HURL: A Unique Diving Operation at Risk Real-Time Enviro Monitoring with BiotaTools AS

MARINE TECHNOLOGY REPORTER

June 2012 www.seadiscovery.com

Interview
Scott Gartshore
CTO, Pharos Group

Arctic
REALM & Thinking Outside the AUV

Munitions
WWII Cache Found Under Cruise Pier

ROVs
A Global Value Chain Perspective

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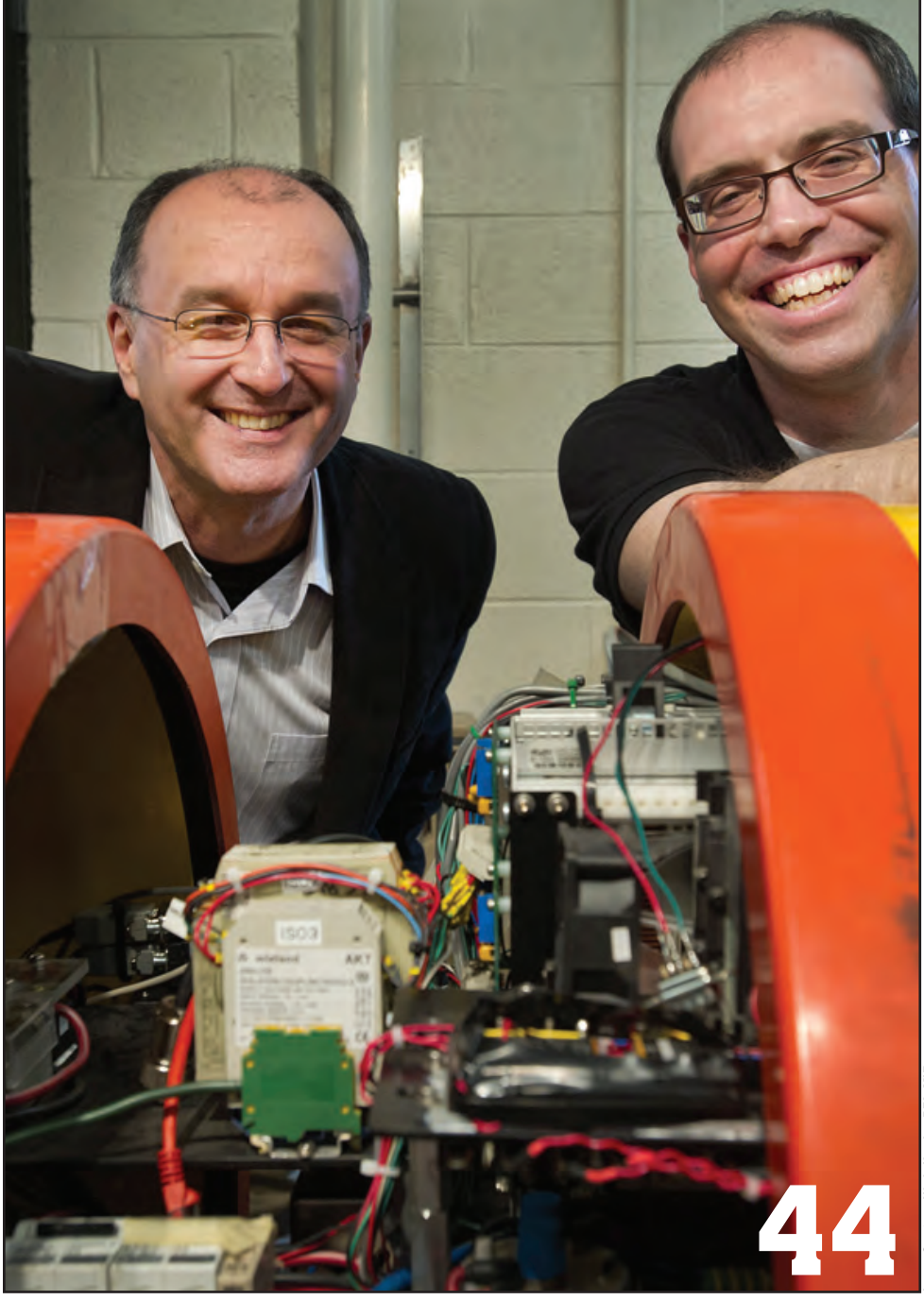

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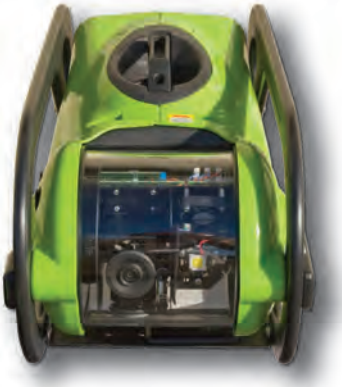

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The Arctic today is shaping, either directly or indirectly, a big share of development in the subsea industry. The fervor to move shipping routes and energy business north of the Arctic Circle is palpable, as countries with a physical connection and even "non-Arctic" countries move to stake claims on the vast potential that lies within. While the list of objectives, challenges and issues surrounding Arctic operations is formidable, make no mistake about it: the push for Arctic maritime and subsea operations starts and ends with the discovery, recovery and transport of oil and gas. At a recently conference dubbed "Leadership for the Arctic," convened at the United States Coast Guard Academy, **Dr. Donald Gautier**, U.S. Geological Survey, put the issue in perspective when he said: "There are between 40 and 160 billion barrels of 'technically recoverable' conventional oil North of the Arctic Circle; most offshore and most in less than 500 m of water." The region is particularly rich in natural gas, too, with an estimated 1200 trillion cu. ft. of natural gas for development.

So what does all this mean? The Arctic is fertile in natural resources, and as companies trip over themselves heading north, there remains a long "to do" list, including logistical, technical and political matters, to name but a few.

I'm pleased to present in this edition the good works from a group in St. John's, Newfoundland, a collective group that knows a thing or two about the Arctic. The article "*Thinking Outside the AUV*" by **Wade Kearley** documents the REALM project within the Memorial University of Newfoundland in partnership with PanGeo Subsea to design and launch an innovative AUV prototype that is designed to drastically reduce sub-bottom imaging costs.

Seeing underwater clearly and efficiently is a never-ending quest for nearly anyone reading this publication, making the find of a group of divers in Seattle of particular interest. On a routine security operation, divers discovered a cache of WWII era munitions situated directly below the city's cruise ship pier. Live munitions finds are always of interest, but those found laying underneath half a billion dollar cruise ships carrying 4,000 people, the interest level is raised. **Kathleen Gleaves,** starting on page 32, walks you through the mission to fully uncover and recover this treasure trove from nearly 70 years ago.

Last, but certainly not least, we are particularly pleased to share with you an insightful article from **John C. Wiltshire, Ph.D.**, Director, Hawaii Undersea Research Laboratory (HURL). HURL is a cooperative program between the University of Hawaii and NOAA, through its Office of Explorations and Research. In the Federal FY '13 budget NOAA zeroed out the National Undersea Research Program, the parent organization of HURL, which will effectively close this unique lab – which features two of the world's eight research submersibles diving below 1500m. At our invitation and Dr. Wiltshire's gracious delivery, he writes a comprehensive history and insight to HURL and its operations; qualifying the unique work that HURL performs daily, and quantifying the tremendous loss – not to mention the staggering cost to restart – of the program. His article starts on page 22.

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Real-Time Environmental Monitoring

By, Kirsten Redmond and Odd Ketil Andersen, BiotaTools AS

In the last 20 years, environmental monitoring in the sea has developed from classical analysis of biodiversity and chemical composition, to biomarkers and diagnostic methods of measuring the health status of individuals. There is now a renewed focus on real-time environmental monitoring. New methods are required based on the need for interactive environmental control, where potential impacts on the environment can be identified early and the necessary response carried out before irreparable damage is caused. The offshore industry in Norway has been one of the driving forces for the development of new environmental monitoring tools, which have been first implemented in the offshore industry before being used in more general environmental monitoring strategies. Statoil and ConocoPhillips are our initial strategic partners.

Measuring on live animals provides a method for environmental monitoring that reduces the need for sacrifice of animals, and allows for constant assessment of their health status. Biosensors for use in conjunction with live animals were developed approximately 25 years ago (1st generation), including heart rate monitors for bivalve molluscs and crustaceans and the open/close frequency of bivalve shells. Improved versions of these methods (2nd generation) represent the center of current real-time monitoring practices. The 2nd generation methods are sensitive and effective at detecting abrupt changes in environmental conditions it is difficult to interpret the biosensor response related to complex and low-dose chronic exposure situations. There is a necessity within the real-time environmental monitoring field for the development of new methods that are both sensitive to low-dose chronic exposure and able to give intuitively understandable responses, at the same time as providing a clear illustration of the degree of exposure to pollutants.

Dr. Odd Ketil Andersen, BiotaTools AS, Norway

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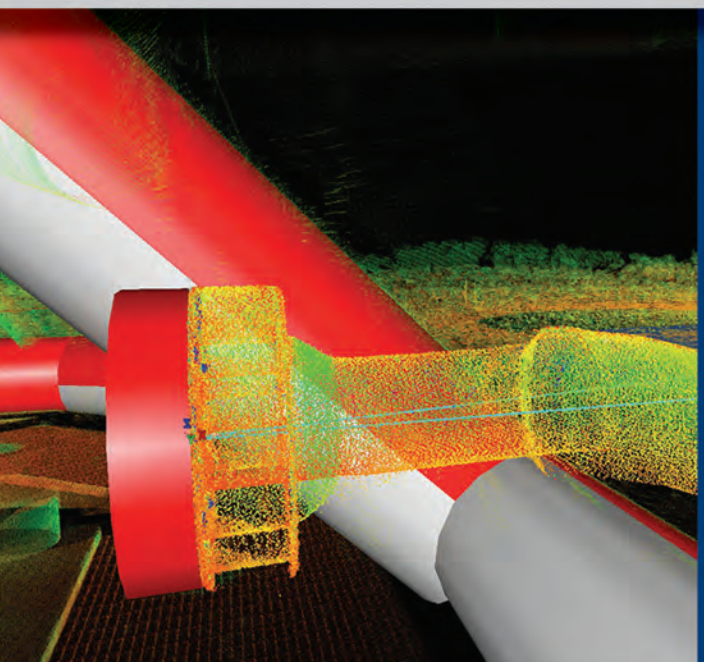

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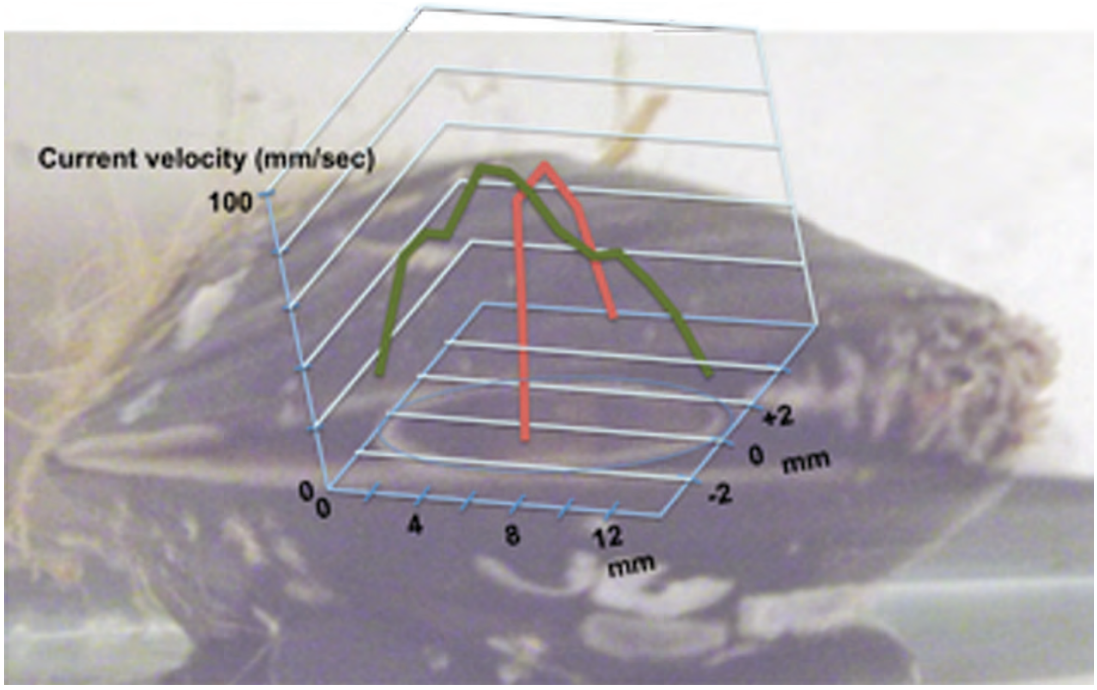


Biota Tools Mussel siphon flow profile

BiotaTools AS in Norway are developing a set of 3rd generation biosensors in order to track the health status of live animals in real-time. These new methods are based upon environmental risk analysis procedures that companies are required to complete prior to offshore exploration and production. Environmental risk analysis is carried out to evaluate possible emissions and the potential for environmental impact. Environmental risk assessment includes Darwinian fitness parameters that are important for the health of a population of organisms, such as growth, reproduction and energy metabolism. These are regularly employed in laboratory experiments, and have been shown to be very sensitive to environmental conditions, but up until now have not been used in environmental monitoring. When trying to measure these parameters on living animals, it is an advantage that the animal is sessile and that it maintains a natural feeding strategy. Filter feeding animals like bivalves, sponges and tunicates fulfil these criteria, and are therefore very well suited to these methods. During the development period, BiotaTools will make use of blue mussels and the Iceland scallop. Energy uptake by individual animals will be estimated by measurements of filtration rate - the rate at which algae in the water is filtered over the gills and consumed. This measurement is considered the most important sensor and the most difficult to develop. The sensor for measuring filtration rates will make three simultaneous measurements: water flow through the animal, the number of particles and the size of those particles, and the resulting difference in particle volume into and out of the shell. This, by the organism, retained volume represents the nutritional energy source. Until the development of the BiotaTools biosensor, no tools have existed that can measure these three parameters simultaneously. The sensor must also be small enough that it can be used in combination with other biosensors in a row of animals.

BiotaTools AS in Norway are developing a set of 3rd generation biosensors in order to track the health status of live animals in real-time. These new methods are based upon environmental risk analysis procedures that companies are required to complete prior to offshore exploration and production.

The design of the biosensor has been solved together with a small company in California, who are experts on measuring current velocities with lasers. A prototype biosensor has been developed and is currently under testing and verification. Together with this company, we have carried out a series of tests where we have measured and characterized the exhalent current on blue mussels and Iceland scallops. We have demonstrated that we are able to measure particles of a relevant size, and identified where and with which precision we must place the sensor in relation to the animal, and how we can process the data we generate. With this sensor, we can also measure when the animal spawns, and as a result identify if the animals follow or deviate from their natural reproduc-

tive cycle. In addition, we have identified methods for measuring growth of the animals and metabolism. All of the sensors will be mounted on each individual animal, and together will give us a large amount of information about the health status of the animal.

The company is currently supporting a PhD project. Kirsten Redmond, employed as a researcher and consultant with BiotaTools, will be carrying out investigations on biosensor responses in blue mussels and Iceland scallop to both natural variation in environmental conditions and when exposed to varying levels of produced water exposure.

The company is at present looking for strategic partners to meet the challenge of developing the organization and to reach the market.

The entrepreneur Dr. Odd Ketil Andersen is a marine biologist with 30 years of experience in environmental science and entrepreneurship. His experience ranges from basic science to applied research and company management. He was Head of Research at the International Research Institute of Stavanger (IRIS) for 17 years, where he brought in many large national and international projects and he was the entrepreneur behind four new daughter companies.

About the Authors

Dr. Odd Ketil Andersen is a marine biologist with 30 years of experience in environmental science and entrepreneurship. He was Head of Research at the International Research Institute of Stavanger (IRIS) for 17 years, where he brought in many large national and international projects and he was the entrepreneur behind four new daughter companies. **Kirsten Redmond**, employed as a researcher and consultant with BiotaTools, will be carrying out investigations on biosensor responses in blue mussels and Iceland scallop to both natural variation in environmental conditions and when exposed to varying levels of produced water exposure.

36-ft. Packcat for Sky Research

Munson Delivers

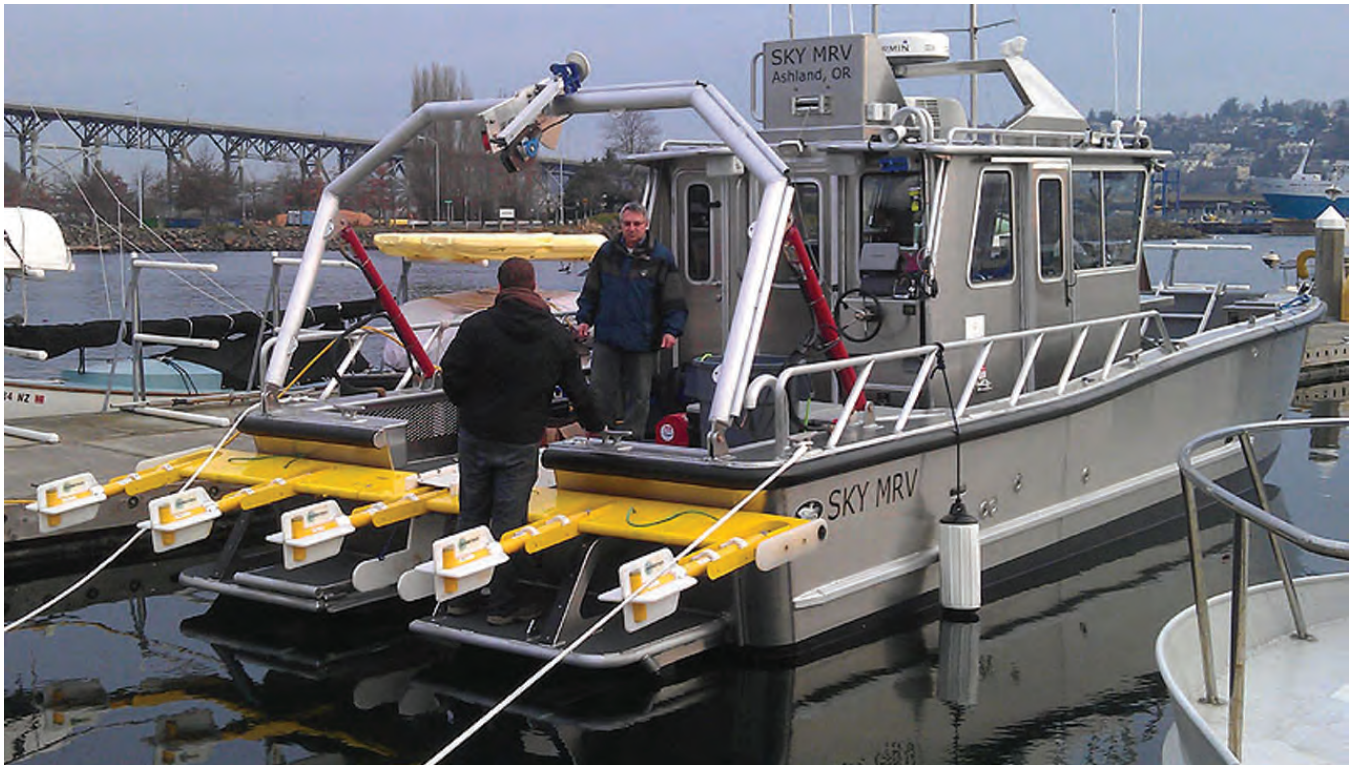
Beneath choppy Puget Sound waters linger remnants of war that could potentially harm both life and this robust sea-faring industry. During a routine security dive, Port of Seattle divers discovered munitions that date back to World War II. (See related story starting on page 32). Munitions were found on six more occasions, the last of which was considered hazardous. The U.S. Army Corps of Engineers authorized a time critical removal action to deal with munitions found where cruise ships berthed on Pier 91.

