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# MARINE TECHNOLOGY REPORTER

March 2011
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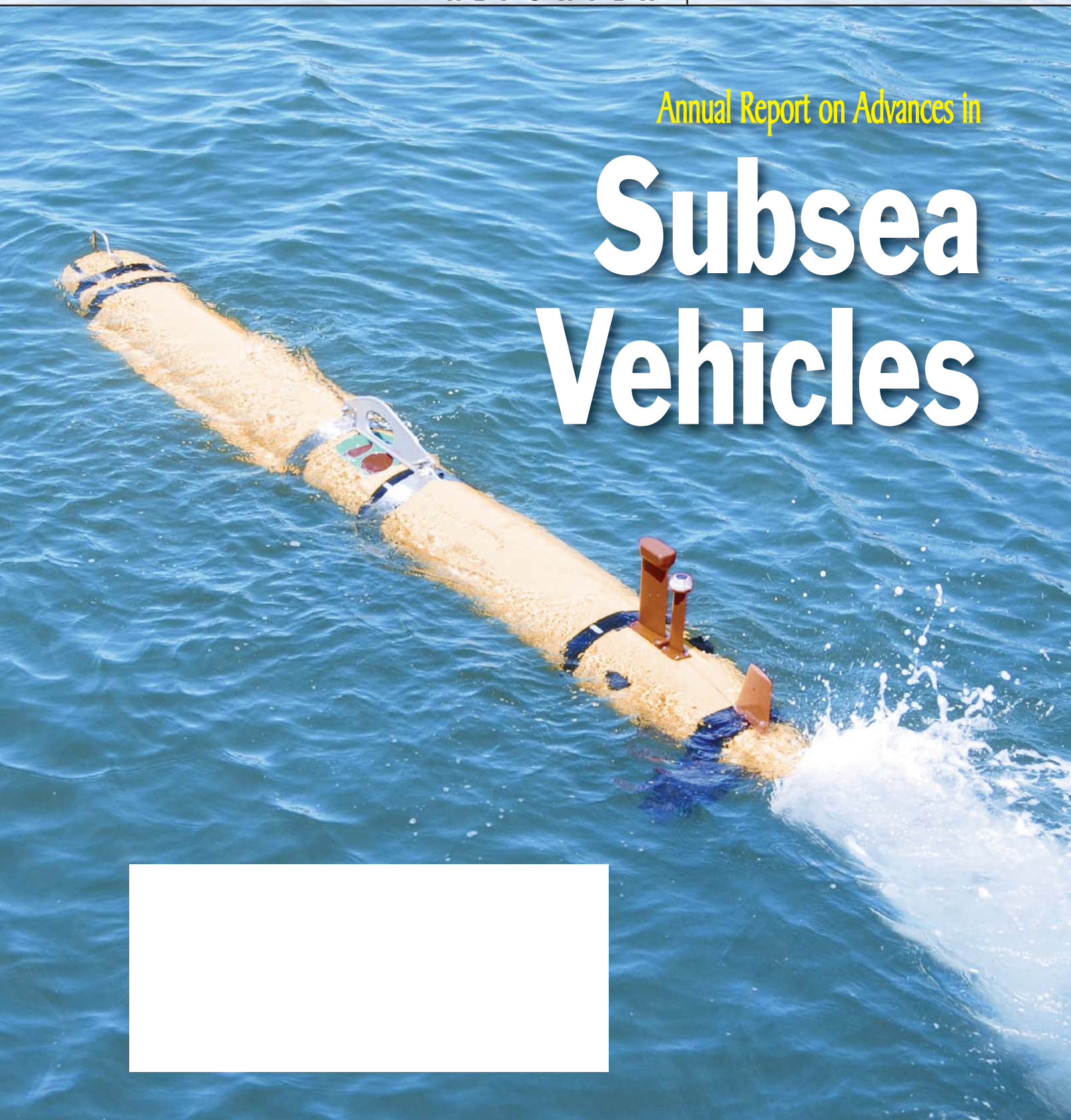

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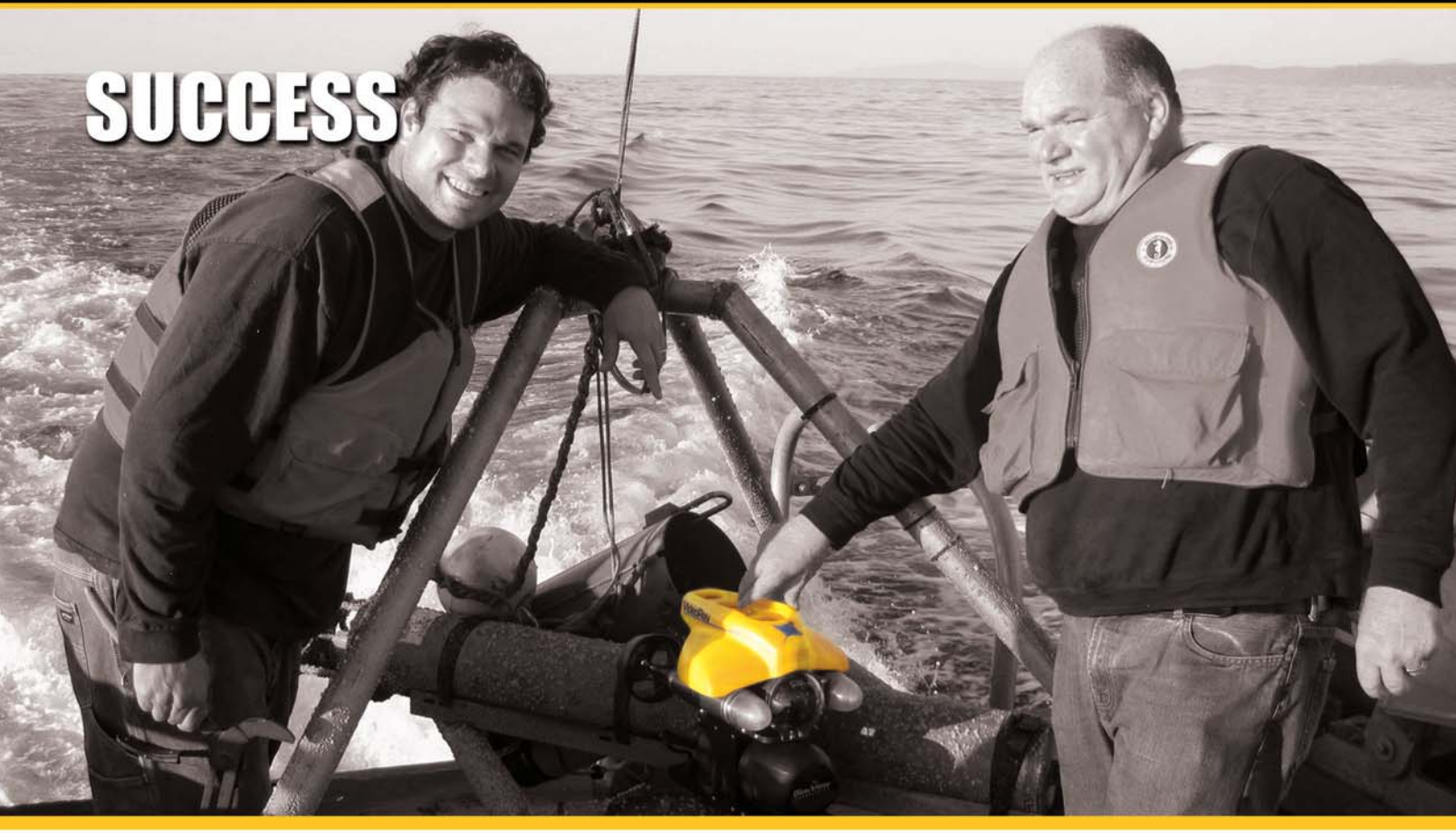


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Pictured : Joe Haxel (left) and Oregon State University's lost Hydrophone recovered from a depth of 175 feet by Dennis Lancaster of Water Work Resources, LLC (right) and Craig Thorngren (not pictured) of Submerged Recovery & Inspection Services along with all it's data using a VideoRay Pro 4 ROV with imaging sonar to attach a recovery line in September 2010.

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(Background Photo: Liquid Robotics)

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***See Story on page 14***

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***See Story on page 44***

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This being our Annual Subsea Vehicles edition, we sought insights and opinions from several leaders on the frontlines of unmanned underwater system technology, courtesy of a virtual "roundtable", starting on page 22. The technology to put machines in places that humans can't — or shouldn't — go is maturing rapidly, driven by operation mandates from military, commercial and scientific sectors. But while the technology has certainly come a long way, there is still much work to be done to realize the full efficiency and cost-effective benefits.

**Power:** Almost universally leaders in the field admit that improved power density and reliability is the number one challenge in tapping the full potential of unmanned underwater systems and bringing them faster into mainstream operations. **Bob Anderson**, President & Co-Founder of OceanServer, positions this succinctly:

*"One recurring technical challenge that affects all types of AUVs in most applications is the **desire for higher density battery power** to enable longer duration missions. Rechargeable Li-Ion provides the best and safest all round solution, and has made gradual improvements over the past 10 years. No replacement technology is on the near-term horizon, but several emerging technologies, primarily driven by military requirements, should eventually enable commercial subsea vehicles to achieve increased mission durations at acceptable costs."*

Through this and other challenges, unmanned vehicles are increasingly finding their way into the commercial sector. This month **Claudo Paschoa**, our correspondent in Brazil, discusses with **Marie-Laure Charles**, the MD of ECA America Latina, her company's penetration into the lucrative but challenging Brazilian offshore energy and gas market. (see story page 38).

In addition, **Alex Bynum** of Saft discusses his company's effort to improve battery performance for UUV use.
(see story page 44).

*Gregory R. Trauthwein • trauthwein@marinelink.com • tel: 212-477-6700*

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## Ultein Delivers for Eidevik

Ulstein signed a contract to deliver an offshore IMR/construction vessel of the ULSTEIN SX148 design to Eidesvik Offshore. "Based on experience we know that Ulstein is quality-conscious and has innovative employees that work hard to deliver on agreed terms and conditions," said **Jan Fredrik Meling, CEO of Eidesvik Offshore ASA.** The ship is of the SX148 design from ULSTEIN, which can carry out highly advanced subsea work like inspection, maintenance and repair of oil installations on the sea bottom. Furthermore, the vessel can be used for clearing oil and gas wells and for well stimulation. The moon pool is located centrally in the ship's hangar, in an efficient layout providing a good and safe indoor work area on the main deck. The vessel is equipped with three ROVs: one for observation and two for operation. It also has an MHS (Module Handling System). Also onboard is a 100-ton AHC (Active Heave Compensated) offshore crane.

## Ocean Power Completes
# New Wave Power Device

Ocean Power Technologies completed the first of its new generation utility-scale PowerBuoy device, the PB150. The PB150 PowerBuoy is touted by the maker as the largest and most powerful wave power device designed by OPT to date. With a peak-rated power output of 150 kW, the PB150 is designed for use in arrays for grid-connected power generation projects worldwide.

"The completion of the first PB150 in the UK is a major engineering achievement for OPT and also begins an important new chapter in the company's commercialization strategy," said Charles F. Dunleavy, CEO of OPT. "The PB150 structure and mooring system has already received independent certification from Lloyd's Register, as announced last month. The new device is intended to become OPT's first "workhorse" for utility-scale projects, and embodies the Company's strong track record in innovation and in-ocean development of wave power systems as a source of clean, renewable energy. With construction of the second PB150 well underway in Oregon, USA, we are very proud of reaching this milestone and look to the future of utility-scale wave energy with increasing confidence."

It is currently being prepared for ocean trials at a site approximately 33 nautical miles from Invergordon, off Scotland's northeast coast. The sea trials are expected to commence as soon as weather conditions permit. **The company is seeking additional financing for the commercial utilization of the buoy after the trial phase is completed including its possible deployment at various potential sites.** A second PB150 is under construction in the US for a proposed utility-scale project in Oregon, and the company is involved in other planned projects in Australia, Japan and Europe that may utilize the PB150. OPT's PowerBuoy has a low visual profile, as most of the structure is submerged, and is designed to have a minimal environmental impact. The company has considerable experience with in-ocean performance of its PowerBuoys, including its PB40 system which has been operating off Oahu, Hawaii, since December 2009 and has subsequently been connected to the grid. That system was developed under a multi-year project for the US Navy and the PowerBuoy underwent an extensive independent environmental assessment. This resulted in a Finding of No Significant Impact (FONSI) – the highest level of environmental assessment rating in the US. In addition, last year the company signed a ground-breaking agreement with 11 US federal and state agencies and three non-governmental stakeholders for the phased development of a 1.5 megawatt wave power project at Reedsport, Oregon in a manner that protects ocean resources and stakeholder interests. **www.oceanpowertechnologies.com**

### Partrac Completes Tidal Energy Site Measurements

Partrac completed oceanographic measurements at a fifth tidal energy site in the UK, and have indicated that further measurements have already been programmed at three more sites in 2011. By their very nature, tidal energy sites present a challenge to acquiring high quality data. The limited tidal window in which to operate (only 10 minutes at some sites), is the most obvious problem. The issue is further complicated by irregular seabed conditions including rock fissures, which present difficulties in emplacing the kit securely on the seabed but which are largely unknown prior to getting out to the site. Partrac have evolved with the industry requirements in order to meet the oceanographic challenges that each individual site presents, tailoring the methods used to the tidal and seabed conditions at each site. As a result of this process, Partrac have now completed 28 individual deployments at tidal energy sites, in each case delivering 100% high quality data return. Partrac and their team are understandably very proud of this technical achievement.

**www.partrac.com**

## Gaoh Offshore Signs Deepwater

# Installer Wind Farm Deal

Gaoh Offshore signed a Letter of Intent covering the design development and construction of its multi-purpose wind farm development vessel, the Deepwater Installer. Gaoh Offshore and STX Offshore & Shipbuilding Co., Ltd. (STX O&S) signed the Letter of Intent [LOI] at the end of 2010 and board approval was given last month.

The LOI is for construction at the STX Dalian Shipbuilding Complex in China after a period of joint further development giving both companies a commercial interest in the design. Work will focus on fulfilling the requirements of Round 3 UK wind farm operators and Gaoh and STX will combine their expertise to provide innovations that particularly benefit installation in deeper water, further offshore. To that end, Gaoh will use the North Sea engineering expertise of one of its key shareholders, Houlder Limited. The vessel is a 140m DP2 jack up capable of operating in the central North Sea area on a year round basis and surviving the 100 year storm criteria on site. It can handle up to 16 3.6MW turbines each trip while

minimizing both port loading and offshore installation time. The design also incorporates a 1600 ton crane and under deck storage to further reduces per turbine installation, commissioning and maintenance costs. This true multi-functionality adds to the design's flexibility and ability to deliver optimal cost efficiencies to safe, efficient and risk optimized installation and field support activities. Officials of both companies including K. J. Hong, Vice Chairman & CEO of STX O&S and Peter Hickson, CEO of Gaoh, attended a signing ceremony in Korea

**http://www.gaoh-offshore.com**

# Upgrade of Hyperbaric Rescue Systems

**Lloyds Classed Hyperbaric Rescue Vessel, Cal Dive DSV Kestrel, Rebuilt and Certified at Arc Controls, Mobile, AL**

Ahead of the forthcoming ADCI Consensus Standards for Commercial Diving, Revision 6 requirement, IMO directives and Class Requirements, Cal Dive International has begun a program to upgrade all Saturation Diving Systems with hyperbaric rescue capability. Utilizing the expertise of Arc Controls, the leading ASME/PVHO fabrication shop on the Gulf Coast, Cal Dive has already begun design and fabrication work on these systems. Using key personnel and machinery, Arc Controls is constructing ASME/PVHO, ABS, Lloyds, and DNV compliant Chambers/Systems at their Mobile, Alabama facility. Coordinating onsite is a team of Cal Dive technicians working to make these systems ready for installation. Both Cal Dive and Arc Controls are committed to building systems meeting requirements to be used anywhere in the world.

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### Naming Ceremony for New Polarcus Seismic Vessel

Drydocks World announced that the high ice-class seismic vessel Polarcus Alima and Polarcus Samur were named in the presence of key personnel from both organizations and specially invited industry dignitaries at its Dubai shipyard. The two vessels are part of a series of six built for Dubai based geophysical operator Polarcus. Three vessels belonging to the series have been delivered. Polarcus Alima incorporates sophisticated seismic technology and is capable of towing 12 streamers, with a 100m lateral separation between streamers. It is a 3D/4D seismic vessel built to the highly merited Ulstein SX134 design and ULSTEIN X-BOW hull.

