MARINE TECHNOLOGY REPORTER

January/February 2013 www.seadiscovery.com

Vehicles Edition

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'Doc' Edgerton
Profile of an Innovator

F6F Hellcat
Discovery off of Miami

Garbage Patch
Myths, Facts on Plastics in the Ocean

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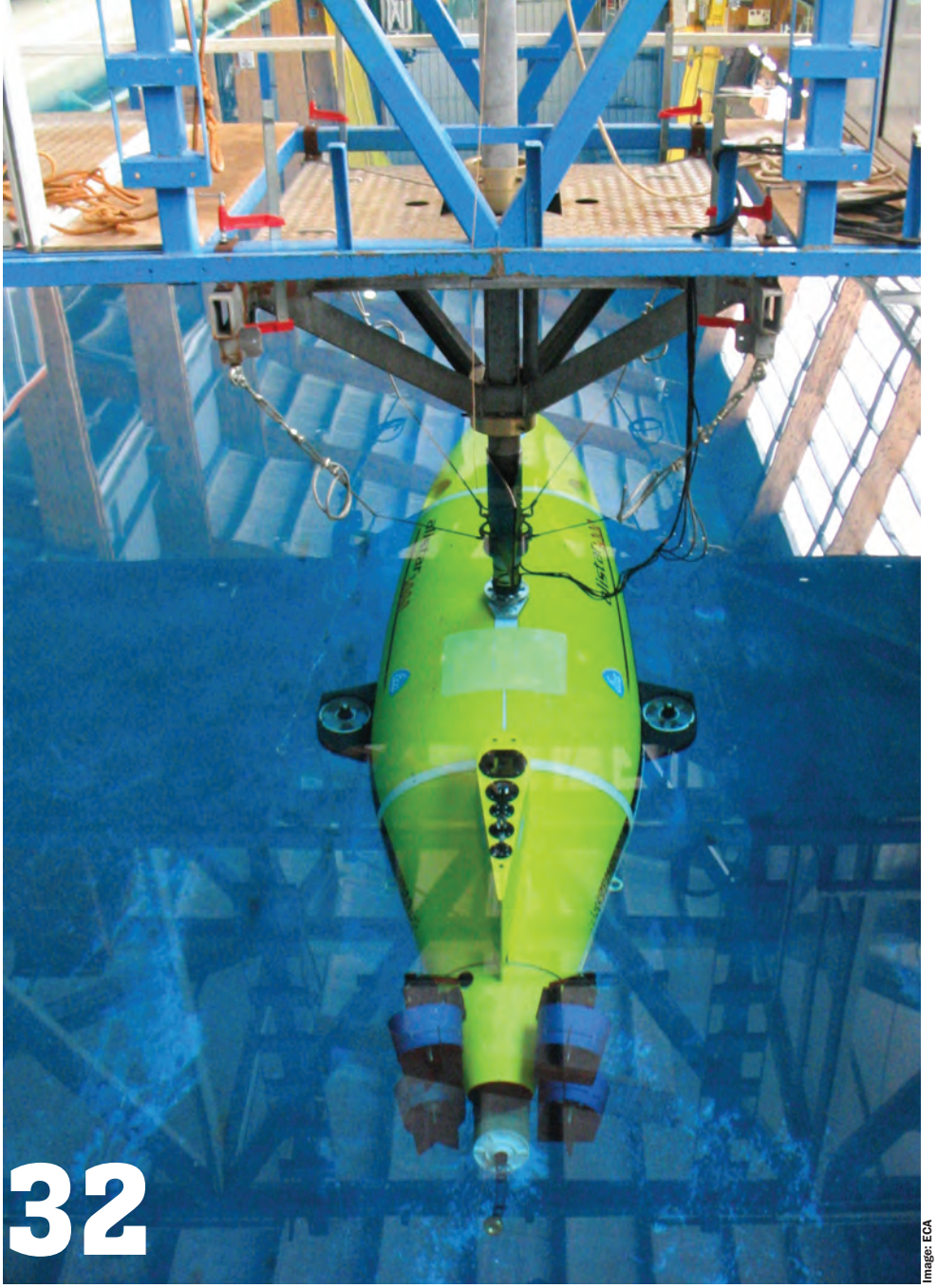

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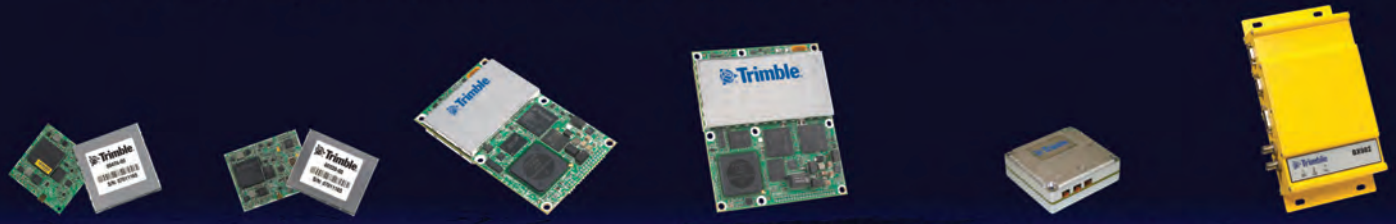

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Knight

Terry Knight is a co-founder and former CEO of Inuktun Services Ltd. Since leaving that company in 2005 he has spent much of his time providing business management and related advisory assistance to numerous companies on Vancouver Island. He currently holds a Marketing Associate position with SEAMOR Marine Ltd. p.42

Moniz

Rhonda Moniz is an ROV Pilot/ Engineer, Diving Safety Officer and Underwater Cinematographer. Moniz is founder and Director of Operations for Benthic Exploration.

Vehicle Notes

Latest developments from leading ROV, AUV, UUV makers.

Falcon Explores a Mountain

Oceana used the SaabSeaeye Falcon DR ROV to record a variety of subsea species.

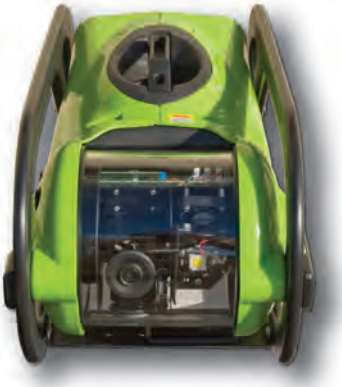
On the Cover

Subsea Vehicles of every size & shape and size are instrumental in helping to visualize the wonders beneath the waves. The image on the cover comes courtesy of Fugro Survey Limited is AUV multibeam data showing clay diaper outcrop in 800m from offshore West Africa.

The story starts page 36

Image: Fugro Survey

SeaBotix



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Little Benthic Vehicles

VIEW:

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Undoubtedly the "Vehicles" edition is one of my perennial favorites, as it affords us the extra pages to take a more intensive look behind the scenes at some of the amazing advances being logged in the design, construction and outfit of ROVs, AUVs, UUV and USVs from around the world. And while a number of the challenges remain the same, you can be sure that advances are plentiful. Coverage starts with our dramatic cover shot from Fugro Survey Ltd., perhaps a cover image that strikes some of you odd given the focus of the edition is vehicles. But considering that it was gathered by Fugro Survey offshore West Africa utilizing a modern Kongsberg AUV, the editorial & art staff together thought it a perfect image to highlight the tremendous emerging capabilities of subsea robots.

Manned or Unmanned; Tethered or Autonomous; Powered by machine, wave or wind: Regardless of the choice, submersible vehicles have been and remain the platform to work underwater, from observation and discovery to coastal and vital offshore asset defense to heavy duty construction and maintenance. The challenges today are not much different than yesterday: there is a steady drumbeat towards removing people from the water, particularly from high-risk jobs, and toward an increased level of autonomy, with the main challenge remaining density and durability of power source. The use of robotic solutions on land and in the air have made great strides in recent years, particularly in military applications, and it can be assumed that similar moves on and below the water are in the works as well.

In a continuation of our "Innovators" series, this month we profile a ubiquitous figure in engineering lore, MIT professor Harold Eugene 'Doc' Edgerton. Many of you are probably well familiar with the legacy of Doc Edgerton to this industry, but reading through Rhonda Moniz's interview with Dr. Kim Vandiver, the Director of the Edgerton Center at MIT and someone who worked with Edgerton as a graduate student in the early 1970s, perhaps you will learn something new.

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OceanGate Inc. discovers Grumman F6F Hellcat off the coast of Miami using manned submersible, 2D and 3D sonar technologies.

OceanGate discovered a World War II-era Grumman F6F Hellcat plane off the coast of Miami Beach. The plane was found during one of an ongoing series of dives in which OceanGate has been using its Teledyne BlueView high-frequency sonar and high-definition photo and video equipment to gather data pertaining to the artificial reefs in Miami-Dade County waters. Recognizing the potential historical and military significance of the find, OceanGate contacted officials at both the Smithsonian Institution and the U.S. Navy, who identified the wreck as a Grumman F6F Hellcat fighter aircraft. "The discovery of this artifact is significant because it helps us reflect on and learn more about our country's heritage, but also because it highlights the key role that direct observation plays in undersea exploration," said Stockton Rush, co-founder and CEO of OceanGate. "Our sonar technology and ability to observe the undersea environment first-hand ultimately led to the discovery of this plane."

Using a Manned Submersible

OceanGate's deep-sea manned submersible solutions are a platform for direct underwater exploration, and are quipped with high frequency 2D and 3D sonar equipment, as well as a multitude of data collection capabilities. OceanGate's *Antipodes* submersible, which enabled the discovery, allows a team of up to five people to collaborate at depth and gather

Left image above: Flight Deck Crew Swarm Over an F6F Hellcat - July 1944.
Right image above: Wreck of the F6F recently found by OceanGate's deep-sea manned submersible.

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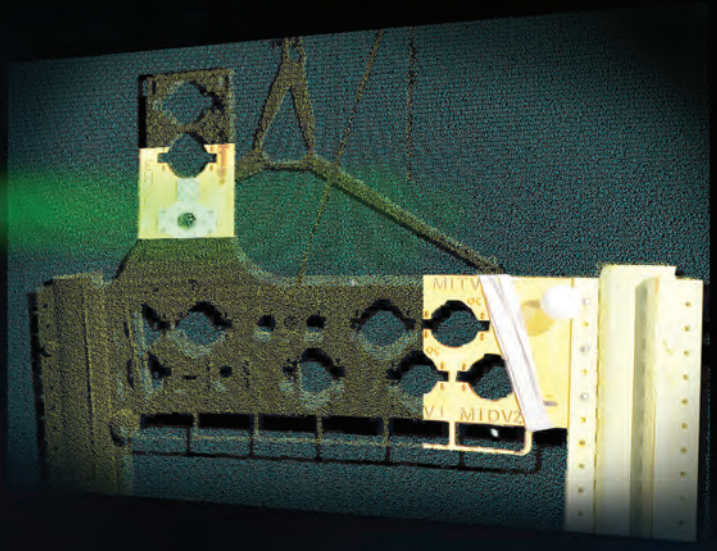

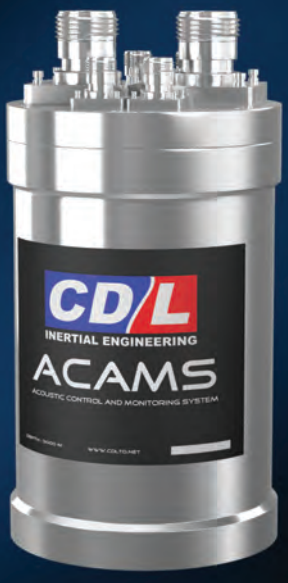

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underwater imagery.

"We were thrilled to be a part of this expedition," said explorer Chris Welsh, co-founder of Virgin Oceanic, who was part of the crew on the first dive. "Nothing translates to others the excitement of a find like the direct viewing of a wreck first-hand, which shows the value manned submersibles can bring to many research communities."

Findings from initial surface-sonar side scans, provided by NOAA, displayed a 33-m (100-ft.) long target, which led the OceanGate team to assume it was a sunken vessel. However, during the initial dive to the site on June 29, 2012, the sonar technology on OceanGate's *Antipodes* submersible produced what is reportedly the first-ever, close-range, underwater scans of the 28-ft. long, Grumman F6F Hellcat, at a depth of more than 240 ft.

Since the first dive, the OceanGate team has returned for additional observation and data collection on eight missions including a recent long-duration dive of eight hours.

OceanGate will donate its collection of photographs, videos, and technical scans of the Hellcat to the Naval History & Heritage Command in Washington, D.C. The files will be used in the preservation of this federally protected site and in possible future research on the plane.

"Sunken U.S. Navy ships and aircraft are protected from unauthorized disturbance under the Sunken Military Craft Act," said Dr. Robert Neyland, head of the Naval History & Heritage Command's Underwater Archaeology Branch. "It is important to preserve and document Navy and Marine Corps wreck sites as an outstanding part of our nation's heritage."

The Hellcat

During World War II, the Grumman Hellcat was flown by both the U.S. Navy and Marine Corps and was a mainstay of the air war in the Pacific. The state of Florida was an active training center for military fighter pilots during World War II, and records from the Naval History & Heritage Command indicate that 79 Hellcats were lost off of Florida's Atlantic coast between 1943 and 1952, with only eight of these losses occurring after 1945. Not all of these losses involved fatalities, as the Command has documentation of many successful water landings and bailouts.

"In the course of its production run, 12,275 Hellcats were delivered to the Navy," said Bob Rasmussen, director of the National Naval Aviation Museum in Pensacola, Florida. "During peak production one each hour, 24 hours per day, rolled off the Grumman line. Of these only a handful exist today and the discovery of one more, even under 240 feet of Atlantic Ocean, is important to Naval Aviation History."

Plastics in the Ocean

How Biological Nets Are Taking On A New Purpose For An Old Problem

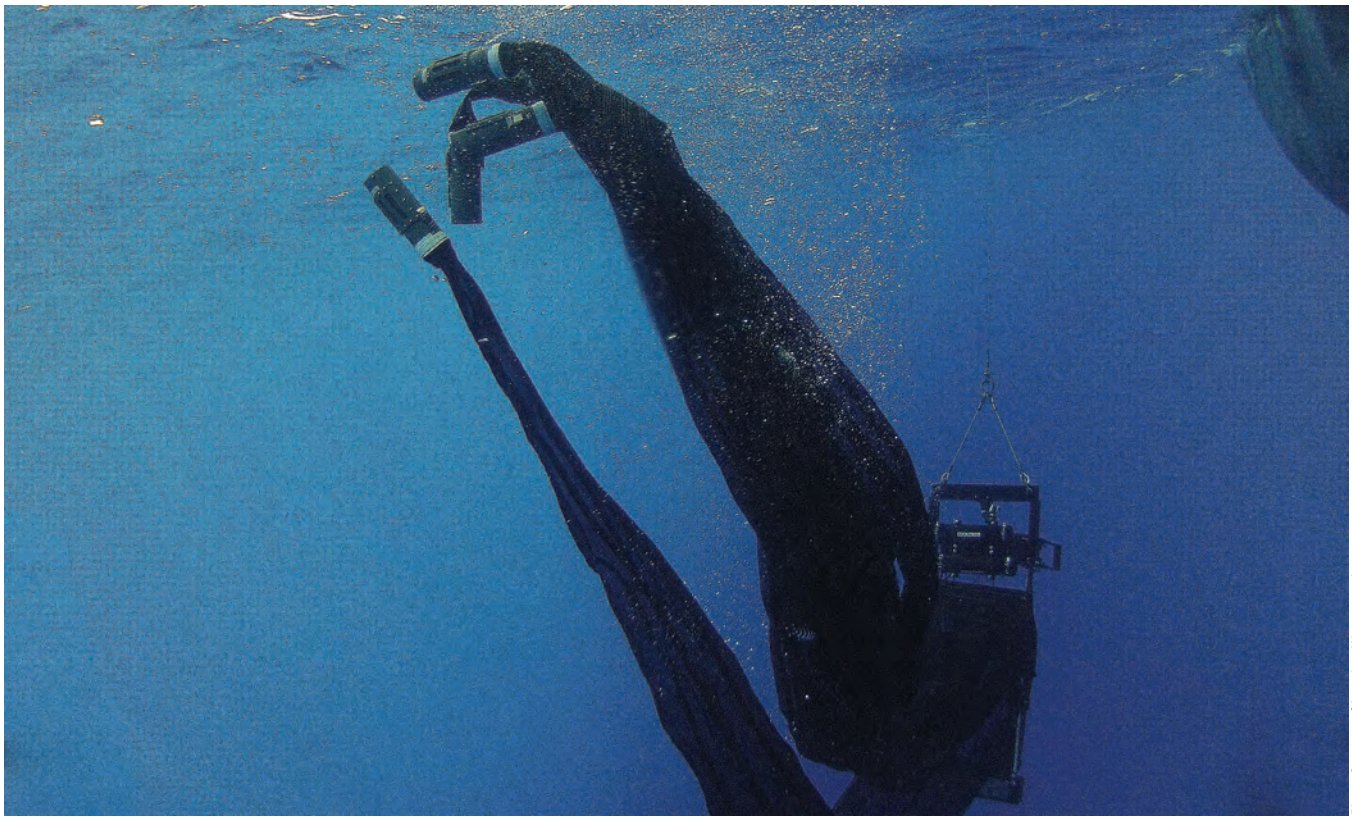

Photo: Courtesy of Jonathan Waterman photo

Aboard the SSV Robert C. Seamans last November, 1,500 miles from land, 38 researchers from Sea Education Association (SEA) studied a Brobdingnagian swath of Pacific Ocean that has become the temporary resting spot for thousands of tons of plastic. Commonly called the "Great Pacific Garbage Patch," the area has attracted significant media attention in the last decade but a surprising dearth of scientific attention. Contrary to popular opinion, the "Patch" is not a continuous field of debris, is not visible from space, nor is it an "island of trash." But it's there. Every year almost 300 million tons of plastic are produced but it is estimated that only a tenth of it is recycled. Much of this plastic finds its way into coastal waters before it is swept out to the open ocean by surface currents. These regions, known as gyres, are some of the most remote areas of the ocean.

By Tyson Bottenus

There are five subtropical gyres - one located in every ocean - and each contains huge quantities of millimeter-sized pieces of plastic. From the deck of the ship on a calm day with no swell, this plastic debris look like confetti. But when the winds pick up, these plastics become almost invisible to the naked eye.

"If you are not specifically looking for plastic with a net or doing visual surveys," says Emelia DeForce, Chief Scientist with SEA aboard the Seamans, "chances are that you will not see the plastic because it is so small in size."