Sky Research was contracted to begin a series of surveys using multi-beam, side scan and stationary scanning sonar to produce a higher resolution picture. Through the use of geophysical and remote sensing technologies, Sky Research has developed an Unexploded Ordnance (UXO) detection methodology. The surveys uncovered 11 discarded military munitions and 212 munitions-related items.

Sky Research selected Munson Boats to produce a customized multipurpose research vessel designed for multi-diver operations, marine magnetometer data collection, Remotely Operated Vehicle (ROV) deployments, and marine survey operations including Side Scan Sonar, Scanning Sonar, Sub-Bottom Profiling and Multi-Beam Bathymetry. One of the primary roles for the new vessel is to collect underwater magnetometer data with the SkyDiver array. The array is made of a reinforced non-metallic fiberglass wing that can carry five magnetometers. The magnetometers detect ferrous metal (iron) objects at or beneath the surface of the seafloor.

The new 36-ft. Munson Packcat has 250 sq. ft. of open deck workspace. The rear deck is equipped with a 1,000 lb. capacity stern A-Frame. The bow deck has a 1,000 lb. davit with a hydraulic capstan, hydraulic bow door, and dual side doors. For dive operations, locations were provided to mount dive ladders on the bow door, transom swim step, as well as port or starboard side doors. Power is provided by twin Volvo D6 330 hp diesel stern drives producing a 30 mph cruise and 41 mph top speed.

The walk around cabin houses the CPU Rack, Garmin 5212 GPS navigation with autopilot, two helm stations and survey work station. The cabin for has heat and air conditioning, galley, head, hot water shower and wireless internet. The SkyDiver high-speed winch is mounted on the roof of the cabin inside a sound proof enclosure.



Subsea 7 Orders Amarcon's OCTOPUS

The seabed-to-surface engineering, construction and services contractor to the offshore energy industry Subsea 7 has ordered the OCTOPUS suite of products for the recently delivered Pipelay/Heavy Lift vessel Seven Borealis. This latest addition to the Subsea 7 fleet is a state-of-the-art vessel that shall be involved in ultra-deep and deepwater projects in the world's deepest and harshest environments.

Amarcon is appointed to deliver a motion monitoring and ship response forecast system, known in the industry as OCTOPUS-Onboard. The order for Subsea 7 is a very extensive one. One of the functionalities is a crane monitoring system. The motions of the heave compensated 5,000t crane are monitored and displayed real-time within OCTOPUS-Onboard. www.amarcon.com

Caley Winch, A-Frame for HHI Oceanographic

Caley Ocean Systems won a contract to supply oceanographic winches and A-frame systems to Hyundai Heavy Industries (HHI) for a new oceanographic research vessel. The state-of-the-art, ocean-going, vessel is capable of surveying to the full ocean depth (10,000m), using advanced exploration capabilities. Caley is providing bespoke oceanographic winches designed to handle high tension, heavy loads, featuring 'SMART' control systems for fully active heave compensation, and variable frequency drives.

Also included is a Conductivity, Temperature, and Depth (CTD) Rosette handling system with built-in motion compensation to cancel out the roll and pitch of the ship, significantly reducing the swaying of the CTD system. The vessel will feature high performance, stern and side Caley A-Frame systems for seabed drilling and coring equipment. Given the tight project timescale, Caley is working in partnership with its long-term Korean agent and sub-contractor on the manufacture of the A-frame systems. www.caley.co.uk

Australian Organization First to Acquire

New MicroROV Navigation

4 Companies Collaborate: VideoRay, SeeByte, BlueView & Teledyne RDI

VideoRay and its partners announced that it shipped the first implementation of VideoRay CoPilot by SeeByte software on a platform consisting of the VideoRay Pro 4 underwater Remotely Operated Vehicle (ROV), BlueView P900 series imaging Sonar, and Teledyne RDI Explorer Doppler Velocity Log (DVL). The first release of the SeeByte solution on a VideoRay ROV follows several months of software and hardware development by VideoRay and SeeByte. SeeByte adapted its navigation software to VideoRay's ROV control system and hydrodynamics. VideoRay worked closely with Teledyne RDI to adapt the Explorer DVL to a smaller, more hydrodynamic housing well suited to the powerful yet ultra-portable VideoRay Pro 4. BlueView contributed its multibeam sonar, with ProViewer Plus advanced target tracking software by SeeByte.

The Defense Science and Technology Organisation (DSTO) is the Australian government's lead agency charged with applying science and technology to protect and defend Australia and its national interests. DSTO delivers expert, impartial advice and innovative solutions for Defense and other elements of national security to agencies like the Royal Australian Navy. DSTO is a world leader in defence science and technology – indispensable in transforming the Australian Defense Force and Australia's national security.

The system, purchased by DSTO, is an observation class ROV system capable of autonomously following a pre-defined mission or maintaining station, regardless of changing currents and rough sea conditions. Using VideoRay Sonar Co-Pilot by SeeByte, the system can automatically identify underwater objects with the BlueView sonar, then on command fly to them. It can also track moving objects. In an Explosive Ordnance Disposal (EOD) context, this provides effortless automatic navigation to underwater locations, and therefore can remove divers from minefields and hazardous situations.

AX-S Subsea Well Intervention Innovation

Expro commissioned its AX-S well intervention system onboard the Havila Phoenix vessel. It completed its commissioning on a subsea well in a fjord in Norway, in April. Many milestones were achieved and preparations are now under way for its first commercial well intervention job in the North Sea. All operations during the commissioning were carried out safely without any incidents. All the subsea packages were fully deployed twice in a complete stack-up and 34 tools runs were performed on the well deploying a variety of down hole equipment including callipers, production logging, CCL, gamma ray, deep set plug, crown plugs and wireline tractor.

Dave Shand, AX-S Managing Director, said: "After more than seven years of development and innovation and $200m investment in technology, it is testament to the hard work of our AX-S team and the backing of Expro that the AX-S system is now ready for business."

ABB: $18m Contract

ABB won an order worth $18m from Daewoo to supply propulsion and electrical power systems for two new deep sea pipeline installation vessels that will build oil transport infrastructure off the coast of Brazil. The order was booked in the first quarter. South Korean shipyard Daewoo Shipbuilding and Marine Engineering (DSME) will build the vessels. The end customer, a joint venture between French oil service company Technip and Brazilian company Odebrecht Oil & Gas, will use the vessels to connect subsea wells with floating installations in depths of up to 2500 meters along the coast of Brazil for oil company Petrobras.

Ramform Vanguard Enters Drydock

The Research Survey Vessel Ramform Vanguard arrived on April 30, 2012, to be docked into dry dock Elbe 17 of Blohm + Voss Repair for comprehensive repair and maintenance work.

Following the EnQuest Producer, which has been at the yard since January 2012 for a 17-month life extension, Blohm + Voss Repair, with this order, once again underlines

its expertise in carrying out complex and technically sophisticated service orders for the offshore oil and gas industry.

The Ramform Vanguard was built in 1999 and is part of a fleet of seven ships of the same type in service worldwide for geological and seismic oil and gas field research.

Owner of the ships is petroleum Geo-Services ASA, based in Norway.

A sister ship, the Ramform Challenger, docked at the yard in May 2011 for similar work.

ROVs: A Global Value Chain Perspective

By Lukas C. Brun

Introduction

The Duke University Center on Globalization, Governance and Competitiveness (CGGC) recently completed a study on three ocean technologies, including ROVs, for a consortium led by Nova Scotia's Department of Economic and Rural Development and Tourism (ERDT). Excerpts from the report on the ROV value chain, and Nova Scotia's position within the chain, are provided in this article.

The ROV Value Chain

The ROV value chain (Figure 1) consists of the supply chain and supporting organizations. The ROV supply chain contains raw material suppliers, component manufacturers, product manufacturers, distributors, and operation/sales. Supporting organizations for the ROV value chain include educational institutions, industry associations, publications and professional conferences. Details on each segment of the value chain are provided below.

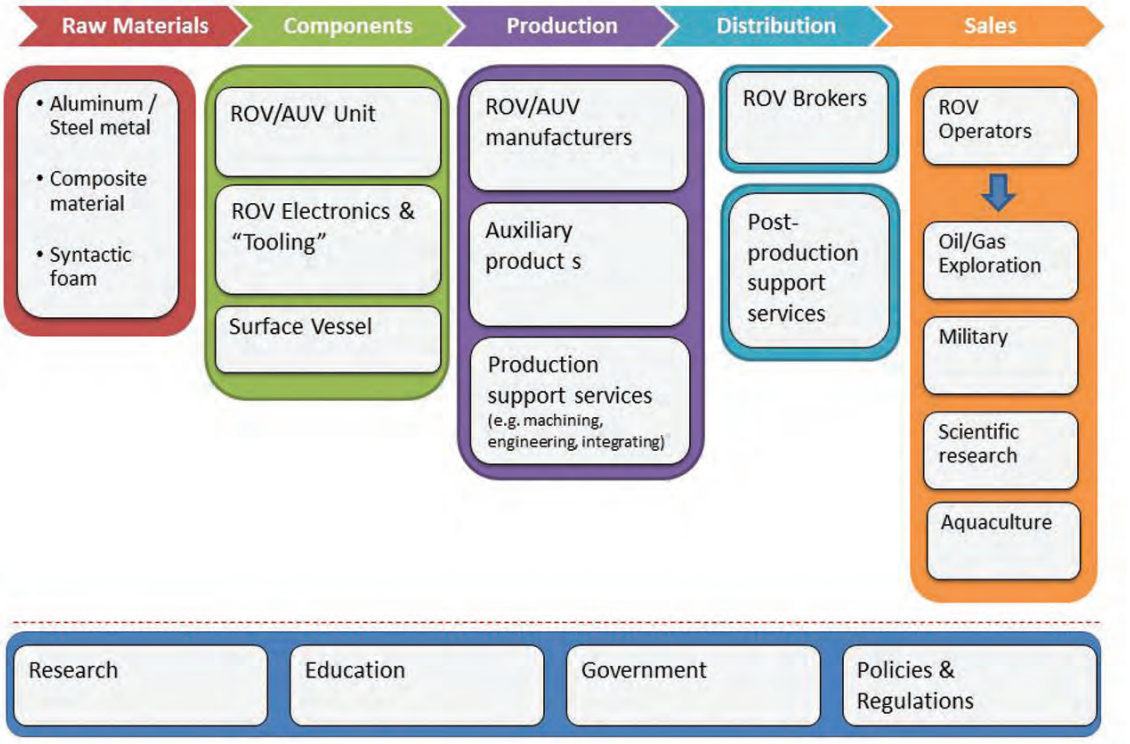
[See Figure 1: ROV Value Chain, below]

Production

The manufacturing portion of the ROV value chain consists of ROV manufacturers, auxiliary product suppliers, and production support services.

ROV manufacturers: Branded firms, like Saab Seaeye and iRobot, who design, manufacture, and sell their vehicles to end-users. ROV manufacturers typically manufacture products in-house, often in close association with members of scientific research networks and their customers to develop innovative products suitable to a variety of uses. The global production for ROV is concentrated in a very few countries. Leading ROV manufacturers are located in the U.S. and U.K.

Figure 1: ROV Value Chain



Source: Duke Center on Globalization, Governance and Competitiveness (CGGC)

producing 70% of all units sold.

[See Figure 2: ROV Production, by country, below]

ROV subcomponent and auxiliary product manufacturers: Subcomponent manufacturers produce the hardware and software components used in ROVs. Many of these companies are located in the USA and UK, but companies in Norway, France, and Germany also supply many components for ROVs.

Auxiliary product suppliers manufacture systems used to launch, control and recover the ROV. These include manufacturers of tethers, tether management systems, LARS, and control rooms needed to operate ROVs. Table 1 lists a few of the leading subcomponent and auxiliary product manufacturers for ROVs.

[See Table 1: Lead ROV component manufacturers, pg. 18]

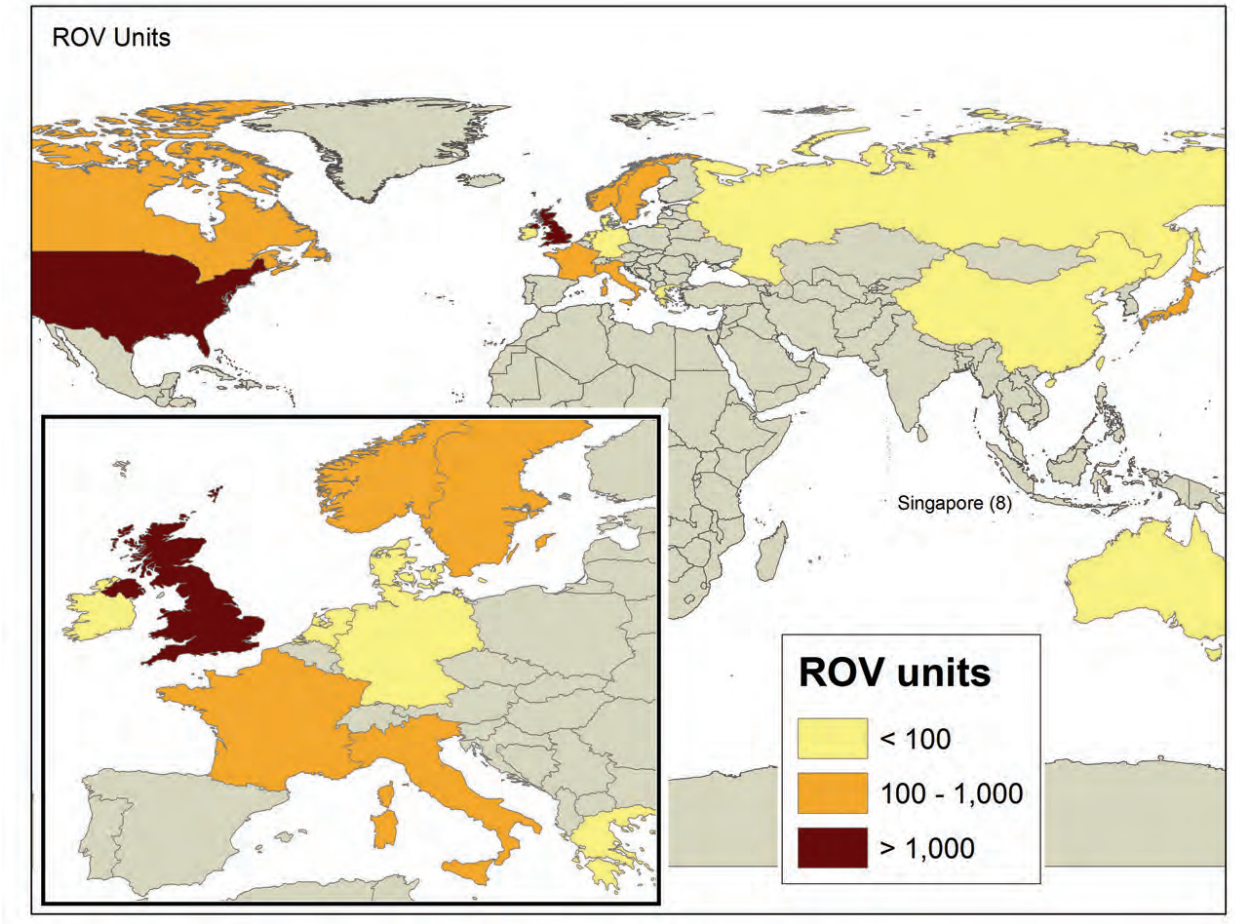
ROV production support service providers: Engineering services, machining services and integrators used on a contract or spot-transaction basis by the product manufacturer to solve specific product-line problems. According to interviews of product manufacturers conducted by CGGC, these services are high-value added activities because of the highly specific knowledge needed to integrate hardware and software into ROVs. The distribution of value among the production segments of the ROV value chain is approximately 40% in platform manufacturing and 60% in instrumentation manufacturing.

Distribution

ROV Brokers: ROV brokers and sales representatives are generally small companies in the local market with rights to distribute and sell ROVs. The industry norm is for the manufacturer to maintain direct sales in its home country or region, while exclusive distributors are used to sell in countries outside the manufacturer's direct sales territory.

Post-production support service providers – Post-production support services for ROVs include repair, maintenance, and training services. The brand manufacturer typically conducts service-after-the-sale at its manufacturing facilities. The component manufacturer may conduct the repair of specific parts, such as servovalve (ROV hydraulics) and electronics. In some markets, the vehicle brand manufacturer may develop authorized service representatives that provide local support to the end-user. Three value-adding activities are related to service after the sale: 1) providing the customer with needed product maintenance and support, which includes performing necessary maintenance service and delivery or installation of replacement parts); 2) maintaining close contact with the cus-

Figure 2: ROV Production, By Country



Category Description	Company Name	Country	2010 Sales ($US M)	2010 Employees
Buoyancy & Flotation	Cuming Corporation	USA	n.a.	200
	Balmoral Offshore Engineering	UK	76.4	125
	Flotation Technologies	USA	13.4	74
Cables & Connectors	Leoni Kabel GmbH & Co KG	Germany	3,916.9	49,822
	Nexans Norway AS	Norway	835.5	1,344
	Norddeutsche Seekabelwerke	Germany	143.6	500
	Divex Ltd	UK	130.5	300
	Tronic Ltd	UK	71.2	270
Cameras & Imaging	Northrop Grumman Corp	USA	34,757.0	117,100
	ATLAS ELEKTRONIK	Germany	508.9	1,915
	Divex Ltd	UK	130.5	300
	Amron International	USA	87.1	80
	Imenco AS	Norway	42.0	79
Handling Systems & Related Equipment	Liebherr-Werk Nenzing GmbH	Austria	1,089.3	1,422
	Palfinger Europe GmbH	Austria	319.9	627
	Huisman-Itrec	Netherlands	268.4	1,399
	HATLAPA Maschinenfabrik	Germany	218.6	288
	Aquanos Ltd	UK	79.3	109
Lighting Systems	Divex Ltd	UK	130.5	300
	Amron International	USA	87.1	80
	Imenco AS	Norway	42.0	79
	OceanOptics Inc.	USA	34.8	253
	Carmanah Technologies	Canada	33.9	65
Manipulators & Tools	Divex Ltd	UK	130.5	300
	Sonsub A/S	Norway	52.9	45
	Cybernétix SA	France	42.3	154
	Imenco AS	Norway	42.0	79
	Bennex AS	Norway	33.7	125
Motors & Thrusters	Voith Turbo Marine GmbH	Germany	1,562.9	4,800
	SMD	UK	68.9	137
	MacTaggart Scott & Co Ltd	UK	49.6	270
	Imenco AS	Norway	42.0	79
	Saab Seaeye Ltd	UK	23.3	120
Navigation, Tracking, Sonars & Acoustics	Sonatech Inc	USA	n.a.	475
	Teledyne Benthos Inc	USA	n.a.	119
	Northrop Grumman Corp	USA	34,757.0	117,100
	KVH Industries Inc	USA	112.2	390
	Amron International	USA	87.1	80
	Kongsberg Maritime	Norway	n.a.	859
Software, Control Systems & Monitoring Systems	SubCom	USA	n.a.	1,200
	Kongsberg Maritime	Norway	n.a.	859
	ATLAS ELEKTRONIK	Germany	508.9	1,915
	SMD	UK	68.9	137
	Cybernétix SA	France	42.3	154

Source: CGGC Ocean Technology Database; Sales and Employment figures from Hoover's

tomer to identify additional needs; and 3) receiving information about product performance. Companies interviewed by CGGC consider post-production support services as a profit-center for the business.

Operator training companies offer training in operating ROVs. Some brand manufacturers provide operator training for vehicles produced by the company.

