your crew with an easy to interpret image of the underwater topography ahead of your vessel.

Alerts can be configured to warn of potential collision hazards or shallow water. These can be based on depth, distance from the vessel and estimated time to impact. Multiple alerts can be programmed and are displayed in the profile view and depth scale. Uniquely, NOAS also offers an intruder detection capability to warn of divers and UUVs approaching your vessel when it's stationary.

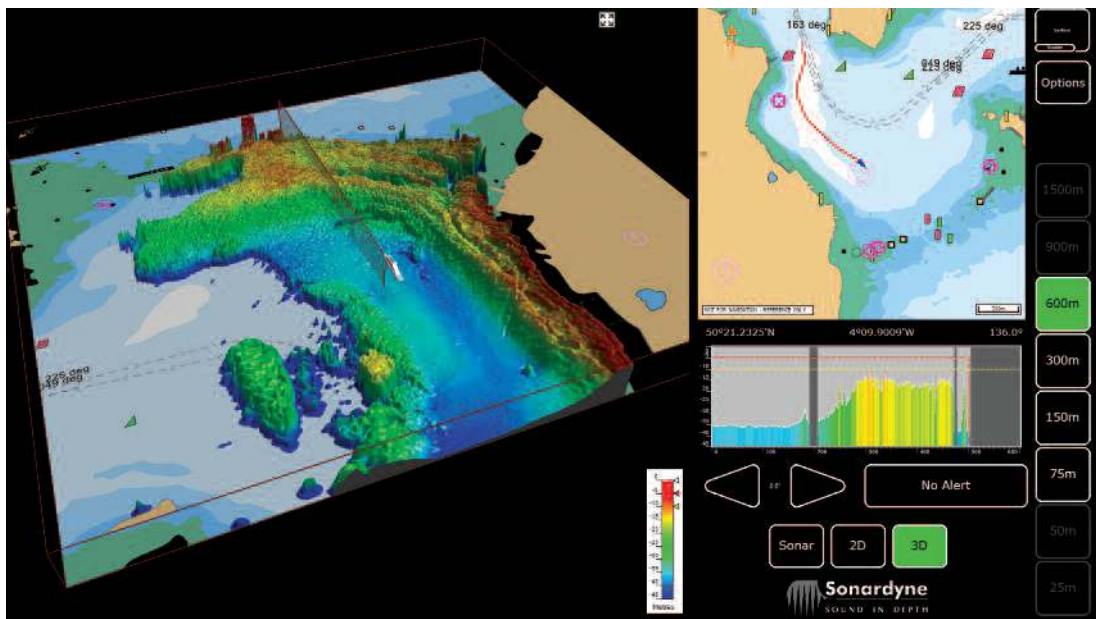
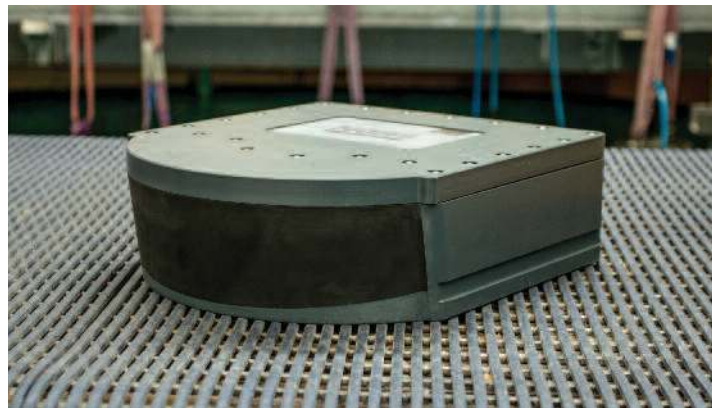
NOAS is designed to be retro-fitted to existing vessels as well as new vessels and comes with comprehensive engineering support and advice to ensure installation, commissioning and crew training is trouble-free.



WHY NOAS IS RIGHT FOR YOUR VESSEL

- Designed for new-build or retro-fit
- Provides 3D seabed mapping ahead of your vessel up to 600 m
- Has a sonar navigation mode with 1,500 m range
- Can be integrated with bridge systems
- Optional long-range diver and UUV detection security mode
- Has no moving mechanical parts simplifying installation and through-life maintenance
- Retains recent terrain history to ease re-tracing your track





UNDERWATER SECURITY

SENTINEL INTRUDER DETECTION SONAR

STRENGTHEN YOUR VESSEL'S SECURITY BY SPECIFYING THE WORLD'S MOST WIDELY DEPLOYED UNDERWATER INTRUDER DETECTION SONAR (IDS), SENTINEL. THE SYSTEM DETECTS, TRACKS AND CLASSIFIES DIVERS AND AUTONOMOUS UNDERWATER DRONES APPROACHING A PROTECTED VESSEL FROM ANY DIRECTION AND ALERTS SECURITY PERSONNEL TO THE THREAT.

