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THE CUSTOMER MAGAZINE FROM SONARDYNE
ISSUE 7

Baseline

Sonardyne
SOUND IN DEPTH

6G®. THE NEW STANDARD

Sonardyne's sixth generation (6G) acoustic positioning, wireless communications and inertial navigation technology has set new standards wherever it has been deployed. From simultaneous operations in the Gulf of Mexico to autonomous monitoring off Norway, pipelay in Ghana to spool piece metrology in Australia, 6G's capabilities are being utilised. Operations are faster and more efficient, equipment is simpler to use and you can do more with it. Discover the impact 6G can have on your next subsea operation. **www.sonardyne.com**

2 Sonardyne Wideband®

SEAMLESS INERTIAL NAVIGATION


DP INS


SPRINT

VERSATILE ACOUSTIC TRANSCEIVERS


HPT


ROVNav 6


Dunker 6


GyroUSBL


AvTrak 6

MULTI-PURPOSE ACOUSTIC TRANSPONDERS


AMT


Compatt 6


GyroCompatt 6


WMT


Fetch and PIES


WSM 6

MODEM


Mini Modem

ACOUSTIC POSITIONING ● INERTIAL NAVIGATION ● WIRELESS COMMUNICATIONS ● SONAR IMAGING | twitter @Sonardyne

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IN NOVEMBER 1971, Sonardyne was officially founded by John Partridge. Through innovation, John's vision for his Company was to improve the safety and efficiency of subsea navigation.

As we celebrate reaching our 40th, Sonardyne has remained true to its roots as a pioneer, only now we are providing that innovation across a myriad of industry sectors. We proudly remain an independent manufacturing business with almost 300 employees worldwide in eight regional centres.

Long BaseLine has always been a core Sonardyne capability and on page 16, you can read how our subsea INS system is paving the way for more efficient operations through sparse transponder arrays. Similar efficiencies can be gained by using our first 'calibration-free' GyroUSBL – see page 20.

Sonardyne is committed to investment in both core technologies and the diverse markets in which we operate. On page 10, we lift the lid on our latest company acquisition, Monaco-based MARSS. Their 'end-to-end' integrated waterside surveillance system NIDAR is the first fully automated command and control system designed to protect vessels, ports, waterside and strategic offshore infrastructure from the threats of attack.

As much as innovation in technology has helped to grow our company, it is our people and the support they give to customers that makes us stand out from the crowd. On page 22 we explain how you can get the most out of your investment in Sonardyne by training alongside one of our many product experts.

As Baseline goes to print, we are just a few weeks away from the most important event in our exhibition schedule – Oceanology International in London. Our website and twitter feed has everything you need to know. We hope to see you there!

Rob Balloch, Strategic Development and Marketing Director

Front Cover
Tow-out begins of a North Sea pipeline bundle from Wick in Scotland. Compatt 6 transponders were installed at regular intervals along the bundle to monitor its position and status during the tow. The Compatts formed the backbone of an 'acoustically hopped' communications network that passed data along the entire length of the pipeline. *Photo courtesy of Subsea 7.*

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Sonardyne
SOUND IN DEPTH

NEWS

SOFTWARE

ViewPoint: Ranger USBL from a different perspective

To mark the introduction of our new navigation package, ViewPoint, Sonardyne is offering Ranger USBL customers a 60 day free trial of the software.

ViewPoint enables users to explore, visualise and share positioning data from Ranger 1 and 2 systems, transforming co-ordinates of surface vessels, subsea vehicles and structures into geographical information that is overlaid on easy-to-use guidance displays. When changes to Ranger are made, such as adding a new tracked target, they can be turned on to build up an accurate view of the offshore scene. Equally when moving location, guidance information can be quickly generated to allow the DP operator to get the vessel there as efficiently as possible.

From a master ViewPoint workstation, guidance information can be distributed across a vessel network to any number of user-configurable remote displays; and because it is serially interfaced to Ranger, ViewPoint is totally secure. There is no way to pass on PC viruses to Ranger or affect live acoustic positioning and DP operations.

"ViewPoint offers users the opportunity to explore, visualise and share positioning data from their Ranger system using easy-to-use guidance displays."

automatically appear on ViewPoint ensuring everyone onboard has access to accurate, real-time positioning information.

ViewPoint supports full, DWG background drawings with layer control, providing onscreen guidance and measurement tools, structure and vehicle outline shapes, offsets, waypoints and geodesy. As subsea structures are installed, so layers

The trial software is available to all Ranger 1 and 2 users and will last for 60 days after installation. To get your copy, head to the ViewPoint product page on the Sonardyne website and register your details. Alternatively, please contact your local Sonardyne office.

INTERNATIONAL

Sonardyne helps in the recovery of Air France airbus black boxes

A Ranger 2 USBL target tracking system has played an integral role in the recovery of the flight data recorders from Air France flight AF 447. The Airbus A330-203 was Paris-bound from Rio de Janeiro when it crashed into the Atlantic Ocean in 2009.

Last spring, during a fourth and final survey to find the wreckage, AUVs discovered the aircraft lying in 3,900 metres of water. French authorities chartered the

One of the flight data recorders recovered from the seabed, it was located by a Remora 6000 ROV tracked using a Ranger 2 USBL. (Photo: BEA).

Cable Ship *Ile de Sein* and equipped it with a Remora 6000 ROV to undertake the vital mission to recover the black boxes.

Because of the extreme depth and the importance of monitoring the precise position of the ROV as it moved around the debris field, the Ile de Sein's owner, ALDA Marine approached Sonardyne to provide a solution. Ranger 2, our latest generation USBL was proposed, and just a few days later, engineers had mobilised the equipment onboard the vessel.

Shortly after arriving on-site, both the flight data recorder and the cockpit voice recorder had been recovered and sent for analysis. Their data has subsequently allowed investigators to explain the tragic circumstances of the crash in which 228 passengers and crew died.

***Dragonquest* is the second of three vessels being constructed at the DSME shipyard in Korea for Vantage Drilling.**

DYNAMIC POSITIONING

First drillship order taken for DP Inertial Navigation System

Vantage Drilling's new 12,000 feet-rated drillship, *Dragonquest*, is set to become the first deep water drilling unit in the world to be equipped with Sonardyne's Dynamic Positioning Inertial Navigation System (DP-INS).

The new system aids vessel positioning by the integration of acoustic and inertial technologies, and will be used by *Dragonquest* when it begins drilling operations in the Gulf of Mexico for Petrobras in 2012.

DP-INS has been developed to meet regulatory requirements which state that deep water drilling units must be equipped with three independent position reference inputs to their DP system.

Traditionally, an acoustic positioning system and two separate DGPS systems are used. However, vulnerability remains should the acoustics be affected by aeration and noise and both GPS systems be simultaneously affected by signal disruption. The latter is particularly common around equatorial regions and during periods of high solar radiation. Solar activity is currently increasing and is forecasted by NASA to peak in 2013.

Consequently, there is a recognised need amongst operators for a third, independent DP reference that would allow safe rejection of a positioning error in one of the other two reference types

Third independent DP reference

DP-INS combines the complementary characteristics of Sonardyne's Long and Ultra-Short BaseLine (LUSBL) positioning technology, with high integrity inertial measurements from our Lodestar AHRS/INS platform. The resulting output is resilient to short-term acoustic disruptions and completely independent from GPS.

A single navigation solution is computed and output to a display with intuitive status and quality metrics. Standard output telegrams are available for Converteam, L3 or Kongsberg DP systems.

In addition to the system's deep water positioning performance and safety benefits, Sonardyne DP-INS delivers valuable costs savings. It can be used with fewer acoustic transponders deployed on the seabed, significantly reducing set-up time following a vessel's arrival on location. The system also only needs occasional aiding from the acoustic system, extending transponder battery life and reducing maintenance operations.

Spencer Collins, Senior VP International Sales said, ''We are delighted to be installing DP-INS onboard *Dragonquest*. The trials over the last year have successfully demonstrated to vessel owners and operators like Petrobras, that Sonardyne can now offer acoustically aided INS tailored for safe and efficient DP operations.''

NEWS

INSPECTION, REPAIR AND MAINTENANCE

Trendsetter selects Sonardyne for second Gulf of Mexico well containment system

Houston-based Trendsetter Engineering Inc. has once again selected Sonardyne Wideband 2 acoustic equipment to play a critical role in an emergency well containment system for the Gulf of Mexico.

In the last issue of Baseline we reported on how, in the wake of the Deepwater Horizon accident, Government and industry had identified the need for a subsea capping stack to be permanently on standby in the region. In just six weeks, Sonardyne's engineers had designed and delivered a solution using acoustic technologies proven at Macondo.

Helix Well Containment Group

This latest contract is for a second Gulf of Mexico emergency well containment system built by Trendsetter for the Helix Well Containment Group (HWCG).