Sales

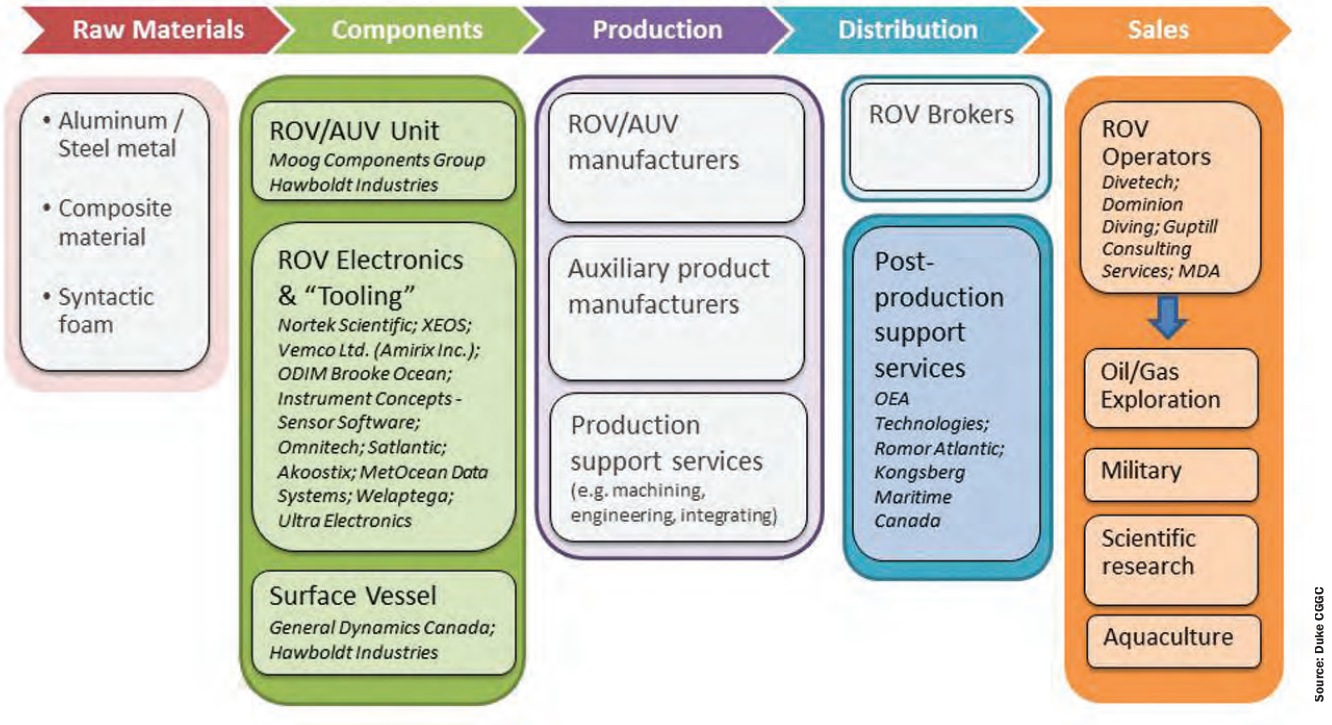
The key end-markets for ROVs are oil and gas, military, and scientific research. The oil and gas industry uses ROVs for pipeline inspection and burial, underwater construction and repair, and detailed ocean mapping. The military uses ROVs for detecting and neutralizing underwater mines. ROVs also are used for a variety of security applications, including port security (hull inspections) and water rank inspections at nuclear facilities. Scientific applications of ROVs include ocean data gathering, mapping, and exploration. Oil and gas sales account for roughly 50% of ROV sales, while defense & security and scientific research markets account for about 25% each.

In the offshore oil and gas sector, ROVs scan the ocean floor to develop precise maps before drilling occurs. Offshore platform construction requires the use of ROVs to grasp and manipulate pre-constructed portions of the platform to the correct place. Once platforms are constructed, ROVs are used to monitor the well site for correct placement of the drill and to identify any leaks of oil that may occur. Oil and gas companies also use ROVs to trench, bury, inspect and monitor underwater pipelines.

Most oil companies use specialized oil service providers to conduct ROV operations. Oil service providers purchase ROVs from manufacturers, integrate tools and instruments needed for the job, and hire ROV operators, often on a contract basis. However, large ROV service providers maintain in-house technical and operational expertise, and even build their own ROVs. Among the largest ROV service operators in the offshore oil and gas sector are SubSea 7 (U.K.), Oceaneering International (U.S.), CNOOC Engineering (China), Halliburton (U.K.), and McDermott International (U.S.). According to industry interviews, ROV services makeup more than half (52.4%) of the global ROV market.

The military/security market uses ROVs for forward observation, reconnaissance, and mine counter-measures. Coast guards, and organizations charged with ocean rescue and port security, use ROVs as scanning and observation tools. For ex-

Figure 3: Nova Scotia's Position in the ROV Value Chain



ample, ROVs are used in port security operations to inspect whether hulls of incoming vessels are leaking, or whether contraband or explosive materials are attached. This "inspection" function is a common use of ROVs. Water tanks used at industrial sites and nuclear energy production sites can be inspected using ROVs rather than placing a diver at risk. In some applications, ROVs perform better than do human divers, independent of the hazardous environment. For example, mini and small ROVs are capable of entering spaces too small for humans. They are able to enter the space and use their onboard cameras to relay video back to the operator station, or deploy small cameras to relay the information.

Gathering ocean data is a key function for ROVs in the scientific market. The data are used for mapping the ocean floor, conducting ocean life surveys, and measuring properties of the ocean water, including its salinity, temperature and depth. Scientists also use ROVs for underwater archeology and geology.

Supporting Institutions

Supporting organizations and institutions are key actors in the global value chain for ROVs. Many of the most important supporting institutions in the ROV global value chain are located in advanced industrialized countries, particularly in the U.S. These include the MIT Sea Grant College Program, Woods Hole Oceanographic Institution (WHOI), the Scripps Institution of Oceanography, and the Monterey Bay Aquarium Research Institute (MBRI). Other prominent institutions are located in Europe, Australia, and Japan. Developing counties, particularly China and India, are rapidly developing advanced research and development capabilities in ROV technology.

As in many high technology areas, spreading knowledge among members of professional and academic research networks leads to product innovation and development. Scientific and industry associations, trade publications, and professional conferences are important in developing and disseminating the latest advances in ROV platform and instrumentation technologies. Notable among professional organizations are the Institute of Electrical and Electronics Engineers (IEEE) and the Marine Technology Society (MTS). Oceans and Oceanology International are major professional conferences for the ROV industry.

Nova Scotia's Position in the ROV Value Chain

Nova Scotia commands a significant presence in the ROV value chain. A particular strength of Nova Scotia's companies in the value chain is in the production of specialized electronic equipment used on ROVs. Figure 3 illustrates the companies in Nova Scotia participating in the ROV value chain and their associated product or service.

[See Figure 3: NS value chain, above]

Notable companies in ROV electronics and communication are Ultra Electronics Marine Systems, producing a wireless non-Radio Frequency communication device for underwater vehicles. Advances in underwater communication devices are critical components for advancing the range and data gathering capabilities of unmanned underwater vehicles. MOOG Components Group (d.b.a. Focal Technologies), part of a major multinational defense and ocean technology corporation, produces rotary joints ("slip rings") and harsh environment

fiber optics for ROVs. Specialization in harsh environment technology is particularly important in the ROV value chain because of the increased demand by governments, natural resource companies, and scientists for Arctic mapping, mining, and exploration.

In addition to producing ROV electronic components, Nova Scotia's firms design and manufacture shipboard systems used for ROVs. For example, Hawboldt Industries manufactures large winches used to house the ROV tether. Their product and service offerings to the industry have expanded from winch manufacturing to loading the tether cable on the winch spool, which requires specialized knowledge and equipment to do properly. Furthermore, Hawboldt designs and builds sophisticated launching and recovery systems (LARS).

Firms in Nova Scotia also provide post-production services. Kongsberg Maritime, a leading manufacturer of ROVs, has its Canadian sales and service facility in Halifax. The company is a global lead firm in unmanned underwater vehicles, and ocean technologies more generally. ROV operators providing services to a number of end-markets also are represented well in Nova Scotia. Dominion Diving is a leading provider of diving and mapping services using ROVs for a range of national and international customers.

Overall, our research identified more than twenty companies in Nova Scotia providing products and services to the ROV global value chain. These companies, both large and small, add to Nova Scotia's strengths in the ocean technology sector, which include excellent universities, transportation infrastructure, geographic location, quality of life, and skilled workforce.

Full report available at http://www.cggc.duke.edu/pdfs/2012-03-05_Nova%20Scotia%20OTReport.pdf

About the Author

Lukas Brun is a senior research analyst at the Duke University Center on Globalization, Governance & Competitiveness (CGGC), and author of the ROV chapter in the Nova Scotia Ocean Technology report from which excerpts were taken for this article. He has more than 10 years of experience in economic analysis and economic development-related contract research. Brun can be contacted at [lukas.brun@duke.edu].

Image Courtesy HURL

Hawaii Undersea Research Laboratory:

A Unique Diving Operation at Risk

By John C. Wiltshire, Ph.D., Director, Hawaii Undersea Research Laboratory (HURL)

The Hawaii Undersea Research Laboratory (HURL) operates two of eight research submersibles diving below 1500m in the world at present. In the US, the only other deep diving submersible operation is 'ALVIN' run by the Woods Hole Oceanographic Institution. HURL is a cooperative program between the University of Hawaii and the National Oceanic and Atmospheric Administration (NOAA). NOAA, through its Office Of Exploration and Research, largely funds the program. Unfortunately, in the Federal FY '13 budget NOAA zeroed out the National Undersea Research Program, the parent organization of HURL. This will close the lab unless other funding is obtained. The loss for undersea research will be considerable.

HURL provides a unique capability to engineers and scientists. HURL has made some amazing contributions. Last year, work by Dr. Robert Dunbar on deep-sea corals showed these to be the oldest living organisms on earth, up to 10,000 years old. HURL has investigated the growth and collapse of Loihi Seamount, the next Hawaiian Island. This has quantified a major tsunami threat. We have developed new deep-sea technology and found several historic shipwrecks.

History

HURL evolved from the 'man-in-the-sea' program of the 1970s. At that time, much interest was focused on underwater habitats with a view to build underwater dwellings and floating cities. HURL started with a deep-sea habitat the 'AEGIR' and the coastal submersible 'Star II', a donation from General Dynamics. It was capable of dives to 1200 feet. In 1981, HURL became part of NOAA's newly formed undersea research program. Our dive program was initiated on July 14, 1981 when the first dive was made into Oak Crater in Eniwetak Atoll. This project included scientists from the Defense Nuclear Agency, Lawrence Livermore Labs, and the Air Force Weapons Agency to conduct studies in this crater made by the first hydrogen bomb ever tested. HURL conducted three months of diving operations at Eniwetak Atoll with additional scientists from the Bishop Museum, the University of Hawai'i, Mid Pacific Research Lab, the West Indies Lab, University of California, the Smithsonian, and others. The Eniwetak expedition launched HURL as a science diving program. The submersible Star II was replaced with the PISCES V brought from the oil industry at the time the oil industry was converting to ROV's. HURL assets were expanded to included the Pisces IV, another deep diving submersibles capable of carrying three scientists or engineers. The Pisces subs have the strength of being able to work together on the bottom in 2000m of water (one and a quarter miles down). The University of Hawaii has just purchased a 6000m depth rated ROV to augment the capability of the submersibles. A 225-foot support vessel designed by HURL for Pacific-wide submersible support carries the submersibles.

Midget Sub

In 2002, HURL found the wreck of the Japanese midget submarine that led the Dec. 7, 1941 attack on Pearl Harbor. This was a significant find as the wreck is in excellent shape on the bottom a few miles off the mouth of Pearl Harbor. The midget sub was hit by a single shell fired from the destroyer USS Ward at 6:45 am in the early morning before the aerial attack began around 8 am. The shell did not explode but punched a hole in the submarine's pressure hull causing it to sink intact and sit upright on the bottom. The USS Ward, crewed by naval cadets, radioed in its impressive kill but this crucial information was ignored by Naval command. Later, during the ensuing court-martial surrounding the catastrophic command failures at Pearl Harbor, it was implied that the USS Ward had not in fact sunk a Japanese midget submarine trying to infiltrate

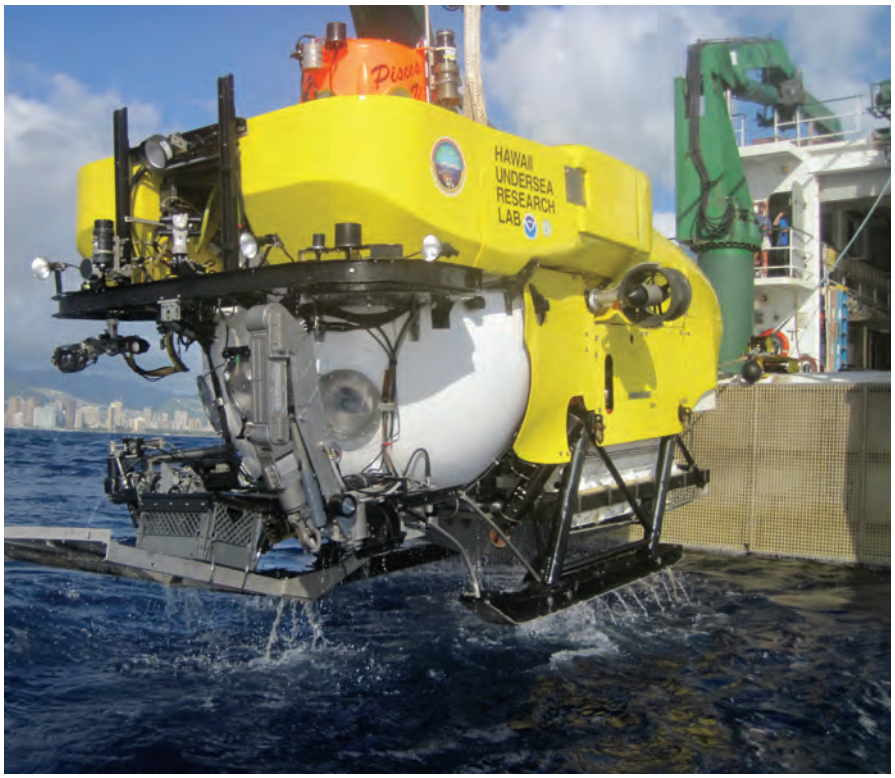


Image Courtesy HURL

Pearl Harbor. Until HURL's 2002 find of the midget sub with the hole just as the Ward's crew described, the Ward's contribution of the first shot and kill of the Pacific war could not be verified. For the remaining crew of the Ward, now in their eighties, this was a triumph. In fact, HURL made a documentary taking one of the remaining Ward crew, Will Lehrner, on the sub to see the Japanese midget submarine he helped sink so many years ago. The discovery of the midget submarine has been the subject of several full-length documentaries. HURL has worked with various NOAA offices and partner agencies including the National Marine Sanctuaries Program and the National Park Service to record the midget sub's condition, carry out corrosion testing, and documenting it with the intent of preserving this valuable maritime heritage site for posterity.

Kermadec Expedition

HURL undertook the most ambitious cruise ever organized in its 30-year history in the Central and Southwestern Pacific region over five months in 2005. This involved 58 scientists from four countries and 12 universities and research institutes. The 14,500 nm routing of this expedition took the HURL program from Honolulu to American Samoa and from there proceeded to the Tonga-Kermadec arc on the way to New Zealand. The return trip passed through the U.S. Line Islands with dives in these remote island areas that have since become marine national monuments. In all, eight separate cruise legs covered 21 different study sites with 78 successful Pisces submersible and ROV dives completed, along with over-the-side instrument deployments, mooring recoveries, and multibeam bathymetric surveys. This investigation of active volcanoes highlighted the hydrothermal systems of this arc that had really not been well studied. Many of the volcanoes had never been visited by submersible before. Several were streaming carbon dioxide at an unprecedented rate. Much of this gas emission from deep-sea volcanoes had not been fully accounted for in climate change models.

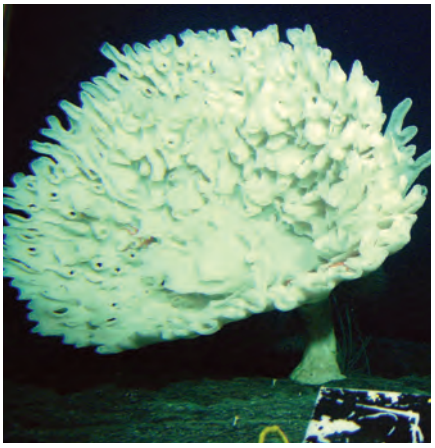
LRT and technology development

One of the interesting technologies that HURL has pioneered is the 50-foot launch, recovery and transport ve-

hicle or LRT. The LRT is a submersible barge. It has major application in the launch of large instrument packages in high sea states. HURL is increasingly becoming involved in the development of offshore wind, including major offshore wind farms and the deployment of seafloor observatories and instrumentation. Other examples of technological development include: a) development of the methodology for, and implementation of, joint technical 'wet' rebreather diver and submersible operations initially used in support of a major multi-year mesophotic coral research project and b) a highly sensitive Deep Ocean Mass Spectrometer, a quantum leap for 'in situ' high resolution chemical analysis particularly in the documentation of chemical weapons discarded on the sea floor.

Loihi Seamount:

One of the most important areas HURL has monitored over the years is the next Hawaiian Island, Loihi Seamount. Now about 3,000 feet below the surface, Loihi will break water between 10,000 and 50,000 years from now. Loihi has already grown 15,000 up from the seafloor. What is important about this edifice is that it forms a natural laboratory for the study of Pacific volcanic processes, especially their collapse with ensuing tsunamis. The long-term study of Loihi submarine volcano, over nearly 25 years, has fully documented its growth including its explosive history, the tsunami risk from major collapse events such as that in 1996, and analyzed its



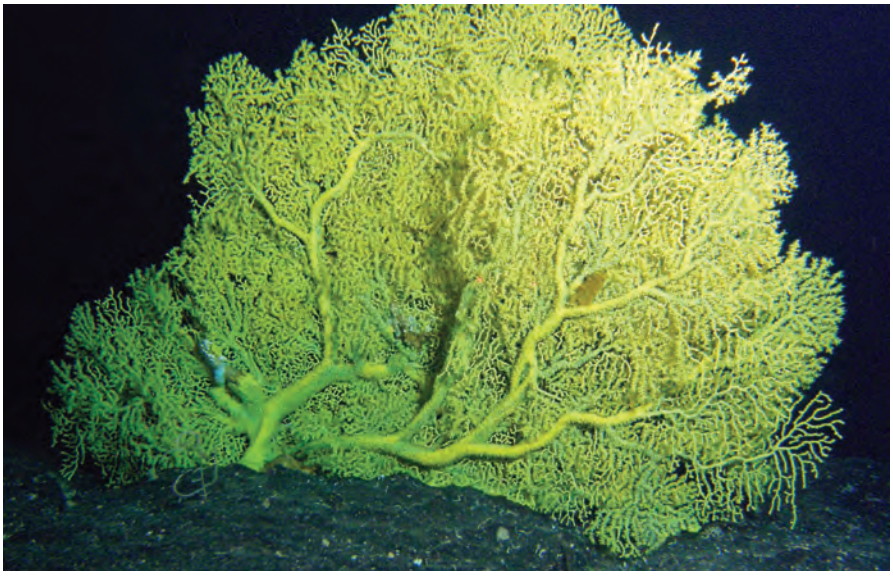


Image Courtesy HURL

unique and extreme ecosystem. This research has resulted in the first full genome characterization of a deep-sea hydrothermal vent organism - Idiomarina loihiensis, which is a deep-sea living gamma-proteobacterium. HURL's latest achievement on Loihi is the first two-sub dive series inside the active smoking Pele's Pit volcanic summit crater for a National Geographic documentary shot with 3D HD technology and to be released in late 2012.