### Keel Laid for T-AGS 60

VT Halter Marine, Inc. on February 1, 2011, held a keel laying ceremony for T-AGS 66 USNS Maury, which is currently under construction at Halter Moss Point. In December 2009, VT Halter Marine was awarded a contract of approximately $87m to build an enhanced version of the T-AGS 60 Class oceanographic survey ship for the U.S. Navy. Delivery of the vessel is expected in July 2013.

## STX Finland Rauma Shipyard

# Fisheries Research Vessel Ordered

STX Finland Oy and Ministry of Fisheries and Marine Resources of the Republic of Namibia have signed a contract for the construction of a fisheries research vessel. The ship, with a contract value of approximately EUR 35 million, is scheduled for delivery in spring 2012. This vessel will be approximately 62m long and will provide accommodation for 45 crew members and research personnel. It is specifically designed for the purposes of Namibian fisheries research. The vessel meets the latest standards set for this type of vessels requiring, in particular, special care in the design of laboratory equipment, propulsion and power generation system. The vessel also has very high overall technical standards and special attention has been given to the vessel's serviceability and low maintenance costs. Furthermore, the ship

(Photo: www.stxeurope.com)

features a dynamic positioning system and it is operational in any African sea and weather condition in all seasons with no restrictions.

The tasks of the research vessel include monitoring of fish stock, as well as sorting, processing, freezing and storage of fish. The multi-purpose specialized vessel will also be used for collecting biological samples for seabed research and analysis and provide assistance for control of fishing. The vessel also features facilities for meteorological research.

# Survey Vessel from Sibu Malaysia Yard

*By Alan Haig-Brown*

A recent delivery from the yard of Eastern Marine Shipbuilding in Sibu, East Malaysia is a further indication of the growing technical sophistication of the Sarawak yards. The 60 x 16-m Offshore Surveyor is designed by Wartsila Ship Design of Singapore. To do its survey work the Malaysian-registered vessel is fitted with 2.4-sq. m. moon pool as well as a deck crane from Marine Equipment of Singapore. Main engines are a pair of Cummins QSK60M diesels generation 2200 HP each at 1800 rpm and turning into Hitachi Nico Model MCR1727VC(CPP gears) with 7.5:1 ratios.

The controllable pitch propellers are a pair of Berg BCP HDX690. Side thrusters on the dynamic positioning vessel is also CPP and they are supplied by the Japanese


(Photos: Eastern Marine Shipbuilding)

firm Kamome. The steering system is by the Singapore firm Palmarine, model PEH5202.

To meet the advanced electrical demands of such a vessel the main shafts are fitted with 700 kW Stamford generators. The Offshore Surveyor, with a 1,672 GRT and a 501 NRT, has tankage equal to 441 cubic meters for ballast water, 505 m3 of fresh water, 422 cu. m. of fuel, 387 cu. m. of drilling mud and 142 cu. m. base oil. Accommodation is provided for up to 46 people.

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Much of LOOKNorth's focus will leverage the investments made by the Government of Canada in RADARSAT 1 and 2, and also use additional radar satellites such as ENVISAT, TerraSAR-X, and COSMO-SkyMed.

## LOOKNorth

# To Identify Sector Needs, Validate Technology

by Andrew Safer

Solving the technological challenges involved in developing natural resources in Canada's North is the focus of a new Center of Excellence that has received funding commitments of $11.6m.

Based in St. John's, Newfoundland, Leading Operational Observations and Knowledge for the North (LOOKNorth) will receive $7.1 million from the Government of Canada from the 2010 Centers of Excellence for Commercialization and Research program over five years. The Government of Newfoundland and Labrador is providing $2 million from the Department of Innovation, Trade and Rural Development and the Research and Development Corporation, and industry partners have committed $2.5 million to date.

LOOKNorth is an initiative of C-CORE of St. John's, a research and development corporation with core expertise in radar and vision systems, ice engineering and geotechnical engineering. C-CORE provides applied R&D engineering related to regulatory, security, operational and market challenges, particularly in the natural resource and energy sectors.

The objective of LOOKNorth is to respond to information gaps by validating existing technologies in Canada's North to assist the natural resource sector in developing oil and gas, hydro and mining in the sub-Arctic and Arctic. The initial focus will be on the use of Earth observation satellite technology to monitor conditions to provide the information industry needs to assess resource opportunities and initiate exploration and development.

To achieve this, LOOKNorth will link the needs of industry, remote sensing technologies that have proven themselves in non-northern environments, and the


**At the LOOKNorth funding announcement in late January in St. John's, C-CORE President Charles Randell noted that the organization's experience leading the Polar View project for the European Space Agency "was an important consideration in C-CORE being named the Center of Excellence for this initiative."**

Canadian small businesses that have expertise in this area. That includes getting the technology through the last stages of development, if necessary, and facilitating the validation process in an operating environment. "These will be technical solutions that provide the best available information to support informed decisions on project designs for safer, more cost-effective, or environmentally responsible operations," said LOOKNorth Executive Director Paul Adlakha.

LOOKNorth will also scan the status of R&D initiatives in government, university and private-sector labs to identify relevant technologies and support them, as required, through the final stages of development. One area of interest is to gather high-resolution information on the concentration, location, and strength of mobile sea ice and icebergs to assist resource companies in planning cargo supply vessel operations. "Climate change is opening up the shipping season in the North," Adlakha said, "extending the open-water season to a time of year when there has traditionally been little marine transport. This extended season can dramatically change the economic model of a Northern project. Current guidelines regarding allowable transit areas are based on historical weather and ice risks. Since there's a greater amount of variability in conditions, additional information is required to support environmentally responsible transportation." He adds that regulations may allow operations provided they are equipped with the appropriate monitoring technologies and the approved ice-class vessel. Since shipping lanes in the North are not well charted, he adds, another priority will be to identify and validate technologies that can collect the necessary bathymetric data the resource sector requires. Sonar, AUV's and other alternatives to satellite technology could be used to collect this information subsea.

Another potential LOOKNorth project is to identify and validate technologies to collect the measurements needed to design the parameters for determining an acceptable level of reclamation for a mine site after it's been shut down. Adlakha notes that the parameters would have to be accepted by the Northern people, the regulatory bodies, and the company. "How do you bring to bear the appropriate information metrics that can be accepted by everybody?" he asked. "Satellite technology has a very strong potential to do that as it has done in southern environments, but a different type of satellite measurement may be required."

Since the freezing and break-up of ice roads in the North doesn't occur uniformly, he added that developing the capability to monitor them over several hundred or several thousand kilometers will be key. This will allow industry to determine their integrity as early as possible when frozen, know when they are starting to break up or melt, and detect when it's feasible to transport cargo by truck. Otherwise supplies have to be airlifted or sealifted into the operations at much higher cost. The ability to measure the stability of sea ice is a potential LOOKNorth project, Adlakha said, that would serve the interests of the oil and gas industry, as the operation of some offshore production platforms requires stable ice in the surrounding area.

Radar satellite technology will provide the principal platform for LOOKNorth's initiatives. This tech-

nology is ideally suited to the North, Adlakha said, because it acquires images of the Earth day and night (there are long periods of darkness in the North), and in all weather conditions including cloud cover and fog. Because it monitors from space, he added, this technology doesn't require a land-based power source, and its operations aren't affected by the extreme temperatures of the North. Much of LOOKNorth's focus will leverage the investments made by the Government of Canada in RADARSAT 1 and 2, and also use additional radar satellites such as ENVISAT, TerraSAR-X, and COSMO-SkyMed.

At the LOOKNorth funding announcement in late January in St. John's, C-CORE President Charles Randell noted that the organization's experience leading the Polar View project for the European Space Agency "was an important consideration in C-CORE being named the Centre of Excellence for this initiative." Launched in 2003, Polar View is an 80-partner international project that offers integrated monitoring and forecasting services in the Polar Regions, as well as mid-latitude areas affected by ice and snow. The information is provided via satellite to a range of public user groups such as Inuit hunters and the coast guard. C-CORE is the program manager for Polar View. Initial LOOKNorth technology validation projects will be identified this summer and the first call for proposals is targeted before Christmas. Adlakha noted that the technologies that are proven in Canada's North will be transferrable to other polar regions.

## Video Ray and

# Acoustic Hydrophone and Data Recover off of Oregon

Craig Thorngren never thought he would grow up to be one of the U.S.'s leading experts on underwater robotics. His initial interests were in Law Enforcement. He joined the US Coast Guard at 18 as a way to get the government to pay for his education. He was involved in increasingly important positions around the U.S. until December 11, 2001. That changed everything for the USCG.

Part of the increased focus on terrorism was the threat of explosive devices planted on ships or docks. The USCG was tasked after 9/11 with preventing that from happening, along with new terrorism prevention missions. The USCG embarked on a program of thirteen Maritime Safety and Security Teams, located at tier one ports throughout the country. Each would be equipped with the best underwater Remotely Operated Vehicles (ROV) and accessories from VideoRay LLC of Phoenixville, Pennsylvania. The first one – number 91101 – was established in Seattle Washington, and the first person assigned to develop an ROV team was Craig Thorngren.

After several years working the Seattle MSST ROV team and working with the USCG to develop tactics and techniques to use this new technology to keep US ports safe, Craig retired from the Coast Guard in 2007, taking a position with a Seattle sonar company BlueView Technologies. Then a year later he branched out on his own, taking advantage of his pioneering work on observation ROVS to form his company Submerged Recovery and Inspection Services.

When Craig got the call in September of 2010 from his friend Dennis Lancaster of Waterworks Resources, LLC of Newport, Oregon, he quickly assessed the job. An expensive hydrophone array belonging to scientist Joe Haxel of Oregon State University's Hatfield Marine Science Center needed to be recovered. The acoustic release that should have sent a buoy to the surface had not worked, and the equipment - 300 pounds of it, six miles offshore, 175 feet deep – needed to be brought to the surface. While the location was known, a mission with divers would be expensive and dangerous, and an alternative technique was needed.

The data stored on the array was critical to the Northwest Marine Renewable Energy Center, for an environmental impact study of wave energy conversion devices. This acoustic baseline research, sponsored by the US Department of Energy, The Oregon Wave Energy Trust and Oregon State University, was irreplaceable.

Joe Haxel was familiar with VideoRays, having operated one in the Antarctic in 2006. Craig was familiar with this kind of recovery, having been involved with several similar missions in the King County area, as well as Norway and Australia. Dennis had worked with Craig before, and was confident that a plan would be successful. The 54 foot R/V Elakha from Oregon State University was booked for five hours. With travel time to and from the site, there was a three hour window to locate and assess the condition of the equipment, develop a plan for recovery, and execute the plan successfully.

The first dive was planned to find the array, assess the condition of the equipment and the recovery lines, and develop a retrieval plan. A BlueView P900-130 multi-

**LEFT: The Hydrophone is located in "snow-blind" conditions at 176 ft. with the VideoRay Pro 4 ROV outfitted with multibeam sonar. The buoys to bring the apparatus to the surface released but became entangled as seen here.**

**CENTER: A carabiner with retrieval line is held in the VideoRay ROV Manipulator Arm as it follows the Pro 4 sonar equipped "guide" to the recovery line of the apparatus.**

**RIGHT: The ROV snaps the carabiner onto the recovery line and releases the carabiner from the Manipulator Arm.**


**Thorngren (forground left) and Haxel (background left) watch as their mission is nearly complete.**

beam sonar was fitted to a VideoRay Pro 4 submersible system, and this state-of-the-art combination was used to rapidly locate and image the array using a LYYN Real Time Video Enhancement Hawkboard integrated into the Pro 4. Pilot Craig could see the buoys had actually released, but were entangled in their recovery line. It was also obvious that some damage had occurred to the compartment that holds the buoy because normally it is attached to the array, and in this case it was clearly broken off and floating above it.

Craig's first plan was to retrieve the array by having the vehicle fly through one of the sides, come to the surface, and then use the tether to lift the equipment. The newest tether from VideoRay is heavily reinforced with additional Kevlar, and can be used to pick up to 1000 lbs. However, it quickly became evident that the initial plan was not going to work because of the "spaghetti" like mess of recovery line. For 20 tense minutes Craig used the ROV manipulator to untangle the tether and recovery line. The second plan was to just grab the recovery line and bring it to the surface. The concern, however, was whether there enough untangled line to get it to the surface. The team quickly found out that the answer was no… there was only about 100 feet of untangled line.

The third plan was to attach a carabineer to a line, fly a second VideoRay ROV down to the target, attach it to the retrieval line at around 90 feet and then pull up the array. Craig explained later: "I think everyone had their doubts that an ROV as small as the VideoRay could accomplish the complex task of attaching a carabineer with a line attached to it. However, I've used this technique in several other recoveries and even taught several classes this technique, so I knew it could work." In this case it worked very well, and shortly thereafter the array was safely on the deck of the R/V Elakha with its priceless data.

In assessing why the mission was successful, Craig pointed out two crucial factors:

"First is the gear. Having the most robust and reliable gear on the market today makes all the difference. Time and time again, my VideoRay has performed brilliantly. I have never had to scrub a mission because of the VideoRay. I can't tell you how many times I've been called in to finish a job that someone else started but their mini-ROV either couldn't do the job, or had some sort of failure. Second is adaptability. Our ability to recognize problems and unforeseen circumstances and to quickly change the game plan to meet those challenges was critical to our success retrieving the array."

Dennis added a third factor – "the collaboration between Craig and I was very important. Our focus has always been to give the customer what they want at a fair and reasonable price. Each time we have worked together, we have far exceeded what the customer was expecting."

**http://www.submergedrecovery.com/**
**http://waterworkresources.com/**
**http://hmsc.oregonstate.edu/**

**Joe Haxel (left) of Oregon State University's Hatfield Marine Science Center, Dennis Lancaster of Waterworks Resources, LLC of Newport, Oregon, and the VideoRay Pro 4 ROV call it a day.**

## Advances, Challenges & Oppotunities

# Robotic Vehicle Technology

*Marine Technology Reporter presents via this virtual "roundtable" insights on the rapidly evolving business of subsea robotic vehicles.*

*— by **Greg Trauthwein, Editor***

## The Respondents

**Bob Anderson**
President & Co-Founder
OceanServer

**Scott Bentley**
President
VideoRay LLC

**Bill Charbonneau**
Product and Sales Manager
Deep Ocean Engineering

**Dave Grant**
Managing Director
Saab Seaeye

**David Heinz**
VP, Maritime Systems
iRobot Corporation

**David P. Kelly**
President & CEO
Bluefin Robotics

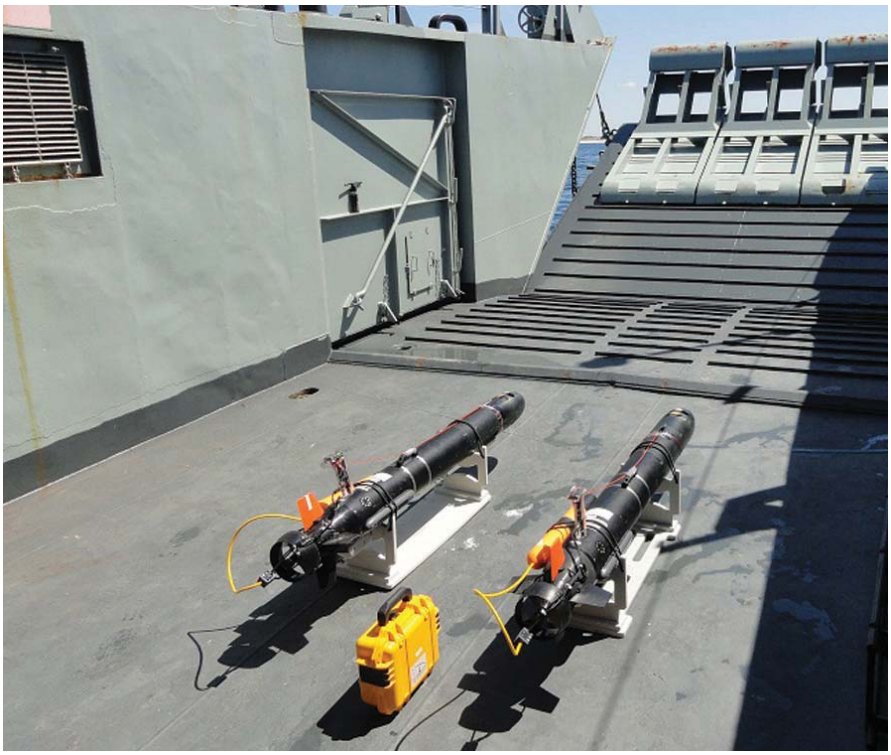
**Justin E. Manley**
Senior Director Scientific and Commercial Business
Liquid Robotics, Inc.