HWCG is a consortium of 24 operators in the Gulf of Mexico who have come together with the common goal of expanding capabilities and pooling technical expertise to quickly and comprehensively respond in the event of a deep water well control incident.

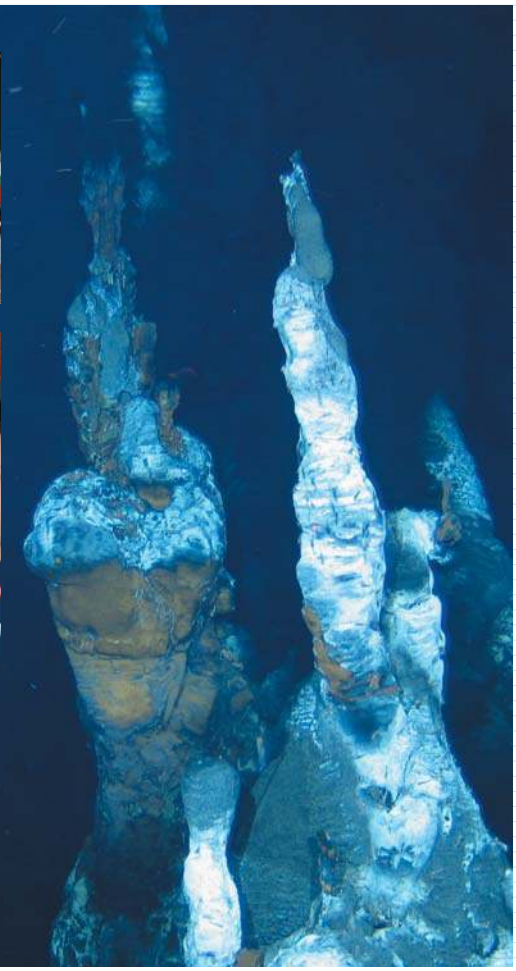
"In just six weeks, Sonardyne's engineers had designed and delivered a solution using technologies proven at Macondo."

The HWCG emergency well response system comprises an intervention capping stack that would be placed over a damaged well to stop its flow. Its advanced design makes it capable of capturing and processing up to 55,000 barrels of oil per day and 95 million cubic feet of natural gas per day in water depths up to 10,000 feet.

During an emergency, the supplied Sonardyne data acquisition system would be used to remotely monitor pressure and temperature sensors fitted to the capping stack. The system consists of a Surface Command Unit, intelligent Deep Acoustic Remote Transducers (DARTs) and a Subsea Electronics Module (SEM) that is capable of reliably transmitting data at high speed, and in the presence of noise from the well, to the surface for immediate analysis.

The intervention capping stack will be continuously maintained by Trendsetter's technical experts at its facilities in north Houston, where it will remain on-call for immediate deployment in the event of a deepwater well control incident.

Wireless Well Control: The Helix Well Containment Group's capping stack is the most advanced well response system in the world.



(Clockwise from top left) The team led by Dr Andy Wheeler pictured infront of RV Celtic Explorer. Chimneys of metal sulphides make up the newly discovered Moytirra Vent Field. An engineer installs Sonardyne's latest generation USBL transceiver onboard.

OCEAN SCIENCE

Ranger helps make major scientific discovery on the Mid-Atlantic Ridge

During the summer of 2011, the Irish-led VENTuRE expedition used a Ranger 2 USBL system to track an ROV three kilometres below the sea surface as it searched for and filmed evidence of a new eco system on the floor of the Atlantic Ocean.

The mission to find and study the newly named Moytirra Vent Field was undertaken from the research vessel *Celtic Explorer*, which had been equipped with the deep rated ROV Holland 1. Precise subsea navigation was called for as the vehicle was required to operate in the challenging conditions created by hydrothermal vents spewing super heated seawater permeated with dissolved minerals and suspended solids. This gives rise to what looks like miniature erupting volcanoes.

Ranger 2 is specifically designed for deep water, long range tracking of underwater vehicles and its track record on similar projects made it the ideal choice for the team.

"On the first dive, we found the edge of the vent field within two hours of arriving on the seafloor," said Dr Andy Wheeler, who led the expedition. "Often the search for vents takes much longer, and our success is a testament to the excellent equipment onboard and the skill of everyone involved."

ORDERS AND CONTRACTS

Allseas places major 6G equipment order for $43 billion Gorgon field development project

Pipeline installation and subsea construction contractors, Allseas Group SA, has placed an order for over £1.3 million worth of Sonardyne 6G positioning systems.

The equipment is destined for use in the massive Gorgon and Jansz gas field development, located some 130 kilometres off the Western Australian coast. The Gorgon Project is the biggest in Australia's history, as well as the largest single investment of its kind in the world. Allseas is responsible for the installation of the offshore pipelines from Barrow Island to the drill centres as well as for the infield lines.

Allseas' vessels and its ROVs will be equipped with Dunker 6 and ROVNav 6 positioning and telemetry transceivers that will be used to command the company's existing inventory of Sonardyne products and its new 6G hardware.

Seabed arrays comprising a mix of Compatt 5 and Compatt 6 transponders will be deployed to create wide area, high precision subsea positioning networks during the construction phases of the field's development.

NEWS

SURVEY AND CONSTRUCTION

6G finds a safe harbour at Stonehaven

Stonehaven harbour, and below right, Aberdeen Sales Manager Alan MacDonald encourages delegates to get hands-on with 6G.

A series of in-water demonstrations have showcased the speed and reliability of Sonardyne's 6G LBL and AMT technology in challenging conditions at Stonehaven Harbour in Scotland.

The event took place over three days and was attended by key industry professionals including chief surveyors, project managers and equipment rental specialists.

Prior to the introduction of Sonardyne's sixth

"I found the speed and success of 6G impressive in such a difficult environment." Jonathan Farquharson, Forum Energy Technologies"

generation equipment platform last year, this kind of demonstration was simply not possible due to the notoriously difficult acoustic conditions created in harbours and docks.

However, 6G equipment uses faster and more robust Wideband 2 digital ranging and telemetry protocols. This makes any system using it more reliable and easier to operate, thereby minimising operational risk, saving vessel time and reducing personnel training requirements.

Last autumn saw the launch of our new-look website. www.sonardyne.com has been overhauled to allow quicker and clearer navigation and greater ease of use. The new home-page benefits from a top level index of the industry sectors within which we operate to help users match their application with our technology. Here you will also find our live Twitter feed. Product pages now feature a section that details support information, such as the instrument's current firmware version and related products. Feedback is welcomed at: marketing@sonardyne.com

>>>>>>>>>>>>

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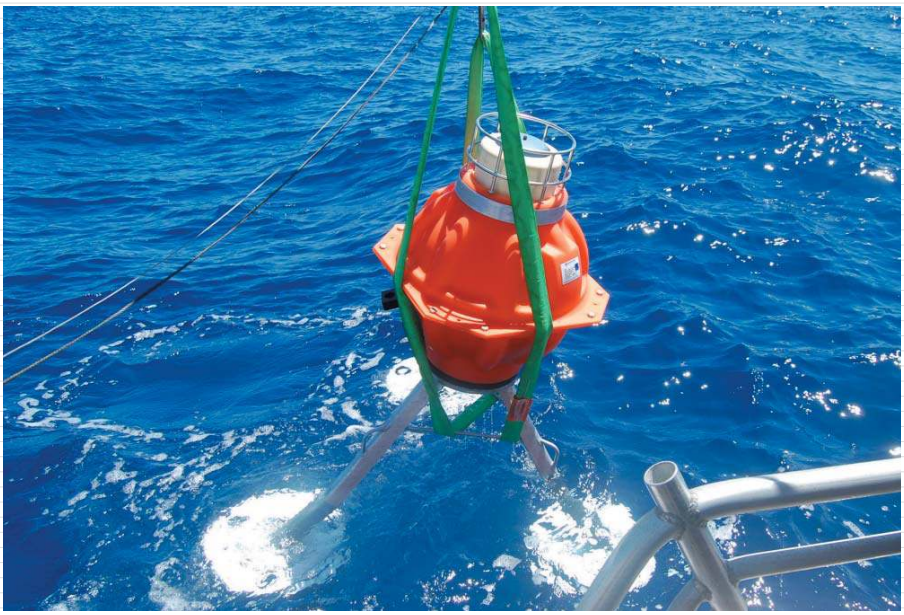


PIES can be free fall deployed to the seabed where it will land in an upright position.

OCEAN SCIENCE

PIES makes a splash in Hawaii

A new instrument to help oceanographers and geophysicists better understand the dynamics of the ocean is now available from Sonardyne.

The Pressure Inverted Echo Sounder (PIES) is a long-life sensor logging node that accurately measures the average sound velocity through a column of water from the seabed to the sea surface.

It works by transmitting a wideband acoustic pulse from its location on the seabed. This pulse is reflected off the sea surface and returns to the seabed where it is detected by the PIES. The resulting data enables two way travel time to be calculated.