Deep Sea Corals

HURL has supported the research of scientists from Stanford University and Lawrence Livermore National Laboratory who found that deep-sea corals are the oldest living organisms on earth. Their innovative approach in applying radiocarbon dating techniques to branches from coral trees have shown gold corals (Gerardia sp) to be 2742 yrs old and deep water black corals (Leiopathes sp) to be 4265 yrs old, projected to be up to 10,000 yrs old when the diameter of the tree base is considered. Benefits and importance of these results include a moratorium on the commercial harvesting on such corals in Hawaii. The long temporal history of these corals allows their use as proxies of climate change.

Pacific Monuments

HURL has a continuing and long-term presence in, and study of, the pristine ecosystems of the Papahānaumokuākea Marine National Monument in the Northwestern Hawaiian Islands, which is both the single largest conservation area under U.S. jurisdiction and one of the largest marine protected areas in the world. While a fair bit of work has been devoted to the shallow water ecosystems immediately surrounding the islands and atolls, relatively little effort has been focused on the flanks, banks, seamounts, and ridges below 100 meters, which make up 98% of the protected area. Examples of HURL's service and stewardship in this deep water realm include: a) the first filming of endangered Hawaiian Monk Seals at nearly 500 m depth in gold coral (Gerardia sp) beds, suggesting that the beds may provide critical Monk Seal foraging habitat, b) discovery of over 80 new species of corals and sponges there, many of which are still being analyzed and c) extensive contribution to the multibeam mapping effort of the monument fully documenting this national treasure.

HURL: Cost Effective, Efficient

The HURL operation is the cheapest deep diving submersible operation in the world. With low overhead and low university salaries, the organization runs on a budget of $3 million/year compared to 10 times this cost for other similar groups running similar equipment. For NOAA, with a desire to fully explore it's western Pacific Monuments, this kind of equipment will be critical for the future operations that are planned. If HURL goes out of existence, its equivalent will have to be reinvented down the road. The problem is that once the Pisces submersibles, which still have a 20-year life expectancy, go out of American Bureau of Shipping certification, the cost of putting them back into service would be astronomical. Instead the likely approach, as has been seen often in government programs, would be to start over with a new build and a price tag in excess of $50 million to obtain, at best, the same result. The two submersibles are presently operated with a crew of five specialists at close to a 100% success rate for over 10 years. This is unique in the industry. Adding two more personnel for ROV operations and another for multibeam mapping rounds out the 24/7 package of capabilities that HURL offers. Other over-the-side operations (e.g. CTD rosettes, fish traps, drop cameras, cores etc.) are also routinely supported from the mother ship, the R/V Ka'imikai-o-Kanaloa. Since 1981, HURL sponsored researchers have spent over 9,000 hours underwater around the Pacific.

The program has an effective public outreach and education

HURL was instrumental in helping to shed light on the Japanese midget submarines that participated in the December 7, 1941 attack at Pearl Harbor.

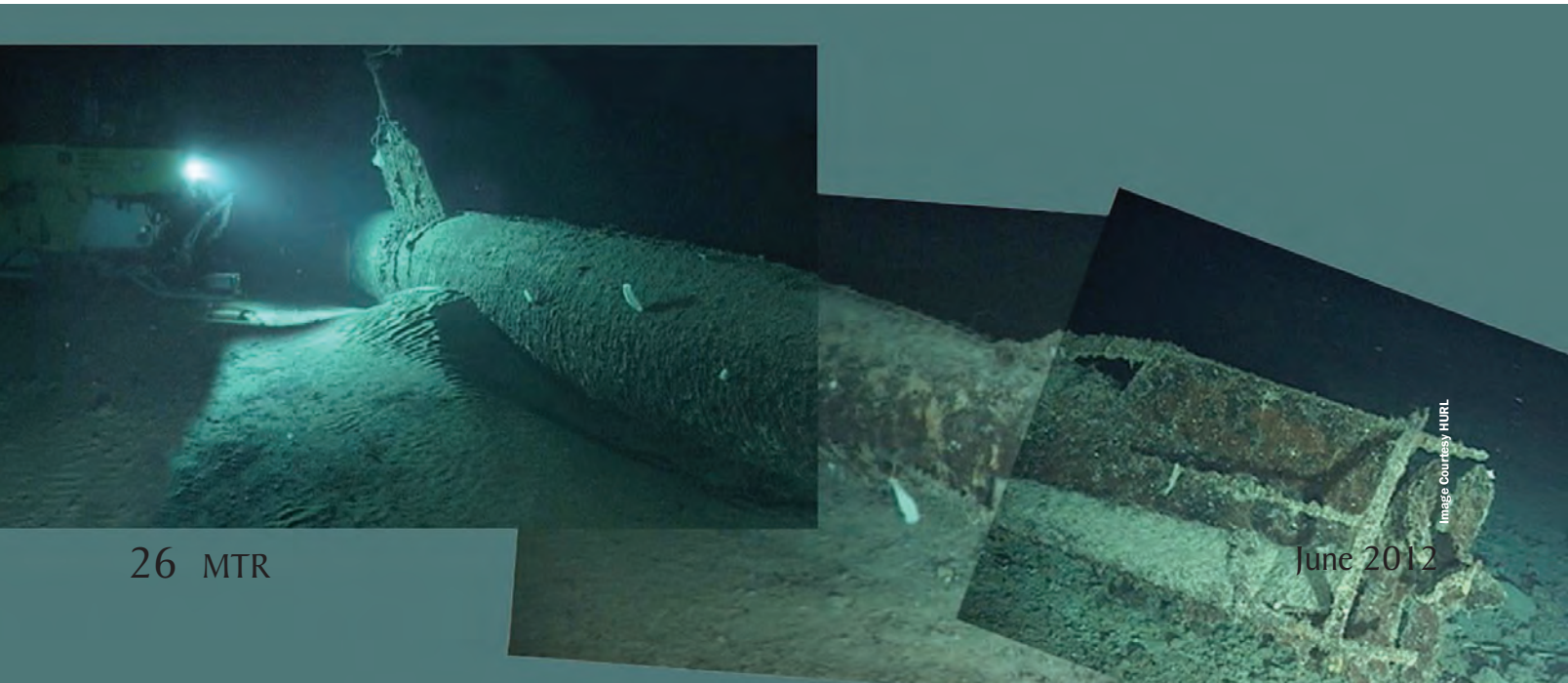


Image Courtesy HURL

component. Examples include: a) the Hexanchus six-gilled shark video from a north Molokai submarine canyon dive that is now NOAA's top YouTube clip at 1.3 million views and climbing; b) in April 2011, nearly 500 students from 35 K-8 classrooms across the country "virtually" accompanied researchers from the University of Hawaii, Bishop Museum, and NOAA on the 1,000th submersible dive. Similar programs riding along with HURL's earlier cruises brought aboard another 1350 K-12 students; and c) HURL extracts useful biological data from all dive video in-house regardless of the dive's purpose and generates products derived from this activity such as HURL's biological database and HURL's deepwater animal photo-gallery and photo identification guide. HURL is one of only two deep submergence facilities in the world that have had a long-term commitment to routinely extracting biological and substrate data from their dive video archives. All of the above history and material can be found on HURL's website at: www.soest.hawaii.edu/HURL.

Image Courtesy HURL

About the Author

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Meet the CTO

Scott Gartshore, Pharos Offshore Group Ltd.'s new Chief Technology Officer.

Marine Technology Reporter recently was afforded the opportunity to pick the brain of **Scott Gartshore**, Pharos Offshore Group Ltd.'s new Chief Technology Officer, to discuss emerging market trends and Pharos Offshore's future.

-By Greg Trauthwein, Editor & Associate Publisher

Please provide a brief background on your education and career.

At the age of 16, I commenced an apprenticeship, working in heavy diesels and hydraulics in the marine, steel and transport industries. I was involved in hands on experience until the age of 30 when I took my bachelors in Mechanical Engineering at the University of Edinburgh. During this degree I started to work for IHC Engineering Business Ltd and continued there once I had graduated. Starting out as a mature graduate, then to design, Lead Engineer through to Senior. I worked as both Project and Sales Manager, primarily involved with the Subsea Trenching side of the company, covering all aspects of the projects, including commercial, production, design through to commissioning.

How would you best describe your management style/philosophy?

I believe those involved in engineering are incredibly inventive and talented if they are given the opportunity. At Pharos we recognise that people are our biggest asset. We have a great retention rate and a lot of really creative individuals, both on and offshore. I think the best any manager can do is support, guide and grown their team.

We understand that you've recently joined Pharos as its Chief Technology Officer: Can you give a brief overview of your responsibilities in this position?

Pharos are focused on growing our engineering we offer to the market, including marketing the company and advertising our track record. I am responsible for the Technical delivery of all engineering projects. One of my particular areas of responsibility is the new system's we have been developing, ITAT (Inter Array Trenching System) and Mentor (Telecoms maintenance trenching system). My experience with Subsea vehicles tells me that systems work best when

there is high quality operational input at the design stage and that's been our approach.

What specifically attracted you to the CTO post at Pharos?

The people! I'd worked previously with the Senior Management as a Project Manager delivering Cable Plough Systems, and through that I delivered a joint presentation at Suboptic 2010 with our CEO Phil Walker. I hold the team in high regard and would regularly recommend them when asked for 3rd party or consultancy specialists by my clients in my previous role. One of the biggest draws to Pharos was the level of technical and personal integrity the team has. Our design team has huge experience in ROV and Trenching systems, so there's always more to learn.

What do you count as the leading technological advantage(s) of the company?

Operational insight and design experience, our teams have laid, buried and repaired hundreds of thousands of kilometers of cable, these same guys are heavily involved in the design processes and on shore build of our equipment.

Where do you see room for improvement?

There's always room for improvement at all levels. I'd like to see us increase our client base and promote the company more, we have some great long term clients but we're always keen to work on new ideas with new companies.

Coming in, what are your top three priorities?

1. Let people know about our track record and what we can offer;
2. Keep building long term relationships with clients and suppliers, and
3. Increase our engineering capacity in a streamlined and responsive fashion

For our readers not intimately familiar with Pharos, please give to us a snapshot of your activities and capabilities in the subsea sector.

Pharos Offshore Group provides subsea cable and pipe installation and trenching services. We have been directly involved with over 750,000 km of cable installation and burial with over 6,000 km of that being three meter burial.

We sell and lease equipment along with the experienced manpower to operate all major makes of Remotely Operated Vehicles (ROVs). Over 90% of our men and women are specialists in both ROV and Plough maintenance and operations.

Our engineering team leverages the experience of our 100+ specialists to design, fabricate and assemble ROV upgrades and modifications. Our ITAT 800 meets the growing need for manoeuvrable trenching vehicles powerful enough to bury offshore wind inter-array power cable. It's proven state-of-the-art jetting technology and reliable commercially available components increase productivity and reduce costs.

From where you sit, by market niche, what do you see as the most promising in the near-term (12-24 months) for business prospects?

In order to meet deadlines a lot of effort, resource and expense are going into the Offshore Wind Market, installation and burial of array and export cables.

This is understandable as there have been delays, however this often means expensive or inappropriate technical solutions are used to meet deadlines. As work continues and maintenance issues come into focus, people will be looking for longer term, more cost effective solutions – which is where the ITAT system is well placed.

How is Pharos investing today in subsea technology?

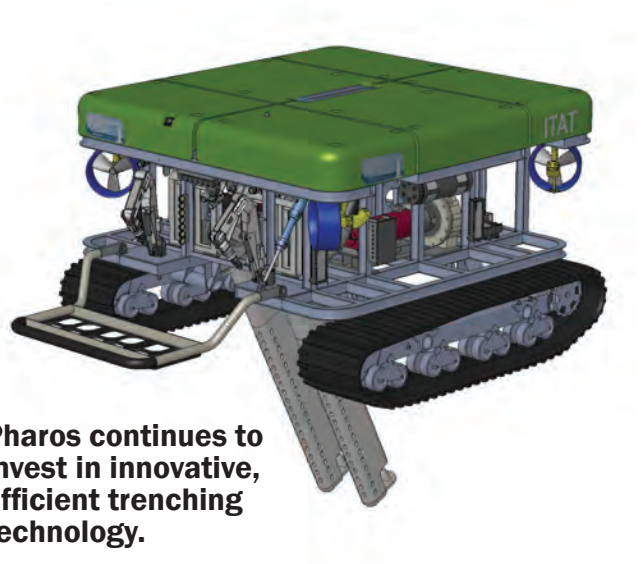
Pharos is a training organisation, on shore and offshore. For us at Pharos, the biggest investment is cultivating lessons learned from the entire teams past experience into know-how for unique technical solutions today. This pays off in the design of engineering solutions for our clients.

"The People"

Gartshore's response as to what attracted him to the Pharos CTO post.

In your career, what one technology do you believe has had the most dramatic impact on our ability to work efficiently under water?

ROV technology as a whole is constantly evolving. Fiber optic technology has certainly advanced the control and reliability of ROVs over the years but it really comes back to the people. Experience with operations and maintenance is the most significant factor between success and failure in subsea operations.



Pharos continues to invest in innovative, efficient trenching technology.

Offshore Wind farms are a big driver for the company's future development.

Cruise Ships and WWII Munitions Don't Mix

By Kathleen Gleaves

On April 22nd, 2010, a light morning mist rolled across the surface of the water as the six Port of Seattle Police Divers prepared for their routine security search of the cruise ship docks. The cruise season would be starting in a few days and Coast Guard security requirements included an underwater inspection of the berthing area. The divers knew the area well, and while their previous searches revealed ample aquatic life, they had never found anything that constituted a security threat.

Lead by Dive Sergeant Pat Addison, the team slipped into the familiar water of Elliott Bay and began their routine sweep. Usually Puget Sound has limited visibility, especially around the active piers of Smith Cove. This morning may have been a bit different. Maybe the water was clearer, maybe there was a rare shaft of Seattle sunlight, but something caught the eye of one of the divers. Partially buried in the silt just off the south end of the pier in 40 feet of water, there was a dull glint of metal and a shadow; not a rock and too smooth to be a log, it was definitely machine tooled. Closer inspection revealed a long, missile-shaped object partially buried in the silt. It was to be the proverbial tip of the iceberg.

Port of Seattle Police Dive Team members suiting up for a routine surveillance dive in Elliott Bay, Puget Sound.

Photo Credit: Kathleen Gleaves

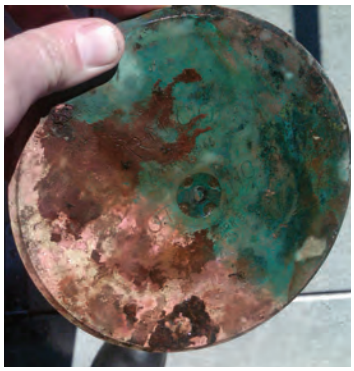


Photo Credit: Port of Seattle

The first object was a 5" training round stamped March 1945.

Photo Credit: Oceaneering or US Army

Remotely Operated Underwater Munitions Retrieval System (ROUMRS) from Oceaneering.

Photo Credit: US Army Corps of Engineers

The first discovered round with an intact fuze, recovered from the silt beneath the Pier 91 cruise ship dock.

The divers surfaced quickly, 'beating their bubbles to the surface' as one diver described it later. A call to the Police Bomb Squad transferred the call up the line to the Navy Explosive Ordnance Disposal (EOD) staff across the Sound at Navy Base Kitsap and notified the Coast Guard. A request came back to deploy the Port's underwater camera and relay the images. The video confirmed the military ordnance identification.

The potential impact on cruise operations scheduled to begin in three days was an immediate concern. The Coast Guard would not allow vessels into port if there was any possibility of harm to the 2000+ passengers. According to Port of Seattle marketing figures, the ships bring over $400M in annual revenue to the region. Disrupting cruise operations would create serious problems.

By afternoon, the dock, located 10 miles from the heart of downtown Seattle, was alive with Navy EOD divers and boats, and Army EOD support vehicles; followed quickly by media helicopters hovering overhead hoping for some flashy pictures for the evening news.

Eventually it was determined that this 5" diameter shell was a training round, the same size, shape and weight as the real thing, but unarmed. It had likely been resting quietly on the bottom since World War II when the pier was owned by the Navy and used to provision military vessels. A stamp on the end dated the shell to March, 1945. Although the shell added some excitement to a normally routine dive, it was never a threat to anyone's safety. The EOD team packed up and went home, returning the pier to routine operations.

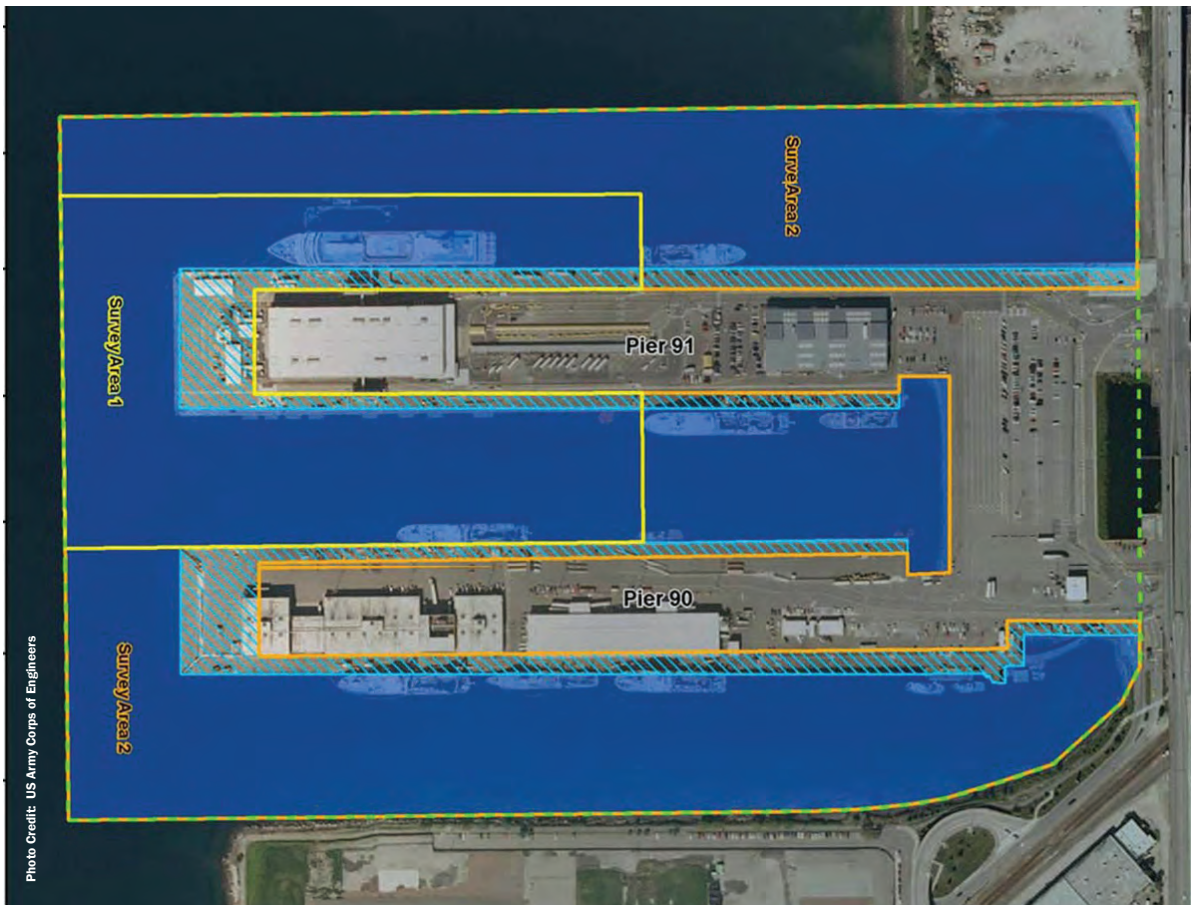
The peace and serenity was not to last. The next scheduled dive found more items similar in size and appearance. More excitement, more Navy teams, but still it seemed the discoveries were just coincidental and harmless.

The summer proceeded quietly with only a few small items described as Munitions Debris (MD) turning up. The cruise ships with their powerful bow thrusters continued to scour the bottom five days a week until their last sailing in late September.