Which means that researchers

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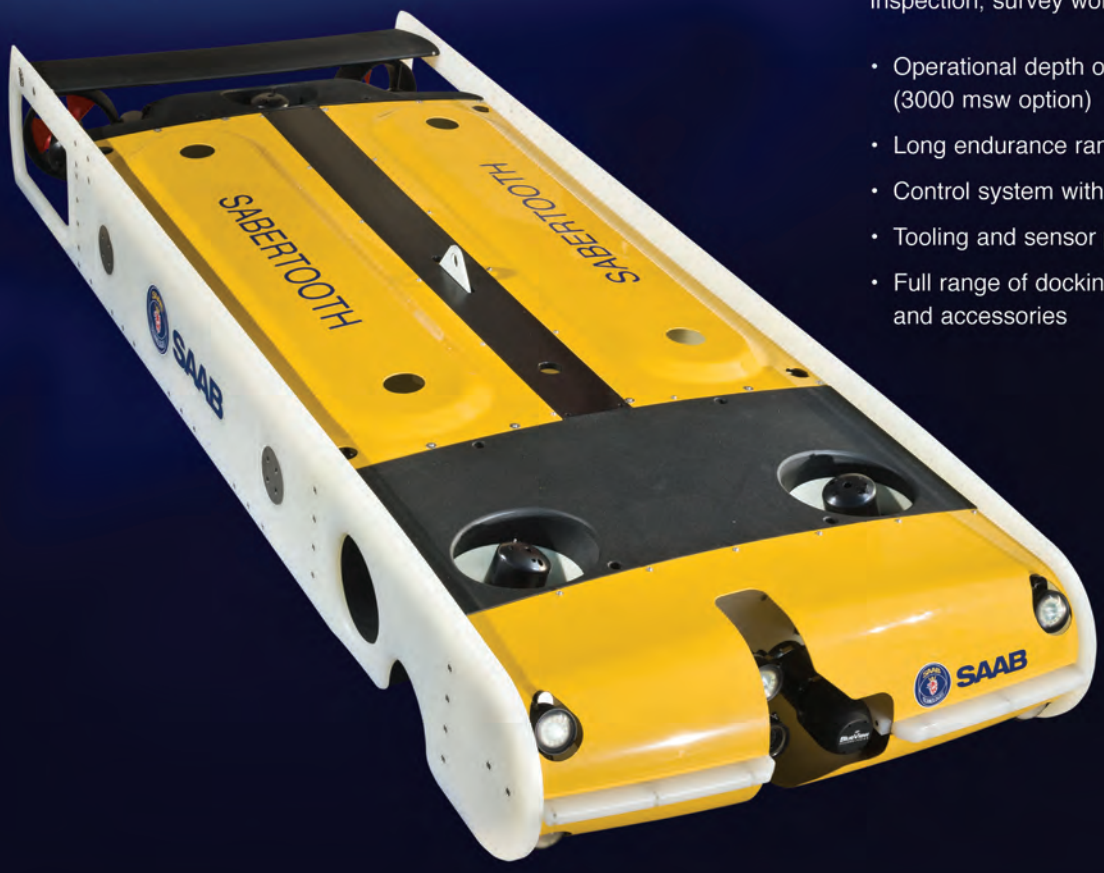

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studying plastic pollution need more than mere pool nets to get an accurate measurement of just how much plastic is in the ocean. To solve the problem of plastics in our ocean, or even just to study it, oceanographic technology needs to be conscious of the emerging science.

Surface Nets

The first studies of plastic pollution began in the early 1970s when researchers with Woods Hole Oceanographic Institution (WHOI) threw a rectangular net into the coastal waters of New England to collect organisms residing in the surface waters of the ocean, called the neuston layer.

The net they used was one that had been developed less than 10 years before by oceanographers frustrated by previous nets that were towed from a vessel's stern. This rectangular net, aptly called a "neuston net," was released adjacent to the vessel and was supported by a boom that could be lowered and raised. The advantage of it being deployed adjacent to the ship minimized any interference bow waves might have on the organisms it was sampling.

Along with different organisms, the team found two types of polystyrene spherules. These spherules, still used today, become Styrofoam when mixed with a foaming agent. Even in the 1970s, the implications of plastic debris were recorded in the scientific literature. Of the 14 species of fish recovered in the nets, eight were found with plastics in their stomachs. The scientists also determined that the spherules had absorbed polychlorinated bisphenyls (PCBs) from the sea water. Re-

The SSV Robert C Seamans, a 134 ft. brigantine schooner owned and operated by Sea Education Association that has been sampling the North Pacific since 2001.

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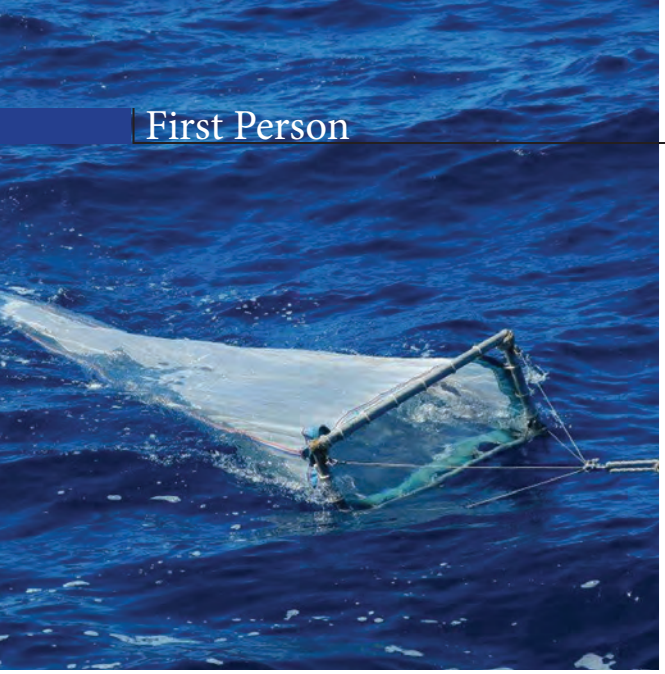


The neuston net sampling the surface of the ocean for plastic.

Contrary to popular opinion, the "Patch" is not a continuous field of debris, is not visible from space, nor is it an "island of trash."

Retrieved plastic pieces stuck on the neuston net. Almost 95% of the plastic found in the North Pacific Subtropical Gyre is millimeter sized.

searchers today worry that if fish consume these spherules, which commonly resemble fish eggs, that PCBs and other persistant organic pollutants (POPs) will bioaccumulate and magnify up the food chain, eventually impacting humans.

Researchers from SEA implemented the neuston net into their research program in the mid 1980s. Since then they have collected more than 100,000 pieces of plastic and currently possess the largest data set on plastic pollution in the Atlantic Ocean. In 2001, they began the task of quantifying plastic pollution in the Pacific Ocean.

But one issue that has consistently plagued the neuston net was in its design. Scientists have observed that in "swelly" conditions, the neuston net tends to bounce from wave to wave.

To get accurate measurements of what exists on the surface of the ocean, scientists must know how long the net was in the water. For example, if the net was deployed for half an hour and was being dragged at a speed of 2 knots, researchers can assume that the net was in the water for one nautical mile. However if the net bounces out of the water between waves, researchers have no idea how much area the net covered.

In 1981 a new surface sampling net entered the oceanographic scene. The manta net attempted to fix some of the design errors of the neuston net by attaching a large wing to the top of it, making the net look similar to that of the manta ray. Along with the wing, the net also includes a counterbalancing weight, sinking the net and preventing it from bouncing from swell to swell.

"The manta net has been the standard for many years," said Kara Lavender Law, research professor with SEA. "SEA has continued to use the neuston net for a couple of reasons, namely for consistency with our historical archive, and the ease with which it can be deployed, recovered and processed."

"Both nets tow at the surface of the ocean," said DeForce. "The neuston net is easier to deploy because it does not require a hydrowinch and it takes up less space on the ship."

Researchers with the Algalita Foundation and 5gyres, organizations also focused on the issue of plastic pollution, have begun modifying the manta net so that it can be used on a variety of vessels, even vessels not typically associated with oceanographic research. By changing the size of the manta net and adding detachable wings, they have recently created the "Suitcase Manta Trawl". Another variant, the "Hi-Speed Trawl", has a considerably smaller net opening that allows a vessel to tow the net at higher speeds.

Below the Surface

"On a cruise in 2009 in the North Pacific," said Giora Proskurowski, a Principal Investigator with SEA, "there was this period where the wind died down. I noticed on the surface of the ocean way more white flecks. It was calm and the lack of turbulence allowed each piece of plastic to rise to the surface." In windy weather, scientists have discovered that plastic tends to get mixed into the water column. This means that the amount of plastic that has been sampled is significantly lower than what actually exists.

"I went back through every tow we had data on and looked at the average wind speed during a tow and compared it to the number of pieces of plastic for every tow in the Pacific and Atlantic subtropical gyres and it was a pretty obvious connection that at high wind speed you had low plastic," said Proskurowski.

To sample plastics at depth, scientists with SEA used a Tucker trawl dur-

ing their Plastics expedition in 2010. Like with the manta and neuston nets, the Tucker trawl was initially designed to study plankton. The net is designed to open at a discrete depth, such as five meters, and once triggered by a messenger, close at that same depth.

But in 2012, SEA received a slightly modified MOCNESS (Multiple Opening/Closing Net and Environmental Sensing System) to study plastics in the water column with more precision.

"The Tucker trawl is strictly mechanical: there are no electrical components," said Erich Horgan of Biological Environmental Sampling Systems, Inc., the company that designed the modified MOCNESS for SEA. "People can put on free standing modules that might be able to measure temperature, salinity, depth but the MOCNESS was the system that allowed a user to see 'what was going on at depth' and be able to influence the depth at which to trip the nets."

Horgan says also that the MOCNESS has a vast range of applications. Aside from conductivity, temperature and depth, the MOCNESS can include devices to measure salinity, chlorophyll, dissolved oxygen and light level. They have also created other modified MOCNESS nets to study predator/prey interactions at depths up to 6,000 meters.

During the 2012 expedition, SEA researchers studying plastic in the Pacific Ocean found concentrations of plastic down to 10 meters below the surface. Concentrations, they found, were consistently lowest at greater depth and highest one meter below the surface.

Clean Up

Media sensation over the issue of plastic debris has spawned an overwhelming question. How do we clean up the mess we have created? Where do we start?

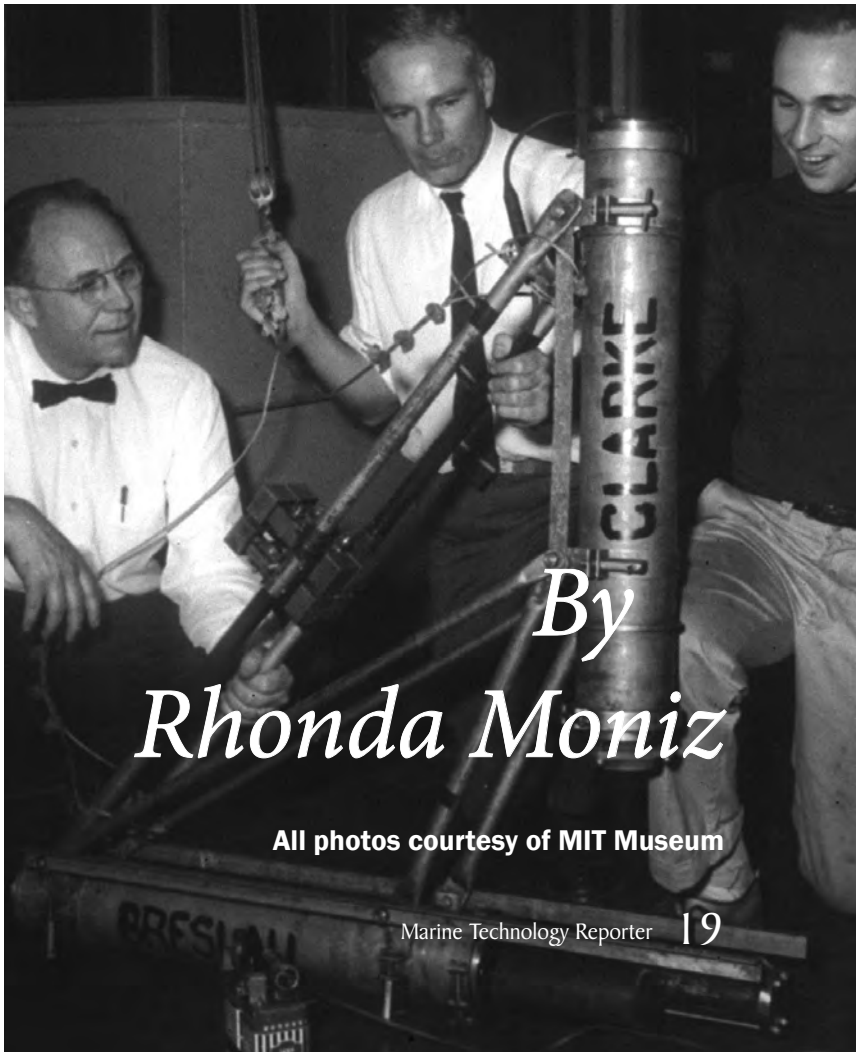
Larger pieces, such as derelict fishing nets, have successfully been picked up by NOAA's Marine Debris program. In July 2012, they successfully removed 50 tons of debris from coral reefs around the Northwest Hawaiian Islands, considered to be one of the most remote regions of the world. To survey large areas of the ocean, a pilot project was launched in 2008 that used unmanned aircraft systems.

Smaller pieces however, like the ones predominantly collected by researchers with SEA last November, remain another challenge.

"One of the difficulties of picking up ocean trash on the surface is the size," said Rachael Miller, founder of Rozalia Project. "It is often very small and surrounded by organic matter."

"Rozalia Project is working on methods to pick up floating marine debris, whatever the material, in a way that reduces bycatch and can be scaled for deployment off of fishing fleets and other vessels who transit both in and out of harbors and across long distances. In addition we are learning everything we can about floating marine debris, especially in urban waters, so we can work on solutions: prevention and education programs that stop the problem at the source."

Harold Eugene Doc Edgerton



By Rhonda Moniz

All photos courtesy of MIT Museum

Harold Eugene 'Doc' Edgerton was born in Fremont, Nebraska, on April 6, 1903. He was one of three children born to Frank and Mary Edgerton, and from an early age Edgerton like to see what made things tick, spending hours taking things apart and putting them back together. He first became interested in photography through his uncle who was a studio photographer, and his uncle would spend time with the young Edgerton showing him the ins and outs of photography including developing and printing the pictures they took.

Edgerton went on to receive a degree in Electrical Engineering in 1925, and took a one-year research position at General Electric in New York, a position that would prove pivotal in his development of the strobe.

Following this Edgerton went on to work on his graduate degree at Massachusetts Institute of Technology (MIT). At MIT he began to study the problems of synchronous motors, in which the speed of the motor is the same as the frequency of the electric current running it. He was most interested in what happened when a sudden change, like the surge caused by lightning striking the power lines reached the motor. Parts of the motor spun so fast that his eye could not see what was happening.

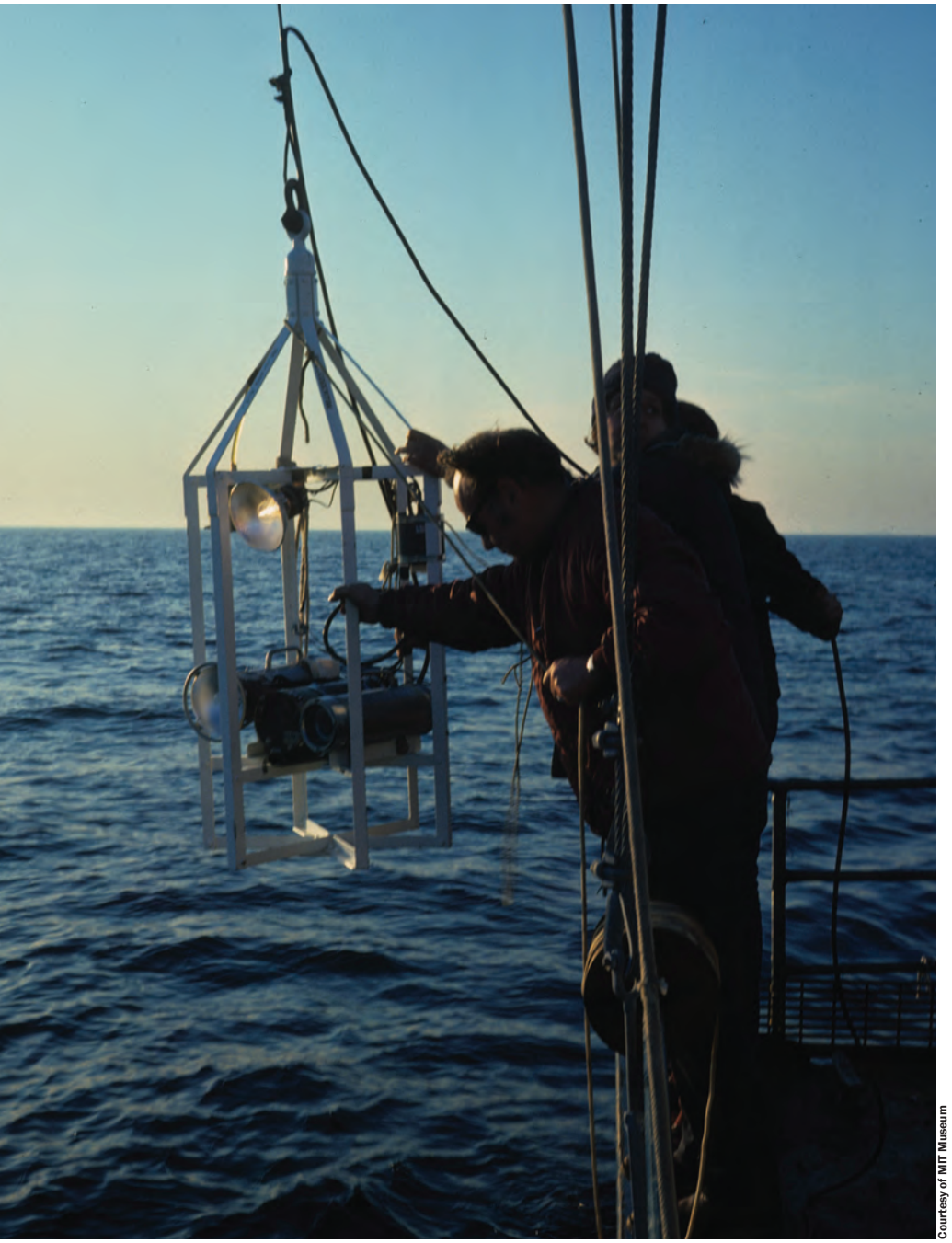
Edgerton noticed that a tube he was using to send power surges to the motor flashed brightly as the power peaked. When the flash of the light synchronized with the motor's turning parts, it made them look like they were standing still, and they could then be analyzed.

Edgerton received his graduate degree from MIT in 1927 and was given an instructors position the following year. He earned his doctorate degree four years later with his dissertation that included a high-speed motion picture of a motor in motion made with a mercury-arc sub strobe.

Edgerton continued to improve strobes and their use in freezing objects in motion so they could be captured on camera. He also continued to make improvements in stroboscopic technologies. An early use of the stroboscope was in a lawsuit between Procter & Gamble and Lever Brothers on the methods they were using when making soap powder. Edgerton's stroboscopic method proved Lever Brothers methods did in fact differ from Procter & Gamble, and the lawsuit was dropped.

Edgerton then became interested in the particular challenges faced when dealing in the underwater environment. He had designed tools that could withstand pressure while being protected by the saltwater environment. He began to develop underwater cameras and lights

Deploying underwater camera and TV apparatus over the side of a vessel.



