

MARINE TECHNOLOGY

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Profile of an Innovator

Rhode Island

16-page Supplement

Dominion Diving

Evolution of a dominating force



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Dominion Diving



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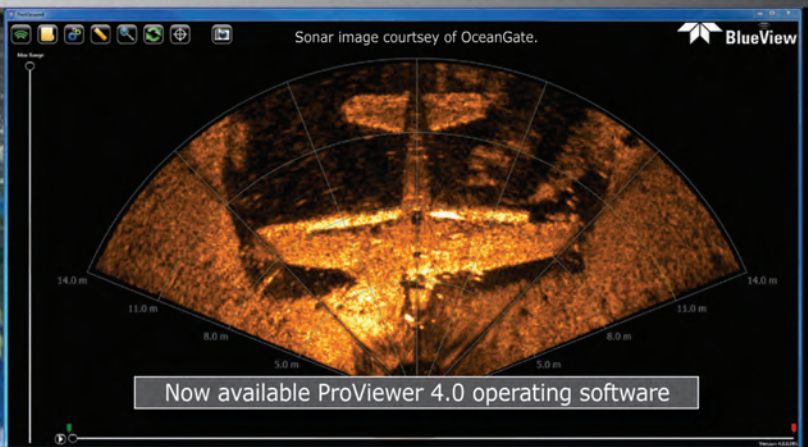
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On the Cover

URI students, technicians and scientists launch the remotely operated vehicle "Hercules" into the Black Sea to study the geology of the seafloor. This is part of a special 16-page supplement on Rhode Island, starting on page 33.



Credit: University of Rhode Island

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Having served the maritime, offshore and subsea industries with information for more than 20 years, it is undeniable that you form special kinship with certain people, organizations and entities. It's human nature. *Marine Technology Reporter's* kinship with the great State of Rhode Island stretches back to 2005 when we started publishing in this format. Not long after the first few editions rolled off the press, I received an invitation from **Dr. Bob Ballard** to visit with him and his students at URI to discuss Dr. Ballard's Archaeological Oceanography Doctorate Program, a report featured in the January 2006 edition of *MTR*.

Since then our relationship with the state has grown ever-stronger, with Rhode Island serving as our "home away from home" on the occasion of four Ocean Tech Expo's in Newport, and via continued interest and support from all corners of the state, starting with the Governor's office, extending through NUWC, and including companies large and small, colleagues and friends.

That's why this month I am particularly pleased to share with you a special 16-page supplement, starting on page 33, entitled "*Discovering Rhode Island.*" In my humble opinion, first-time *MTR* contributor (but seasoned business journalist) **Patricia Keefe** has done an outstanding job of delivering the essence of the state in a packed 16 pages of coverage, starting with a message from **Governor Lincoln D. Chafee**, and including insightful features on the state and its commitment to the ocean, from the perspective of defense, education, environment and renewable energy.

When Rhode Island looks at the ocean, it views it with a keen and discerning eye, as it is the ocean that is the life-blood for much of the state's prosperity. It examines not just the water, but the totality of the ocean environment, including all systems from below the seabed to high in the atmosphere, an approach which helped to foster the state's **Special Area Management Plan (SAMP)**, which as Keefe describes is a "ground-breaking, standard-setting, nationally lauded approach to ocean management with a focus on renewable energy."

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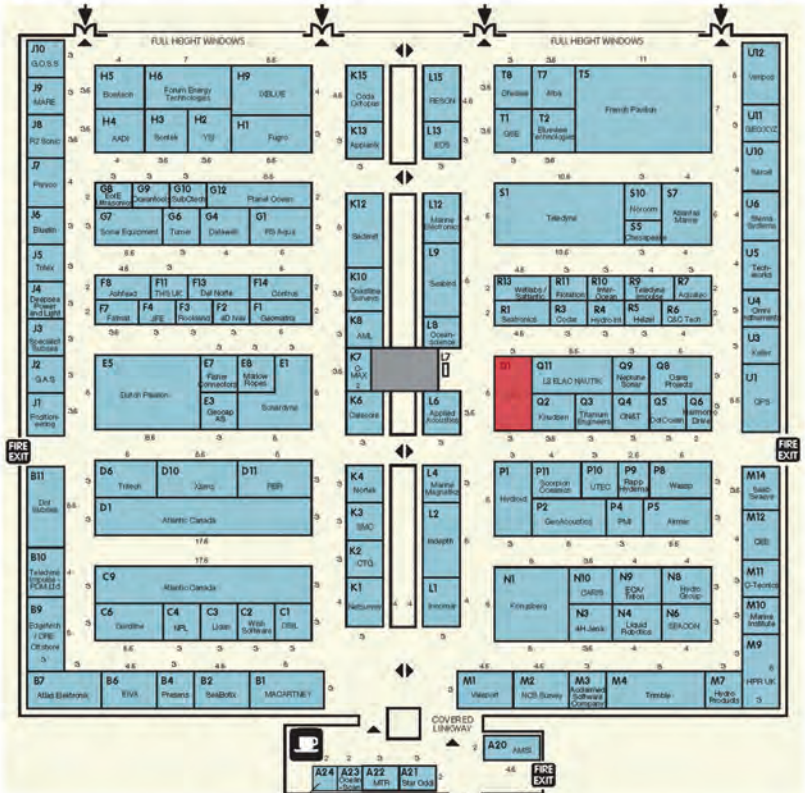
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Dominion Diving

By Tom Peters, Halifax





Where else...



Over 100 years ago, when Captain Bob Bartlett was heralded as the only person capable of delivering Robert Peary to the North Pole, no one in Newfoundland and Labrador was surprised... after all, at the time, he already had over 400 years of ocean technology experience to draw from.

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it's happening here.

It started as a basic, grassroots, two-man operation by two friends with an ear for music and a passion for diving. Today, after 43 years of hard work, determination and innovation, Dominion Diving Ltd., based on the Dartmouth side of Halifax Harbor, is the largest provider of diving and marine services in Canada, said CEO Robin Lohnes.

Robin's father Barry Lohnes and his business partner Jim Ritcy, members of a 1960's band, initially struck out with their subsea enterprise in 1969 after Ritcy introduced the senior Lohnes to diving. It was not an instant success.

They struggled in the early years and thus maintained other occupations, even working for another diving company until they got a much needed foothold in the business.

"They got word of a wreck that was located off Sable Island," said Robin, now 37, a fixture in the company since he was 15. "It was a liberty ship from the Second World War. It was laden with brass and other cargo. They purchased a small wooden boat, about 40-ft. long, took it to Sable Island and pulled up some brass by hand. They made a few of those trips."

Their old wooden boat subsequently sank, leading to the acquisition of a larger 65-ft. wooden vessel equipped with a crane.

"So they went back out, and every summer they would work

out there, salvaging the brass and cargo. Their methods got more refined, and then they started locating more wrecks up and down the coast, salvaging propellers, shafts and that sort of thing," Robin said.

It was a total salvage operation until the company could acquire the capital to invest in boats and equipment. "They then became more of a presence in the inshore construction and diving industry," Robin said, noting that his father and Jim were the company's only employees for the first four or five years.

As the company progressed, offshore exploration activity off the Nova Scotia coast became more intense, and Dominion Diving began to focus more on the sector.

Underwater robotic vehicles, which eliminated restrictions and risk to human divers, were also coming to the market – a technology which Dominion Diving became involved with.

"They stressed themselves quite heavily to get started with the purchase of their first underwater remote operated vehicle (ROV) around 1982. They bought that, and as they continued it blossomed into a real going concern. The company went through a number of different phases," Robin said.

"We had been using older, traditional diving methods right up until the fixed link (the 12.9 km Confederation Bridge between New Brunswick and Prince Edward Island), and began construction in the '90s (1993-97). Around that time, some of the diving regulations were becoming a bit more strict and defined. That's when we got into hard hat diving (with mounted cameras) and air hose, which was really the real old fashioned way of diving," Robin said, citing the advantages of unlimited air and communications not afforded in scuba diving.

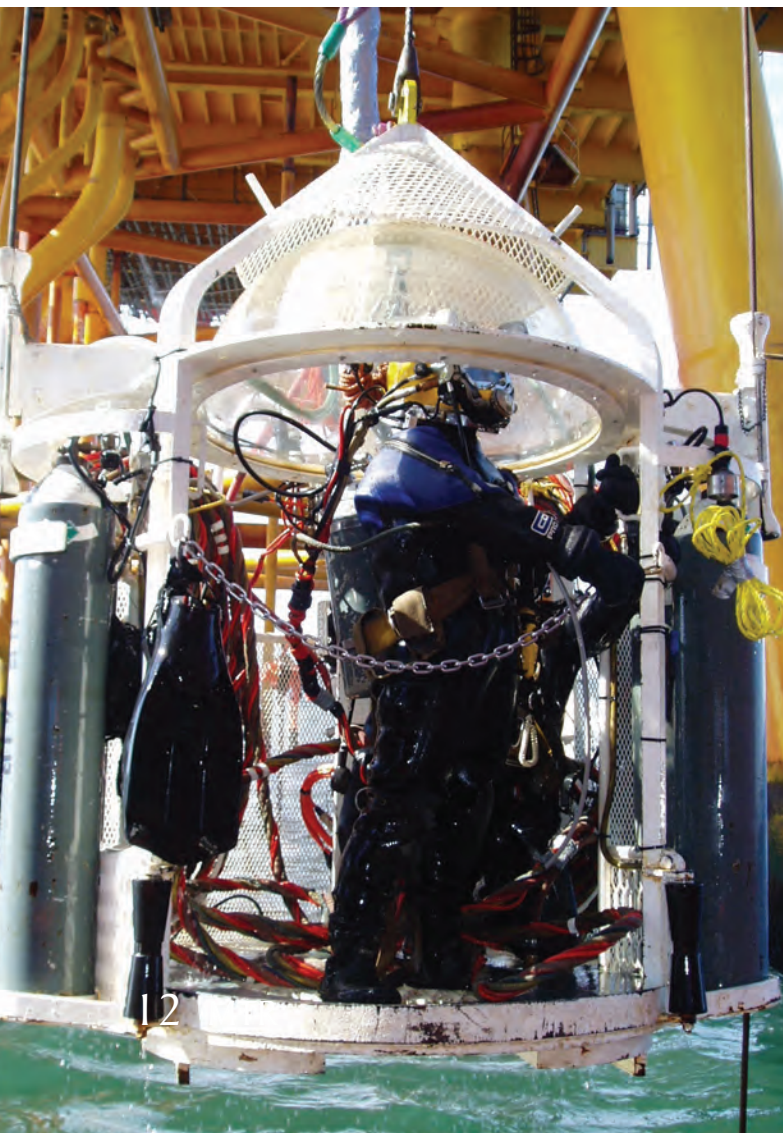
"The fixed link was a big job. It changed the company. We employed 60 divers there for three years. We had five decompression chambers, and then we built a specialized diving system, a transfer under pressure system with a closed bell to increase bottom time. The depth was 130-to-140 ft. in the center (channel) and we were trying to stay longer on the bottom, so we did that with this special system," he said.

During this same period, Dominion was heavily involved in the Newfoundland offshore business.

"We were operating 13 ROVs, three were ultra deep vehicles, 2,000 to 3,000 m rated vehicles. And as always, we continued to do a lot of work at (Halifax) shipyards, laying transmission cables, wharf construction, pipelines," Robin said. "We had a pretty heavy fleet of boats and barges. We did a lot of towing and a lot of crane barge lifting. There were periods where people thought our main presence was in the offshore, but our bread and butter has always been in inshore diving and construction."

What started as a two-man operation 43 years ago has grown to the largest provider of diving & marine services in Canada.

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That was then, this is now: Dominion Diving's first ROV, circa 1982, above.

Dominion Diving ROV today, working in the demanding offshore O&G field.



While things were moving along smoothly and in a busy fashion, “changes happened after 2000,” Robin added. “Some larger competitors moved up from the States and disrupted our operations in Newfoundland, quite severely to the point where we had to sell some assets and restructure the company and rethink our strategy.”

In 2002, co-founder Jim Ritcy passed away, subsequently leading to a buyout agreement with the Ritcy estate. Robin became CEO and his brother Matthew, 35, president in 2005.

“Matthew never chose the diving route,” Robin said. “He went down the route of robotics; that’s what he looks after. He is a ROV pilot, a certified hydraulic technician. He looks after all our contractual bidding, pricing structure and still works offshore. I’m on the diving, barge, tugboat side of things. The ROV operation it is a division of the company responsible for 50% of the revenue.”

Robin said that, during the reconstruction, “we went back to our traditional services, inshore construction, diving, tugboat and crane services. We rebuilt the company, acquired some new assets and presently we are operating four ROVs, three

work class and one observation vehicle and have about 45 employees. We have six small tug boats and a 90-ft. offshore towing and research vessel. We do a lot of work with BIO (Bedford Institute of Oceanography) and do coastal towing with the larger vessel.”

Innovate to Compete

For Dominion Diving, its diversity in the marine industry has led to new innovation and the company’s involvement in sub-sea technology.

A 24-hour operation ready to answer industry emergency calls, Dominion needs quick solutions and equipment modifications to meet immediate challenges.

“We are continually developing subsea technology,” Robin said. “We try to minimize our reliance on outside resources. We are not 100% self-sufficient but we have our own certified in-house fabrication shop, and one of the main purposes of that is for underwater tooling for our ROVs. These things are limited in their dexterity, so we make things to make them able to complete tasks. Basically, instead of going to an alter-

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(L to R): Robin Lohnes, CEO; Shawn MacPhail, Operations Manager; Matthew Lohnes, President.

nate source, someone who doesn't own a ROV, and explain to them what we want to design and then go to a fabrication company that is not familiar with diving to build what these other people have designed, well it just doesn't work. We design and build everything. We have several subsea engineers we utilize," and staff takes advantage of past experience in determining what will work.

"We develop some of our own electronics to suit us, and we will work with the ID (Innovation in Design) Lab at Dalhousie University (Halifax). We come up with ideas, they refine them, and we work together to produce them. They (the lab workers) are a very interesting bunch to work with because they are nonprofit and have a wealth of ambition, creativity and knowledge. They are smart people," Robin aid.

One innovative piece of technology designed and built in collaboration with the Dal lab was an underwater video system aimed at resolving problems in maintaining safe storage of gathered data.

Because DVDs and hard drives are susceptible to damage under harsh conditions, Dominion integrated a digital video tape into a video box with several built in features.

"It is quite a complex little box," said Robin. The previous systems used were quite large, as he motions to nearly the size of the top of his office desk, with two TVs in them. "We shrunk that down. We designed it down to less than quarter the size and we had Dalhousie shrink it again. It now fits inside a 12-in. by 12-in. case. We call it the data vault. Everything is digitally stored, and we get good quality images."

The data vault is the company's latest piece of technology. "But we are continually taking various hydraulic rotary and torque tooling and adapting them so the underwater robotic vehicles can use them. It is those simple things it would take engineers outside the company too long to design and we just



(L to R): Robin Lohnes, CEO (son of Barry Lohnes); Barry Lohnes: One of the original founders; Matthew Lohnes, President (son of Barry Lohnes).

do on our own," he said.

With long term plans to become a global offshore player, Robin says one of the biggest challenges will be asset acquisition. "The drilling and exploration are getting deeper and deeper," he said, referring to upcoming offshore projects off Nova Scotia that will be in water depths of up to 4,000 m. "The equipment that is required to go to those depths is equivalent to what you would use on the Moon, less the rocket. The stuff is complex, the pressures are enormous and the prices extreme."

Another potential challenge for offshore development has been the discovery of huge amounts of natural gas on the U.S. mainland, gas that could be released through 'fracking.'

"It has a negative effect. When there is an abundance of anything, the value goes down so there are two things with natural gas; there is an abundance on land and it is cheaper to get it," Robin explained. "It doesn't require the gear you need in the ocean to get it. So it affects the value of it, and feasibility of offshore and on land are two different things."

With an ever-changing industry, Dominion Diving has no thoughts of backing down from the competition.

"The company is very stable, very diversified, very aggressive and unique in our approach to things," said Robin. "We are always looking for new markets, new methods and some we develop ourselves. We are definitely a force to be reckoned with, even to foreign entities. We will go head to head and quite often have quite good results, and a lot of that I attribute to the personnel we have here. We have world class people."

For Robin, it all adds up to being in the business "for the long haul."

"It's in my blood. I have salt water in my veins," he said with a smile.

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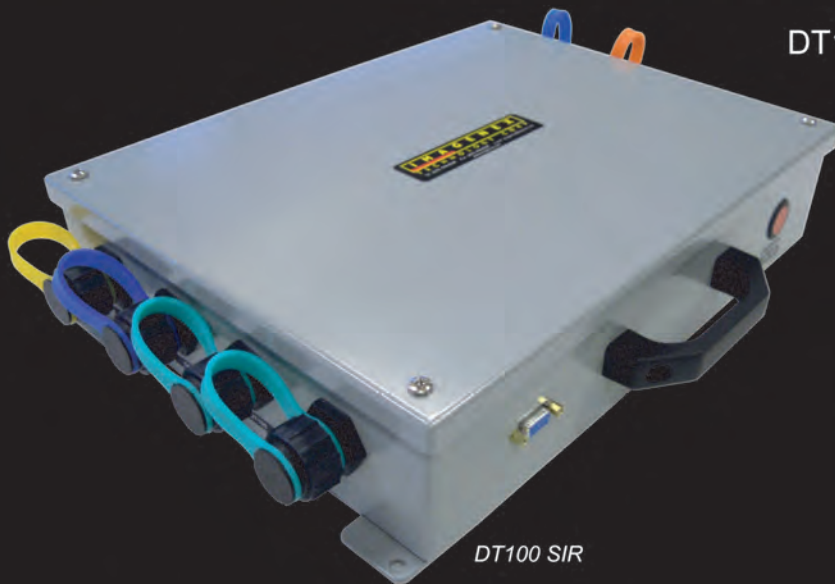
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By Paul Devine & Peer Fietzek



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Teledyne Marine has recently licensed technology developed by CONTROS GmbH to produce the HydroCO₂ and HydroCH₄ instruments and allow its customers to better address their bio-geochemical as well as oil and gas-related applications.