On their final descent of the season, the divers found another cache of projectiles. The dive team assumed they had another training round on their hands and brought it to the surface only to discover that this find had an added attraction - it appeared to have an intact fuze. No longer were they dealing with inert training rounds, these had the potential for damage and injury. Again the Navy EOD team took charge of the scene, eventually recovering a 3" armor-piercing round, a mechanical timer fuze, and a 20mm small arms casing.

According to Sgt. Addison, it was quickly obvious their somewhat temperamental underwater video equipment was outdated. "We got a new HD 1080P video camera for the job," said Addison. The new camera, a Bonica Snapper, with twin G8V 15 LED video lights was brought into play several times giving experts on the dry side a chance to see what the divers on the wet side were seeing.

These discoveries changed the game. The Pentagon declared the site a Formerly Used Defense Site (FUDS) making remediation funds available and placing the project under the control of the US Army Corp of Engineers (USACE). Oversight of the project was handed to Seattle District Corps Commander, Col. Anthony O. Wright. He was assisted by the Kansas District in Omaha for their expertise in the FUDS program.



Aerial map of Pier 90 and 91 shows the Phase One and Phase Two operations area. Phase One covered the most critical area used by the cruise ships. Phase Two encompassed the neighboring pier and surrounding areas.

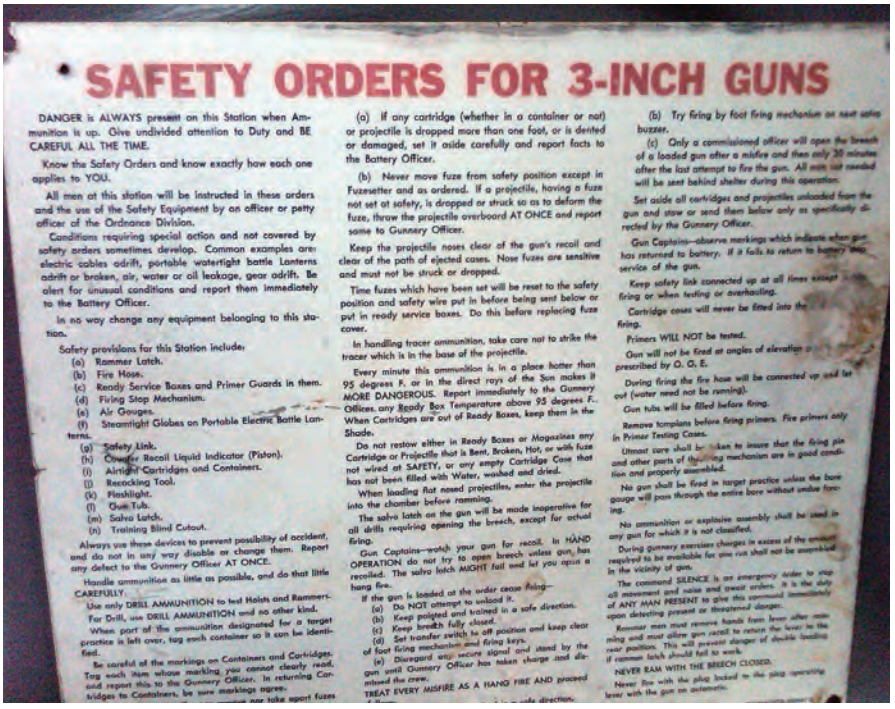
Piers 90 and 91 were used by the US Navy from 1935 through the late sixties. The property was transferred to the Port of Seattle in 1976. The site provided winter moorage to large fishing trawlers and small cargo ships until the growth of the cruise industry in Seattle spurred the construction of the new Smith Cove Cruise Terminal which brought the cruise ships to Piers 90 and 91, the exact location of the old Munitions Response Area (MRA).

These disposal projects typically move slowly through the military system, but pressed up against the next cruise ship schedule, the system reacted quickly to the situation. The Army Corp authorized a Time-Critical status to the operation, cutting planning time to less than 6 months instead of the usual two to three years. Environmental Impact statements were developed including the effects of planned sonar use on marine life and potential effects on tribal fishing grounds in the area.

Clean-up, called a Remedial Investigation, was completed in two phases. Phase One lasted from December 2010 through April 2011 and cleared the immediate area under the cruise ship berths of visible objects to allow the 2011 cruise season to proceed on schedule. Using a transect grid search, divers identified and collected eleven functional military munitions and over 200 Munitions Debris (MD) objects. Empty rounds were approved for immediate removal and transport to Joint Base Lewis McCord for disposal. For any items identified as having an explosive potential, a Remotely Operated Underwater Munitions Recovery System (ROUMRS) was used to move it to a secure location until the search was complete and the disposal facility was in place.

Looking like a creature from a futuristic horror movie, the ROUMRS from Oceaneering, a Norwegian company specializing in remotely operated vehicles (ROVs) for the oilfield industry, measures 90" x 51" x 69" and weighs 3040 pounds on land. It has two, seven-function arms, and a hopper assembly with a 200-pound lift capacity. It has a 15kW HPU with a 16-function valve pack, three vertical thrusters with nearly 500 pounds of up/down thrust, and four horizontal thrusters with forward, reverse and lateral thrust. Its high-end optics include two wide-angle color lenses, a 36x zoom, a camera, and two lasers with line beam optics.

Sky Research of Ashland, Oregon, was contracted to provide search support to the Land Air & Sea Explosive Ordnance Disposal (LASEOD) team brought to Seattle for the project.



SAFETY ORDERS FOR 3-INCH GUNS

DANGER is ALWAYS present on this Station when Ammunition is up. Give undivided attention to Duty and BE CAREFUL ALL THE TIME.

Know the Safety Orders and know exactly how each one applies to YOU.

All men at this station will be instructed in these orders and the use of the Safety Equipment by an officer or petty officer of the Ordnance Division.

Conditions requiring special action and not covered by safety orders sometimes develop. Common examples are: electric cables adrift, portable watertight battle Lanterns adrift or broken, air, water or oil leakage, gear adrift. Be alert for unusual conditions and report them immediately to the Battery Officer.

In no way change any equipment belonging to this station.

Safety provisions for this Station include:
(a) Rammer Latch.
(b) Fire Hose.
(c) Ready Service Boxes and Primer Guards in them.
(d) Firing Stop Mechanism.
(e) Air Gouges.
(f) Steamtight Globes on Portable Electric Battle Lanterns.
(g) Safety Link.
(h) Counter Recoil Liquid Indicator (Piston).
(i) Airtight Cartridges and Containers.
(j) Recocking Tool.
(k) Flashlight.
(l) Quoin.
(m) Salvo Latch.
(n) Training Blind Cutout.

Always use these devices to prevent possibility of accident, and do not in any way disable or change them. Report any defect to the Gunnery Officer AT ONCE.

Handle ammunition as little as possible, and do that little CAREFULLY.

Use only DRILL AMMUNITION to test Hoists and Rammers.

For Drill, use DRILL AMMUNITION and no other kind.

When part of the ammunition designated for a target practice is left over, tag each container so it can be identified.

Be careful at the markings on Containers and Cartridges. Tag each item whose marking you cannot clearly read, and report this to the Gunnery Officer. In returning Cartridges to Containers, be sure markings agree.

(a) If any cartridge (whether in a container or not) or projectile is dropped more than one foot, or is dented or damaged, set it aside carefully and report facts to the Battery Officer.

(b) Never move fuze from safety position except in Fuzesetter and as ordered. If a projectile, having a fuze not set at safety, is dropped or struck so as to deform the fuze, throw the projectile overboard AT ONCE and report same to Gunnery Officer.

Keep the projectile noses clear of the gun's recoil and clear of the path of ejected cases. Nose fuzes are sensitive and must not be struck or dropped.

Time fuzes which have been set will be reset to the safety position and safety wire put in before being sent below or put in ready service boxes. Do this before replacing fuze cover.

In handling tracer ammunition, take care not to strike the tracer which is in the base of the projectile.

Every minute this ammunition is in a place hotter than 95 degrees F. or in the direct rays of the Sun makes it MORE DANGEROUS. Report immediately to the Gunnery Officer, any Ready Box Temperature above 95 degrees F.. When Cartridges are out of Ready Boxes, keep them in the Shade.

Do not restow either in Ready Boxes or Magazines any Cartridge or Projectile that is Bent, Broken, Hot, or with fuze not wired at SAFETY, or any empty Cartridge Case that has not been filled with Water, washed and dried.

When loading flat nosed projectiles, enter the projectile into the chamber before ramming.

The salvo latch on the gun will be made inoperative for all drills requiring opening the breech, except for actual firing.

Gun Captains—watch your gun for recoil. In HAND OPERATION do not try to open breech unless gun has recoiled. The salvo latch MIGHT fail and let you open a hang fire.

If the gun is loaded at the order cease firing—
(a) Do NOT attempt to unload it.
(b) Keep pointed and trained in a safe direction.
(c) Keep breath fully closed.
(d) Set transfer switch to off position and keep clear of foot firing mechanism and firing keys.
(e) Disregard any secure signal and stand by the gun until Gunnery Officer has taken charge and dismissed the crew.

TREAT EVERY MISFIRE AS A HANG FIRE AND proceed

(b) Try firing by foot firing mechanism or rest salvo buzzer.

(c) Only a commissioned officer will open the breech of a loaded gun after a misfire and then only 30 minutes after the last attempt to fire the gun. All men not needed will be sent behind shelter during this operation.

Set aside all cartridges and projectiles unloaded from the gun and stow or send them below only as specifically directed by the Gunnery Officer.

Gun Captains—observe markings which indicate when gun has returned to battery. If it fails to return to battery stop service of the gun.

Keep safety link connected up at all times except [illegible] firing or when testing or overhauling.

Cartridge cases will never be fitted into the [illegible] firing.

Primers WILL NOT be tested.

Gun will not be fired at angles of elevation [illegible] prescribed by O. O. E.

During firing the fire hose will be connected up and let out (water need not be running).

Gun tubs will be filled before firing.

Remove tompions before firing primers. Fire primers only in Primer Testing Cases.

Utmost care shall be taken to insure that the firing pin and other parts of the firing mechanism are in good condition and properly assembled.

No gun shall be fired in target practice unless the bore gauge will pass through the entire bore without undue forcing.

No ammunition or explosive assembly shall be used in any gun for which it is not classified.

During gunnery exercises charges in excess of the amount required to be available for one run shall not be assembled in the vicinity of gun.

The command SILENCE is an emergency order to stop all movement and noise and await orders. It is the duty of ANY MAN PRESENT to give this command immediately upon detecting present or threatened danger.

Rammer men must remove hands from lever after ramming and must allow gun recoil to return the lever to the rear position. This will prevent danger of double loading if rammer latch should fail to work.

NEVER RAM WITH THE BREECH CLOSED.

Never fire with the plug locked to the plug operating lever with the gun on automatic.

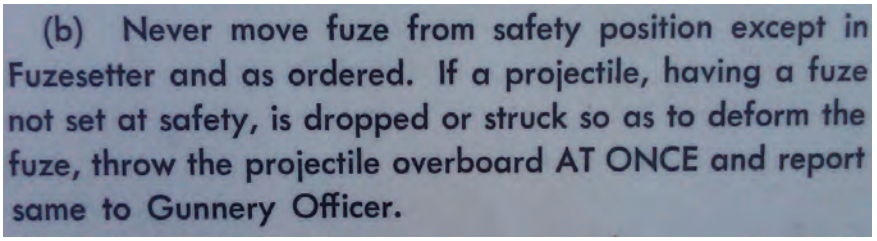


Photo Credit: Port of Seattle

Several weeks after inadvertently bringing the live rounds to the surface, divers found a metal sign buried in the muck warning sailors that if they drop and dent a projectile with a fuze, they should immediately throw it overboard.

(Photo Credit: US Army Corps of Engineers)

The largest of the armed projectiles is held upright by a Navy Diver shortly after removal from approximately 40 feet of water in Puget Sound.

Side Note

Holland America, Carnival, Princess and Royal Caribbean cruise lines use the piers as homeport for their summer Alaska excursions. Although old military munitions have turned up in other locations, nowhere else are there large passenger ships parked on top of these munitions in a mere 40 feet of water.

According to Army Corps reports, Sky deployed various types of sonar equipment to map the topography, and then used a magnetometer to locate metallic objects for further investigation by the divers.

Divers recorded GPS coordinates for each object to complete the detailed mapping work.

A fascinating collection of debris joined a growing mini military museum on the pier; a 1917 First Aid Kit, a brass anti-aircraft gunner's site and a mix of vintage and modern kitchenware tossed overboard from the ships.

With the completion of Phase One identifying and mitigating any immediate risks, Capt. Scott Ferguson, Coast Guard Commander of Sector Puget Sound, allowed Port Operations to continue through the 2011 cruise season with additional safety and security measures firmly in place.

Phase Two was a broader search of the seafloor beyond the immediate cruise ship berths. The final search began in February 2012 and was completed in late March.

The entire Remedial Investigation process ended with a series of dull "thuds" in April as the collected explosives were detonated in a Contained Detonation Chamber set up on the pier. According to Mark Murphy, Project Manager for the USACE, the fuzes were the only explosive materials recovered, "No fully-armed munitions were found." Those hoping for a Hollywood-style series of fiery explosions were disappointed, as only low-level thuds were heard in the immediate area.

In a final press conference for local news agencies, Col. Wright of the USACE was quoted by KING 5 News, "We are confident that the removal action conducted at Terminal 91 resulted in greatly reducing the potential safety risk from remaining military munitions. However," he continued, "there are currently no technologies available that are 100 percent effective in detecting all military munitions."

In the end, the final tab for the search and clean-up topped $11M, and involved dozens of divers, sonar equipment, ROVs, and underwater video cameras. As the 2012 cruise season builds to its peak with ships in port almost daily, it's hoped there are no more surprises hiding in the silt.

A partial list of the more than 300 found munitions include:

2 – MK 3 Mod 1, 40mm, Projectile
1 – MK 23 series AA Warhead
1 – MK 29 MOD 2, 3' Armor Piercing Round
9 – 40mm casings
1 – 5" MK15 – Armor Piercing
1 – 20MM projectile
147 – 20mm rounds
20 – .50 Cal
2 – 40mm rounds

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2012 Marine Technology Reporter Editorial Calendar

January / February — **Ad Closing: Jan 13**

Offshore Inspection, Repair & Maintenance

Market: Salvage & Recovery
Product: Scientific Deck Machinery
Directory: Umbilicals, Cables, Connectors & Power Supply

Bonus Distribution
AUVSI
Feb 7-9 Washington, DC
Underwater Intervention
Jan 24-26 New Orleans, LA

March — **Ad Closing: Feb 23**

Subsea Vehicle Report – Unmanned Underwater Systems

Product : Sonar Systems & Seafloor Mapping
Regional Report: Atlantic Canada
Preview: Oceanology International 2012 Technology Guide

Bonus Distribution
Subsea Tieback
Mar 6-8 Galveston, TX
Oceanology International
Mar 13-15 London, UK

April — **Ad Closing: Mar 22**

Global Offshore Deepwater Report

Market: Seismic Vessels & Systems
Product : Deepwater Positioning, Mooring & Anchoring
Special Report: Environmental Monitoring, Remote Sensing & Pollution Control

Bonus Distribution
Offshore Technology Conf.
Apr 30 - May 3 Houston, TX

May — **Ad Closing: Apr 19**

Hydrographic Survey

Market: Renewable Energy –Wind, Wave & Tidal Power Report
Product : Instrumentation: Measurement, Processing & Analysis
Preview: OceanTech Expo Preview & Show Guide

Bonus Distribution
OceanTechExpo
May 21-24 Newport, RI
UDT Europe
May 29-31 IFA, Spain

June — **Ad Closing: May 24**

AUV Arctic Operations

Market: Communications, Telemetry & Data Processing
Product : Deck Machinery, Winches, Cranes and Ropes
Special Report: Seafloor Engineering & Remote Operations

Bonus Distribution
EnergyOcean
Jun 19-21 Boston, MA

July / August — **Ad Closing: Jun 21**

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Market: ROV Technology: Workclass to Micro Vehicles
Products : Underwater Imaging: Lights, Cameras, Sonar
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Market: Marine & Subsea Engineering & Construction
Product : Offshore Inspection, Repair & Maintenance
Regional Report New England

Bonus Distribution
Oceans MTS/IEEE
Oct 14-16 Virginia Beach
SNAME
Oct 22-24 Providence, RI
MAST Americas
Nov 14-16 Washington, DC

November / December — **Ad Closing: Nov 22**

Fresh Water Monitoring & Sensors

Market: 2012 Market Planner
Product : Naval Underwater Warfare Technology
Special Edition: 2nd Annual Underwater Imaging Contest

Please note that the publisher reserves the right to alter this calendar. All features are subject to change in light of industry trends and developments.

Mapping for Oil

Marine seismic surveying with Atlas Copco Hurricane compound compressors in deep water or 'transition zones'

By Joe Bradfield

Marine Seismic Surveying

The most common method of marine seismic surveying uses intense blasts of air that send vibrations through the water deep into the sea floor. Computers interpret the unique reflections to detect and map any oil and gas reserves as far as 6,000 meters below.

According to Daryl Heiser, the application and product support manager for Atlas Copco Hurricane, not only do Hurricane marine packages provide engineers with an impeccably reliable pneumatic source but they are ideal for this application.

While other systems require large compressed air storage to ensure recovery, Hurricane compressors maintain a steady backpressure that delivers a near constant 155 bar at a consistent rpm. This requires significantly less storage capacity. Reducing storage requirements in turn reduces the size of the unit.

Atlas Copco marine compressors have the smallest footprint of any marine compressors on the market, a welcome asset in the restricted space of a ship at sea.

Picture Perfect

In 1959 the first ship to tow a single air gun ("sonic source") from a streamer over a hydrophone placed on the sea bed produced a simple but reliable 2-D image of the conditions below it. Today's source ships can pull thousands of air guns in streamers several miles long to make highly detailed, precise 3-D charts. The number of sonic sources and length of streamers is limited only by a cost-analysis considering the area being covered and the degree of detail required. These "source ships" not only need large volumes of high-pressure air but also require rapid recovery. For instance, typical air requirements for an array of sonic guns range from 10 to 400 cubic inches at 2,000 to 3,000 psi. The array is fired in precise intervals of anywhere from 8 to 12 seconds.

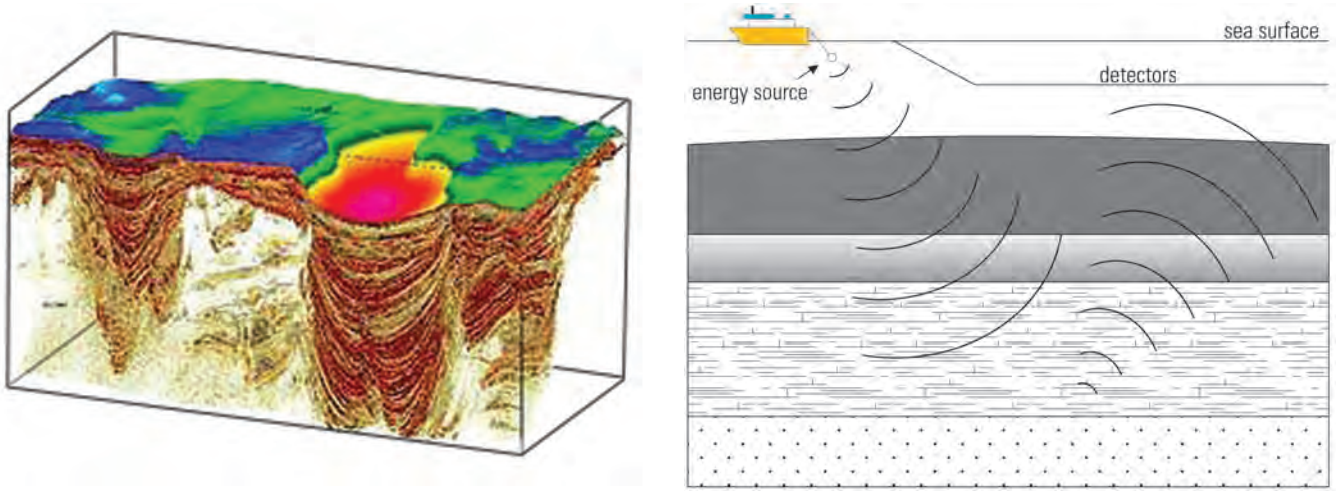
The compressors must meet this demand without fail for every firing throughout a 12-hour shift or more. A failure can mean repeating a day's work from the beginning. Repeating a run not only creates added expense but is also a disheartening setback for the crew, who put in long hours to finish mapping a location while conditions allow.

