MARINE TECHNOLOGY REPORTER

January / February 2014 www.seadiscovery.com

UUVs

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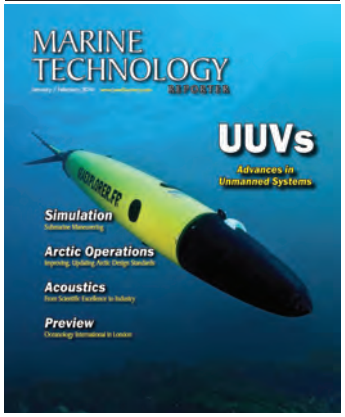

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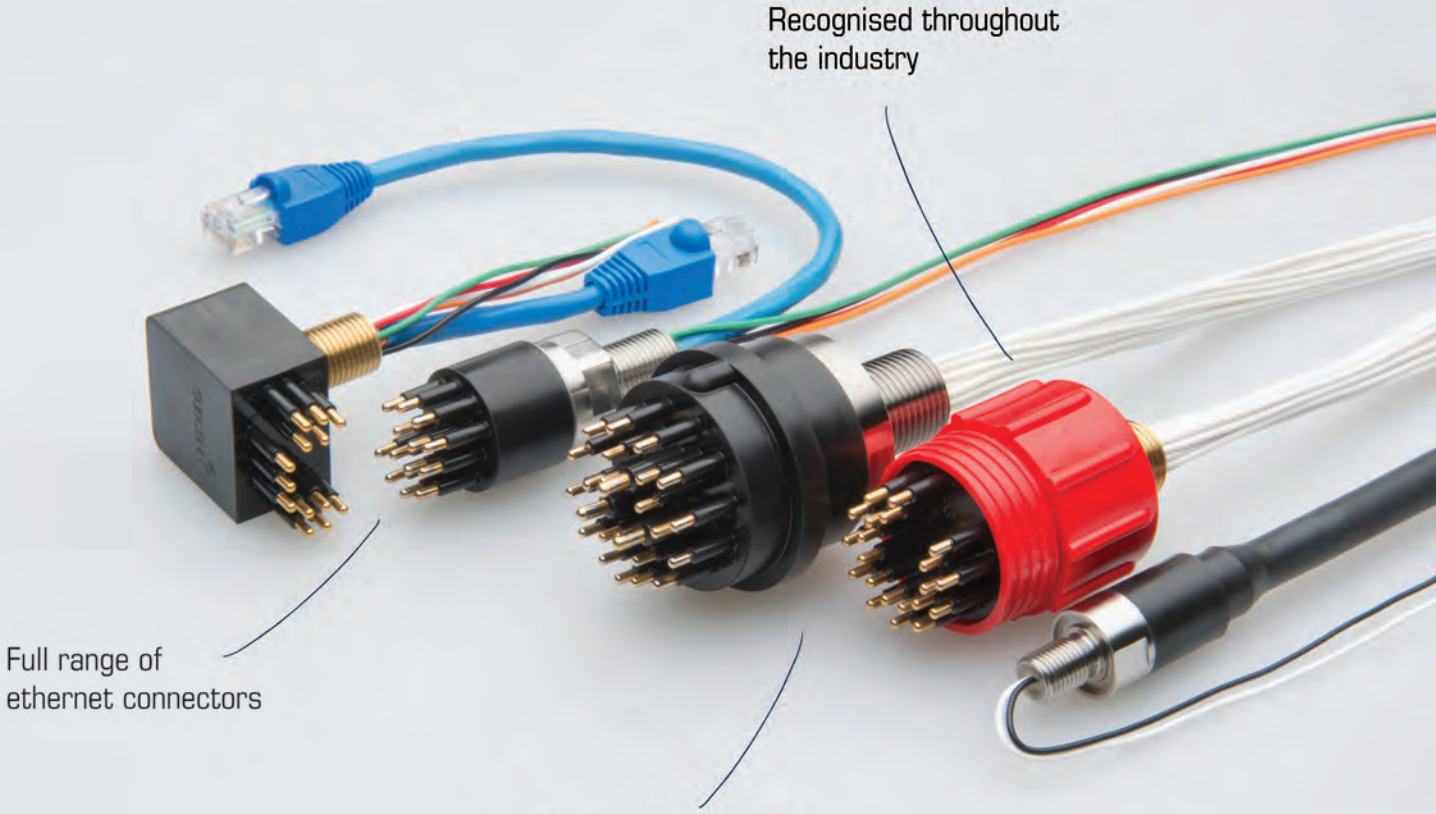

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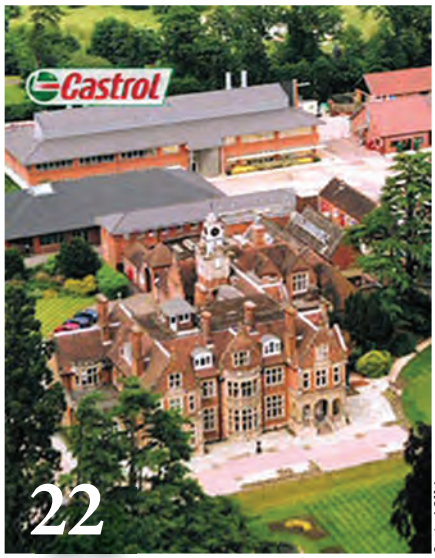

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Next month the subsea community gathers in force in London for Oceanology International 2014, the world's largest and arguably the most influential exhibition for this industry in the world. As this is *MTR's* traditional "UUV" edition, our collective editorial minds were already consumed exploring latest developments in the AUV, ROV, glider and ASV sectors, when along comes the "OI 2014" preview from event director **James Coleman**. Professor **Ralph Rayner**, OI 2014s conference chair, not only neatly tied the ribbon on this edition, he also provided perfect fodder for this page as he is quoted:

> *"Perhaps the most significant technological change we're seeing is the move from using conventional ships to unmanned vehicles. We're seeing the emergence of many new unmanned vehicles and platforms made possible by novel new materials, novel power sources, and advances in computing.*
>
> *The growing use of UUVs is also driving developments in sensors. It's driving the development of lower power sensors that will operate for longer durations with much higher degrees of reliability than has perhaps been required in the past.*
>
> *With the increasing use of autonomous vehicles comes the need for better underwater communications, and better underwater positioning. As we move towards exploiting resources in ever more difficult parts of the ocean, in deeper water and in harsher environments these technologies come into their own in making this possible."*

So there you have it, in the proverbial nutshell. The use of UUVs advances at a brisk pace, in tandem with and driving development across nearly every other sector. This, coupled with vibrant and fast growing offshore energy and maritime markets, particularly in the United States, bodes well for a strong 2014 and beyond.

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O&G Exploration off the Falkland Islands

Rockhopper Exploration discovered up to 1.4 billion barrels boe in its Sea Lion prospect in the North Falkland Basin during the spring of 2011. In 2012 disappointment set in with many dry wells and only Borders & Southern Petroleum finding an estimated 190 million barrels of condensates in the South Falkland Basin. In 2013 exploration was basically halted while seimic surveys continued. There were two 3D seismic campaigns in the South Falkland Basin and the start of a third. 2013 also saw FOGL and Desire Petroleum plc merge, which has resulting in a larger company with a budget of $275 million for exploration.

The major focus in 2014 will be on the Sea Lion discovery in the North Falkland Basin. According to operator Premier Oil plc and partner Rockhopper Exploration plc., the field is believed to hold 394 million barrels of oil equivalent that can be recovered. Once developed it is expected to reach a gross production plateau rate of between 80,000 and 85,000 barrels per day, although first oil is unlikely to be achieved until late 2018 at the earliest. Premier holds a 60% interest in the PL032 license, which contains the majority of the Sea Lion discovery, after it farmed into the field in October 2012. Rockhopper has a 40% share. Premier and Rockhopper are not the only companies keeping a close eye on the Sea Lion project. This is because the field extends south into the PL04b license, in which Falkland Oil & Gas holds a 40% stake along with Rockhopper (24%) and Premier (36%). Estimates for the PL04b license range from 71 million barrels to 218 million barrels.

The Argentinian government, which still claims the islands belong to Argentina, have demanded that exploration stops and have sent warnings to the effect that they will seize ships that partake in the exploration efforts, including cargo ships, that enter its ports. In truth there does not appear to be much the Argentinians can do to stop the exploration efforts, short of starting another shooting war, which it is in no condition of doing. There is still much potential along the North and South Falkland Basins, and it is possible that larger reservoirs may still be found during the ongoing seismic surveys.

Posted by Claudio Paschoa on **SeaDiscovery.com**

Naval Sonar

& Whale Behavior … the debate carries on

A study funded by the United States Navy illustrates how noises from explosives, engines and other industrial activities can directly affect blue whale (Balaenoptera musculus) behavior.

The largest marine mammal, with most adults over 100 feet long and 30 tons in weight, has been the target of studies like this for years but in this newest experiment, researchers found that sonar-induced disruptions on how whales feed could have previously undocumented impacts on their health.

To conduct the experiment, researchers simulated military sonar and other mid-frequency sounds on tagged blue whales in feeding areas within the Southern California Bight. Within the controlled areas, researchers then exposed the whales to two different sounds: simulated military sonar signals and “pseudo-random noise.”

What they found was that whales in certain states, such as feeding or non-feeding, were ultimately affected by the noises. Researchers described their actions as “brief avoidance responses” and when the noises were deactivated, the whales’ behavior tended to return to pre-exposure conditions.

A leading hypothesis amongst whale researchers is that acoustic sonar waves may disrupt communication between blue whales, leading to mass strandings. These events have been documented since 1874 but since the introduction of naval sonar, the frequency of whale strandings has increased over time.

Researchers concluded that the behavioral changes due to naval sonar operations hinges on the amount of noise the whale is exposed to and whether or not the whale was feeding.

by Tyson Bottenus on **SeaDiscovery.com**

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Pulling Power

Modern deck machinery is essential to efficient subsea vessel operations.

For those on the water conducting experiments, surveys or military exercise, it is impossible if not foolhardy to point to one system or piece of equipment that is head and shoulders above the rest in importance when it comes to conducting a safe and efficient project. But for those who have been present when a winch has jammed, a line has snapped or rough seas have thwarted deployment and recovery operations, it could be argued that modern, precision controlled deck machinery plays an indispensible role in making or breaking an operations.

The Investigator

Look no further than page 14 and MTR's two page feature on Australia's new, largest Research Vessel, Investigator, for proof. The ultra-modern 93.9m RV is a testament to modern marine and RV technology, complete with a suite of modern deck machinery and systems that dominate its large deck.

The complete suite of fisheries, scientific and ship's deck equipment was supplied by Rapp-Hydema, including an array of coring, trawling, towing, general purpose, CTD deployment, drum, and anchor/capstan electric winches. Triplex AS, a Rapp-Hydema subsidiary, supplied the coring boom, pipe handler, over stern A-frame and CTD Overhead crane. The aft deck is serviced by a Bergen DKF300 Main Crane, with a capacity of 25 metric tons at 12m, or 5 metric tons at 20m. In addition there are also a Bergen DKF40 utility crane and a Bergen DKF70 stores crane fitted.

A 400-ton MacGregor subsea crane on board North Sea Shipping's North Sea Giant has a similar design with the main AHC winch installed under deck

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MacArtney was chosen to supply a major consignment of high performance oceanographic winches to JAMSTEC, the Japanese Agency of Marine-Earth-Science and Technology. The total of eight winch systems and appurtenant equipment were delivered to Mitsubishi Heavy Industries who, in co-operation with MacArtney launch and recovery technicians, installed them onboard the new JAMSTEC research vessel R/V Shinsei Maru. R/V Shinsei Maru was completed and delivered to JAMSTEC in June 2013, the latest addition to the JAMSTEC fleet. To effectively carry out its broad range of oceanographic surveying, R/V Shinsei Maru is equipped with a wide variety of onboard observation systems, portable research equipment and a remote controlled unmanned probe. For launching and recovering this multitude of surveying systems and equipment, it is outfitted with a MacArtney winch solution. Comprising eight winch systems (four stationary and four portable), the MacArtney winch solution includes General Survey Winch, Large Wire Winch; Medium Wire Winch; Small Wire Winch; CTD Winch

Six of the MacArtney winches onboard R/V Shinsei Maru are empowered by Active Heavy Compensation (AHC), which is designed to dramatically reduce unwanted undulation, cable slack, pull and equipment instability by compensating for the motion caused by heavy seas, in effect helping to dramatically decrease weather related downtime.