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Left: A bottom lander deployment combining an ADCP and the HydroCH4 sensor.

infrared detector (NDIR-detector) and the principle of absorption spectrometry (1). To overcome the temperature dependency of the NDIR sensors, the detector is temperature stabilized and the gas is lead through a heater before entering the NDIR unit both during initial instrument calibration as well as during operation in the field. To compensate for the long term drift of the sensor, a “zero point” reference is routinely taken by the NDIR-detector within the instrument after the air within the gas stream has been chemically freed from CO₂ or CH₄. This zero reference data can be used to track the temporal signal drift of the NDIR-detector and allows for the derivation of the sensor’s actual response time (2).

The HydroCO₂ and HydroCH₄ physical packaging allows for a wider range of deployment possibilities than previously available with existing dissolved CO₂ and CH₄ measurement systems. When configured as a flow through system inside of a vessel or within a laboratory, these instruments have a significantly reduced maintenance effort and smaller size than prevailing underway systems that use large equilibration chambers and bottles of reference gasses. Use of the HydroCO₂ and HydroCH₄ systems enable deployment from smaller vessels, adding a valuable measurement parameter while reducing the energy and space requirements (e.g., less room occupied in a vessel’s wet lab). When configured as a self-contained submersible system, the systems will operate from water surface to 6000m of depth. The 9 cm diameter pressure housing on the system allows for easy deployment on buoys, moorings, AUV’s, gliders and Argo floats (2 and 3). Example of a bottom lander deployment combining an ADCP and the HydroCH₄ sensor is shown here.

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Teledyne RD Instruments is confident that these carbon sensors will aid in both scientific research and environmental monitoring. Through a newly established product grant program, Teledyne RD Instruments will offer the loan of up to 3 instruments – one each of either a HydroCO₂, a HydroCH₄ sensor, a WH/OS ADCP, or Citadel CTD system – for new and interesting applications utilizing these combined technologies.

Users are encouraged to submit detailed proposals on how they would utilize these products to improve their scientific research or environmental monitoring.

Full details and an online submission form can be accessed at www.rdinstruments.com. **Proposals are due on or before April 15, 2013.**

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Five Minutes with **John Tamplin** Founder, Seafloor Systems

Can you tell us how you came to be involved in the subsea industry with a short career background prior to Seafloor Systems?

• I was a Naval Hydrographer and Sonar Technician with an EOD (Explosive Ordnance Disposal) Unit prior to entering into the private sector. My job in the Navy entailed using sidescan sonar to detect and locate undersea mines as well as underwater search and recovery operations. Once I detached from active duty, I was hired by Reson, Inc. in Santa Barbara to support their range of multibeam echosounder systems.

I worked for Tony Parker at Reson, who inspired and tutored me to succeed. I owe a great deal of my success to Tony. From there, I worked as Sales and Support Engineer for Triton Technology, Inc. in Watsonville, CA. I worked for a very smart and all around great guy named Fred Newton. Fred is a legend in the underwater search and recovery industry, and I was lucky to get the opportunity to work for him. The experience I gained working for Fred has served me well, and I am very appreciative of his patience and tutelage. Guys like Tony Parker and Fred Newton are two great examples of successful people imparting their experience and wisdom to the next generation, and I was lucky to work for both of them. I try to continue this legacy with the young men and women that I hire to work at Seafloor Systems.

What is Seafloor Systems?

• Seafloor Systems is a diversified company serving the Hydrographic Survey industry in four ways:

- 1.) **Equipment Rental** – We have the largest pool of multibeam echosounders in the United States.
- 2.) **Sales** – We represent 25 of the industry's top



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We understand you started Seafloor Systems in 1999. Can you take us back and tell our readers why you started the company, its original focus and how that focus has changed from then to now?

I believe in always continuing to look for the next challenge and opportunity to grow professionally and personally, no matter your age or position in life. Leaving Triton and moving to Oregon was hard, but my wife and I were in a good financial position and the industry was in an upward cycle. The timing was perfect. I originally started Seafloor Systems as a Manufacturer's Representative and also provided hydrographic survey field support for equipment that I was most familiar with. The company has evolved into its current form due to the diverse variety of fields I have worked in as well as investing for the future. In this vein, I eventually purchased that first piece of rental equipment, a multibeam echosounder from Honeywell-Elac in Germany, and developed custom survey systems for customers.

Since you started Seafloor Systems, what do you find to be the biggest challenge to running a profitable company?

Accounts Receivable. Most customers have the good intention of paying, but, sometimes not the fiscal discipline to pay in a timely manner. Collections are equally as important a function as engineering, sales and support when running a business.

What do you monitor to help yourself decide the business' direction?

Beyond monitoring all the profit and loss statements, balance sheets, and reports, I like to take advantage of the wisdom and experience others pass onto me. A friend of mine was buying up houses in small towns that didn't seem like good investments. When I asked him why he specifically chose these towns, his answer surprised me. He said he monitors various large companies (like Home Depot and Wal-Mart) for new store developments. These companies allocate millions of dollars into market research before deciding to build. He was taking advantage of their budget, and it has

been very successful. I have kept my ear to the ground regarding new developments by such leading manufacturers such as Hypack, Teledyne and Trimble, of whom I represent. Rarely do industry leaders develop equipment or software on a whim; it's always based on research and future demand.

Looking at the various markets you serve, by type, what are your specialties, and/or where does the majority of your business come from today?

Our specialties are by far our Multibeam echosounder rental pool and our Sonarmite echosounder production. These two account for nearly 50% of our revenue. We have the largest pool of rental multibeam systems in the U.S., covering the spectrum of water depths from one to 3,000m. We also keep our lease pool up-to-date and offer proven, bullet-proof technologies. We prefer to leave the beta-testing to the manufacturers, not our customers. Our Sonarmite echosounder is the most compact echosounder system on the market, provides survey grade results, and is bullet-proof. My mantra is to provide a good, quality product and it will sell itself.

How have the general economic struggles of the past four years affected your business?

We have been lucky in that the diversity of our company offerings; it has enabled us to maintain and grow in several areas over the last four years.

How is your company differentiated from others serving the same market?

We have a small, but tight-knit, well-trained and smart group of individuals that are all capable of providing service and support in all facets of our business. I take pride in the fact that when a customer calls in for technical support, there is always someone available to provide top-notch assistance.

In your career, what do you consider to be the technological development that has had the biggest impact in making the business of sub-sea more efficient and safe?

I believe the technological development would be ROV's. On a purely efficiency basis, GPS has developed into such a versatile and accurate tool. It is invaluable to the industry whether it's hydrographic survey and mapping, vessel navigation or mine hunting.

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RAMA Done, PIRATA Next

RDSEA Fulfills 2012 Contract with NOAA on “RAMA” in the Indian Ocean; “PIRATA” in the Atlantic Next for 2013

By Rick Cole

RDSEA International, Inc., St. Pete Beach, Fla., was contracted in 2011 by the National Oceanic Atmospheric Administration’s (NOAA), Pacific Marine Environmental Laboratory (PMEL) to provide assistance and support for research in the eastern Indian Ocean on the “Research Moored Array for African-Asian-Australian Monsoon and Prediction Program” (RAMA) for the 2012 season. PMEL, in collaboration with multinational institutions in the region, coordinated their annual research cruise from the Republic of Indonesia (Jakarta). Project partners consist of The Agency for the Assessment and Application of Technology (BPPT) and the Ministry of Marine Affairs and Fisheries Research (KKP). BPPT, a non-departmental government agency in Indonesia under the coordination of the Ministry of Research and Technology, is tasked with carrying out governmental duties in the field of assessment and application of technology and manages a full fleet of research vessels along

with the buoy network of Indonesia and surrounding waters including its tsunami early warning system. BPPT’s R/V Baruna Jaya III was responsible for all cruise logistics on the 2012 RAMA cruise. RDSEA, with experience on large basin-scaled monitoring programs dating back to early NOAA and National Science Foundation (NSF) projects in the Pacific Ocean and more recently on RAMA working with China’s State Oceanic Administration’s First Institute of Oceanography on their in-situ measurement contribution to the RAMA program, was brought onboard to assist and support project operations along with PMEL, BPPT and KKP personnel. This particular cruise was dedicated to the recovery and deployment of deep-water ATLAS (Autonomous Temperature Line Acquisition System) buoy and mooring applications along with newly designed T-Flex (Tropical-Flexible) buoy systems. T-Flex development is PMEL’s latest effort to address Legacy ATLAS capabilities with updated system integration and technologies replacing



Rick Cole (RDSEA), Patrick Berk (PMEL) rear, center, and the BPPT, KKP Team on Baruna Jaya III, Indian Ocean, RAMA.

(Courtesy RDSEA)



Author Rick Cole of RDSEA International on the scene in the Indian Ocean

some PMEL produced sensors with those commercially available. Telemetry is via the Iridium network which allows the transmission of higher resolution data streams.

With NOAA's Tropical Atmosphere Ocean (TAO) program combining efforts in the Pacific with the Japan Agency of Marine-Earth Science and Technology to form the TAO/TRITON array, RAMA in the Indian Ocean and the "Prediction and Research Moored Array" (PIRATA) research in the Atlantic Ocean, the "Global Tropical Moored Buoy Array" (GT MBA, Fig. 2) was created, all large ocean basin monitoring systems. RAMA, a subcomponent of the "Indian Ocean Observing System," the youngest of the arrays has an emphasis on the role of the ocean for prediction of the Asian Monsoon, Indian Ocean Dipole and El Nino Southern Oscillation, all contributing factors to global climate. This research will also benefit many outside the Indian Ocean region due to the atmospheric connections that influence surrounding nations. Additionally,

Patrick Berk and Rick Cole deploy an Argo float from BJ3.



(Courtesy RDSEA)

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data collected will contribute to improve forecasting of tropical cyclones and storm surge. Continued science and technology transfer to the Indian Ocean rim countries helps establish observing capabilities in the region and to promote programs to better understand their role in the global climate system.

Fig. 3 displays the spring 2012 cruise track of Baruna Jaya III along the 90° and 93° East measurement lines of RAMA. Two legs were scheduled due to logistical constraints, departing Cillegon, Java in mid-April and arriving Banda Aceh on Sumatra in early May. Banda Aceh is now known as “ground zero” for the 2004 tsunami that devastated Indonesia and the surrounding region. Three sites were visited on leg one; south of the equator at 11°, on the equator, 0° and north at 1°. Leg-2 consisted of more site visits in the north at 3° and 8°. Ancillary projects were also carried out on this cruise such as CTD casts at various locations along the cruise track and Argo float and drift buoy deployments.

The Argo program is a carry-over from the World Ocean Circulation Experiment of the 1990s and provides a quantitative description of the changing state of the upper ocean and the patterns of ocean climate variability from months to decades. Argo builds upon other upper-ocean observing networks, extending their coverage, depth range and accuracy, enhancing them through the addition of salinity and velocity measurements. The final array of 3,000 floats will provide 100,000 temperature/salinity profiles and velocity measurements per year distributed over the global oceans at an average 3° spacing. The floats cycle to 2,000m depth every 10 days, with four to five year lifetimes for individual instruments. All Argo data are publically available in near real-time via the Global Data Assembly Centers in Brest, France and Monterey, Calif. after an automated quality control check and in scientific quality form, delayed mode data is available within six months of collection. The program has reportedly just reached a milestone of collecting and recording its millionth

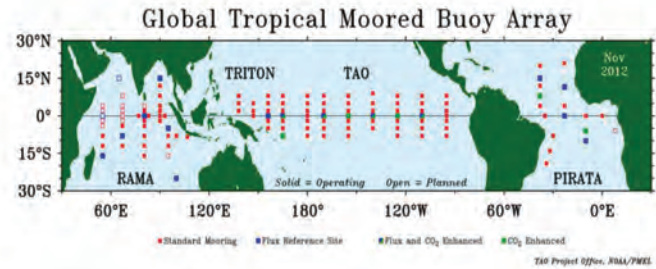
March 2013

ocean profile.

NOAA's drift buoy program is managed in Miami, Fla. at the Atlantic Oceanographic and Meteorological Laboratory (AOML), Drifter Operations Center. Using research vessels, Volunteer Observation Ships and aircraft, Lagrangian drifters are placed in areas of interest around the world's oceans. Once verified operational, they are reported to AOML's Drifter Data Assembly Center. Incoming data from the drifters are then placed on the Global Telecommunications System for distribution to meteorological services everywhere.

Preparations are now underway for the beginning of the 2013 field season on RAMA with all agencies planning logistics and cruise tracks for system cycling and new site installations, moving forward to completing the RAMA array. 2013 brings new adventure for RDSEA and more support to the GTMBA network having been invited on PIRATA in the Atlantic with The Oceanographic Institute of the University of Sao Paulo, funded to contribute to research, observation and modeling of the impacts of climate change on the South Atlantic. An important component of the Brazilian observational program is the PIRATA Project which has been monitoring the tropical Atlantic over a decade in collaboration with France and the U.S. The IOUSP has developed their version of an ATLAS-like buoy system (similar to the designs on the GTMBA) that will enhance their research needs on the deployment and management of current meter arrays across the Brazil Current, in the South-eastern Brazilian Bight (22°S to 28°S). The first of these buoys, Guariroba, is being tested now locally and will be deployed near 28°S and 42°W on an early spring cruise in 2013 initiating the "ATLAS-B" Project. The Guariroba buoy will provide valuable information for understanding variability of the atmospheric South Atlantic Convergence Zone. Cruise logistics will be handled on board R/V Alpha Crucis (formerly known as R/V Moana Wave, University of Hawaii, an old friend to RDSEA).

**The GTMBA:
RAMA, TAO/
TRITON and
PIRATA.**



(Courtesy of NOAA-PMEL)

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MREC Looks Ahead to San Diego

Fourth Annual Marine Renewable Technical Conference Tackled Sandy and Sets Sights on Oceans 2013

Super Storm Sandy blew through New England at the same time the Fourth Annual Marine Renewable Technical conference was taking place. Thankfully, the conference was re-scheduled in three parts in January; two webinars (to accommodate speakers and attendees who could not travel) and one full day conference.

“Using webinar technology enabled us to bring the content of eight individual peer reviewed presentations to a wider audience that could not otherwise have participated,” said Maggie Merrill, conference manager. The presentations focused on research results in areas related to ocean wave, tide and wind energy development. Technologies and techniques for assessing resources and predicting performance were highlighted. Melding engineering, economics and environmental impacts of ocean energy devices was discussed at length.

Those who did make it to Rhode Island during the Oct. 30-31, 2012, time frame were treated to some crazy weather, challenging logistics and some wonderful, impromptu field trips. Woods Hole Oceanographic’s (WHOI) Anthony Kirincich opened his doors to some attendees. The next day all trekked

over to the UMass Dartmouth School for Marine Science and Technology (UMD-SMAST). Speakers from the conference presented their work to a lunchtime crowd. The following day a caravan travelled to University of New Hampshire (UNH) to see the test facilities there, meet with the UNH Center for Ocean Renewable Energy team and see the General Sullivan Bridge tidal power test site.

The full day conference, held Thursday January 10 in Rhode Island, was launched with style by University of Rhode Island, School of Engineering Dean, Raymond Wright. He spoke of the breadth of URI’s engineering expertise and announced that they are now searching for three faculty positions in the area of ocean energy, a great sign of where URI sees this field trending.

Senator Sheldon Whitehouse (D-RI) provided a “call to action” to the technical community to keep working on the tough solutions to generating clean energy from the ocean. He said that the U.S. must come up with carbon neutral methods to generate energy to meet the needs of the future. The U.S. has great capacity to innovate and create solutions to global ener-



John Miller welcomes Serhii Honcharenko-Kimo Business Ent. Ukraine and Pedro Fernandez Carrasco-Univ. of Politecnica de Madrid, Spain.



Raymond Wright, Dean URI College of Engineering with Senator Sheldon Whitehouse (D-RI) in exhibition area at the technical conference.

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George McBride, official field trip driver, explains his new approach to instream power.

gy issues. The State of Rhode Island and the entire Southeastern New England region have the engineering and research assets needed to make this happen.

Bill Staby, CEO of Resolute Marine Energy invited everyone to participate in the rigorous, but needed process of setting standards for the industry. As one of the members of the U.S. Technical Advisory Group for the International Electrotechnical Commission, Technical Committee- 114, Staby joins more than 50 colleagues from around the world in analyzing and vetting the standards that will be used to guide the emergence and growth of marine energy systems globally.

Setting Sights on Oceans 2013

The topic of marine renewable energy is sure to be on the agenda at Oceans2013, September 23-26, 2013 in San Diego. Collaborating with two international societies, the Marine Technology Society and the IEEE/Oceanic Engineering Society will enable a needed cross fertilization of ocean disciplines needed to further support the emergence of ocean energy development. Connecting the knowledge base of both societies including; ocean structures, materials science, oceanographic science, marine biology, bathymetric surveying, hydrodynamics, environmental analysis, moorings and tension members, just to name a few, with the principles of electrical generation will be a powerful combination. Also of great value to the



academic community are the peer reviewed publishing opportunities offered by both societies.

“OCEANS conferences in San Diego have always been innovative,” said conference chair Robert Wernli. “We look forward to continuing that tradition as we join forces with New England MREC and its partners in San Diego this September to solidify the conference’s MRE track and expand it beyond its heretofore introductory status.”

New England MREC and its partners will enhance the visibility of the ocean renewable energy agenda at OCEANS. “We will coordinate and engage with industry, academic and government labs to ensure there are high quality papers presented at OCEANS 2013 MTS/IEEE San Diego. Our network will help expand the OCEANS meeting’s reach into the emerging ocean renewable energy industry,” said John Miller, New England MREC Executive Director.

“With the theme, ‘An Ocean in Common,’ OCEANS2013 has opened its doors to many new co-participating Societies, now including AGU, ASA, SNAME, and many others. We welcome the inclusion of the Marine Renewable Energy Center’s Technical Conference and hope the association will continue in years to come.