**Donald Rodocker**
President
SeaBotix Inc.

**What do you count as the defining accomplishment(s) of your career?**

**Bently, VideoRay** The defining accomplishment of my career was building the executive ranks of VideoRay. For example, we have the smartest R&D guy in the ROV business, the best software guy, and the best marketing guy. Pretty good for a company barely 10 years old with less than $10m in revenue.

**Heinz, iRobot** I'm an "odd duck" when you compare me to others in the robotics business. I joined iRobot after a 32 year career in the Marine Corps, where I achieved the rank of Major General and ran the Defense Department's largest acquisition program in history. So, I would say that is my defining accomplishment ..so far. Moving forward, I am incredibly excited about my leadership position at iRobot. I have a master's degree is in computer science and have always had an affinity for artificial intelligence and autonomous behavior. The importance of monitoring and understanding changes in ocean properties will increase exponentially in the next few years. The ocean is key to understanding climate change and impacts to ecological systems that provide us with oxygen, water



OceanServer AUVs

## *Heinz, iRobot*

***The future will be more about sensor integration and autonomy. It is also about the data, not just the platform that collects it.***

and food. Oceans will also become central to mineral exploration and harvesting in the future. The products we are developing and producing at iRobot have the potential to help in all of these regards. Knowing this, I'm sure this next phase of my working life will be just as exciting and rewarding as the previous 32 years.

**Manley, Liquid Robotics** I am very proud of having challenged the limits of unmanned marine vehicle technology since the early 1990s. The first marine robot I built, an autonomous surface craft (ASC), could barely cross the Charles River in Boston. Today the Wave Glider (still an ASC though that term has fallen out of use) can cross ocean basins while providing near real-time connectivity to shore. All by harnessing natural energy sources. Missions I could barely imagine nearly 20 years ago are now possible, even routine. Many "failures" along the way have taught me to remember the ocean is the most extreme environment we routinely enter and that imagination is always a few steps ahead of engineering. In terms of pure personal enjoyment I have appreciated the chance to employ new technologies in the field, sometimes for very special purposes.

# *Kelly, Bluefin*

***Low-cost data processing has led autonomy to function in real time. This has allowed us to develop new AUV behaviors and advance multi-platform operations.***

Supporting the use of AUVs in the search for submerged debris from the Space Shuttle Columbia in 2003 was one such example. In addition, navigating ROVs over the RMS Titanic to bring live high definition footage to living rooms in 2004 and being an honorary plankholder in the NOAA Ship Okeanos Explorer are some of my favorite memories.

**In your opinion, what has been the biggest Enabling Technologies that has advanced subsea vehicles in the last decade?**

**Kelly, Bluefin** Being such a rapidly maturing industry, there are several technologies that have enabled growth opportunities for AUVs. There are two that stand out. First, the size of sensors and electronics has been shrinking. Companies, like Bluefin, can now integrate them into AUVs allowing the technology to address new applications. Second, low-cost data processing has led autonomy to function in real time. This has allowed us to develop new AUV behaviors and advance multi-platform operations.

**Anderson, OceanServer** System developers addressing Subsea challenges have benefitted from advances in a wide variety of technologies, justified or funded by mainstream commercial and military market requirements. CPUs with lower power consumption and running dependable embedded operating systems, with high-capacity memory (often solid-state these days) provide cost-effective processing power and a common interface language for sensor drivers. Subsea device developers benefit from a rich selection of sensors, navigational aids, and communications devices that can be easily integrated into systems-level products targeted at the relatively niche applications in the subsea environment.

**Charbonneau, Deep Ocean** Increased bandwidth has significantly increased underwater images resolution; Power and control systems have improved to meet the demands for operating in stronger currents; and Digital interface systems have enabled the integration of additional sensors and options.

**Heinz, iRobot** Designs are more flexible and reliable, and are now proving their viability and cost effectiveness beyond the early adopters in the ocean sciences and military. Future improvements in sensor packaging, power efficiency and mobility will accelerate this even further. Autonomy has also improved significantly with the advent of smaller and faster processors and better programming environments, enabling vehicles to perform more missions with less interaction. That is ultimately how

Bluefin's HAUV

robots make a difference—they relieve humans of dull, dirty, dangerous and otherwise prohibitively costly tasks. Our UUVs are already hard at work doing these tasks today.

**Bentley, VideoRay** In my opinion this is the availability of small, comparatively inexpensive multibeam sonars such as those pioneered by BlueView Technologies. The "video like" returns allow operators with little experience to use them to navigate in water with almost no visibility – when you experience this yourself it is truly amazing.

**Grant, Saab Seaeye** There are several.
**Power boost:** A doubling of thruster power in top of the range electric vehicles means that the newest generation of vehicles are serious competitors to the hydraulic ROV systems and can operate to depths greater than 6000m. The development of 800Hz, 3000v power distribution systems also means smaller diameter umbilical/tether cables and more power at greater depth of operation
**Remote control systems:** Significant developments in control systems technology have been achieved including the innovative concept of Intelligent Control of Nodes (ICON). This allows each device within an ROV to think for itself and talk remotely to operators and engineers through a gateway into the heart of the vehicle through a remote web interface.
**MMI simplified:** Another innovation is a simplified man/machine interface (MMI) that improves the efficiency of piloting the vehicle, keeps the pilot in touch with the health of the ROV and warns of potential problems. Smart fault diagnostics gives the pilot a clear interpretation of a fault and the remedial action to be taken, including remote isolation of the failed component so that the ROV can keep working.
**Brighter lights:** Rugged LED lighting has brought significant benefits to ROV operations. It is less prone to damage than tungsten lighting, meaning there is less need to re-surface the ROV for repair and its brighter illumination improves video images.

**What trends do you see today that you believe will change this business in the coming decade?**
**Kelly, Bluefin** AUVs are on the precipice of general acceptance. The past has been primarily dedicated to

# *Donald Rodocker, SeaBotix*

***2011 will see the release of a new product referred to as the Containerized Delivery System (CDS). This new system is a deep water rapid response inspection system.***

proof-of-concept operations by the US Navy and experimentation on behalf of the early adopters. We are now starting to see a new wave of users leverage the technology to perform routine operations particularly in the commercial oil and gas market sector. As a result, providers face new challenges to enhance platform reliability, refine operational concepts and scale up for increased production rates to meet demand.

**Charbonneau, Deep Ocean** The differences between consumer electronics and commercial electronics continue to merge and future systems will need to integrate this technology into the commercial instrumentation. Hybrid systems which operate a tethered (ROV) and allow for autonomous operations when required will be needed for new applications.

**Anderson, OceanServer** Younger decision makers accept and often seek technology-based solutions for survey applications historically done in less automated ways. ROVs and now AUVs with ever more effective sensors, behaviors, ease of use and robustness, are increasingly being incorporated into routine survey operations. Even in the most demanding applications, such as offshore construction and production hydrography, contractors are expanding or developing complimentary uses for automated vehicles.

**Manley, Liquid Robotics** Declining budgets and increasing costs are a dominant trend in the marine sector, especially for Government agencies. The costs of operating and maintaining traditional maritime infrastructure, in particular ships, will challenge operators and technology providers to come up with new tools and methods to "do more with less." A secondary trend is the significant need for scientists, engineers and technicians in the marine sector. Talented young people do not often consider our industry as a career option but I believe that will change over the coming decade. The next generation entering the field will bring a unique outlook and an appreciation for new technology, from cloud computing to nano-technology, that will change our field as surely as the iPod changed music for the average listener.

**Heinz, iRobot** The future will be more about sensor integration and autonomy. It is also about the data, not just the platform that collects it.

**Grant, Saab Seaeye** New technology for niche markets will help grow the market. Technology such as hovering hybrid AUVs already used in the defence market can be reconfigured

SeaBotix's LBV

# *Dave Grant, Saab Seaeye*

***After a slow first half in 2010, business picked up in the year and 2011 looks to be as good as the record years of 2008 and 2009.***

for the oil and gas market and used primarily for autonomous/semi-autonomous field maintenance and inspection. This same technology can be used to provide a resident hybrid AUV for maintenance of a subsea installation which is under the control of an operator and is of particular interest for under ice locations or parts of the world where it is not easy to use a conventional ROV deployed from a vessel.

**Today, where do you see opportunities for growth in this sector?**

**Kelly, Bluefin** Today, the US Navy provides the greatest opportunities for AUVs and is currently transitioning the technology to become fully operational platforms. As this takes place, we will see an increase in production rates and service contracts. Widespread acceptance for AUVs will grow as well. We expect new opportunities to develop internationally among the military and commercial sectors.

**Grant, Saab Seaeye** Demand for ROV systems in the oil and gas Industry will grow steadily. Greater demand also exists amongst Defense Forces everywhere as there is significant untapped opportunity for the use of ROVs. Brazil, Asia and West Africa are the main areas of potential growth.

**Charbonneau, Deep Ocean** Homeland Security systems; Oil/Gas – for rig inspections and pipeline; surveys; Fisheries Research; Marine Archaeology; Environmental Studies; and Mine Countermeasures.

**What do you count as the leading technical challenges to making Unmanned Underwater Vehicles more efficient?**

**Bentley, VideoRay** The leading technical challenge is to make vehicles smaller, lighter, faster, and easier to deploy and operate. While VideoRay leads in each of these categories today, making the vehicle even more portable, working in faster currents, and making greater use of the computer and sensors to drive the thrusters (rather than having joystick deflection control thrusters,) is a challenge. You can relate this to the Ford Model A – it was a truly revolutionary product, but it was a challenge to learn how to drive it. Today's cars with adaptive cruise control are an example of about a century of development. I expect the increase in computer control to "engineer the talent" out of search and recover operations will be as dramatic a change – but will be commonplace before the end of this decade.

**Anderson, OceanServer** One recurring technical challenge that affects all types of AUVs in most applications is the desire for higher density battery power to enable longer dura-

# *Justin Manley, Liquid Robotics*

***Liquid Robotics is providing improved connectivity to subsea systems through our "gateway" capability.***

tion missions. Rechargeable Li-Ion provides the best and safest all round solution, and has made gradual improvements over the past 10 years. No replacement technology is on the near-term horizon, but several emerging technologies, primarily driven by military requirements, should eventually enable commercial subsea vehicles to achieve increased mission durations at acceptable costs.

**Kelly, Bluefin** Bluefin is continuously investigating new ways of overcoming the technical challenges of AUVs. There are two leading challenges we face: one, reliable, hi-bandwidth communications for vehicle operation and data transfer, and two, a power solution with greater energy-density for longer durations and high power sensors.

**Manley, Liquid Robotics** We used to talk about power, communications and navigation as the three obstacles to improved UUVs. Generally speaking navigation and communication systems have come a long way. While greater precision and increased bandwidth are always desirable, current offerings get most jobs done. Unfortunately, energy storage is still a major challenge. Today's most capable UUVs have made use of sophisticate ideas, from buoyancy engines to extreme drag reduction, to increase performance. These improvements tend to be accompanied by an increase in cost, complexity or both. For example the UUV endurance leaders, buoyancy driven gliders, require careful attention to weight and balance. This is acceptable to many users but not all. Fuel cells have proven to be viable for long range survey AUVs, but the maintenance cycle can be very demanding. Current energy storage technologies are evolving slowly and radical advances have yet to materialize. Much can be accomplished with today's UUVs but even a simple doubling of endurance, without an associated cost or complexity increase, would widen the base of viable applications.

**Grant, Saab Seaeye** UUVs efficiencies. The gap between electric work ROVs and hydraulic work ROVs has closed, leading to an increased use of electric vehicles with significant savings in the cost of ownership that offers a more effective solution for many work tasks.
Longer term cost savings will also come with the growing use of hybrid ROVs for maintenance, inspection and light work tasks, where a support vessel is not needed. The challenge is to make both ROVs and hybrid AUVs more intelligent and allow for more semi-autonomous operation. We also need to provide improved tooling and sensors to reduce the time to perform the underwater tasks, especially for ROV operations.

**Charbonneau, Deep Ocean** Vehicles must be designed to integrate a wide host of ancillary sensors for easy expansion as new sensors are developed. Power and Control systems must provide the ability to work in strong currents and in hazardous work environments.

**How was business in 2010? How does it look for 2011?**

**Anderson, OceanServer** As a small company, we have gradually improved our product features, customer relationships and brand recognition, resulting in revenue growth and a positive business outlook. 2010 was a very good year, and 2011 should be as well.

**Charbonneau, Deep Ocean** Deep Ocean Engineering has undergone a major change in operations. The company has relocated to a manufacturing facility in Cataumet, MA. 2010 was a reconstruction year and 2011 has many potential increases as we work with our existing customer base and search out new customers for our products.

**Grant, Saab Seaeye** After a slow first half in 2010, business picked up in the year and 2011 looks to be as good as the record years of 2008 and 2009.

**What do you count as your company's leading strength(s)?**

**Kelly, Bluefin** Not only does Bluefin provide five different AUV models, but Bluefin is a full AUV lifecycle

provider offering research and development, technology integration, full-scale manufacturing, platform training, and operations support. No other provider has comparable depth and breadth of expertise and resources dedicated exclusively to AUV development and production.

**Rodocker, SeaBotix** SeaBotix has many strengths in providing solutions to unique applications. Our industry experience and dedication to working with clients has led to several products that have solved requirements other companies have been unable to provide. SeaBotix is only content with pushing new technologies to create more capability to more industries.

**Grant, Saab Seaeye** We are market leaders because people respect and trust our technological excellence in terms of quality, reliability and operational performance. We have supplied well over 500 electric ROV systems to our various markets. Such a reputation comes entirely from building a dedicated team of highly skilled people with deep knowledge and experience in the world of underwater vehicles.

**Bentley, VideoRay** VideoRay's greatest strength is our technology and manufacturing team, and our lead in the industry.

**Charbonneau, Deep Ocean** Deep Ocean Engineering has a wide range of vehicles to meet almost any application. The Phantom class of ROVs are based on an Analog Control system and fill the need for a simple, rugged and reliable system. The new "VECTOR" series product line is our digital class of vehicles that will allow us to easily integrate sensors and control to the vehicles for our customers.

### Weaknesses?

**Charbonneau, Deep Ocean** Deep Ocean Engineering was recently purchased and there is a completely new management team working to revitalize the Deep Ocean Engineering product lines and bring them back to their status as the premier small and medium size inspection class ROVs in the marektplace.

**Bentley, VideoRay** Our greatest weakness is the need to explain the technology to almost every customer. Ten years ago I think almost none of

## Scott Bentley

*In my opinion this is the availability of small, comparatively inexpensive multibeam sonars such as those pioneered by BlueView Technologies. The "video like" returns allow operators with little experience to use them to navigate in water with almost no visibility.*

our current customers were using ROVs – or even considering them.

**Rodocker, SeaBotix** We wish there was more time in the day and an unlimited budget to develop. There are so many new product concepts we have and not enough resources to bring them to market as fast as we would like.

**Grant, Saab Seaeye** We used to be highly dependent on the oil and gas industry, but now our market growth is more evenly spread amongst other sectors, notably the defense market.

**How is your company investing today to better serve the subsea market?**

**Rodocker, SeaBotix** With the recent acquisition by Bolt Technologies SeaBotix will be in a better position to invest in new product development. Bolt Technologies has a long history in the subsea market that will further strengthen our goals.

**Anderson, OceanServer** We split our R&D investment between hardware development and software utilities to simplify and improve the operational model for the operator.

**Heinz, iRobot** This year, we are making improvements to Seaglider to provide enhanced buoyancy capabilities that will allow for operation over a greater range of ocean densities. We are also improving Seaglider's payload capacity and sensor choices. In addition, we continue to develop Ranger for market entry in 2012.