MacGregors received an order for two MacGregor active heave-compensated (AHC) offshore cranes from a Turkish shipyard for a new subsea inspection, maintenance and repair (IMR) and construction vessel for a Norwegian owner. A 250-ton and a 15-ton MacGregor subsea crane will be installed on the 129m vessel. The 250-ton unit will have its winch installed below the working deck and will also feature wire rope integrity software. The order was booked in the third quarter 2013 order intake.

"The MacGregor equipment shares this focus and will be delivered with the added benefit of wire rope integrity software, which enhances operational safety and allows an operator to monitor a wire's wear status and therefore plan for its replacement and even extend its lifespan," said Frode Grovan, Director, Sales and Marketing for Advanced Load Handling. The cranes will enable subsea operations to depths of between 2,600m and 3,000m and both will be fitted with a MacGregor Arctic package for safe and efficient operations in cold climates. The Skipsteknisk ST-259-design vessel is scheduled for delivery at the end of 2015.

Vestdavit & the Norway Way

New regulations for davits used in the Norwegian offshore industry will not come into force until 2015, but in the meantime, they are already raising the safety bar, and in fact Vestdavit already has a NORSOK-compliant davit. NORSOK standards are developed by the Norwegian petroleum industry to ensure adequate safety, add value and with an eye towards cost effectiveness for petroleum industry developments and operations. Beyond this, NORSOK standards are as far as possible intended to replace oil company specifications and serve as references in the regulatory process.

According to Vestdavit, NORSOK regulations apply to davits and lifting appliances used on offshore installations and specify many new design features and safety systems must be employed. For its part, Vestdavit has invested heavily to ensure that its davits comply with NORSOK standards. Today, it boasts a 6 ton NORSOK-compliant davit and claims that orders from major offshore operators are coming, in response. A Korean shipyard building a unit for the Norwegian sector of the North Sea for a major operator is the latest to contract a 6 ton SWL NORSOK R002 davit from Vestdavit.

The PLR-6000 pivoting A-frame davit includes all mandatory safety features. The HPU, valves, control systems, electronics cabinets and back up accumulators are all mounted on a separate skid. The system will be fully FAT tested with DNV verification prior to delivery. This greatly simplify yard installation, saving time and cost, says Wigand.

Global integrated geoscience company CGG is leading a joint industry project to improve workboat launch and recovery safety. Vestdavit is the key equipment supplier in the project which also involves DNV and Wilhelmsen as vessel manager. CGG operates a large global fleet of seismic vessels, all

of which regularly launch and recover workboats. This operation is critical to the performance of the vessels and by the nature of the task will always pose hazards for the personnel involved.

A task force was set up to evaluate and report on safety, technical status of equipment, maintenance status, spare parts status, operational procedures and practice, certification status and operational qualifications of personnel. It recommended setting up a joint industry project to develop rules and regulations that will improve safety during launch and recovery of seismic workboats. The project, says Vestdavit, will deliver a new industry standard/guideline for seismic workboat launch and recovery equipment, maintenance and annual testing and davit operator qualifications.

"We are very happy to bring our experience with high quality workboat davits and training operators of these to the project," said Bjørnar Dahle, key account manager, Vestdavit. "These standards and guidelines can help raise the standard across the industry to the level of best practice which already exists. We supply the best equipment, but it must always be maintained and used correctly. This project will help to ensure operators maintain and use launch and recovery equipment safely, which will reduce risks and downtime." DNV will manage the project, which should complete its work by the end of 2014.

Ready for Launch is Australia's Largest Research Vessel

At the end of 2013, the team of Sembawang Shipyard of Singapore and Teekay Shipping Australia will deliver the new scientific Research Vessel Investigator to its owners, the Commonwealth Scientific and Industrial Research Organization (CSIRO), an agency of the Federal Government of Australia.

Investigator is designed to be among the most capable and quietest non-naval research vessels in the world. It will serve Australia in diverse scientific operations ranging over an area from the equator to the ice shelf of Antarctica and spanning almost one-third of the circumference of the globe.

The "design and build" contract for construction of this ship was awarded to a team led by Teekay Shipping Australia and Sembawang Shipyard of Singapore. The design was developed by RALion, a joint venture between Vancouver BC Naval Architects, Robert Allan Ltd, Alion Science and Technology of Alexandria, Virginia and Alion Canada of Ottawa. The contract was awarded to this international team in January 2011. An extensive program of model testing and design work was completed by November of that year. The vessel was launched on July 21, 2013 and then officially named Investigator at a ceremony in Singapore on September 5, 2013. It was due to be completed and turned over to the owners at the end of 2013.

Investigator has been designed to handle the heat and humidity of the tropics and the cold and ice of Antarctica while working safely and effectively in the broad expanse of the Great Southern Ocean separating these extremes. This ice capable vessel has also been designed to meet the underwater radiated noise requirements of the DNV "Silent R" notation up to 11 knots – a capability that enables her to undertake the most sensitive types of environmental research.

Investigator is fitted out with a full range of scientific laboratories, science and fishing winches, coring equipment, air and water sampling devices, and acoustic systems. It is capable of general-purpose oceanographic survey operations in coastal and deep ocean areas, including the physical, chemical and biological oceanography, multi-discipline environmental investigations, ocean engineering and marine acoustics, coastal hydrographic survey, marine geology and geophysics, bathymetric surveys and fisheries research.

In support of these missions, the ship is extensively equipped to perform all the following tasks:

- Acoustic habitat mapping

Invetigator Main Particulars	
Length, o.a	93.9 m
Beam	18.5 m
Depth to Main Deck	9.5 m
Draft	5.7 m
Draft, Navigational	6.9 m
Complement	60 (including scientists)
Vessel Speed	15 knots
Range	10,800 nm
Endurance	60 days

The complete suite of fisheries, scientific, and ship's deck equipment was supplied by Rapp-Hydema, including an array of coring, trawling, towing, general purpose, CTD deployment, drum, and anchor/capstan electric winches.

- Acoustic surveys in support of bathymetric, geomorphological and biological research using a combination of hull-mounted, drop keel mounted, and towed transducers
- Acoustic surveys of marine species
- Acquiring geological samples of the ocean bottom in depths of up to 5000 m
- Acquisition of benthic samples of the ocean bottom at depths up to 6500 m
- Acquisition of up to 20-30 m core samples of the ocean bottom at depths up to 7000 m
- Bottom trawling to depths of up to 4000m
- Calibration of ship mounted transducers
- Conduct horizontal or oblique plankton tows over the stern or over the side of the Vessel
- Conduct oceanographic sampling with rosettes of up to 36 bottles and CTD instrument packages to >6500 m depth while continuously sounding
- Freeze and cold store samples for further analysis at shore based facilities
- Launch / tow / retrieve a broad variety of active and passive sensors and sensor platforms including magnetometers, hydrocarbon sniffers, sonar tow fish, AUVs and UUVs
- Launch/tow/retrieve a variety of egg, larval, juvenile and adult fish sampling systems
- Marine mammal and seabird enumeration, identification, tracking, and bio assessment
- Mid-water and surface trawling

To accomplish the scientific missions above, Investigator is fitted with a gondola and two retractable drop keels to house the extensive scientific sonar and transducer suites, supplied by Kongsberg. The vessel is fitted with a stern ramp to support fisheries research activities.

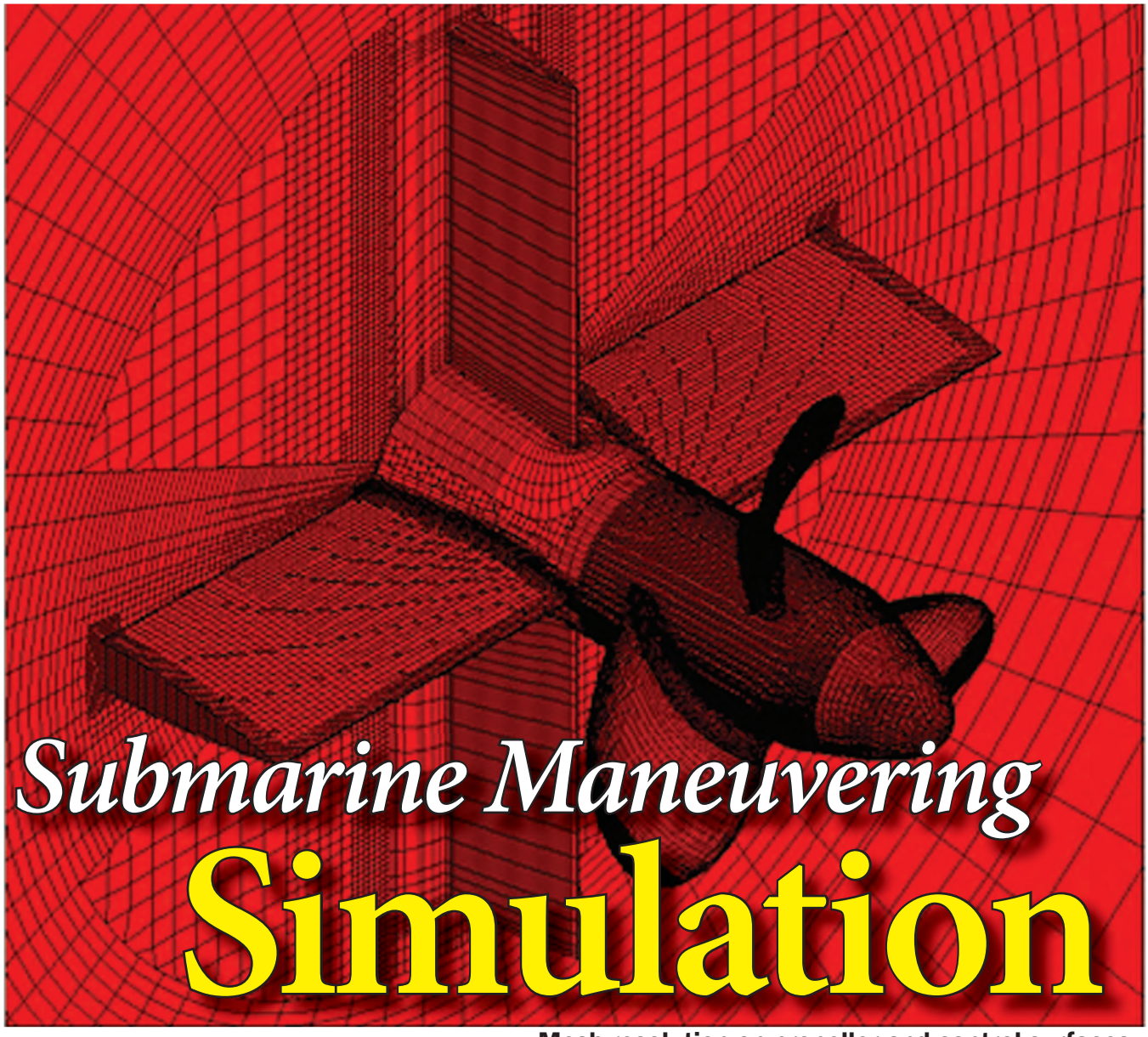
Investigator is classed by Lloyds Register of Shipping with the following notation: +100A1, +LMC, UMS Ice 1C IWS, EP, Research Vessel, DP (AM) and DNV SILENT-R.

The vessel is twin screw, powered by an integrated diesel - electric propulsion and ship service plant provided by L3 Marine Systems. Three Mak 9M25C diesel generators provide a total electrical output of 9 MW at 690V. To meet the noise requirements of DNV Silent R notation, all three diesel generators are double resiliently mounted on araft system engineered by RALion and supplied by Mak. The L3/Indar 690V AC 2600 kW propulsion motors feature a resiliently mounted rotor and other design features to meet the noise requirements. These propulsion motors are believed to represent the first use of AC motors of this size range in a research vessel to meet DNV Silent-R requirements. Wartsila provided the 3.5m diameter 5-bladed propellers, which are specially designed to be cavitation free at 11 knots, and the complete shaft-line from motors to propeller. The ship is also equipped with an azimuthing, retractable bow thruster, Thrustmaster model TH1500MLR, rated at 1200 kW and with Becker Flap type high lift rudders, all creating a vessel with much enhanced maneuverability at low speeds.