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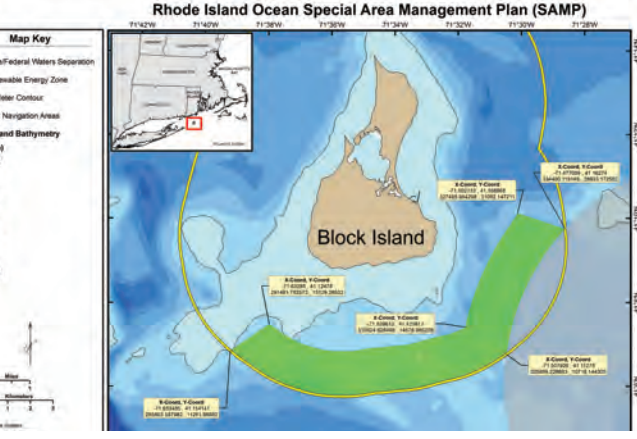
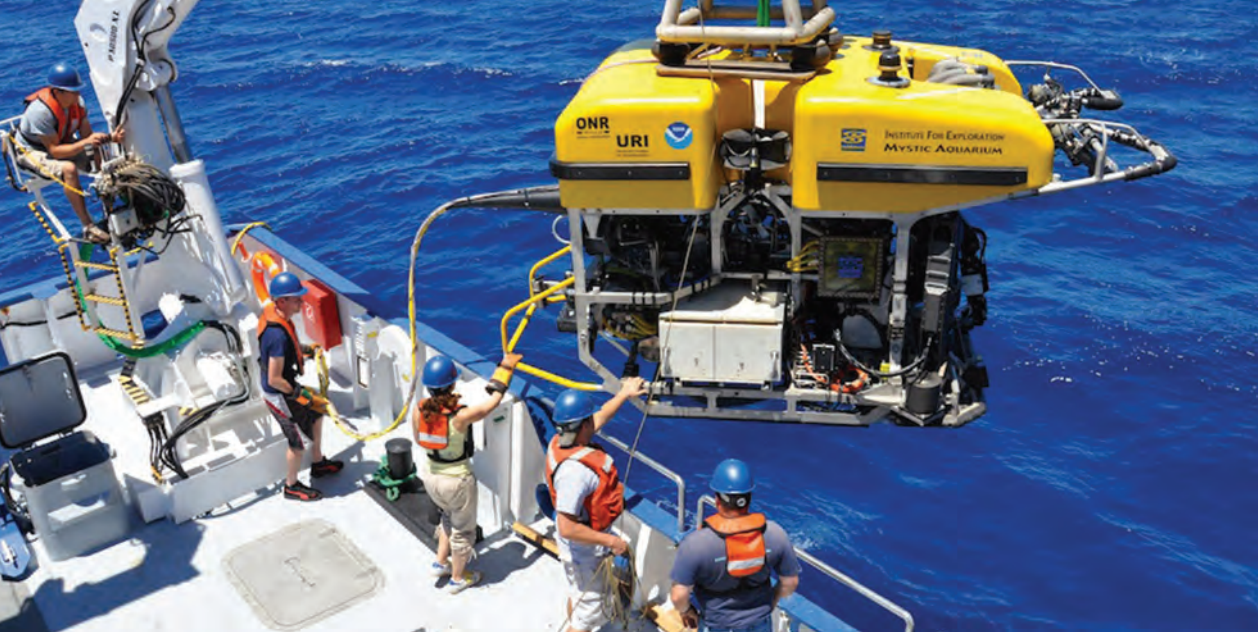
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Rhode Island, Leading the Way

As the birthplace of the American Industrial Revolution, Rhode Island was at the forefront of innovation, entrepreneurial creativity, and economic transformation, beginning with the Slater Mill in 1793. Just as Rhode Island led our nation through the introduction of new manufacturing processes two hundred years ago, we continue to break new ground and promote economic growth through our maritime and defense industries, cutting-edge research institutions, and the Ocean State's position as the country's current leader for offshore wind energy.

Only in Rhode Island can you find such a diverse range of defense and maritime-related expertise concentrated in such a small geographic footprint. Our defense sector supports multiple Department of Defense and Homeland Security needs with a highly connected network of companies - from multinational corporations to start-ups that are moving out of the lab and into the marketplace. Rhode Island excels in manufacturing and developing technology for everything from sophisticated nuclear submarines to wooden skiffs.

From the establishment of the Newport Torpedo Station on Goat Island in 1869 to the emergence of today's Naval Undersea Warfare Center in Newport, Rhode Island has a long and proud history of leading the U.S. Navy's undersea warfare research and system development efforts. Rhode Island's excellence in undersea warfare has fostered partnerships between the defense and private industries that have created thousands of quality jobs and support a strong supply chain of growing businesses in the state.

Rhode Island has also made critical infrastructure investments in our ports, including the Port of Davisville at the Quonset Business Park - home to well-known firms like General Dynamics Electric Boat - and the Port of Providence. By taking steps to modernize our ports, one of our leading economic assets, we have expanded the capacity of Rhode Island to continue to be a premier hub for maritime activity for decades to come.

Rhode Island's 400 miles of coastline has helped the state to become the center of world-class oceanographic research. As a leading institute of ocean education and research, the University of Rhode Island's Graduate School of Oceanography is playing a key role in the development of ocean science, spanning the core disciplines of marine geology and geophysics, biology, atmospheric and ocean chemistry, and physics.

In 1966, URI's Department of Ocean Engineering was the first in the nation to establish Master's and Doctorate degrees in Ocean Engineering. The program conducts research and trains a world-renowned workforce in ocean robotics, underwater acoustics, tsunamis, coastal circulation, marine geomechanics, ocean structures, and offshore energy generation. Graduates are employed by major corporations, small companies, and consulting firms, as well as major government research laboratories.

Rhode Island led our country in a major economic transformation at the end of the 18th century, and the state is positioned to do so once again by paving the way in exploring the sound and effective development of offshore wind energy. Through a partnership with the federal Bureau of Ocean Energy Management, Rhode Island has provided critical scientific and technical information to identify the optimal areas for offshore renewable energy development.

A critical part of this process has been Rhode Island's investment of more than \$10 million in the creation of an Ocean Special Area Management Plan (SAMP) for promoting balanced uses of our oceans. Rhode Island is the only state that has adopted a SAMP in federal waters with a specific focus on the development of offshore renewable energy resources. At the same time the Ocean SAMP was adopted, Rhode Island held a competitive process to choose a preferred developer for an offshore wind farm. The developer has already made significant investments to establish a wind farm in state waters off Block Island, which could well be the first offshore wind farm in the United States.

Utilizing the natural capital found throughout our state, Rhode Island will continue to lead as a regional and national center of excellence for renewable energy.

Just as they have throughout Rhode Island's history, our defense and maritime industries, educational and research institutions, technological advances, and coastal infrastructure are key economic advantages. Rhode Island is open for business and continues to lead the way in the 21st century.



Sincerely,

Lincoln D. Chafee, Governor, Rhode Island



Rhode Island

An Ocean of Opportunity

By Patricia Keefe

Aerial view of Narragansett Bay with the Claiborne Pell Bridge, known as the Newport Bridge, in the foreground. Naval Station Newport is to the north right of the bridge.

Rhode Island may be the smallest state in the union, but its vision of the future is as far reaching as the ocean lapping at its shores.

Taking a page from the University of Rhode Island (URI) motto, “Think Big, We do!,” the Rhode Island Economic Development Corp. (RIEDC) is working hard to position the state as “a premier hub for maritime activity for decades to come. “The message? If it’s on the water, in the water, under the water or about the water – you’re going to find it here.

Sandwiched between much larger and seemingly more glamorous states with longer coastlines, Rhode Island nonetheless stands out by virtue of its “perfect marriage” between subsea technology and the marine environment.

That historic, symbiotic relationship is one reason many expect Rhode Island to be the first to “wet steel,” by fielding not one, but two offshore wind farms that will be based out of the upgraded facilities at Davisville port at Quonset (See wind story, p. 44). Another marine first is the innovative **Ocean Special Area Management Plan (SAMP), a nationally lauded spatial grid mapping of the sea floor in and around Rhode Island** (see SAMP story, p. 43), and then there’s the University of Rhode Island (URI)’s innovative research centers of excellence, and the country’s first doctorate and graduate degrees in ocean engineering. (see p. 40)

Rhode Island is also home port to a sizeable naval presence, including the prestigious Naval Underwater Warfare Center (see p. 36), as well as to what one colleague calls “the greatest living explorer on the planet,” oceanography rock star, marine archeologist and former naval officer Dr. Bob Ballard.

Ocean State boosters keep coming back to the surrounding marine environment – starting with Narragansett Bay, a deep, natural harbor – and the communities that feed off it, and each

other, including the U.S. Navy, which awarded \$200 million in contracts to R.I businesses last year; URI’s Marine departments, a robust R&D community and more than 500 defense and marine-based business and agencies. “People are linked to the ocean here, one way or another,” said Prof. Dwight Coleman, director of URI’s Inner Space Lab. In a state where they joke that no commute is ever more than 20 minutes, it’s easy to understand how tightly knit the community has become over the years. Politicians at the state and federal level mix regularly with URI oceanography and engineering professors, who mix even more frequently with researchers from the NUWC and officials from a host of government regulatory, research and marine agencies. “We actually know them well, which as you can imagine, is helpful when you are trying to get things done,” said Coleman.

Many people jump back and forth between the different sectors of the heavily interlinked marine community throughout their careers. The result is both a rich pool of uniquely skilled, cross-disciplinary marine experts, and innumerable business opportunities, ranging from R&D partnerships to spinoffs out of Navy and University research projects, to new versions or applications of commercial technology. RI’s largest and most successful spinoff is ASA, a marine engineering services company, whose RI office alone had sales of \$11 million before it was sold to RSB. Other spinoffs of note include Far Sounder, a maker of sonar and 3D imaging products, and SubChem Systems, Inc., which makes submersible chemical analyzers for water quality monitoring and underwater surveillance.

It’s those kinds of success stories coupled with the anticipated economic boom driven by offshore energy that has the state betting big that more marine business will be dropping anchor in Rhode Island.



NUWC Courting Industry

By Patricia Keefe

Rhode Island may be the “red” state in terms of the state color, flower and tree, but it bleeds blue – Navy blue. That’s because the U.S. Navy is deeply anchored into the fabric of the Ocean State’s history and economy. Its roots stretch all the way back to the birth of an armed naval force in 1775, and to the arrival of the forerunner to today’s naval research center on Goat Island in 1869. The Naval Academy sat out the civil war in Newport, which is now home to a collection of Naval training facilities, including the Naval War College. Over the years, Quonset Point has hosted the Naval Air Station, the Seabees and the Navy’s Antarctic Support Squadron. On the financial side of the ledger, the Navy today is not only the third largest employer in the state; it is also the leading economic force for many businesses – big and small.

Particularly big is the Naval Undersea Warfare Center (NUWC), a roughly billion-dollars-a-year research center that serves as the nation’s repository for undersea warfare and technology knowledge. It is big, really big, and its tentacles are everywhere. **“If Rhode Island has one drawing card in the business of undersea technology, it’s NUWC and everyone affiliated with it. The Rhode Island high-tech industry is NUWC actually, and the industry spinoffs,”** says Malcolm Spaulding, co-founder of South Kingston, R.I. based ASA Sciences and Professor Emeritus of Ocean Engineering at the University of Rhode Island.

“Contractors locate in Southeastern Rhode Island because of the proximity to NUWC. And for the jobs - lots and lots of them,” continues Spaulding. “NUWC is the largest employer of graduates of URI’s marine sciences and engineering programs. If you look at NUWC staff, about a third came from URI,” he adds. “We probably hire more PhDs – 170 – than anyone else in the area; half our people have masters,” says Don Aker, Deputy Technical Director of NUWC, Division Newport.

Overall, NUWC employs 2,748 government civilian employees and 31 military members with a total gross payroll of more than \$296 million. Of the full-time government civilian staff, 74% are scientists or engineers and approximately 36% have graduate degrees. Anywhere from one third to one in every five are said to be University of Rhode (URI) Island alumni, many of whom went through NUWC’s internship program, and later have the opportunity to return to URI under a special, multi-discipline master’s program offered to NUWC employees.

With everyone coying up to NUWC, it might come as a surprise to find that facility is actively and aggressively seeking paying customers to buy its services, licenses and intellectual property. Especially when you look at the numbers.

NUWC impact in dollars and cents

The Navy’s substantial presence is divided primarily between Naval Station Newport, which houses most of the U.S. Navy’s training facilities, including the Naval War College among its 50 plus tenant commands, and NUWC Newport, the east coast underwater research and development arm of the NavSea. In addition to R&D, NUWC provides testing and evaluation, engineering, autonomous underwater systems, fleet support for submarine warfare systems and many other offensive and defensive weapons systems associated with the undersea realm. NUWC employs more than 4,400 civilian and military personnel worldwide, with budgets of over \$1 billion. With that kind of presence comes a lot of economic power, and payout. In 2012, the total funded program of the Naval Undersea Warfare Center (NUWC) Newport topped \$935 million. More than half of its total operating budget, \$581 million, went to payroll, construction, facility support and local contracts. The command is the largest federal activity in R.I. in terms of personnel and payroll, with NUWC taking the big-



(Photo: U.S. Navy)

Left
Don Aker, Deputy Technical Director of NUWC, Division Newport



(Photo: U.S. Navy)

Right
Dr. Theresa Baus, Head, Technology Partnerships Office



gest chunk of that. The center awarded approximately \$421 million in contracts, of which \$200 million went to Rhode Island. NUWC also provides a lot of funding from the Small Business Innovative Research (SBIR) grant program.

“It’s a big boost to the community, a lot of the sponsors of those grants were based here in Newport because there’s good contact with the engineering, customer and defense communities,” said Jim Dodez, Vice President of Marketing and Strategic Planning, KVH Industries, Inc. in Middletown, R.I. SBIR grants stems from the mandate that a certain percentage of all government research money has to be directed to small business. “So much money has been spent here.”

As has so much knowledge has been gained, and stored, and actually, declassified. And much if it is up for grabs. That’s because despite those impressive budget figures from last years, the truth is, NUWC is not funded like your average government or military agency, which means it has to operate like

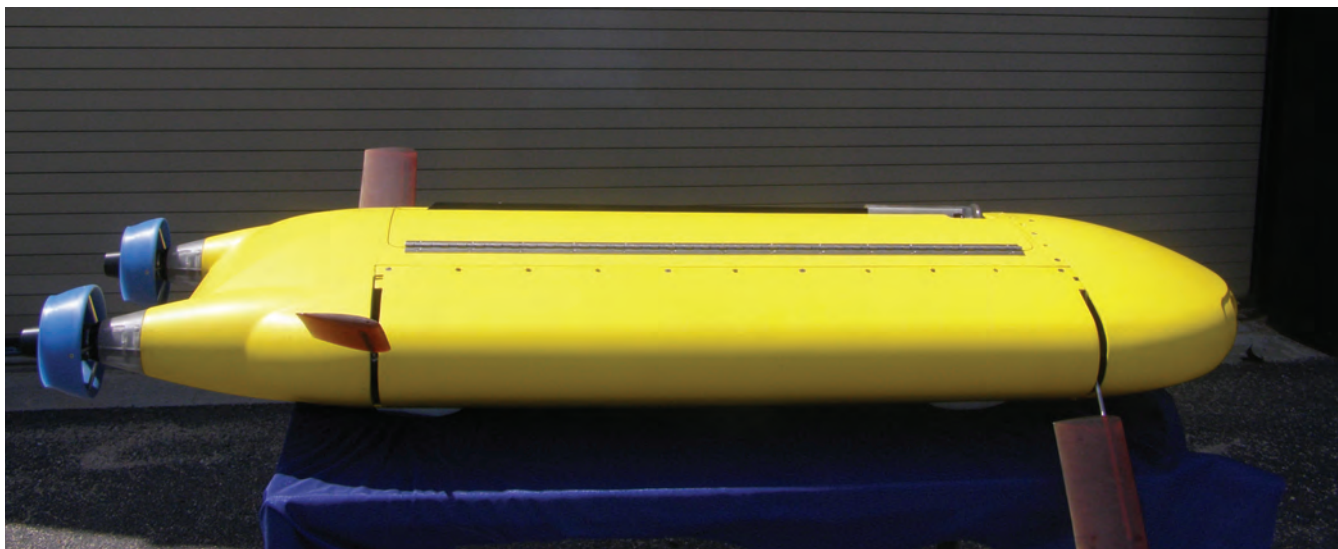
a business. And that means actively selling its services and access to its intellectual property.

“One of the things that make us different from other government entities is that we are a Naval working capital fund activity. Almost every other federal agency has a line item in the budget to do what they do. We don’t,” explains Dr. Theresa A. Baus, Head, Technology Partnerships Office, Naval Undersea Warfare Center (NUWC). As a result, NUWC needs customers and sponsors to bill or services. Most of its budget comes for doing work for other sectors of the Navy, but they still need dollars back as it were, from the private sector, about 3%. So much so that the facility is open to doing projects that fall outside their purview.

“My function is to facilitate agreement between the division and outside entities, and we do this in a variety of ways,” said Baus.

Spaulding describes Baus as “essentially the technology

RAZOR UUV with both propeller and bio-robotic propulsion fins.



(Photo: U.S. Navy)



(Photo: U.S. Navy)

MARV and REMUS UUVs aboard U.S.Navy vessel ready for launch.



(Photo: U.S. Navy)

A mid-sized Autonomous Reconfigurable Vehicle (MARV) UUV ready to go.

transfer office of NUWC at the pointy end of trying to get industry to take advantage of what they've got to offer."

Anything labeled a "warfare center" tends to give off a scent of secrecy. But Akers said people might be surprised. "We definitely have areas of the organization we let the outside world into. Much of our research involves things we can do in association with universities and individuals."

Have it your way

The opportunities for contracting with the private sector come from many angles. In addition to licensing NUWC's technology, the facility makes money by:

- **Selling outright or leasing** access to, the center's enormous trove of technology, patents and other intellectual property. Patents can be licensed singularly or in bundles. "We are probably awarded about 50 patents a year out of the 73 or so applications we file," said Baus. "We are usually first or second in the Navy in terms of who gets the most patent awards every year," adds Akers.
- **Renting** out its unique testing facilities to customers in a wide range of industries. "We have a number of unusual test facilities that are important to have for us, but industry may not have enough usage for them to justify owning and operating one. As a government facility we can do that," explains John Woodhouse, a NUWC spokesman. For example, NUWC has isolation room that allows researchers to measure sound. There is also a wind tunnel that can rack the effect of flow over a surface. Several years ago, Ford Motor Co. wanted to see how much noise was created by the side view mirrors on the Ford 150 truck. So they contracted with NUWC to bring in a truck and test the sound.
- **Cooperative Agreements.** This is where NUWC and a client sit down and work out the scope of the project, who

does what, can use what, who pays for what, and at the end, how the technology rights will be handled. One thing potential clients should be aware of – NUWC can only grant non-exclusive usage rights to a technology under a cooperative agreement.