At the same instant, an accurate measurement of depth is made using a highly precise internal pressure sensor. Average water column velocity can then be calculated directly from the depth (i.e. distance) and travel time data.

Last September, a PIES unit was free-fall deployed from a small vessel, owned and operated by Liquid Robotics. The unique design of the instrument ensures that it always lands on the seabed in an upright position making it quick and easy for users to deploy without the involvement of a costly survey vessel and ROV.

Depending on the sampling interval configured, Sonardyne's PIES is capable of remaining on the seabed for up to five years. The unit now in place is logging an average sound speed reading every seven minutes with an accuracy of approximately one metre per second.

Fast and efficient data retrieval

At any time during a Sonardyne PIES deployment, stored data can be retrieved on-demand acoustically at the surface, either from a vessel or using an ASV (Autonomous Surface Vehicle). The unit incorporates Sonardyne's Wideband 2 acoustic communications signal architecture which guarantees data retrieval is both fast and energy efficient.

However, PIES data gathered during the Hawaii survey will only be recovered at the end of the mission. In a few months, Sonardyne engineers will return to the site and will acoustically command the PIES unit to disconnect itself from its tripod stand. It will then return to the surface under its own buoyancy, be recovered onboard and its data downloaded for analysis.

PIES was deployed in a 950 metre deep channel between the islands of Hawaii and Maui. It will remain there for several months.

Technology

Sentinel IDS and NIDAR

Intelligent maritime sec

Marine and Remote Sensing Solutions Ltd (MARSS) recently became the latest member of the Sonardyne group of companies. During a visit to MARSS's headquarters in Monaco, Baseline caught up with **Johannes Pinl**, the company's founder, and **Rob Balloch**, Strategic Development Director for Sonardyne to get the latest on the acquisition and the partnership's first commercial product – NIDAR.

In today's uncertain times, the threat to waterside critical infrastructure, vessels and VIPs has never been higher. NIDAR has been developed with that in mind. It is an advanced Command and Control (C2) surveillance software system that has been designed especially to combat piracy, protect sensitive infrastructure and provide real-time situational awareness to security providers.

"Like all good ideas, NIDAR is deceptively simple," says Johannes. "It brings local and wide area surveillance systems into one solution and reprocesses them to autonomously detect and classify the threat in a secure browser-based format allowing control from anywhere in the world."

"What makes NIDAR work is its ability to merge multiple sensor data into one cohesive solution," continues Johannes. "We discovered early on that the average commercial security system was found to be lacking when it came to both gathering data from the world around it and intelligently analysing it to determine risk levels."

Initial development of NIDAR began five years ago and from day one, Johannes and his team set their sights on developing a fresh autonomous approach that would reduce false alarm rates and increase >>

curity at your fingertips

Technology

Sentinel IDS and NIDAR

the efficiency of threat response. The result had to be affordable, scalable and very simple to operate.

"There are major challenges associated with working in a market dominated by large defence-orientated systems but when a renowned software entrepreneur with a background in secure, heavily encrypted financial transaction software joined the development team, the project really started to accelerate," says Johannes.

"As the product started to take form, the search for a suitable name began. Research led us to NIDAR, an ancient Somalian god who was known as the righter of wrong. The word survives in modern Somalia as part of a popular saying, 'NIDAR will find and punish you'."

Rapid expansion

After securing initial investment, MARSS was established and in 2006, the fledgling company convinced the European Union that it could lead the development effort for a major EU security program looking at the protection of ports and commercial shipping. "We were the smallest company to ever be given a lead management role in an EU program," Johannes points out. "Within 12 months, our team expanded rapidly to include engineers with military and Silicon Valley experience. The EU program not only provided funding, it brought commercial partners, facilities and experience providing vital feedback during development."

It was during a visit to Sonardyne's sonar development facility in Dorset that the MARSS and Sonardyne teams first encountered each other. MARSS had agreed to lease a number of expeditionary Sentinel diver detection sonars as part of the EU program. "When we saw the first ever Sentinel on the bench being prepared for trials, we knew it could deliver the performance we needed," remembers Johannes.

NIDAR was reaching a level of maturity. The system had been proven across a number of sites and MARSS was looking for a commercial partner. "Megayachts, which was NIDAR's original market, are fun and exciting but we recognised that to achieve real growth we needed to break into the global waterside security market," says Johannes. "Sonardyne and Sentinel were getting noticed internationally and we realised there was real cross-over in our objectives."

Equally the match made sense from Sonardyne's perspective. "From early 2009, we were installing Sentinel sonars at customers' sites across the world with little or no Command and Control infrastructure in place," explains Rob. "When we quizzed clients, the universal issue was price and complexity. There was no readily available system in the marketplace that could handle all that sensor data in an intelligent way and be affordable."

Rob continues, "We knew that there was a gap that existed between current technology and what clients expected. It was clear that NIDAR could fill the gap so what began as an opportunity to invest in MARSS rapidly evolved into a strategy for its acquisition."

Within weeks of the acquisition being completed, the first commercial sales of NIDAR systems were confirmed. In each case, the

1 The NIDAR multi-touch user interface provides a Situation Awareness Picture for early confirming of threats, alerting on-shore and deterring attackers.

2 Stitched together infrared images created a panoramic view around an asset with targets overlaid.

3 A live thermal or optical video moves from target to target. In the event of an alarm the system keeps the threat in constant view.

4 The centre of the screen displays data sets such as targets, radar and sonar tracks overlaid on a satellite view, ECDIS charts or a classic radar screen.

5 Target images are listed with risk level, name, speed, heading, range and time to closest point of approach.

Over the last six months, the Sentinel and NIDAR product teams have clocked up thousands of miles demonstrating the technology during trials and defence trade shows.

NIDAR solution was able to provide an effective situational awareness system that integrated local and wide area surveillance technology.

"The client asked us to integrate sonar, radar, AIS, electro-optics, satellite data and ancillary systems into a single display," says Rob. "NIDAR is sensor independent; so we can integrate any surveillance sensor and where possible we reprocess the raw digital data through our own behavioural analysis filters and classification algorithms to improve the target detection, threat assessment and the subsequent generation of an alarm. By using the latest advances in software design we can achieve this in an affordable way."

More than just a C2

Johannes is keen to stress that NIDAR is so much more than just a C2. "We display the information in an intuitive way, making the system more efficient and accessible to a broader market. The intelligence in our system reduces false alarms creating a more efficient system in a browser based format that can be monitored and controlled from any authorised network device."

NIDAR utilises advanced behavioural algorithms and data encryption protocols to provide secure networks to get the situational awareness information to remote devices, enabling informed command decisions," emphasises Johannes. "Consider the scenario of an attack on a waterside facility protected with NIDAR. Security guards are alerted to the threat from an approaching diver by on-screen alarms. A camera is already tracking the co-ordinates of the threat so visual confirmation can be made that there is no surface target generating a false alarm. Simultaneously, Sentinel's integrated underwater deterrent is broadcasting audio warnings at the target to surface and surrender to the security vessel that has automatically been sent a navigation solution to intercept. Supervisors and first responders can observe and control the entire engagement in real time from anywhere in the world using their iPad."

NIDAR has come a very long way in a short time and Rob is equally enthusiastic about future developments. "NIDAR is currently focused on surface and subsea detection however in 2012 we will be able to monitor the airspace around an asset, completing the situational awareness picture. Beyond that is autonomy; we already have all the sensor information operating in a secure environment that could assist the operation of autonomous response vehicles such as USV's, UAVs, and non-lethal deterrents."

"The requirement for underwater surveillance systems is accelerating across a wide market area," concludes Rob. Demand for Sentinel systems has grown significantly in the last three years and customers are always asking for a layered protection approach. NIDAR brings a new accessibility and order to the management of sensor data that helps our clients make more efficient use of available intelligence, make more informed decisions and fundamentally, increase their levels of security. **BL**

Case Study

Autonomous monitoring and data acquisition

Subsea 7 deploys AMTs f

Subsea 7, a global leader in seabed-to-surface engineering, construction and Life of Field services, has recently been charged with tackling suspected pipeline creeping at one of West Africa's largest fields. A complex network of subsea manifolds, flowlines, control umbilicals and export lines lie in depths of up to 1,500 metres and are tied back to a moored FPSO. A routine ROV inspection by the field's operator identified that a pipeline close to a PLET (Pipeline End Terminal) had exhibited signs of movement due to axial creeping.

"Recovering data is both fast and secure, and by removing the overhead of a dedicated ROV and support vessel, remote monitoring projects using AMT's have been proven to deliver substantial cost savings."

Pipeline creeping

Sometimes referred to as 'pipeline walking', axial creep occurs as a result of repeated expansion and contraction of a pipe induced by internal pressure and temperature fluctuations. This behaviour is particularly common in fields using High Pressure/ High Temperature pipelines and where the seafloor is of a type that offers low resistance to the lateral forces being exerted upon it.