Courtesy of MIT Museum

as well as imaging recording instruments that were at the cutting edge of oceanographic research for that time. His instruments used light and sound and were used in many application of ocean research. Edgerton's area of expertise involved the precise control of high-energy short pulses. These were used in stroboscopes, modular switches for atom bombs, and high speed flashes. These were then applied to the problems faced by underwater acoustic waves. By improving and shortening the sound pulse length he was able to improve resolution. His acoustic based tools included side scan sonar, sub bottom profilers and pingers. Because the cost of operating in the ocean environment was high, expeditions often had overlapping scientific missions. He worked with a number of explorers including Jacques-Yves Cousteau who approached Edgerton to collaborate on acquiring deep-water images.

In the mid-thirties Edgerton was approached by an expert in bioluminescence to photograph deep-sea bioluminescent fish.

This led to his first successful development of an underwater camera for oceanographic research through collaboration with the Woods Hole Oceanographic Institute (WHOI). His systems included hand-held, deep-sea, stereo, elapsed time and silhouette. Lighting instruments developed by Edgerton included strobes for various submarine vehicles, and strobes for underwater cameras.

Known to everyone as "Doc" Edgerton, he is considered a pioneer in a number of areas including underwater photography and marine technology.

MTR recently talked with Dr. Kim Vandiver who is the Director of the Edgerton Center at MIT. Dr. Vandiver worked with Edgerton as a graduate student at MIT in the early 1970s.

What are some of the interesting earlier projects you were able to work on with Doc Edgerton?

Well I was his TA in 1972 -73 and that was in the midst of his preparations for going out and looking for the Monitor.

He was in and out of the lab building cameras and loosing cameras. On the first dive down they lost a camera that got tangled on the wreck. They lost it and had to go back and retrieve it later.

What was it like working with

Doc would always say, 'Well, there is a lab bench and a soldering iron, it only takes a few micro-seconds, what are you waiting for?'
He would give space, he would give materials, and he would give advice.

Doc?

When Doc died in 1990 the family and Edgerton foundation put together a little committee and came to MIT interviewing people. They asked them what was special about Doc and what should we do that would be an appropriate legacy to him. Everybody was talking about the photographs because they were famous, but I took a little different point of view. What made Doc so loved by students and faculty and everybody at MIT was that he was an extremely generous person. If a student came in and said they had always wanted to do something or learn how to build something Doc would always say, 'Well, there is a lab bench and a soldering iron, it only takes a few micro-seconds, what are you waiting for?' He would give space, he would give materials, and he would give advice.

He sounds like he was an incredible mentor.

He was. I remember one day when I was his TA and we had something called the freshman seminar, when students would show up once a week and we would show them films. One thing he was famous for was his post cards. Doc never carried business cards. If you ever met Doc, sitting next to him on a seat in an airplane you would not leave without one of his post cards. He would strike up a conversation with anyone and hand them a post card. On the back of the post card he would have printed many of his iconic shots, and they had his name and address on the back of them and he would just hand them out like popcorn. If you ask people one thing they can remember about Edgerton even if they only met him once it would be the postcards. That is the way he was, you could be standing outside of his office looking at his images and he would walk out and strike up a conversation and give you a postcard.

It also sounds like his students admired him a great deal.

They did. One time one of the freshman showed up at the door and Doc and I were standing at the door as the students were filing in. There was this one freshman that was looking sort of sheepish and he asked Doc "would it be OK if my girlfriend came to class?" Doc gave the young lady this really stern look and said "You can't get into my class without a pass." She about looked like she was going to die and Doc reaches into his pocket and pulls out a postcard and hands it to her and says, "here's a pass." He was a character but a really generous character. People loved him

Left
Underwater camera; Woods Hole trip on Bear; 1952.

Right
Marine organism on the deep sea floor, photographed in black & white.

(Images Courtesy of MIT Museum)

for his sense of humor but also they deeply appreciated all he did for people.

He was not only a pioneer in his work but sounds also like a great motivator.

He was. My first year as his TA he told me he did not want me to simply assist but to actually work on a cool project while I was there. So I worked on a photography technique called slieren and took about five months to perfect it. I then walked into his office and he said I think you have got it.

What is slieren photography?

It is used in super sonic wind tunnels to see shock waves on aircraft. You can take pictures of bullets and see heat waves from a candle. I had my first professional publication while working with Doc. He was a remarkable man.

Subsea Vehicles

Manned or Unmanned; Tethered or Autonomous; Powered by machine, wave or wind: Regardless of the choice, submersible vehicles have been and remain the platform to work underwater, from observation and discovery to heavy duty construction and maintenance. The follow is a synopsis of some key developments across the various platforms.

For all of their value in the role of subsea defense or offshore energy installation and construction, for example, it could be argued that the discovery of new or previously unseen subsea creatures and habitats are the biggest stage globally for subsea vehicles, as recent events such as first-ever video footage of the Giant Squid in its natural habitat are most widely disseminated via mainstream consumer media channels. Recently Discovery Channel, NHK and NEP sent a crew of scientists and filmmakers on an extensive search to capture video footage of the elusive giant squid, and found success. Late last month Discovery Channel presented their special, "Monster Squid: The Giant is Real." In the summer of 2012 after years of planning, a group of marine scientists, submersible pilots and filmmakers joined Discovery Channel, NHK and NEP in the expedition, which used a Triton 3300/3 submersible equipped with an array of electronic lures, pheromone dispensers and specialized low-light high-definition cameras.

The team made 55 dives at depths up to a thousand meters hoping to catch a glimpse of a Giant Squid. After many dives in the darkness at over 60m, with veteran Triton Pilot Jim Harris at the helm, two team members struck documentary film gold capturing the first ever footage of a giant squid in its natural habitat.

While unmanned submersibles receive the lion's share of attention, a recent filming of the Giant Squid (inset left) from the manned Triton Sub proved the continued value of man and machine.

(Photos: Discovery Channel/NHK/NEP)

Shark Marine Debuts MAKO DDS Diver Delivery System.

Shark Marine marine debuted its owned 'manned' submersible, but one in quite a different scope, via its MAKO DDS Diver Delivery System. Ontario, Canada-based Shark Marine introduced the MAKO DDS next-generation Diver Delivery System that the company claims marks an evolution in diver transportation, combining a production device with the Shark Marine Navigator, Diver Held Navigation and Sonar Imaging System. The combination results in a system that is designed to allow automated flight paths, from a simple "Go to Target" to complex survey routes, while providing the diver with full navigation and forward-looking sonar to locate and view targets up to 810 ft. away. Intelligent operation modes include: Go to Target; Survey Routes; Waypoint Routes; Auto Depth; Auto Altitude; Auto Heading; Station Keeping; and Hover Mode.

MAKO DDS is designed to be a flexible platform, and comes in three configurations with 4, 6 or 8 thrusters. Power is provided by neutral buoyant power cells that can be changed, even underwater, and the system can operate with 2, 4 or 6 batteries. MAKO DDS is designed to carry one or two dives, and to tow additional divers and payload.

OceanGate announced that it has acquired a three-person, diesel-electric submersible Lula from Portugal's Rebikoff-Niggeler Foundation. The submarine, which can operate at a depth of 500 m (1,640 ft.), was purchased, according to OceanGate, to meet the increased demand for manned submersibles in commercial applications focused on biological and environmental surveys, monitoring, and inspection.

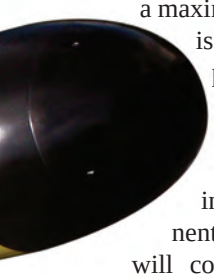
Lula will expand OceanGate's ability to meet growing industry client demands, helping fulfill contracts for the University of Washington on behalf of the Defense Advanced Research Projects Agency (DARPA) and Office of Naval Research. Lula will also supplement OceanGate's Antipodes submersible in performing survey, inspection, and monitoring work in the Gulf of Mexico. "OceanGate's acquisition of Lula reflects the increased demand for submersibles in specific commercial applications," said William Kohnen, president/CEO of Hydrospace Group. "As more organizations continue to re-evaluate the use of manned submersibles and their value as part of the overall portfolio of sub-sea operations, we will continue to see the market grow. As an industry, these forward looking market development roles continue to be lead by privately funded organizations like OceanGate as they deploy more technology and applications related to submersible solutions."

OceanGate acquired a three-person, diesel-electric submersible Lula from Portugal's Rebikoff-Niggeler Foundation.

Teledyne Webb Research last month delivered the first Slocum G2 glider to Brazil.

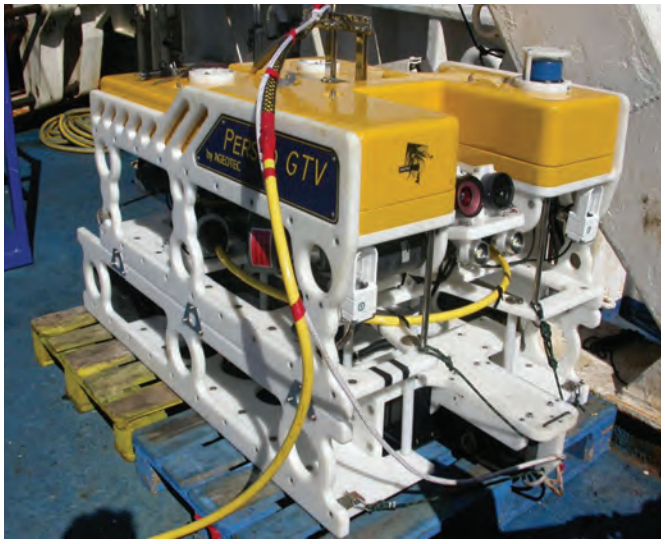
The submersible is equipped with a five-function manipulator and accompanying sampling box, which together allow for in-situ sampling of marine objects, core sampling for geologic research, and collection of diverse data sets. As a direct observation platform, Lula offers excellent visibility and outstanding opportunity for clients doing monitoring and inspection work. Its 1.5-m diameter hemispherical viewing dome delivers a wide field of view. In addition, Lula is outfitted with state-of-the-art illumination systems, video and photo equipment, and pre-installed oceanographic data sensors.

Teledyne Webb Research announced recently that it has delivered the first Slocum G2 glider to Brazil, a glider that was purchased for the Coastal Hydrodynamics Laboratory at the Oceanographic Institute of the University of Sao Paulo. "The ratio between the number of samples the Slocum glider can take and the cost is very interesting. We can sample a transect more frequently than we can with a ship," said Marcelo Dottori, Ph.D., head of the new glider program at the University of Sao Paulo. The glider is an AUV driven by a buoyancy engine capable of long-term deployment for measuring oceanographic parameters. The Slocum G2 has a maximum depth rating of 1000m, and is designed to require very little power to operate; able to be deployed for as long as one year. The Slocum glider in Brazil will be used for sustained monitoring of the ocean over the continental shelf of Sao Paulo State. It will collect conductivity, temperature and depth along with chlorophyll, turbidity and CDOM data. The glider is outfitted with a CTD, an altimeter, and a FLBBCD sensor for the measurement of CDOM, Chlorophyll and backscatter. The initial glider for the University of Sao Paulo is a 200m depth rated coastal version. Subsequent gliders will be optimized for deeper operation at a maximum 1000m depth. Dr. Dottori's choice of the Slocum G2 glider was a result of previous work with the Slocum gliders at the Laboratoire d'Océanographie de Villefranche. He envisions several other researchers in Brazil using the capabilities of the gliders in the future. Two additional gliders are expected to ship to the University later this year.



NCS Survey has expanded its growing autonomous underwater vehicle (AUV) fleet with the purchase of two Teledyne Gavia AUVs. These vehicles are the latest in the Gavia

NCS Survey recently took delivery of two more Gavia AUVs.



AGEOTEC's Perseo GTV

Mariscope ROV and oceanographic equipment for the Chilean environmental ministry.

Offshore Surveyor series and are equipped with high-resolution side scan sonar, a multi-beam echo sounder, a sub-bottom profiler, an ultra-short baseline positioning system, long baseline (LBL), GPS and an inertial navigation system. The AUVs are used to provide ultra-high-resolution data for pipeline and platform inspections; scour monitoring surveys; cable and pipe route surveys; and offshore wind farm surveys. For three years, NCS Survey has operated these vehicles in difficult access and remote areas including the southern tip of Argentina. Additionally, the company has a high level of repeat business from clients like Shell, BP and ConocoPhillips. The vehicles are rated to 1000m but regularly operate in depths as shallow as 2m. They can perform in currents of more than 2 knots, under jackup drilling rigs and very close to fixed platform structures. Their modularity offers ease of transportation as no module weighs more than 25kg in its transit case.

Bluefin Robotics said recently that it will produce a variation of the Knifefish UUV for the Naval Research Laboratory (NRL). Knifefish is a specialized Bluefin-21 UUV that is being developed for the Surface Mine Countermeasure Unmanned Underwater Vehicle (SMCM UUV) program for which Bluefin is under subcontract to General Dynamics Advanced Information Systems. Bluefin completed the Knifefish Preliminary Design Review earlier this year and will leverage that design to deliver a system to NRL. The vehicle will be used to advance NRL's low-frequency broadband (LFBB) payload technology and support their broader mission to advance basic and applied research in undersea warfare.

"This is just another example of how the UUV technology is maturing into a reliable, robust platform option for advancing new science and capability," said David P. Kelly, President and CEO, Bluefin Robotics.

Bluefin's technology has proven suitable for specialized acoustic payloads like NRL's LFBB sonar. For the past 10 years, the two groups have been working closely together on developing and fielding the Reliant vehicle, a Bluefin-21 used as a science and technology system for the original LFBB development.

"Science and defense programs are now mutually benefitting from the investments made in the UUV technology. Bluefin has been a key contributor to that effort with the Reliant vehicle, their commercial systems, Knifefish, and now with our new UUV," said Dr. Brian Houston, acting head of NRL's Physical Acoustics Branch. "The science made possible with this vehicle will advance the nation's mine-hunting capabilities that can be incorporated into future generations of UUVs."

Ageotec, a manufacturer of observation and light-work class ROVs, delivered to Cadden its first Perseo GTV in early 2012. According to Ageotec, the Perseo GTV fills a gap in deep-sea survey and intervention ROV operations. The vehicle measures 1.5 m (l) x 0.9 m (w) x 0.8 m (h) with a depth rating of 1500 m and a weight of 200 kg. It has an ajustable payload of 18 to 40 kg, with three hi-res video channels (real-time) and eight serial data lines on a single-mode fiber optic umbilical. Due to its modular design, features can be upgraded and a wide variety of sensors and accessories can be installed, including: multibeam sonar, dual head profiler, boom camera, pipe/cable tracker, up to two 5- or 6-function manipulator arms. The Perseo GTV delivered to Cadden may be configured alternatively to host either a R2Sonic 2022 multibeam echosounder with its ancillary sensors, or two Hydro-lek 5-function manipulators, one of them equipped with a rotary pipe/cable cutter.

The recently created Agency for environmental issues of the Chilean Government (Superintendencia de Medio Ambiente, [SMA]) has ordered an ROV and several CTDs to the Chilean Branch of Mariscope Meerestechnik.

OceanServer Iver2 AUV is now available with EdgeTech 2205.

Mariscope

won an open tender published by the SMA and delivered the vehicle during December of 2012. The unit has been equipped with a special dredging device, developed by the German company. It is an observation class ROV, model FO II. In addition to the ROV, SMA ordered three CTDs from Mariscope, which will be 75m type from Sea & Sun Technologies. Mariscope and Sea & Sun have a strong cooperation over several years in the South American market. The aim of the SMA in the new equipment procurement is to start the control of harvesting sites in Chile, mainly where the Aquaculture industry has been active for nearly 25 years. The ROV will be used to control sedimentation under the net cages, take sediment samples and control underwater waste disposals.

Forum

Energy Technologies late last year signed a contract with Cummings Consulting, Inc. (Cummings) to supply a pair of complete Sub-Atlantic Mojave Remotely Operated Vehicle (ROV) systems. Both of the Mojave ROVs will be equipped with job specific tooling systems such as; electric winches, touch screen control monitors, Sub-can Control Systems, sonar, color and monochrome cameras. Also included are two three function manipulators and VisualSoft data capture capabilities. The Mojave systems are capable of reaching depths of 30m, and will be deployed for assessment analysis immediately off the coast of Florida. “The Mojave was the perfect observation vehicle for us because of its high thrust, low cost and easy deployment. Our relationship with Forum played an important role in our purchase as well.

VideoRay

recently completed Pro 4 Underwater Remotely Operated Vehicle (ROV) training for the Irish Navy. VideoRay’s UK Dealer Atlantas Marine is delivered a VideoRay Military Pro 4 ROV System to the Irish Navy, accompanied by on-site system training for eight ROV Pilots at the naval base in Cork, Ireland. The VideoRay military ROV configuration is delivered with a rugged hand controller, high-bright daylight viewable monitor, manipulator, and a shiphull crawler attachment which is the ideal tool for efficient hull inspections. This ROV system is a tool for general underwater inspection and recovery tasks where rapid deployment is important. This sale follows the delivery of three VideoRay Pro 4 ROV systems to the UK Navy which played an important role in the 2012 Olympic Games security operations.

OceanServer

Technology continues to deliver AUV based acoustic imaging with the qualification and release of the new EdgeTech 2205 high resolution side scan sonar. The 2205, designed specifically for use on AUVs, represents EdgeTech’s latest generation of electronics, transducers and software specifically optimized for the demanding size and power constraints present in a small platform footprint. The 2205 is available with EdgeTech’s unique Dynamic Focusing (DF) and Multi-Pulse (MP) technologies, and includes its new Powered Arrays designed to provide longer range performance along with advances in noise immunity. The addition of EdgeTech’s 2205 side scan sonar provides a nice performance choice for Iver2 AUV users looking for high resolution acoustic imaging in littoral waters.

The Iver2 AUV equipped with an EdgeTech 2205 offers an innovative approach to survey operations. It can maintain constant depths with minimal turnaround times to ensure complete area coverage and to maximize the image quality for any sonar data set. Recently an Iver2 AUV with the integrated EdgeTech 2205 side scan sonar successfully conducted surveys in coastal areas in Florida, Massachusetts and Rhode Island.

SeaBotix recently introduced a new product called SeaLift, which builds on the core vLBV vectored MIniROV systems by adding four additional vertical thrusters. With six vertical thrusters, SeaLift can lift up to 18 kg and still maneuver. The ability to lift, move and deploy heavy objects came at the request of a SeaBotix client that needed a small portable system and deep depth rating. Lifting the object(s) is one thing, keeping the ROV stable and able to maneuver is another. The SeaLift has a pivoting grabber system where an object can be grasped in front of the ROV and then the grabber rotates down to position the payload centered under the ROV. This method enables the SeaLift vehicle to maintain a horizontal attitude for optimal maneuverability. Objects can be picked up, moved and placed with great precision. The SeaLift is available in 300 and 950m depth ratings and as an upgrade kit to existing vLBV clients.

Hydroid reports that after extensive trials by the German Bundeswehr Technical Center for Ships and Naval Weapons (WTD 71) in Eckernfoerde, the Federal Office of Defence Technology & Procurement (BWB) in Koblenz has placed a contract for six REMUS 100 Autonomous Underwater Vehicles manufactured by Hydroid, Inc. (a Kongsberg Company) to enhance the capabilities of the German Navy's mine divers. Delivery of the REMUS 100 systems and operational training of military personnel will occur during the next 12 months.

The easy to handle REMUS 100 AUV is equipped with side-scan sonar and various other oceanographic sensors. It navigates by transponder interrogation and DVL-aided inertial dead reckoning in pre-programmed missions. The recorded data will be used to search for mines, lost objects, debris and wrecks or simply to collect topographic ocean floor mapping for hydrographic and scientific applications.