THE PERFECT DEFENCE

Sentinel IDS provides reliable, effective and affordable security for vessels considered to be vulnerable to unauthorised access from the water. The moment a diver or underwater drone, UUV or AUV enters a monitored exclusion zone, the alarm is raised and the threat is tracked. With the ability to detect threats up to 1,500 m away, Sentinel's long range performance gives your security officers ample time to assess the situation, intercept the threat or simply move the protected vessel away from it – ensuring the safety of owners, guests and crew always comes first.

SCALABLE PROTECTION, INVISIBLE INSTALLATION

Sentinel's flexible architecture allows any size of vessel to be comprehensively protected. We've engineered all the complexity associated with configuring and operating advanced sonar technology into easy-to-use software, meaning that your security personnel don't need to be sonar experts to use it. In fact, once it's set up, Sentinel can be left to run autonomously. Your owners and guests will never know that the system is on duty protecting them.

With both temporary and permanent installation options catered for, Sentinel's compact sonar can be deployed using its own cable, over the side of a tender or permanently through the hull of your vessel.

Our experienced team will survey your vessel to define the optimum configuration of equipment including: sonar locations (single or multiple), deployment arrangements (fixed or retrievable), cabling and bridge hardware.



WHY SENTINEL IS RIGHT TO PROTECT YOUR VESSEL

- Reliably detects underwater perimeter security breaches
- Works with existing security sensors to provide 360° monitoring
- Long-range detection provides maximum reaction time
- Fully autonomous; alerts you only in an emergency
- Can be remotely monitored when a vessel is unoccupied





SUPPORT

WE INSTALL WE TRAIN WE MAINTAIN

WITH HUNDREDS OF VESSEL INSTALLATIONS SUCCESSFULLY CARRIED OUT, WE HAVE THE EXPERIENCE TO WORK SIDE BY SIDE WITH YOUR NAVAL ARCHITECT, SHIPYARD, DP SUPPLIER AND CREW TO MAKE THE PROCESS OF INVESTING IN SONARDYNE PROBLEM FREE AND LOW RISK. IT'S ALL PART OF THE SERVICE THAT HELPS LOWER OPERATIONAL RISK, SPEED UP YOUR MARINE OPERATIONS AND KEEP VESSEL DOWNTIME TO A MINIMUM.

EXPERT ADVICE

Our long-term partnerships with clients has enabled us to develop a unique and extensive insight into the diverse nature of vessel operations and the associated commercial and operational pressures. We understand that the technology investment decisions you make today, will affect your fleet's operational capability for years to come, so they need to be right.

That's why you can trust our global commercial and technical teams to give you expert advice on which system is best for you, how to finance it (now including lease rental), where and how it should be installed, what hardware you'll need and the typical performance you can expect to see based on how and where you will be using it.

OPERATOR TRAINING

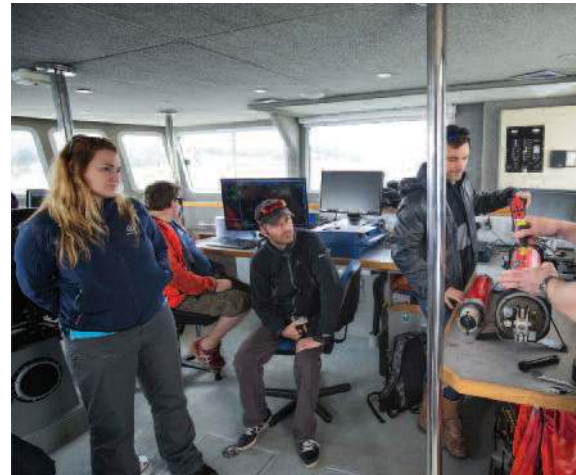
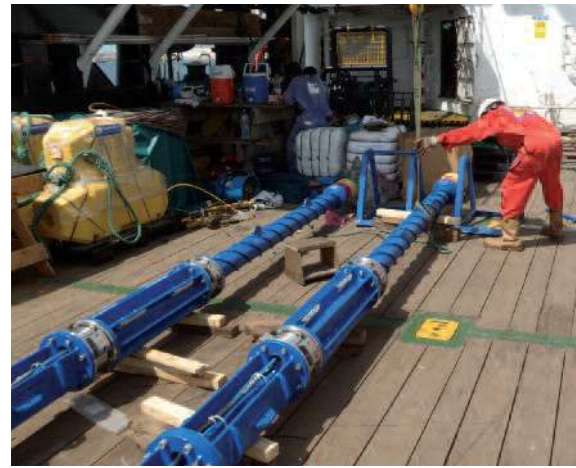
Making sure that you get the very best out of your Sonardyne technology once it's installed and commissioned is at the heart of our operator training programme. From standard courses run at our worldwide centres to bespoke courses held on your vessel, our training is comprehensive and flexible.