In order to make an accurate assessment of the magnitude of the movement involved, and to ensure that the pipeline's structural integrity remains in tolerance, Subsea 7 was tasked with performing a detailed study of the affected pipeline. The investigation would specifically involve measuring the amount of movement relative to the nearby PLET and the behaviour of the movement over an extended period of time.

ROV survey

A common approach to this type of survey is to deploy an ROV at the scene and use it to take repeated measurements of the moving structure relative to nearby datum points (often known as monuments) that are considered to be in a fixed, stable location.

In order that sufficient data can be gathered to allow meaningful analysis, repeated measurements over many weeks and months have to be gathered.

Aside from the substantial costs involved in mobilising an ROV, vessel and survey team for each data collection trip, there is the underlying risk that no two surveys will ever be the same due to absolute positioning accuracies in deepwater.

Autonomous monitoring

Keen to investigate alternatives to an ROV-based survey, Subsea 7 contacted Sonardyne to establish whether specialised Autonomous Monitoring Transponders (AMT) would be able to meet their needs.

AMTs are part of Sonardyne's 6G (Sixth Generation) product range and at first glance, appear identical to Compatt 6 navigation transponders. However with the

(Top) A long duration AMT. (Main photo set) A network of three AMTs have been deployed offshore Africa to monitor a pipeline suspected of moving due to axial creep. The two units in yellow look similar to standard Compatt 5 transponders but are in fact sixth generation units that utilise the same Compatt 5 mechanics. This allows users to upgrade to 6G cost effectively.

for pipeline creep survey

Autonomous and logging feature enabled, the AMT is a very different instrument.

It has been developed with a unique autonomous operating mode that allows it to make and store enormous amounts of acoustic range (distance) and sensor measurements over many years without user intervention. The precision available from the unit enables any deformation of the seabed or slightest movement by a structure, to be measured to less than a centimetre.

For this project, it was determined that a network of three AMTs deployed at strategic locations would enable Subsea 7 to remotely monitor the behaviour of the pipeline. One AMT was mounted on the nearby (rigid) PLET, another one some 60 metres away down the pipeline and held in a seabed frame 10 metres offset from the pipe, and a third in a clamp attached onto the pipe itself.

Low cost data collection

At pre-set intervals, each AMT wakes up and begins to acoustically interrogate the AMTs around it.

Highly precise acoustic ranges measured repeatedly and simultaneously between each unit, detect any lateral displacement from the pipe. Temperature and sound velocity is recorded by the AMT to compensate for the 'time of flight' range measurements.

Any vertical displacement, either from seabed settlement or buckling, is recorded using a highly precise and stable onboard pressure sensor. This allows the differences in average water column height between different AMTs to be identified. Finally, any changes in pitch and roll of the pipeline (or surface on which the transponder is placed) is recorded using highly precise inclinometers.

At any time, stored data can be recovered from the surface using a vessel-of-opportunity equipped with nothing more than an over-the-side dunking transceiver connected to Sonardyne's Monitor software.

Monitor guides the operator through set-up, deployment and data collection operations. Logging regimes can be as simple or as complex as the survey demands, ranging from single logs from a single sensor to multiple repeat logs from a variety of sensors.

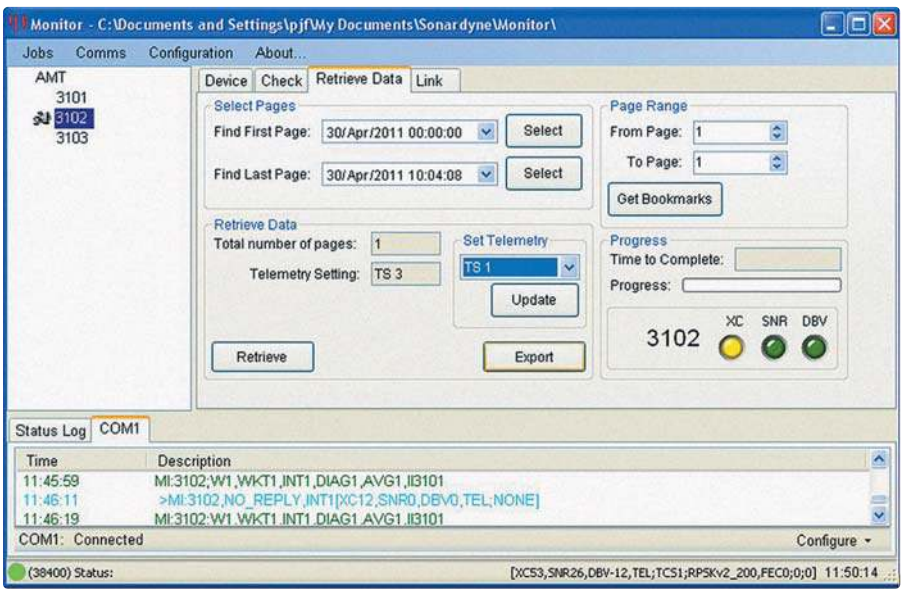
Recovering data is both fast and secure, and by removing the overhead of a dedicated ROV and support vessel, remote monitoring projects using AMTs have been proven to deliver substantial cost savings.

In July, the first two months of surveillance data from the project was successfully recovered. Analysis performed by Subsea 7 has enabled the exact displacement of the pipeline to be determined and reported to the field's operator. The AMTs will remain deployed in the field for some time to come to enable long term conclusions to be drawn.

"At any time, stored data can be recovered from the surface using a vessel-of-opportunity equipped with nothing more than an over-the-side dunking transceiver connected to Sonardyne's Monitor software application."

David Snowball, the Project Surveyor for Subsea 7, said of the AMT development over the last year, ''I'm pleased to say the hard work put in, both onshore and offshore, has now been rewarded with a viable product that allows autonomous monitoring for a number of potential Life of Field applications.''

(Below) Over-the-side dunking transceiver used to set-up the AMTS and recover data on demand to the surface.
(Right) Autonomous monitoring projects using AMTs are controlled using Sonardyne's Monitor software. Monitor guides the operator through set-up, deployment and data collection operations. Shown is a typical data retrieval screen.



Technology

Sparse Long BaseLine positioning

LESS IS MORE:

SPRINT paves the way for Sparse Long BaseLine operations

SPRINT is Sonardyne's Subsea Precision Reference Inertial Navigation Technology for subsea vehicles. In the last issue of Baseline we examined how it could be used to extend the operating limits of Ultra-Short BaseLine (USBL) positioning systems. Continuing the story, Subsea INS Product Manager, **Malik Chibah** looks at how SPRINT improves the operational efficiency of Long BaseLine (LBL) positioning through the use of sparse transponder arrays.

Long BaseLine acoustic positioning is used whenever the highest level of subsea positioning accuracy is called for. However, before operations can commence, a seabed network of transponders (typically five or more) must be deployed and then 'baseline' calibrated, all of which consumes vessel and ROV time. The challenge therefore is to make LBL more efficient whilst maintaining the precision required for the task in hand. With the arrival of Sonardyne's SPRINT INS platform, Sparse LBL answers that challenge.

As its name implies, Sparse LBL uses fewer transponders deployed on the seabed than a conventional LBL array. Depending on the operational scenario, just one or two transponders can be used, thereby significantly reducing the amount of equipment required to be mobilised for a project and minimising the time between arriving on site and a survey commencing. With fewer transponders, alternative calibration techniques such as 'USBL top-down', 'box-in' or 'SLAM' (Simultaneous localization and mapping) can also be used, further speeding up subsea positioning operations.

Lodestar INS and Fusion 6G

For Sparse LBL, SPRINT tightly couples Sonardyne's Lodestar INS platform with Fusion 6G, the industry standard LBL system.

With known transponder positions, the Lodestar mounted on the ROV can navigate in Sparse LBL mode, using the ranges from one or more seabed deployed transponder(s) to acoustically aid the INS and constrain error growth in the absolute position output.

Being reliant on far fewer range observations, it is important that those ranges are as reliable as possible. The use of Wideband 2 signals in Fusion 6G, enables robust and accurate ranges combined with reliable performance in noisy, multipath conditions.

Uniquely, these signals have built-in diagnostics (signal-to-noise level at both ends and correlation quality) to tell SPRINT whether the ranges are good or potentially bad and hence should be rejected. This is all designed to maximise the integrity of Sparse LBL INS operations.

Fusion 6G allows for both a traditional full LBL acoustic solution and a Sparse LBL INS solution to be processed simultaneously for the same vehicle. This feature allows for a 'low risk' introduction to Sparse LBL operations as the relative performance can be verified by the user. >>

A SPRINT-equipped ROV returns to the surface after recovering a Sparse Long BaseLine transponder array.