The REMUS 100 is a compact, lightweight AUV designed for operation in underwater environments up to 100 meters deep. The vehicle can be configured with a wide variety of standard and/or customer-specified sensors and system options in order to meet specialized mission requirements.

For more than 35 years, Advanced Subsea (AS) has been deeply involved in marine technological innovation. Through steady research and partnerships with research institutes in France and Brazil, Advanced Subsea has been developing new tools, procedures and methods for monitoring oceanographic and meteorological parameters. AS is an independent French company specialized in deep water subsea construction support and services with its head office in Paris and support offices in Houston, Luanda and Rio Janeiro. Advanced Subsea's Modeling & Forecast Services are based on a partnership between Advanced Subsea SAS & LEGOS – CNRS Laboratory for Geophysics & Spatial Oceanography.

One of the most important aspects of AS's work in Brazil is related to Met-ocean studies which include Operational Oceanography, Ocean modeling & forecast, along with Oil Spill Studies.

Met-ocean Studies

Advanced Subsea's Met-ocean services are dedicated to Oil companies, marine contractors & port authorities. The scope of Met-ocean studies in Brazil includes:

- Meteo-oceanographic studies: Waves, Current, Tide, Wind, Rain, Air Temperature, Seawater physical & chemical parameters
- Radar Surface Waves & Currents monitoring
- Real time mapping
- Met-ocean Modeling
- Daily weather and sea state condition analysis & forecast
- Pollution drift monitoring

According to Jacques Schoellkopf, AS's Director in Brazil, Advanced Subsea also offers Met-ocean services such as engineering, development, mobilization, servicing of Met-ocean systems, wave/currents coastal HF radar, telemetry systems, data buoys and current meters along with operational deployment and servicing of Met-ocean data acquisition systems. Met-ocean data analysis & reporting, data validation and pre-processing, Met-ocean reporting, standard statistical study and engineering statistical studies.

In the deepwater segment of oil and gas E&P, AS has been active in deepwater Met-ocean modeling and forecast, sea state analysis, currents numerical modeling, analysis and forecast of daily operational conditions, and the oil spill drift modeling. Advanced Subsea's Met-ocean services were used to monitor the Frade oil spill in the Campos Basin in 2011.

Advanced Subsea is conducting consulting and research work for Brazil's national operator on Petrobras's PRESAL36 project, which is a high resolution 3D ocean current model, zoomed in on the pre-salt area.

AS also developed eddies tracking techniques, which can be used either in PRESAL36 outputs or surface currents derived from satellite imagery observation and analysis for any place in the world, said Schoellkopf. The eddies evolution mapping made around the Frade oil field during the November 2011 oil spill was calculated using Lyapunov FSLE technique. This service is available for any place off the Brazilian coast, on a daily basis.

Other Met-ocean services offered by Advanced Subsea include the development of Met-ocean data analysis and reporting, software packages and data validation, pre-processing modules, standard statistical study packages and engineering statistical study packages.

Some of the recent Met-ocean services rendered by Advanced Subsea include the development and servicing of a Met-ocean data acquisition and processing system for ELF (2 years), the development and servicing of a Met-ocean data acquisition and processing system for CEA (3 years), a large deepwater current measurement campaign (2 years) for Phillips Petroleum and a five semi-submersible Met-ocean buoy study for Petrobras in partnership with IPT.

With the great demand for specialized deepwater equipment and services, for deployment at the new pre-salt plays and other post-salt deepwater plays along Brazil's coast, from Petrobras and other super-major O&G operators in Brazil, Advanced Subsea has been busy running its Met-ocean services and some of its other services such as field development survey and acoustic rig positioning, AUV/ ROV pipeline inspection & survey construction support and tie-in metrology.

At this point there are very few completely national companies that have the capacity to offer such specialized deepwater E&P support services and basically there are no 100% national companies with the capacity to manufacture deepwater support equipment including AUVs & ROVs and other Met-ocean acquisition systems.

That may be changing, as up-and-coming local companies specialized in subsea technology services and equipment manufacture join the market. But for the foreseeable future, the majority of specialized deepwater equipment and services will be provided by foreign companies, through its Brazilian subsidiaries.

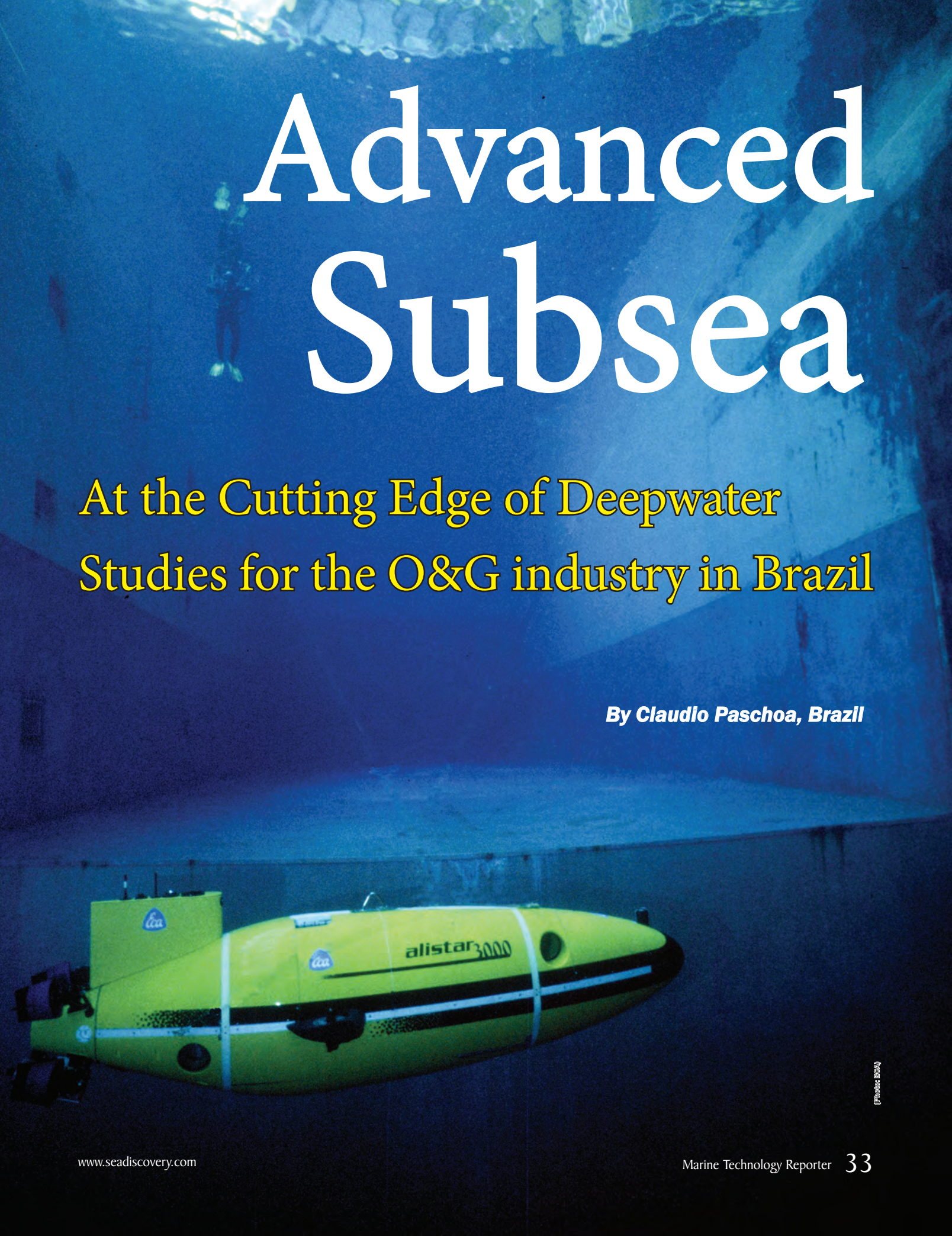
Because of Brazil's local content laws, foreign companies wanting to enter the O&G equipment and services sector are encouraged to open a local subsidiary and hire local manpower in order to participate in Petrobras tenders.

ECA Hyatec has set up shop in Brazil, and through its Brazilian subsidiary ECA Latin America Ltda. offers a range of AUVs, ROVs and other equipment to O&G operators and Navies in Brazil and all of Latin America. **Pictured right is an ECA ALISTAR3000 AUV in a pool.**

Advanced Subsea

At the Cutting Edge of Deepwater Studies for the O&G industry in Brazil

By Claudio Paschoa, Brazil



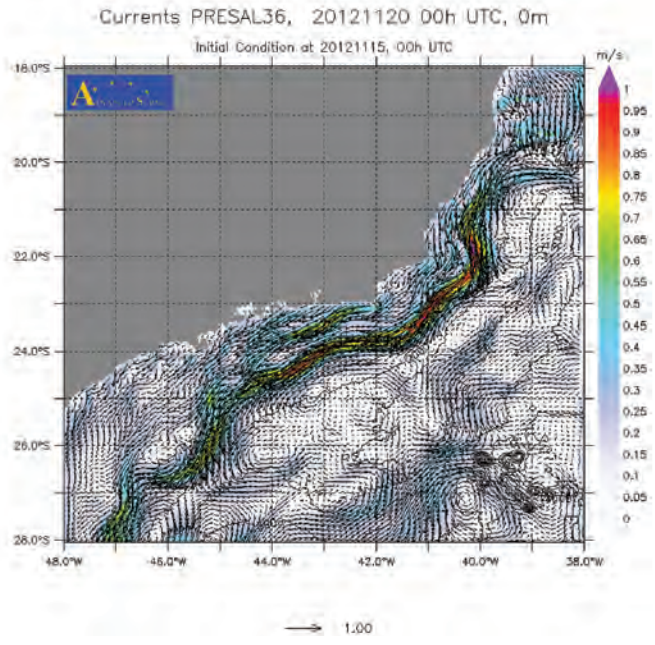
(Photos: BSA)

(Photo credit: Advanced Subsea)

Advanced Subsea Group Director, Jacques Schoellkopf. He has an MSc from the Museum d'Histoire Naturelle de Paris (Paris VI) and worked at Knowledge Systems/ S20 Group and C.G Doris prior to joining Advanced Subsea SAS as group director.

Some international deepwater companies have been here for many years, including familiar names such as FMC, Aker and Subsea 7. Many more are recent arrivals, international companies exploring opportunities to set up shop in Brazil, such as ECA Hyatec, which through its Brazilian subsidiary ECA Latin America Ltda. offers a range of AUVs, ROVs and other equipment to O&G operators and Navies in Brazil and all of Latin America. New arrival Advanced Subsea do Brasil, born from a French parent, has opened its own local subsidiary in downtown Rio de Janeiro and has been involved it deepwater survey and construction support in Brazil.

According to Schoellkopf, a partnership between Advanced Subsea do Brasil and ECA (a French company specialized in ROVs and AUVs) has been formed to conduct work in deepwater pre-salt areas in the Santos Basin, primarily using the Alistar 3000 AUV from ECA for data acquisition. The AUVs are used either in autonomous mode or in remote mode using a 3km fiber optic umbilical. The scope of AUV applications are construction support for field installation with pre-lay survey, touch-down point monitoring and as-laid/as-built survey at the development stage and IMR activities such as pipeline inspection, FPSO riser & mooring inspection at the exploitation stage. Advanced Subsea and ECA launched a Joint Innovation Project based on Alistar 3000 for sharing AUV experience between major Brazilian market operators.



(Credit: Advanced Subsea)

View of currents from PRESAL36 output.

Advanced Subsea has completed a Survey Construction Support Services Contract with REPSOL offshore from Spain for the development of the Montanazo & Lubina deepwater field. The scope of work was to perform pre-engineering survey, pre-lay survey, coring & seabed sampling, then trenching depth monitoring and finally as-trenched/ As-built Survey and Reports.

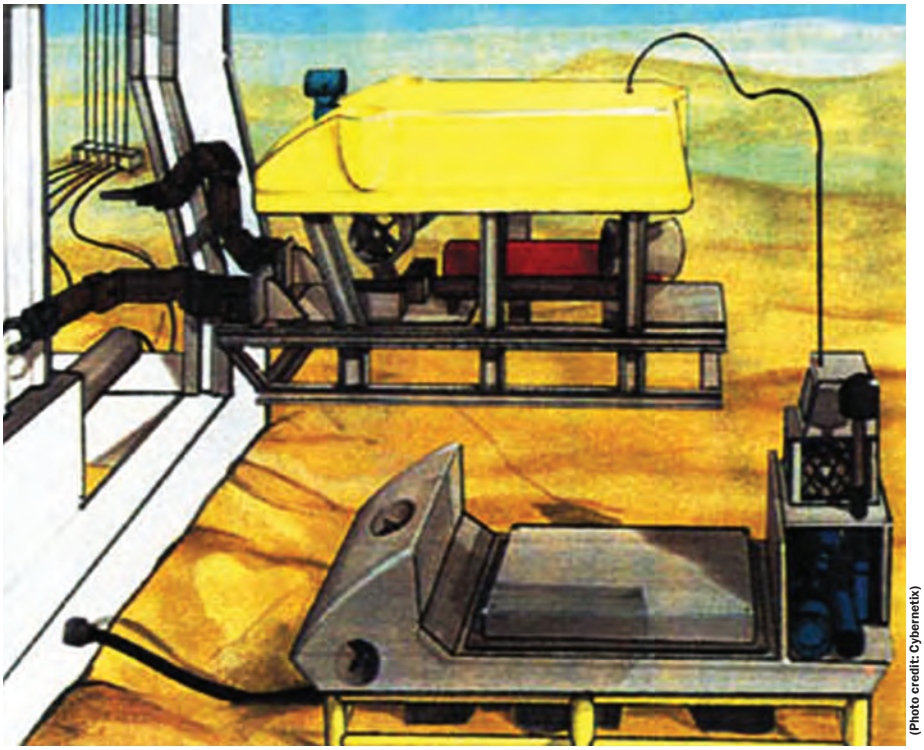
According to Schoellkopf, the Pre-salt ROM is important as a way of forecasting the complex deepwater currents that occur along the pre-salt. These currents can be strong and unpredictable, endangering the expensive drilling equipment. In addition, it is important to better understand the speed and nature of the currents in the event of an oil spill, to expedite clean-up and recovery efforts.

Advanced Subsea do Brasil is currently offering consulting & services in the following areas: Rig Positioning; Survey Construction Support; Metrology; LBL array design; Intervention & Inspection AUV Services; and Operational Ocean-

ography - Numerical Ocean Models.

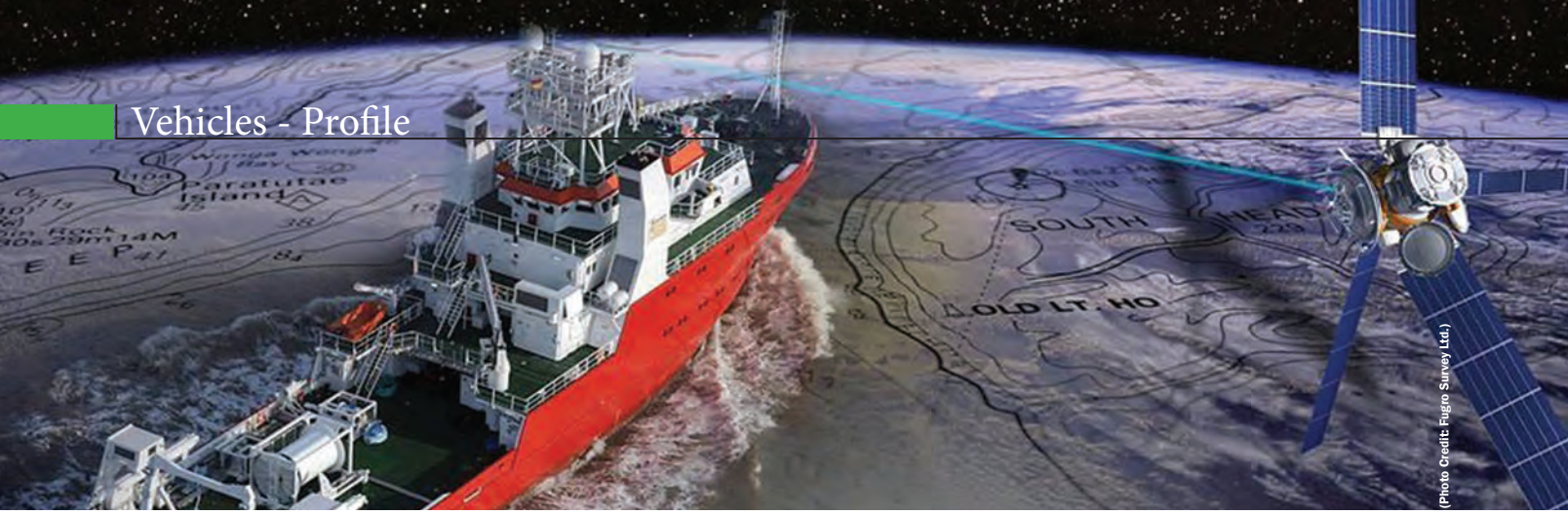
In 2013, Advanced Subsea will raise capital via an IPO to boost development of its deepwater activities, particularly its positioning & survey services, operational and IMR services in Brazil, West Africa and the Gulf of Mexico. In order to increase efficiency in their subsea operations, one of Advanced Subsea's partners, Marseille-based Cybernetix, is also developing a hybrid AUV/ROV aiming at providing full IMR services (Inspection Maintenance and Repair) on the basis of the very innovative solution, Swimmer AUV/ROV designed to provide deepwater inspection and intervention services. The Swimmer AUV transports a specially adapted Work class ROV to the deepwater location and connects itself to a special subsea power hub that is energized from a surface vessel such as an FPSO, even a large multipurpose vessel can be its support vessel as the electronic connection to the subsea power hub is done through a power and control umbilical. Once hooked up the ROV can be deployed to do its own work controlled from the surface vessel, between ROV interventions, the host AUV can conduct its inspections and sensory monitoring of offshore structures, such as flowlines, riser and pipelines. An operational Swimmer system will make it possible for on-sight field development engineers to easily plan future ROV operations interventions and avoid the costs of a permanently stationed support vessel and heavy deepwater ROV umbilicals. The Swimmer is a resident subsea system capable of staying up to three months submerged, even in deep waters.

It is also important to note that not only subsea service providers but also more and more foreign subsea equipment manufacturers also appear to be negotiating partnership with Brazilian companies or even opening their own subsidiary company in Brazil, as the supply logistics from vital subsea equipment is one of the main concerns regarding equipment supply for the pre-salt.



(Photo credit: Cybernetix)

Drawing of Cybernetix's Swimmer ROV.