**Kelly, Bluefin** To better serve the market, Bluefin has been investing in a new state-of-the-art facility of which it occupied in November 2010. The water-front building provides ample space for manufacturing and engineering functions and several new capabilities that will accommodate increased productions rates anticipated for the upcoming growth phase of AUV technology.

**Manley, Liquid Robotics** Liquid Robotics is providing improved connectivity to subsea systems through our "gateway" capability. By integrating active acoustic systems in the Wave Glider we will provide telemetry, and in some cases positioning, to all manner of undersea systems. Mobile vehicles and fixed installations will all benefit from this new approach to connectivity undersea. Systems that have been "out of touch" will now be more readily accessible to operators on the surface, and on

**Video Ray**

shore. Scientific data previously trapped undersea, sometimes for months at a time, will be analyzed sooner and commercial operations will be safer and more efficient. Look for technical publications on this capability in the near future.

**Bentley, VideoRay** Of course most of our effort is to make our systems even more reliable, increase our depth rating, improve our tether pulling capability, etc. However, much of our investment is in our collaboration with sensor and software companies. Even our software development is much more oriented towards our software development kit than producing a direct end user product. It takes a lot of work to make sure every sensor manufacturer, or software company that wants to work with us has the tools and support they need, and it is our biggest individual R&D investment.

**What new product or service will you deliver to the market in the coming 12 months?**

**Rodocker, Seabotix** 2011 will see the release of a new product referred to as the Containerized Delivery System (CDS). This new system is a deep water rapid response inspection system. The self contained 20ft container houses a Launch and Recovery System (LARS), Tether Management System (TMS), vectored Little Benthic Vehicle (vLBV), control room and winch. Depth capability is 4,000 meters and the vLBV offers a stable sensor platform. Unique features are the less than one day mobilization, single 20ft container and greatly reduced asset cost over large work class ROV systems.

**Grant, Saab Seaeye** Panther XT Plus. This new, light, but powerful ROV has the proven performance of the Panther XT work ROV, yet is packed with ten powerful thrusters. Not only can it swim over 30% faster than anything else of its type, and has over 50% more thrust than its nearest competitor, it also has a power to weight ratio over twice that of any other comparable ROV on the market. It can also accommodate industry standard seven function position feedback manipulators providing the operator with heavy duty power and precise control allowing faster completion of complex manipulator tasks.

Sabertooth: Currently in development, this autonomous/semi-autonomous hovering AUV will perform maintenance, inspection and light work tasks and will lead our development of the next generation of underwater vehicles.

## Kongsberg & Hydroid

# Building an AUV "1-Stop Shop"

*Marine Technology Reporter recently spent some time with* ***Bjørn Jalving****, Vice President of Kongsberg Maritime's Subsea AUV Department and* ***Christopher von Alt****, President of Hydroid, Inc. (a subsidiary of Kongsberg Maritime) to get their views on the AUV industry and what the future holds.*

**What do you count as the defining accomplishment(s) of your careers, and why?**

**von Alt** A defining accomplishment of my career was collaborating with a team of truly talented and dedicated people to develop the REMUS family of vehicles and to found a company that is now part of Kongsberg. To me, the best part is that Hydroid has created many new, interesting and well paying jobs in a community I have lived in for more than 25 years. This accomplishment is important to me because it means that the trust granted to the development by the Office of Naval Research, more specifically people like Tom Swean, and the Woods Hole Oceanographic Institution, was not squandered. What we started, we finished. We did not give in. I am very grateful for that opportunity.

**Jalving** I started working with AUV research and development in 1992. I was responsible for the development of the HUGIN control system, mission management system and aided inertial navigation system. To make these systems into one integrated solution in the 1995 – 2001 time period was very rewarding with a lot of good memories from at sea testing with colleagues and customers. Since 2007 I have been responsible for the HUGIN AUV business unit. The defining work task now is the co-operation with Hydroid where we align the HUGIN and REMUS product lines, strengthen the technology base and provide users operational synergies.

**What are the biggest enabling technologies that have advanced subsea vehicles in the last decade?**

**von Alt & Jalving** Autonomous Underwater Vehicles have become useful tools because small, low power, low cost reliable computers, support electronics, sensors, and rechargeable lithium-ion batteries became commercially available to teams of innovative and motivated engineers who did not give up until they got these systems working. A number of AUVs became functional in a number of different companies throughout the world at about the same time. The determination and reliability of the people in these companies coupled with their capacity to be innovative and collaborate with each other and with their customers has over time made some AUVs more successful than others. Most of the technology used in these systems was commercially available to each group; I do not think there was one enabling technology that made it happen.

**What trends do you see today that you believe will fundamentally change this business in the coming decades?**

**von Alt & Jalving** The warming of the planet will lead to: a reduction in ice coverage at the poles for much of the year as well as rising sea levels; an increase in the intensity and number of storms; highly variable climatic conditions that will alter the way water and heat are distributed around the globe, and the fielding of a large number of systems that generate power from both the ocean and the atmosphere. All of these outcomes will stimulate the use of AUVs. In the oil and gas industry there will be increased focus on remote operations, safety and environmental monitoring. Especially in deep waters and distant areas AUVs will have a role to play. In the military, the acceptance of robotics is an important trend. AUVs offer cost-efficient capacities to the navies.

**Today, where do you see the opportunities for growth in this sector? By market, by geography**

**Jalving** AUVs hold tremendous potential for subsea data gathering at increased speed, lower cost, and with unmatched quality. Therefore, we believe the use of AUVs will grow in all major markets and geographies.

**What do you count as the leading technical challenges to making UUVs more efficient?**

**von Alt & Jalving** As a result of more than 20 years of focused R&D, today's AUVs are already very efficient, and have reached a high level of maturity. There is an effi-

ciency potential in continued sensor development specifically for AUV use, with size, weight and power being the limiting factors. Autonomy and robustness will also continue to develop.

**How was business in 2010? How's it look for 2011?**

**von Alt & Jalving** Business in 2010 was good, 2011 will be better. Hydroid and our parent organization Kongsberg Maritime continue to show strong growth.

**What do you count as Hydroid's leading strengths and weaknesses?**

**von Alt & Jalving** One of Hydroid's greatest strengths is that it is now part of Kongsberg, a company that has strong values and creates advanced high-technological solutions for operations conducted under extreme conditions such as the deep sea, in the defense theater, and in space. Collaboration is fundamental to the way we do business. We collaborate as individuals and as an organization – to the benefit of our customers and our own competitiveness. We are constantly improving our products and our processes. We are reliable and we strive to meet our customers' expectations. These values are our leading strengths. As we like to say, "the difficult we get done right away - the impossible takes awhile." Our customers can look forward to continued improvements in the capabilities and performance of our AUVs as well as increased synergy within the HUGIN/REMUS AUV product lines.

**How is Kongsberg Maritime and Hydroid investing today to better serve the subsea market?**

**von Alt & Jalving** Kongsberg Maritime and Hydroid are investing in our people, in our products, and in developing a thorough and in-depth knowledge of our clients' needs and objectives. As our AUV customer base grows, we invest in world-wide customer support. We also invest to provide full picture solutions to solve a customer's complete problem.

**What new product or service will Hydroid deliver to the market in the coming 12 months?**

**von Alt & Jalving** Hydroid will provide SPAWAR with REMUS 600 AUVs equipped with technologies for meteorological and oceanographic data collection, as well as technologies for processing and disseminating this data. This technology will enable superior decision making based on information collected by a system of networked sensors and shared through a network of

## *von Alt (left) & Jalving (right)*

***Our customers can look forward to continued improvements in the capabilities and performance of our AUVs as well as increased synergy within the HUGIN/REMUS AUV product lines.***

interoperable Naval and Joint networks information systems.

The ultimate end user is the Naval Oceanographic Office (NAVOCEANO), which acquires and analyzes global ocean and littoral data and provides specialized and operationally significant products and services to all elements within the Department of Defense.

Kongsberg is introducing the portable shallow water REMUS 100 AUV system to its equipment lease pool in Aberdeen, Scotland, to complement the existing subsea rental inventory. The product already has a proven track record and introducing it into the rental marketplace will create opportunities for customers to use this technology to support and expand their subsea operational activities. Kongsberg Maritime will begin offering the REMUS 100 for rent beginning in April of 2011.

We have developed a complete and portable mine localization and neutralization system. This spring we will on a vessel of opportunity demonstrate this capacity with HUGIN 1000 and the Minesniper mine disposal weapon, the latter which is made by Kongsberg Defence Systems.

Another new offering is a fully automated multi sensor pipeline inspection system. In February 2011 a HUGIN 1000 vehicle equipped with HISAS 1030 synthetic aperture sonar, EM3002 multibeam echo sounder and an optical camera with LED lighting, was used to inspect around 30 km of subsea pipeline in an 8-hour, two-pass mission: In the first pass, side-scan data from the HISAS 1030 sonar was used to detect and track the pipelines in real-time. Software for pipeline detection and tracking extracted pipe-like features in the sonar images, with a high degree of robustness towards false detections. The PipeTracker software runs as a plug-in module in the standard HUGIN payload system. The vehicle control system in turn uses the identified pipeline tracks to position the vehicle at an optimal range for HISAS imaging.

The whole process is fully automated inside the AUV and requires no operator intervention. In the second pass, HUGIN followed the pipeline tracks identified in the first pass at low altitude and inspected the pipelines using the EM3002 multibeam and the optical camera. After the mission, the recorded HISAS 1030 data was post-processed into high-resolution (4x4 cm) sonar images and bathymetry maps of the pipeline. Together with the optical images and the multi-beam data recorded in the second pass, this gave a detailed view of the pipeline surroundings and the pipeline itself. The collected data was spectacular. The complete procedure was repeated the next day over another pipeline in a new 8-hour, two-pass mission.

**Hugin & REMUS**

## ECA Robots

# Working the Brazil Deep

*__Claudio Paschoa__, MTR's correspondent in Brazil, interviews __Ms. Marie-Laure Charles__, Managing Director of ECA América Latina Ltda., based in Rio de Janeiro, about the innovative subsea systems ECA has been introducing to the already competitive and growing Brazilian subsea and deepwater market.*

French subsea systems manufacturer ECA has recently been introducing its full range of subsea products in Brazil, including the AUV Alistar 3000, ROV systems and seabed mapping software, with an eye at the growing demand for subsea robotic equipment in Brazil´s shallow and deepwater plays. Founded in 1936, since 1981 ECA has been specializing in the design and manufacture of remote controlled systems for intervention in "hostile" environments. These activities include four main sectors: subsea (offshore oil & gas, defense, oceanography), nuclear, pipes, sewers, boreholes, and large bore pipe works such as main ducts and galleries, and environments with explosive risks.

ECA supplies a wide range of products such as remote controlled vehicles, subsea video systems, robotics systems, remote controlled tools and seabed mapping software. Some of these are also be available for rent. Another important aspect of their business is that ECA also designs and manufactures special customized systems, fulfilling their customer's requirements.

**Tell us about your career and your position in ECA?**

I have been working for 15 years in the Military and Defense Sector. My last position before joining ECA was with French defense industry company Thales, as Managing Director for Chile, Argentina and Peru. I was recruited by ECA one year ago and since the company has many subsidiaries, I spent two months visiting these locations and learning about the products.

At the end of March 2010, ECA sent me to Brazil as

**Underwater and shoreside (inset) view of Alistar 3000 AUV.**


(Photo ECA Hytec)

Managing Director and Administrator to open an office in Rio de Janeiro, which is responsible for all of Latin America in both the civilian and military business sectors.

**What are ECA´s main business sectors and what are the main products it brings to Brazil?**

ECA is specialized in maritime and subsea technology in the civilian and military sectors. It is important to highlight that ECA is the world leader in the manufacture of subsea robots for submerged mine detection and destruction. ECA also builds ROVs and AUVs and for the O&G industry. Presently we have contracts with Petrobras for subsea robots and seabed analyzing software, and with the Brazilian Navy for a ship simulator.

All the electrical systems and the steering console on the four Scorpène submarines bought by Brazil from France are from the ECA group. The four submarines will be assembled at the new submarine base, which is being built in Rio de Janeiro. ECA is also committed to offer full technology transfer to its Brazilian clients.

**What contracts to you already have for subsea robots in Brazil?**

ECA already has two robots with Cenpes (Petrobras research center), but these contracts were awarded before I came to Brazil. Now that we have incorporated our own company in Brazil, since July 2010, which is named ECA América Latina Ltda , I am prospecting other customers, starting with French companies with whom ECA works in other countries (Total, Technip, Schlumberger, etc.) and other Petrobras' suppliers.

**How was the process to open your company in Brazil and how did you feel about the local bureaucracy?**

It was very complicated and slow! You really must have very solid nerves and be very patient as the bureaucracy is extremely complicated and the incorporation process exceedingly slow. **Comparatively doing business in Chile is much simpler; they are more organized and you are not faced with wrong information and lies, as sometimes happens in Brazil.**

From my experience in Latin America, I would have to say that Chile is the most organized and efficient country to do business with. Here in Brazil decisions are too decentralized, it gets very confusing and communication between different government institutions is bad. So you have a person saying one thing in Brasilia and another saying something else in Rio, while none of them seem to know what documents are needed. It is all very frustrat-

ing, simple processes take longer and get more expensive, as the steps you need to take are not obvious. The Brazilian logic is very different from the European logic!

**How are your business relations with Petrobras?**

Petrobras is very big and it is complicated to know who you need to work with. ECA supplies various products and Petrobras already is a client for some products, such as the seabed imaging software from Triton Imaging.

Triton Imaging was acquired by ECA one year ago and it already was a Petrobras supplier.

So for this kind of software I need to speak to someone in Macaé and someone in Houston, and they don´t communicate between themselves so I end up being the link between them, so it gets a bit complicated and a lot of time is wasted. However, other than communication glitches, our business with Petrobras is very good.

**With which Petrobras departments do you do most of your business?**

Mostly we work with the subsea department of Petrobras and Cenpes, where they test new equipment.

**When you have your Rio office operational, how many expats will be working with you?**

With the local content laws in Brazil, we must hire Brazilians even for the office. It will be only me from France and all the other employees will be Brazilian.

To start with I believe we will hire three or four locals for the office and grow from there. The demand for our products will dictate how many more we hire.

**Which AUV and ROV models are you mostly selling in Brazil?**

Now we have the Alistar 3000 AUV, which can go down to 3000 meters. This is our model for the O&G industry. At the moment we have a model which we are testing along with Total and Cenpes. They have asked for some modifications and we are working on them.

We are also offering the Alistar 3000 to other O&G companies and the Alister model AUV for military use. All our equipment with a name ending in "ar" is for civilian use and all equipment with names ending in "er" are for military use. As for ROVs, ECA offers three models, the H1000 for deepwater inspection and intervention, the H300 for shallow water and the Roving Bat for hull

**ECA K Ster subsea mine detector & destroyer.**


(Photo ECA Hytec)

inspection. We also offer electric and hydraulic manipulator arms for ROV use, with depth ratings from 300 to 7500 meters. ECA is also developing an ROV for the French Navy to be rated for 2000 meters but for now it is only a military model.

**Does ECA also market high end simulators for civilian and military use?**

Yes we have various models of simulators for both military and civilian use. At the moment we are finalizing a contract for a ship simulator with Femar (Foundation of the Brazilian Navy) in Rio de Janeiro, but the simulator is to be installed at the Merchant Navy School (CIABA), in the city of Belém, in Para state, which is in Northern Brazil. We also have submarine simulators being used to train Brazilian Naval personnel in Europe, for training on the Scorpène submarine systems.

**Could you tell us more about your seabed mapping software?**

As I said before, ECA acquired Triton Imaging on January 1st, 2010. Triton Imaging pioneered sonar data acquisition software more than twenty years ago. This includes imaging software for a variety of data types, such as side scan sonar, forward-looking sonar, multibeam sonar, sub-bottom profiler and seismic. For the O&G industry, the most used would be the search and survey, hydrography, and seismic software applications.

The Triton Perspective Map for example, is a multilayer, map-based display and data fusion software that integrates other proprietary software modules into a cohesive suite, which can process, fuse, and displaying sidescan, bathymetric and seismic data.

Triton Imaging is a world leaders in research and development of software for acquiring and optimizing a multitude of data streams.

In Brazil we already have Petrobras as a client and we are offering our imaging products to other O&G related companies operating in Brazil.