However, the client doesn't have to pay any fees. The topic area of research has to be in NUWC's mission area and the work has to be collaborative, and of mutual benefit to both parties.

- **Joint research** on areas the Navy is very interested in, such as battery technologies, corrosion, antifouling coatings, chemical sensor detection, buoys, autonomy in general. This is especially helpful in enabling the navy to avoid reinventing the wheel.
- **Access to NUWC's pool** of government mandated Small Business Innovation Research fund. Akers says NUWC has about \$200 million set aside for contracting with small businesses. "We use that to try and get a nice innovative company to give us new ideas."

So it's not just the university that is open for business. For startups, spinoffs and small businesses especially, examining NUWC's services and portfolio may be well worth it. As many industry observers have noted, you can't buy the kind of brain power and institutional knowledge roaming about NUWC's laboratories, nor can most young companies afford to build any testing facility, never mind anything particularly unique. NUWC is willing to work with anyone willing to pay them or who can find a use for much of the technology they develop. And the list of people who are profiting from that agreement is getting longer by day.

"For a long time people have thought they couldn't come in and talk to us. That was true 10 or 15 years ago. But things have changed," says Aker.

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Credit: University of Rhode Island

URI students, technicians and scientists launch the remotely operated vehicle “Hercules” into the Black Sea to study the geology of the seafloor.

URI Scientist Seek Solutions

By Patricia Keefe

There is so much research going on in the state of Rhode Island that its Science & Technology Advisory Council (STAC) gives out annual research grants to research teams already working on projects to facilitate even more collaborative research. The goal is to give a boost to those projects that have the best shot at attracting significant follow-on funding from government agencies or commercial interest.

STAC’s program is indicative of the depth and breadth of research underway across the state in its universities, businesses, defense and government laboratories, and of the potential lurking just beneath the surface for entrepreneurs and established companies to profit from technological advances.

The scientific community here is constantly percolating with projects looking into all aspects of the marine sciences, producing reams of data that can answer questions, solve prob-

lems or inform business decisions involving virtually every aspect of ocean-going enterprise and equipment.

But to solve problems, you need to be in the know. The best way to do that is to tap into the people who do know, or who at least can figure out what it is you need to know, and who can then help you exploit all that knowledge.

And the best way to do that in in the subsea world is to team up with the experts at either the Naval Underwater Warfare Center (NUWC) or any one of the appropriate URI nationally recognized marine sciences departments or innovative “centers of excellence.”

“There is a huge heritage of technology around Narragansett Bay, walking around in the heads of these brainy engineers who have worked on these projects over the years. When you have people like that, you get a lot of start-up companies,” said



Jim Dodez, vice president of marketing and strategic planning for KVH Industries. He should know, KVH's first product for the commercial maritime market was based on sonar buoy technology used to listen for Soviet subs that it licensed from Raytheon. "We have the knowledge district for marine science and technology," agreed Prof. Dwight Coleman, director URI's Inner Space Center.

"What we have to offer industry," said Prof. Harold Vincent, a research professor in ocean engineering, and the director of the URI- NUWC Center of Excellence in Undersea Technology (CEUT), "is the strength of several decades of experience, and you multiple that by the number of people and you are talking hundreds of years of experience developing initial prototype instruments for deployment in the marine environment." It's not uncommon for marine scientists who can't find the tool they need, to develop one from scratch, according to Vincent. But even failures are educational. "We may have tried to build something, and it failed, and we can share with some company the lessons learned."

There are plenty of lessons to be learned in Rhode Island, home to one of the oldest and most prestigious centers of marine sciences and oceanographic research in the country.

Established 51 years ago, the Graduate School of Oceanography (GSO) at URI is one of the nations largest. More than 80 students are currently enrolled - two-thirds in doctoral programs and one-third in master's programs. Many traditionally end up working for NUWC in some capacity or another. Masters and PHD degrees are awarded in "the classical areas of oceanography" - biological, chemical, geological, and physical - as well as in archaeological oceanography, the specialty area of ocean explorer Dr. Bob Ballard. A "Blue MBA" is offered in conjunction with URI's College of Business Administration.

According to university figures, GSO researchers conduct more than 200 research projects, with a combined budget of approximately \$30 million. Much of that funding comes from federal agencies, including the National Science Foundation, the Office of Naval Research, and The National Oceanic and Atmospheric Administration (NOAA), among others.

GSO works closely with the Department of Ocean Engineering, which is actually part of the Engineering Dept. In 1966, it established the first M.S. and Ph.D. Degree programs in Ocean Engineerings.

Creating a hub of oceanographic operations

Both schools are housed at the Narragansett Bay Campus, which provides continual access to the biggest laboratory on the planet - the ocean. That's also where the GSO docks the Endeavor research vessel between voyages. Endeavor is owned by the National Science Foundation, but has been operated by the GSO for 30 years through more than 500 expeditions. The ship is part of the National Oceanographic Laboratory System (UNOLS) of 22 government- and insti-

tionally owned research vessels used to conduct federally funded ocean research. The GSO is contracted with UNOLS through 2014 to handle all scheduling of those ships.

The coveted UNOLS duties dovetail nicely with another GSO innovation, the wildly successful Inner Space Lab (ISC), which was the brainchild of ocean archeologist Dr. Robert Ballard.

Opened in 2009, the ISC is to ocean exploration what Houston is to the space shuttle. The ISC is a facility that establishes real-time connectivity - "telepresence" - between scientists onshore and remotely operated vehicles onboard research ships using satellite connections and Internet. The ships stream video back to the ISC lab, which repackages the images for dissemination to school systems and a network of scientists around the country.

The goal is to broaden the reach of the activities of the ship by allowing more people to take part in the exploration programs, said Coleman, adding "From the ship perspective, you can only take so many people and you never know what you will find. You can't bring all that expertise with you, so you need to be able to tap into a brain trust. It's like having a fleet of scientist on call."

"Telepresence" has other practical applications. The U.S. Army, for example, uses that technology to hook in experts to help ID in real time, what's seen at underwater munitions dumps. "It would be difficult to bring these people to the ships, but you can have networked people all over the world looking at a feed in real-time," said Coleman.

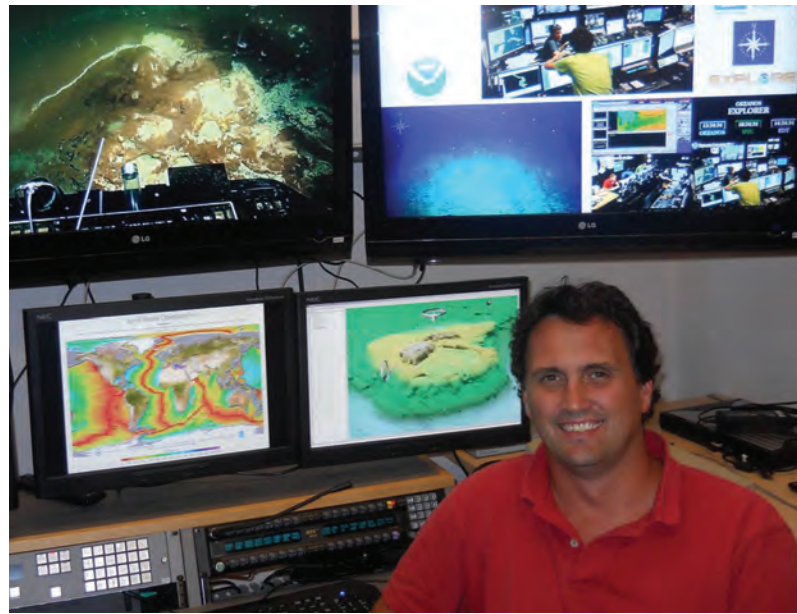
Another first for URI is the Center for Excellence in Underwater Technology, which represents NUWC's first formal research sponsorship with a university. With \$150,000 in seed money from the Navy, CEUT was tasked with developing dual-use technology for environmental protection and management, aquaculture, ocean energy systems, and port and harbor security, among other issues. Its first project was designing and building an undersea distributed network system.

The cooperative agreement between URI and NUWC expired last January. While NUWC may rebid the contract this summer, the University is continuing on with the center. Its mission in part is to establish cooperative research, product development, and technology transfers. Vincent plans to focus the center on three areas going forward: instrumentation, robotic vehicles and renewable energy.

CEUT Director Harold Vincent, a research professor in engineering, said the intent from the beginning with URI's Centers of Excellence was to invite business participation. The advantage to small businesses is multiple: participation is free; exposure to research may trigger ideas for commercialization; that could lead to access to Small Business Technology Transfer Program funding, which requires partnering with non-profit research institutions, which joining the center takes care of. Also, "By their keeping eyes and ears open, companies can save research dollars and time by not reinventing the wheel if



Credit: University of Rhode Island



Above: Prof. Dwight Coleman, a marine research scientist at URI's Graduate School of Oceanography, and Director of the Inner Space Center, sits in front of a bank of monitors streaming live video feeds from remote research ships.

Left: URI ocean engineering student Michael Smith prepares to test an autonomous underwater vehicle he built for a class project in the wave tank at the URI Narragansett Bay Campus.

they don't have to," says Vincent.

Open for business

The university is not interested in hiding its light - the results of all that research - under a bushel. It wants to connect with businesses, and is experimenting with how best to do that. "We're looking for opportunities - not problems, but opportunities, like wind power," said Bruce Corliss, Dean of the Graduate School of Oceanography.

"We are trying to develop these relationships in order to create partnerships that would help us also have an impact on the private sector," he said. By summer, Corliss hopes the GSO will be ready to start having conversations with companies "to let them know what we do, what our capacities are, and what the research possibilities are. Then in turn, we'll see what their needs and interests are to see if can't assist with that."

One approach, done through CEUT, has been to hold topical workshops addressing specific issues, such as green ships and anti-fouling coatings, and invite interested parties from specific sectors, like ship builders or marine operators, to learn,

listen and talk to each other.

"I did a green workshop on ships. Not only was there an exchange of information, but some possible proposals they could work on together," said Corliss.

An example of how that kind of collaboration can work is none other than one of the 2011 winners of the STAC Rhode Island Research Alliance Collaborative Research Grant Awards.

Amtek SCP was awarded \$94,644 on research in marine biofouling on high-performance molded materials. By collaborating with a research university, Ametek SCP will be able to evaluate novel coatings and expand its markets.

From the study of the disbursement of toxins and dispersals in the water, to improving the autonomous capabilities of unmanned devices, to sniffing out chemical sources underwater, the range of research and its possible applications to business problems and adaptations to existing technology is endless. All that's needed are collaborators, sponsors, partners and follow on research designed to mold some of this vast repository of knowledge into useable tools, for today and tomorrow.

SAMP Sets Standard for Ocean Mapping

One of the jewels in Rhode Island's marine crown is the **Rhode Island Ocean Special Area Management Plan (SAMP)**, a **ground-breaking, standard-setting and nationally lauded approach to ocean management with a focus on renewable energy**. Faced with increasing pressure on ocean resources from offshore energy, aquaculture, liquefied gas, resource extraction and shipping traffic, Rhode Island officials realized they needed a way balance environmental protections with economic development in order to better manage ocean resources. "Planning for offshore wind is a better strategy than waiting for it to happen," said ASA Science co-founder and Professor Emeritus Malcolm Spaulding, who co-led the URI team working on the SAMP. More than just a map, the resulting Ocean SAMP is a regulatory and ecosystem-based ocean management and planning tool that has been held up by both President Obama's Ocean Policy Task Force and the Secretary of the Interior as a national model for other states to adopt.

"Planning for offshore wind is a better strategy than waiting for it to happen"

Malcolm Spaulding, ASA Science co-founder and Professor Emeritus, who co-led the URI team working on the SAMP



The two-year, \$8 million project utilized a mountain of ecological, atmospheric and marine data coupled with marine spatial planning techniques to create a gridded map of the sea floor in an area that extended 30 miles off the coast of Rhode Island and encompassed a 1500-square-mile area in and around RI, in state and federal waters. The resulting SAMP provides the state with a master plan for protecting resources, promoting economic growth and designating appropriate areas in state and federal waters for siting wind farms. It is the first state to zone its offshore waters for a range of uses and activities. Extending the study into federal waters smartly extended "federal consistency" requirements 30 miles off shore, said Grover Fugate, director of Rhode Island's Coastal Management Resources Management Council (CMRMC), which is charged with developing and implementing SAMPS, as well as issuing permits for any activities in tidal waters. It also may have sped up the auctioning of wind energy leases since the Bureau of Ocean Energy Management decided to adopt the state's suggestion for the best wind energy areas in area federal waters and then moved to set auction dates.

Led by Fugate, the project involved a minimum of 40-50 scientists and researchers between The University of Rhode Island (URI) and Roger Williams University, along with contributors from other government agencies. Research conducted by URI provided most of the data, looking at everything from viewscapes, historical sites, marine mammals, plant life, sediment, ocean engineering, wind speeds, current and wave data, shipping lanes, fish distribution, wildlife and avian habitats, even areas of interest to Native American tribes.

"Marine spatial planning has to take into account all the different aspects of the marine environment, from fisheries, to military, commercial, to marine mammals and birds. You name it, it has to be taken into consideration. Rhode Island has set the precedent, and set the standard for the rest of the world, said Prof. Dwight Coleman, a marine research scientist at URI's Graduate School of Oceanography.

One of the SAMP's most critical contributions in the renewable energy space has less to do with mapping than time, observes Spaulding. It not only provides other states with a time-saving model, it will save developers years of costly permitting work, and potential battles, he said, thereby cutting costs and speeding up the approval process. As a cautionary tale, he pointed to Cape Wind. "They spent \$35 million to \$40 million and no turbines moving. They ran into a whole series of issues related to siting." Conversely, when Deepwater applied for its siting permit in Rhode Island waters, because it based its plan on the recommendation of the SAMP, "they didn't have to argue about 'why that location?' The SAMP took all that uncertainty away."

In Rhode Island the Future is

Blowing in the Wind

Credit: Quonset Business Park

By Patricia Keefe

Aerial view of the Port of Davisville at Quonset Business Park.

It's powerful, it's clean, and it's something the Ocean State has plenty of: energy-rich offshore winds. Rhode Island, along with its designated developer, Deepwater Wind, hopes to be the first in the U.S. to harness that blow, starting with an initial, five-turbine, 30-MW demonstration project off Block Island, to be quickly followed by the nation's first 1,000-MW farm situated further out in federal waters.

Besides bragging rights, successful deployment could put the state well on its way to diversifying its energy resources and reducing its fossil fuel consumption. From an economic standpoint, the Rhode Island projects, coupled with other anticipated wind farm developments in the region, are expected to provide the state and its subsea maritime industry with a significant payout via the creation of new jobs, new job categories, the facilitation of new and existing business expansion, increased shipping and rail traffic, and manufacturing and vessel-building opportunities – all combining to infuse new life and a brighter future into existing ports.

The potential for the marine industry is enormous, agree many observers. "We're talking hundreds of jobs," said Fara Courtney, Executive Director of the Cambridge, Mass.-based U.S. Offshore Wind Collaborative (USOWC). Moreover, as the industry grows there will be a need for larger scale, specialized vessels to handle construction and transport. "If you look at the supply chain in Europe, the amount and types of

equipment used for wind farming are incredible. It's a huge industry just waiting to start up here," said Grover Fugate, executive director of Rhode Island's Coastal Resources Management Council (CRMC).

For example, the economic benefits from Block Island alone could net Rhode Island an estimated \$107 million in constant 2010 dollars terms or \$92 million in net present value (NPV) as of Jan. 1, according to a July 2010 report prepared for the Rhode Island Economic Development Corp. (RIEDC), by Boston-based Levitan & Associates, a management consulting firm specializing in energy. (Levitan based its calculations on an assumed January 2013 startup date.) It also estimated that a then 385-megawatt proposal by Deepwater would provide the state \$886 million in constant 2010 dollars or \$659 million in NPV terms as of January 1. That proposal has since been bumped up to 1,000 megawatts. Do the math.

Deepwater, meanwhile, claims that even a single 1,000-megawatt project might be enough to "entice both domestic and foreign suppliers to seriously consider establishing significant parts of their fabrication, manufacturing, assembly, and support services" in Rhode Island and Massachusetts. The developer is already committed, under a joint development agreement with the state of Rhode Island, to doing pretty close to that. It will be leasing 117 acres at Quonset Business Park, for the storage, fabrication, and staging of its offshore



components; locating its regional headquarters and foundation manufacturing headquarters in Rhode Island, and encouraging its vendors to use local workers where possible.

A Three-Hour Tour

The course to getting there, however, is both arduous and studded with obstacles. Hauling in offshore wind power is neither easy, nor free. It currently takes developers years to navigate their way through the choppy slop of appropriate siting, analysis and mapping of waterway traffic, including marine and avian patterns; wind and ocean currents and speed; a host of ecological and environmental concerns; supply chain issues; utility contracts and connection; financial commitments; and a veritable sea of state and federal regulations from seemingly all possible angles and agencies.

Rival Cape Wind in Massachusetts, for example, is more than a decade into the process, and despite having won construction permits, must surmount legal challenges before it can start. And in Rhode Island, lawsuits have similarly forced Deepwater to ratchet back to 2014, the planned spring 2013 launch of its \$250 million Block Island pilot, which is designed to power about 10,000 households in the region and cut by 40% power rates on Block Island, currently among the highest in the nation.