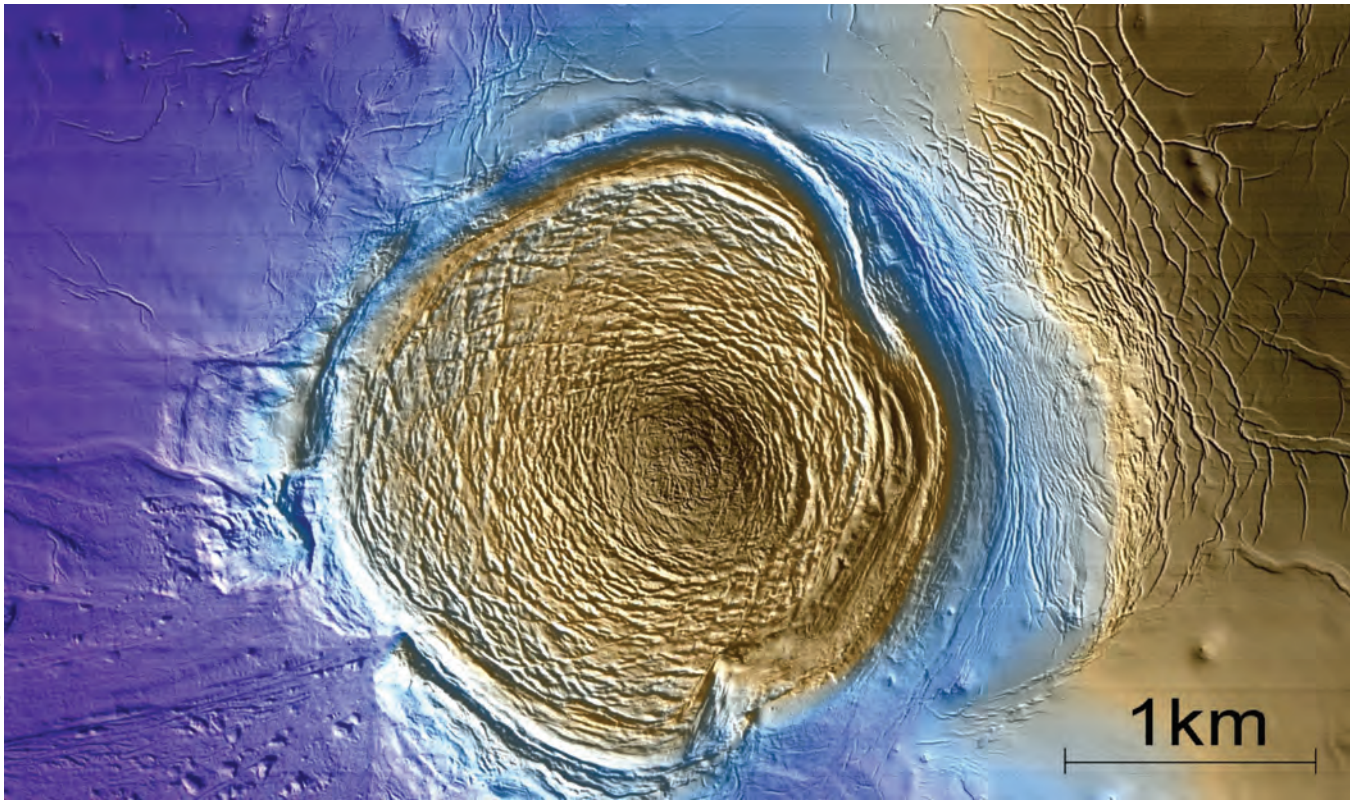
(Photo Credit: Fugro Survey Ltd.)

Fugro Survey Ltd.

Fugro Survey Limited carries out offshore subsea survey projects in the North West European Continental Shelf, Mediterranean, and West Africa regions. It is part of the geotechnical and geophysical services group Fugro and, more specifically, part of its Survey Division. The Aberdeen, UK, based subsidiary sails a fleet of five hydrographic and geophysical survey vessels, as well as autonomous underwater vehicles (AUV) that are designed to provide precision seabed and sub-seabed data collection abilities down to 3000 m.

The Fugro name is ubiquitous in offshore and subsea circles, gratis of its experience on some of the largest and most technically challenging jobs. An example of this is the Rosebank development operated by Chevron North Sea and its co-venturers Statoil UK, OMV and DONG E&P.

Fugro Survey were contracted by Chevron to undertake geophysical, geotechnical, and environmental surveys in blocks 205/1, 213/26, and 213/27 that lay west of the Shetland Islands and for a gas export pipeline route to shore. Fugro used two of its dedicated survey vessels, Geo Prospector and Fugro Galaxy, to conduct the surveys. The specialist AUV Echo Surveyor 4 was used to collect engineering grade of geophysical



(Photo Credit: Fugro Survey Ltd.

data in water depths of over 1200 m; it was reportedly the first time an AUV has been used in a major UK deepwater project. According to the company, the AUV tile camera was proven effective for collecting images suitable for environmental habitat assessments, and has already been used in the largest deep water development projects in West Africa, Brazil, and the Mediterranean.

"We have two main types of business," said Eric Robertson, Commercial Manager, Fugro Survey. "The first is geophysical and environmental surveys, such as Rosebank, which are vessel-based. The second is specialist survey positioning and construction support services both within the Fugro group and to third party construction companies or operators. This type of activity is extremely complex. We must offer real accuracy and reliability to succeed but with Fugro Starfix we can offer high precision differential GPS for decimetric accuracy and highly specialist acoustic underwater positioning and advanced software solutions."

Together this means, for example, the company may have five of its own vessels working on projects but its personnel and equipment could also be working on more than 40 additional rigs, barges, and ships at the same time.

Investing in Technology

"In terms of business philosophy, we see investment as being the engine of growth," said Robertson. "Investment not just in technology but also in people, training and systems. As an example of that we would point out to the many ves-

(Photo Credit: Fugro Survey Ltd.)

Above: Echo Surveyor IV, a Kongsberg HUGIN AUV, ready for launch.

Left: AUV multibeam data from Mediterranean showing mud volcano in 800m.

(Photo Credit: Fugro Survey Ltd.)

"In terms of business philosophy, we see investment as being the engine of growth"

Eric Robertson, Commercial Manager, Fugro Survey

(Photo Credit: Fugro Survey Ltd.)

sels in the site surveying sector which are typically between 25 and 40 years old. Fugro Searcher, commissioned March 2010, was the first new build dedicated site survey vessels in the North Sea in 30 years."

MV Fugro Searcher was the first example of Fugro's global series of dedicated hydrographic and geophysical site survey vessels. FSSV 65 is the design name for a 213 ft. (65-m) double-hull survey vessel designed and built to Fugro Survey specifications by German shipyard Fr. Fassmer GMBH. A 12-month process of computer modeling and tank testing was required to achieve optimum hull form and performance output. The FSSV 65 design has proved to be a capable and successful survey platform. The efficient diesel electric drive and specially designed hull ensures quiet operational acoustics that significantly improves the quality of data that can be collected. Desiring an advanced fleet, Fugro installed DP functionality and cutting edge survey equipment including the latest Kongsberg multibeam and sub-bottom profilers and solid digital streamers. It is also a spacious design with en suite accommodation for 42 people and supplemented by modern crew leisure facilities including a video room, gym, and internet café expected from today's generation of surveyors and engineers. The ships have already tackled analogue geophysical surveys in shallow and deepwater, multi-channel seismic rig site surveys, environmental and geotechnical investigations, pipeline and cable route investigations, and swathe bathymetry projects.

The second in the series, Fugro Galaxy, was delivered in March 2011 and included a 7-ton side and extended 20 ton rear hydraulic A frames for enhanced shallow geotechnical operations. Meanwhile, Fugro's global build program has now moved to other parts of the world with the production of three new vessels; MV Fugro Equator delivered in July 2012 and being operated from Fugro's Singapore office; MV Brasilis due for delivery at year end to Fugro in Rio de Janeiro; and Fugro Australis for Fugro in Perth, Australia. Investment continues with the recent purchase of a second AUV for Fugro Aberdeen. The 3000m depth rated Kongsberg manufactured Hugin 1000 AUV, named Echo Surveyor 6, will be delivered in April 2013. Echo Surveyor 6 will offer additional capacity for deepwater projects in Europe and West Africa region and compliments Fugro's two Hugin 1000's in Asia-Pacific and two Bluefin 21 and one Hugin 3000 in the Americas regions.

Investing in People

Apart from its cutting edge technology, Fugro Survey Limited has also become known for its high personnel standards and innovative approach to HSE. "Investment into personnel training, development and management systems is very important," said Robertson. "For example, health and safety has been a continuous focus for the last 15 years and we've just been awarded the Order of Distinction at a gala ceremony in

September 2012 by the Royal Society for the Prevention of Accidents (ROSPA). This is the highest merit of continuous HSE performance excellence as it is only awarded after 15 consecutive gold awards are achieved. In addition to the Order of Distinction we have also been presented four President's Award. "Our HSE is employee-driven so that it is the personnel that have the power to stop unsafe acts from occurring. It is all about employee empowerment. One example is our new campaign iPower, which began July 2012 and will run until February 2013, and focuses on five key areas where safety can be improved: planning and awareness; transportation and driving; plant and equipment; workplace behaviour; and high-risk activities. We also bring our field staff together annually in a brainstorming forum to produce new ideas such as the simple booklet of key offshore risks that we produced a few years ago. The idea was taken up by the Fugro group and has now been distributed to all 13,500 employees in the Fugro group in multiple languages."

It has now been more than six years since Fugro Survey Limited has been split from Fugro Subsea Services, and in that time the company's revenue have doubled. Looking ahead, Fugro Survey Limited and the wider Fugro group count on the Fugro Academy, a training center set up in 2006 to provide new recruits with basic training and company familiarization before their six-months of technical courses in their area of expertise, as a chief conduit to its inevitable future growth. Nearly 400 people join Fugro yearly and, rather than poaching them from competitors, the company is keen to bring more people into the industry and the academy is the gateway for many into professional geophysical, surveying or engineering careers.

"About 10 percent of our business is renewables today but we will see how that develops," said Robertson. "Most of our work is on the construction support side and with UK Round 3 projects starting in 2015, there are potentially huge projects we hope to be part of. Within oil and gas there remains a steady flow of prospects and new developments along the Atlantic margin and Norway that we expect will increase. Fields such as Rosebank and Laggan-Tormore are the new frontier for the UK oil and gas industry. Other markets now coming to our attention include the Norwegian Barents Sea and east to Russia, and west to Greenland. Meanwhile, Fugro continues to focus on the deepwater development of West Africa and the Mediterranean as part of its long-term strategy."

www.fugrosurvey.co.uk

Falcon Explores a Mountain

Oceana, an ocean conservation organization, has explored a number of undersea mountains in the Atlantic and Mediterranean using the small, deep-swimming Falcon DR ROV. They recorded many species and habitats needing protection and conservation with the 1000 m-rated Saab Seaeye ROV - from carnivorous sponges to lobsters and sharks. Never before has such an enterprise been undertaken by an NGO, said executive director of Oceana in Europe, Xavier Pastor, explaining that efforts to preserve biodiversity have overlooked deep-sea areas. Now high technology underwater vehicles are making this more possible.

"Oceana is a pioneering NGO in the use of ROVs," said Xavier Pastor, who understands the important role technology plays in documenting habitats and species that require protection. Oceana started the current project some 240 km off the Portuguese coast in the range of marine mountains called the Gorringe Bank.

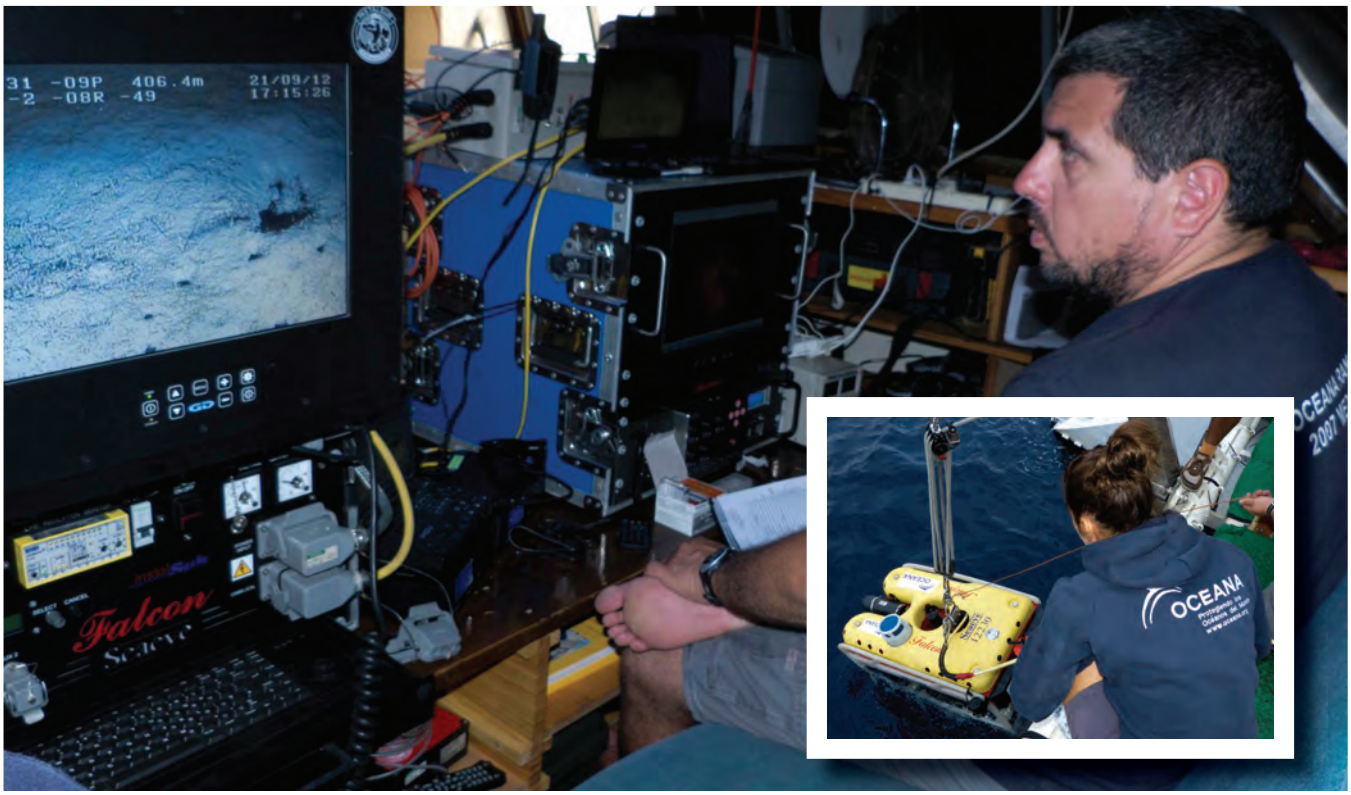
Scientists filmed algae forests and hundreds of species, and noted the ecological value that undersea mountains, called seamounts, offer to many species including whales, dolphins and swordfish. Director of research in Europe, Ricardo Aguilar, says they have found species whose existence on the Gorringe Bank was unknown in an ecosystem that needs conservation.

He adds that when they later explored the Chella Bank - offshore Almeria in South East Spain - they found protected species such as a carnivorous sponge and angular rough shark at risk from damage to their seamount habitat by recreational and commercial fishing.

He explains that deploying the Falcon for hundreds of hours of filming has enabled Oceana to gather essential scientific data. "Filming rocky sites at various depths requires a high degree of technical complexity," he said. Being able to use transects – the more complex operation of moving the ROV along a path, rather than directly up and down – has given a more comprehensive view of the area. Its five powerful thrusters make precise maneuverability possible and keep the vehicle steady in strong currents while filming and collecting samples when needed.

Oceana also benefit from having an ROV that is small enough to be manhandled from its vessel, yet has advanced distributed intelligence technology that allows a host of advanced systems to be fitted. These include systems such as video and the high definition cameras manufactured and supplied by Marine Vision, who also supplied the ROVs.

The Falcon DR, operated by Instalsub for Oceana, came over from the Gulf of Mexico where Oceana used it to assess the long-term impact of the Deepwater Horizon spill on marine ecology in the area.



Subsea 7 DSV Design Goes to Wärtsilä

Wärtsilä signed a contract for the design of a new diving support vessel (DSV) to be built for Subsea 7. The new VS 4725 DSV design was created by Wärtsilä Ship Design specifically for this vessel, which will be built at the Hyundai Heavy Industries (HHI) shipyard in Korea. The contract was signed with HHI in December, and the vessel is scheduled for delivery in 2015.

The vessel is intended for North Sea diving operations on a year round basis. In customizing the design of such a complex vessel, close co-operation between Subsea 7, HHI, Drass Energy, the diving equipment supplier, and Wärtsilä was essential.

The DSV is to be equipped with the latest integrated diving equipment, while a 3-split engine and propulsion configuration for redundancy. Under this configuration, the systems relating to the generator sets, propulsion machinery, thrusters, electrical controls and all related auxiliary equipment, are divided into three sections. In addition to the excellent redundancy, this also ensures a high ERN (Environmental Regularity Number) score, while limiting the failure risk. In a worst case failure scenario, most of the generator sets and thrusters will remain in operation.

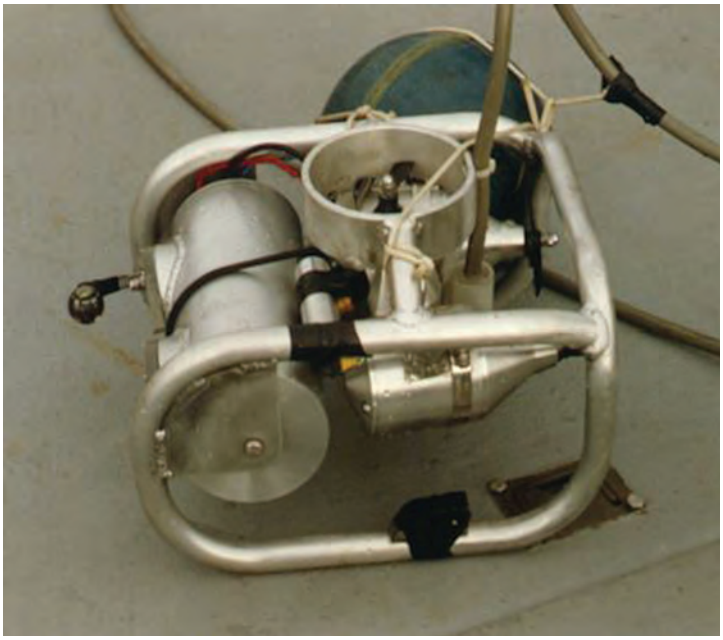
"The operational profile of the vessel forms the basis for every Wärtsilä ship design. By working closely with the owners and operators to reach a complete understanding of their needs, we can design vessels that are both economically and environmentally sound, but moreover, fulfils the demands and requirements of our clients. Our more than 50 years of experience provides, of course, a solid foundation for our design solutions, and working with highly professional partners, such as Subsea 7 and HHI, is always a pleasure," says Riku-Pekka Hägg, Vice President Wärtsilä Ship Design.

"The development of the Wärtsilä VS 4725 DSV, the development of the dive system by Drass, and the overall design and building by HHI is the result of good co-operation between all the parties involved. Wärtsilä Ship Design's willingness and ability to adapt to the specific requirements and standards needed were key considerations in the award of this contract," said Mr Stuart Smith, Vice President for Technology and Asset Development, Subsea 7.

www.seadiscovery.com

ROV Seamor *Evolution of a Brand*

By Terry Knight



Redesigned ROV Seamor circa 1986

Towable Seamor

Originally developed in the mid-1980s by two Canadians, Seamor was intended to become a simple, low-cost, underwater "flying" video camera system that could be easily deployed from a small boat and enjoyed by those who wanted to enjoy the underwater world without getting wet – a "Recreational ROV." Today, more than 30 years later, that market is still in its infancy.