- First Platform Deck: scientist's accommodation forward; stores and transceiver room midships, and control room, switchboard room, winch room and container hold aft
- Main Deck: contains all the science labs, CTD lab offices and workshops and is the primary working deck
- Forecastle Deck: crew accommodation, galley, mess, lounge spaces and galley stores, with the upper level CTD lab and CTD winch spaces aft and enclosed anchor and mooring space forward
- 02 Deck Level: senior crew, offices, hospital, chemistry lab, and boat deck
- 03 and 04 Decks: Senior Officers and Sr. Scientist accommodations and offices

The complete suite of fisheries, scientific, and ship's deck equipment was supplied by Rapp-Hydema, including an array of coring, trawling, towing, general purpose, CTD deployment, drum, and anchor/capstan electric winches. Triplex AS, a Rapp-Hydema subsidiary, supplied the coring boom, pipe handler, over stern A-frame, and CTD Overhead crane. The aft deck is serviced by a Bergen DKF300 Main Crane, with a capacity of 25 metric toes at 12m, or 5 metric tons at 20m. In addition there are also a Bergen DKF40 utility crane and a Bergen DKF70 stores crane fitted.

Roll stabilization on the ship is provided by a U-Tube tank system designed by HOPPE.



Submarine Maneuvering Simulation

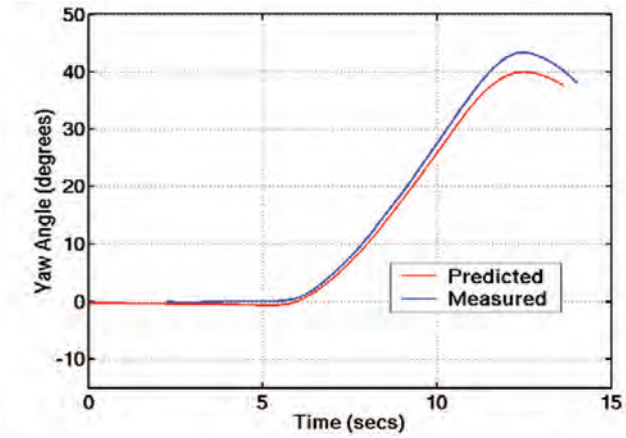
Mesh resolution on propeller and control surfaces.

By Dejan Matic, Bill Clark, Ganesh Venkatesan, CD-adapco

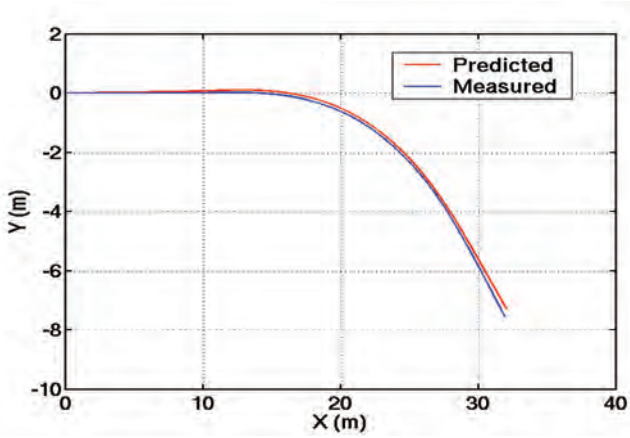
The numerical simulation of submarine maneuvering is a challenging problem that has only recently been addressed by technological advances in commercial Computational Fluid Dynamics (CFD) software. In this article, we demonstrate how CD-adapco's simulation technology can be applied to accurately predict how a submarine's motion is driven by hydrodynamic forces, and compare numerical results with experimental data.

The physics-based simulation of a full-scale submarine performing maneuvers is an expensive proposition relative to many CFD applications. This is principally due to the wide range of length and timescales that must be resolved in order to predict accurately the flow around the submarine hull. An additional challenge involves representing the full geometric complexity of an appended submarine and propulsion unit. The length scales range from the very thin boundary layer to the full length of the submarine. The time scales range from a fraction of the propeller blade passing period to the total duration of a maneuver - more if several maneuvers are combined in a single simulation. These disparities in scale lead to very large computational meshes and simulation times that, until recently, have challenged the state of the art in computational resources.

The submarine in question is propelled by a three-bladed rotating propeller.



Comparison of predicted yaw angle with measurements for horizontal overshoot maneuver.



Comparison of predicted in-plane trajectory of body center-of-gravity with measurements for horizontal overshoot maneuver.

Maneuvers were executed through the application of rudder and stern planes, and controlled by varying the position of these control surfaces in response to the submarine motion predicted by the simulation.

Numerical method

During the course of a maneuver, the submarine changes its position and orientation continuously in time in response to the pressure field generated by application of the control surfaces. The simulation of a maneuver requires the coupled solution of equations of motion of the rigid body (in six degrees of freedom) with unsteady Reynolds-averaged Navier-Stokes equations (URANS). The URANS solver uses a fully-implicit iterative time-integration scheme. It computes the flow field around the body first and integrates the computed shear stresses and pressure distribution on the surface of the body, providing the hydrodynamic forces and moments acting on it. The equations of motion are then solved in order to obtain instantaneous displacements and rotations.

This information is used to update the computational mesh which is rotated and translated as a rigid body with respect to an inertial frame of reference.

The integration and rigid body mesh movement are performed automatically using CD-adapco's Dynamic Fluid-Body Interaction (DFBI) model at each iteration. By converging this iteration process at each time step, the trajectory of the body is obtained. The implicit nature of the method (in which equations of motion are calculated simultaneously with the flow field) is important to ensure the overall stability of the simulation without using an impractically small time step.

Computational mesh

The discretized domain consisted of 3 million computational cells, including layers of prismatic cells next to the walls, which was prescribed in order to capture the near wall boundary layer. The mesh was automatically constructed using CD-adapco's automatic hexahedral meshing methodology: a simple background hexahedral mesh was created within the boundaries of the computational domain, overlapping the geometry of the submarine. Any hexahedral cells that were located completely in-

Surface pressure distribution

side the body or the extruded layer were deleted, while those that intersect this layer were trimmed so that any overlaps were removed. Finally, the mesh was locally refined in regions where large flow variations were expected. The propeller was enclosed inside the cylindrical mesh block that rotates about the propeller axis, with a sliding interface between the cylindrical mesh block and the surrounding fluid domain. Rudder control surface motions were accounted for by using mesh distortion. As the rudder is deflected to a new position at each time step, the mesh in this structured block is locally deformed and smoothed. By employing this procedure only a single computational mesh had to be generated for the entire simulation - rather than creating several meshes for various rudder positions and interpolating between them. Because the rudder mesh motion was integrated into the solution process, less user input was required.

Maneuvering simulations

For the case of constant heading and large depth, the submarine is assumed to be traveling through an infinite domain of stagnant water. The motion of the submarine is controlled by a 3-bladed propeller, rudder and stern planes. The entire computational mesh including the submarine body is assumed to be moving with the body without any deformation. The flow field computations were performed in the inertial frame of reference, which makes the specification of boundary conditions easier. Since the body moves through infinite volume of stagnant water, the velocity specified at the far field boundaries of the computational domain is zero.

For the case of horizontal overshoot maneuvering, the top and bottom rudder surfaces were actuated to initiate the maneuver. In the experiment, the rudder was first deflected to 10 degrees and held in this position until the body reached a yaw angle of 30 degrees. The rudder was then reversed. Predicted time history of roll, pitch and yaw angles show good qualitative agreement with measurements.

Conclusions

Good qualitative agreement has been shown between predictions and measurements for the studied maneuvers. The results obtained demonstrate the suitability of the present methodology for the simulation of submarine maneuvers and motion of similar underwater autonomous vehicles.

CFD simulation tools will help engineers to optimize the design and analysis process and improve the maneuvering capabilities, survivability and cost of submarines.

New Offshore Environmental Lubricant

By Claudio Paschoa, Brazil

During the OTC Brazil 2013 in Rio de Janeiro, MTR's correspondent Claudio Paschoa met with Chris Morrissey, who is Team Leader in Energy Lubricant Development for Castrol in the UK, and Carmen Pino, Regional Sales Director for Castrol Offshore for a chat about the new Environmental Lubricant being developed by Castrol Offshore with the support of OneSubsea. This barrier oil provides extreme thermal stability, good electrical insulation and lubricity, and fully meets the tightest OSPAR environmental legislation

The O&G industry is increasingly targeting deepwater plays, where subsea equipment such as pumps, manifolds and Xmas trees are constantly under high pressure, be it the water pressure at depths that may exceed 2,000m or high pressure from the reservoir itself. There is also the heat coming from the reservoir and the cold from the deep ocean waters which may affect subsea equipment.

Most subsea equipment uses some form of lubricating oil, which is used to lubricate hydrodynamic bearings, mechanical seals and other internal components, but also acts as cooling medium in motor, pump or compressor components. Lubricants additionally keep certain insulation properties in motor and power penetrators, along with transporting wear particles to filters and acting as a barrier between sea/process and internal components. "There were a couple of main drivers in developing the new

(Photo BP)

Castrol's Pangbourne Technology Center.

lubricant. One was the need for environmentally enhanced lubricants, because the traditional kinds lubricants used for subsea applications at the moment do not meet the tighter environmental legislation being introduced, so we wanted to develop a product, which was fully compliant to the stringent environmental legislation in the North Sea. Then, through this development, it became clear that there was a need to extend the performance of the lubricant in order to reach thermal stability requirements. The current conventional lube stars to break down at 100 °C and we managed to extend the thermal stability of the new lube to 220 °C," said Morrissey. The development of a enhanced lubricating oil is a long process, which involves identifying raw materials, formulation screening and the optimization of additives long before any rig or equipment testing is done. "When we started out we didn't really know what we could achieve with the environmental lube, so there was a bit of a challenge there. The typical additives used in standard lube oils don't pass the environmental legislation tests, so we had to search for new chemicals, new additives, new building blocks," said Morrissey.

The major testing in the development stage involves thermal stability testing, TAN variation testing, fluid drying test with coalescing filter and motor insulation compatibility testing, all of which are done at Castrol's Technology Center in Pangbourne, near Reading, west of London. "We have development centers all over the world, but for energy and more specifically for subsea, Pangbourne is where it happens," said Morrissey. "The development work with OneSubsea has been going on for seven years now. We build a collaborative relationship with OneSubsea knowing it would take a bit of time to get through this development, in order to go through all the improvement testing and so on. The key thing in this industry is that everyone wants to know that the product is absolutely going to work and that takes a long time."

Also according to Morrissey, the fin-

(Photo: Claudio Paschoa)

Chris Morrissey and Carmen Pino at the OTC Brazil 2013.

ished product should be ready to go to the market by mid 2014 and the launching location is still uncertain.

"The way we run our organization, we may choose a specific region to launch it but in general cases, especially with the level of certainty we have in the product, we can globally launch pretty seamlessly throughout the organization," said Pino. Since the lubricant was conceived to pass the North Sea environmental legislation, there is a good possibility that it will be first launched in the North Sea, however Morrissey quickly pointed out that "We have to figure out where the first unit using the lube will be delivered and then support it in that region first, as a priority."

There are certainly important advantages offered by the new product, and with the enormous growth that is occurring in the subsea industry these advantages may become an important deferential for players and equipment manufacturers to embrace Castrol's environmental lubricant.

"We are quite excited about two key areas where we see that the new lube has great advantage. One is the demand for this kind of lube from locations where field conditions are really hot and the other is use of the lube in subsea boosting and compression equipment, where OneSubsea is getting to the end of development testing in the use of the lube in its subsea wet gas compressor. Up to now testing has indicated that this lube is ideal for the requirements of this technology. Subsea boosting and compression technology is increasingly being used in deepwater fields as it offers increased operational flexibility, while at the same time bringing some of the surface production equipment to the seafloor. This technology has proven to bring advantages, such as increased production, recovery and flow assurance. Yet some of the equipment requires a

lubricant oil with high thermal rating in order to increase performance and reliability.

Depending on the location where the equipment will be used, there may also be a requirement to comply with specific environmental legislation.

"Thermal stability is really the key aspect of the product, along with the controlled amount of additives used. When we look at the mechanical seals for example, these run at high speeds, creating a pressure differential, which generates a lot of heat. If the lubricant breaks down at high temperatures you get deposits building up on the face of the seals which may cause long term reliability issues. You don't want anything flaking out across those surfaces, you want them to remain absolutely clean and in order to attain that you need a lube with a high thermal stability and a perfectly balanced additive count, because additives can drop out of the fluid and cause lacquering of the seal face", said Morrissey.

Castrol is a global company and as such they have many options on how to market the new product.

"I think there are two elements we need to take into consideration when marketing this product. First there is the equipment and project we know of today, where we will be working collaboratively with the technical departments, receiving direct feedback on the product. There is also a more interesting part, where we try to discover in what other applications the lubricant can be used, for instance, thrusters and well capping may benefit from this kind of lubricant, the potential is huge and that's where our global organization will come into play," said Pino.