Technology

Sparse Long BaseLine positioning

ROV-mounted hardware

As with a conventional LBL setup, the vehicle is fitted with a ROVNav acoustic transceiver. Communications up to the vessel are routed via the Lodestar which acts as both a multiplexer (reducing the number of interfaces to the ROV that are required), and provides the necessary means to very accurately time stamp acoustic range data, essential for accurate subsea aided INS.

In addition to LBL acoustic aiding, Lodestar has the ability to use vehicle-mounted aiding sensors such as Doppler Velocity Logs (DVL) and pressure/depth sensors to further improve the precision, accuracy and reliability of the navigation solution. DVL aiding allows SPRINT to 'ride-through' loss of acoustic aiding (USBL or Sparse LBL) without significant degrading of performance over given time periods.

Case study

In the summer of 2011, SPRINT was mobilised on a customer's vessel to provide extended USBL tracking and Sparse LBL positioning of the vessel's ROVs.

The vessel was operating in water depths of approximately 1,100 metres (3,630 feet) and although two USBL systems were available, the positioning requirements of the project determined that the ROVs should be positioned using LBL.

Multiple seabed transponder arrays had been deployed around drill centres with additional transponders deployed on pipe routes between the main arrays. SPRINT navigating in Sparse LBL mode was used to position the ROVs at various points in the field, particularly in corridor sections between the main arrays.

(Above left) A subsea Lodestar INS unit awaits final installation on an ROV. (Above right) A ROVNav 6 LBL transceiver. When configured for Sparse LBL operations, the ROVNav is connected directly to the Lodestar unit, receiving power, communications and very accurate time stamping.

In such scenarios, Sparse LBL INS provides significant benefits to the user. It can provide near full LBL levels of positioning performance in areas where the operational benefits of using fewer transponders can be realised. One or two transponders need to be within acoustic range of a vehicle using SPRINT Sparse LBL.

Furthermore, in these areas baseline lengths can be increased as SPRINT can seamlessly continue to precisely navigate the ROV between acoustic updates by using the vehicle's own onboard sensors such as DVL and high accuracy pressure/ depth instruments.

Figure 1 **This data set represents 10 minutes worth of tracking data where the ROV was within acoustic range of enough transponders to undertake simultaneous Sparse LBL INS and full acoustic LBL tracking. Baseline lengths were between 300 and 500 metres. During the periods of simultaneous tracking, the difference between the sparse and full LBL solution was shown to be less than 50 centimetres.**

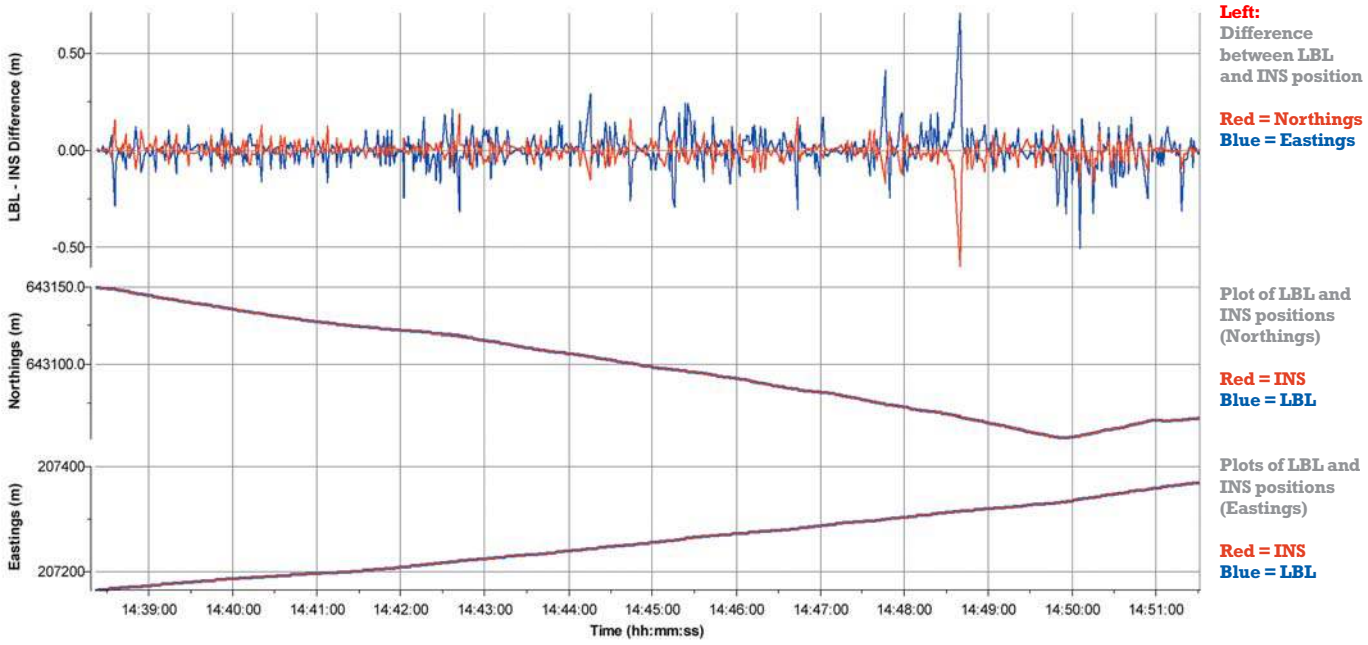
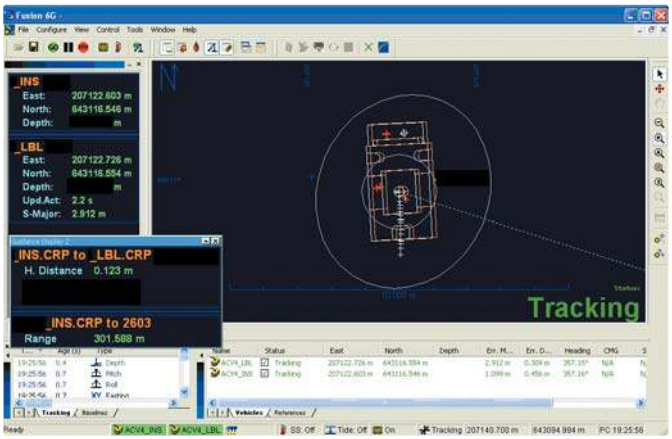


Figure 1 represents 10 minutes worth of tracking data where the ROV was within acoustic range of enough transponders to undertake simultaneous Sparse LBL INS and full acoustic LBL tracking. Baseline lengths were between 300 and 500 metres. During the periods of simultaneous tracking, the difference between the sparse and full LBL solution was shown to be less than 50 centimetres.

Note the horizontal difference between the full and Sparse LBL tracking solution is just 12 centimetres with SPRINT using aiding from a single Compatt 6 transponder for ranging with a baseline distance of 300 metres.



(Above) Fusion 6G allows a full LBL and Sparse LBL solution to be processed simultaneously for the same vehicle. (Below) SPRINT UI overview.

1	INS Position	8	INS (Vehicle) Position
2	Pitch	9	INS & Time Sync Quality
3	Roll	10	Heading
4	Chart Controls	11	Status Descriptions
5	INS Error Elipse	12	INS Status
6	External Position & Depth	13	System Status
7	USBL Position	14	Aiding Input Status

Other benefits of SPRINT

SPRINT is a very flexible INS solution that requires no re-configuration for USBL aiding or Sparse LBL operation. Later on this project, SPRINT was acoustically aided (at different times) by both a Sonardyne Ranger 2 USBL system and another manufacturer's USBL with no change to hardware or software. In practise, the user simply selects which acoustic aiding source (USBL or LBL) they wish to use.

SPRINT provides a high frequency positioning output (up to 100 times a second) regardless of the update rate of the aiding sensors. This aids subsea vehicle control and visualisation and also improves survey data quality.

Lodestar processes all INS data onboard, automatically storing raw sensor and mission-critical data. These features allow real time navigation to continue and recorded data to be recovered if communications are lost.

Using data logged by the SPRINT system in real time, Sonardyne's INS post processing and QC software package, Janus, can deliver further benefits. Offline 'forwards and backwards' processing improves accuracy and ensures completely smooth navigation data while maintaining highly accurate dynamics. Janus also allows data to be reprocessed using different configuration parameters and the user can change when sensors are used.

Planning makes perfect

Whilst Sparse LBL can provide positioning performance similar to full LBL with far fewer transponders, careful consideration of survey planning is needed to achieve optimum system performance.

There is less acoustic range redundancy than with full LBL and therefore systematic errors can be difficult to detect. For this reason, those considering Sparse LBL should consider the following critical elements;

- **Robust acoustic ranging performance regardless of acoustic conditions**
- **Correctly calibrated Sparse LBL transponder positions**
- **Accurate sound velocity measurement**
- **Depth control of both the ROV/INS and the sparse LBL calibrated transponder position/depth measurement**
- **Tidal corrections – autonomous logging of pressure, temperature and speed of sound**

Field proven

The results we have seen from the project outlined above, and customer trials elsewhere, confirm that SPRINT aided by a Sparse LBL array provides a viable alternative to full LBL. With less equipment to mobilise and deploy, combined with SPRINT's ability to extend the performance of USBL systems, significant ROV and vessel cost savings can be made without sacrificing subsea performance. **BL**

Hardware

Calibration-free USBL Transceiver

Does GyroUSBL signal the end of USBL calibrations?