The first Seamor prototype consisted of two aluminum tubes strapped to an aluminum frame. One tube housed a color video camera (the size of a chimney brick) and the other an incandescent floodlight. Each tube was also fitted with a variable speed thruster at the rear (sewing machine motor c/w model airplane propeller). The ROV was surface powered and controlled via a 100 ft. "off-the-shelf" multi-conductor cable and a crude power supply/control system. A small portable TV set completed the system.

While the initial version of Seamor provided many hours of enjoyment at a small cost, it soon became evident that being constrained by the depth and scope of the tether cable was an undesirable limitation – particularly when the wake from a passing BC Ferry was encountered.

Several months later a completely redesigned Seamor was produced. This unit incorporated three redesigned thrusters, two horizontal and one vertical, along with a tilting camera/light housing, all mounted on a welded aluminum frame. Initially neutral buoyancy was achieved using a "Grimsby" float attached to the tether.

The months turned into a couple of years and many improvements to Seamor until, in 1989, Inuktun Services Ltd. was formed to manufacture the production version of the ROV Seamor for the industrial sector of the "low-cost" inspection ROV market.

The development of ROPI, a "custom ROV" project started in 2002, resulted in the introduction of a completely redesigned, more powerful and technically advanced Seamor which became one of Inuktun Service's growing modular mobile robotic systems products.

In 2006 Mr. Robin Li, then an employee at Inuktun with both an MBA and an Engineering degree in his

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pocket, successfully negotiated the purchase of the ROV Seamor brand and associated technology and started Seamor Marine Ltd. As the name implies the business activities of Seamor Marine Ltd. are specific to the ongoing development, manufacture, global marketing and sales of the ROV Seamor and related system components. In addition to advancing its technologies and providing system enhancements, a primary goal of the company is to maintain the modularity inherent across the range of ROV Seamor models. Each system incorporates standard modules that are common with other models, a feature that not only permits component swapping between models, but also facilitates system customization without the usual associated excessive costs.

The Seamor brand currently comprises four standard ROV models as well as a full range of components and related accessories. All of the ROVs can be hand-deployed and operated, by one or two people, from a pier or small craft and are depth rated to 600m/2000 ft. A recent addition to the portfolio is the 7F-H-ARM, a self-contained 7-Function Hydraulic Articulated Robotic Manipulator. One of the smallest skid attachment hydraulic manipulators on the market today, this unit can be employed as a stand-alone subsea robotic system, or readily skid mounted and paired with a Seamor.

This system is self-contained system designed to be easily mated with virtually any ROV system of a similar size – just provide a six-pin connector interface for surface power, RS485 communication and gripper camera; attach the skid-mount unit to the ROV; make appropriate buoyancy adjustments, and go to work.

In addition to the skid-mount, dexterous arm and gripper, the 7F-H-ARM incorporates intuitive programmable position controls, gripper camera, and control unit complete with dedicated LCD touch screen controller/video monitor and joystick control. An indexing sample carousel is also available as an option.

RL-K 7500 Subsea Crane

During customer days at the production plant in Rostock in January 2013 Liebherr presented its new subsea crane, type RL-K 7500. With this new knuckle boom crane the company extends its range of offshore cranes for subsea operations. The RL-K 7500 is able to lift up to 260t in the air and handle loads down to a water depth of 3,400m. The maximum rope diameter is 100mm, the maximum overturning moment of the crane is 75,000kNm. Depending on customers' specifications, the boom configuration allows for working radii of up to 50 m.

One advantage of the crane's knuckle boom is that loads can be lowered to the water surface with a short rope length between crane boom head and water line.

Based on sophisticated Motion Reference Units (MRUs) the Active Heave Compensation system compensates this movement. In order to meet the high power demands of the AHC the hydraulic hybrid drive system Pactronic, originally developed for Liebherr mobile harbor cranes, was specially adapted for subsea applications. Pactronic is characterized by an additional energy storage device. A hydraulic accumulator supplements the fluid pump in delivering power to the system. It serves as a pressure storage reservoir incorporating a gas in conjunction with a hydraulic fluid. Energy is stored in this compressed gas to be released upon demand.

The AHC system is fully integrated in the Litronic system. One of its most important features is its self-learning function. It automatically recognizes the vessel's motion and adjusts itself according to this information. Hence, the system does not need to be manually adjusted and is independent of weather conditions. Up to 70% of the power required to operate the AHC system is currently obtained from Pactronic. This means that the hybrid drive system provides a maximum power of almost 4 MW.

In order to ensure optimized rope guidance, the crane has a patented horizontal winch shifting system that guarantees the ideal fleet angle of the rope under all load conditions in both hoisting and lowering operations. A further innovation is the vertical winch frame lifting system, which is also patented. Two hydraulic cylinders allow for the adjustment of the lifting height without moving the drum of the hoisting winch. Due to this design, wear of the main wire rope is minimized, intended to extend its service life and reduce life cycle costs. With the RL-K 7500 Liebherr offers an innovative crane concept for subsea applications.

The RL-K 7500 can be rated both as general purpose offshore crane and as heavy lift crane, being able to hoist loads weighing up to 300 t. It can thus be installed on board drill vessels and also heavy lift vessels.

Tobias.Fröhlich@Liebherr.com
www.Liebherr.com

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YOU NEED TO BE INCLUDED

The summer issue has become the industry's leading market guide for companies seeking product and service providers year-round.

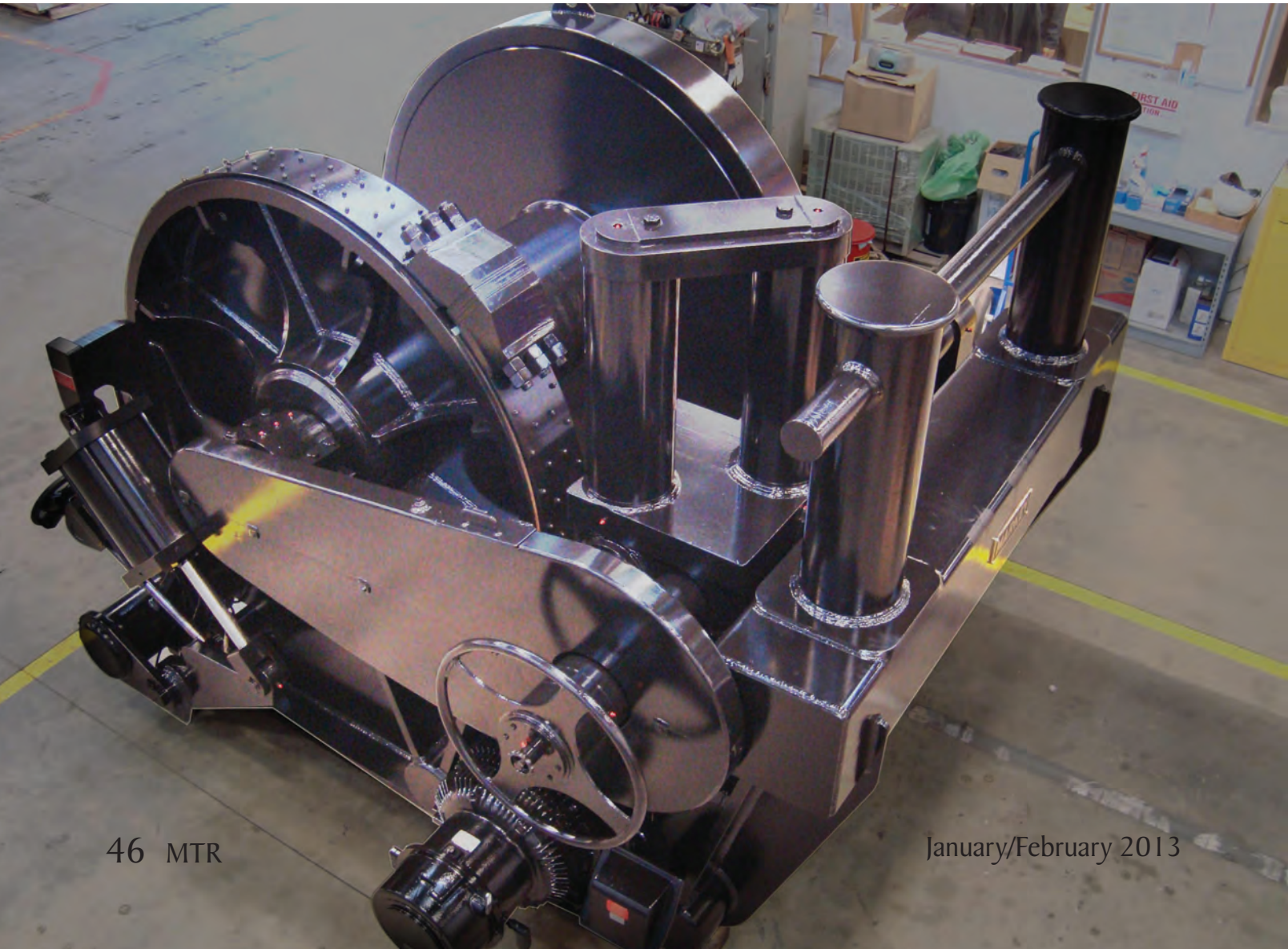
APPLY TODAY!

Markey Electric Winch

Markey Machinery is preparing a new TES-40-75HP electric towing winch for shipment that will be installed on Harley Marine Services new Z-drive ship assist tractor tug M/V Robert Franco. The first item of two suites of deck machinery specified by Harley for both the M/V Robert Franco and its' sister, the MV Ahbra Franco, the TES-40-75hp towing winch also fills out Markey's electric towing winch line which now covers wire sizes between 1.25 through 2.5-in. The TES-40-75HP is a rugged single-drum electric towing winch with fairlead and warping head, designed specifically for use on ASD-tugs where aft deck space is at a premium. Its AC Variable Frequency electric drive satisfies a wide range of performance requirements. All electrical components comply with ABS, USCG, and IEEE-45 standards.

The tow winch is part of a two-winch suite of equipment that also includes a Markey Model DEPCF-52- 75HP Class II Hawser Winch. Together, the two winches will share a single VFD drive panel and dynamic braking resistors, while having discrete wheelhouse controls for each winch. This reduces the impact of "below-deck" equipment on available space, as well as system cost while supporting full functionality of either winch. The balance of the two ship sets is scheduled to ship in the near future. Both tugs are being built by Nichols Brothers Boat Builders of Freeland, Washington, with expected launch dates in the spring and summer of 2013. The tugs will enter service on the U.S. West Coast and will enhance Harley Marine's current fleet of tractor tugs operating in the Tanker Escort and Ship Assist markets.

www.markeymachinery.com



March 15- November 8, 2013

Coming this spring!

For the third year in a row Marine Technology Reporter sponsors the Subsea Photo Contest, showcasing the best underwater images- from vessels and equipment to people and ocean life. Winning photos will be published in a special section of the Nov / Dec issue of MTR, featuring the Grand Prize Winner *on the front cover of the magazine.*

3rd Annual

Subsea Photo Contest

MARINE TECHNOLOGY REPORTER and SeaDiscovery.com

underwater technology and ocean science news

To see submissions from last year, go to:
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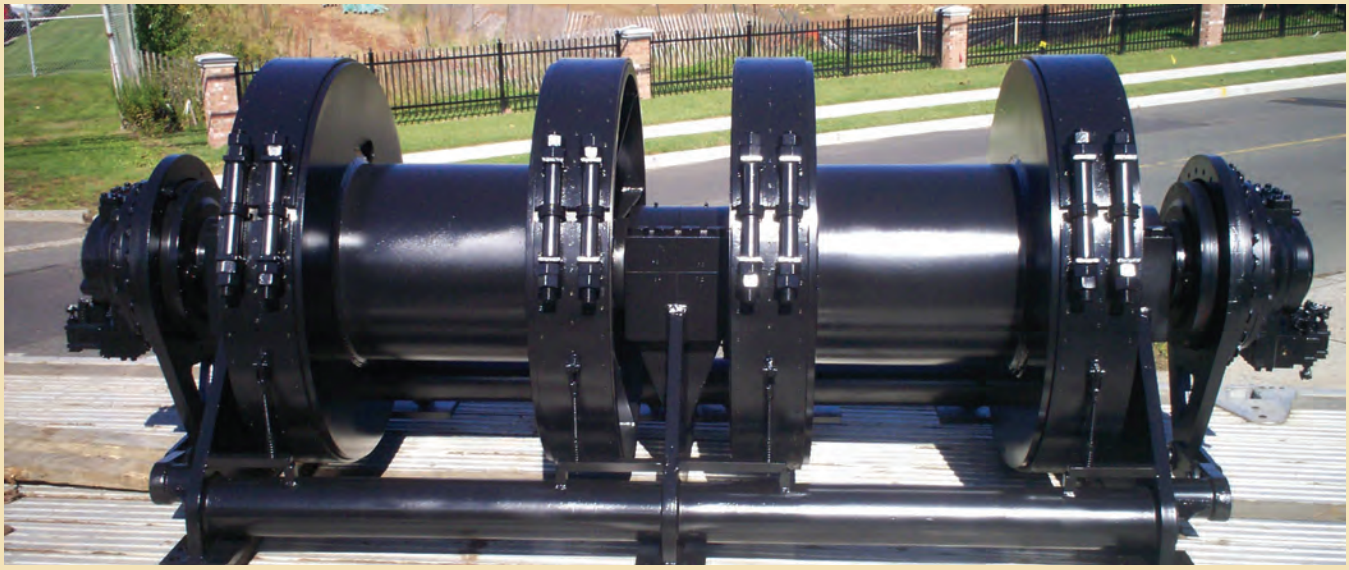


Mooring Line Chafe Protection

Fluoron Inc. has developed an Eddy Mooring Line Protection System that is designed to separate the mooring line from all surfaces that will chafe the line. The Eddy System will exceed the breaking strength of the line application, to reduce the possibility of "Snap Back Phenomenon," provides chafe protection between mooring line and metal surfaces, at points of contact and eliminates wear on polished Stainless Steel bits. Flexibility of Eddy System will provide chafing protection for 360 degrees within the I.D. of a chock and eye. The Eddy System is UV protected. When the mooring line is at maximum tension the internal core fibers will rub against each other developing frictional heat that will melt the fibers together, reducing the breaking strength by 50%.

www.fluoron.com

JonRie Marine Winches

JonRie Marine Winches introduces its new Series "220" Double Drum Escort/Assist Winch currently be installed on the twin ship sets for Caribbean Tug-Z and the new Twin ASDs for Seabulk Towing. JonRie delivered its first three ship sets last year to Caribbean Tug-Z and Seabulk Towing. The fourth ship set to be delivered this spring to Seabulk Towing with a fifth ship set being a larger version to be installed on the new Marine Towing of Tampa ASD this summer. All five ship sets feature JonRie's Constant Tension (Active Heave Compensation)/Constant Scope systems. All five tugs feature independent drives for each drum and JonRie's standard foot pedal for hands free operation. Also featured on each drum are JonRie's Tension read out system. The bow winches also share their Hydraulic Power Unit (HPU) with aft Capstans and Towing Winches.

The winches were originally designed for Submarine Docking but now are being used to handle barges and as a redundant line on all ship Assists and Escort Work the tugs will be involved in. This type of redundant line tethered to the ship is standard on the Panama Canal. All ADSs should be in service by the start of 2014.

www.marinewinch.com

Otto Candies Winch Refit

Rapp Hydema completed a second winch drive retrofit for Otto Candies in Houma, LA, in January 2013. An existing Rapp hydraulic winch was converted to electric, with the addition of an Active Heave Compensation (AHC) package as well. "Active Heave Compensation is important for our vessel operations in Brazilian waters, and the Rapp electric retrofit package has shown well with other customers," said Brant Folse, Project Manager and Marine Engineer at Otto Candies. Rapp has converted other hydraulic winches in recent years. Rapp's package includes an award-winning motor, recognized as a new, innovative technology at the 2010 Offshore Technology Conference (OTC) Spotlight on Technology ceremony, and also a liquid-cooled arrangement internally. Other components include VFDs (variable-frequency drives), energy magazines, a motor-controlling encoder, wireless remote control, and main, tension, and speed control. According to the manufacturer, Rapp liquid-cooled motor provides more kW per kilogram of weight than comparable air-cooled designs. The motors are mounted on Rapp's own in-house manufactured gearbox, which were developed long ago for its hydraulic winch lines.

www.rappmarine.com

FET Acquires Dynacon

Forum Energy Technologies, Inc. acquired Dynacon, Inc. Dynacon is a provider of launch and recovery systems (LARS) used for deployment of remotely operated vehicles (ROVs) and also manufactures high quality, specialized cable and umbilical handling equipment for all segments of the marine industry. Dynacon's Bryan, TX, location employs more than 100 people and consists of 82,000 sq. ft. of manufacturing and office space and 40,000 sq. ft. of specialized test area located on 16 acres. Cris Gaut, Forum's Chairman and CEO, said, "Dynacon expands our Subsea Technologies capability and integrates an important part of the ROV supply chain. We plan to continue Dynacon's long legacy of providing top quality systems to its customers, while investing in the company's facility in Bryan to expand capacity. We welcome all of the employees of Dynacon to Forum."

KOGT Acquires Apply Nemo AS

Kongsberg Oil & Gas Technologies AS (KOGT) entered an agreement to acquire 100% of the shares in Apply Nemo AS, an independent supplier of advanced engineering services, products and solutions for subsea oil and gas applications. The acquisition, which is expected to be completed early January 2013, will strengthen Kongsberg Oil & Gas Technologies' scope of deliveries and capacity to the subsea oil and gas markets. Apply Nemo was established in 1989 with focus on subsea pipeline engineering and complex solutions and has since been transformed into a product focused organization.

Xylem Appoints Goldsmith UK Director

Water monitoring specialist Xylem Analytics UK appointed David Goldsmith as Director of Marine and Coastal Business. Goldsmith has extensive experience in marine technologies, having worked closely with AADI for many years in the oceanographic sector. He will be responsible for bringing the YSI, SonTek and AADI brands together under the Xylem Analytics umbrella.

SeaBotix Opens New East Coast Office

SeaBotix opened a new east coast office based in North Dartmouth, Mass. This satellite office, situated in the heart of the northeastern USA's maritime corridor, will be a hub for sales, technical support, service, and training and will allow SeaBotix to expand its service to clients in the region. SeaBotix East will be headed by ROV Pilot/Engineer, Rhonda Moniz. In her decades of ROV experience, Rhonda has been involved in a number of global expeditions with Dr. Robert Ballard and is the Explorer in Residence for the New Bedford Ocean Explorium. Rhonda is a Master Instructor with PADI and served as Science Advisor on many underwater production teams for the Discovery Channel and PBS NOVA series.

Wolfe Joins EdgeTech

EdgeTech added Damon Wolfe to the role of Product Line Sales Engineer. Wolfe joins EdgeTech after four years with the U.S. Army Corps of Engineers (USACE) where he served as a technical lead for a variety of surveying and remote sensing projects including hydrographic surveying, topographic surveying, geodetic surveying and photogrammetry. Prior to working with the USACE, Wolfe was in the United States Marine Corps.

Ellis Joins DeepSea Power & Light

DeepSea Power & Light said that Amanda Ellis has joined the team as its new Marketing Coordinator. Ellis will manage and develop all communication related materials; including, expanding the company's social media activities.