Facts about the new Environmental Lubricant

- Performance assurance has been achieved by benchmarking the fluid through testing against existing lubricants of known performance and track record,
- An alternative environmental oil solution, which has little or no additional risk to reliability, and with the benefits of higher performance,
- Further rig testing and real life machine running hours will ensure maximum confidence before launch,
- For wet gas compressor the contra-rotating seal tests and full compressor trial are planned, with TRL4 to be reached by March 2014,
- Next steps for the hot pump development (400F/ 204C) is to qualify the elastomers/polymers over a wide temperature range for extended periods,
- Market demand for larger capacity machines will push performance limits of the barrier oil.

Cold Weather Ops

Improving and updating Arctic design standards for material, equipment, and offshore structures for the petroleum, petrochemical and natural gas industries.

By Andrew Safer

Seventy representatives from seven countries met for two days in St. John's, Newfoundland and Labrador in early October 2013 to further the creation of standards for resource development in the Arctic.

The countries represented included Canada, UK, France, Italy, Norway, Netherlands, and Russian Federation. It was the third annual meeting of the International Organization for Standardization's (ISO's) Technical Committee on Arctic Operations (ISO TC 67 SC8) which focused on advancements in standards with regard to (1) ice management (led by Canada), (2) escape, evacuation and rescue (Russia), (3) environmental monitoring (Russia), (4) working environment (Norway), (5) land extension and Arctic islands (Netherlands), (6) Arctic materials (Russia), and (7) physical environment (Norway). This technical committee is a follow-up to ISO 19906, which established Arctic design standards for material, equipment, and offshore structures for the petroleum, petrochemical and natural gas industries.

Out in Front

Recalling his first involvement in an ice management program in the Arctic in 2000-2001, Stephen Green commented on the current push to develop operations standards. He is Canadian chair of the ISO Canadian Mirror technical

(Photo credit: Lisa L. Piercey)

Representatives of the ISO's Technical Committee on Arctic Operations attended meetings in St. John's, Newfoundland and Labrador.

committee and general manager of Provincial Aerospace's Environmental Services Division in St. John's. "Now, with better technology," Green said, "we are in a position to more effectively utilize oil and gas reserves, and with the reduction in Arctic ice, there is a commercial opportunity for shipping using the northern sea routes. The Arctic train is leaving the station," he observed, "and you can't stop it. You have three choices: You can either be on the train and influence its course, you can stay behind at the station, or you can be under the train." He added that the technical committee's focus is to be proactive and work together to develop standards for the protection of people, the environment, and assets. "Even if Canada decides not to drill in the Arctic," Green said, "there's drilling in western Greenland.

We have an obligation to make sure that risk is minimized. When someone is drilling outside your borders, it becomes a global issue."

The International Oil and Gas Producers Association (OGP) has championed the development of Arctic standards since the committee was struck in 2011, noted Green. Industry representatives at the meetings included individuals from OGP, Husky Energy, Statoil, BP, Chevron, Shell, Gazprom (Russia), ENI (Italy), and TOTAL SA (France). Representatives from Petroleum Research Newfoundland & Labrador, Canada-Newfoundland and Labrador Offshore Petroleum Board, BN Petrole AFNOR (France), and the Petroleum Safety Authority (Norway) also participated in the meetings, as did the Canadian Standards Association and Standards Norway.

The technical committee convenes plenary meetings twice a year. The first meeting was in Moscow in November 2012, the second in Rotterdam in April 2013, and the next meeting will be in Paris in April 2014. The work groups continue to collaborate between meetings.

Progress & Planning

On October 2, the work groups with representatives from each country reviewed their progress to date, outlined the work that needs to be completed, and began to develop work plans. Votes were cast in a plenary session on October 3, with each country having one vote. "Bringing together international experts face to face is an essential part of the international standards development process," said Paul Steenhof, project manager for CSA Group (Canadian Standards Association). "By meeting together, we're able to start developing the

work plans. This often occurs through a negotiation process where face-to-face time is critical." Once a New Work Item has been accepted by the Subcommittee, the standard for that item is typically scheduled to be completed in three years, said Steenhof. If a four-year development track is required, ISO is notified.

The Ice Management standard, for example, is set to be finalized by the end of June, 2016. Stephen Green is vice-chair of the ice management work group (Robin Browne of Chevron Canada is chair), which encompasses ice, currents, meteorology, and icebreaking and ice management operations utilizing remote sensing, aircraft sensor, and radar data. Their work will culminate in the creation of a manual that will include checklists that oil companies will use in the development of their ice management plans.

António Simões Ré who is Canadian vice-chair of the ISO technical committee and also working group lead of the escape, evacuation, and rescue work group, likened the decision making process to that of the United Nations. "Countries have different approaches to legislation," he said. "For example, traditionally, the Russians tend to be more prescriptive while Canadians are more oriented towards performance-based, so you have to work through that." Simões Ré, who is a senior research engineer at the National Research Council of Canada's Ocean and Coastal Rivers Engineering facility in St. John's, noted that the biggest challenge for his work group is addressing the requirements of both onshore and offshore operations. Whereas winter conditions are severe in the offshore areas, onshore operations may benefit from temporary infrastructure such as ice roads which facilitate evacuation. He doesn't think the hazards and challenges of working at the different latitudes in the North can be addressed by improving on existing technologies.

"A step change is needed," said Simões Ré. "We need new ways of doing things, due to the remoteness and lack of infrastructure. The solutions will need to be more self-sufficient and robust." He foresees either the development of designs that are fitted for all hazards and conditions that work in all seasons—but that do not do anything exceptionally well—or multiple types of evacuation technology that will be tailored for each season. While Arctic operations won't provide a high-volume market for new technologies, Simões Ré sees this as an opportunity for companies to showcase their design capabilities, which will likely lead to applications in less challenging environments.

St. John's was chosen as the venue for the meetings in Canada due to the high concentration of harsh-environment expertise residents here. "This has been an opportunity for Newfoundland and Labrador to truly become the Arctic gateway," said Green. "If we can survive on the Grand Banks, it's a great testing ground for the Arctic." He added that Newfoundland and Labrador has the highest per capita involvement on the technical committee internationally.

Companies located in the province that were represented at the meetings include: Provincial Aerospace, AMEC Environment & Infrastructure, AKAC Inc., Iceberg Logistics Inc., Rutter Inc., Oceans Ltd., Oceanic Consulting, Deltaradar, and Virtual Marine Technology. OceansAdvance, the organization that represents the ocean technology cluster in the province, coordinated the event. "The entry of the International Organization for Standardization into the Arctic equation can be seen as a strong affirmation that the region is on the cusp of major development," said Les O'Reilly, executive director of OceansAdvance, "especially across the oil and gas industry, including the ocean technology sector."

The National Research Council of Canada (NRC) on the Memorial University campus hosted the event. Financial and logistical support for the October meetings was provided by NRC. Atlantic Canada Opportunities Agency and the Government of Newfoundland and Labrador's Department of Innovation, Business and Rural Development provided financial support, and the City of St. John's provided logistical support.

Bottom Line: Standards + Cooperation = Safety

Characterizing Canada's effort with regard to the technical committee, Green said, "When it comes to the Arctic, we have the federal and provincial governments and the private sector working together. We're all on the same oar, which does not happen in a lot of countries." Steenhof said the Arctic is "a huge priority"—not only because of its high concentration of natural resources, but also because of the necessity to ensure sustainable economic development as well as environmental protection—noting a recent protest by Greenpeace in the Russian Arctic.

"I attended a meeting last week with senior representatives of oil and gas producers," he added, "and they emphasized the need for safe operations in the Arctic. Operational standards are of critical importance in this regard—to the oil companies in particular. They need the social license to operate in the Arctic, and standards help them achieve that."

Marlin AUV

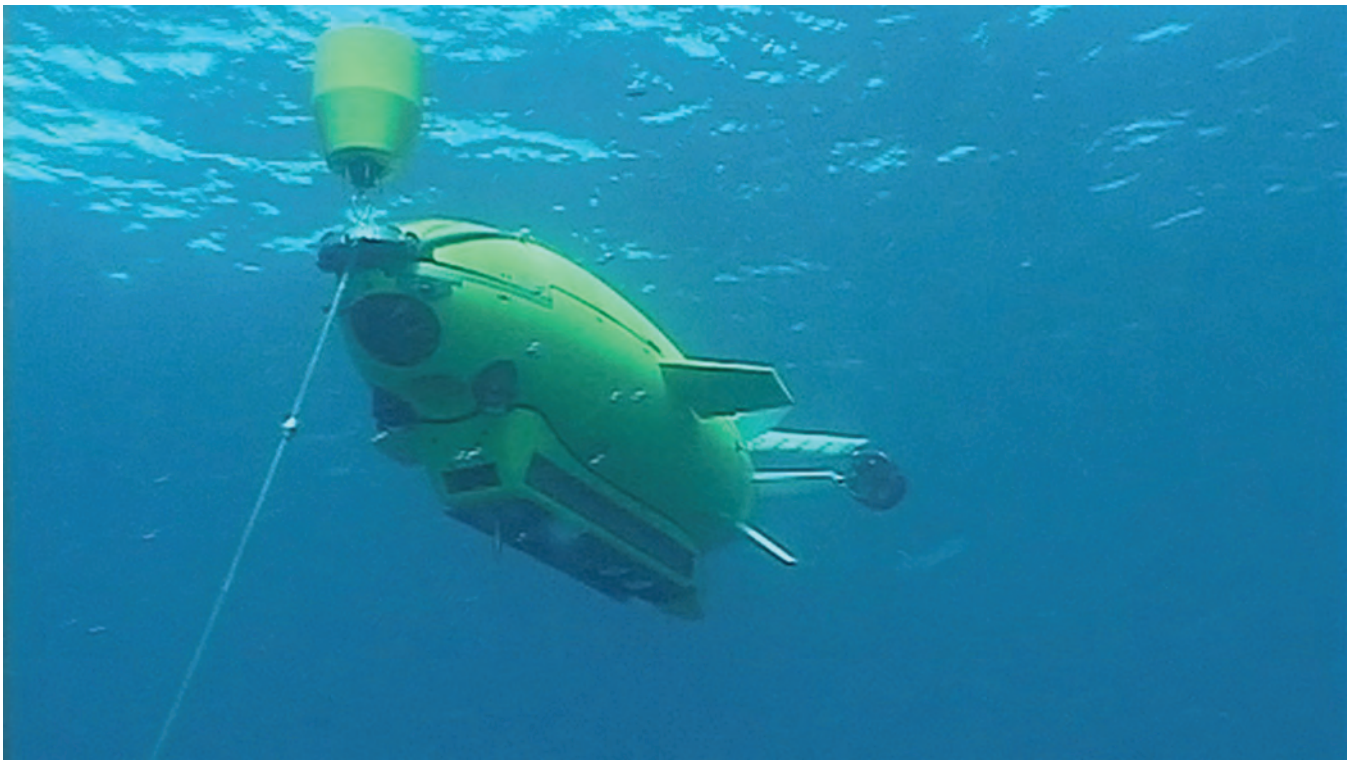
Lockheed Martin's Revolutionary Vehicle

During the OTC Brasil 2013, one of the standout presentations was on the Lockheed Martin Marlin AUV. At first glance it resembles what you'd expect from any top of the line AUV. Yet on closer examination it offers capabilities that may be real game-changers for the industry. After the presentation MTR's Correspondent in Brazil, ***Claudio Paschoa*** *spoke to Dan McLeod, Senior Program Manager at Lockheed Martin.*

Although the Marlin AUV is presented as targeted for customers who conduct subsea infrastructure surveys and inspections, it is capable of much more, as it can be configured to operate subsea Xmas tree valves and other such equipment, which until now have been a territory solely for ROVs.

The Marlin AUV can also be useful for simpler tasks such as surveying a large area of uncharted seabed, where an operator plans to place subsea systems, such as Xmas trees, manifolds, subsea pumps and subsea pipelines, during the early phases of field development or to examine an area of subsea structures prior to decommissioning and provide operators with significant improvements over general visual inspection (GVI) by the addition of sensors that produce 3D models of the structure being inspected. "Additional benefits include rapid response when a loss of well containment requires large standoff distances between the host vessel and the sensing platform. 3D geo-registered models of the entire scene can be collected within hours of the incident providing responders

Marlin using a homing device.



(Photo Lockheed Martin)

with a clear vision of the underwater scene along with in-situ status of critical components," said McLeod.