Transition Zone (TZ) Surveys

Maynard Jones is a senior service engineer with Atlas Copco Hurricane. He works closely with the company's marine clients. Jones said that although they can design a compressor solution for any type of marine seismic surveying application, one in particular has been demonstrating the benefits of using Hurricane compressors. This is the transition zone (TZ) market.

In Brief

Seismic surveying for the oil and gas industry uses vibrations to determine the size and location of underground gas and oil reserves for engineers. It is based on principles developed by earthquake seismology. The marine version of this seismic exploration is a niche market with a slender profit margin. Competition for jobs is tight, as crews from around the world eagerly watch for jobs everywhere in the world. So whether they are working in deep seas or in swamplands, marine survey companies can't take chances on their equipment. Atlas Copco Hurricane, a world leader in compressor technology, designs compressor packages specifically for use in marine applications.



These show how air is used to "see" changes below the sea surface and the computer-generated models of what is detected.

A Hurricane booster on board another ship conducting seismic mapping.

Blowing better bubbles

Ships using Atlas Copco Hurricane compressors for seismic mapping offshore.

Compressor choice is the crucial foundation of any air-dependent seismic system. Heiser said Atlas Copco Hurricane's success in the TZ market stems from both compressor design and proprietary salt-water resistant materials. Typical models for TZ acquisition include the **air-to-air-cooled:**

SB13-44 (600 cfm at 2,500 psi)

SB15-44 (800 cfm at 1,500 psi)

SB18-44 (800 cfm at 2,500 psi

And the sea-water-cooled:

SBM12-44 (500 cfm at 3,000 psi)

SBM18-44 (800 cfm at 2,700 psi).

These Hurricane compound units feature a 4-stage system. The unit takes in ambient air at normal atmospheric pressure through a screw compressor. Then three successive piston compression stages ramp up the pressure for anywhere from 300 to 800 cfm to thousands of pounds per square inch. The Hurricane units deliver consistent volumes of high pressure air shot after shot, for uniform bubble-blasts within a few seconds of each other without high load reversals on the system.

TZ data acquisition takes place in shallow water surveys, those occurring in the interface between land and deep water, the transition zone. Since these surveys are conducted along shorelines and in large lakes, estuaries and even swamps, they present surveyors with added difficulties. Streamers and cables can tangle in submerged rocks, vegetation and even underwater wreckage. Water levels are affected by tidal action and wave conditions.

Since water in a TZ is usually less than 10 meters deep, the streamer cables may contain both source and hydrophones together in each cable. Individual phones might even be pushed into the bottom by hand. This shallow water work requires smaller ships, even rafts, and the most compact marine compressors made.

Shooting for Long Life

Heiser said this smoothness of operation, combined with Atlas Copco's proprietary corrosion resistant materials, increase unit longevity. It is because they are so corrosion resistant that the units can use sea water to keep the pressurized air cool. Jones added that sea water also contributes to cooling the unit's diesel engine. Electric compressor packages are also available but the trend among companies has been for diesel power. He said that depending on where the unit is located on the ship, sea water has generally proven most effective, and this contributes to unit life, as well. Heiser also addressed ease of maintenance. Atlas Copco keeps crews productive because the Hurricane units are so accessible. Servicing is simple. "Even a complete valve rebuild takes only a few hours to do, rather than days of downtime that some other units require."

Global Support

Atlas Copco customers also enjoy global support. Whether a U.S.-based survey company, for instance, bids jobs in the Gulf of Mexico or the Gulf of Tonkin, there is a local customer service center not far away. No other compressor company can support their equipment so well globally.

Ask anyone from the growing number of shallow water surveyors about their air concerns. They'll tell you how Hurricane can make even difficult TZ just a bit more easy.

About the Author

Joe Bradfield is senior writer for Ellenbecker Communications, an international communications firm specializing in the drilling, mining, and construction industries.

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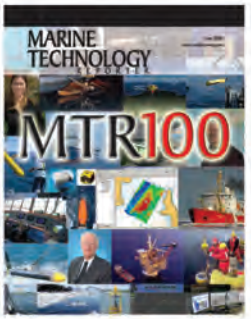

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Thinking Outside the AUV

Photo Courtesy Chris Hammond

By Wade Kearley, BFA, MLT

The data-collection capacity of an AUV expands significantly if you add an external 3.5 meter-long sensor-array wing while maintaining programmable flight. After two years of applied research, the REALM project within Memorial University of Newfoundland in partnership with PanGeo Subsea Inc. is closing in on the launch of an AUV prototype that could greatly reduce sub-bottom imaging costs for a broad range of marine projects.

The water ahead of the zodiac is almost calm as Ron Lewis, (M.Eng.) approaches the shore. Just ahead of him the water ripples as the Explorer, an autonomous underwater vehicle, returns from its pre-programmed mission and docks at the nearby wharf. Once lift cables are hooked on, the winch operator slowly hoists the 4.5 meter-long AUV with a difference: a 3.5 meter long wing strapped across its belly. There is no back slapping, but the team of researchers on the water and onshore at the Holyrood Marine Base, an hour`s drive from St. John's, know that, after 12 days of sea trials, they have passed an important hurdle.

Image Above

After reprogramming the "guts and glory" of the AUV two members of the REALM project team prepare to close and seal the Explorer for sea-bottom trials: (L-R) Ron Lewis, project manager and Peter King, lead engineer.

This is the culmination of a two-year partnership to deploy proven acoustic marine technology in an innovative way. The partners include PanGeo Subsea Inc. and the Responsive AUV Localization and Mapping Project (REALM) at Memorial University of Newfoundland in St. John's.

Speaking by telephone from Paris where he was attending a World Ocean Council meeting, Gary Dinn says the project had its genesis in the halls of a federal funding agency. It was 2010 when Dinn, vice president for technology development with PanGeo, struck up a conversation with a bureaucrat familiar with his company's acoustic technology. She thought he would be interested in the REALM project which had renewed research funding. "They were deploying their AUV

with broadly available technology, but wanted an edge. The marriage of their AUV with our patented SBI technology presented a unique industrial application that couldn't happen anywhere else," says Dinn. The Sub Bottom Imager (SBI) uses acoustic imaging to delineate sub-seabed strata and buried geohazards up to five meters below the surface to a resolution of five centimeters. The sensor array is usually deployed with an ROV. This, according to Dinn, has been effective but costly for their customers. "A workclass ROV, including the vessel and crew, costs up to $100,000 a day. But with an AUV you take the ROV vessel and crew out of the equation, reducing costs to less than one tenth of what it now takes," explains Dinn.

He believes those savings make the technology more practical and less of a risk for applications in at least two areas. First of all are cost-sensitive applications to determine the suitability of the seabed in a pre-route survey for pipeline or cable burial with a detailed technical analysis of the seabed. Secondly there are low cost deepwater survey applications to 1,000 metres covering any distance.

According to Dinn, routine inspections of undersea pipelines and cables by an AUV equipped with their technology could become a matter of standard practice.

No Existing Models

Guiding a tour of the AUV lab on the Memorial campus, Ron Lewis can't resist resting a hand on the bright yellow Explorer which dominates the long narrow room. He says the AUV-SBI project began in earnest in 2010 with significant discussions around how to tackle a project for which there are no existing models. "There is one smaller AUV in the United States with a much smaller wing," he says, "but nothing of this scale anywhere in the world."

Engineering for the integration to succeed included modification of the SBI sonar technology for housing in the Explorer which in turn required a significant refinement of the AUV's dynamic behaviour. "For the technology to work we have to fly at 3 knots ideally about 3.5 metres above the sea floor," says Lewis. The risks were considerable, with more than $2.75 million in technology alone involved not to mention the costs of research and development. But the rewards included new AUV survey services from PanGeo Subsea and significant investment in Memorial University's design capabilities for hull design, vehicle control, stability, and performance," he says.

Ron Lewis, REALM Project Manager

"…the rewards included new AUV survey services from PanGeo Subsea and significant investment in Memorial University's design capabilities for hull design, vehicle control, stability, and performance."

The Best Way to Mount an AUV

Conceptual design started in 2010 as they grappled with considerable road blocks. "There were some limitations to integration right off the bat," reveals Lewis. They did not want to integrate the SBI technology into the central pressure vessel where the "guts and glory" of the AUV are housed. That left the limited option of loading the sensors into the fore and aft flood chambers. "But then the team came up with the idea of mounting an external wing," says Lewis.

"We are no longer limited to the physical size of the AUV. We have introduced another dimension—it was a torpedo and now we have the starship Enterprise"

Ron Lewis

But where was the best place to mount it? After considering everything from the bio-model of a hammerhead shark to the feedback from hydrodynamics colleagues, they selected the underside near the center of gravity using a special clamp designed to hold the array in place. With the weight balanced properly the Explorer's shape had changed from a cylinder to an inverted monoplane.

Next they needed answers related to performance. The SBI can only capture high resolution images at speeds of three kilometers an hour

Retrieving the Explorer after a successful 12-day trial with the external mock-up wing attached.

(Photo Courtesy Darwin Northcott)

"They were deploying their AUV with broadly available technology, but wanted an edge. The marriage of their AUV with our patented SBI technology presented a unique industrial application that couldn't happen anywhere else"

Gary Dinn, vice-president, technology development with PanGeo Sub Sea

but the AUV is less maneuverable at such low speeds. Would the vessel over-pitch during a dive and go too deep? Would it fail to rise to the surface after a dive as it was programmed to do?

"A workclass ROV, including the vessel and crew, costs up to $100,000 a day. But with an AUV you take the ROV vessel and crew out of the equation, reducing costs to less than one tenth of what it now takes"

Gary Dinn

Crunching the Numbers with CFD

To answer these questions the partnership proceeded to computational fluid dynamics (CFD) in the virtual environment. "This was a cost effective way to look at wing drag and see if it would affect the hydrodynamics," says Lewis, "but CFD is very easy to use incorrectly." They brought in the technology, the software and the experts to work with graduate students and interpret results, which, says Lewis, at least in the virtual world, received thumbs up.

In December 2011, the partners moved from the virtual environment to controlled environmental testing with particle image velocimetry (PIV) at the Marine Institute's flume tank. Equipped with recording and environmental controls they looked at different pitches and performance under different flow speeds, validating straight and level, flow around the wing as it is designed, and the wake behind the wing. After two months of data analysis they validated the CFD results, "within an acceptable margin of error," says Lewis. With those results in place they proceeded to the next phase: twelve days in Conception Bay.

Out Of the Tank and into the Bay

For marine research in Newfoundland, April can be the cruelest month: Arctic ice, freezing temperatures, and high winds are not uncommon. But, April 2012 delivered twelve straight

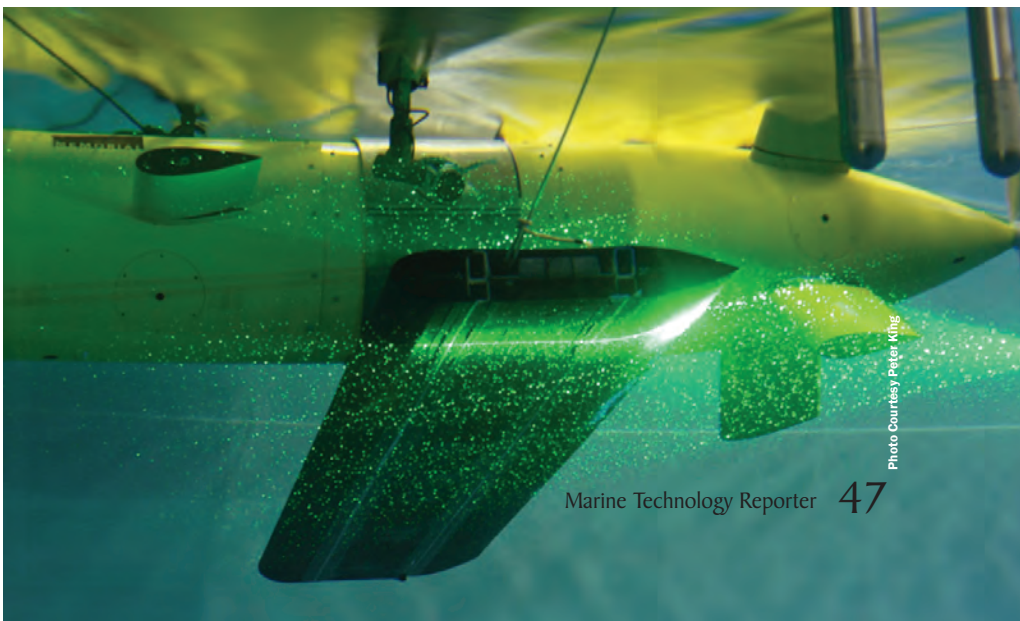


Photo Courtesy Peter King

Controlled environmental testing with particle image velocimetry, at the Marine Institute's flume tank in St. John's, confirmed the computational fluid dynamics results.

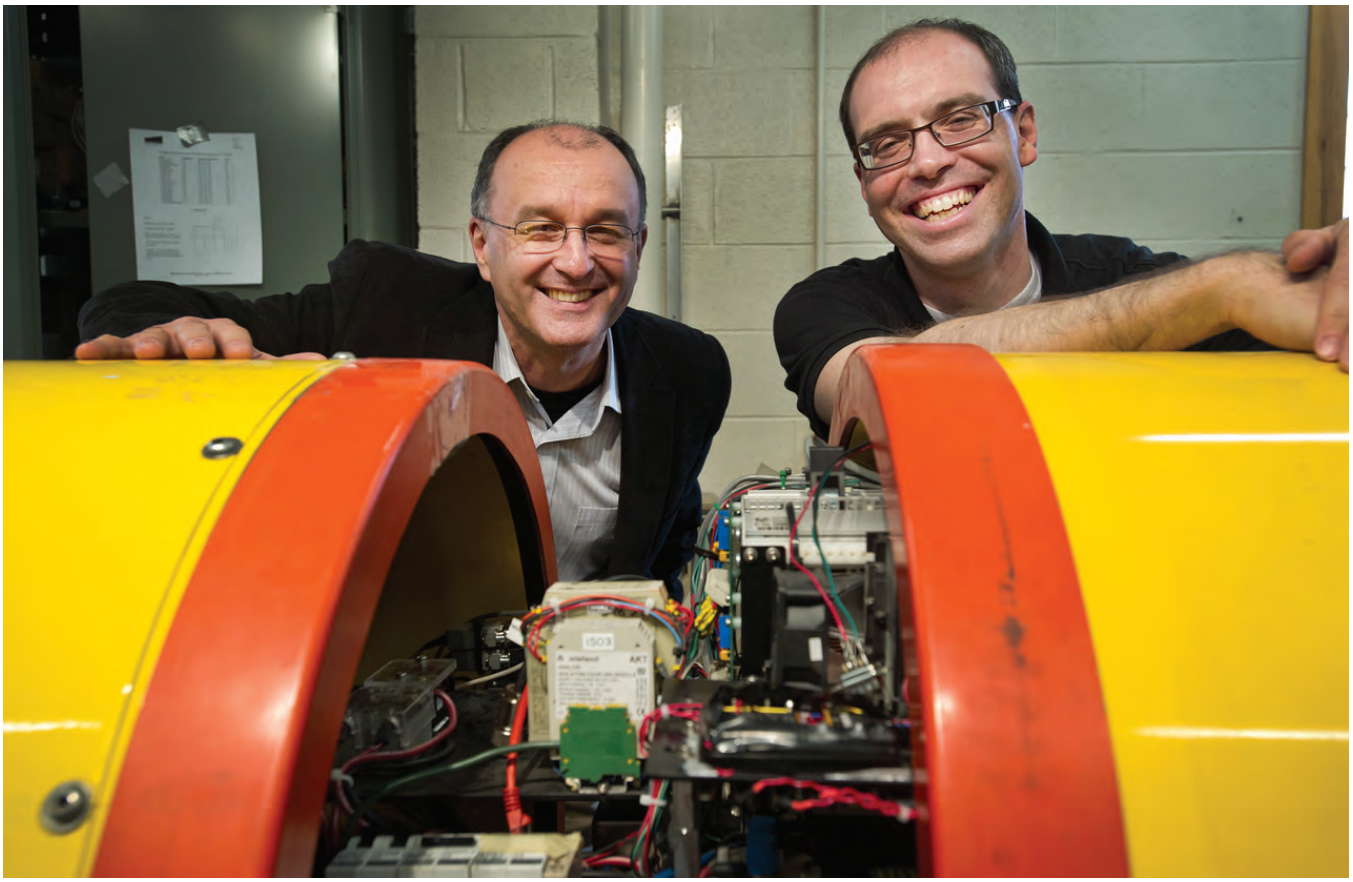


Photo Courtesy Chris Hammond

With the preliminary work behind them, the team is now into the full integration phase in preparation for prototype tests in the autumn of 2012: Gary Dinn, vice-president, technology development with PanGeo Sub Sea (left) and Ron Lewis, project lead for the REALM project.

days of calm. Standing on the wharf in Holyrood, an hour's drive outside St. John's, Lewis is cautiously enthusiastic about the sea trials. "Technically everything went well," he says. Explorer, outfitted with the mock-up wing, operated within the speed envelope at the required distance from the seabed.

"We know now that the technology can go out and cover an area and bring back the data," says Lewis. "We did repeatable runs. We made sure we could operate safely at the right speed, depth, and range. The rest is just engineering."

There were, however, a couple of issues. "It's not as easy to pull out of a dive or an ascent as we would like," reveals Lewis. In practical terms that means, if they were to run a mission at the present state of development, indepth mission planning would be vital.

Critical Analysis

When drilling and excavating on the Grand Banks the majors know they need to be on their game and not just because of the massive icebergs, but also because of the challenges buried in the seabed, such as large boulders or other unexpected formations which can cause delays and cost overruns. So if there is a way to get a preview of potential hazards on the proposed drill center, even to the depth of five meters, the risks could justify the cost of a sonar survey.

Many of the majors working on the east coast of Canada require a WROV vessel which, despite a daily cost in the vicinity of $100,000, appears to be in constant demand. It seems likely that if they had access to a proven technology to conduct a percentage of the sub-mud line surveys, it would be an advantage because it frees the costly WROV vessel for heavier work.

Industry sources say there is a precedent in the oil and gas industry for the kind of opportunities to which the AUV-SBI technology might lend itself. Specifically, as offshore fields mature there are often smaller pockets of oil which attract smaller players to develop them on a cost effective model. This is already happening in the North Sea and these sources say it could be in the interest of smaller players on the Grand Banks to adopt this technology, allowing them to leverage the least expensive solution and get the sub-mud line information they need.

Gary Dinn appreciates this perspective. "There are advantages to an ROV. You get real-time feedback, instead of the post mission data you get with the AUV. And the ROV gives you more precise control when you want a closer look. But

this new technology is meant to complement that, not replace it," he says. And Dinn believes the market is much broader than oil and gas. "There are applications for power projects running seabed power cables for domestic use and for export."

The crown corporation Nalcor Energy has explored routes for an HVDC transmission line from the Lower Churchill Hydroelectric Project across the frigid Strait of Belle Isle to the island of Newfoundland. For that work in the relatively shallow waters, they selected conventional tow fish technology. For new technology to break into such a market the AUV-SBI team will need to demonstrate that they can cost-effectively fly accurately and bring back good, robust data to generate results in which the clients can be confident.