The introduction of Sonardyne's first 'calibration-free' acoustic positioning transceiver, GyroUSBL, means that the time-consuming, but very necessary, procedure involved in setting up an Ultra-Short BaseLine (USBL) positioning system, could be a thing of the past in certain scenarios. Survey Support Group engineer **Darren Murphy** explains how.

YOU DON'T HAVE TO dig very deep to uncover the reasons behind the popularity of USBL as a subsea positioning technique. Systems like Ranger 2, Sonardyne's latest USBL, allow multiple subsea targets to be tracked in deep water, whilst simultaneously providing a vessel with highly stable and repeatable position reference data for DP. And with the introduction of Sonardyne's Wideband 2 signal architecture, the precision available from USBL has never been better.

Key to unlocking the best performance is to ensure your USBL system is correctly calibrated. This process determines the precise mis-alignments and offsets between the acoustic transceiver and the vessel's own attitude and often separate heading sensor. Only unbiased ranges and GPS co-ordinates are used to determine the position of a transponder deployed on the seabed around which the vessel sails. The transponder position is then compared to the USBL derived positions and used to estimate the systematic biases. The more care and attention paid to this process, the more accurate the system will be.

Calibration can be a time consuming exercise as it ideally requires deep water and can involve many hours of vessel manoeuvres. However it is important to understand that the process is also critical to the paying client as an 'accuracy verification survey'. The process independently determines the accuracy of the system on that particular vessel, in representative water depths and using the vessel's deployment system and attitude and heading sensors. Very few clients will risk putting something on the seabed in the wrong position and so will insist on this type of independent survey being carried out at least once a year.

Because of their versatility, USBL systems are routinely moved from vessel-to-vessel to support a wide range of projects. Each move requires re-calibration and hence more time and cost.

So where does GyroUSBL come in?

Sonardyne's GyroUSBL transceiver integrates our Lodestar Attitude and Heading Reference System (AHRS) and sixth generation (6G) USBL electronics into a single unit. The Lodestar is in fixed mechanical alignment to the USBL's acoustic array and its precise alignment 'zeroed' at the factory.

This means the GyroUSBL can be quickly installed on a vessel without the need for a lengthy calibration to determine the alignment of the ship's motion sensors to the acoustic transceiver, as they are already known. The new vessel's GPS to transceiver offset is often already well known and fixed.

A simple 'spin-test' overhead an existing, or specially deployed transponder, can be carried out en-route as a client accuracy verification survey. This will check for gross errors, for example, due to damage during installation and confirm the system's accuracy.

We recommend that an initial 'straight out-of-the box' USBL calibration is carried out when first deployed. Although the Lodestar is accurately aligned in the factory, calibration in deep water over many kilometres with accurate GPS enables remaining tiny mis-alignments to be measured which are then fixed for future installations on other vessels.

GyroUSBL is a particularly suitable tool when using over-the-side

GyroUSBL was deployed on an Over-The-Side deployment pole fitted to the vessel *HOS Sweetwater*.

poles or through-hull stem tubes which are often very flexible. This in turn enables high accuracy survey to take place from much lower cost vessels.

CSA International Inc

During the summer of 2011, CSA International Inc, an environmental survey company working in the Gulf of Mexico, put GuroUSBL to the test tracking an ROV in 1,478 metres water depth. The transceiver was supplied as part of a Sonardyne Ranger 2 USBL and was installed on an over-the-side deployment pole fitted to the offshore supply vessel *HOS Sweetwater*.

As recommended, an initial out of the box calibration was carried out showing a slant range accuracy of 0.3% (1Drms). For many projects, this performance would meet positioning specifications, however after a full calibration was performed, slant range accuracy was just 0.13% (1Drms) of water depth. Now the system can be moved from vessel-to-vessel and can be expected to deliver 0.13% accuracy assuming similar signal to noise levels.

Eddie Walsh, CSA Operations Supervisor, said, "The performance of the entire Ranger 2 system was very impressive. In addition to the calibrated free GyroUSBL, we were able to track the ROV at a 1Hz update while simultaneously tracking three individual transponders using different tracking scenarios." He added, "The through-life savings in vessel day rates due to the elimination of repeated calibrations will ensure that the GyroUSBL will pay for itself very quickly. In the future, when we install the system on a different vessel, we can begin work with minimal vessel delays."

So whilst USBL calibrations might not entirely be a thing of the past, there is no doubt that GyroUSBL can save significant vessel time and cost on surveys where appropriate. **BL**

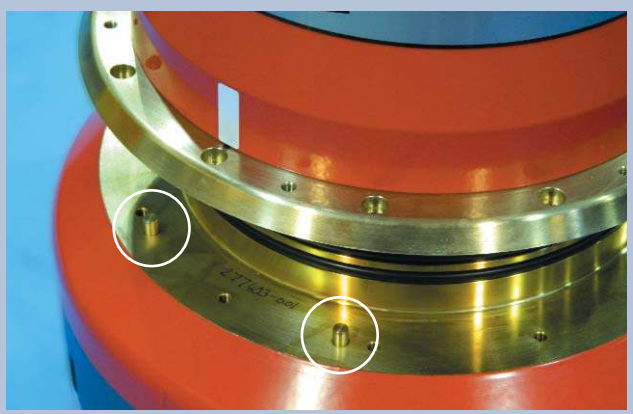
New USBL transceiver mechanics save vessel time and operational costs

At the heart of any Sonardyne USBL system is an acoustic transceiver which includes a multi-transducer array and signal processing electronics. This is typically installed on a rigid pole deployed through the ship's hull. After installation, the mechanical alignment of the transceiver to the vessel's sensors needs to be determined to tiny fractions of a degree. This is done by undertaking a USBL calibration (see opposite).

Occasionally, through accidental damage for example, the need arises for the array, or even the whole transceiver, to be replaced in the field. Due to rotational tolerances in particular, as bolts are loosened, the precise alignment will therefore change, hence after re-installation a new USBL calibration would traditionally be required, consuming vessel time.

In order to reduce customers' costs, new mechanics in Sonardyne's 6G USBL transceivers ensures that the critical alignment from the array to the transceiver and transceiver to the deployment pole adaptor, can be precisely and unambiguously maintained using precision alignment dowels (as shown in the picture).

Customers changing out a transceiver or array in the field need no longer carry out a new USBL calibration unless the highest accuracy possible is required .Sonardyne support personnel are available to advise users on the appropriate accuracy verification procedure to meet the requirements of the vessel and client.



Customer Support

Hands-on training

Training and Simulation: How to get the best out of your people and our products

At Sonardyne, creating trusted, low risk solutions for your subsea engineering challenges is what the Company is all about. Product delivery is just the start of the story. Making sure that clients are getting the very best out of products once they have deployed them, is a key part of our customer support programme. At its foundation is training reports Senior Surveyor **Robert Dixon**.

FROM STANDARD COURSES run from our dedicated sea trials and training centre in Plymouth, to bespoke training courses on a client's vessel designed to duplicate the exact scenario that clients will encounter on a project, Sonardyne's training programme is expansive and ever evolving. In this article, we take a look at our approach to training and the very important role it plays.

Reducing risk

The days of viewing staff training as a "nice to have" rather than as a necessity are long behind us. Today, as water depths increase and projects become ever more complex, the demand for more capable and versatile acoustic systems has risen. Our new 6G technology has all the complexity built into the hardware not the software which reduces the variables that a user has to configure. But in an industry where the cost of downtime is so high, it is vital that those overseeing acoustic operations are both confident and capable in their ability to understand the equipment, spot problems as they arise and find solutions.

Our programme of training courses offers operators the chance to gain hands on experience with equipment. Courses can take place anywhere in the world, however, our dedicated training centre is based in Plymouth, South West England. The length of courses range in time, from between one and a half days, through to four days depending on the topic to be covered.

First principles

All courses start with the basics of underwater acoustics. This ensures that delegates are confident about the theories behind the systems that they will soon be operating. Environmental conditions offshore can change with little or no warning, so thorough understanding of first principles enables operators to respond to changing conditions and resolve any problems that might arise quickly and effectively.

Following the completion of the theoretical elements of the course, attendees then get onto the water for hands-on training with real equipment onboard our training and trials vessels.

We have transponders permanently deployed in the estuary of the River Tamar, itself a very challenging operating environment for acoustics. Participants have the opportunity to gain experience of operating a USBL or LBL system in these difficult conditions, and are challenged by our instructors to overcome any problems they encounter.