**What are ECAs investment plans for Brazil?**

Well, ECA began by investing $200 thousand as company's capital, which allows for only one permanent visa for an administrator, in this case: me, which is demanded by Brazilian law. We will invest in the new French business center in downtown Rio de Janeiro. Right now it is hard to say how much will ultimately be invested.

With the demand by the Brazilian government for 60 to 70% local content in equipment for tenders run by

Petrobras and the Brazilian Navy, we intend to build at least 70% of our products here in Brazil. Therefore we are looking for local companies that have products related to ours and potentiality to build some of our products, so we can begin a partnership and begin a technology transfer process in order to capacitate this local company to build selected products to ECA quality standards.

Since ECA has many different branches it would be impossible to have only one company building all the different equipment, therefore we are looking for one or two local companies to be our partner in each of our segments, and once chosen we will train them in France and then begin the technology transfer in order to start manufacturing. If we send anyone from France to work with these companies it will be mostly during the first stages for supervision during short periods. As our office in Brazil also will supply all of Latin America we are talking about, eventually, having our full range of products to be manufactured in Brazil.

**Which do you consider to be ECAs main products?**

Our main products are ship simulators, subsea robots and airplane simulators.

**How do you see the market potential for your products in Brazil?**

It is very, very good! Brazil is in a full growth mode and is in need of many different products. An example is if Brazil buys Frigates from Italy, they will be using ECA simulators to train the Brazilian Naval Officers, so it is more business for us.

Of course the potential of the O&G market is immense for the subsea robots and also for ship simulators for the shipping industry involved in O&G operations.

We really hope to do business with Brazil for a long time. ECA definitely has short term goals in mind but expects a lot of business in different segments in the long run.

**How do you see the business opportunities for ECA in Latin America?**

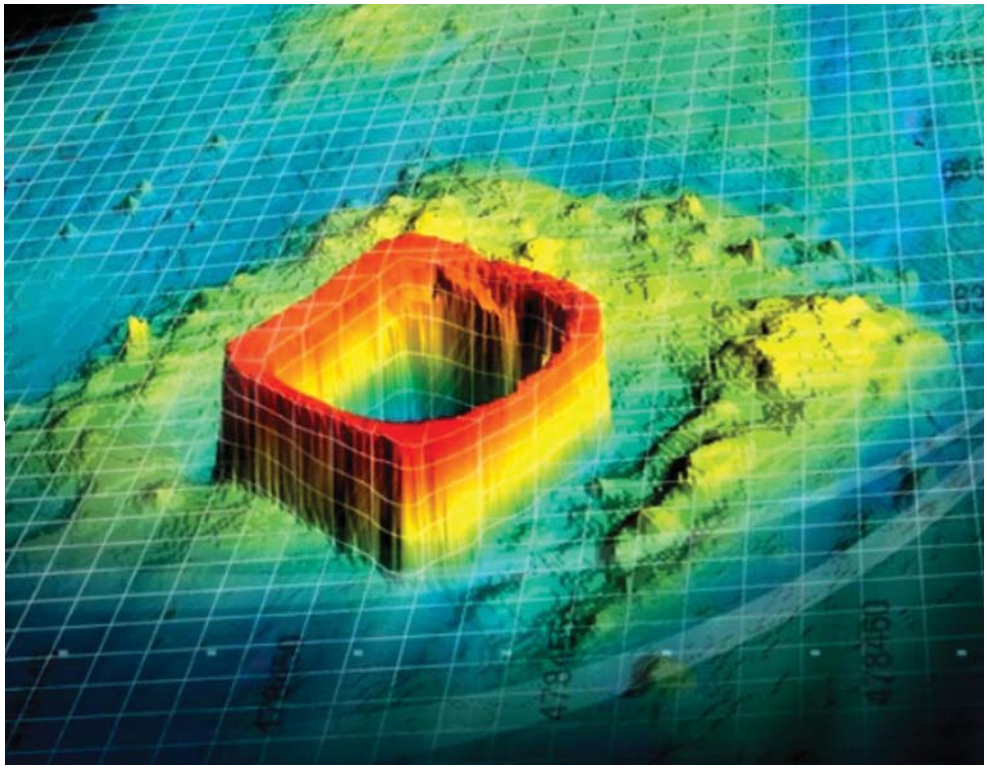
Actually it is very good, the economic crisis did not affect Latin America so much, and as we have a wide range of products, there are demands from each country for different equipment and services.

**What kind of support do you get from the French Consulate in Rio de Janeiro?**

We receive a lot of support from French authorities in Brazil, including in terms of security as we are also a defense company. They are also very helpful with understanding the local bureaucracy and with local contacts.

There is a great demand for deepwater subsea equipment and services in Brazil, could you tell us a bit more about how the Alistar 3000 AUV is being used in the deepwater pre-salt by ECA and your partner Advanced-Subsea?

Deepwater services are based on Alistar 3000, either in autonomous mode or in remote mode using a 3km fiber optic umbilical. Scope of applications are construction support for field installation with pre-lay survey, touch-down point monitoring and as-laid/ as-built survey at the development stage and IMR activities such as pipeline inspection, FPSO riser & mooring inspection at the exploitation stage. Advanced Subsea & ECA just launched a Joint Innovation Project based on Alistar 3000 for sharing AUV experience between major Brazilian market operators.



(image courtesy of Triton Imaging)

**Triton Imaging sample.**

**And what is your opinion of Brazil as a place to live?**

I really like the climate, although it is very hot now, (but in France it´s snowing!) and the people, they are very friendly. I haven´t travelled very much in Brazil, only to a few state capitals, so I hope to get to know the country more in time. I really like to go to Búzios (beach town 300km northeast of the city of Rio) though, it´s a beautiful place, very nice to relax.

## ECA USV

ECA´s latest military equipment innovation is the Inspector USV (Unmanned Surfce Vehicle), the vessel is an easily reconfigurable 8.2 meter speedboat, which is a platform capable of carrying out a wide range of missions, such as Mine warfare and Mine countermeasures (MCM), Inshore hydrographic and oceanographic ops, O&G survey, Coastal and Port security, Intelligence, Surveillance and Reconnaissance (ISR), Structure and Hull inspection, Fleet training, Naval combat and Electronic warfare. It runs on two turbo diesel engines and hydrojets, with a maximum speed of 30kts, a remote control range of 30nm, and a 50cm draft, permitting it to penetrate very shallow locations. The Inspector USV comes equipped with 360º night & day camera and may be configured to carry a range of other equipment, sensors and weapons. It also has the capability to remotely launch a K-STER Mine killer and also tow multibeam and side scanner, among others.

# Developments in Battery Technology

*by*
*Alex Bynum, Saft defense sales manager, naval applications*

At the Navy Energy Forum in October 2010, the U.S. Navy shared its Energy Vision for the 21st century. This vision focuses on the nation's over-reliance on petroleum and the need for alternative energy sources to ensure the Navy's energy security. Recognizing its dependence on petroleum, along with the negative environmental, financial and security impact of petroleum-based fuels, the Navy has outlined several goals for developing a greener fleet. Secretary of the Navy Ray Mabus outlined several ambitious goals that would cut petroleum use in the Navy's commercial vehicle fleet in half by 2015, and transition shore-based energy requirements to renewable power sources, such as solar, wind and hydropower. A key factor in supporting these goals is energy storage systems and advanced battery technologies.


## How do UUVs fit into the plan?

The Navy's Energy Vision is supportive of its 2004 Unmanned Undersea Vehicle (UUV) Master Plan in its effort to balance investment in technologies to enhance combat capabilities, reduce greenhouse gas emissions, conserve energy, and speed the development of new UUV systems. In order to accomplish these goals, the Navy must rely on development of alternative power sources and increasing efficiency to adapt current fuel-based energy sources to battery, renewable or fuel cell-based systems.

The type of energy source selected for a UUV application is driven primarily by mission requirements for speed and endurance. Long endurance, payload power and high speed are all factors that require increased energy on the UUV. It is important to note that energy source selection cannot be done without consideration to the impact on vehicle design, size and type. There is no clear-cut choice of energy system that meets all mission needs and all vehicle design constraints.

As mission requirements for UUV subsystems continue to increase, so does the demand for more power and energy at a reduced weight and size. Safety and cost are also critical factors in the design and development of future UUVs. In its efforts towards maximizing energy independence and security, the Navy is pushing for robust energy storage solutions that meet all of these demands.

Meanwhile, the commercial marine industry is moving toward systems that utilize renewable energy sources and reduce reliance on petroleum. In addition, the uses of unmanned systems, which rely on battery power, have been expanding for an array of applications in the energy sector, such as offshore drilling. These environmental and economic issues set the stage for an increasing need for advanced battery technologies.

For complex systems such as UUVs, energy storage systems play an important role in providing propulsion and powering the vehicles' electronics. These vehicles rely solely on stored

energy to power the vehicle and its critical systems. With the role of batteries taking center stage in naval and marine applications of the future, it is very important to develop reliable and sophisticated energy storage systems.

Energy storage systems enhance the overall performance of any military application. Selecting a cell with the optimal power-to-energy ratio affects system safety and efficiency. Too much power or energy means the system will require more cells to satisfy the other requirement. For example, a system with excess energy is more energetic when misused and a system with excess power has higher short circuit currents and requires larger downstream switching. Both result in a system heavier than ideal.

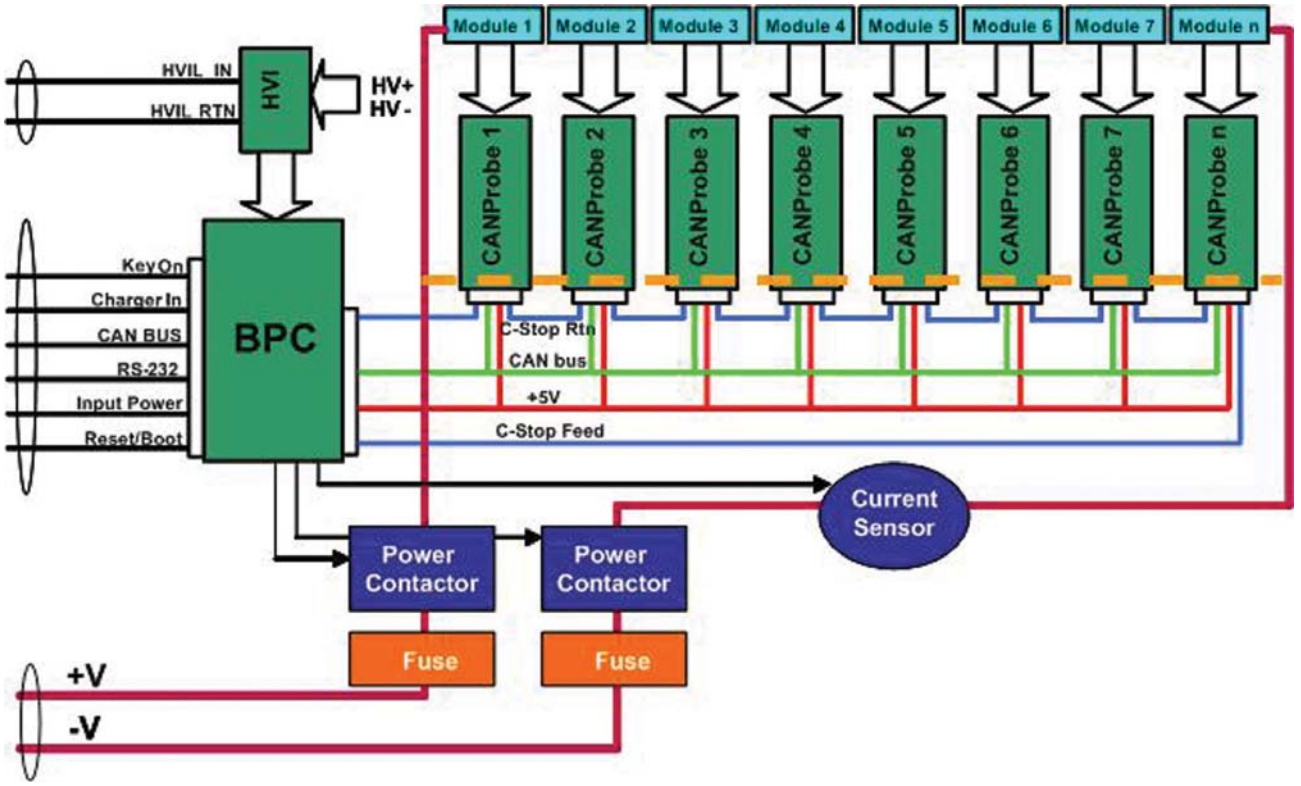
## Chemistry selection

Saft offers several choices of electrochemistry, including primary and rechargeable, each optimized for particular naval applications. Lithium-ion (Li-ion) batteries are a popular choice for marine designers because they offer qualities making them ideal for jobs demanding high power and energy without additional weight. Lithium-ion provides more energy per volume than many other electrochemistries and operates at higher voltages to maximize the power-to-weight ratio of a battery. Li-ion batteries can also be recharged repeatedly, which reduces life cycle costs. Because of these advantages, Li-ion battery technology is increasingly being used in a number of marine, space and military applications with similar performance demands.

Li-ion, however, can be less tolerant of abuse conditions and failure modes. Due to this, designers must consider risk mitigation for the user and platform taking into account the worst possible failure regardless of probability. In order to offer a more abuse tolerant technology that maintains many of the benefits of other Li-ion technologies, Saft developed Super-Phosphate™ using lithium-iron phosphate technology.

## Introducing Super-Phosphate Technology

For UUVs, Saft's Super-Phosphate iron phosphate-based rechargeable chemistry offers an ideal balance of power, energy and safety, making it a good solution for naval applications. Like standard lithium-iron phosphate electrochemistry, Super-Phosphate operates at a slightly lower voltage profile and is less energetic than traditional metal oxide technologies, but offers addi-




tional features such as proven safety, longer cycle life, better calendar life and a wide operating temperature range, including superior low-temperature performance compared to standard iron phosphate technology.

Traditional Li-ion batteries are made with transition metal oxide cathode materials such as Lithium Cobalt Oxide or Lithium Nickel Cobalt Aluminum Oxide. Lithium-iron phosphate (LiFePO4) batteries are rechargeable Li-ion batteries that use LiFePO4 as the cathode material.

This low cost, naturally-occurring mineral offers excellent thermal stability. The use of iron phosphate material in Li-ion batteries was first discovered and patented in 1997 by Dr. Goodenough from the University of Texas.

Super-Phosphate™s being incorporated into a variety of marine applications that require high energy and the safest operation. The primary advantage of iron phosphate over metal oxide based Li-ion is increased abuse tolerance, because the cell is less prone to reactivity under such conditions. Both Li-ion and lithium-iron phosphate batteries offer their own unique advantages and provide options, so marine designers can select the best power source to fit the application.

## Cell Selection and Safety

Although the terms "energy storage system" and "battery" are often used interchangeably, they are not always the same. Saft develops energy storage systems with sophisticated software and electronics that communicate factors such as state-of-charge, state-of-health, and other conditions to the platform, while also performing thermal management to regulate the system and ensure proper functioning. The best way to define an energy storage system is to look at typical design considerations.

System safety, reliability and availability are prime considerations when choosing the system architecture for a large lithium-ion battery. For any given energy requirement, the capacity of the cell to be used determines the quantity of cells, while the desired system voltage determines the number of cells to be placed in series. However, the system designer still faces a wide range of options regarding the arrangement of cells, monitoring electronics and controls.