Ellis holds a Bachelor of Arts in International Relations from San Francisco State University. She worked as a Marine Science Instructor for the Marine Science Institute, where she educated students on the environmental importance of marine habitats. Her increasing interests in environmental communication led her to begin a Communication graduate program at San Francisco State University.

Northcutt Joins Tesla

Jay Northcutt joined Tesla Offshore LLC, a division of Tesla Exploration Ltd, as Operations General Manager. For the past 16 years, Northcutt was Geophysical Manager with C & C Technologies. Tesla Offshore LLC specializes in marine geophysical and marine construction survey services, primarily in the Gulf of Mexico region. Tesla Offshore has its main Operations office in Prairieville, LA and its Corporate Sales & Special Projects Operations office in Houston, Texas.

Aquatic Appoints Bamford VP

Aquatic Engineering & Construction Ltd, an Acteon company, appointed Jenny Bamford as vice president commercial and part of its senior leadership team. Bamford is an experienced business professional and brings with her exemplary project management and commercial skills having worked in both the telecoms and the offshore oil and gas industries.

Her remit is to provide commercial leadership governance and strategic direction to the global business.

Growing SubConn Demand in GOM

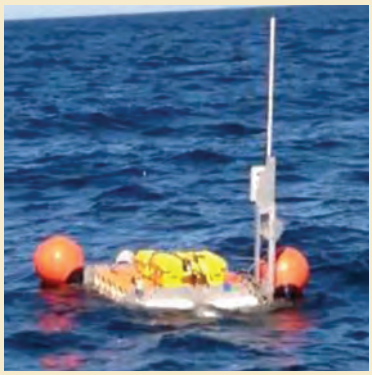
Empowered by the accession of experienced underwater technology professionals Scott Allen and Jacobo Aguilar, MacArtney Inc. launched an upgrade of sales and support efforts to back existing and potential SubConn customers in the Gulf of Mexico (GOM) area. Allen, a newly appointed items sales manager with more than 13 years experience, will be heading a dedicated SubConn support team. Aguilar has been with MacArtney for several years and brings expert technical knowledge about SubConn connectors to the sales team.

Portable Buoy System for

Underwater Noise Measurements of Ships

Noise Control Engineering, Inc. (NCE) created a portable system for measuring underwater radiated noise from vessels and offshore platforms. The system was developed using internal research and development funds as NCE sees an increasing need for underwater noise assessments given the planned construction of new Fisheries Research Vessels worldwide and a growth in awareness of underwater noise issues as they relate to the marine industry.

The system uses a floating buoy that supports measurement hydrophones and data acquisition electronics. NCE engineers connect with the buoy electronics remotely to collect and process data; providing the ability to calculate underwater noise signatures within minutes of the measurement. The buoy can be deployed from the ship being tested by using a small crane or A-frame; this removes the need for additional support vessels, reducing the planning and operational costs of the test. The measurement system can be broken down and shipped in conventional cases, allowing for measurements to be performed in locations convenient to a particular port or shipyard.



NCE has used the system in two tests thus far, which were performed on nearly opposite sides of the globe. NCE has plans to use the system to measure noise from five different vessels in the next twelve months. This system can take measurements in accordance with the Grades B and C requirements of ANSI's underwater measurement standard – S12.64 (2009). NCE's Senior Engineer, Jesse Spence, stated that "this measurement system will not only augment NCE's existing capabilities of underwater noise prediction, measurement, and solution identification, but will also reduce the costs of testing for shipyards and owners who need to perform underwater noise diagnostic or compliance measurements for their vessels."

Swire Seabed Invests in Custom ROV Launch

Kongsberg Evotec will deliver its new mobile Launch and Recovery System (E-LARS) for Remote Operated Vehicle to Swire Seabed in August 2013.

Swire Seabed based Near Bergen, Norway, has a three-vessel fleet that provides services across the entire subsea spectrum including construction support, work and observation ROV services and geotechnical, seismic, trenching, dredging, decommissioning and renewables support.

With its development of E-LARS, Kongsberg Evotec has placed great emphasis on safety and security for both the operator and equipment. Technical highlights of the E-LARS system include the use of Permanent Magnet Motor (PM) technology and a low requirement for on-going maintenance.

E-LARS uses an innovative control system designed to achieve operational benefits by providing the operator with continuous real-time information about capacity, and umbilical status and history. E-LARS also features Kongsberg Evotec developed Active Heave Compensation that operates on minimal power consumption. As a result of these developments, E-LARS supports operators in extending its operational window.

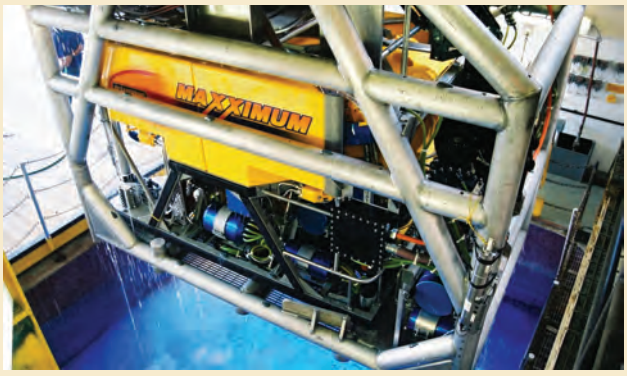
L to R: Jon Olav Kopperstad, VP Offshore Supply & Subsea, Dagfinn Vattøy, Sales Manager, Leif Løken, Product Manager.

Sonardyne, Oceaneering Demo ROV DP Capabilities

A recent trials partnership between Sonardyne International Ltd. and Oceaneering International, Inc. has resulted in the development of a Fly-By-Wire (FBW) system for ROV (Remotely Operated Vehicle) control in any water depth, allowing the vehicle to hold station indefinitely and navigate to real-world coordinates automatically. A Sonardyne SPRINT system was installed on one of Oceaneering's Maxximum ROVs and integrated with a Sonardyne Ranger 2 Ultra Short Baseline (USBL) system for acoustic aiding of the Inertial Navigation System (INS). The trials took place in the Gulf of Mexico in water depths of 3,057 m (10,030 ft.) and results showed that continuous hovering of the ROV in mid-water beyond Doppler Velocity Log (DVL) range was possible, as well as automatic navigation to waypoints.

The majority of ROV navigation systems use an Attitude and Heading Reference System (AHRS) and DVL to provide a relative or dead reckoned position. These systems are subject to time and distance based position errors and only operate close to the seabed, meaning mid-water operations are conducted via manual control so real world or relative coordinates cannot be easily used by the ROV pilot. Sonardyne and Oceaneering have developed a novel navigation and control system solution using the dual output of INS and AHRS data from SPRINT to provide ROV Dynamic Positioning (DP) in all water depths with capabilities beyond current state-of-the-art, without affecting reliability or ease of use.

The system has two methods of ROV control: 'Navigation' and 'Passthru'. In 'Navigation' mode, the ROV control system uses INS positioning optimized for DP with real-world position, velocity and attitude data at high output rates. This speeds up ROV operations by improving vehicle control precision, automating station keeping and delivering FBW capability. 'Navigation' mode is available continuously in all water depths when USBL data is available. If the INS solution should become degraded or is unavailable, the system automatically reverts to 'Passthru' mode. 'Passthru' mode is a dead reckoned solution using self contained AHRS data that is inherently robust and reliable when combined with DVL data.



The results of the trial showed that continuous hovering of the ROV in mid-water beyond DVL range was possible, as well as automatic navigation to waypoints. When the ROV was in DVL range of the seabed the 'Navigation' mode performed equally as well as the 'Passthru' mode but with the added benefit of real-world referenced positioning data from the USBL system. The faster update rate (20 Hz, compared to the 5 Hz rate of the DVL) has the potential to refine vehicle control precision.

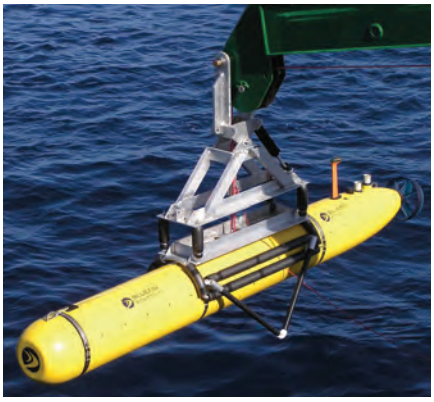
www.Sonardyne.com

Santana Joins VideoRay

VideoRay said that Paco Santana has joined the company as the Director of Business Development. Santana's responsibilities will include developing and leading the VideoRay Business Development team in sourcing, managing, and implementing new business opportunities, especially in the Military, Law Enforcement, and Offshore Oil & Gas markets. Santana comes to VideoRay with 26 years of leadership experience and management expertise, including over 22 years of service in the U.S. Navy. He retired in 2008 as a Special Operations Officer and Master Explosive Ordnance Disposal (EOD) technician. His last naval appointment was as the Program Manager for Joint Service and Navy EOD. In addition to his naval service, Mr. Santana spent four years in the private sector. His most recent position was at iRobot where he served as the Director of Maritime Systems Applications from 2009 to 2012.

Bluefin Offers SeeTrack AutoTracker

SeeByte, a leader in creating smart software for unmanned maritime systems, and Bluefin Robotics, the leading provider of Autonomous Underwater Vehicle (AUV) solutions, announced their collaboration to provide enhanced software solutions for deepwater export pipeline inspections. The collaboration is aimed at equipping Bluefin's 21-inch AUV platforms with SeeTrack AutoTracker. SeeTrack AutoTracker was developed to enable AUVs to perform export pipeline inspections using on-board payload sensors to detect pipelines and automatically adjust the vehicle's trajectory to optimally track the pipeline.



Kraken Wins Government Funding

Kraken Sonar Systems signed a Contribution Agreement with the National Research Council of Canada Industrial Research Assistance Program (NRC IRAP). The funding will be applied to the development of AquaTrak - a new Correlation Velocity Log (CVL) designed for underwater navigation. AquaTrak will be used to measure the speed over ground of Unmanned Underwater Vehicles (UUVs) and can also be used for high resolution current profiling.

The CVL is similar to the DVL in that it uses sonar echoes from the seabed, however the CVL does not measure frequency shift but instead takes direct spatial measurements of vessel displacement between successive sonar transmissions using a sparse array of receiver elements. The layout of the elements is optimized to allow for many possible displacement vectors with a small number of receiver elements, a specific array configuration known as "minimum redundancy" which is used also by radio-astronomers to address the complexity of their instruments.

This allows size, weight and power to be significantly reduced compared to the DVL while offering increased accuracy. Also, by operating at a lower frequency, the CVL offers increased operational range.

"We greatly appreciate the funding support from NRC IRAP to help us develop such an innovative sensor for underwater navigation," said Karl Kenny, President and CEO, Kraken. "We expect that our AquaTrak CVL will provide a superior value proposition to customers as it will feature greater performance in speed, accuracy, and range; with lower size, weight, power and cost than conventional technology."

Kraken Sonar Systems earlier announced that it acquired all Intellectual Property (IP) rights to the AquaPix Synthetic Aperture Sonar (SAS) technology platform from Marport Deep Sea Technologies Inc. Kraken was recently spun-out from Marport and is headquartered in St. John's, Newfoundland.

Unmanned Vehicle U. Earns License

Unmanned Vehicle University has received a university license from the Arizona State Board for Private Postseconday Education. The license grants UVU the authority to grant Doctorate and Masters Degrees in Unmanned (Air/Ground/Sea/Space) Systems Engineering. A Certificate in Unmanned Systems Project Management is also available for Undergraduates. Unmanned Vehicle University touts itself as the first University in the World dedicated to education and training in Unmanned Air, Ground, Sea and Space Systems. MS and Doctorate degrees are offered in Unmanned Systems Engineering as a totally online curriculum. The university just published a textbook on unmanned systems: Introduction to Unmanned Systems: Air, Ground, Sea and Space, Technologies and Commercial Applications.

Hyperbaric Trials Unit Supports MOD

QinetiQ is supporting the MOD in testing new composite materials for the UK submarine fleet using its recently re-commissioned and refitted Hyperbaric Trials Unit (HTU). The HTU forms part of an array of specialist equipment housed in QinetiQ's Diving and Hyperbaric Test Cente based in Haslar, Portsmouth. The use of composite materials in the construction of submarines has a number of advantages, including the need for less maintenance which delivers a reduction in operating costs. Composite materials also provide the opportunity to reduce the acoustic signature of a submarine. As part of an on-going program composite materials are tested by the MOD to develop new approaches and designs. To carry out the testing of the composite materials requires a sufficiently large pressure chamber which can also meet the demanding pressure fatigue cycling regime. The HTU is fully capable of meeting these requirements and QinetiQ also is able to provide a number of highly experienced and knowledgeable hyperbaric experts to support the testing program.

Mariscope Installs Oceanohraphic Buoy in Perú

Mariscope Ingeniería, the Chilean branch of Germany's Mariscope Meerestechnik, has installed an oceanographic buoy offshore the town of Pisco. The buoy was manufactured by AXYS Technologies in Canada following the specifications of Mariscope. The instrument was installed for the oil company SAVIA Perú in order to determine oceanographic parameters in the area of interest, related to the installation of new oil rigs. The buoy is equipped with accelerometers for wave height and direction measurements, as well as with a Doppler current meter of de Nortek Aquadopp 400 KHz profiler type. Additionally the buoy carries a complete Met station and a CTD to complete the range of parameters to be measured.

The data are transmitted via satellite in

2013 UNOLS Cruise Opportunity

Chief Scientist Training

New to planning oceanographic field work? Wondering how to request research vessel time, or to request a submersible or ROV? Needing samples or wire-time to initiate a research project? If so, take part in the 2013 UNOLS Chief Scientist Training Cruise!

This cruise and a pre-cruise information short course will instruct early career marine scientists including PhD students on how to effectively plan for, acquire, utilize and report on time at sea for multi-disciplinary research and education. The full program will take place from October 13-22, 2013, beginning and ending at the University of Rhode Island Marine Operation Facilities in Narragansett, RI, and will include a 7-day cruise on the R/V Endeavor to at sea locations in the Middle Atlantic Bight. Small stipends are provided for participant travel costs (from within the U.S. only), research supplies and shipping. However, space is limited. To apply you must be an employee or student at a U.S. institution or a U.S. citizen working abroad. To be considered applications must be received by March 15, 2013.

Please visit

www.surveymonkey.com/s/RK7XPHG

order to be able to monitor the oceanographic conditions before and during the time of the installation of the new rig. Meteorological and Oceanographic data will be used in order to plan and carry out the deployment procedures in an area of the open Pacific Ocean, were permanent winds and swell difficult the operations.

MARS Deployment and Overboarding System

Caley Ocean Systems won a contract by Cameron to develop a new deployment and overboarding system for the MARS (Multiple Application Re-injection System) for deepwater scale squeeze applications. The modular handling system will allow the MARS hardware to be more easily deployed onto the seabed from smaller vessels. The MARS system is used to improve oil recovery as part of enhanced oil recovery (EOR) in mature basins, brownfield developments and greenfield projects. Caley is supplying a standalone handling system comprising a high performance spooler, hydraulic power unit (HPU) and control station. It will use a flexible riser to deploy the MARS system, and feature Caley's proven clamping technology to reduce fatigue loading on the riser.

Cameron MARS (Multiple Application Re-injection System).

Swire Oilfield Services Opens New Global HQ

Swire Oilfield Services opened its new global headquarters in Aberdeen, part of an overall investment in the business of more than $70m to support the company's international business development strategy. Swire Oilfield Services currently employs 750 people globally and expects to further increase its workforce by approximately 30% over the next 12 months. Globally, the company has increased its fleet size by 65% in the last five years.

iXBlue's First User Conference

This month iXBlue will hold its first User's Conference and Training Event, a conference designed to provide an overview and update on iXBlue systems, solutions and field work with presentations and talks by renowned experts on FOG technology, acoustic positioning systems, and other key technologies. The main themes for this event are Fiber Optic Gyroscope technologies; Subsea Positioning for Autonomous Underwater Vehicle (Out of Straightness survey, Metrology, Navigation at the North Pole, Dynamic Positioning); Ship Navigation and Surveys; and Land & Air Mobile Mapping Surveys.

The inaugural iXBlue User Conference will be held in Houston Texas Feb 25 to 27 with iXBlue product training offered on Feb 28 2013. Customers attending will have unprecedented access to iXBlue experts and partners as well as other users. They will have the opportunity to learn and participate in discussions regarding new technologies in the field. The conference will offer excellent opportunities to interact with experienced users of iXBlue systems and will showcase the wide range of iXBlue technology applications.

Call: +1 781 937 8800
Email: userconference@ixblue.com
Visit: www.ixblue.com

Flagship Projects Leads to Growth

TWMA signed a contract win for Zakum Development Company's (ZADCO) flagship UZ 750 Project at Abu Dhabi's Upper Zakum field, the fourth largest oilfield in the world. Commencing in December 2012, the contract, worth up to $20m, will see TWMA design, commission and operate an advanced solids control and fluid recovery system for the artificial islands project - the first of its kind in the United Arab Emirates. The contract is for a period of five years with two one-year extension options.

AXYS Partners with OADS on Vindicator

AXYS Technologies Inc. has partnered with Optical Air Data Systems (OADS) to develop and manufacture the Vindicator Generation 3 Laser Wind Sensor for the AXYS WindSentinel floating wind resource assessment system. Combining the current Vindicator technology with lessons learned from the world's first commercially deployed floating LIDAR systems, the Vindicator Generation 3 Laser Wind Sensor will feature enhanced wind resource data collection combined with an innovative lens cleaning solution specifically designed to deliver reliable, accurate results in the challenging marine environment.

Safety Contract win for NHC

A North-east hyperbaricand UKAS testing facility has won a prestigious contract to test a piece of life saving equipment for the diving industry. The National Hyperbaric Center (NHC), based in Aberdeen, has recently taken on the testing of The Sea Marshall, a piece of equipment used by divers worldwide for alerting and locating a man overboard.

Featured Product

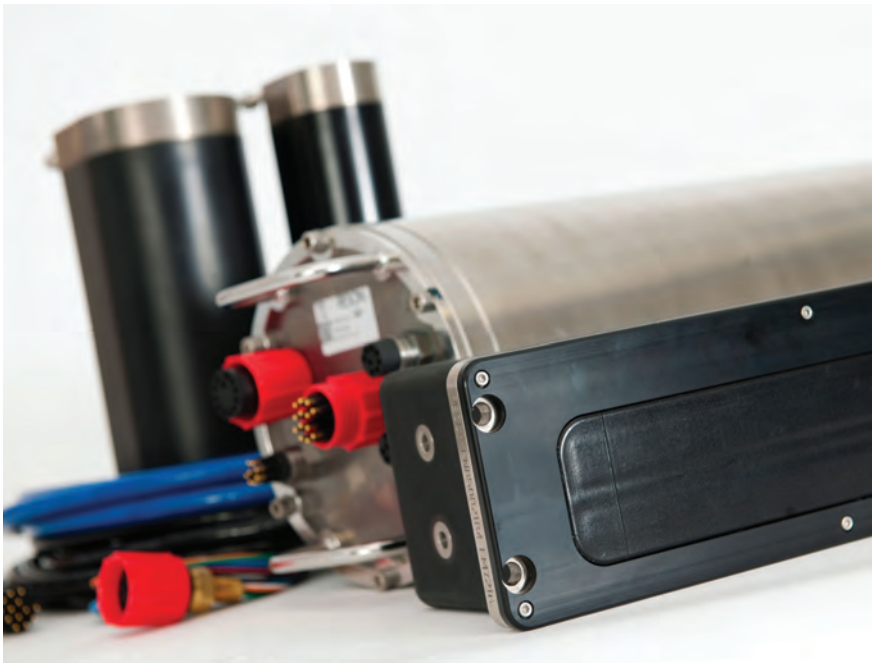
Lightweight, 10° Down-Angle Options to "Mini" M Series Sonar

Teledyne BlueView's new mini M Series is now available with lightweight and 10° down-angle options.