Lockheed Martin developed and tested the Marlin AUV employing a Coda Octopus Echoscope 3D imaging sonar as the primary inspection sensor. The Echoscope produces a 128 x 128 matrix of receive beams at a rate of 5/second; a high-density return imaged from multiple aspects that results in a 3D image of the desired objects. The Marlin's software geo-registers each image pixel and constructs a 3D model using advanced image processing techniques. The result is a high-resolution 3D model of the target structure. According to McLeod, "Introduction of new sensors support even more advanced capabilities leading to autonomous metrology, hydrocarbon detection tracking and fingerprinting, non-contact corrosion potential measurement, thermal measurements and 3D underwater scanning lasers."

The Marlin's sensor suite can generate accurate, hi-resolution, 3D, geo-referenced models, showing a clear view of subsea structures, including the use of lasers to produce clear images in murky waters. The 10-ft. submersible is highly maneuverable and is able to operate in tight spaces. It can reportedly perform up to four times faster inspections, delivering higher fidelity information in hours versus days. Traditional means of inspecting subsea equipment employ visual sensors such as video or still cameras mounted on ROVs that are controlled through umbilicals from a dedicated vessel on the surface. This requires significant topside support equipment and skilled operators on site to control and maintain the ROV. While the quality of images has improved with the advent of HD sensors, image quality is often degraded by movement of the cameras and the turbidity of the water, potentially reducing the effectiveness of inspections. The final data provided to clients is often composed of many hours of recorded video that must be archived and revisited for detailed examination, which in turn increases the time it takes to make informed decisions.

While workclass ROVs are a standard in the performance of IRM tasks in deepwater, AUV use is starting to make some inroads as more sophisticated units such as the Marlin AUV become more reliable and efficient. While ROV use still dominates, the inherent cost structure, which includes a large DPII vessel, volumes of deck space and experienced ROV technicians and pilots, are cumulatively helping to open the door for AUV systems for opportunities.

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"The implementation of AUV-based IRM will provide significant improvements in safety, operating efficiency, and project economics for deepwater fields. No longer will large DPII vessels with expensive and cumbersome ROV spreads be required for simple IRM. In the near term, AUVs can be deployed from smaller vessels, be capable of operations in higher sea state and current conditions, and perform IRM tasks much more efficiently without the operational limitations and equipment hazards imposed by umbilical and tether management systems," said McLeod

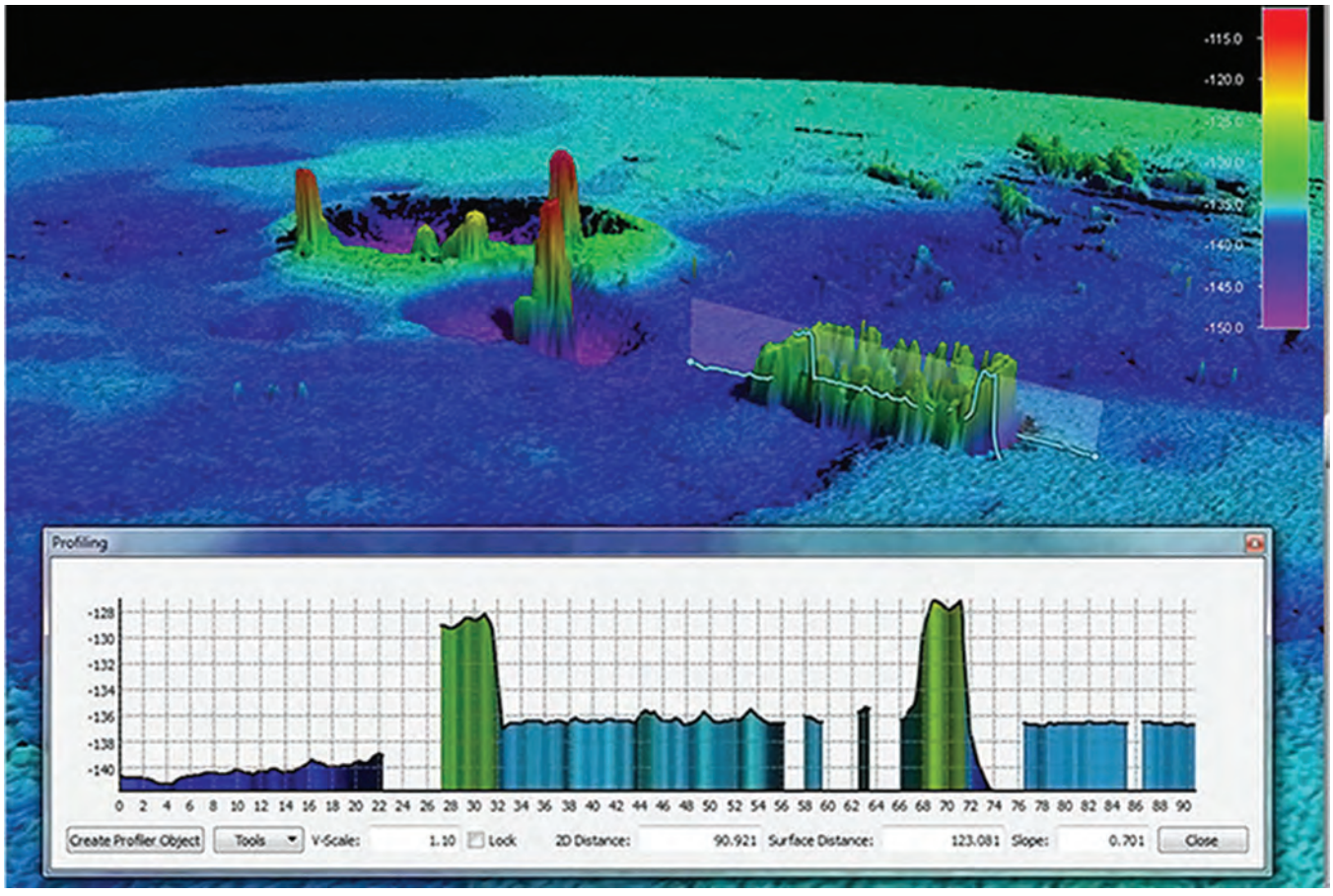
Reduction in equipment complexity, vessel size and crew size can also help lead to improved safety, reliability, and lower environmental impact. Eventually, AUVs will become "field resident," residing in the subsea field for periods of months or years, helping to eliminate the need of the persistent presence of surface vessels, allowing further improvements in environmental monitoring, equipment safety, and operating efficiencies, and substantial reductions in costs. The latest models will have this "residence" capability, which allows it to remain docked underwater next to a subsea field for long stretches of time, independent of its control vessel, this feature alone may be considered something of a game-changer as it will simplify subsea field monitoring and intervention while at the same time significantly lowering OPEX.

"Another major feature is the vehicle's patented and unique launch and recovery system, allowing it to be released from the surface crane and recovered underwater using a homing system, thereby at least mitigating the downtime caused by heavy seas, which normally cause AUV launching and recovery operations to be aborted" said McLeod.

Future capabilities for deepwater AUVs will be substantially enhanced through the use of subsea docking stations and local Wi-Fi "hot spots." The ability to upload high volumes of mission sensor data, download supervisory instructions, and recharge batteries will extend AUV mission life to days or weeks, and eventually to months and/or years.

The ability to have localized real-time high bandwidth wireless communications for critical IRM operations such as subsea production equipment monitoring, sampling, valve operations, and other intervention operations will eliminate the need to mobilize expensive surface vessels and large ROV spreads to accomplish routine maintenance tasks. The value of these capabilities for remote deepwater and/or arctic locations cannot be overstated, since it provides immediate in-field access to complete tasks that would otherwise take days or weeks to accomplish.

Marlin's 3D sonar imagery.



(Photo Lockheed Martin)

Dan McLeod - Sr. Project Manager at Lockheed Martin

(Photo Lockheed Martin)

Marlin AUV Launch at Sunrise.

SeaExplorer

Underwater Glider Sets Record

ACSA announced that the SeaExplorer glider (featured on this month's cover), developed by ACSA in partnership with ACRI, CNRS and IFREMER, completed a two-month record mission in collaboration with the Laboratoire d'Océanographie de Villefranche (LOV) of National Center for Scientific Research (CNRS) and Pierre and Marie Curie University (UPMC). "The mission objective was to evaluate the endurance of our first glider equipped with rechargeable batteries while performing several round trips between France and Corsica Island" said Dr. Hervé Claustre of the CNRS LOV. ACSA introduced rechargeable Li-Ion batteries as an effective, reliable and affordable solution. "The SeaExplorer glider has also acquired a wealth of high resolution data along its transects whose results will be presented by LOV at the Ocean Science Meeting in Honolulu Hawaii in February 2014," said Dr. Claustre.

Launched on September 5, 2013, LOV scientists recovered the glider on November 5, 2013 at Bay of Angels on the French Riviera. Completing a two-month mission, the SeaExplorer glider, according to ACSA, became the first glider to break a double world record for multi-sensors Unmanned Underwater Vehicle (UUV) with rechargeable batteries.

Journey of the SeaExplorer

Reaching the milestone of 60 days and a total of 1,183 km on a single battery charge, the SeaExplorer glider was launched south of Nice and averaged 0.5 knots, providing more than 1,168 profiles of the water column from near surface to 500m depth with 100% communications even in high sea-states. Supervised by satellite telemetry from onshore office using ACSA's IRIS software, the performance was manually stopped whereas internal parameters indicated 18% of its battery energy remaining.

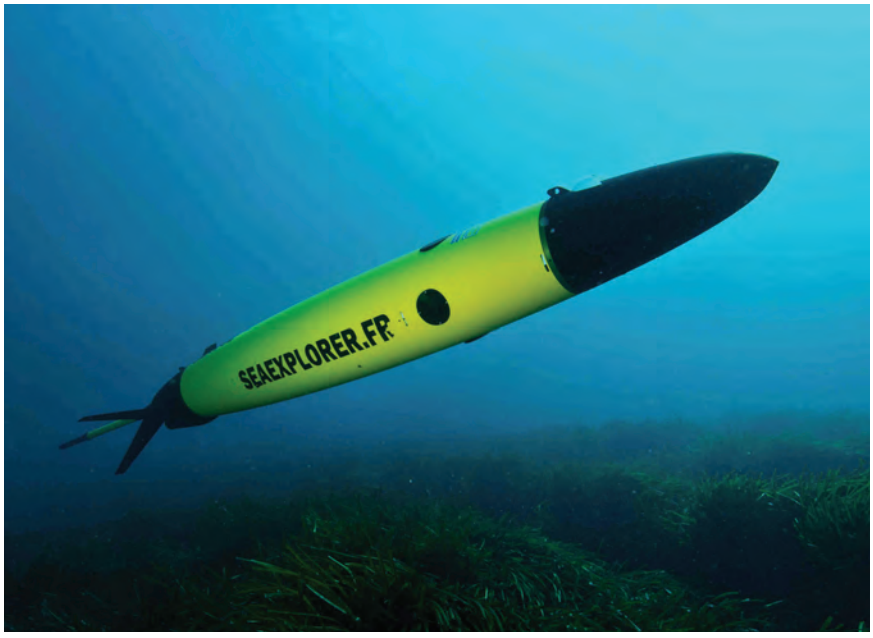
Besides the platform's endurance record, the scientific payload was equipped with SeaBird pumped CTD (Conductivity/Temperature/Depth) and Dissolved Oxygen sensors recording continuously at 4 seconds inter-sample time (metric resolution) for a total of 90 Mo. First comparisons of the SeaExplorer dataset with simultaneous profiles from a ship-borne CTD-rosette show very good data quality, even across strong temperature gradients, according to ACSA.

"I am delighted with SeaExplorer performing eight weeks and setting this record," said Laurent Beguery, expert consultant for ACSA, from the French Operating Gliders Center (CNRS DT/INSU). "The performance of the endurance test is clearly a success. This means that this first rechargeable glider is now mature enough to represent a reliable alternative to alkaline and primary Lithium powered gliders. I personally do appreciate that this type of glider avoids operations of batteries replacement every 2 to 4 months and reduces, to 20 hours only, immobilization time for refueling at the workshop. In other words, for scientists, it makes lots of savings in materials replacement, technician man-hours as well as for ballasting time and … hopefully increases the Mean Time Between Failures (MTBF)." In addition, as most organizations – particularly research organizations – are budget challenged going forward, cost optimization concerns are today top-line discussion regarding the types of tools employed to study the oceans. Developers and proponents of SeaExplorer maintain that it has proven to require fewer technicians, helping to save costs. To understand the unique capability of rechargeable as a major step forward in the challenge to increase cost-effectiveness of gliders operations, Patrice PLA, Sales & Marketing Director said "Out of 10 months of at-sea operations per year, rechargeable batteries not only grant higher availability rate but also reduce operating costs between 75,000 to 150,000 Euros per glider over five years compared to alkaline and primary Lithium batteries traditionally used by scientists."