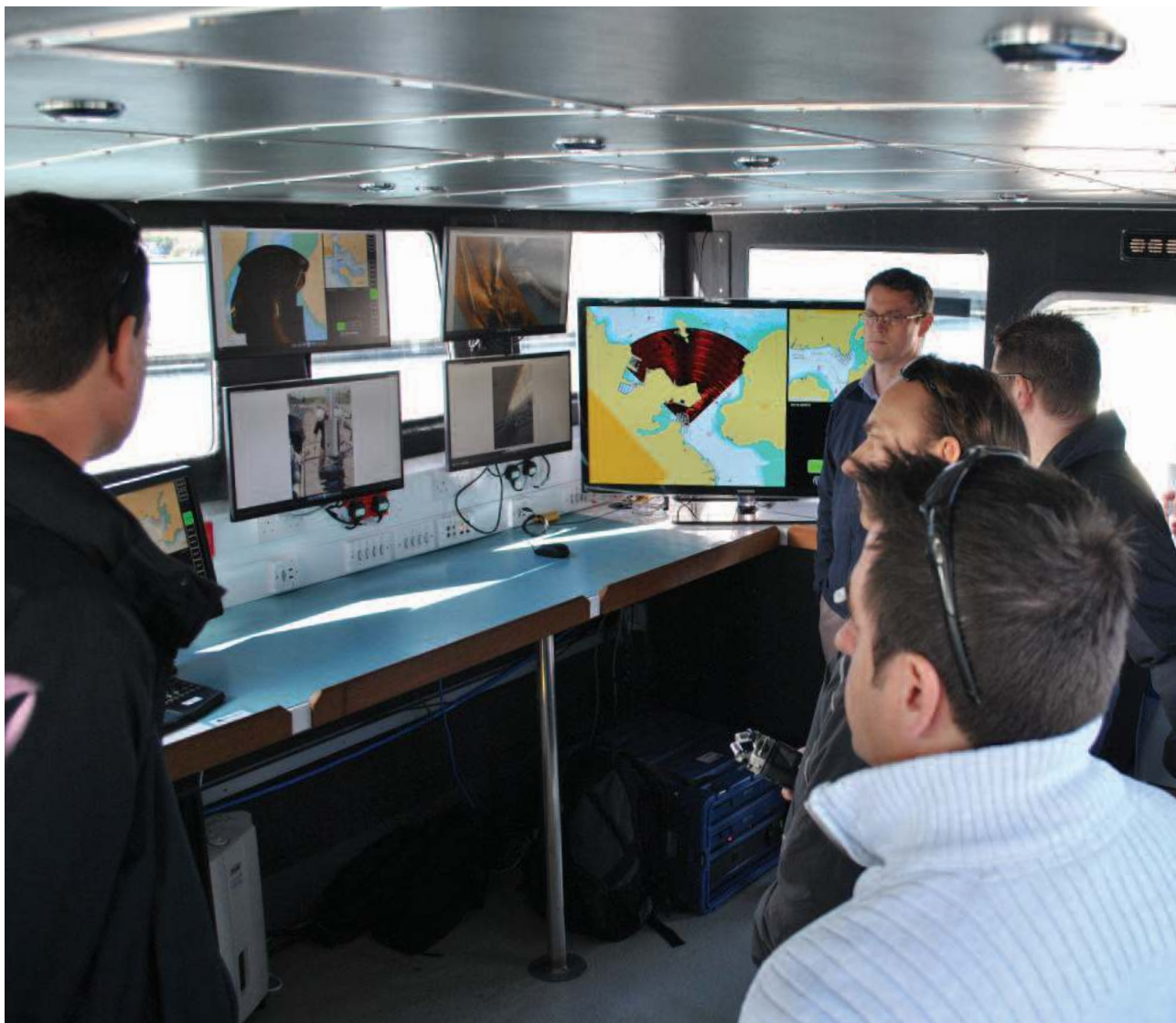
HELP WHEN YOU NEED IT

Once you become a Sonardyne customer, you gain automatic access to our customer care programme. A dedicated email helpline connects you to product engineers ready to answer your questions, but, if it's more urgent, our 24-hour worldwide telephone helpline is standing by ready to resolve any operational issues you are facing.

ANNUAL SERVICE VISITS

Of course, the best way to ensure that your equipment always performs as it should, is to service it regularly. Book an annual service visit and one of our field engineers will inspect the health of your vessel's Sonardyne system, including updating software and firmware and inspecting equipment such as through-hull deployment machines, to make sure regular checks are being carried out.





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