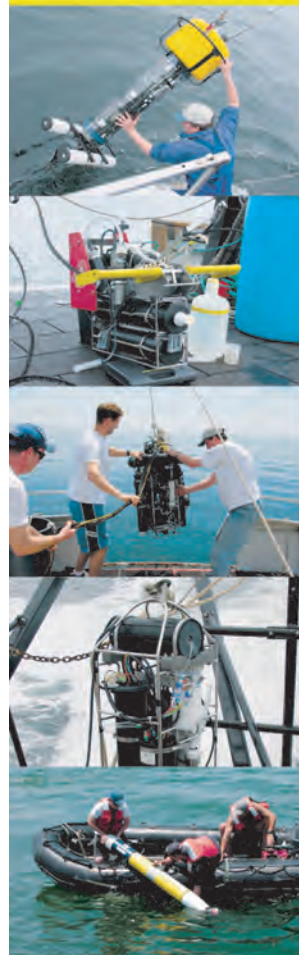
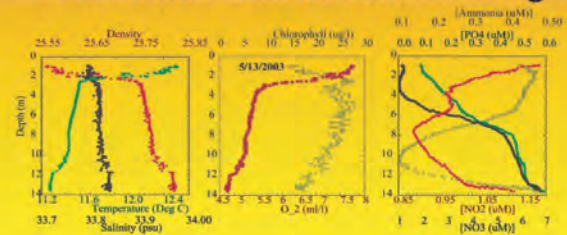
That delay could push out the start date on its utility-scale, regionally focused project, the roughly \$6 billion Deepwater Wind Energy Center (DWECC). The large scale wind farm is designed to function as a regional energy center, producing 1,000 megawatts off 200 turbines, most of which will be located in the ocean waters of southern Rhode Island Sound 20 to 25 miles from the shoreline. The DWECC would feed into a cable system called the New England –Long Island Interconnector, which will deliver energy to Long Island and Southern New England, enough to power 350,000 homes. Leases for federally-sited wind farms are slated to be auctioned in the first half of this year. Deepwater has said it expects construction to begin in 2014 or 2015, with the first wind turbines in operation by the end of 2016 or 2017.

Federal legislation passed in January may help speed things up a bit. The new law extends production and investment tax credits for wind-energy projects that begin construction by Jan. 1, 2014. There are also state and federal mandates to get going on renewable energy goals, pressure that has particular resonance for the 28 coastal states that consume 78% of the US electricity production.

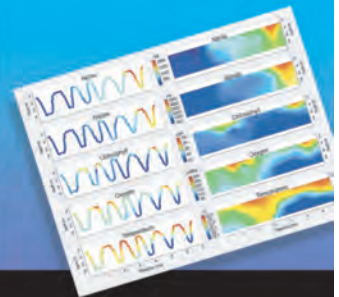
A July 2008 U.S. Department of Energy's report, "20 per cent Wind Energy by 2030," found that offshore wind capacity could provide 54 gigawatts (GW) of the 300 GW needed to deliver 20% of the nation's electricity from wind energy by 2030. As luck would have it for Rhode Island and Massachusetts, about a quarter of the country's wind reserves are located in an area south of Martha's Vineyard, which also happens

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“Rhode Island is very well positioned to be a winner, than any other state”

Energy analyst Steven Kopits, MD of Douglas-Westwood in New York

to be the Bureau of Ocean Energy Management’s designated range for large wind farms.

Even better, wind farm developers and their backers aren’t just wading through regulatory marshes. They are closely examining the region’s harbors and ports, looking for proximity to projects, access to water and space availability. Ports with channels deep enough to accommodate the huge vessels needed by the industry, and sizeable staging areas for assembling components, are going to be critical to the construction and maintenance of these farms, and both states are determined to win the lion’s share of that lucrative business.

Tiny R.I. has already taken some giant steps toward that goal, compared to other states. “Rhode Island has really stepped out in advance of many other states and done some very innovative things to help the industry move forward,” said USOWC’s Courtney.

“Rhode Island is very well positioned to be a winner, than any other state,” said energy analyst Steven Kopits, managing director of Douglas-Westwood in New York.

The CRMC in particular draws special praise for developing the Rhode Island Ocean Special Area management (SAMP) plan, a spatial marine mapping of a defined area of the ocean floor off the Rhode Island coast. (See RI SAMP). The SAMP provides regulatory standards for offshore development and was used to designate siting areas for wind farming in both state and federal waters. President Obama’s Ocean Policy Task Force called it a national model for marine spatial planning.

If you build it, they will come

In New England, where the battle to be first in the water has now extended from the wind farm proposals out to the ports, yet another ace in Rhode Island’s pocket is The Port of Davisville at Quonset Business Park in North Kingstown. One of the largest ports in the northeast with 3,200 acres, it is also the seventh largest importer of autos in the country and home to 168 companies that employ almost 9,000 people. Longtime,

key tenants include Electric Boat Corp. and Senesco Marine. Located near the mouth of Narragansett Bay, the port features four berths and five terminals with over 58 acres of laydown and terminal storage.

“To have that much property on the waterfront with a combination of rail connects, airstrip and deep water access at one facility – I think it is a fantastic asset,” said Jim Dodez, Vice President of Marketing and Strategic Planning, KVH Industries, Inc. in Middletown, R.I.

Steven King, managing director of the port, believes wind farm activity could muscle its way into the number two or three spot in the port’s business lineup once the market takes off, some three years or so down the road. To get ready, Quonset has made \$30 million in infrastructure improvements, including a \$7.5 million dredging project, the purchase of a \$4 million Gottwald 7608 Mobile Harbor “super” Crane that can lift up to 140 metric tons and stands approximately 126 feet high, structural improvements to Pier 2 to support the crane and the addition of lighting and new fendering to Pier 1, King said.

Hot on Quonset’s heels, though, is a \$100 million project to build South Terminal in in the economically depressed fishing and shipping port of New Bedford, Mass. The project will “purpose build” a multi-use terminal to serve foremost as a base of operations for the assembly, staging and transport base of offshore energy-related projects. Cape Wind has committed to working out of the new terminal.

Rhode Island is betting that Davisville is ideally suited and situated to serve as the preferred base port for primary staging and maintenance for a collection of regional wind farms, and it’s not alone in that assessment. Although they believe there will work enough to go around eventually, right now, industry observers say there is no doubt that Davisville is the most attractive option.

“From an economic development point of view, Quonset, by any metrics is an ideal port from which to support offshore wind development,” said Malcolm Spaulding, co-founder of

“To have that much property on the waterfront with a combination of rail connects, airstrip and deep water access at one facility – I think it is a fantastic asset,”

Jim Dodez, VP, KVH Industries, Inc.

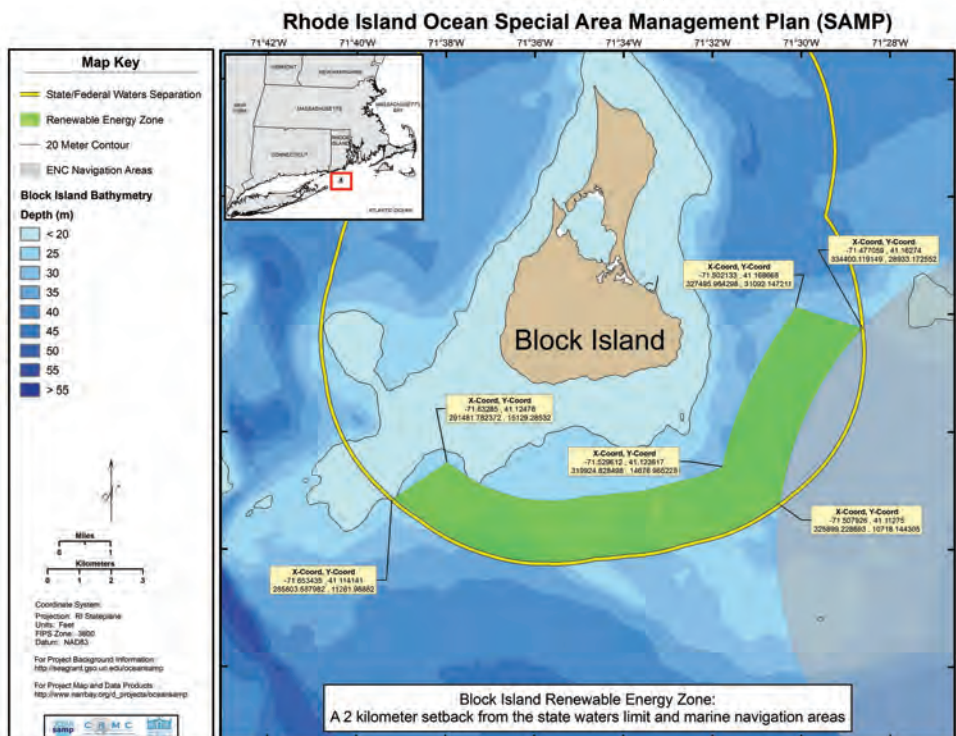


South Kingston, R.I.-based ASA Sciences and URI Professor Emeritus of Ocean Engineering. “The biggest competition to supporting offshore wind at Davisville is really the port’s other businesses, primarily auto imports, which like wind farms, gobbles up a lot of space.”

Beyond the ports, the double-edged sword of offshore wind offers still more economic opportunities. It will create more construction, design, transportation and maintenance jobs, but that’s partly because the offshore environment is more complex and more hostile, and easily accessed. “You can’t just put two guys in a truck and send them out to fix X number of turbines a day,” said Kopits. “For starters, you need a vessel, and it has to be crewed, and you’ll probably need a barge as well

– you can see how much more expensive this is going to be.”

And there are the project-specific vessels that will have to be built to construct the platforms and haul huge payloads once the industry gets underway. These include new-generation purpose-built vessels heavy lift vessels, jackups, offshore supply vessels, transport vessels and barges and cable lay vessels. The available fleet of construction vessels today are in the Gulf of Mexico or off the coast of Europe, where Kopits says most are booked out for the next year. He estimates a combined total of 20-25 new ships of all kinds may eventually be needed, but he suspects they’ll mostly be built in non-union shipyards in the South.



Designated areas for renewable energy projects around Block Island as laid out by the Ocean Special Area Management Plan (SAMP).

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MSI to Provide Professional Maritime Training to NOAA Officers

The Maritime Simulation Institute will provide professional maritime training to National Oceanic and Atmospheric Administration (NOAA) Corps Officers. In the NOAA Basic Officer Training Class, maritime instructors from the Maritime Simulation Institute will train the initial accession NOAA Corps Officers in the nautical sciences including basic safety training, seamanship, electronic navigation, ship stability, Rules of the Road, and shiphandling.

The class will culminate with critical Bridge Resource Management (BRM) training on full mission ship simulators at the Maritime Simulation Institute. The BRM training will prepare NOAA Corps Officers to effectively stand their first navigation watches at sea and to respond appropriately to shipboard emergencies. The maritime instruction will be held at both the NOAA Corps Officer Training Center located at the U.S. Coast Guard Academy in New London, CT, and at the Maritime Simulation Institute's headquarters in Middletown, RI. The experiential simulations used by the Institute are custom tailored to meet each client's specific training needs. The NOAA Corps Officers will not only develop their shiphandling skills; they will also be challenged in simulator-training sessions by instances of equipment failure, extreme environments, unusual navigation circumstances and other potential emergency situations.

Maritime Simulation Institute instructors are providing professional maritime training as part of the current NOAA Basic Officer Training Class, which is now underway and will continue through the end of May 2013.

In addition to the ongoing nautical instruction for NOAA's newest Ensigns in the Basic Officer Training Class, for the past three years, the Maritime Simulation Institute has also provided simulation training in Advanced Watchkeeping for NOAA mid-career officers as part of NOAA's Refresher Training, or REFTRA. The REFTRA course prepares NOAA Corps Officers rotating from shore assignments back to sea, often in command of one of NOAA's fleet of ships.

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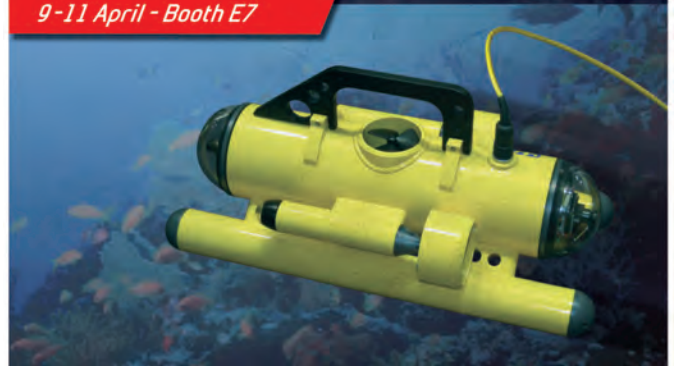
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Don Rodocker

The Man in the Sea

In the early days of subsea technology, there were a number of pioneers: men and women who stepped over the edge of what we knew about the underwater world. These individuals left the comfort of solid ground to explore beneath the waves and report back to the rest of us what they had seen. They pushed boundaries, raised the stakes and in some instances opened our minds to the possibilities. They were subsea visionaries. Today, those boundaries continue to be pushed, and undersea technology, now more than ever, is reaching new heights. The pioneering spirit has never been better represented than in the father and son team of Donald and Jesse Rodocker, founders of SeaBotix Inc. LLC. Don

began his career as one of the early pioneers in the diving industry. His cutting edge designs in dive equipment, hyperbaric support systems and remotely operated vehicles laid the groundwork for many of the systems we see operating in the field today. His son, Jesse, has also had an impressive career working on high profile projects such as the search for Amelia Earhart, counter mining measures for WWI and WWII seamines in the Baltic Sea and the archaeological investigation of a WWII Japanese midget sub. MTR recently sat down with Don Rodocker to not only get a glimpse into the origins and history that led up to the creation of SeaBotix, Inc., but to also visit, if just for a moment, that golden age of subsea technology.

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You've had an illustrious career in the subsea industry. Can you recap some highlights?

I started diving in 1965. I was in the Navy stationed at the Bremerton Naval base off the coast of Washington State. I would go snorkeling in the waters there – which were about 45°, a bit on the chilly side. You could snorkel for about 30 minutes or so, and then you would have to jump out. It would take about that long just to warm up and to get the color back in your lips. Then I would jump in again, maybe for 20 minutes and jump back out. It would take progressively longer to warm up. Mind you, I was not wearing a wetsuit of any kind. Still, I was hooked. The incredible flora and fauna was very intriguing. There were so many alien creatures. And there was treasure down there. You would find something on every dive, anchors and shell casings, all kinds of things. It was so interesting to me. Since I was limited by my lack of thermal protection, I finally decided to make myself a wetsuit. I got a pattern, bought some material and made a shorty. I thought I had died and gone to heaven. I could stay much longer and see so much more

that way. Then the limitation was not thermal but rather how long you could hold your breath. So I decided to take a SCUBA course at the YMCA and got certified. I then got a part-time job so I could afford some equipment and bought a custom wet suit. That's when life really got good.

Sounds like you made it happen. Serving in the Navy and a part-time job kept you busy.

Yes, I was serving in the Navy and married with kids. I had a full plate. I remember there was a dive locker on the ship I was on, which was a subma-

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Jesse Rodocker in the field.

rine tender that we used as a base for all these reserve ships. So we would go into these decommissioned ships, haul away all the machinery and paint the bilges. Just go through them completely. So during this time I got a part-time job, and that allowed me to buy more diving equipment. On board the ship I also started making my own diving equipment including weights. You couldn't tell them apart from the ones you bought. I then bought a double manifold from someone and got a couple of tanks and had hydros done on them. I made my own harness.

So you started building diving and subsea equipment from the beginning.

Yes, I didn't really have a choice. So then I left Bremerton, went to Naval school and got qualified in a very short period of time – less than three months. As a reward, they gave me Navy SCUBA School. I became the ships diver on the submarine. This happened just in time for a six-month Western Pacific cruise, so I got to do some really exciting diving which continued all over the world. At the end of that tour, I was getting out of the Navy, and they tried to entice me to stay. They asked me what it would take. I said I wanted second-class diving school, first class diving school, saturation training and assignment to the Man in the Sea Program. Well, they laughed and said they could get me one school and one duty station or maybe two schools, but all four is asking too much.

What is the Man in the Sea Program?

It was a Naval initiative started in 1964 when the first Sealab was established. There were three Sealabs, which were experimental underwater habitats. They were part of the Deep Submergence Systems Project.



The HyBall ROV.

So no cigar.

No, and I said, "Well, you asked." But then when I got back from the Philippines early – about a month later – the boat came in. I met it, and they said, "Hello, Mr. Man in the Sea." So then I had to make a decision: I had to either sign on or get out and head to college as I had planned.

Did they let you participate in all four schools?

Yes, I did all that. I got an amazing education in the Navy. From nuclear power school to jet propulsion school to air conditioning and refrigeration school, machinery repair school and then all the diving schools.

What was it like being involved in the Man in the Sea program?

Our job was to carry out the operational and technical evaluations on the Sealab III. Sealab III was really Sealab II after an overhaul. Both were located off the coast of La Jolla, California. Sealab III was also, about three times deeper than Sealab II. We were also support for the landing class ship IX501, also known as the Elk River or what was more affectionately referred to as Moose Creek. We put the thing together, sorted out a bunch of things wrong with it and then did some saturation dives and trials. We hit 1,010 feet. That was the world record at that time.

Another first.

Yes. So following the Navy I started Saturation Systems Inc. with Chris DeLucchi. One of the things we did early on was a dive on the Andria Doria. This was the first commercial saturation dive of a salvage operation ever.



Don Rodocker at an exhibition.

That must have been quite the feat in those early days.

It was. When we did the dive on the Andria Doria we built a closed circuit diver gas recovery system because we could not afford the gas. We were in Fairhaven, Mass. rolling cylinders down the dock. That was first generation. Then we did another generation for Seaway Diving at Sat Systems. We were interested in recovering the purser's safe on the Doria, and the objective was to cut a hole in the wreck. To do this we built a portable saturation habitat called "Mother" that was lowered to the side of the wreck where we could breathe a mixture of 92% helium and 8% oxygen. This would allow us to work for several days before decompressing and surfacing. We did not get what we were after, but we did get a great deal of publicity. That publicity really took us to the next stage, which was to build equipment and use the money we made there to do more treasure diving. The two would then feed on each other.

You went back to the Doria years later with a SeaBotix ROV as well.

Yes. We went back on the 50th anniversary of the sinking just to bring new technology back to the Andria Doria. We used a SeaBotix LBV200 on that dive, and did a bunch of investigation on the wreck.

What followed the earlier dives on the Doria?

We then got a sizable contract with a Norwegian company called Seaway Diving who was just setting up their saturation diving program. This was to support the oil operations in the North Sea. We got heavily involved and ended up working with a company called Draeger.

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We were working with Seaway Diving when Draeger had started building saturation diving systems and of course rebreathers, including semi-closed and closed circuit systems rebreathers. We did some testing with those and some evaluations on the diving systems they were building.