The SeaExplorer Platform

SeaExplorer can navigate at sea for months to persistently gather subsea data down to 700m depth. For oceanographic applications, following six sensors are already integrated and available off-the-shelf: Conductivity/Temperature/Pressure (CTD), Dissolved Oxygen (DO), Chlorophyll, Phycobilins, Turbidity and Chromophoric Dissolved Organic Matter (CDOM). On-going developments concerns acoustic payload for marine mammals detection, nitrate sensor, video camera for jellyfish observation and an hydrocarbon sensor to monitor oil spills and marine pollutions. Also are considered current (ADCP) and turbulences sensors. Given the open software and hardware architecture of the scientific SeaExplorer payload, all users can easily and fastly integrate their own custom sensors. In addition, it is important to note that the interchangeable payload design enables users to conveniently remove and replace sections upon sensors needed. To increase operating reliability, new safety devices such as Argos and underwater pinger are now available in option. The SeaExplorer provides universities, governments and scientists with an affordable UUV to cost-effectively monitor the ocean.

www.acsa-alcen.com



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Mega Machines

Unmanned Systems take Center Stage

On top of the water, underwater and on the seabed, vehicle robotics are quickly proving their value as a game changer. Profiled here are some latest developments.

Pharos Offshore acquired an SMD built 1200HP cable burial tool in July 2013, since then the vehicle has undergone extensive modifications at the Tees Offshore Base, in Middlesbrough that have enhanced the configuration to provide a more effective post lay/installation burial vehicle.

The UTV1200 has a combination of jetting tool packages to meet client requirements where the jetting assembly has been relocated within the core vehicle frame, where the centrally mounted jetting swords optimize steering and handling as well as cable acquisition capability, thus allowing 10m radial maneuverability during jet trenching operations.

With a rated production speeds greater than 300m/h at 1.6m trench depth for jetting of sands greater than 50KPa. Modifications also include the removal of the cable reel system which has reduced the center of gravity by reducing the height of the lift frame greatly improving the vehicle stability.

Engineering and design has been completed on a complimentary mechanical chain cutting package in coordination

Pharos Offshore's UTV1200 has a combination of jetting tool packages.

with spoil eduction from the cutting face and the base of the trench formation immediately astern of the cutting tool. Product handling is accomplished by means of two elliptical manipulators to place the product in the cable highway, which also incorporates an automatic cable discharge system. Modular by design, integration is by means of two flange faces; reconfiguration between jetting and mechanical trenching may be performed on location within 36 hours.

"The previous configuration of UTV1200 (LBT1) allowed for concurrent trenching (mechanical and jetting) of a pre-loaded product, however after carrying out research the integration of a pre-loaded product was deemed too specialized in the current market, driving the equipment modifications," said Chris Gamble, Director of Operations.

UTV1200 can be provided on project specific terms or through a long term lease, in coordination with our expertise, we can offer operational teams to undertake all trenching project requirements.

Bibby Remote Intervention Limited (BRIL) has secured a multimillion contract with Olympic Shipping to install two 150 horsepower deep water **Quasar ROVs** onboard the construction support vessel (CSV), Olympic Ares. The two ROVs will be installed in the purpose built ROV hangers onboard the vessel by BRIL for ROV and survey services.

This follows the signing of a charter agreement with Bibby Offshore and Olympic Shipping for the Olympic Ares for a seasonal charter during 2014 with options to extend. BRIL will install the ROVs in Q4 this year and Bibby Offshore and Olympic will jointly market the vessel up until the charter agreement begins in 2014.

Increased market demand for ROV services, along with contract wins in the renewable and oil and gas sector has driven BRIL's rapid development. "To deliver high quality products and services to our clients, we have invested significantly in our ROV fleet, including the addition of the 150hp Quasars to our13 systems," said Mike Arnold, chief operating officer, BRIL.

Bibby Offshore with new sister company Bibby Remote Intervention Limited (BRIL), has grown from 10 employees in 2003 to now employing more than 1,300 people onshore and offshore worldwide, with offices in Aberdeen, Liverpool, Singapore, Trinidad and Houston. The company has an international fleet of six subsea support vessels and 13 Remote Operating Vehicles

(ROV) and will continue to add to its fleet to meet demand.

C-Enduro recently underwent trials, organized by the National Oceanography Center (NOC), trials attended by the potential users from NOC and Royal Navy personnel who saw the C-Enduro operate autonomously and follow various courses set out by ASV's control system. The highlight of the two day event came when the vehicle followed a course spelling out 'ASV'.

C-Enduro is designed to deliver a step change in oceanographic data collection, with an endurance of up to three months enabled by its power structure which can support up to 500 watts of payload power. The applications for the vehicle range from marine environmental surveying to security and defense roles.

C-Enduro was developed under a UK Government-backed Small Business Research Initiative (SBRI) initiated by the National Oceanographic Centre's (NOC) requirement for long endurance USVs for environmental research. The initiative is co-funded by the National Environment Research Council (NERC), NOC's parent body, with the Technology Strategy Board (TSB) and the Defense, Science and Technology Laboratories (DSTL). The team behind the development of the LEMUSV, led by ASV, includes Hyperdrive Ltd who investigated motor options and power management systems and Cranfield University who have conducted research into collision avoidance technologies.

ASV undertook the detailed production design, build and commissioning of the fully operational, open ocean going C-Enduro vessel. The robust vehicle design utilises state of the art technologies from the consortium and was designed to operate in coastal or open ocean weather conditions, currents and sea states.

SeaRobotics has deployed a "collapsible" unmanned surface vehicle (USV) in support of important Arctic fisheries research conducted by Florida International University (FIU). The collapsible, 4m USV was used to provide a broad range of survey data regarding the seabed off the shores of Point Barrow, Alaska, the northernmost point in the U.S.

At the request of FIU, SeaRobotics outfitted the USV with an array of sensors that included a Kongsberg EK-60 split-beam echo sounder, M3 multi-beam sonar, 1.8 MHz DIDSON imaging sonar, and a low-cost side-scan sonar system. This equipment enabled researchers from FIU to perform a bathymetric survey of the seabed and collect other data regarding the health of fisheries located in the coastal waters of the Chukchi and Beaufort Seas.

"We generated some very exciting data using the USV while keeping our research personnel safely on shore. Safety

Bibby Remote Intervention added two 150 hp Quasar ROVs to its fleet.

and efficiency are always major concerns when working in the Arctic and having a programmable, stable, and robust platform allowed us to collect novel data in challenging conditions," said Kevin Boswell , Marine Sciences Professor in the Biology Department at FIU. "We also benefitted from the considerable amount of support given to us by residents of the Alaskan native community in the Barrow area. Their assistance will continue to be important to our future research efforts in the area including our return trips to the Arctic with the USV," added Boswell.

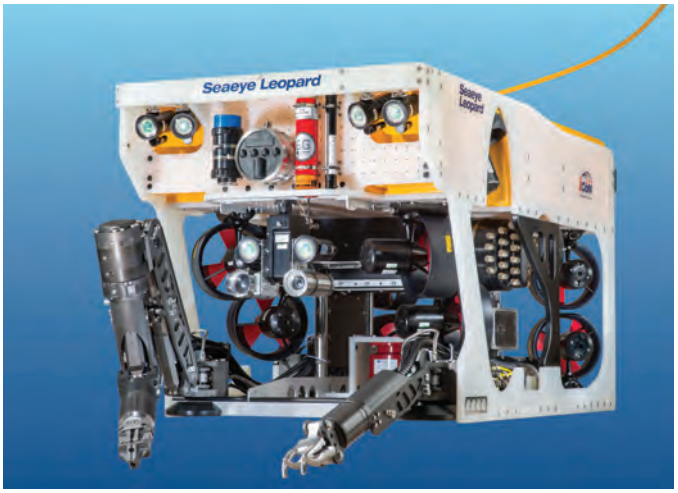
Applications for SeaRobotics include bathymetric and hydrographic surveys; coastal, harbor, and riverine surveillance; and target and destructive test boats. SeaRobotics surface vehicles range from small, modular, man-portable systems to large, long-endurance workhorse vehicles that provide survey and surveillance systems.

With 11 thrusters, high payload, and a host of advanced technology, the new **Saab Seaeye Leopard ROV** recently made its debut. Aimed at the compact work-class market, Leopard was designed to be best-in-class regarding the handling of tooling, cameras and survey equipment. As always, Saab Seaeye is mindful of preserving precious deck space, and the the minimal deck footprint of the Seaeye range is maintained with the combination of a 20 x 8 ft. single lift, A-Frame & winch LARS and a 20 ft. control cabin for easy transport and rapid mobilization.

Its pack of eight horizontal thrusters and three vertical thrusters is designed to give Leopard exceptional thrust, powering the vehicle forward at over four knots, and enabling it to hold steady in strong cross-currents.

For the pilot, the vehicle's iCON intelligent control system gives clear and enhanced information while independently managing each device on the vehicle, including auto redundancy that will keep the ROV working even with multiple equipment damage.

Saab Seaeye's new Leopard features 11 thrusters and iCON technology.



www.seadiscovery.com

The pilot will also find that iCON includes pitch and roll stabilization for stable flight even with large tools and sensors deployed. In addition, the networked design of the iCON control system has refined the main electronics pod into an intelligent power distribution and data hub, and relocated the brains of the system into sensors and actuators around the vehicle.

The chassis was designed with rapid reconfiguration and easy maintenance in mind. A large open payload bay within the vehicle allows for ample tooling and survey sensors to be installed rapidly on sliding trays. Its one-ton through-frame-lift capability and four point docking system for tooling skids allows more demanding payloads to be added.

First to order the Leopard is Australian-based Dive Works Subsea Solutions. "We've found that even though we are a Commercial Diving and ROV services company, the industry is heading more and more towards using ROV's rather than divers," said Andrew Ford, Managing Director, Dive Works Subsea Solutions. "Over the past few years, more than half of our work has been for Falcon ROV services." Dive Works are focused on servicing the Australian Oil and Gas industry.

Oceaneering subsidiary **Deep Sea Systems (DSSI)** has designed and built the Sea Maxx Satellite Remotely Operated Vehicle (SAT-ROV) to work in tandem with work class ROVs at depths up to 4,400m. This SAT-ROV is deployed from a separate housing mounted beneath the work class ROV cage. The SAT-ROV is 18 x 24 x 30 in. and 230 lbs. in air and it is positively buoyant in water.

Sea Maxx is powered by four thrusters including two horizontal, one lateral and one vertical. It is equipped with a wide angle HDTV camera module, two variable intensity 40 watt LED lights and a 450 ft. length tether.

The small size of the Sea Maxx allows it to inspect difficult to reach and confined areas that a larger Work Class ROV cannot access. Sea Maxx ROV is controlled via a fiber optic link through the WCROV armored umbilical cable. The control CPU, display and joystick controls are mounted alongside the WCROV console allowing for tandem or independent operations.

The Sea Maxx is equipped with an advanced undersea HD camera optimized for wide angle close-up inspection and the ability to zoom-in to obtain additional detail. Images are recorded without loss of quality by a high resolution digital video recorder. Upon completion of ROV operations, HD video / stills can be provided to the customer.

The HD camera allows operators to obtain 2.0 mega-pixel digital images anytime during operations with or without ROV sensor data overlay.

In Development for the system are:

C-Enduro: Long Endurance Marine Unmanned Surface Vehicle (LEMUSV).

- Articulated Claw “Hook-Grab-Cut”
- Laser Scaling
- 3D HD Camera

Teledyne Gavia said that it sold two additional 1,000m depth rated Gavia Offshore Surveyor Autonomous Underwater Vehicles (AUVs) to UTEC Survey Inc. of Houston. UTEC purchased its first Gavia AUV in August 2011 then took delivery of a second vehicle in April 2012. After honing their AUV operations over the past two survey seasons, the company decided to increase the fleet with the purchase of two further vehicles, the first delivered in October 2013 and the second system delivery due early in 2014.

The UTEC Gavia AUVs are fully equipped for geophysical surveys in near-shore environments out to 1,000m. UTEC’s Gavia AUVs have recently proven their capability off East Africa where they are used for a wide variety of offshore survey and inspection tasks. The vehicles are fitted with swath bathymetry, side scan sonar, sub bottom profiler modules, as well as a depth rated camera with strobe lighting. The built-in camera allows for overlapping images which are digitally stitched together forming a complete mosaic of the survey mission. The two most recent vehicle purchases come with the DVL aided ROVINS154 Inertial Navigation System module (IXBlue, France), providing a high accuracy INS in a package that is not of US origin so it does not automatically come under the ITAR export control regulations. All UTEC AUV INS navigation is further enhanced by the additional purchase of both USBL and LBL systems from Teledyne Benthos (Falmouth, Mass.) which provide aiding to the INS enabling higher accuracy and longer endurance missions.