The most important feature of any high voltage battery is the capability to be installed, operated and maintained by users protected from hazards of electric shock and arc flash exposure. Saft applies NFPA 70E: Standard for Electrical Safety in the Workplace to all operations involv-

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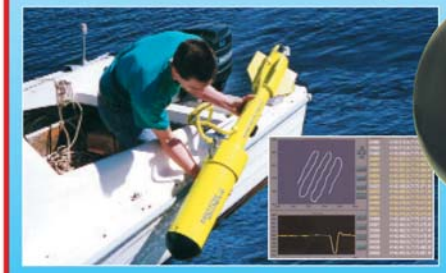


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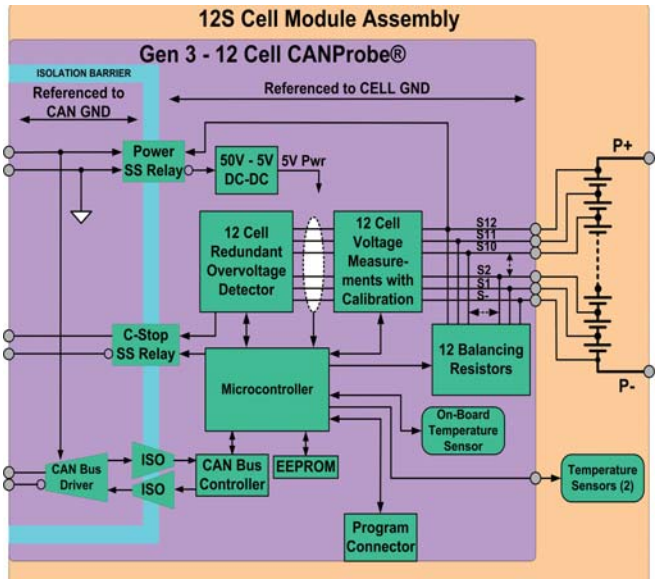
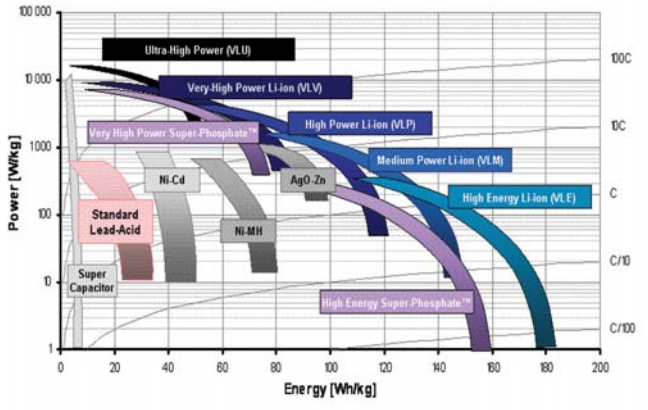



ing the risk of contact with electrical potentials exceeding 50V.

Another important requirement is that system architecture may not contribute to the failure of any cell. The first case to be considered is that no cell may be placed at risk of overcharge due to the system architecture. This requires that back-charging or circulating currents must be controlled. For example, if two sets of cells are placed in series and the strands are connected in parallel without controls, discharge of some cells in one strand due to self-discharge, electronics failure, a foreign object, or moisture will result in the overcharge of the remaining cells in that strand. Thus, the charge current through each strand of cells must be controlled to prevent overcharge.

Another guideline within Saft's system architecture is that each cell be monitored for overcharge. To address the critical nature of this requirement, Saft's standard practice is to always include a redundant sensing method for each cell that is communicated over a physical communications link. The primary and secondary devices use different technology for both the sensing devices and the communication links, further reducing the likelihood that a common failure mode would affect both cells. The detection of a dangerously high cell voltage by either the primary or redundant monitoring circuits blocks the charge of that cell. Some system architectures result in worsening the effects of cell failure. This is a concern when cells are connected in parallel before being placed in series, or when cells are connected into a series-parallel matrix with connections both ways. In both of these arrangements, the presence of a short circuit at one cell, whether caused by internal short, local heating, crush or penetration, will result in the parallel-connected cells delivering power into the short. This can increase the energy released in the failure, exacerbating the reaction. To prevent this type of cell failure, the architecture recommended by Saft consists of single cells placed in series, with the currents of each series strand managed to prevent contributing to cell failures or exacerbating failure effects. The mechanical design and architecture of the battery protects against cell failure propagation. The effects of a failure of any single cell are managed to prevent those effects from inducing failures of other cells within the battery. Saft has successfully demonstrated propagation prevention in numerous batteries by integrating key principles into the battery architecture such as managing vent gasses and thermal characteristics of the vent gasses. Although future mission requirements for the U.S. military are unknown, Navy engineers will continue to partner with battery manufacturers to leverage the latest technology. Saft has invested years of research into developing cutting-edge battery systems to safely provide the most power, in the smallest package, to Navy designers. Saft already has a wealth of experience in the marine industry as a supplier of battery systems for emergency back-up, lighting, engine starting and other auxiliary systems. The use of Li-ion batteries for ship and boat propulsion applications and Super-Phosphate for UUVs is therefore a natural progression for Saft, based particularly on its broad expertise in delivering lithium battery systems for the military and space industries.




## About the Author

*Alex Bynum is the Defense Sales Manager focusing on naval applications for Saft's Space & Defense Division, located in Cockeysville, MD.*

## Navy Report

# Japan Invests in Subs

*The JMSDF new construction plan includes a significant investment in new submarine capability,* ***Jurrien Noot*** *reports.*

The FY 2005- 2009 Mid- Term Defense Program was based on the National Defense Program Guideline for FY 2005 and after, which was approved by the Security Council and the Cabinet on December 10, 2004. Under the program, the number of escort divisions was to be brought to eight and the number of submarine divisions to five. The capabilities of Aegis destroyers were to be improved to enable them to respond to ballistic missile attacks. Joint Japanese – U.S. research in this area was to be supported. There was to be less emphasis on the provision of capabilities to counter full scale invasion threats, although destroyers, submarines and minesweepers would continue to be acquired. There would be efforts to curb the life cycle cost of equipment and a general procurement reform was to be promoted. Cooperation with the Coast Guard was to be strengthened.The total amount of defense expenditure for the period was estimated at $290.8B at FY 2005 price levels. In case of need, an extra $1.2B might be provided. Naval vessels to be procured under the program included a total of five destroyers, four submarines and 11 other ships with an aggregate weight of 59,000 tons. The defense budget request for FY 2010 is $56.1B, compared to $56.4B in 2009.

### New Submarine Construction Projects

**• 2,900-ton SS (16SS Soryu)**

The lead unit of a new 2,900 ton submarine class was first budgeted in the FY 2004 program. Units are being authorized at a rate of one per year since, with the exception of FY 2009.

(Source: MOD Japan)

**The Oyashio class units were alternately constructed between the Kawasaki Kobe Shipyard and the Mitsubishi Kobe Shipyard at an overall rate of one per year.**

(Source: MOD Japan)

**The new 2900-ton Soryu class submarine.**

This class i has a V4 275R Mk II auxiliary Air Independent Propulsion (AIP) system. Preliminary characteristics published indicate a surface speed of 13 knots and a submerged speed of 20 knots, as in the Oyashio class. There will be six 533 mm torpedo tubes. The stern planes are in an 'X' configuration. Experiments with the AIP system had been carried out on the submarine Asashio. Construction alternates between the Kawasaki Kobe Shipyard and the Mitsubishi Kobe Shipyard. The lead unit was delivered on March 30, 2009 as the Soryu. The fourth unit was launched on November 15, 2010.

**• 2,700-ton submarine (05SS Oyashio)**

The Oyashio class units were alternately constructed between the Kawasaki Kobe Shipyard and the Mitsubishi Kobe Shipyard at an overall rate of one per year. The final unit of the class was programmed under the FY 2003 budget. She was launched on 8 November 2006 as the Mochishio (Job Nr 8115) and it was delivered on March 6, 2008. A network enabled command and control system known as MOF was fitted from unit eight Yaeshio.

## Other projects

**• 3,200-ton Hydrographic Survey Ship (19AGS)**

The FY 2007 budget request contains funding (JPY18,8 billion) for one 3,200-ton hydrographic survey ship. It is to be the first of a series of four units but the others have so far not been programmed. It was delivered on 17 March 2010. The hull is was constructed to merchant ship standards in order to keep the cost down.

**• Next-Generation Schnorkel Submarine**

On May 10, 2009, the JMSDF initiated a research and development project for a next generation schnorkel submarine based power generation system to be included in the FY 2010 budget. The project is estimated to take some 5.5 years at a cost of JPY13 billion. Existing systems such as those based on the MTU 16V 396 SE or the SEMT Pielstick 12 PA4 200 SM do not meet the performance requirements. The project goal is to improve stealth, and to reduce size and noise. The new power generation system would be introduced from 2020.

**• Next Generation Submarine Sonar System**

On May 10, 2009, the JMSDF initiated a research and development project for a next generation submarine sonar system to be included in the FY 2010 budget. The project is estimated to take from two to four years at a cost of $156m.

The project goal is to incorporate advances in information technology and facilitate shallow water operations. Existing sonar systems cannot cope with improved quietness of the target due to advances in underwater technology expected for the 2020s. The system is intended for the next generation submarine.

## Batten to Head Marine Energy Center


(Photo courtesy Oregon State Univ.)

Belinda Batten, head of the School of Mechanical, Industrial and Manufacturing Engineering at Oregon State University, will be the new director of the Northwest National Marine Renewable Energy Center beginning in July.

## Medeiros Joins OceanWorks

OceanWorks welcomes Lisa Medeiros to its team in the position of Business Development Manager. Acting as Business Development Manager for the offshore oil and gas industry. Medeiros joins the OceanWorks team from the Offshore Division of OYO Geospace in Houston and brings over 15 years of offshore and marine industry experience.

**www.oceanworks.com**

## Caswell Wins Humboldt Research Award

Hal Caswell, a senior scientist in the Biology Department at Woods Hole Oceanographic Institution (WHOI), was awarded a 2010 Humboldt Research Award by the Alexander von Humboldt Foundation in Bonn, Germany. The award is given "to internationally renowned scientists and scholars whose fundamental discoveries, new theories or insights have a significant impact on their own discipline and who are expected to continue producing cutting-edge achievements in the future," according to the foundation. Caswell is known for his work on population dynamics and demography. His recent research in this area has focused on developing models for studying threatened species, such as right whales and polar bears.

## Waggoner Rejoins BMT

BMT Scientific Marine Services, a subsidiary of BMT Group Ltd, said that Mark Waggoner was appointed as the new Service Manager. He rejoins BMT after a five year absence, having worked previously as a Field Instrumentation Inspector/Field Engineer.

## Bluefin Names III as East Coast Representative

Bluefin Robotics announced a regional partnership with International Industries, Inc. (III), provider of marine, hydrographic and survey equipment and software. Headquartered in Annapolis, Maryland, III will promote and sell Bluefin products in New York, New Jersey, Pennsylvania, Delaware, Ohio, Indiana, Maryland, Tennessee, Kentucky, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Illinois, Michigan, Wisconsin and the District of Columbia.

## Rapp Hydema Delivers Icelandic Trawler

Rapp Hydema has completed sea trials of electric winches for the F/V Thorunn Sveinsdottir, an Icelandic fishing-trawler. The substantial winch suite supplied includes Split Trawl, Sweep Line, Gilson, Cod-End, Out-Haul, Auxiliary and other winches, net reels, and Anchor Windlass. Rapp has been a long-time supplier worldwide of such devices — but this was a unique order. Rapp has some of its newest research-and-development achievements on display. Perhaps most important, Rapp's new liquid-cooled motor is aboard—patented, and then awarded—at last May's OTC in Houston.

## MirTac Implement Star for Seatec

MirTac has completed the implementation of asset management system Star IPS at Seatec. MirTac supports Seatec in its maintenance, safety and audit operations for its diving and ROV projects. Seatec Underwater Systems B.V. provides worldwide technical solutions and services to clients in various sectors such as On- and Offshore Contractors, Dredging Industry, Shipyards and Government Departments. **www.MirTAc.nl**

## Farsounder Upgrades Software

FarSounder released SonaSoft version 2.3; an upgrade to the software which powers all FS-3 series sonars. This upgrade includes significant processing, user interface, and display improvements. Upgrade features include:

## SeeByte Expands Engineering Team

SeeByte welcomed Pedro Patron, Joerg Baumgartl and Sorin Suciu to its expanding team of engineers.

Dr. Patron joins SeeByte from the Ocean Systems Laboratory at Heriot Watt University, where for the past six years he has held the role of Research Scientist. Pedro dedicated his time there to investigating methods for increasing the autonomy of Unmanned Underwater Vehicles (UUV). Pedro has had previous experience in working with SeeByte on a part-time basis, focusing on the early stages of SeeTrack Autotracker, one of SeeByte's current underwater solutions.

Dr. Joerg Baumgartl most recently spent three years as a research fellow at St Andrews University where he worked within the field of bio-photonics relating to novel optical trapping and imaging techniques for medical and biological purposes. Joerg attained his Doctorate in Physics whilst studying in Germany before moving to Scotland to continue his career.

Sorin Suciu is a senior software engineer with extensive experience in the financial sector. He has worked for JP Morgan on a broad range of software and IT related tasks since 2003 and will bring this experience to the SeeByte team.

Dr. Scott Reed, Head of Engineering at SeeByte said "I'm exceptionally pleased to welcome Pedro, Joerg and Sorin to our Engineering team. Their skills and experience make them key attributes to the company's engineering capabilities, and I'm sure they will complement the dynamic of our already effective team."

**www.seebyte.com**

- Improved In-Water Target Detection
- Automatic Bottom Detection
- Improved Shallow Water/Short Range Performance
- Support for C-Map Vector Charts

FarSounder has also upgraded its chart plotting capabilities and now offers support for C-Map vector charts by Jeppesen-Marine.

**www.farsounder.com**

## GE Expands O&G Portfolio

GE announced that its Oil & Gas business entered into an agreement to acquire the Well Support division of John Wood Group PLC for approximately $2.8b. The transaction, which the Board of Wood Group intends to unanimously recommend to its shareholders, is expected to close later in 2011, subject to shareholders' approval and customary closing conditions. With 3,800 employees, more than 20 manufacturing and multiple service centers worldwide, Wood Group's Well Support division is comprised of three business platforms: ESP (electric submersible pumps), Pressure Control (surface wellhead and flow control systems) and Logging Services (wireline logging).

**www.ge.com/oilandgas**

## RBR Appoint SALT as Represenatives

RBR appointed Sea and Land Technologies (SALT) as the exclusive representative for RBR in the ASEAN economic area. This area includes: Indonesia, Malaysia, the Philippines, Singapore, Thailand, Brunei, Burma (Myanmar), Cambodia, Laos, and Vietnam.

## Specialist Subsea Services Acquires Geoscience Consultancy

Specialist Subsea Services (S3), provider of ROV and survey services to the international energy industry, acquired geoscience consultancy Caledonian Geotech as part of its strategic growth plans. Caledonian Geotech, based in Dundee and formed in 1980, provides services including the practical application of geology, land and marine geophysics, hydrography, engineering and oceanography to onshore and nearshore development and maintenance projects. Its operations complement the ROV, survey, geotechnical and data management services of S3, headquartered in Aberdeen and with operations at international energy industry hubs.

## LYYN Expands in N. America

LYYN Inc. is appointed GP Marketing as its sales representative for the security market in the Pacific North West. GP Marketing is a well established twenty year old Rep firm dedicated the security/video market covering Alaska, Washington, Oregon, Idaho and Montana, and carries many well-known security focused brands. "We are very happy to be able to work with the team at GP Marketing to develop the LYYN business in the security market", says Derek Trimble, Sales Manager Security in North America. "Their established customer base and knowledge of the market place will enable a fast growth for us in their territory".

## Delta T's New Engineering Group

Delta "T" Systems established a new full-service engineering division. Delta "P" Subsea Systems, LLC. offers contract engineering for onshore, offshore and subsea projects alike. Boatbuilders can take advantage of cost saving contract engineering services.

## WHG Opens in Brazil

Vitta

Woods Hole Group opened its newest office in Brazil. The Cape Cod-based company opened the new facility to support the offshore oil & gas industry, port development agencies, and the coastal engineering needs in the bourgeoning Brazilian marketplace. In Brazil, Woods Hole Group will operate as Woods Hole Group do Brasil Ltda, Servicios em Oceanografia. Andre Vitta will be managing the office.

## New Distributor for 'Predator' ROV

Global Marine Systems announced that Great Eastern Group, an operational offshore company specializing in program management, environmental compliance, geophysical surveys, marine construction, and ship management & operations, will distribute its Inspection Class ROV system 'Predator' in Rhode Island.

Based in Florida, with offices and marine facilities in Rhode Island Great Eastern Group is the latest international distributor for Global Marine's innovative Inspection Class ROV.

## GE O&G Wins $50m Petrobras Order

GE Oil & Gas received two contracts with a combined value of more than $50 million to supply a total of 171 subsea wellhead and installation tooling systems to Petróleo Brasileiro S.A. (Petrobras).

The equipment will be deployed in Petrobras' Campos and Santos basins projects offshore Brazil.