Sonardyne's sea trials and training centre, Plymouth, south-west England.

Sonardyne's RIB: supports equipment deployment and recovery training.

The courses are designed to test their understanding of the underlying measurement processes and provide invaluable preparation of personnel for the use of these systems in the workplace.

Plymouth courses are all small (no more than 6) with a very high instructor-to-pupil ratio. This ensures that all attendees get the opportunity to individually practice configuring and operating systems. An exam at the end of each course provides employers with a valuable assessment of the new skills their staff have acquired.

Although Plymouth is the main centre of our training programme, courses are regularly held in our regional offices, at a client's premises or on their own vessel.

Wherever in the world the training takes place, a dedicated internet link to the training vessels and equipment deployed in Plymouth still offers trainees the opportunity to control real in-water hardware from desks thousands of miles away. The use of Skype and webcams allows course attendees to both hear the acoustics live from Plymouth and see the facilities and area within which they are operating. Tide tables are also consulted to allow an understanding of how tidal the area is.

When in-water training is not necessary, Sonardyne's highly sophisticated simulator software package can be used. This offers a number of benefits. Firstly it requires nothing more than a PC to operate and secondly it allows the creation of highly realistic scenarios, which operators may potentially face.

This is particularly helpful with short 'refresher' courses designed to prepare staff for an imminent project. In these cases, the exact hardware that they will be using and coordinates of where they will be operating are input into the simulator package. The course allows them to familiarise themselves with the project set-up and configuration prior to mobilisation. Delegates are given the opportunity to face the very challenges that they may meet offshore but with expert tuition on hand to talk them through any potential pitfalls and risks. This allows operators to really consider their actions in a safe and risk free environment before undertaking the task in the field.

Bespoke courses

The number of bespoke courses is growing year on year. Held at Plymouth or anywhere in the world convenient to the client, these courses have a training syllabus designed specifically to fulfil an individual client's needs and focuses exclusively on the products they own and how they use them.

Such a course has recently taken place in Shekou, Shnezhen, China. Sonardyne trainers visited the China Offshore Fugro Geosolutions office for two days of classroom presentations and discussions. These were then followed by a further two days of in-water training with live acoustics onboard a vessel chartered for the course. The Sonardyne team installed the equipment ready for training in less than two hours.

2012 courses

In 2012, there are a number of new courses being added to our existing training programme to reflect our growing product range and growing demand for thorough, hands-on training. Details of the upcoming courses are available on our website at www.sonardyne.com/support. Follow the link to training course. Whatever your requirement and whatever your hardware, we have a training course that would work for you. **BL**

Although Plymouth is Sonardyne's main centre for training, courses are regularly held around the world. (Clockwise from top left) USBL training onboard a research vessel; in-water LBL training course in China; a 6G workshop; Sonardyne Aberdeen's training room.

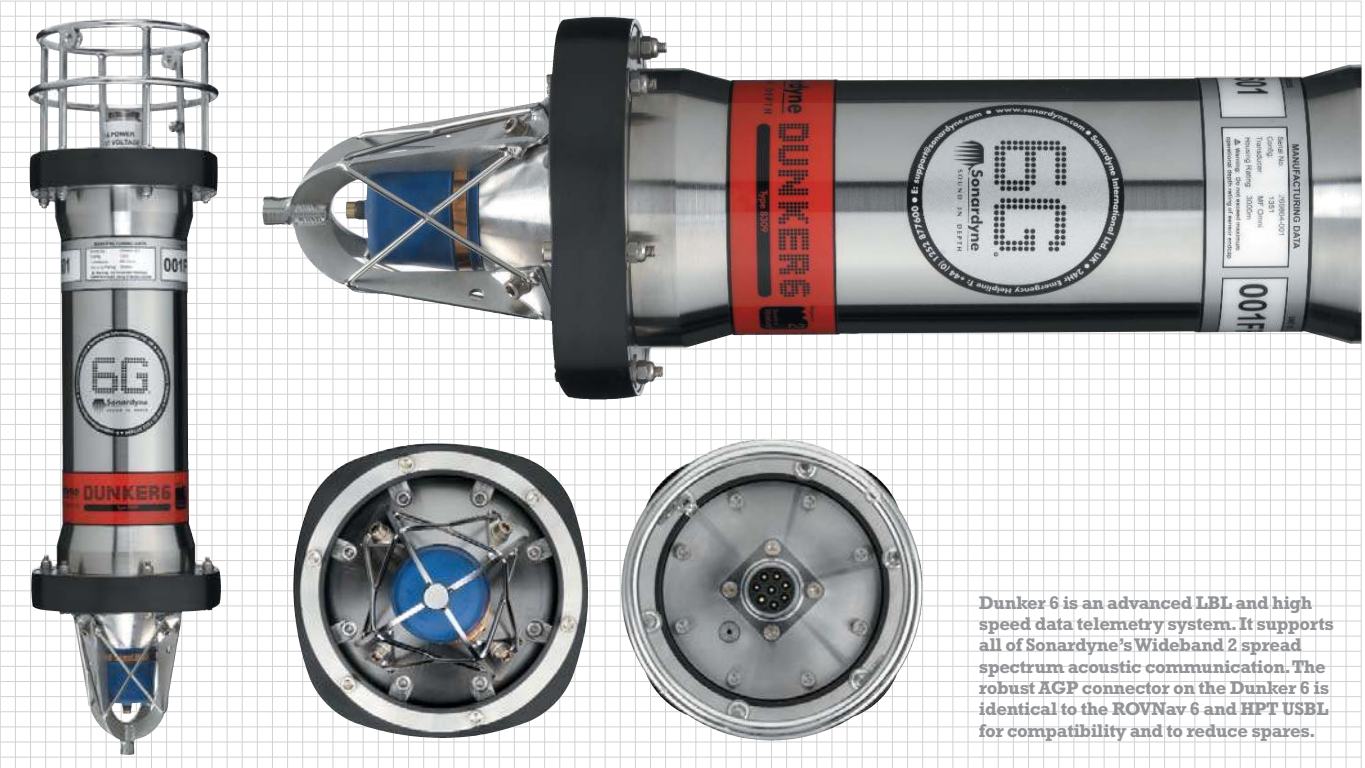
In-water courses allow users to get hands-on with the equipment.

Technology

Systems and Products

Dunker 6 Transceiver

A versatile and easy to deploy acoustic dunking transceiver designed for use with Sonardyne's sixth generation subsea positioning, autonomous monitoring and wireless communications products.



Dunker 6 is an advanced LBL and high speed data telemetry system. It supports all of Sonardyne's Wideband 2 spread spectrum acoustic communication. The robust AGP connector on the Dunker 6 is identical to the ROVNav 6 and HPT USBL for compatibility and to reduce spares.

Dunker 6 is a 6G Wideband 2 Long BaseLine (LBL) and telemetry transceiver specifically designed for vessel deployment. The Super Duplex Stainless Steel housing with shock and vibration isolated electronics makes for an extremely rugged dunking system.

Dunker 6's high power output and Wideband 2 signal processing architecture, delivers a long operating range when commanding deep water Long BaseLine seabed transponder arrays, and reliable acoustic performance in challenging acoustic conditions such as when deployed from a noisy DP vessel or in multipath environments.

Dunker 6 is also fully compatible with Sonardyne's wireless modem and logging equipment such as AMT, PIES (see page 9) and Fetch products. Here, Dunker 6 can be used to test the instrument prior to deployment, set-up a remote monitoring campaign and later, retrieve stored data efficiently and at high speed.

A standard system kit consists of the Dunker 6 and 100 metres of cable supplied on a Stainless Steel cable drum that features a brake and locking mechanism for safe operating on a back deck. A 10 metre deck cable is also supplied to connect the drum to a Surface Interface Unit (SIU). This is the interface between the user's PC and Dunker 6, supplying it with 48V and communications.

An internal Lithium-ion rechargeable battery pack minimises the supply current for long dunker cables and enables the Dunker 6 to be acoustically located if the cable is cut accidently.

Dunker 6 Facts & Figures

- High power, long range LBL transceiver
- Integrated modem capability for data download from Sonardyne modem products at up to 900bps user data rate
- Real time diagnostics available on ranges to enable quality control
- Rugged mechanics and industry standard connectors
- Shock mounted internal electronics
- Internal Li-Ion battery ensures that the transmit Source Level (SL) is maintained during telemetry
- Robust performance in shallow water and reverberant environments around structures

Technology

Systems and Products

Wideband Sub-Mini 6

Wideband Sub Mini 6 (WSM6) is Sonardyne's latest generation of versatile USBL (Ultra-Short BaseLine) transponder that now supports the Wideband 2 signal architecture whilst retaining many of the design features that made the previous model an industry standard.