SRI International demonstrated capabilities for conducting underwater chemical surveys with its in situ membrane introduction mass spectrometry (MIMS) device integrated into a Bluefin-12 autonomous underwater vehicle (AUV). The sensitivity, specificity, and versatility of mass spectrometry enable in-water identification and analysis of a wide range of chemicals.

“The ability to combine highly sensitive and calibrated mass spectrometry with AUVs gives researchers and industry a new tool for critical underwater survey applications,” said Timothy Short, manager of the Marine and Space Sensing Group in the Space and Marine Technology Program at SRI International. “Much as we are seeing an increase in valuable data collection applications for unmanned aerial vehicles (UAVs), we can now collect and analyze underwater data more efficiently and accurately. The integrated SRI-Bluefin solution is unprecedented for its ease of deployment, advanced survey capabili-

SeaRobotics “Collapsible” USV Aids in Arctic Survey.

ties, and reduced cost of operations."

The unique capabilities of the SRI MIMS device integrated into the Bluefin-12 AUV platform addresses complex survey and data collection challenges associated with ocean monitoring and exploration, including an enhanced ability to differentiate hydrocarbon sources (e.g., biogenic versus thermogenic) and high-fidelity baseline measurements to understand with greater accuracy the impact of drilling in specific areas.

Shark Marine Technologies delivered the newly enhanced Sea-Wolf 3 ROV system to The State Oceanic Administration of China, which will use the Sea-Wolf 3 to perform marine scientific surveys and research activities. The SOA is responsible for overseeing marine construction projects, submarine engineering projects and routine coastal surveillance.

(Photo: Teledyne Gavia)

Left

UTEC Survey Adds Two Additional Gavia Offshore Surveyors.

Below

Oceaneering subsidiary Deep Sea Systems (DSSI) has designed and built the Sea Maxx Satellite Remotely Operated Vehicle (SAT-ROV) to work in tandem with work class ROVs at depths up to 4,400m.

The Sea-Wolf 3 system is loaded with extras and software capabilities just recently introduced into the light work/ inspection class of ROVs. The system was designed for increased modularity and ease of maintenance and configurations.

The Sea-Wolf 3 has an increased payload, an external pan/ tilt platform and an open frame design to allow more flow to the thrusters and less drag in currents.

This system features the DiveLog software, adding a new level of autonomy for the ROV pilot. New capabilities include: Route Following, Go To, and Station Keeping. DiveLog has also simplified the data inputs from multiple sensors onto one screen, whilst recording all the data into convenient project folders.

Right
Shark Marine ROV to China.

(Photo: Shark Marine)

Below
Recovery of Bluefin-12S from A-frame.

Listen Up!

Jasco has a long history in acoustics

By Tom Peters, Halifax

A small Canadian company is using its "scientific excellence" in acoustics to advance human and industrial activities mainly in a marine environment. JASCO Applied Sciences has more than 30 years of experience in various aspects of marine acoustics. It has delivered its expertise internationally and has become one of the global leaders in marine acoustic data collection and analysis.

The company was initially formed as JASCO Research in 1981 in Victoria, B.C. by Joseph A. Scrimger (JASCO), a scientist with Defense Research Establishment Pacific (DREP) and an expert in marine acoustic modeling, said JASCO's product engineering manager John Moloney.

During the early days of the company, Scrimger added Dave Hannay and Roberto Racca to his staff to conduct some acoustic modeling and oceanographic projects outside of DREP. The pair collaborated with Scott Carr on an environmental impact assessment at the acoustic range in Nanoose, BC, with their focus on acoustic modeling. Carr, Hannay and Racca eventually took over JASCO when Scrimger died.

In 2006, Carr, while attending a conference in Nova Scotia, decided to establish a JASCO office on the East Coast.

"This operation has grown to be the largest office in the company," Moloney said in a conversation at the company's facilities in the Burnside Industrial Park, across the harbor from Halifax. "We now have the bulk of the employees, approximately 40 of about 76 in the company."

In addition to Victoria, there are satellite offices in such locations as San Diego, Washington, Anchorage, England, Australia and Mexico.

Moloney explains that JASCO's work is focused in three areas.

"First, modeling is a core part of the business. We basically model the impact of human activities on the marine environment. We are concerned about pollution but it is a unique kind of pollution, anthropogenic or man made noise from industrial activities and there effects on marine environments." Many of JASCO's customers are just looking for the modeling aspect to determine that if they carry out certain processes what impact might these activities have on the environment.

Moloney explained that some JASCO clients want to take the project a step further. "They want us to monitor what they are doing. Some measurement programs are just short term monitoring," he said, while others can be very long term "in the order of decades." Moloney said JASCO has been involved for several years in a project in the Chukchi Sea where the company has been monitoring marine life.

He describes the project as a "passive acoustic program in support of the oil and gas industry" which is undertaking initiatives in the Bering, Beaufort and Chukchi regions, mostly on the U.S. side.

"Those types of programs require measurement of the radiated noise from drilling platforms, support vessels and exploration. If some are shooting seismic, we measure the sounds they emit and the effects they have on the environment," Moloney said.

The company's monitoring programs result in major data collection.

"This year we will likely collect about 30 terabytes of data and a key thing we do is we actually analyze the data. We collect data from around the world, it comes back here where it is uploaded and processed," with a lot of manual analysis augmented by automated analysis.

From data collected, JASCO can determine various aspects of marine life such as population density estimates for animals, types of animals in a particular region, determine migration routes and migration patterns.

"We are trying to get as much information about marine life out of those data sets and that is unique," said Moloney.

"So modeling, monitoring programs and the data analysis, those are the three things we do," he said "So in the end, where we are getting more involved these days is in the behavioral impact. We do a deep analysis of the data with biologists and acousticians to determine animal behavior and in last several years the demand for us to do that has grown significantly."

Moloney said JASCO has developed a strategic arrangement with Cornell University in Ithaca, New York which enhances the company's ability to provide behavioral science and bioacoustics to its clients.

JASCO's work over the years has meant the company has looked to various areas for appropriate software to use in its work. "We do have bunch of suites of software, certainly a lot are detectors and classifiers and we have detection tools developed in-house," Moloney said. "We also make use of modeling tools that were developed in-house but we also use third party tools in the analysis of our data and modeling so it's a combination of in-house products and third party."

On the hardware side, Moloney said JASCO was "forced to develop hardware products.

When started to look at things we needed to deal with our customers, we couldn't find anything commercially. We tried some available technology and we quickly ran into problems with equipment that couldn't survive in harsh environments. We had a lot of soft noise problems, low reliability and robustness issues," he stated.

So JASCO developed its required hardware and never intended to sell that equipment commercially. However, as things turned out "we have developed products that people have come in and said that is pretty slick and can we buy it. So we have started to do that. We have taken an in-house research tool and we are now in early stages of bringing it to the market and selling it," Moloney said.

The main piece of equipment Moloney referred to is called the AMAR G3, an autonomous multi-channel acoustic recorder which can stream real time data.

"It is a very capable device, designed for long duration autonomous missions," said Moloney. "It uses very little power, it has a very large capacity with a two terabyte recorder, it has a very high bandwidth and probably the most important thing is because we started off in an acoustic domain, we are getting a very low soft noise. We worked very hard on that," he said.

Moloney calls it "an enabling technology that can be configured in any fashion a customer wants." It can tethered to a bottom mooring.

The equipment is designed so modules can be added to meet different requirements. There are deep and shallow versions of the housing and can provide real time data streaming when integrated with a real-time telemetry system.

"It is a very flexible and capable platform," he added.

JASCO has a high flow, low noise mooring in which the equipment can be inserted for measurements in tidal environ-

AMAR G3, an autonomous multi-channel acoustic recorder which can stream real time data.

ments. “A big part of our growing business is doing anthropogenic noise in river environments where companies are doing bridging projects and pile driving. We can use the same instruments that were designed originally for deep ocean in shallow and flowing river environments,” he stated.

Although JASCO started with a focus on marine acoustic work, Moloney explained the company does have some capability and capacity to do terrestrial acoustics and blast physics. “We are a very academic and scientific company. Many of our acousticians have done work in sort of terrestrial acoustics” and although the company has some done work in this field.

JASCO is not without its challenges.

“Our biggest challenge is we are a small Canadian company and it is really about judging how much to invest from a capital perspective to service the growing market that we see,” Moloney said. “Sales are not a problem. There seems to be a significant demand on us. We have deep connections in the oil and gas sector servicing our customers with high quality services and products. We have to make sure we sustain that level of good science and technology and make sure we deliver on programs we have. That is the key challenge.”

On the competitive side, the biggest competition comes from “academic institutions, that are subsidized. They don’t bear the costs of their overheads and their rates reflect that so it is a bit of an issue,” he added.

But Moloney said if an industrial company has a schedule and really wants to get through an environmental assessment critical to their situation “we offer a strong compelling case to them because we are a company, we have to deliver on time. We are not driven by an academic schedule. We are extremely proud of our science so we strive for scientific excellence,” Moloney stressed.

Going forward Moloney says the company is looking at more real time systems and instruments. “Collecting data and analyzing after the fact is not the way it is going for us in the future. Our instrument fleet is capable of streaming data with real time processing and real time classification. Companies want information now. We have that in-house capability.

“The other place we are going is up river,” he said with a smile. “We are looking more at jetties, retaining walls and bridging projects. Basically harbors, estuaries and rivers and effects on migratory fish, smaller and less sexy species.”

There is also an energy to grow the company globally. China, Latin America and the developing countries in Southeast Asia are areas of interest for JASCO.

Ocean energy sources such as offshore wind power also hold a future for JASCO.

Moloney said the company focus is quite straight forward.

“We feel our job is to enable human and industrial activities in the environment but to do so in an eco-friendly way. We are not here to impede anybody, we are here to enable someone,” he said.

AMAR G3

Grennan CEO @ Global Diving & Salvage

After more than 30 years as founders and owners of Global Diving & Salvage, Inc., Tim Beaver and John Graham continue to remain excited about the future of the company. This month, they announced the newest chapter in Global's history; Devon Grennan, President for the past four years, will now also take on the position of Chief Executive Officer. Beaver and Graham will maintain ownership and continue to serve on the Board of Directors, but will step down from direct operational involvement. Grennan began his tenure in 1995 as a Marine Environmental Supervisor moving up the ranks to Environmental Division Manager and by 2005 serving as the General Manager. In 2009, Global formed its senior management team and Grennan was moved into the position of President. As CEO/President his newest undertaking is to determine the overall strategic plan for the company and lead the senior management team and the Board of Directors in Global's mission to provide quality marine service and discover new opportunities to better serve the maritime industry.

von Alt

Fotheringham

Leadership Changes at Hydroid

Hydroid announced changes in its leadership team. **Christopher von Alt**, one of the company's founders since its inception in 2001, resigned from his position as president effective January 1, 2014. Hydroid's board of directors selected **Duane Fotheringham**, Hydroid's vice president of operations, as his successor. Von Alt will retain his current position as chairman of the board and in addition, will undertake special long-range technology-centered projects that will focus on the advancement of REMUS technology. Fotheringham assumed the role of vice president of operations in 2008.

Hydroid also appointed **Graham Lester** as vice president of sales and marketing. A Hydroid veteran of eight years, Lester was previously the director of Hydroid's European office. In his new role, Graham will oversee the company's US and international sales and marketing.

Byus to Lead Battelle's Maritime Systems

Fred Byus, a U.S. Navy retired Rear Admiral, has been named General Manager of Battelle's Maritime Systems business unit. Byus joined Battelle in December 2007 as Vice President of National Security's Navy Market Group after a 31-year career in the U.S. Navy. His Navy experience included leadership positions in nuclear engineering, submarines, and command and control of fleet and joint forces. Byus also has served as Oceanographer and Navigator of the Navy, Commander Naval Forces Korea, Commander Submarine Squadron Seven and Commanding Officer of USS Tautog. He served on the board of directors for Battelle's wholly-owned subsidiary, Bluefin Robotics, from 2008 to 2013. He will continue to work closely with Bluefin in his new role.