The Last Ten Percent

Back in the lab after the sea trials, Lewis is pleased but reserved. "We have completed ninety per cent of the process towards integration," he says. When Gary Dinn first broached the idea they wanted to see if they could engineer the solution in such a way that they could understand the dynamics and teach it to others. Now he knows.

"What gets me excited is that we have a lot more vehicle," says Lewis. We are no longer limited to the physical size of the AUV. We have introduced another dimension—it was a torpedo and now we have the starship Enterprise," he says with a broad smile, adding that it is up to the PanGeo's of the world to create the commercial opportunities.

At the time of writing Dinn and Lewis were scheduling meetings for late May 2012, to map out the final integration and trials of the "live" unit in early autumn, 2012. "As part of that, we will confirm the test results, complete the physical integration and get ready to fly," says Dinn.

Dinn says the ideal outcome would be to see the SBI integrated into the unit and an oil company contract them to survey a potential pipeline route. "But applications for this type of mobile, inexpensive surveying is pretty broad, and can even include mineral prospecting, and archaeological work," explains Dinn. "The AUV changes the equation."

Photo Courtesy Chris Hammond

ARIS Sonar Imaging System

offers clearer details to The Environment Agency

Project at a Glance

Problem: Keeping up with monitoring of rare, threatened species in England & Wales

Solution: Investment in additional Sound Metrics sonar units

www.macartney.com

Across England and Wales, The Environment Agency monitors fish life in rivers and waterways. They investigate rare and threatened species, such as eel and lamprey, and enumerate salmon and sea trout migrations. These agencies also investigate fish behaviour around in-river structures like abstraction sites and pump houses, tidal flap structures and fish passes to name a few applications.

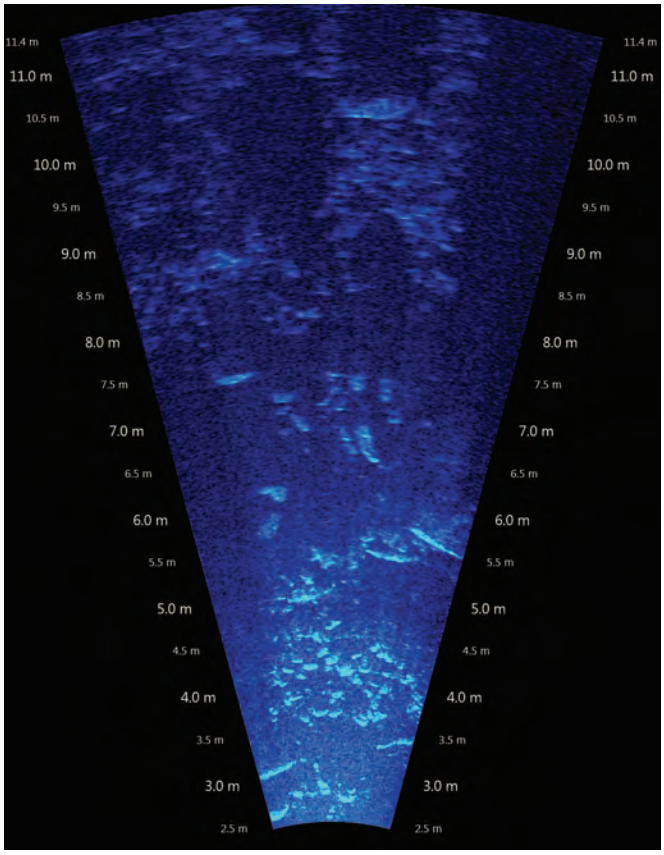
The Environment Agency already uses the DIDSON multibeam sonar system for their fish studies, which have proven to be highly effective in river monitoring. However, with The Environment Agency responsible for such a large area to monitor, demand has now outstripped the availability of the seven existing units and The Environment Agency fisheries technical experts were keen to increase their remote non-invasive monitoring capacity.

They have ordered new, additional sonar units through underwater technology supplier, MacArtney Underwater Technology. MacArtney will supply three of the new generation sonar models from Sound Metrics Corp, the Adaptive Resolution Imaging Sonar (ARIS) for their specialised fish monitoring work.

"The higher resolution and lower power requirements of these short range units will be ideal for studying fish movements in the turbid waters around tidal flap structures and fish passes, particularly in remote locations that lack mains power supply," explained Jon Hateley, Technical Advisor (Hydroacoustics) at the Environment Agency.

All the new ARIS Explorer range of sonar's are low powered, drawing less than 15W – half the nominal 30W required for the current DIDSON. It also requires less maintenance as the sealed lens arrangement eliminates the need for a silt box and the internal focus drive mechanism avoids potential jamming issues.

The DIDSON system is still a popular choice for imaging sonar units for fisheries and Marine Scotland has recently placed an order for a standard 300m rated DIDSON system. This system will be used by the Scotland Freshwater Laboratory for fisheries investigation and fisheries research projects.



New generation sonar units from Sound Metrics Corp. supplied by MacArtney will aid specialized fish monitoring work.

MacArtney Underwater Technology will supply the DIDSON, a range of accessories, commissioning and training. The Environment Agency in Wales has also purchased a DIDSON LR (Long Range) imaging sonar.

All ARIS and DIDSON system orders include the sonar, Pan & Tilt rotators, special lens items, commissioning and training if and as required.

Smart ROV Tools
Guard the Environment

Project at a Glance

Problem: Checking for residual fuel in a 70-year-old wreck while minimizing environmental risk

Solution: Unique ROV-mounted sampling system

www.gdiving.com/

Checking for residual fuel in a 70 year-old sunken wreck without opening the tanks and risking an environmental catastrophe needed a clever solution. The answer came from Global Diving and Salvage which created a unique sampling system mounted on a Saab Seaeye Cougar XT ROV and can penetrate a sealed container and extract a sample without creating a leak point.

Global was contracted by the United States Coast Guard to determine if oil was present aboard the S.S. Montebello, a tanker torpedoed in 1941 off the coast of California.

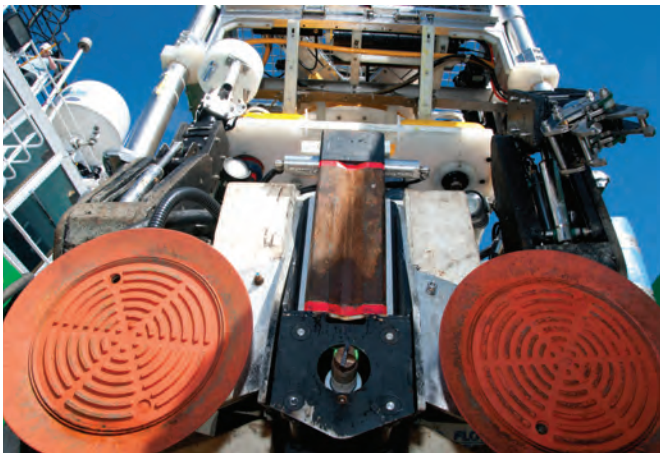
During the investigations Global fitted-out the Cougar with a range of tools to perform 3D modeling, sonar inspection, thickness gauging, a backscatter investigation, the physical sampling of the ship's fuel tanks and sediment sampling of the general area.

To prepare for the assessment, Global first had to clean off areas of the surface, which meant removing more than 70 years of debris. For this process they used the Cougar's power and tooling capability to clear the tank with a wire wheel and barnacle buster fitted to the manipulator arms.

A Tracerco neutron backscatter system was used to help determine the likelihood of oil in the wreck's cargo holds. This backscatter tool is a non-invasive contents-sensing device, something like an x-ray that emits neutron particles capable of passing through insulation material and carbon steel to determine the presence of content. It was mounted on a skid attached to the ROV and integrated with the vehicle's control package. The ROV's powerful and responsive thrusters held the system steady whilst the backscatter operation was carried out.

Due to depth of water - 275m (900 ft.) - and the potential risk of leakage of the tank contents, the development of Global's unique sampling tool system to extract a sample was paramount to the success of the operation. The innovative feature meant that when the hole was drilled through the tank and a sample taken, the hole was then sealed – all in one leak-proof operation without fittings or valves.

The success of this procedure required the reliability and capability of the Cougar's hydraulic tooling package; for once the sampling operation is underway, a breakdown or glitch can be disastrous. It was essential that the sampling system was held steady by the ROV's responsive power and suction cups while the sample was taken and the surface sealed. The happy outcome of the mission was to discover that no oil was present in the wreck and that it offers no threat to the ecological environment.



Global's unique sampling tool system with suction cups fitted to the Cougar.

Global's ROV control cabin.

Silence is Golden... Especially Underwater

Project at a Glance

Problem: Growing concern across maritime regarding underwater radiated noise & its effects on sea life

Solution: MARIN's new silent towing carriage

www.marin.nl/

MARIN introduces a new silent towing carriage in a bid to further the industry's knowledge about underwater-radiated noise.

Traditionally, underwater-radiated noise is mainly of interest for naval vessels and fishery research ships. Nowadays, however, there is growing concern that marine life is affected by the rise in background noise levels in the oceans, which is being caused by an increase in shipping, amongst other factors. Marine mammals and fish use sound to communicate and to sense their environment and this requires low background noise levels.

This topic is highly relevant for ships that need to operate in vulnerable areas such as the Arctic but this has also resulted in an interest in evaluating underwater-radiated noise caused by shipping in general. In this context, standardized procedures for fullscale noise measurements have recently been proposed by ANSI/ASA, ISO and DNV.

MARIN has responded to the need for more knowledge on underwater-radiated noise from cavitating propellers by developing a new silent towing carriage for the new Depressurized Wave Basin which was officially opened last March. This carriage has a much lower background noise level than the existing standard carriage and is much more versatile than the old, silent towing carriage. The old towing carriage for noise measurements was developed for the US/ NL Flow Noise Project in which, amongst other things, the radiated noise from breaking ship waves was successfully measured. The new design focused on minimizng the transfer of vibrations of the carriage to rails and of course, on minimizing the mass of the carriage. Additionally, the propeller drive train is being redesigned so it will be as silent as possible. The goal is to measure the noise of propellers that need to comply with the ICES 209 norm.

The procedure for noise measurements in the new Depressurized Wave Basin is similar to full-scale noise trials: the ship sails over a pair of hydrophones, which are mounted on a mast in the basin. Due the basin's large size, the influence of reflections is limited. Therefore, the facility offers unique features for cost-effective noise reduction in ship design and consequently, in turn, the quality of marine life will be improved.

About the Author

Frans Kremer is senior project manager at the Ships department of MARIN, the Maritime Research Institute Netherlands. MARIN offers simulation, model testing, full-scale measurements and training programmes, to the shipbuilding and offshore industry and governments.
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Marine Buoyancy Solutions

Giving Heavy Loads a Lift

Project at a Glance

Problem: Safe, effiicent tow out of offshore windfarm monopiles from Kent to Vlissingen in Holland

Solution: Seaflex Ltd. inflatable buoyancy units

www.uniquegroup.com

Unique Maritime Group recently announced two key projects involving buoyancy systems provided by Seaflex Ltd. The London Array is an offshore wind farm under construction in the outer Thames Estuary in the U.K. With 1,000 MW capacity, it is expected to become the world's largest offshore wind farm. Seaflex products played a key role in three critical phases of the construction:

- **Assistance with the float out of heavy gauge steel monopiles, on top of which each wind turbine is mounted**
- **The installation of the export power cable to the onshore power management station in Kent**
- **The final connection of the power cable to each wind turbine**

Seaflex were contacted by Ballast Nedam B.V. with the request to supply bespoke buoyancy modules to be fitted inside mono piles prior to tow out to the site off the Kent coast from Vlissingen in Holland. Each monopile was of tubular steel construction at 4.5m diameter and up to 65m long. With a wall thickness of 75mm – 80mm each monopile weighed in the region of 400t.

Seaflex were contracted to manufacture 6 x 88t Inflatable Buoyancy Units with a diameter of 4.5m and 6m in length to suit a standard pile. Each buoyancy unit was double skinned for added protection against the inner wall of the monopiles. It was decided two sets would be needed to enable one set to be in use while the other was on it's return trip to Vlissingen, keeping the project on schedule.

Visser and Smit contacted Seaflex for the remaining two phases, to connect the export power cable from the cable lay

vessel Spirit to the power management station ashore, and to patch in each wind turbine to the offshore hubs – or subsea junction boxes in layman's terms.

The main export power cable has a diameter of 208mm and weighs over 80kg/m in the water. Seaflex supplied over 3km of SeaSerpent cable buoyancy system in 50m and 100m lengths, each section delivered on a steel deployment reel. SeaSerpent was the perfect product for this installation due to the extremely shallow water (0m to 6m over 3km) and because due to tidal variations, the cable route dried out for 8 hours in every 12.

SeaSerpent allows for a high rate of lay meaning the 4 operational hours were used to maximum efficiency.

At the offshore end of the power cable a hub was installed in the midst of the turbine array, with cable spurs running to each turbine. As the spurs approach each turbine, they cable lay vessel performs a zig zag course, laying the cable in what is know as a lazy 'S' over the last 500m or so. After detailed engineering analysis with Visser & Smit, Seaflex were asked to provide 3 x 120m lengths of 33kg/m SeaSerpent and 25 x 250kg Air Lift Bags, not to lift the cable, but to lighten it in preparation for the cable end to be winch up inside each turbine's J-Tube. During the winching operation, Hughes Sub Surface Engineering divers were employed to peel off the SeaSerpent and remove the 250kg Air Lift Bags at the J-Tube's bell mouth.

Vessel Floatation

During a power outage, The Jean Ricciardi, a 25-m, 250-gt vessel ran aground and damaged her hull resulting in her sinking close to Sete harbor, in France. Due to the water depth and the close proximity to the harbor entrance a rapid solution was required.

The local diving & salvage contractor, Prodive of Monaco, contacted Seaflex to supply the necessary equipment - 12 x 20t ALB (Air Lift Bags).

The bags were packed and dispatched from stock the same day from Seaflex head quarters on the Isle of Wight and arrived on site two days later.

The salvage was completed by the contractor within a week of the call to Seaflex and the Jean Ricciardi has now been safely removed from the water to be broken up for scrap.

The Seaflex buoyancy range includes;

- **Air Lift Bags (ALB's)**
- **Inflatable Buoyancy Units (IBU's)**
- **Mono Buoyancy Units (MBU's)**
- **SeaSerpent Cable Buoyancy System (SS)**
- **Kraken Pipeline Buoyancy System (KS)**
- **WaterLoad Bags (WLB's)**
- **Lifeboat Testing Bags (LBTB)**
- **Load Cells (LC)**

Optech: Completes Field Trials for Bathymetric System

Optech, a developer, manufacturer and supporter of advanced lidar and camera survey instruments, announced the successful completion of field trials for the new airborne Optech CZMIL Coastal Zone Mapping and Imaging Lidar system. The CZMIL system underwent field trials and validation in coastal Mississippi and Fort Lauderdale, Fla.. The system flew over five sites ranging from urban areas to barrier island habitat. GPS-based ground control, Lynx vehicle-based lidar data and sonar data were collected for comparison to CZMIL data, in partnership with the University of Southern Mississippi. In Fort Lauderdale CZMIL flew offshore over the Navy's South Florida Ocean Measurement Center (SFOMC). In addition to data acquisition over known targets, Optech collected sonar data over the project area for comparison to CZMIL. Over each site were collected Optech CZMIL lidar data, CASI-1500 hyperspectral data and Optech T-4800 metric frame camera imagery.

Optech CZMIL was designed by Optech for the U.S. Government under the auspices of the U.S. Army Corps of Engineers (USACE) and the Joint Airborne Lidar Bathymetry Technical Center of Expertise (JALBTCX). It was built and tested by Optech with the assistance of the University of Southern Mississippi (USM).

OBIT

Keith Field, President of Flange Skillets

Keith Field, 55, President of Flange Skillets, International, passed away unexpectedly on April 15, 2012 in New Orleans. He was born in Newport News, Va., to Lilah and Graham Field. Keith graduated from the University of Virginia with an architectural degree and a job transfer sent him to Florida shortly thereafter. While in Florida, Keith formed his own company and was a member and past president of the Master Custom Builder Council of Central Florida. He was also a well respected businessman in Mt. Dora and worldwide with a passion for creating and constructing custom homes. He owned several historic buildings in downtown Mt. Dora and was passionate about renovating and protecting them. He was a SCCA champion driver, played keyboard for the "Bob Willey Band", lived on Lake Dora and loved boating. He was a member of multiple pet rescue groups having a home filled with various rescued pets. He became father of three at age 50.

CTG Names Douville as Hires VP of Mfg.

Channel Technology Group (CTG) said that Gary Douville will join CTG as its new Vice-President of Manufacturing Operations. Douville will be responsible for CTG Manufacturing, Procurement, Planning and Materials Management, Quality and Continuous Improvement. CTG is a vertically-integrated designer, manufacturer and supplier of piezo-electric ceramics, transducers, systems and services. CTG is owned by private equity firm Blue Wolf Capital Partners, LLC. Douville graduated from University of Connecticut in Storrs, CT with a Bachelor's of Science degree in Mechanical Engineering and has a Master's of Science in Management from Rensselaer Polytechnic Institute in Hartford, CT.

Seatronics Expands to Brazil

Seatronics, an Acteon company, continued its three-year expansion plan by opening a new office in Macaé, Rio de Janeiro, Brazil. With established bases in Aberdeen, UK; Abu Dhabi, UAE; Houston and Louisiana, USA; Perth, Australia; and Singapore, this new office in South America reflects the company's ongoing expansion and increased business from new and existing clients. The vice president of the USA and Brazil regions, Mark Teles, will lead the Brazilian team. Seatronics has agreements with world-leading equipment manufacturers, including CodaOctopus, Valeport, Marine Magnetics, Predator ROV, Cooper Interconnect, BlueView, Zetechtics, Tritex NDT, J2 Engineering Services, Oceaneering, Global Marine, Seacon and Bowtech.

Retiring US Navy EOD Expert Joins VideoRay

Mark W. Fleming has been appointed to the newly created position as VideoRay LLC's Business Development Manager for Military and Government sales. He will be responsible for building on VideoRay's extensive network of underwater solutions for Ship Hull Pier / Dock Inspection and Response. During his 30 years in the U.S. Navy, His most recent position was the Requirements and Asymmetrical Warfare Officer, Explosive Ordnance Disposal Group ONE, at the rank of Chief Warrant Officer 5. He will work from a new office that VideoRay is opening in San Diego.

EIVA: Pedersen on Board

The shareholders of EIVA have appointed Flemming Bligaard Pedersen to the Board of Directors. Pedersen holds a degree in civil engineering with a PhD in load bearing structures. He recently retired as Managing Director and Group CEO of Rambøll, where he worked for almost 40 years, whereof the last 20 years as Group CEO.

Mariscope Expands Global Reach

ECOS Canarias is an environmental consulting company with a growing technological department. Located on the Canary Islands, the company is in the middle of an increasing marine sector, pushed by the Oceanic Platform of the Canary Islands (PLOCAN). ECOS is a privately owned company specialized in Marine Technologies and Operations cooperating with the German ROV manufacturer Mariscope Meerestechnik. After purchasing its first ROV (a Mariscope FO II model) and following onsite training, both companies agreed on a stronger cooperation. As result, ECOS Canarias will be representing Mariscope Meerestechnik on the Canary Islands and the Spanish mainland.

Mariscope also recently announced:

- In the U.S. **ACAMAR**, directed by Chuck Phillippe, will represent Mariscope Meerestechnik. Email: chuck.phillippe@acplus-marine.com
- In China it will be represented by Company Beijing Time Frequency. Email: madmax.ma@gmail.com
- In Finland the company **Meri-Norpat Ay** will represent Mariscope. Email: marko.saramo@merinorpat.com
- **Navaltis** from Turkey started the representation of Mariscope in April. Email:okaracaoglan@navaltis.co.uk

UTEC Survey Wins $3m in Contracts

UTEC Survey announced two contracts which see the utilization of additional vessels in West Africa and the Arabian Gulf. The Maridive 515 was mobilized in the UAE in early April and is conducting a major pipeline survey in the Arabian Gulf. The 55m vessel, built in 2009, is fitted with a comprehensive analogue survey spread complete with onboard processing and is currently committed until June 2012. Meanwhile the HD Independence has been utilized in the Gulf of Guinea, West Africa in a project expected to be complete this month before the spread moves to other work in the region. This 50m air diving vessel is fitted with analogue survey and geotechnical spread.