That company grew, and we sold lots of diving systems. It grew fast over a five-year period. We had 130 employees, but we were underfunded. Most of the units we were shipping from San Diego were going to the North Sea and the Gulf of Mexico. There was a lot of freight involved, which made it very expensive. So once the technology caught up and other companies could build similar equipment, it made it very competitive. Also, the way we wanted things done and how we thought they should be done was not really what the industry was about. It was do the minimum to get the job done. We were quite a ways away from that ideology, so we decided to shut it down. We shut it down and disbanded.

You were really at the forefront of underwater technology on several levels.

• I then started a company called Gas Services Offshore Limited. It was to develop a system for gas recovery. I developed a system called the Gas Miser, which was a deep diving gas reclaim system. Chris DeLucchi and I also developed the Sat Hat, which was a versatile dive helmet. It had a demand regulator and a push-pull regulator with mixed-gas reclaim capability. It could also be used with open circuit, free flow mode or with a semi closed-circuit rebreather.

What were some projects in the field that used the systems?

• We participated in raising five tons of Russian gold. That got things started with that company. That company went on to become the Pressure Products Group, and later DiveEx was one of the companies that we acquired. It still exists today. I then sold the company and was approached by an offshore-diving supervisor. He had built this concept of an ROV and I ended up funding that. I got heavily involved. The company was called Hydrovision. Hydrovision produced the Hyball.

Were those the origins of your involvement with ROV technology?

• Yes. We spent a bunch of money and developed this vehicle. There is a little over 400 Hyballs out in the field. It was the first production built ROV. The Hyball 225 was known in the field as the eyeball. It was an incredible learning experience. At that time I sold the balance of the companies known as Pressure Products Group. I then became semi-retired in Seattle but continued to dabble in hyperbaric oxygen and ROVs. I wanted to develop a small ROV. It was really what we wanted to do from the first concept with the Hyball. But now the

cameras had shrunk quite a bit; it was much easier to shrink this thing down. We worked with a company in Vancouver that built a small ROV called the Scallop. They were interested in selling the IP on this and another system. I looked at it and got one, but you couldn't really get it across the pool. I used this as a proof of concept for a small vehicle and went off of my boat with a drawing board. We built a prototype of the LBV in my shop in Washington. We did some initial testing and built some thrusters that had certain criteria that we had to meet, such as a 3-knot current minimum. We determined how much thrust we needed to have. We built thrusters that would produce enough to propel it at 3-knots. It was in the early days of solid modeling and the cost to do the solid modeling was quite expensive.

Did this early investigation into smaller ROV technology lead to the inception of SeaBotix?

• My son, Jesse Rodocker, was down in Austin when he called me and said, "It's time to get the Little Benthic Vehicle off the shelf. The market is ready." I said, "If you will help me, let's go for it." So we did. In 1999 we put together the business plan and started developing the framework for what is now SeaBotix Inc.

What are some of the concepts behind the SeaBotix LBV and vLBV ROV lines?

• We progressed the concept and design and really did a lot of testing and trials to make sure it was capable. The problem with the Scallop was it wasn't able to get across the pool because the thrusters were too far apart. You have to remember, when you're talking about the smaller robots there is also an optimum at the size endpoint. The smaller systems or the micro ROVs just cannot carry the payload and deliver the payload with maneuverability. You can pile a whole bunch of stuff on it, and it struggles to get there. You can pull an 18-wheeler with a Volkswagen, but you don't go very far or very fast. Today, our systems are being used all over the world in all sorts of applications. We can carry the payload our end users need and maintain maneuverability. In one application, for example, some of the early adopters were able to take the vehicles and do inspection work. The first tunnel inspection was more than 1,100 meters inside a pipeline. We have since gone past two kilometers. There have been many "firsts" achieved with our vehicles. We dealt with all of those early challenges, and we also dealt with the price point. By pushing the price down and taking the risk, we were able to increase the volume substantially. We are now just about to go over 1,000 units sold.

So looking toward the future for SeaBotix ...

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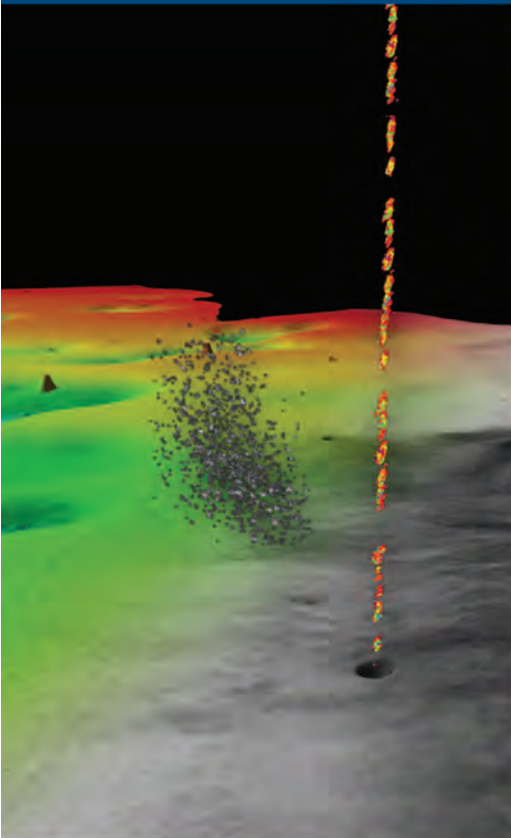
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DSTO First Purchaser of Kraken Sonar Systems Aquapix SAS

By Andrew Safer

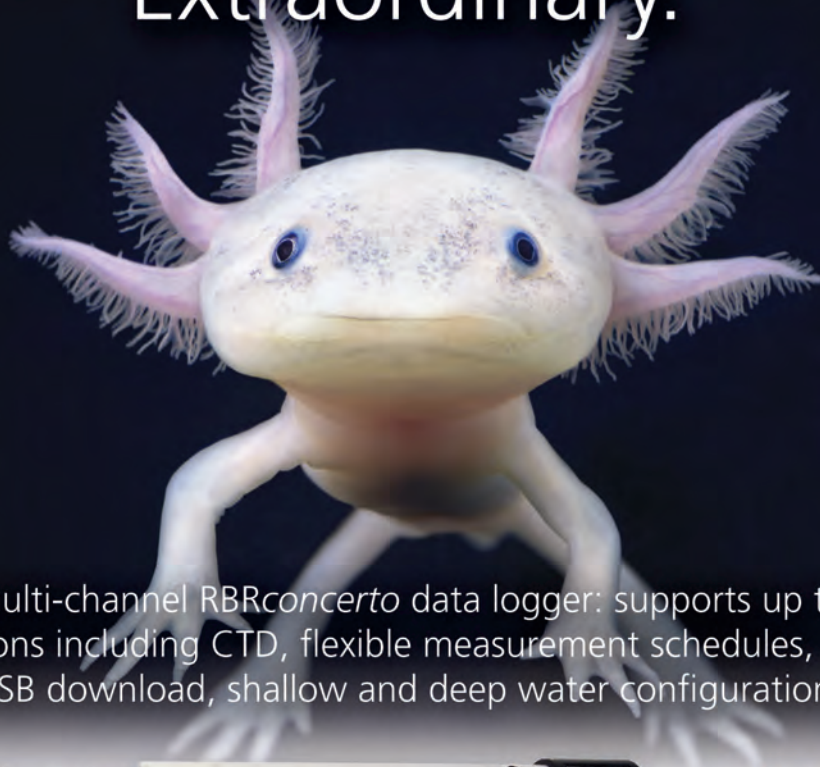
Defense Science and Technology Organization (DSTO) of Australia purchased an interferometric synthetic aperture sonar (SAS) system from Kraken Sonar Systems of St. John's, Newfoundland in December 2012. This is Kraken's first commercial sale of the AquaPix SAS system, which follows two sets of sea trials in which the system had been previously tested by Defense Research and Development Canada (DRDC) in Halifax, Nova Scotia and the Naval Undersea Warfare Center (NUWC) in Newport, Rhode Island. Financial terms and contract details regarding the DSTO sale were not disclosed.

"We intend to run AquaPix in as wide a variety of environments as possible to ascertain its full range of capabilities," said David Battle, Head of the Littoral Unmanned Systems Group at DSTO, which is part of Australia's Department of Defense. He added that mine countermeasures and route survey tasks are their top priorities. Asked why DSTO selected the Kraken system, he cited the low cost of AquaPix ownership and several technical features. "We are hoping that the design emphasis on multi-path mitigation pays dividends in shallow water where SAS has been known to struggle," Battle said, adding that the quality and consistency of data are key. Another DSTO priority is a quick and simple integration.

"Reliance on correlation-based micro-navigation techniques should reduce the dependence on tight inertial navigation system coupling, thus simplifying the overall integration task." While the contract value was not disclosed, Battle reported that the price paid was significantly less than those quoted by the other manufacturers who had been invited to tender.

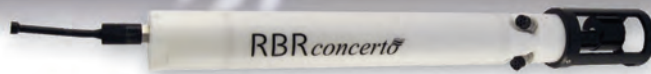
A key feature of the AquaPix system that stands out in comparison to conventional sonar, said Kraken Sonar Systems President and CEO Karl Kenny, is the synthetic aperture signal processing software which "tricks the system into thinking the physical transducer array is much longer—20 to 25 times longer," resulting in greatly increased image resolution and range. He adds that the interferometric SAS produces detailed seabed images with 3 cm resolution to ranges over a 400-meter swath—200 meters x 2 for both sides of the vehicle. Through advanced signal processing, the transducer pings are realigned and made coherent over 1/16 of a wavelength, equivalent to the diameter of a thick human hair. "Interferometric" refers to upper and lower transducers that together enable locating a point on the seabed. In combination with the pressure sensor onboard, this provides the bathymetry. "The high resolution and potential improvements in coverage rate have generated a great deal of interest in SAS technology generally," Battle said. "The ability to source

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Kraken Sonar Systems President and CEO Karl Kenny and Engineering Manager David Shea.

both images and bathymetry through the same sensor seems to be emerging as a must-have feature for AUV sensors.”

Kraken Sonar Systems was spun out from Marport Deep Sea Technologies in September 2012 to focus on military and commercial applications for the SAS technology initially developed by the NATO Underwater Research Center in La Spezia, Italy. Marport acquired the intellectual property from NATO via DRDC in 2010 and further developed the technology between early 2011 and August 2012. Dr. Marc Pinto, who has been involved in the development of SAS since the early 1990s and served as Head of the Mine Countermeasures Department at NATO Underwater Research Center, is currently Chief Technology Officer at Kraken.

After spending 18 months developing the Aquapix system, Kraken’s first real-world testing opportunity came in August 2012 when they were awarded a Defense Industrial Research Program contract from DRDC to trial the system in a Repeat-Pass Interferometric SAS program. “The purpose was to collect sonar data to get very high resolution bathymetry,” said Vincent Myers, Defense Scientist at DRDC, by conducting multiple runs

at varying altitudes over the same area, where mine-like targets had been placed. This also enabled them to look for subtle differences in what Myers refers to as “coherent change detection.” He added, “We also wanted the experience of using SAS in Canadian waters using one of our own vehicles.” Myers reported that Kraken’s integration of the system into the ISE-built hull section of the Arctic Explorer AUV went smoothly and there were no performance issues during the two-week trials. “Looking at the data, some images were pretty spectacular,” he recalled. “I’ve seen a lot of SAS data, and this was right up there, on par with world-leading SAS. I’m impressed they were able to develop this technology in such a short period of time.” Kraken is currently processing the data.

The system covered a swath of 220 meters per side, reported Myers, who added that the constant resolution provided by SAS is not found in other data acquisition methods. “The problem (with the other methods),” he said, “is that their resolution degrades with range which limits their usefulness for our purposes, which is to detect naval mines.” He said another advantage of the Kraken system is that it does not require an inertial nav-

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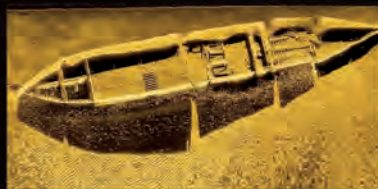
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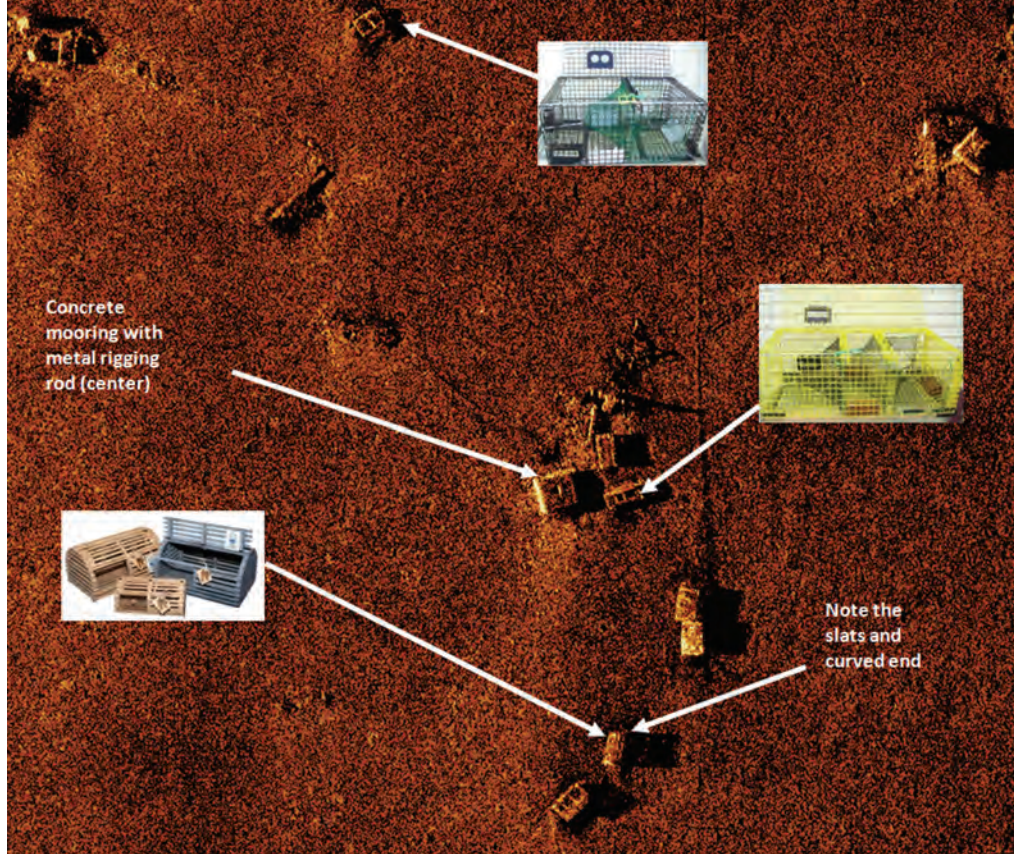
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Debris Field Imagery Generated by AquaPix SAS.

igation system to produce the imagery. He added that while INS is still required onboard to determine the absolute position, the ability to strap on to the Aquapix system without having to interface it with INS was a plus.

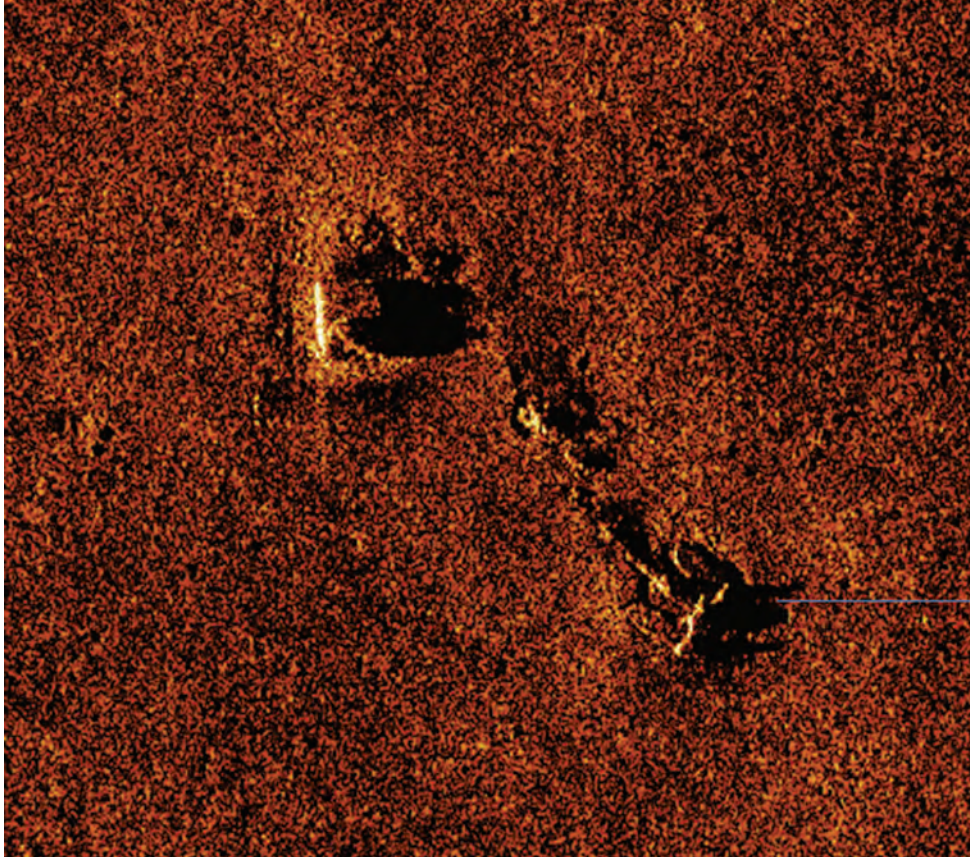
The trials conducted at NUWC in November 2012 and January 2013 were supported by a Cooperative Research and Development Agreement (CRA-DA) between NUWC and Kraken. The purpose was to integrate and evaluate the AquaPix SAS on one of NUWC's medium-sized AUV's, a 12.75-inch diameter REMUS 600 built by Hydroid Inc. Kraken's Kenny reports that NUWC engineers provided technical input on the payload module requirements and Kraken engineers designed a drop-in wet payload section with minimal integration requirements. Within a five-day period, the conventional side-scan sonar payload section was removed and Kraken's AquaPix SAS module was assembled, tested and installed at NUWC's facility.