The new contract awards were negotiated as part of GE's ongoing three-year frame agreement with Petrobras for the supply of subsea wellhead systems.

## Tsunami Detection Sensors Delivered for Med

Sonardyne International delivered tsunami detection technology for incorporation within an advanced warning network being installed in Cyprus. CSNet of Florida, and Limmasol, Cyprus is working with the Oceanography Center of Cyprus to develop a prototype tsunami warning system to protect Cyprus and the eastern Mediterranean coastline. They have turned to Sonardyne for some of its tsunami warning technology that is already in operation in the Bay of Bengal. The order includes sensitive water pressure sensors and a software algorithm developed to control the system. The Tsunami Warning and Early Response system for Cyprus (TWERC) will differ from other warning systems because of the relatively confined nature of the Mediterranean. Tsunamis originating in the deep ocean may travel thousands of miles before they come ashore and this gives more time to register and distribute a warning. The Mediterranean, on the other hand, is seismically active and could generate a tsunami that hits the coast in less than an hour and this demands a warning system capable of rapid activation and response. The TWERC system will consequently consist of an array of seismometers working in conjunction with the Sonardyne pressure sensors that are configured to create an Offshore Communications Backbone (OCB) that can also support the region's emerging offshore energy enterprise. The OCB covers several hundred kilometres of seafloor off the southern coast of Cyprus and will provide real-time, continuous communications with a control centre ashore.

# Ocean Business 2011

www.oceanbusiness.com

Scheduled to take place April 5-7, 2011 at the National Oceanography Center, Southampton, UK, OceanBusiness 2011 seeks to build on its past success of bringing the subsea community together for three days of exhibition, conference and in-water, hand-on technology demonstrations. Several companies are using the event to launch new products and re-introduce established ones. The following is a sampling.

**Teledyne Marine** invites visitors to attend its Product Innovation Preview at the National Oceanography Center in Southampton on April 4. Teledyne RDI, Teledyne TSS, Teledyne Odom, Teledyne Benthos, Teledyne Webb Research, and Teledyne Gavia have joined together to present new products and technologies. Visit: www.teledynemarine.com/pdfs/TM_OB_web.pdf; for the plan: RSVP to: *Email: mnewcombe@teledyne.com.*

**Tritech** is conducting three one-hour dockside demos at 12.30pm on Tuesday April 5; 9am Wednesday & 3pm on Thursday.

**The Oceanscience Group** will present its sensor deployment systems: the UnderwayCTD and UnderwaySV deployment systems. Seating is first-come, first-serve basis; *Email: info@oceanscience.com* to reserve your space.

**ROMOR Ocean Solutions** announced the release of its new and first official ROMOR product: the C-ROM, Compact Recoverable Ocean Mooring. Contact ROMOR at *Email: sales@romor.ca.*

**RESON** plans to release its next generation of SeaBat 7125 multibeam: the SV2 and ROV2. The 7125SV2 system can be seen alongside the permanently installed SeaBat 7101 on the ABP Southampton survey vessel Protector. For those not wishing to set sail, RESON are conducting three workshop sessions. To schedule an advanced meeting, *Email: mairi.law@reson.com.*

**Quester Tangent** will host Workshop and Training Sessions for an hour on each day of the show. The instructor is Dr. Jon Preston, Chief Scientist at Quester Tangent. To reserve a place, *Email: andy@underseasense.co.uk*

(Photo: Greg Trauthwein)

## Ocean Careers @ OB

Ocean Careers is a 3-day event running alongside Ocean Business from April 5-7, 2011 at the NOCS in Southampton. The objective is to highlight career and job opportunities available within the marine science and ocean technology sectors and show students studying engineering, science or mathematics as well as to those students that have already opted to study marine related subjects how their skills can be used in the marine science, ocean technology and offshore industries. If you can spare time to inspire the next generation, Email:

sharla.hancock@
intelligentexhibitions.com

# OceanTech Expo

Explore the business of Ocean Technology

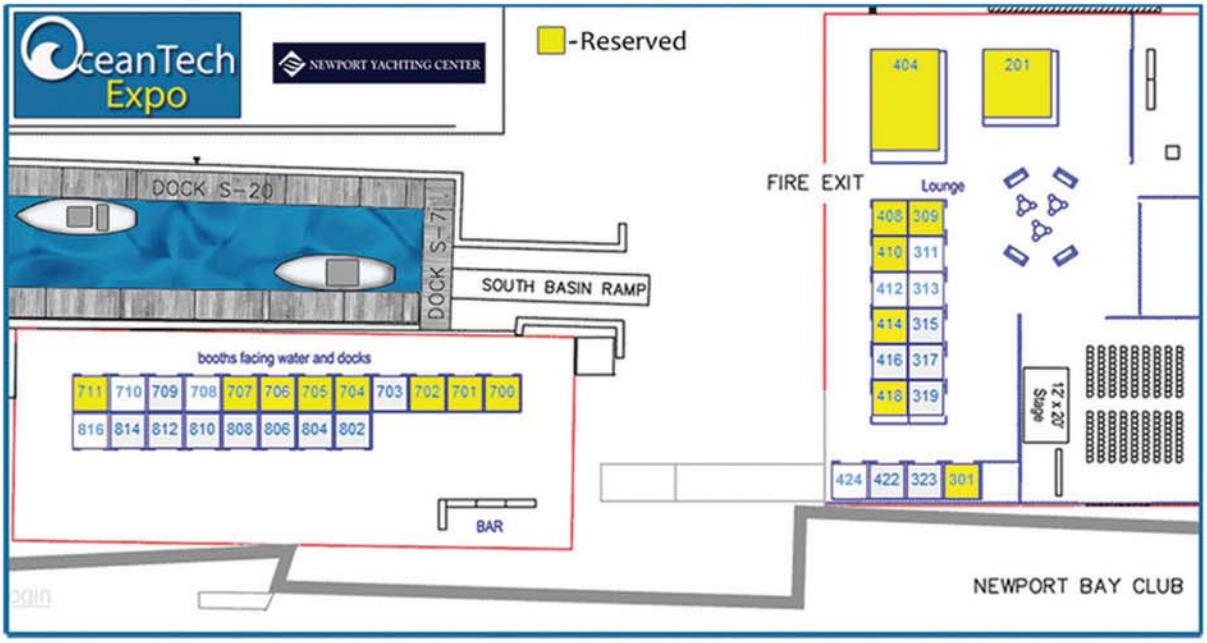
## See you back on the water in Newport.

**In response to the demand for more room for cutting edge ocean technology demos, OTE is expanding the booth space for Demo Tent!**

**We would also like to welcome our media partner, Hydro International ; they will be chairing the hydrographic panel at this year's event. We look forward to working with them on another successful OTE.**

## Space is filling fast. Register today!

### 2011 Floorplan

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Hydro International
RIEDC Rhode Island Economic Development Corporation
SAIC From Science to Solutions
AMERICAN SALVAGE ASSOCIATION

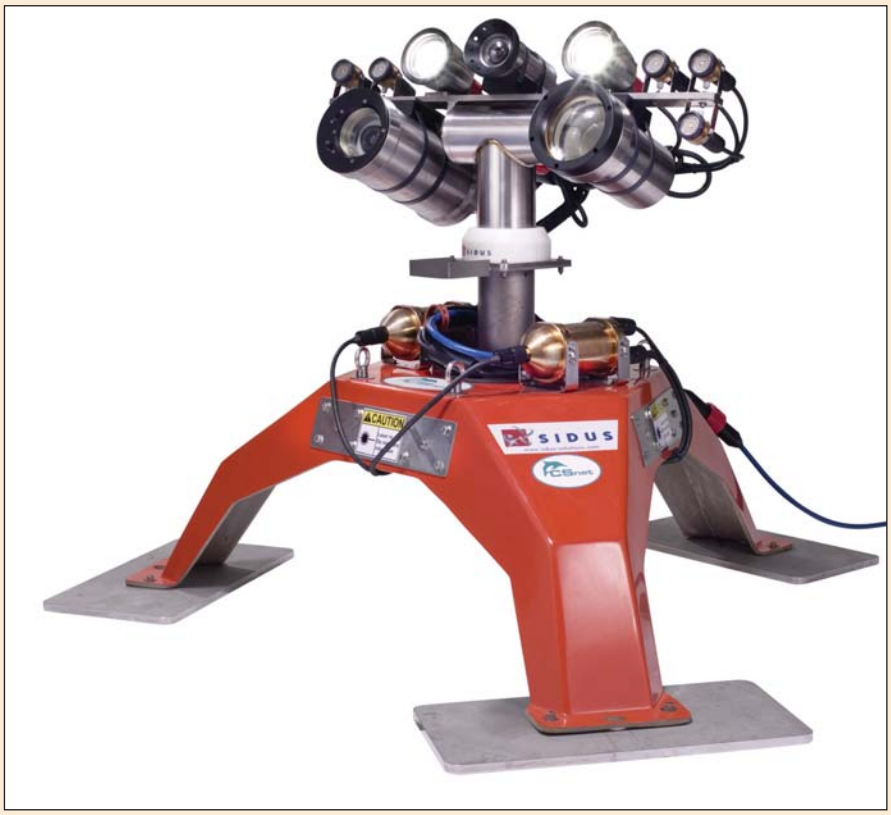
## Newport, R.I. May 17-19, 2011

**Contact Rob Howard @ 561-732-4368 or howard@marinelink.com to reserve your demo and booth space today!**

oceantechexpo.com

# Sidus Develops Seafloor Observer System

Sidus Solutions developed the Seafloor Observer system, featuring remote positioning, lighting, video and still photography through a single Ethernet cable at depths up to 3000 meters. The system shown was recently supplied to a major offshore communications corporation and was deployed 4Q 2010. Traditionally, most deepwater video imaging systems have required additional hardware, such as a separate junction bottle or subsea node to distribute video and telemetry signals via Ethernet. Where previous solutions have also required several software packages to interface with various imaging components, the Seafloor Observer is controlled via a single Ethernet cable, from a single console through an intuitively laid out Graphical User Interface (GUI). Additionally, this system allows other operators at additional remote sites to control all functions through a web interface – without the need for any special hardware or software installed at the remote site.




The Seafloor Observer imaging consists of an 8 megapixel digital still/video color camera, a 200 W/s strobe and a low light sensitive, optically corrected video camera. Remote users can fine tune image settings, including exposure and annotations, capture still images and download to the surface via Ethernet from around the world. MPEG-4 video resolution, compression and video frame rate is remotely adjustable for optimized performance in bandwidth limited applications. Integrated red scaling lasers allows for image scaling and object distance measurement.

Through integration of heavy duty stepping technology and extremely low backlash gearing, pan and tilt functionality is provided by the SS252 robotic positioning device. Delivering an impressive 65 ft-lbs (90 Nm) of torque on each axis, the Seafloor Observer offers high accuracy, 12 bit positioning feedback at speeds up to 40 degrees per second. Whether tracking a slow moving sea slug or chasing a quick cutthroat eel, the system can provide smooth and responsive dynamic monitoring.

Illumination is provided by two dimmable 3000 lumen LED flood lights and six 3000 lumen LED spot lights. These shock resistant LED lights have an operating life of over 50,000 hours and can be configured in a variety of color temperatures and wavelengths. Lighting components can also be remotely turned on and off in various combinations to offer optimized image exposure and low, medium and high power operating modes. The system is designed to operate on supplied voltages of 24VDC @ 150 Watts maximum for all components, except the six LED spot lights which operate at 375VDC @ 1000 Watts maximum. Input power is through a single multi-cable that carries both voltages as well as CAT-5 Ethernet.

**Email: info@sidus-solutions.com**

# New Mooring Comms System

Traditionally, moorings have had to rely on the mobile telephone network or radio to transmit data to onshore bases. Off the coast of the islands of Morea, a new innovation provided by MacArtney Underwater Technology Group transfers data via wireless modem. This new technology opens up areas otherwise unavailable by mobile networks and unsuitable for conventional radio transmission systems. In the drive to understand the mechanics and effects of global warming on our planet, oceanographic institutes are installing buoys in various areas to map the water conditions and wildlife and to chart any changes over time that relate to an increase in global temperatures. The sites of such buoys vary greatly and one of the more recent installations has taken place In the coastal waters of the volcanic island of Morea, 15km North West of Tahiti in French Polynesia. Chosen for its well-established coral reef and its abundance of life, this location is expected to provide valuable information about changes in a range of underwater parameters, including water temperature, changes in current speed and water levels. Yet placing moorings and designing buoys requires expertise and cooperation between scientists, engineers and underwater experts. Of the many considerations in designing and building a mooring system is the communications system. Information gathered from the range of instruments on the mooring needs to be transferred in some way onshore. Typically, data from buoys is relayed to onshore information centres via mobile telephone networks, by radio transfer or by cable.

**www.macartney.com**

## Imenco's ROV Shackle

Imenco's semi-automatic ROV Shackle has been proven as the safest and the best in the market because there is no need to retrieve the shackle pin. The shackle can be used as many times you like as long as you clean it with fresh water after operation. No loss object occurs and no prevention is needed, and easy handling, operated with only one manipulator claw, and with safety lock. Maintenance kit available upon request to save time if maintenance should be needed. Many major operators and contractors have recommended Imenco shackle for safe and user friendly operations underwater. The shackle's body and most part is made from high tensile stainless steel S165M equivalent to Martensitic Stainless steel 17/4PH The pin is standard shackle pin. The Imenco Shackle comes in various sizes 6.5T – 12T – 17T – 25T- 25T- 35T – 55T – 85T – 150Tons. Safety factor is 5. Any certification can be provided according to client's instruction.

For the bigger shackles clients often request a transportation basket which also can be certified.

**Email: al.cohen@imenco.com**

## Fugro GRL Models NDT Tools

As part of a European FP7 Project to develop new underwater non-destructive testing tools, Fugro GRL provided its DeepWorks software to simulate the deployment by ROV of a long range ultrasonic manipulator in the jacket structure of an offshore platform. The work was part of 'SubCTest', a 2m project, sponsored by the EC to develop ROV deployable inspection systems.

TWI in Cambridge has developed a prototype Long

Range Ultrasonic Tool (LRUT) designed to be deployed by ROV and clamp around vertical or horizontal jacket tubulars. Fugro GRL created a simulation of the deployment of the tool by ROV and a simulation of the tool's operation in attaching itself to the tubular. Carrying out a simulation of the tool's operation was useful in reducing risk and cost prior to the underwater trial, in providing an early learning opportunity for engineers, and to allow design changes to be made based on the simulation rather than waiting to discover problems in the trials phase. The simulation has provided important proof of concept for the application of the tool. Using DeepWorks, FGRL was able to model the articulated mechanism of the ultrasonic manipulator as well as its electro-hydraulic supply system from the ROV. The tool could be tilted up and down, rotated and clamped around vertical and horizontal tubulars. The LRUT model was quickly generated using CAD models supplied by TWI. DeepWorks' drag and drop interface allowed the model to be rapidly configured and early simulations were possible within a day. Refactoring and modifications were carried out by engineers without the need to use simulation specialists. **www.fugro.com**

## New Ethernet Fiber Optic Multiplexer

Moog introduced a new expandable Gigabit Ethernet (GbE) fiber optic multiplexer. The Focal 907-GEM multiplexer provides four independent and switchless 10/100/1000 Mbps Ethernet links, as well as expansion capability through a PC/104 connector. Typical applications are remotely operated vehicles (ROVs), video systems and advanced sonar systems. A key advantage of the Focal 907-GEM multiplexer is its low-latency switchless design needed for today's increased use of real-time Ethernet for critical control systems and digital video. This multiplexer significantly reduces size and total system cost when compared to standard media converter solutions, as it replaces four separate Ethernet media converters with a single board and single fiber link. In addition, support for non-Ethernet signals via expansion cards allows for expandable and reconfigurable multiplexer solutions. The 907-GEM can be stacked with up to 6 standard Model 907 expansion cards to add up to 48 additional data channels, including serial formats (RS-232/485), analog signals (sonar, ADC/DAC, audio), CANBus and other standard protocols. **Email: staylor@moog.com**

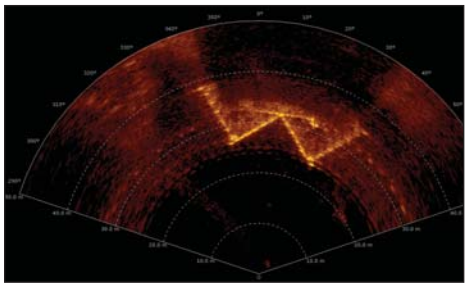
## Birns Introduces the Aurora Light

BIRNS, Inc., launched the BIRNS Aurora, new high intensity Light Emitting Plasma (LEP) deep submergence light provides 14,000 lumen brilliance. LEP is a new lighting technology that the company touts as a more powerful and efficient alternative to LED, Tungsten Halogen and Metal Halide lighting. Its light sources use a solid-state device to generate Radio Frequency (RF) energy to power a plasma light source. The BIRNS Aurora does not require metal electrodes to drive power into the source, thus has a more robust quartz vessel. This unique LEP light has a 30,000 hour lamp life, and produces a continuous spectrum, and delivers an exceptionally high lumen density—in fact, the single bulb (approximately 2 mm long) produces 14,000 lumens of brilliant white light at 5,300K, at a Color Rendering Index (CRI) of 94. The BIRNS Aurora offers physical dimensions that are smaller and more efficient than metal halide systems, according to the company, and is engineered with a robust aluminum housing with a tempered 6km borosilicate glass lens. It has an overall length of 11", and a housing length of 5.5". With a mounting diameter of 2.5", it can be tailored to fit large or small vehicles, and runs on 28Vdc with a 9.3A power draw.