The new Sonardyne Wideband Sub Mini 6 (WSM6) is the sixth generation version of Sonardyne's best selling USBL acoustic positioning transponder/ responder. It offers superior ranging accuracy, operation in a multi-user, multi vessel environment and fast USBL position updates.

WSM 6 is designed for positioning ROVs, towfish and other mobile targets in water depths of up to 4,000 metres. Reliable, robust and compact, the new transponder is based upon field proven WSM mechanics and is available in MF Directional and MF Omni-Directional versions to suit a wide range of operational scenarios.

On the inside, WSM 6 has been re-engineered to incorporate the latest Sonardyne Wideband 2 signal technology. This offers superior ranging accuracy, operation in a multi-user, multi vessel environment and fast position updates.

In addition to supporting new Sonardyne Wideband 2 signals, WSM 6 also supports Sonardyne's original Wideband 1 scheme, Sonardyne Tone, HPR300 and HPR400 channels, offering maximum flexibility and compatibility with customers' existing acoustic positioning hardware. The popular 'Quickset Channels' feature is retained and extended to include Wideband 2 signals to aid rapid set-up and ease of use.

The Type 8271 WSM 6 is equipped with an omni-directional transducer and is depth rated to 1,000 metres making it suitable for a wide range of USBL tracking applications.

The Type 8270 WSM 6 is a 4,000 metre rated unit and features a high power directional transducer with an acoustic output comparable to Sonardyne's most powerful full size seabed transponders.

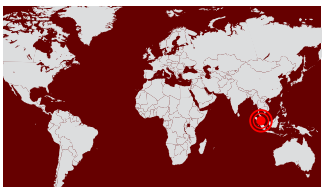
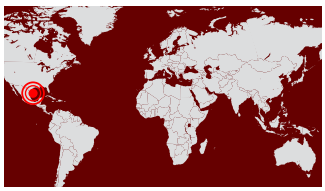
Both types of WSM 6 have a depth sensor fitted as standard to aid USBL positioning accuracy and an external on-off switch for ease of use and storage when not in use.

Wideband Sub-Mini Transponder / Responder (WSM6) Facts & Figures

- Supports Wideband 1 and 2 signals
- Choice of 1,000m or 4,000m depth rating
- Channel selection via serial data port by PC
- Transponder or Responder modes
- Depth sensor for improved USBL positioning performance
- Long-life NiMH battery
- Compact and rugged design
- Windows based software for test and setup
- External On-Off switch for ease of use and storage

International

News from around the World




SE Asia – Singapore
Nick Smedley
Senior Vice President

Operations Department
We have seen significant sales of Fusion 6G LBL and Ranger 2 USBL into the Middle East, Japan and China. To manage these projects, we have recently established a dedicated operations department. James Hope and Nge Aik Moh lead the team and are responsible for project planning, equipment mobilisation and support.

I'm pleased to welcome Nicolas Eng to the team who takes up the reigns of Workshop Manager. Over the next few months, Nicolas will be getting to grips with our diverse product range and introducing new initiatives to streamline equipment servicing and repair. As Baseline went to press, we held our 40th anniversary celebrations. It was great to see so many familiar faces.

Sentinel
Maritime Security remains high on the agenda in the region, both onshore and offshore. The many demonstrations of Sentinel we've chalked-up in the last few months have led to some strategically important (as yet undisclosed) orders. The acquisition of MARSS (page 10) substantially strengthens our product portfolio in this market.

USA – Houston
Simon Reeves
Senior Vice President

Upgrading to 6G
Here in America the drilling market is picking up significantly in the Gulf of Mexico which is having a huge impact on our business.

A second acoustic monitoring system has been sold to Trendsetter for the Helix Well Containment Group (page 6). More and more survey companies, driven by the oil majors, are making the transition from 5G to our newest top of the range 6G technology.

'INS' with the new
Sonardyne's new Position Inertial Navigation System (DP-INS) only became commercially available last year, but we are already predicting that it is going to be big business in 2012. DP-INS systems have been purchased by Oceaneering for installation on three of their vessels, together with Vantage Drilling for its new vessel, *Dragonquest*, which has headed to the Gulf of Mexico (page 5).

Oceaneering has also been the first in our region to place an order for a SPRINT system, our INS solution for subsea vehicle navigation. The system is due to be deployed in Brazil later this year.

UK – Aberdeen
Barry Cairns
VP Europe and Africa

Ever expanding
2012 looks set to be an exciting year with the Aberdeen office almost doubling in floorspace. The new larger office will allow us to improve our equipment servicing facilities and hold larger stocks of product on site, enabling faster and more efficient turnaround of orders.

New Sales Manager in Europe
We are delighted that Aude Kuchly has joined us as a Sales

Manager in Europe. She will be based in Nice, France from where she will be responsible for our growing customer base in the region. Aude brings with her a wealth of experience in the subsea navigation and instrumentation industry.

Fugro moves to 6G
Fugro Survey B.V. has made the move to 6G following the purchase of ROVNav 6 systems and the upgrade of Compatt 5 transponders to Compatt 6. The Netherlands based firm is one of the world's top survey companies and has been a major user of our products for many years.

Brazil – Macaé
Richard Binks
Offshore Business Director

SURF's up
6G has dominated business over the last year. We have seen the technology adopted by the major contractors in the region for SURF (Subsea construction, umbilicals, risers and flowlines) projects that are already underway or will kick off in 2012. Our success in getting Sonardyne specified pays dividends for the many workshops and trials the Brazil team have co-ordinated.

Scintillation
We have now entered a period of elevated sun spot activity that is set to last for the next few years. Its effect on DGPS is felt most in this region with several rigs recently reporting incidents of signal dropout. Sonardyne DP-INS (page 5) provides a third independent reference and has been approved for operational use by Petrobras. A Dual Independent Marksman system with integrated DP-INS is one of the more notable orders we have received.

New office
Construction of our new office in Rio das Ostras has reached the interior fit-out phase with the installation and commissioning test tank marking a major milestone. We look forward to moving in early this year.

Help & Advice

Your questions answered

Ask Darren

Customer Services Manager, **Darren Taylor** and his team are the front line of Sonardyne's customer support network. If you have a question, they can give you the answer.

Contact support@sonardyne.com with all your non-urgent technical questions for a fast response from Customer Support. For emergency assistance offshore, please contact Sonardyne's 24hr helpline: +44 (0)1252 877600

Q Onboard various vessels we noticed that the envelopes with the Sonardyne Emergency dongles are open. We are not sure if someone onboard may have tried the dongles in which case they may have already expired. Is there a safe way of verifying the validity of these dongles or do they have to be returned to Sonardyne?

A On your PC, go to All Programs then select the Sonardyne applications folder. You should see an application called Fusion Security Tool.

Connect the dongle to your PC and launch this program. A dialogue box will appear that tells you all about the dongle. If it has not yet been activated, then the box labelled 'Expires' will read: n/a

It's worth mentioning that an Emergency dongle does not need to be upgraded if you upgrade your primary dongle. This may be the reason the envelopes were open.

Q I recently took delivery of my Compatt 6 with a label saying that the lithium battery has been disconnected for shipment. How do I connect the battery?

A Go to our website: www.sonardyne.com and select Compatt 6 in the A-Z list of products. You will find a Quick Start Guide there on this subject which talks you through the process in detail. You can either; download this as a PDF, view it on screen or contact us for a hard copy. Quick Start Guides are available for a range of products and cover everything from upgrading firmware to deployment of a Dunker 6.

Q I'm trying to set up a Scout USBL. I have set up the system comm port and connected the cables as instructed but the message "resetting transceiver, please wait" keeps coming up in red. I am using Surface Interface Unit type 8038-000-02.

A The A,B,C and D ports in the SIU are virtual expansion ports. In order for the PC running Scout to be able to see them, the drivers will need to be installed. The drivers are provided on the software CD in the Tools folder as USB To Serial Driver. Once the drivers are installed, ports A,B,C and D will be visible in the PC's device manager and also through the Scout software. It will then be possible to connect the Main comm port to Comm A and establish communication through Scout to the transceiver.

Q Hi, just a quick one. Can a Compatt 5 battery be used in a Compatt 6?

A I'm afraid not. The PCB inside each battery pack which calculates consumption is designed to exclusively work with either a Compatt 5 or a Compatt 6; so a Compatt 6 will not recognise a Compatt 5 battery. You can tell which is which by their colour; Compatt 5 battery packs are black, Compatt 6 batteries have a red case or red label.

Q Hello Darren, we currently have an issue with our Ranger USBL; it no longer tracks our ROV. It was working on a different job with a different vehicle last week. Job files and noise plots attached.

A Looking at all the data you have sent us, I don't think the problem is with your Ranger hardware. You were able to track fine up until the point when the ROV was placed in the water so everything points towards that as being the source of the issue. Noisy hydraulic pumps are a common cause of acoustic interference so get your technicians to investigate. In the meantime, set up the ROV transponder in Responder mode, this should help improve the situation.

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