Known targets that had been laid were surveyed at varying altitudes and stand-off distances, reports Kenny who adds that there was consistent 3-cm resolu-

tion to ranges in excess of 200 meters. 3D bathymetric data was also collected to produce digital terrain models of the seabed in compliance with IHO S44 special order requirements.


Delivery of DSTO's Aquapix system is slated for the end of March. Asked if the availability of SAS at a low price point could be a game changer, Battle replied, "SAS could be a game changer if it proves robust in a wide range of environments."

The problem has been that SAS has remained very expensive, and occasionally finicky, while real array side-scan systems have continued to evolve and improve. If SAS technology becomes more affordable and demonstrates the same kind of robustness that real array systems have become known for, then I think it will be adopted very quickly." Myers said that a reduced-cost option for SAS will make this technology available beyond militaries—to research organizations and universities. Kenny reported that a key focus of Marport and Kraken's R&D efforts has been to develop the technology that would enable them to price their Aquapix SAS system in the \$250,000 range.




Anchor Image Generated by AquaPix SAS.


ROVS	Video Systems	Sonar Systems	Magnetometers	Diver Delivery Systems	Tether Management	Diver Held Sonar Imaging and Navigation
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Mississippi Department of Marine Resources Purchases

Triggerfish T4H ROV

The Mississippi Department of Marine Resources based out of Biloxi, Miss., purchased a fully loaded Remotely Operate Vehicle (ROV) from DOE, Inc. (formerly Deep Ocean Engineering) in November 2012. The *Triggerfish T4H* ROV is a redesign of one of the most popular ROV's ever made, Deep Ocean's *Phantom HD2*. The *Triggerfish T4H* consists of four brushed thrusters that provide 42 lbs of forward thrust and two "vertrans" thrusters that provide 24 lbs of vertical and lateral thrust with a DOE camera on a 180° tilting mount. In addition to the base vehicle configuration, the vehicle was equipped with a Tritech MicronNav USBL Tracking System, a BluView Dual Frequency Sonar, two DeepSea Power and Light SeaLaser100s, a rear facing black and white DeepSea Power and Light Multi-SeaCam, and a DOE single function manipulator/cutter. Mississippi Artificial Reef Program Coordinator, Kerwin Cuevas, and his crew Jimmy Sanders and Eric Broussard, participated in a week long training to familiarize themselves with the complete ROV system so that they can run and maintain their vehicle to gather data for their program. MDMR will utilize the ROV to aid in the management of their 15

offshore reefs which cover 16,000 acres and their 67 inshore reefs which are a mix of recycled materials, piers, and jetties. The ROV is ideal for the sampling techniques of the agency and matches nicely to the environment it will be working in. The sizing lasers, camera, lights, and dual frequency sonar all are able to tilt so that videographic data and sonar data can be matched up to the same field of view. With the visibility of the waters off the Mississippi coast having moderate to high turbidity, the dual frequency sonar can find areas of interest for the crew rather quickly. Kerwin has stated that, "The vehicle performs better than we expected and it will aid in conducting our surveys and research immensely."

DOE, Inc strives to provide purpose built ROVs with integrated solutions to our clients and a high level of customer service. The *Triggerfish T4H* is a highly adaptable open frame vehicle and the ability to add multiple sensors or tools makes this vehicle one of the most widely sought after vehicle designs on the market today.

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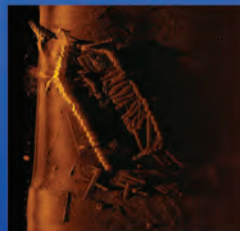
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New Name in Subsea

A new subsea oil and gas group, Harkand, chaired by oil and gas industry veteran Tom Ehret, is launching with an ambition to grow to a turnover of \$1 billion in the next five years. Following investment by Oaktree Capital Management in Iremis, Integrated Subsea Services (ISS) and their sister company Andrews Survey last year, the three names have merged to form one group focused on the fast-growing subsea inspection, repair and maintenance (IRM) market.

Nicolas Mouté (above) is the chief executive officer of the Harkand Group. International operations are headed by Harkand Iremis Managing Director Patrick Chapalain and European Operations are headed by Harkand ISS Managing Director David Kerr.

The group will combine proven survey, inspection, repair and maintenance services with the Iremis fleet of multi-purpose diving support vessels, ROV and Air Diving support vessels and ISS' fleet of 23 ROVs and teams of ROV operators, surveyors and divers. The vessel fleet includes the new state-of-the-art multi-purpose diving support vessels, Harkand Atlantis and Harkand Da Vinci.

Ocean Installer Names CCO, CFO

Ocean Installer appointed previous CFO Ole Sanne to the new position of CCO and named Jim Dåtland new CFO. Sanne has been with Ocean Installer since the company's inception and has more than 15 years of experience from the subsea sector. Dåtland has spent the last seven years with the offshore drilling contractor Seadrill Ltd. focusing on investor relations and corporate finance activities.

Unitech Appoints CEO



Vahl

Unitech appointed Martin Vahl CEO, responsible for the further expansion Unitech's global subsea connector business and growth into the umbilicals and flying leads market. Formerly a Royal Norwegian Naval officer, he has more than 10 years of management experience in the offshore industry.

New Esri Ocean Manager at the Helm

Esri hired Drew Stephens as industry manager to expand the market for GIS. Stephens has worked with Esri for many years promoting the use of GIS to design sustainable practices for land and sea. Skilled in database design, training, and consulting, Stephens brings more than 20 years of GIS experience and knowledge. He will open opportunities for applications of Esri technologies in re-

Stephens



search and exploration, marine ecosystems, aquaculture and fisheries, coastal protection, and ocean-use planning.

Jessup Joins Rapp Hydema US

The U.S. division of Norway's Rapp Marine Group added Mark Jessup to assume responsibilities in marketing and sales support for Rapp Hydema US and Rapp Hydra Pro. He has been involved in the deck machinery and marine crane industry for more than 35 years.

Birns Chooses New England Sales Rep

Birns, Inc., announced Electronic Sales of New England (ESNE) as its newest sales representative. The agreement includes sales and support of BIRNS' electrical, coaxial, optical, electro-coax, electro-optical and electro-opto-mechanical hybrid connectors in CT, MA, NH, VT, ME, RI, NY, NJ, PA.



Tritech Appoint Sales Manager

Mike Broadbent, promoted to Sales Manager, has extensive technical and commercial experience having begun his career as a design engineer and holding several senior management positions with subsea electronics companies before joining Tritech in 2006.

Xodus Launches New Team in Australia



James Knipe (right) joins the Xodus team in Perth as subsea team lead. He is pictured with global subsea director Duncan Brown.

Xodus Group added subsea and production assurance teams to its Perth operation. The new services, announced at the Australia Oil and Gas Exhibition and Conference, underpin Xodus' growth in the region where it has achieved turnover of AUD 1.5 million since April 2012. During the same period, the Perth-based team has expanded considerably from two people to 27 with aims to have up to 60 staff by the end of 2013. James Knipe joins the Perth office from Aberdeen as subsea team lead and hopes to build a team of six this year. James is a chartered engineer and has been with Xodus since 2010. He is experienced in conceptual, front end and detailed design projects for subsea, oil and gas and renewable energy developments around the world.

Chris Smith has relocated to Perth from the Xodus London office to lead the production assurance offering.

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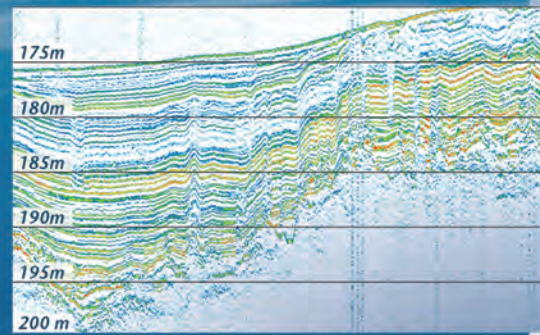
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Jee Engineer wins Subsea Award

Paul Otway of Jee Ltd. has been awarded the Young Emerging Talent award at the Subsea U.K. Business Awards at the Aberdeen Exhibition and Conference Center. Paul, 27, won for his work on projects as a subsea engineer within the company, including work on the world's longest subsea tieback and project management of a major subsea pigging operation. Paul joined Jee, a multi-discipline subsea engineering and training company operating in the global oil, gas and renewables industries, as a graduate in 2009.



Jee has recently achieved a significant growth milestone by opening the company's first London office. The new office will aid the company's overall growth strategy, which will see the firm create 150 jobs in the U.K. over the next four years.

DPS Offshore Rebranded

Forum Energy Technologies, Inc. rebranded its DPS Offshore product line as Forum Subsea Rentals. With an inventory of the advanced subsea rental products. Forum Subsea Rentals services both existing and new clients from locations in Aberdeen, Great Yarmouth, Houston, Dubai and Singapore.

USN Accelerates Hydroid AUVs

Hydroid said its contract to provide Littoral Battlespace Sensing (LBS) AUVs to the U.S. Navy's Space and Naval Warfare Systems Command (SPAWAR) has moved directly from the Engineering Development Model (EDM) phase to full rate production (FRP). The decision to make the move from the EDM phase directly to FRP was made by the U.S. Navy's Milestone Decision Authority (MDA), the Navy's Program Executive Office for Command, Control, Communications, Computers and Intelligence (PEO C4I) after more than a year of extensive testing and evaluation determined that Hydroid's LBS-AUV systems were ready for deployment.

Newport Ocean Observing Conference

The Newport Ocean Observing Conference, sponsored by the Yaquina Bay Ocean Observing Initiative, will be held April 30 and May 1 in Newport, Oregon. Newport is a growing center of marine research on the U.S. West Coast, with approximately \$1B in marine research infrastructure investments in recent years.




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ROVOP Contracts, Appointments

ROVOP said it has made a strong start to 2013 after expanding its management team and signing £3.5 million of contracts in January alone. The company, which provides subsea ROV services, has bolstered its management team with the appointment of Moray Melhuish as commercial director, and strengthened its onshore resource by welcoming Mike Duffus as project manager. Melhuish takes up his role following two years as sales manager with Subsea 7. Joining ROVOP from Bibby Remote Intervention, Duffus brings with him more than 30 years of subsea service experience. ROVOP took delivery recently of one of its new work class ROVs. The 150hp Schilling HD can operate at depths of up to 3,000m.

Shark Delivers SeaSAR to Long Beach Police

Shark Marine Technologies provided a complete SeaSAR search and recovery system to the Long Beach (CA) Police Department Dive Team consisting of a Side Scan Sonar, Tripod-mounted Scan-



ning Sonar, a Pole-Mounted Multibeam Imaging Sonar and two Navigator Diver Held Sonar Imaging and Navigation Systems, all operated through a single software program on a waterproof top-side console. The following systems were selected: a side-scan sonar for wide area searches; an over-the-side

pole mounted multi-beam sonar for quick target location or hull scanning; a tripod mounted; scanning sonar for site management or confined area searches and two Navigator, Diver held Sonar Imaging and Navigation Systems for target reacquisition, investigation, identification, and diver based searches.

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SEA CON Expands

With SEA CON's growth comes the need to add staff. To that end, SEA CON recently welcomed to its sales team Michael Michulka, Leighton Mauro and Gary Kelly. Michulka is a graduate of the Institute of Electronic Science at Texas A&M University. He is based in Texas and is a member of the Texas State guard serving as a Staff Sergeant. Mauro, an existing member of the SEA CON team, has started his new role as Gulf Coast Sales and is also based in Texas, supporting sales in the Gulf Coast area. Formerly with Teledyne Impulse-

PDM, Kelly joins the SEA CON sales team as U.K. Sales Manager and brings with him a combination of knowledge, experience and consultative sales skills. Based in the U.K., Gary will focus his initial efforts on supporting U.K. sales.

OSIL: Successful Year

OSIL reports a good year selling bespoke data buoys in 2012, and with a new contract for three data buoys supplied in Dubai at the beginning of the year, 2013 is expected to be another successful year in the data buoy market.

Applied Acoustics

Applied Acoustic Engineering appointed a new distributor in Australia. Western Advance Pty Ltd. is an independent supplier to the oil and gas, defense and security industries based in Perth, Western Australia. As well as providing project design, equipment supply, installation, commissioning and field support to diverse Australian companies, Western Advance is a specialist distributor to the offshore survey and construction industry.



Michulka

MacArtney

UNDERWATER TECHNOLOGY

Hosting Knowledge Sharing Events

In the wake of the recent opening of new MacArtney Inc. offices on the Western U.S. Seaboard, MacArtney Pacific Northwest and West Coast Operations will be opening doors to ambitious 'Lunch and Learn' knowledge sharing and networking events. MacArtney customers, along with other interested parties, are invited to share a lunch while learning, sharing knowledge and networking with industry professionals within the realm of underwater technology.

As the main attraction, MacArtney's experienced Technical Director, Steen Worsøe, will be flown in from the MacArtney Group headquarters in Denmark. Mr. Worsøe will give a presentation on 'Cathodic Delamination' - the invisible 'killer' of rubber molded connectors, hereunder outlining how one can identify, understand and prevent this detrimental phenomenon.

OceanWorks: Survey, Upgrades for Turkish Navy

OceanWorks International announced the delivery of a system upgrade, Lloyd's certification renewal and completion of sea trials for the Turkish Navy's Atmospheric Diving Suit system. After five years of operation, the Turkish Hardsuit Atmospheric Diving System (ADS) was returned to OceanWorks International to complete the major Lloyd's survey and to upgrade the system electronics to the latest configuration.

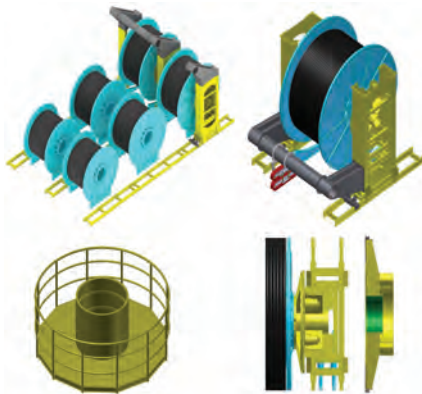
The Hardsuit Quantum has been upgraded to include new LED lights, a new low-light pan and tilt camera and an updated pilot control system which allows for redundant surface controls. A new electronic panel system inside the suit also improves accessibility for maintenance. The upgrade to the Quantum II configuration offers much improved operational, maintenance and training features.

The contract included provision of a temporary replacement ADS system to ensure that the Turkish Navy did not experience any interruption of their rescue and salvage capabilities during this upgrade and refurbishment period. The upgrades and major survey represent a strong commitment by the Turkish Navy to the Hardsuit ADS system as the cornerstone of their submarine rescue capability.



Ecosse: Shaking Up Pipelay Sector

Ecosse Subsea Systems developed and patented the PREP (Plastic Reeled Elastic Pipelay) system, a modular system used for the laying of reeled rigid pipe (on a project by project basis) from smaller vessels and can be installed within 48 hours. PREP uses many of the same components as a conventional pipelay system, but its innovative component assembly avoids the need to be mounted on a specialist pipelay vessel while offering flexibility, mobility and reduced cost, both in terms of the pipelay system itself and also associated vessel costs. The PREP system takes advantage of the underutilised elastic properties of steel pipe to be able to lay pipe from smaller vessels and the huge fleeting tower that is the dominant feature in conventional systems is not re-



The patented PREP system, a modular system used for the laying of reeled rigid pipe.

quired. PREP's flexibility addresses one of the major barriers to entry into the conventional pipelay market - capital investment in suitable pipelay vessels, spool bases and global infrastructure.

ABS Approved Subsea Mooring Connectors

Subsea mooring connector (SMC) equipment supplier, First Subsea, has been awarded the American Bureau of Shipping's ABS 2009 Approval for specialist subsea mooring connectors.

It is the first manufacturer of offshore mooring connectors to achieve this type approval for the design and manufacture of large scale forgings over 500mm in diameter.

The approval applies to First Subsea's range of Ballgrab ball and taper mooring connectors manufactured from steel grade 4330V forgings up to 510mm outside diameter.

The subsea mooring connectors can be used with R3, R3S, R4, R4S & R5 grade chain and shackle.

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New Obstacle Avoidance Sonar

Sonardyne International launched its new Navigation and Obstacle Avoidance Sonar, NOAS, at NAVDEX 2013 in Abu Dhabi. Designed for use on submersible vehicles, NOAS enables faster, safer and more efficient navigation by detecting and classifying potentially hazardous underwater obstacles in its path. NOAS is designed to provide a unique combination of very long range 2D navigation performance, 3D object detection and class leading intruder detection in a single compact sonar. In 2D mode NOAS provides the crucial long range navigation information enabling underwater vessels to steer a safe course. When combined with its 3D capability, the sonar scans the water column to enable more detailed detection and classification of obstacles and the seabed, in front of the vessel.

The first in a family of products, NOAS has been specifically developed for installation on manned submersibles and swimmer delivery vehicles (SDVs) where available space and power is often restricted. With this in mind, the compact subsea housing contains the 2D array, front-end electronics and processing whilst a separate projector is used if the optional 3D capability is required. NOAS feeds fully-processed sonar images to, and is controlled by, the host platform's own control system.

www.sonardyne-ms.com



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CDL Wins Tech Award

A revolutionary underwater true north seeking inertial system developed by Aberdeen-based engineering company CDL for remotely operated vehicles (ROVs) and many other subsea applications has won an award from the subsea industry.

The company's Tiny Optical Gyro System (TOGS) scooped the prestigious Subsea Industry Innovation and Technical Award, at the Subsea 2013 Awards Dinner, organized by Subsea U.K. and held at the Aberdeen Exhibition and Conference Centre on Wednesday, February 6.

From its development just 24 months ago, the system, which comprises a three axis fiber optic gyro, has rapidly become accepted as an international industry standard for ROVs which rely on heading and motion guidance to carry out essential operations.

Small and lightweight, the TOGS has become an effective alternative to high cost, overly specified systems as well as lower cost 'spinning mass' gyroscopes which can be prone to reliability issues. It can be used in many underwater operations, particularly where space is limited and, with no moving parts and excellent shock resistance, provides a high degree of robustness and longevity. The system outputs all six degrees of freedom measurements to accurately

CDL MD Andy Doggett

track all aspects of an ROV or vessel motion. The surface variant of the system, TOGS-S, is fully IMO (International Maritime Organisation) certified for heading navigation for surface vessels up to 85 knts.