**www.birns.com**

# M3: Kongsberg Expands Multibeam Sonar Performance

Kongsberg Mesotech Ltd. introduced the M3 MultiMode Multibeam Sonar. The first two models of the M3 series are intended for the underwater vehicle market, in particular, work class ROV operations. According to Peter Fox, Ph.D., Principal Systems Engineer of Kongsberg Mesotech Ltd. and leader of the development team, "The M3 Sonar is a radical departure from conventional multibeams; with a simple, elegant user interface driving a versatile multichannel sonar transceiver capable of extreme spatial and temporal agility, with highly innovative composite transmit and receive transducers, a state-of-the-art-signal processing with true time delays, dynamic focussing, andand pulse compression.



**M3 Sonar - Intakes at 25m (50m).**

**M3 Sonar Head 500m depth rated.**

The M3 MultiMode Multibeam Sonar combines imaging, profiling and true zoom modes in a single design. Short range (0.2 m) and long range (100 m) imaging capability plus multiple true zoom windows are now possible. Dynamically variable bandwidth provides optimized images and target detection with high resolution and enhanced shadows. ROV operators can now take advantage of the high refresh rate of conventional multibeam technology or tradeoff refresh rate for Enhanced Image Quality Modes providing detailed images of exceptional quality. The M3 Sonar enables operators to use the same sonar for obstacle avoidance at 100m range and close work in zero visibility conditions. Enhanced Image Quality Modes and true zoom windows provide high resolution and high Signal-to-Noise Ratios where the operators need it, with centimetre range resolution and beamwidths less than 1°. The sonar is available in either 500 m or 4000 m depth rated versions for shallow or deep water applications. The M3 Sonar provides the sophistication and performance levels formerly found only in high end multibeam sonar in a compact package of only 3.8 kg. dry weight with an 18 cm diameter and 14 cm length. Compact deep water rotators from Kongsberg enable operators to aim this compact multibeam where they want it. The M3 Sonar provides a 120 degree (horizontal) and 30 degree (vertical) coverage with a maximum range of 100 metres. The vertical coverage is also adjustable to suit the operator's requirements. Ethernet telemetry is standard.

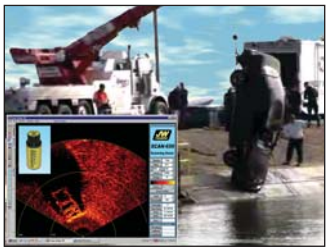
**Email: daryl.morse@kongsberg.com**

## Tritech Launches 4000m Gemini Imaging Sonar

Following the success of the shallow-water real-time imaging sonar, Gemini 720i, Tritech has launched a deep-rated version of the popular sonar, Gemini 720id. Available now in 300m and 4000m versions, Gemini is a forward-looking sonar which uses an array of transducers to provide a 120º field of view, for a real-time sonar image of the underwater scene ahead. "Ashtead Technology Offshore is extremely excited to be the first to present, to the rental market, the latest generation of 2D multibeam sonar technology in the Americas region," said Chris Echols, VP of North America, Ashtead Technology Offshore (US).

## Sonar in Search for Missing Persons

Stanislaus County Sheriff's Department dive team slowly motored their boat along the concrete lined drainage canal, periodically stopping and lowering their scanning sonar to see what was beneath the muddy water. They were searching for a 2003 Toyota Corolla belonging to alleged kidnapping suspect Jose Esteban Rodriguez.



**Car being removed from canal; Inset photo – scanning sonar image of car on river bottoM.**

They were using a variety of high tech equipment including ROVs and sonar systems. Teams spent 10 days searching the 75 foot wide canal that was as deep as 50 feet in spots. They located and removed 16 vehicles, including a pickup truck and a motorcycle. Rodriguez's car was among those found, but the windows were down and no one was inside.

Mark Cardoza, a sheriff's department diver, reported their JW Fishers SCAN-650 scanning sonar was instrumental in locating a number of the vehicles. The sonar operates in water similar to the way radar operates in air. It sweeps a circle up to 250 feet in diameter with a sound wave. The wave reflects off any object on the bottom and is received by the sonar transducer. The data is transmitted topside where a detailed image of any underwater object is displayed on a laptop computer. Cardoza remarked, "This sonar will now be the go-to technology to help us better utilize our limited bottom time."

**www.jwfishers.com**

## BlueView Receives Large Volume Imaging Sonar Order From VideoRay

BlueView Technologies received an order for one hundred (100) high-resolution P Series Imaging Sonar systems. In the coming months BlueView will deliver the compact, low-power 900 kHz imaging sonar systems to VideoRay for integration onto its microROV systems providing their customers with unparalleled real-time underwater search and navigation capabilities. BlueView's P Series Imaging Sonar are available with 3 field-of-view options – 45º, 90º, and 130º (the widest available), and operate in low or zero visibility conditions minimizing downtime due to water clarity conditions. Engineered to operate while in motion or from a stationary position, BlueView 2D Imaging Sonar enhance detection, tracking, monitoring, and inspection operations for a wide variety of underwater applications, including: Search & Rescue; Offshore Oil & Gas; Structure & Hull Inspections; Dive Operations; Equipment & Material Placement. Together, BlueView and VideoRay form one of the most compact, portable, easy-to-use, and effective underwater support systems available – proven time and again by some of the world's best military, law enforcement, and offshore organizations.

**www.blueview.com**

## GSE Rentals Hires Out Ranger 2 Tech

GSE Rentals of Aberdeen, UK has made an investment in Sonardyne's advanced 6G technology by adding a Ranger 2 USBL (Ultra-Short BaseLine) acoustic positioning system to its equipment inventory. This is the first purchase of a Ranger 2 system by a rental company and it is anticipated by GSE that the system will be in high demand for survey operations in the North Sea and elsewhere.

**Training at Sonardyne's offices in Aberdeen.**

Ranger 2 is designed for deep water, long range tracking of underwater targets such as ROVs and also position referencing for dynamically positioned (DP) vessels. The new system builds on the simplicity and performance of Sonardyne's popular Ranger 1 system but adds support for the company's latest sixth generation (6G ) acoustic instruments and Wideband 2 signal architecture. These technologies offer precise acoustic ranging, fast data telemetry and hardware that is easier to set up and operate even in the most challenging subsea operating environments.

The equipment purchased by GSE Rentals includes a complete Ranger 2 topside, high performance omni-directional HPT transceiver and four directional Wideband Mini Transponders (WMT). This equipment package can be easily and quickly installed on vessels-of-opportunity to position multiple subsea targets over a wide area and range of water depths with the highest levels of accuracy.

# Log onto SeaDiscovery.com to explore these new job openings.

### CONSTRUCTION MANAGER

Job Location: Korea, Ulsan
On behalf of the owner, provide shipyard oversight for a new-build project involving the construction of two ultra-deepwater drillships. Shipyard oversight includes oversight from the completion of the Design Stage as the project transitions into the Construction Phase, followed by ensuring that transition from the Construction Phase to the delivery of the project and into the first part of the Operational Phase is accomplshed in a timely and cost efficient manner.
The rigs are based on a Hyundai Gusto P10000 hull design and are designed for operations in waters of up to 12,000 feet, although either may be outfitted for less depending on specific contract requirements. The units will have DP-3 station keeping abilities, the ability to handle two complete BOP systems, a heave compensated construction crane to facilitate deployment of subsea production equipment and accommodations for up to 200 personnel.

- Degree in Engineering, Engineering Management or equivalent experience.
- Minimum 5+ years experience in Petroleum industry with experience in Project Management and Scheduling software.
- Experience in managing multi-million dollar engineering and construction projects and necessary multi-cultural leadership and management techniques.
- Independent thinker, familiar with process improvement and process consulting.

John Peter
J. Peter and Associates
PO Box 891624
Houston, TX 77289
USA
Phone: 01-281-471-8468
Email: jp@jpeterandassociates.com
WEB: http://www.jpeterandassociates.com

### ELECTRICAL ENGINEER

Job Location: Korea, Ulsan
On behalf of the owner, oversee the electrical engineering aspects of a new-build project involving the construction of two ultra-deepwater drillships. The rigs are based on a Hyundai Gusto P10000 hull design and are designed for operations in waters of up to 12,000 feet, although either may be outfitted for less depending on specific contract requirements. The units will have DP-3 station keeping abilities, the ability to handle two complete BOP systems, a heave compensated construction crane to facilitate deployment of subsea production equipment and accommodations for up to 200 personnel.

- Degree in Electrical Engineering or equivalent experience.
- Minimum 3-5 years experience in the design application and field engineering of major electrical systems.
- In-depth knowledge of the application, design and maintenance of drilling rig electrical and mechanical equipment and systems as well as knowledge of control and instrumentation systems.
- Good understanding of the Classification Society Rules (ABS, DNV, BV) relating to machinery and electrical systems.
- Working knowledge of rules related to industry applications of societies rules, such as the IEEE/NEC/IEC/ANSI/ISA/API/ASME.
- Familiarity with appropriate software.

John Peter
J. Peter and Associates
PO Box 891624
Houston, TX 77289
USA
Phone: 01-281-471-8468
Email: jp@jpeterandassociates.com
WEB: http://www.jpeterandassociates.com

### CHIEF OFFICER

Job Location: Singapore, Singapore
C-MAR Group currently require a highly experienced Chief Officer/for our client's saturation diving support vessel with built in air and sat dive spreads. Their specification includes dynamic positioning to DP2 standard.
This position is available on a permanent basis; the successful candidate will undertake 6/6 week rotations. All candidates must be available in order to travel to the vessel for joining as soon as possible. Day rate is negotiable upon acceptance.
Required skill/Experience:-
<LI> Chief Officer Certificate (or higher)
<LI> DP Unlimited Certificate
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<LI> Medical
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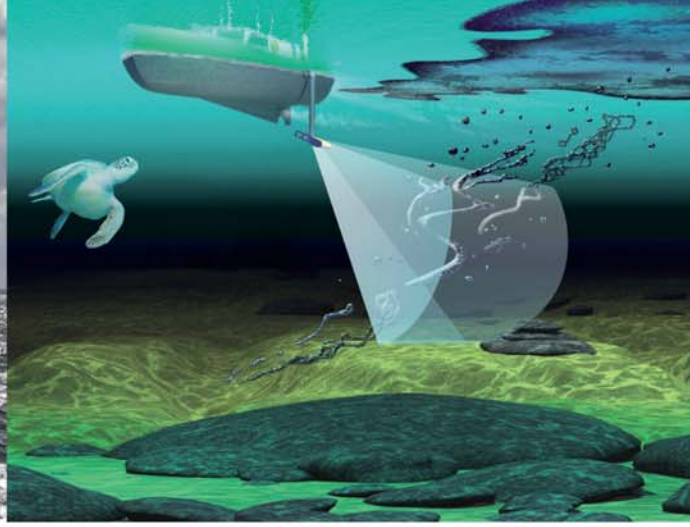

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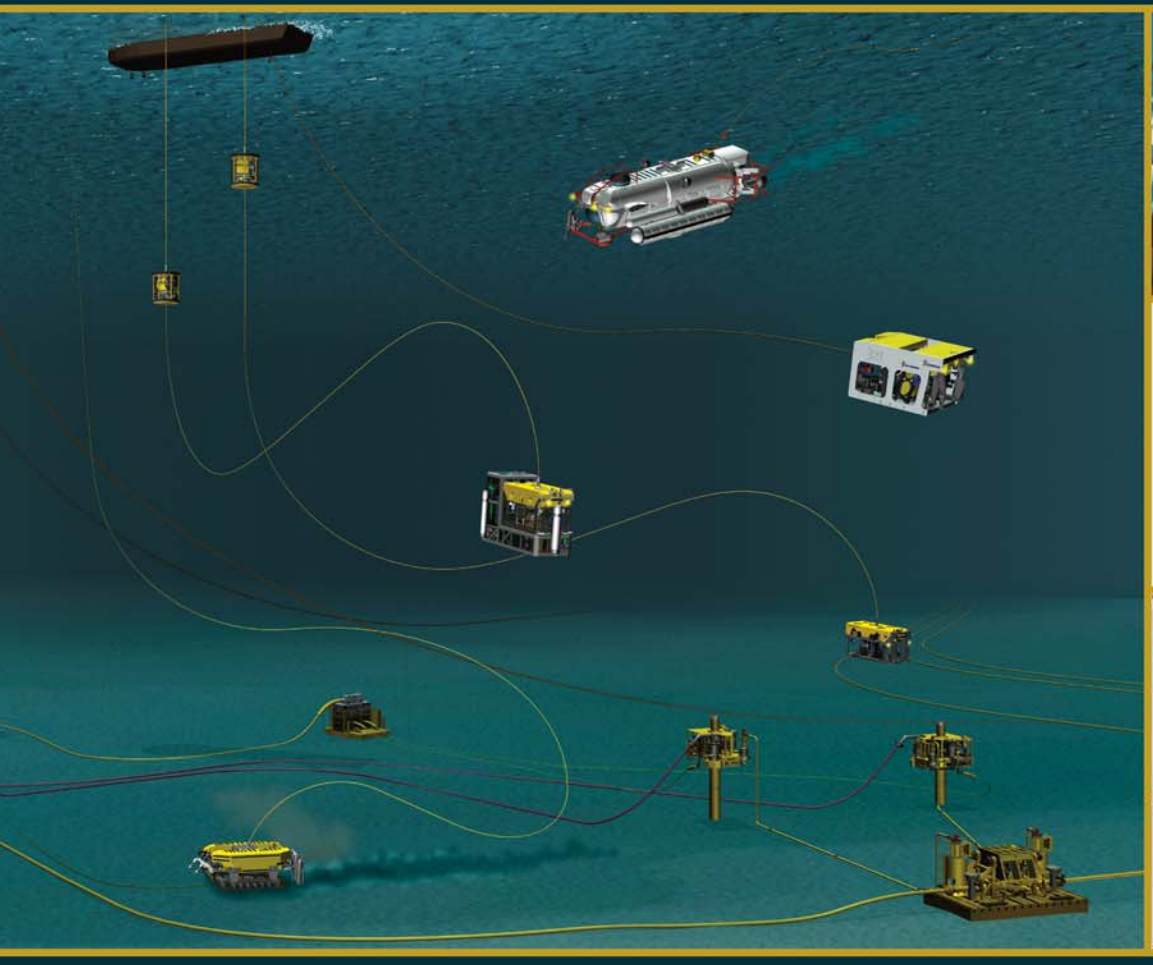

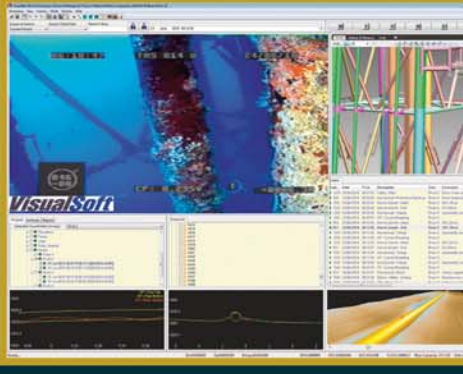


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