Teledyne BlueView added two new options to its mini M Series 2D Multibeam Imaging Sonar, lightweight and built-in 10° down-angle. The new lightweight model reduces the M Series weight by 30% to 3.4 lbs. in air with near neutral buoyancy in water. The new M Series lightweight and 10° down-angle options are specifically engineered to meet the demands of micro-ROV and diver handheld platforms. The built-in 10° degree down-angle enhances usability by improving imaging of bottom or surface targets without having to tip the sonar or platform downward, and the lightweight improves handling.

www.blueview.com

RESON SeaBat 7125-ROV2
Enhanced Performance



RESON is adding the extra features contained in its Feature Pack 3 (FP3) to the SeaBat 7125-ROV2 multibeam system. FP3 contains RESON's latest SeaBat technology for enhancing performance and efficiency, based on four state-of-the-art features: RESON's new SeaBat User Interface, Tracker (Autopilot), X-Range (400kHz), and Full Rate Dual Head (400kHz).

FP3 was introduced earlier this year on the SeaBat 7125-SV2 hardware platform and has proven to be a successful addition to the RESON family, providing customers with added value by maximizing data density and enhancing data quality through increased noise immunity. The X-Range and Full Rate Dual Head features form the core of the FP3 and are what make this feature pack such a useful addition to the SeaBat family. RESON's X-Range is a software and hardware package that provides extended range performance for the SeaBat 7125 as well as significantly increasing the system's protection to external noise. X-Range combines frequency modulated transmission with advanced signal processing techniques to extract maximum possible performance from the system.

www.reson.com

Offshore Flow Measurement Solutions from McCrometer

McCrometer offers advanced flow meter technology measurement solutions for challenging space- and weight-constrained offshore oil & gas production environments. Subsea modules, Offshore Platforms and FPSO Vessels necessitate flow meters that can maintain accuracy under rugged, crowded, high pressure conditions. Already cramped installations are further complicated by the extensive straight pipe runs required by most flow meter measurement technologies to condition fluid for measurement accuracy and repeatability. McCrometer's versatile, space- and weight-saving V-Cone Flow Meter and highly scalable Wafer-Cone Flow Meter have met the challenges of the oil and gas industry for more than three decades.

V-Cone Flow Meter

Featuring advanced dP technology, McCrometer's V-Cone Flow Meter offers built-in flow conditioning that is designed to reduce the upstream/downstream straight pipe run required by Orifice Plates and Venturi Tubes by up to 70%. This reduction in pipe requirements adds up to cost savings in materials and installation labor, reducing FPSO Vessel tonnage and the footprint of Subsea modules.

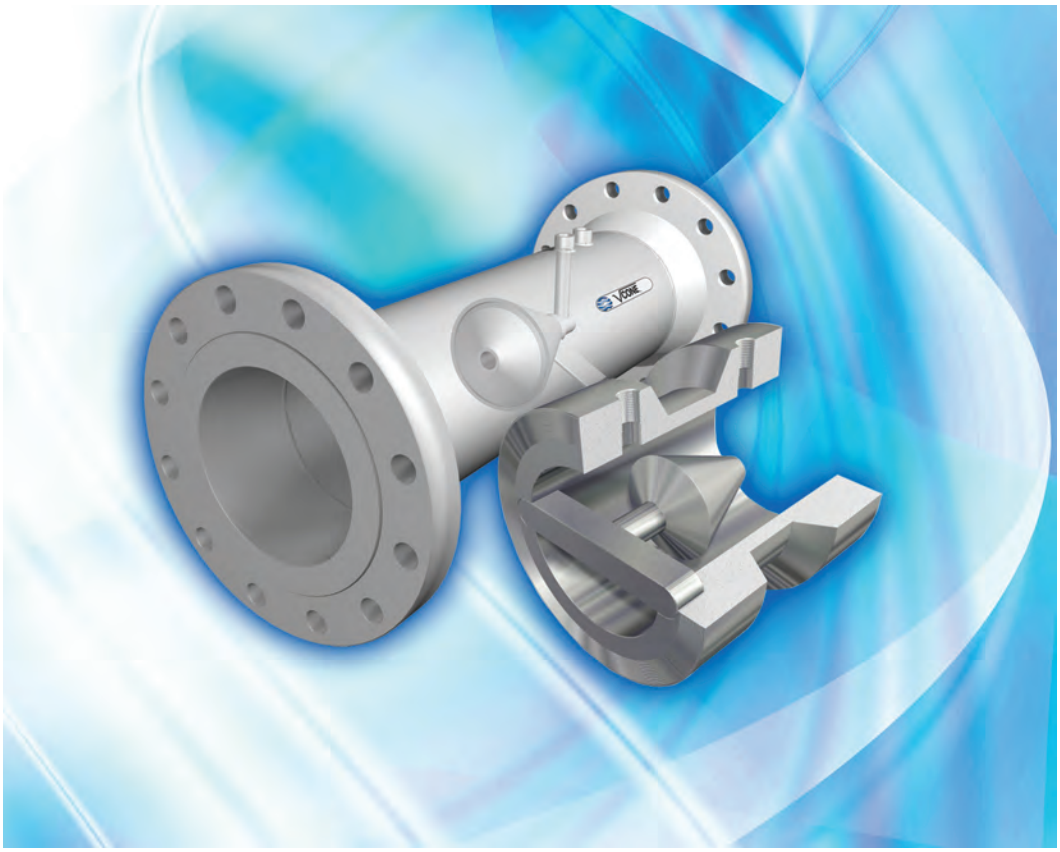
McCrometer

The V-Cone provides a stable flow profile for reliable measurement, featuring accuracy of ±0.5% of actual flow and repeatability of ±0.1% over the entire range. It is ideal for the measurement of liquid, steam or gas and is available for line sizes from 0.5 to 120 inches, with an unmatched 10:1 turndown ratio for wide rangeability. Its no-moving-parts design provides an extremely rugged instrument with virtually no maintenance required over a long life.

Wafer-Cone Flow Meter

The scalable Wafer-Cone Flow Meter is ideal for small line processes in line sizes from one to six inches. Like the V-Cone, self-conditioning means little or no upstream or downstream piping runs are required. The economical Wafer-Cone can be installed virtually anywhere in a piping system or be easily retrofit into an existing piping layout, making it ideal for retrofitting into the space-constrained offshore production environment as well as reducing the cost of new installations.

www.mccrometer.com



SEA CON's New Ultra Series

Developed in response to the needs of both the offshore oil and renewable energy industries, SEA CON's new ULTRA series is larger than other SEA CON connectors and is suitable for high power. This connector range has a depth rating to 30,000 ft. (15,000 psi pressure rating mated/10,000 psi open face) and is available in three sizes; 30, 45 and 50 with the number of the connector indicating its overall diameter (in tenths of inches) of the base connector pair. Other key features include: front and rear pressure rated; inserts reversible between shells, meaning the sockets can be on the bulkhead, suitable for power packs, batteries; field installable and serviceable; and simple design

www.seaconworldwide.com

DeepSea Power & Light: 220Vac SeaLite Sphere

DeepSea Power & Light released the-220Vac version of the SeaLite Sphere, taking this LED light to the next level by extending the range of input voltages available for the subsea market. SeaLite Sphere previously covered both low (10-36Vdc) and high voltages (120V) in AC and DC. This powerful, dimmable, and compact LED light is now available for 220-275Vac (50/60Hz) and 275-385Vdc input as well. The SeaLite Sphere uses the same connector choices, mounting bracket, input voltages, and easy dimming options that have been used with the Halogen Multi SeaLite family of lights for many years. The LED SeaLite Sphere successfully operates around the world, from splash zones to depths of 6000m and beyond.

Email: Pedram_pebdani@deepsea.com

200m Rated DS5X Sondes for Rent

OSIL added a 200m rated Hydrolab DS5X to its rental pool and the units are now available for hire. The DS5X is a multiparameter water quality sonde, capable of measuring up to 15 water quality parameters simultaneously. The memory capacity of up to 120,000 measurements allows users to deploy the sonde in situ for long periods of time. With its central brush motors, the DS5X is also ideal for extended deployments where biofouling may otherwise become an issue. As with the other Series 5 multiparameter sondes, the DS5X allows optimized combinations of sensors and accessories to suit water quality monitoring applications in all environmental water sources such as rivers, streams, lakes, reservoirs, oceans, bays, estuaries and groundwater aquifers. The DS5X can be used in a broad range of applications including dredge monitoring, long term in-situ environment monitoring and buoy based applications.

www.osil.co.uk
Email: sales@osil.co.uk

Cable-Free ZLand System

FairfieldNodal enhanced the ZLand nodal system, the latest addition to the company's premier cable-free seismic acquisition lineup. These new nodes feature longer recording times and the ability to add external sensors.

The new ZLand nodes are available in one- and three-component versions. Both models allow data downloads in half the previous time and extend recording time to 36 days or more. The one-component node is smaller and even lighter weight than the original ZLand node.

www.fairfieldnodal.com

Four pin Addition to Range of API Connectors

To support the growing demand for API connectors - the MacArtney Underwater Technology Group is ready with a 4-pin addition to the Mac API Power and Signal Connector range. The 4-pin connector features a compact, rugged design that the company says is ideal for securing critical connectivity and optimal design for underwater equipment solutions. The new connector is especially applicable for riser monitoring, drilling control and BOP (blow out preventer) systems.

From draft to delivery, the Mac API 4-pin connector is designed to comply with American Petroleum Institute (API) standards 16D and 17E - for use in critical and strictly regulated environments. The connector is tested to full ocean depth and has an operational depth rating of 4000m. In addition, the connector has an operational voltage of 600 V and can take 10 A per pin. The Mac API 4-pin connector will work at temperatures ranging from -15 to +60 degrees Celsius.

www.macartney.com

MTS/IEEE San Diego conference to be the largest in U.S. history: World ocean community to gather at An Ocean in Common in San Diego, September 23-26, 2013

More than a dozen professional and academic societies are coming together for OCEANS '13 MTS/IEEE San Diego, An Ocean in Common. The conference is scheduled for September 23-26 with many side activities taking place before, during and after the event, making it the largest and most comprehensive ocean science and engineering gathering in U.S. history.

The sponsoring societies are the IEEE Oceanic Engineering Society (IEEE-OES) and the Marine Technology Society (MTS). Scripps Institution of Oceanography at UC San Diego has been announced as the OCEANS '13 MTS/IEEE San Diego academic host. Participating societies include: AGU Ocean Sciences (AGU-OS), Acoustical Society of America (ASA), The Oceanography Society (TOS), Society of Exploration Geophysicists (SEG), American Fisheries Society (AFS), the Society of Manufacturing Engineers (SME), the Association of Dive Contractors (ADC), and others.

According to conference chairman Robert Wernli, the world's leading scientists, engineers and technologists will be attending to participate in the celebration of the 50th anniversary of MTS, the 45th for the IEEE Oceanic Engineering Society, and the 110th anniversary of Scripps Institution of Oceanography at UC San Diego.

"Scripps Institution of Oceanography is proud to be academic host of An Ocean in Common," said Doug Bartlett, a professor of marine microbiology and chair of the Education Department at Scripps. "This historical gathering couldn't be more timely as Scripps celebrates its 110th anniversary during the conference. Our oceans, 70 percent of Earth's surface, require our collective intelligence and attention as never before and Scripps is proud to be a collaborator in this vital gathering of scientists, engineers and the community."

This international conference is a major forum for scientists, engineers, ocean professionals and enthusiasts to gather and exchange their knowledge and ideas. An Ocean in Common features a day of tutorials, multiple tracks of technical sessions, student poster competition, keynote speakers, receptions, public exhibit halls, and a banquet on the USS Midway aircraft carrier in San Diego Bay. In addition, a two-night film festival and weekend golf tourney will kick off the week's activities. Other side events offered include local diving, and visits to the many attractions that make San Diego one of the world's most popular destinations. Today it was announced that a second exhibit hall has been opened, due to popular demand. Information on Registration, Schedule, Call for Papers, Exhibit Space, and updates on the week's events are posted at http://www.oceans13mtsieeesandiego.org

MARINE TECHNOLOGY REPORTER

2013 Editorial Calendar

January/ February — Ad Closing: Feb 1

Subsea Vehicle Report: Unmanned Underwater Systems

Market: Renewable Energy –Wind, Wave & Tidal Power Report
Product: Scientific Deck Machinery
Regional Report: Northeast USA

Bonus Distribution
Subsea Tieback
March 5-7
San Antonio, TX

March — Ad Closing: Mar 1

Instrumentation: Measurement, Processing & Analysis

Market: Sonar Systems & Seafloor Mapping
Product: Umbilicals, Cables, Connectors & Power Supply
Preview: Ocean Business 2013

Bonus Distribution
Ocean Business
April 9-11
Southampton, UK

April — Ad Closing: Apr 1

Offshore Energy Report

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

Bonus Distribution
OTC
May 6-9 Houston, TX

May — Ad Closing: May 7

Hydrographic Survey

Market: Salvage & Recovery
Technical: Seaflooor Mining
Product: Subsea Inspection

Bonus Distribution
Energy Ocean International
June 10-12 Warwick, RI
UDT 2013
June 18-20 Hamburg, DE

June — Ad Closing: Jun 3

AUV Operations

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

Submission Deadline:
Entries for the MTR 100 must be submitted to the editor by June 28

July/ August — Ad Closing: Jul 26

MTR 100

The MTR 100 is an invaluable guide for companies, government agencies, municipalities, research institutions and universities

Special Edition:
MTR 2013 Global Subsea Products & Services Directory

Bonus Distribution
AUVSI Aug 12-15
Washington DC

September — Ad Closing: Aug 28

Ocean Observation: Gliders, Buoys & Sub-Surface Monitoring Networks

Market: ROV Technology: Workclass to Micro Vehicles
Products: Underwater Imaging: Lights, Cameras, Sonar
Regional Report: Southern California
Preview: Oceans 2013

Bonus Distribution
Oceans '13
Sept 23 to 27
San Diego, CA

October — Ad Closing: Oct 4

Subsea Defense

Market: Naval Underwater Warfare Technology
Product: GPS, Gyro Compasses and MEMS Motion Tracking
Special Report: Training & Education Institutions & Facilities

Bonus Distribution
SNAME
Nov 6-8 Seattle, WA

November/ December — Ad Closing: Nov 22

Fresh Water Monitoring & Sensors

Market: Marine & Subsea Engineering & Construction
Product: Offshore Inspection, Repair & Maintenance
Preview: Underwater Intervention 2014

Special Edition:
2nd Annual Underwater Imaging Contest

Bonus Distribution
Underwater Intervention

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

Photos: Mara Tuchman

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PRODUCT & PROFESSIONAL SERVICES DIRECTORY

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25	DeepSea Power & Light	www.deepsea.com	(800) 487-3775
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Bye, bye birdy.

Just one of the many iconic images from the work of Harold Eugene 'Doc' Edgerton, the MIT professor who was a true pioneer in a number of underwater areas. (Story p. 18)

(Photo Courtesy of MIT Museum)

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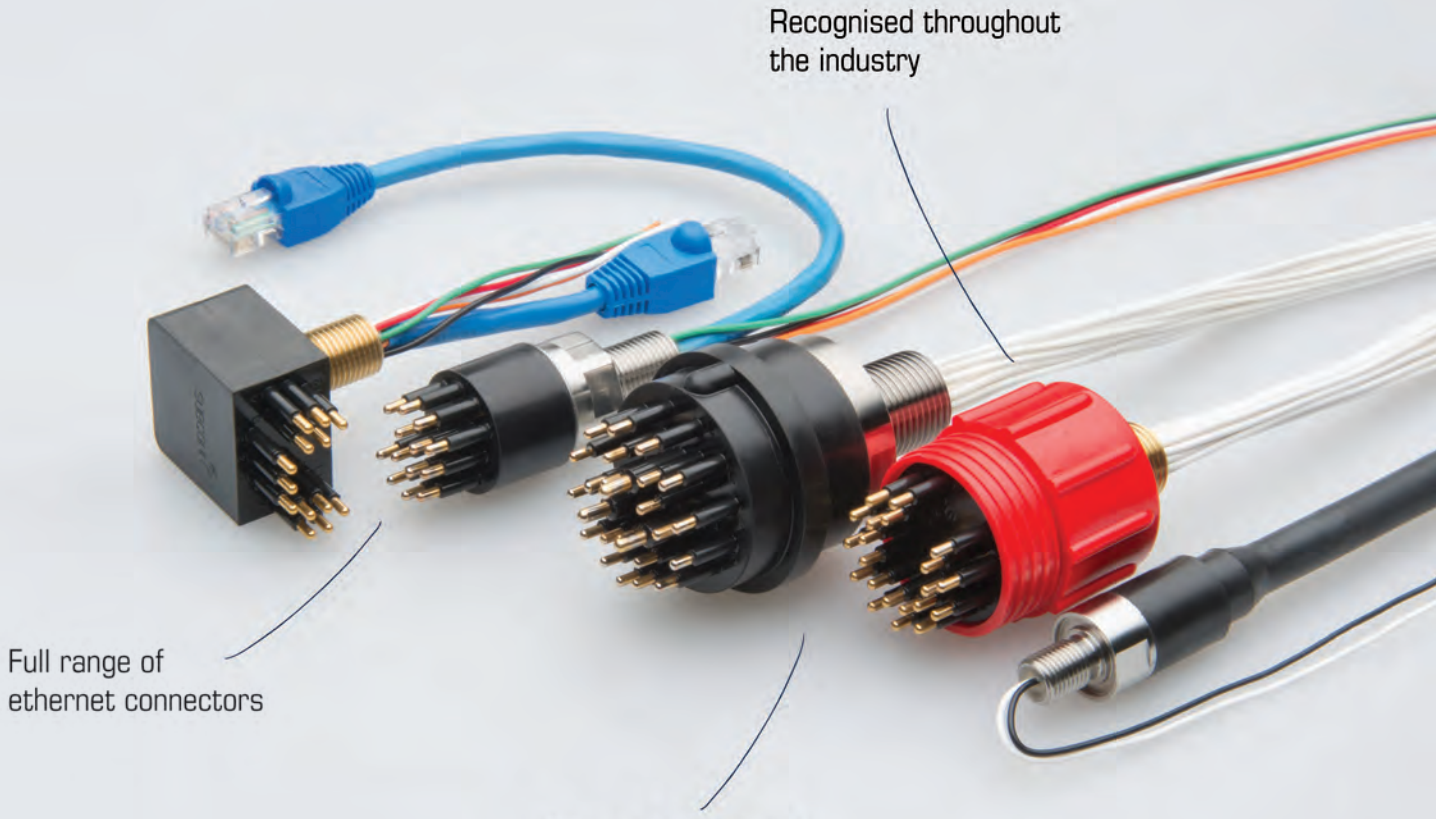

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