Koden Broadband Echo Sounder

Mantsbrite Limited is now supplying the new Koden CVS-128B and CVS-1410B FX2BB broadband echo sounders to its 175 strong U.K. and Ireland dealer network.

The Koden CVS-128B and CVS1410B are dual frequency broadband echosounders with a 2kW power output. The CVS-128B has an 8.4" color display and the CVS-1410B has a 10.4" color display. Two types of broadband transducer are available where the user can select and change a frequency as required to target specific fish species or avoid interference with other echosounders. The Koden TDM-017 broadband transducer allows the operator to choose any two frequencies between 38kHz and 75kHz; with the TDM-091D broadband transducer the operator can choose any two frequencies between 42kHz to 65kHz and 130kHz to 210kHz. The two chosen frequencies can be displayed simultaneously.



March 2013

New Tritex Multigauge 5600

Dorchester based Tritex NDT have launched their new Multigauge 5600 general purpose thickness gauge. The new upgraded gauge, based on the already very popular original



Multigauge 5600, has new features including a large modern color display and an easy to use clear graphic menu. The gauge has been designed in line with Tritex's concept of simple, accurate and robust. Intuitive menus allow for easy navigation whilst the gauge has added features to improve performance. The gauge uses the Multiple Echo technique to ignore coatings up to 6mm thick and just

measures the metal substrate. No grinding or removal of the coatings is required, significantly reducing preparation time and ultimately saving both time and money when carrying out inspections.

www.tritexndt.com

SeaBlazeX: Underwater Light

Lumitec introduces the SeaBlazeX underwater light. The SeaBlazeX is the latest offering in Lumitec's industry-leading Seablaze line and features twice the useable light of the SeaBlaze3. Completely surface mount, the SeaBlazeX housing is constructed of carefully formulated bronze alloy with



a designed underwater service life of more than 50 years. The circuitry is self-contained and tested to rigorous military standards for EMI, transient voltages, temperature extremes and mechanical shock and vibration. A wire guard protects the power wire and offers a clean, professional appearance on the inside of the vessel.

Exclusive thermal fold-back technology ensures the light can operate above water indefinitely without damage. And with a lower profile and smaller footprint than most other lights, mounting options are no longer limited to wide flat transom areas. The SeaBlazeX is currently in production, with shipments commencing in January.

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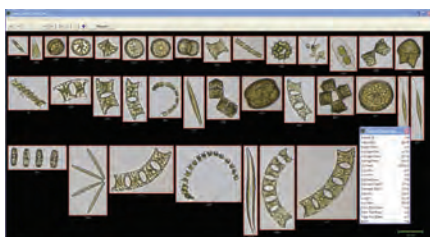
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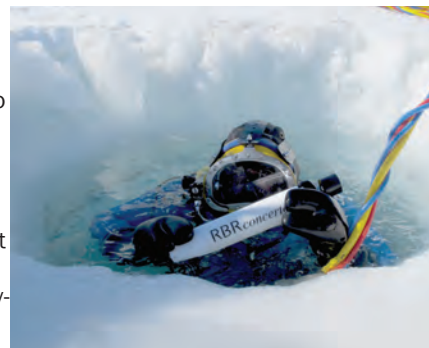
<http://walz-usa.com>

RBR Concerto takes the polar plunge

In polar regions, researchers and their instruments are working at their extremes. The ability to deal with harsh conditions is paramount, and the RBRconcerto C.T.D is designed with this in mind. Unlike other instruments, the RBR conductivity cell is based on high strength ceramics and shock-absorbing plastics, which are immune to abuse - no matter whether the instrument is dropped on a steel deck or if the instrument is embedded in ice.

The measurement of conductivity in frozen water is of limited utility - but the ability to withstand frozen in periods is just another part of RBR's design philosophy. RBR's C.T.D package consists of connectors that are easily handled with gloves, cables that are standard issue, batteries that can be purchased anywhere in the world, and a conductivity sensor that can withstand freezing. You can rely on RBR for Polar deployments.

www.br-global.com



Satlantic

New SUNA V2

The new SUNA V2 with shortened path length and adaptive sampling is finally here! The new SUNA V2 represents the latest advance in UV nitrate technology that broadens previous operational ranges to include extremely turbid environments. This highly anticipated UV nitrate sensor raises the bar for continuous nitrate monitoring and extended deployments in both freshwater and marine environments.

www.satlantic.com/suna



Turner Design

Cyclops-6K Submersible Sensors

Cyclops-6K, the newest version of the Cyclops-7 Submersible Sensors, enables fluorescence detection to ocean depths of 6000 meters. Reinforced Titanium housing and a specialized optical head ensure sensor integrity at extreme pressures. The LED excitation source allows for low power consumption and excellent signal stability enabling long-term deployments. The introduction of the Cyclops-6K gives researchers a new, affordable tool for deep ocean exploration.

Designed for Integration

The Cyclops-6K integrates easily with any third-party platform that supplies power and datalogging.

Product Highlights:

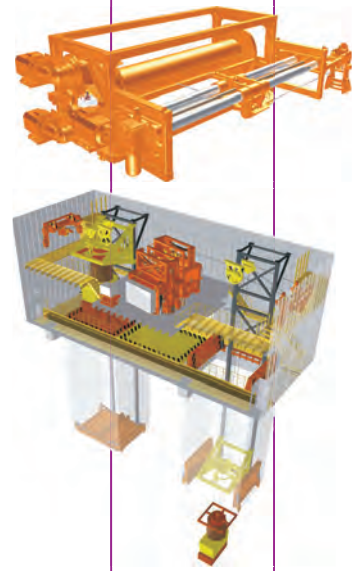
- 6000 meter depth
- Reinforced Titanium housing
- Easily integrates with CTDs, ROVs, AUVs
- Small size
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- Affordable price/excellent value

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Stand W1
www.atlasservicesgroup.com



Aquatec is launching a new wireless temperature and depth logger, the AQUA-logger 530WTD, at Ocean Business. The innovative design includes the ability to store data and display graphs automatically via wireless technology, negating the need for cabled connections or manual interaction.

Stand R7
www.aquatecgroup.com



ASV's C-Stat 2 is a station keeping vessel designed for applications where anchoring may be difficult or the cost and practicalities of operating a manned vessel for continuous periods of time are prohibitive. The aim of the C-Stat 2 program is to produce a rugged, cost efficient and practical vessel capable of operating for weeks and months at low speeds whilst reliably holding position in high currents and powering payload equipment.

Stand V22
www.asvglobal.com



CDL is an engineering company that offers a variety of market ready products and systems for use in both the surface

and subsea (offshore and onshore) industries with applications for controls and monitoring, data logging and transfer, attitude and motion sensing (heading, pitch and roll sensors) and navigation and positioning. The new generation Subsea Vibration and Motion Monitoring System, VIBRIUS, consists of a very powerful product grouping that includes a number of logging sensors that offer high accuracy data while utilizing very low power making them highly suitable for battery powered long term installations.

Stand Q1
www.cdlttd.net



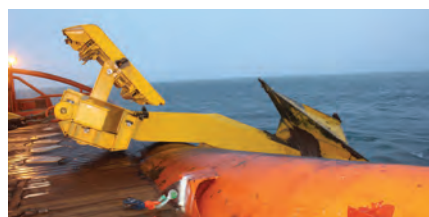
dotOcean created the GraviProbe, a free fall penetrometer characterising sediments and mud layers. It is mainly used by leading ports and dredging companies to optimize their dredging effort, follow up sediment consolidation and (re)define the nautical depth. dotOcean also gives advice on innovative dredging strategies for ports and harbors.

Stand Q5
www.dotocean.eu

Ecosse Subsea System's

Ecosse Subsea System's SCAR subsea trenching plough can be operated from a range of vessels, including anchor handlers and multicats and launched/recovered over the stern roller, negating the need for expensive vessel hire and lifting equipment. It can be operated by four to six man crews and when used for Burial Assessment Surveys it aids project planning by providing data on soil strengths, tow force requirements, speed, route mapping and identifies variations and potential problems.

www.ecosse-subsea.com



Fischer Connectors

Fischer Connectors has been designing, manufacturing and distributing high performance push-pull connectors and cable assembly solutions for almost 60 years. Known for its reliability, precision and resistance to demanding and harsh environments, its products are perfectly adapted to electronic equipment needs for harsh environment, such as marine exposure. Easy to connect, sealed up to IP68, rugged and reliable.

Stand E7
www.fischerconnectors.com



Kraken is a marine technology company engaged in the development of high performance sonars and sensors for military and commercial applications. They're showcasing AquaPix, an Interferometric Synthetic Aperture Sonar as well as Aqua-Trak - a new Correlation Velocity Log.

Stand C9
www.krakensonar.com

NKE Instrumentation

NKE's trade is the design, manufacture and installation of intelligent and communicating sensor-based instruments and systems in the fields of environment and safety: instrumentation aimed at measuring the quality of seawater on the planet, in lakes and freshwater reservoirs; control of heating and ventilation systems, based especially on renewable energies and safety for the autopilot system of sailboats and MOB.

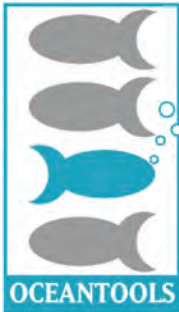
Stand T5
www.nke-instrumentation.fr



OneOcean Corporation, a Seattle-based Software-as-a-Service (SaaS) technology company devoted to solving the ocean's big data problem, is announcing the beta release of ClipCard, an innovation for managing, accessing and exchanging ma-

rine geospatial data. ClipCard presents a rich abstract of big data in a useful object that can be viewed and shared anywhere. ClipCard helps users understand what big data contains, and gives them the means to transfer the source data when they need it through Amazon's global cloud infrastructure.

Stand V32
www.oneoceanorop.com



OceanTools is an independently owned, world leading subsea engineering company specializing in the design and manufacture of subsea equipment. At OB '13 you will see: Subsea Leak Detection, Subsea Cement Returns Confirmation, Survey Frames,

Fibre Optic Gyros, Subsea Displays, High Precision Altimeters, Pan & Tilts, Video Overlays, Underwater Switches, Subsea Engineering Solutions.

Stand G9
www.oceantools.co.uk

SubChem

SubChem Systems recently delivered two ChemFIN Nutrient Analyzers to the Woods Hole Oceanographic Institute and Environment Canada. The ChemFIN, a single-channel submersible nutrient analyzer, is SubChem's newest product for monitoring nitrate, nitrite, phosphate, silicate



or ammonia. The single-channel ChemFIN joins SubChem's successful multi-channel product: the Autonomous Profiling Nutrient Analyzer (APNA). Both submersible analyzers can provide long-term, continuous or intermittent, real-time measurements of nutrients from fixed or mobile platforms. A new accessory is available, for real-time monitoring of Total Organic Phosphorous (TOP) and/or Total Organic Nitrogen (TON), with the ChemFIN and APNA Nutrient Analyzers.

www.subchem.com

SubCtech

SubCtech is an international operating company based in Kiel, Germany. As a developer of marine technology and underwater power supplies the company presents a product family of pCO2 analyzer and complete mobile and stationary environmental/ water quality monitoring systems. This family was recently completed by a pCO2 Lab analyzer which will be launched at OB'2013.



Stand G10
www.subctech.eu

Teledyne TSS

Visitors to the Teledyne TSS stand at Ocean Business will have their first opportunity to see the company's new gyro compass changeover system that protects navigation equipment against the danger of a sudden loss of heading input. The new system will provide valuable protection for dynamically positioned (DP) vessels that can experience a dangerous loss

of heading if one or more of their main navigation gyrocompasses should fail. This year it will be accompanied by the first production version of the new SDC-10 surface display computer which has been designed to support all Teledyne TSS tracking systems. Teledyne TSS expertise in motion sensor technology will also attract interest with its successful DMS-500 range of motion sensors. These instruments typify the company's expertise in this demanding aspect of technology. Visitors to Ocean Business will be able to inspect the DMS-525 model in this range which measures heave, roll and pitch.

Stand S1
www.teledyne-tss.com

Valeport

Valeport is announces the launch of the VRS20 Radar Level Sensor. Using non-contact technology, the VRS20 can be installed easily to measure water level in a wide variety of applications. The VRS20 uses 25GHz pulsed k-band radar to measure water level to an accuracy of ±10mm (this is unaffected by changes in water density or atmospheric condition). It has been designed to work seamlessly with Valeport's TideMaster tide logger or can operate as a standalone device with optional integrated GPRS telemetry. Alternatively it can interface with a third party data logger. Data collection is a simple process for the VRS20, with RS232, RS485 and SDI 12 communication as standard. With a wide range 9 – 28v DC power supply, the device is also versatile.



Stand M1
www.valeport.co.uk

Digital Video Inspection System

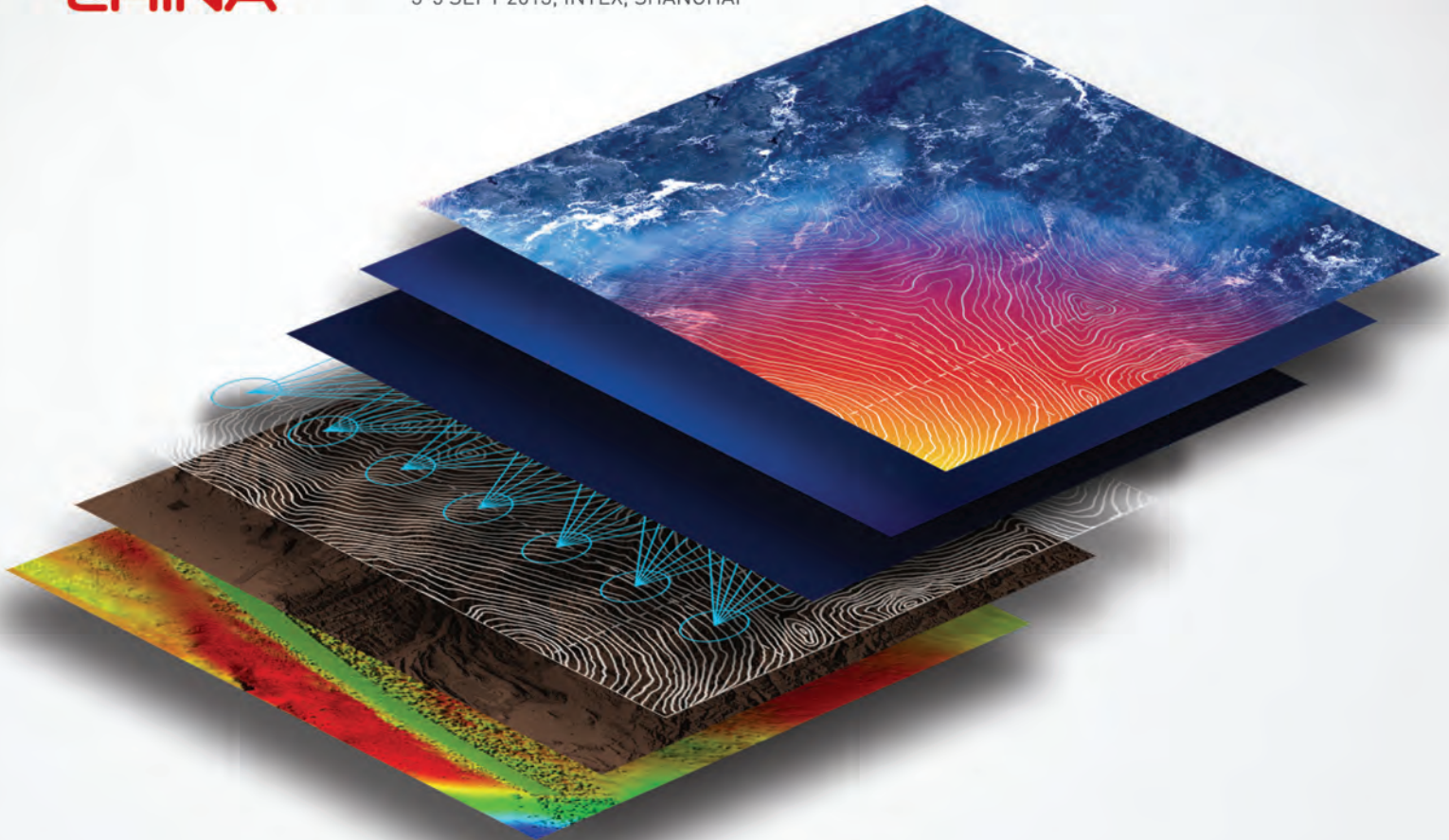


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February 18, 2013

Abstract Deadline

May 3, 2013

Notification to Authors

June 7, 2013

Final Paper Deadline

July 15, 2013

Conference

September 23-26, 2013

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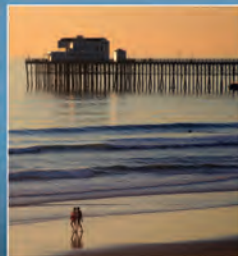
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Oceans13mtsieeeSanDiego.org



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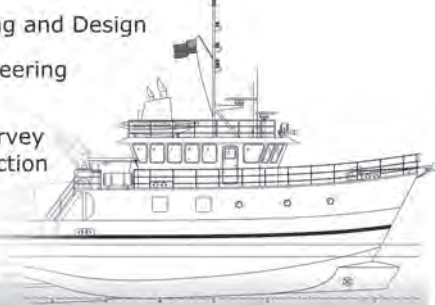


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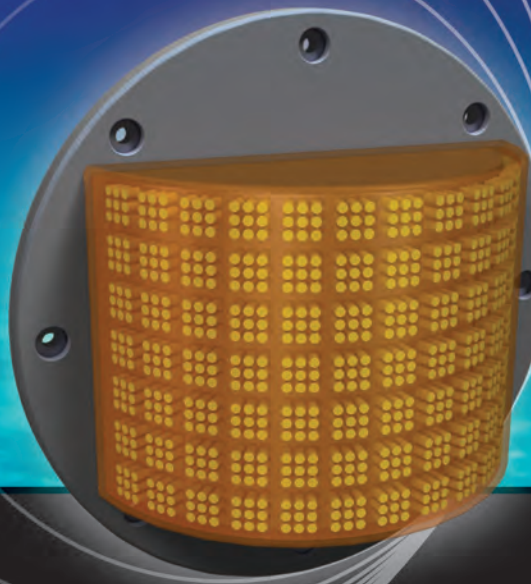
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