Sonardyne, Liquid Robotics, Deploy in GOM

Launched and ready to gather data from Sonardyne's Fetch subsea sensor node. The Wave Glider is the world's first persistent marine robot that can operate for up to a year at sea, enabling a whole new category of ocean data services. In a joint project with NERACOOS, U.S. IOOS, the University of Maine's School of Marine Sciences and Houston-based Sonardyne Inc., a Wave Glider has been launched near Monhegan Island in the Gulf of Maine. Over a period of 6 to 8 weeks it will collect information on water conditions in the Gulf of Maine, including temperature, salinity, and wave height.

Two of Sonardyne's long-life subsea sensor logging nodes, called Fetch, have been deployed onto the seafloor, from where they will make regular subsea measurements using their onboard suite of environmental sensors. When requested to do so, the stored data will be transmitted wirelessly up to the Wave Glider for onward transmission via a satellite link to the shore for near-realtime assessment. This project demonstrates how the combination of Fetch and Wave Glider technologies can expand the spatial and temporal resolution of the installed Ocean Observing System. After the initial deployment in the Gulf of Maine is completed, the Wave Glider will transit to waters off the mid-Atlantic for additional missions, including tsunami detection.

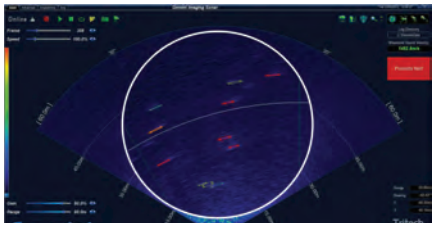
www.sonardyne.com
www.liquidr.com

McCarthy Joins Seabed Technologies

Seabed Technologies said that Kevin McCarthy, former VP at Hydroid, has joined as COO. The company also announced that Seabed Technologies has moved into a new manufacturing facility in the Falmouth Technology Park, in close proximity to the Woods Hole Oceanographic Institution. Seabed Technologies was founded to commercialize the technologies developed in the laboratory of Dr Hanumant Singh of WHOI's Deep Submergence Laboratory. The company has core business interests in imaging in the marine and polar environment. Its core technology includes high dynamic range camera systems, photomosaicing and 3D image reconstruction underwater, and the Seabed family of AUVs and towed vehicles. It holds the exclusive license from the WHOI for the manufacture and further development of the Seabed Autonomous Underwater Vehicle, imaging systems, and software packages developed in the laboratory of Dr. Hanumant Singh in WHOI's Deep Submergence Laboratory.

www.seabedtech.com

Tritech's Gemini SeaTec Sonar



Gemini SeaTec provides an early warning of the presence of marine mammals in the vicinity of marine current turbine structures. The Gemini SeaTec system has been field tested on the Marine Current Turbine (MCT) SeaGen installation in Strangford Lough, Northern Ireland, overseen and tested by the Sea Mammal Research Unit (SMRU) Ltd. The latest version of Gemini SeaTec system includes improved software algorithms for analyzing moving marine life targets according to their size, shape and swimming behavior. Targets are categorized using a traffic light system, indicating the probability that a moving target is a marine mammal.

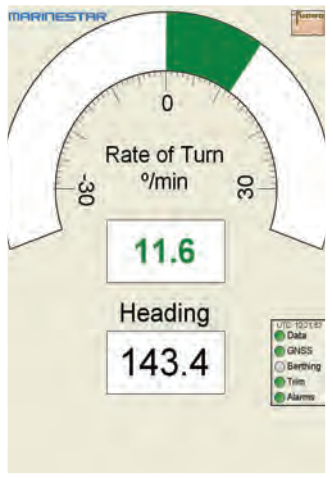
'Possible' (green) targets are the correct size and shape; 'Potential'(amber) denotes upgraded 'Possible' targets that also have a path that suggests the object is not moving with tidal drift. 'Probable' (red) targets are upgraded from 'Potential' when they have a high probability of being a marine mammal.

BlueView Debuts BlueViewer 3D Viewer

BlueView Technologies updated the operating software for its 2D and 3D sonar systems. ProViewer 3.6 and ProScan 3.6 include multiple updates to improve processing speed and ease of use. Online downloads are available at www.blueview.com and the new software is included with the appropriate sonar in new shipments. BlueView also introduced its new 3D point cloud viewing software, BlueViewer to view the output of BlueView BV5000 3D Multibeam Scanners and MicroBathymetric systems.

wwww.blueview.com

Multi-Function Navigation System Approved



The Marinestar Maneuvering System (Marinestar MS) designed by Fugro in Norway has been approved by the BSH marine test house in Germany as both a Speed and Distance Measuring Equipment (SDME) and Transmitting Heading Device (THD). This means that Marinestar MS can be installed as an alternative to a doppler speed log in order to meet the requirements of SOLAS for ships over 50,000 gt to have the ability to measure speed over the ground in both the forward and athwartships direction. The system can equally act as an alternative to one of the gyro compasses.

The system is based upon high performance dual system (GPS & GLONASS) differential position receivers and the Fugro navigation satellite augmentation broadcast. Marinestar MS also acts as a berthing system providing quay distance and approach speed fore and aft.

Featured Product

EvoLogic's Special Edition Underwater Acoustic Modem

EvoLogics GmbH presented the White Line Science Edition - a new line of S2CR underwater acoustic modems with an embedded network protocol development platform. Intended for universities and other research facilities, the S2CR White Line Science Edition modems are a great tool to effectively design, test and implement underwater acoustic network protocols. EvoLogics designed an open environment for network protocol developers, offering the scientific community a flexible framework to test new network protocols on real hardware - the new S2CR White Line Science Edition (S2C R WiSE) acoustic modems facilitate an embedded developer sandbox of up to 32 GB. The EvoLogics WiSE toolchain allows to build custom firmware modules for S2C modems and opens endless opportunities for new implementations.

EvoLogics S2CR WiSE modems are an excellent testbed for new underwater network protocols, as test scenarios for performance evaluation can now run on real hardware in real-world conditions. Moreover, the NS-2 framework is preinstalled on all S2CR WiSE modems. The EvoLogics WiSE line includes the S2CR 48/78 WiSE and S2CR 18/34 WiSE underwater acoustic modems. Implementing the patented S2C technology, these devices offer the scientific community all the benefits of the main EvoLogics S2C R modem range. Both S2CR WiSE modems are available in a variety of configurations to suit a wide range of application scenarios.

http://www.evologics.de

OSIL: New Tern Buoy

OSIL launched its 1.2m Tern buoy, designed for extended deployment in harsh coastal environments in deeper water depths, and suitable for all applications, including scientific studies, water quality monitoring, coastal engineering projects, harbor and coastal monitoring and maritime traffic control. All instrumentation and cables are held internally, protected by the enclosed top section, which has been designed to minimize damage from the elements or interference. The platform also offers a higher visibility profile, easily seen in high-traffic areas. The 1.2m platform has approximately 400kg net buoyancy, and is supplied with a range of sensors that can be specified by the customer (including CTD, DO, pH/ORP, Turbidity, Chlorophyll, Rhodamine, current speed/direction, and meteorological sensors including wind speed/direction, air temperature, humidity, pressure, solar radiation, as well as a GPS locator).

www.osil.co.uk

MP Series Multi Beam Sonar

Ross Laboratories, WASSP Ltd., and Furuno USA introduced the WASSP Marine Professional (MP) shallow water multi beam system. Proven in the fishing industry, the new hydrographic survey version meets the requirements and specifications for shallow water surveyors. Ross Laboratories is a manufacturer of hydrographic survey systems and a HySweep dealer. Furuno USA, the distributor of WASSP in the US and Canada, selected Ross Laboratories as an Elite dealer for this multi beam system manufactured by WASSP Ltd. in New Zealand. From the basic multi beam system only to a survey ready system complete with Heave, Pitch, Roll, and Heading sensors, Ross Laboratories 35 years' experience manufacturing hydrographic survey equipment.

www.wassp.com

New Torpedo Range Record

Atlas Elektronik increased the reach of its torpedoes, setting a new range record. At a test-firing in March 2012, the heavyweight torpedo SeaHake mod4 ER (Extended Range) achieved a range of over 140 km. SeaHake mod 4 is the latest advancement of the DM 2 A4 heavyweight torpedo, which is in service with the German Navy as well as the navies of Turkey, Pakistan and Spain. It extended its range by fully exploiting the system's unique propulsion and battery technology. The new version of the SeaHake mod4 is also fitted with innovative navigation and communications technology, enabling extremely precise navigation and control of the torpedo over the entire distance. The SeaHake mod4 ER can be deployed from seagoing platforms as well as from special land-based platforms.

www.atlas-elektronik.com

SeaView: Modification for SAAB Seaeye Falcon DR ROV

SeaView Systems released its new ROV service line built around a modification to the fiber optic SAAB Seaeye Falcon DR ROV. At first look the modification is a bolt on skid that provides a full second suite of five thrusters to the ROV. Working in a Master/Slave configuration, the Raptor skid taps into the Falcon DR's data network and emulates the commands given to the Falcon DR ROV thereby providing double the thrust while providing 100% redundancy of system propulsion with no interference to the original ROV. Not so readily apparent are electrical and software enhancements which, when integrated with a Doppler Velocity Log (DVL) aided Inertial Navigation System (INS), provide Dynamic Positioning (DP) for performing highly accurate, repeatable HD video and multi-beam sonar surveys (environmental, ordinance disposal, route, asset inspection, and wreck survey).

www.seaviewsystems.com

OSIL: New Oil in Water Monitoring Buoy

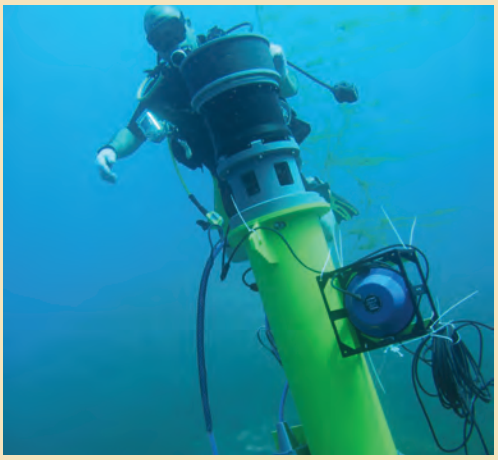
OSIL debuted its new Oil in Water Monitoring buoy, a rapid deployment option for localized spill events and preventative monitoring. The buoy system is designed for short term monitoring (up to 24 months) and emergency deployment in sheltered coastal and inshore areas, where deployment from a small vessel, or by a single person, may be required. The lightweight, low-cost buoy is designed to be handled by one person in the field, weighing just 25kg, and being only 60cm in diameter and 2.0m in overall length. Detection of hydrocarbons in the water column is performed by a submersible sensor. Sensors are available for both crude oil and refined fuels, and are protected from collision damage within the robust central structure. This has been designed to accommodate a multiparameter sonde or similar instrument, meaning the system can also be equipped with a range of sensors to measure and report other water quality parameters.The system itself is powered by two 5W solar panels, and is equipped with battery backup, navigation and warning lights, and any other markings as necessary. A range of telemetry options are available (UHF/VHF, GSM, GPRS, Satellite), selected to suit both the location and application requirements. OSIL provide a complete data telemetry solution, including either desk top or web-based software packages to access the data, ensuring constant and immediate data collection.

www.osil.co.uk

Sonardyne to Protect MidEast Facility

Sonardyne installed an integrated intruder detection system for an undisclosed strategic waterside installation in the Middle East. The contract included the deployment of a network of the company's Sentinel underwater sonars, seabed mounting systems, armored fiber optic cabling, onshore equipment shelters and a centralized command and control system. With global orders approaching 100 systems in 3 years, Sentinels are operational worldwide protecting energy infrastructure, coastal assets, vessels and strategic military assets. The system reliably detects, tracks and classifies underwater targets approaching a protected asset, providing security personnel with advanced threat warnings. The system is scalable to meet the needs of a single vessel right-through to the largest port and coastal borders.

www.sonardyne-ms.com



Underway CTD on Canadian Icebreaker

While on passage from the Canadian west coast to the arctic, Department of Fisheries and Oceans (DFO) scientists from the Institute of Ocean Sciences (IOS) in Sidney, BC, were able to collect dozens of high quality 400m CTD profiles across the Pacific Ocean without stopping or slowing the icebreaker CCGS Sir Wilfrid Laurier. The researchers used the Oceanscience UnderwayCTD system.

The DFO scientists have traditionally used expendable CTD (XCTD) probes, launched from the Laurier while slowing the ship to about 9 knots, from its typical transit speed of about 11 knots. While easy to deploy, the expendable probes do not match research-grade oceanographic instruments in accuracy and resolution, and are not ideal as a tool to monitor subtle changes and variability in the temperature and salinity fields of the North East Pacific, associated with climate change and moving fronts.

www.oceanscience.com

BioSonics MX Echosounder

BioSonics offers the MX Aquatic Habitat Echosounder, a complete hardware-software solution for mapping and quantitative assessment of submerged plants, substrate classification, and bathymetry. The MX uses scientific single beam sonar housed in a Pelican Case with an integrated DGPS and storage for the transducer, cable, and fittings. It comes complete with Visual Habitat MX software, a powerful new data processing and visualization tool developed specifically for the MX.

Visual Habitat MX software was developed in tandem with the MX sounder as a means to quickly and effectively present information in a clear and visually captivating display. Users can instantly generate color-coded maps showing data parameters for each transect including bathymetry, plant coverage, and substrate type. A toggle function connects each echogram data file with a map view of the transect plan. An integrated utility provides instant background mapping imagery over which habitat information can be superimposed. Data can be processed and maps can be generated within minutes of data collection.

www.biosonicsinc.com

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Experience: 5 – 10 Years Experience

Desired Education Desired Education Level: BS/MS degree in Computer Engineering/Computer Science/Electrical Engineering or similar
Location: EdgeTech-ORE Marine Group, Boca Raton Florida
The successful candidate for this Software Engineer – Embedded Real Time Systems position works in a product development environment with a multi-disciplinary team of scientists, engineers and software staff to develop new and next generation high-end acoustic products for the marine industry. This Software Engineer position requires "hands-on involved" in developing the embedded real-time parts of our products.
The Software Engineer – Embedded Real Time Systems has experience in developing embedded real-time software systems with a number of the following capabilities:
• Code design and implementation in C /C++/C# and assembly languages.
• Windows application development as well as embedded operating systems.
• VHDL programming of FPGAs and PLDs.
• Implementing DSP algorithms.
• Hardware abstraction layer software drivers.
• Familiarity with debug tools, emulators, and MatLab
• Knowledge of computer networks and distributed systems (TCP/IP & UDP.)
• Serial Communication Interfaces (SCI): RS-232 etc.
• High speed interfaces (e.g. SATA and USB).
As part of the Product Development team this Software Engineer job responsibilities span the entire product development lifecycle (requirements, design, implementation, test and deployment). They may include:
• Interfacing with other product development engineers in order to understand requirements.
• Participating in the design phases to determine whether requirements are best met by software or hardware functions; making maximum use of commercial off-the-shelf or already in-company developed components.
• Implement a design in the most cost-effective way. Working though any problems arising during implementation in accordance with the fundamental architectural concepts, and performance trade-offs.
• Generating a set of test procedures, with emphasis on real-time performance, which determine that related high level requirements have been met.
• Submitting reports and technical memoranda, code documentation, and maintaining an engineering notebook.
• Actively participating in beta testing, transfer to production, and maintenance

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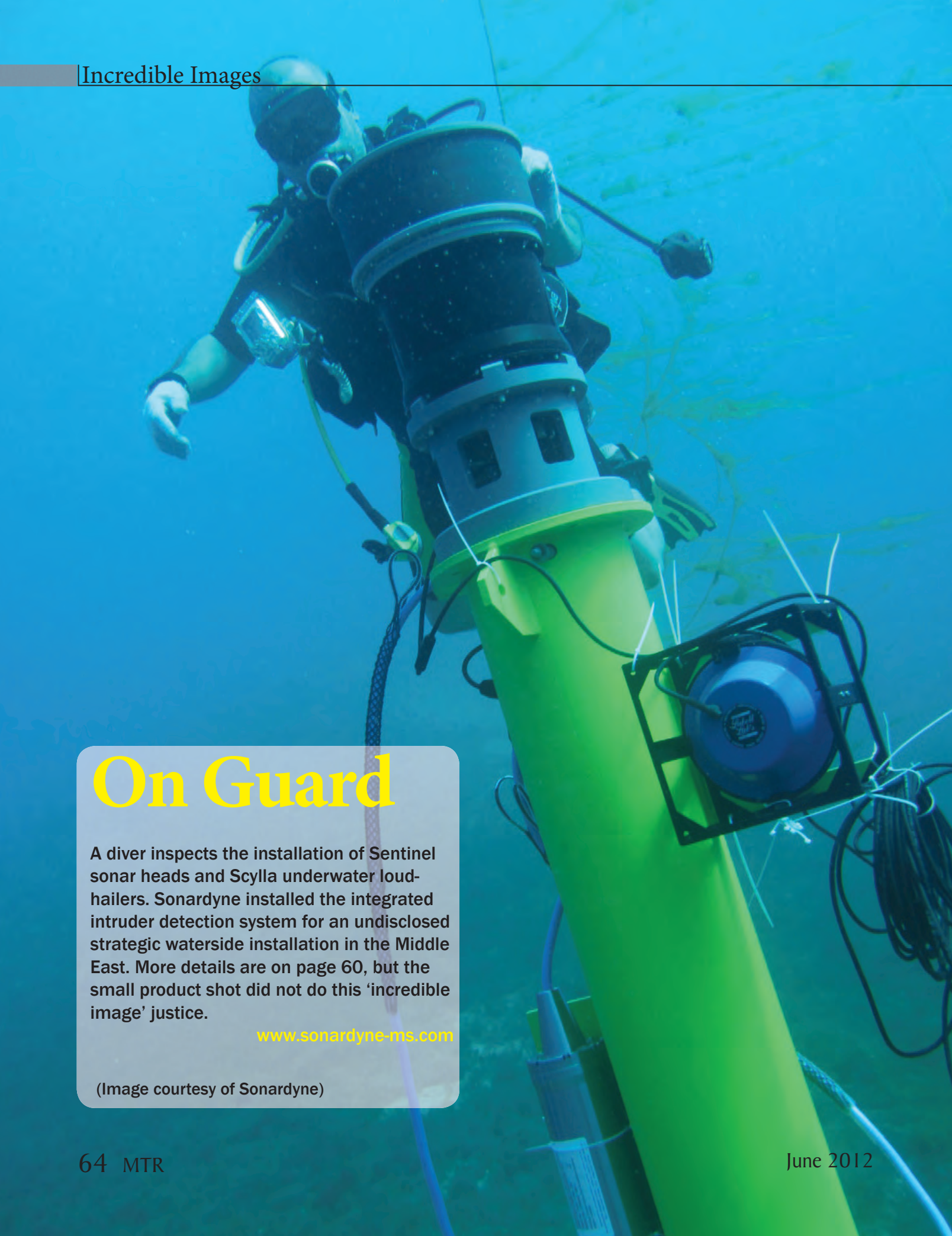
C2	Trimble	www.trimble.com/gnss-inertial	Please visit us online



On Guard

A diver inspects the installation of Sentinel sonar heads and Scylla underwater loud-hailers. Sonardyne installed the integrated intruder detection system for an undisclosed strategic waterside installation in the Middle East. More details are on page 60, but the small product shot did not do this 'incredible image' justice.

www.sonardyne-ms.com

(Image courtesy of Sonardyne)

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Photo by Ali Bayless

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