Directors Appointed at RS Aqua

Ocean equipment distributors, RS Aqua Ltd. of Hampshire, U.K. announced two directorial appointments effective January 1, 2014. These see **Martin Stemp** appointed Sales Director and **Terry Edwards** becomes Technical Director. Stemp has coordinated and managed the introduction of additional distributorship agreements with several notable manufacturers including Liquid Robotics Inc, Vemco Ltd. and Rowe Technologies Inc.

McFarlane: Distinguished Speaker at MBARI

On November 6, 2013 Dr. James R. McFarlane, President, International Subma-

Lester

Stemp

McFarlane

rine Engineering Ltd was honored with this year's David Packard Distinguished Lecturer award from the Monterey Bay Aquarium Institute (MBARI). McFarlane contributed to MBARI's formative years as a critical advisor to David Packard and as a participant in several engineering reviews. Research Chair Bruce Robison remarked, "Jim McFarlane is a gifted, innovative engineer with an outstanding track record of designing and building undersea vehicles."

McFarlane delivered a lecture at MBARI titled "Genesis and metamorphosis of underwater work capability," reviewing different submersible vehicle designs and components that make them operate optimally. Doug Au, MBARI's director of engineering development commented, "I am very pleased that we can have someone who was so involved with MBARI in the early days come back and provide a distinguished lecture. I hope we can use his insight as MBARI looks to the future and conceives our technical roadmap."

Teledyne Opens Technology Center

Teledyne Oil & Gas, a business unit of Teledyne Technologies Incorporated, recently held a Grand Opening celebration of its new 52,000-sq. ft. Technology Development Center in Daytona Beach. The Technology Development Center is a high-tech research and new product development center to bring forward engineered solutions to complex technical challenges, primarily for the offshore oil and gas production and exploration industries. The Honorable Rick Scott, Governor of Florida, provided opening remarks for the building, along with Dr. Robert Mehrabian, Chairman, President and Chief Executive Officer of Teledyne Technologies Incorporated, and other industry executives. This new center is expected to add more than 100 new jobs to the local community. The new building complements the existing 100,000-sq. ft. Teledyne Oil & Gas headquarters and manufacturing plant located on the same campus. The Technology Development Center will focus on new product development and doubles the capacity for research and development for global

Blair

Smith

Mendez

Schwinn

oil & gas operations. This facility marks the first centralized research and development facility outside of Teledyne Scientific, the company's corporate research center in Thousand Oaks, Calif.

SEA CON Bolsters Executive Ranks

As SEA CON's growth continues, so too does its investment in people. The Business Development Management team is comprised of **Craig Smith, Sergio Mendez, John Blair** and **Tom Schwinn**, a team with a range of knowledge gained by years of experience.

Smith started with SEA CON Europe in 1995 at age 17. He completed his business studies at college while working for SEA CON. With his new role of Business Development Manager Smith will continue to promote and develop the SEA CON Group worldwide within the Military, Oil & Gas and Oceanographic sectors.

Mendez joined SEA CON in September of 2008. He is a graduate of Texas A & M University in College Station, Texas with a Bachelors degree in Marketing and International Business.

Blair recently joined SEA CON as Oil & Gas Business Development Manager, Americas. Blair is from College Station, Texas and joined the U.S. Army straight from high school. In 2008 John joined Bennex (now Siemens) as subsea Sales Manager for upstream electrical and fiber optic distribution, sensing as well as other products.

Schwinn joined SEA CON in December of 2013. He is a graduate of the University of Massachusetts, Dartmouth with a Bachelor of Science degree in Electrical Engineering. Most recently Schwinn worked at General Dynamics Electric Boat designing and building nuclear submarines for the US Navy.

Subsea UK Reveals New Board

Subsea UK has unveiled its new Board following a members' ballot at the industry body's annual general meeting. All board members were required to stand for reelection. Three new members were elected. They are Peter Blake from Chevron, David Sheret from Bibby Offshore and Martin Sisley from Ocean Installer. The six reelected were Frank Bee of Shell, Brian Green of Severn Subsea Technologies, Geoff Lyons of BPP-Tech, Ian Mitchell of BP, Tim Sheehan of Ashtead Technology and John Mair of Subsea 7.

XPRIZE Offers $2M

XPRIZE launched the Wendy Schmidt Ocean Health XPRIZE. This $2 million dollar competition challenges global innovators to develop accurate and affordable ocean pH sensors to measure ocean acidification. Through the galvanizing force of this XPRIZE, teams will not only develop breakthrough technical solutions to measure ocean chemistry – a critical step in addressing the environmental challenge of ocean acidification–but will provide a solid foundation for new enterprise that will catalyze the growth of new industries. For more information:

www.oceanhealth.xprize.org/

EIVA Training Program for 2014

The dates for the EIVA software training courses of 2014 are now finalized, offering training courses at various locations throughout the world. EIVA provides training courses, enabling users to get the most out of their solutions. Now, the program for the 2014 training course activities is available at EIVA's website, with a complete list of locations and dates. Locations include the UK, Singapore, USA (Houston), Nigeria, Dubai, Australia, Trinidad, Canada, India, Hong Kong, Brazil and Denmark. The courses are arranged by either EIVA or a member of its international network of Training Partners, including for example Atlas Services Group. This means that the demand for training courses is met on an international basis by an increased number of locations and training courses – the highest ever. For a complete list visit:

www.eiva.com/services/training-courses

OI 2014 Technology Preview

By James Coleman, Event Director, Reed Exhibitions

We look forward to welcoming readers of *Marine Technology Reporter* to Oceanology International (OI) being held March 11-13, 2014, at the ExCeL London Exhibition and Convention Centrre. OI is the biennial global forum where industry, academia and government share knowledge and connect with the marine technology and ocean science community, improving their strategies for measuring, exploiting, protecting and operating in the world's oceans.

Established in 1969, OI features the world's largest exhibition for marine science and technology, agenda-setting technical conferences, visiting vessels and waterside demonstrations, and networking opportunities. All are entirely free to attend: in 2012, 7,669 came from all over the globe to take advantage of what is on offer. The 2014 event is due to be the largest ever with the 520 exhibiting companies from over 35 countries taking an additional 10% more space than at the record-breaking 2012 event.

Marine Technology Update in a Nutshell

Looking at the overall state-of-play within marine technology currently, and therefore what will be on show and talked about at OI 2014, conference chairman, Professor Ralph Rayner, explains: "In the wider world of technology we see an accelerating pace of change. We see the emergence of new materials, new sensor technologies, new computing capabilities, all of this is changing very rapidly, and these changes are influencing what's happening in the world of marine technology.

"Perhaps the most significant technological change we're seeing is the move from using conventional ships to unmanned vehicles. We're seeing the emergence of many new unmanned vehicles and platforms made possible by novel new materials, novel power sources, and advances in computing.

"The growing use of UUVs is also driving developments in sensors. It's driving the development of lower power sensors that will operate for longer durations with much higher degrees of reliability than has perhaps been required in the past.

"With the increasing use of autonomous vehicles comes the need for better underwater communications, and better underwater positioning. As we move towards exploiting resources in ever more difficult parts of the ocean, in deeper water and in harsher environments these technologies come into their own in making this possible.

"Equally we have huge societal challenges, ocean acidification and changing climate, all of which demand the ability to make long-term observations of the world's oceans on a reliable and cost-effective basis. The Oceanology International exhibition showcases all of these technologies and more. And it illustrates how they're brought to bear on pressing societal needs and practical problems of working in the ocean environment."

Expanded Conference Program

The areas highlighted by Professor Rayner are certainly also evident in the expanded OI conferences, which are largely divided into two parts: on one side are updates on areas of technology; and the other is dealing with areas of application of those exciting technologies.

Ocean science and technology lie at the very heart of OI 2014, with the conference program picking up on each major technology strand featured in the exhibition. As well as the traditional areas (ocean observing systems; hydrography and geophysics; and site investigation; and dealing with UUV development), there are two new conference programs this year: underwater positioning and metrology; and underwater communications. Then too there are conference programs dealing with operating in extreme environments, highly important as the oil and gas industry moves into ever-deeper waters and the Arctic; maritime security; and the rapidly growing marine renewables sector and its demands for technologies to support survey, installation and maintenance.

Another OI introduction is the concept of topical panel discussions looking at areas which are creating a growing demand for marine science and technology: aquaculture, ballast water and subsea mining have been chosen for this treatment this year.

More Features

This year's OI features a new Innovation Zone, held in collaboration with the Oiltech Investment Network with the aim of connecting innovative technology

Professor Ralph Rayner

providers with access to funding opportunities. Another new feature for 2014 is Spillex, which focuses on the prevention of, and response to, environmental incidents in the marine environment.

No Oceanology International is complete without its display of vessels and dockside demonstrations.

This year's will be no exception with a growing list of both on the event's website at **www.oceanologyinternational.com**. The early list of vessels includes an oil spill response, survey vessels, both conventional and remotely controlled; a vessel with a deployable ROV on board; and an offshore wind farm support vessel.

The expanding program of associated events run by supporting organizations such as IMarEST and IMCA, and exhibitors on topics as varied as 'Meet the Metocean Expert', 'ROV training – an international perspective'; 'Fluid Mud in Ports and Navigation: Management Today and in the Future' and 'British-Dutch Round Table on Marine Monitoring and Surveying for Offshore Wind Energy Projects'.

Free to Attend

Register to attend the exhibition and conference programs free of charge at **www.oceanologyinternational.com**, and visit the website for the full exhibitor list, the extensive conference programmes, and details on the myriad of features at OI 2014.

OI 2014 Exhibitors

Company	Company	Company	Company
2G Robotics Inc	Asian Prime Sources Limited	Castalia S.C.p.A.	DeepOcean AS
3D Laser Mapping	Association of Diving Contractors	Cathx Ocean Ltd.	DeepOcean Vision Ltd
4D Nav	ASV Ltd	CCC (Underwater Engineering) S.A.L.	DeepSea Power & Light
4H- JENA engineering GmbH	Atlantas Marine	Cescor srl	DenAr Ocean Engineering Ltd
Aanderaa Data Instruments AS	Atlantic Canada Pavilion	Cesigma	DERINSU UNDERWATER ENGINEERING TURKEY
Abyssal S.A	Atlas Professionals	Channel Technologies Group	Develogic GmbH
Acclaimed Software Co Ltd (The)	AXYS Technologies, Inc	Chesapeake Technology Inc	Digital Edge Subsea Ltd
Acodaq Ltd	Balmoral Offshore Engineering	Christian - Albrechts University, Exzellenzcluster Ozean der Zukunft	DNV GL
Acoustic Polymers Ltd	Biosonics Inc	Ciscrea	DOE Inc.
ACSA	BIRNS Aquamate LLC	Clarksons Research Services Ltd	DOF Subsea AS
ACSM Agencia Martima	Bluefin Robotics Corporation	CLS	dotOcean
Adler & Allan Ltd	Blueprint Design Engineering	C-MAX Ltd	Dutch Ocean Group
Ageotec Srl	BMT Group Ltd	C-Nav	DWTEK Co., Ltd
Airborne Hydrography AB	BMTI	CodaOctopus Products Ltd	Dynamic Load Monitoring UK Ltd
Airmar Technology	Bowtech Products Ltd	CODAR Ocean Sensors	ECA ROBOTICS
Alba Ultrasound	Braveheart Shipping BV	Comex	ECO/Environment Coastal & Offshore
Albatros Marine Technologies	Brest Metropole Oceane	Concept Cables Ltd	Edgetech
All Oceans Eng Ltd	Bretagne Commerce International	Consilium Italy S.r.l.	EGS (International) Ltd
AllMaritim AS	Briese Schiffahrt GmbH & Co. KG Research Vessel Department	CONTROS Systems & Solutions GmbH	Eiva A/S
Alnmaritec Ltd	Briggs Marine & Environmental Services	Cooper Interconnect	Elmeridge Cables Ltd
AML Oceanographic	Brone Positioning & Survey Limited	Cousin Trestec	emma technologies GmbH
Applanix	C & C Technologies Inc.	CP+ A Suzano Group Company	English Braids
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Aquatec Group	Cadden	Cygnus Instruments Ltd	EOMAP GmbH & Co. KG
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Argus Remote Systems AS	Cambridge Consultants Ltd	Data Quality Systems	Etpm Ltd
ASD Sensortechnik GmbH	Caris BV	Datawell	EvoLogics GmbH
Ashtead Technology	Carmacoring S.R.L	DECO Geophysical SC	Exocetus Development LLC

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Falmat Inc
Falmouth Scientific, Inc
Fastwave
FIELAX Gesellschaft für wissenschaftliche Datenverarbeitung mbH
First Point Assessment Limited
Fischer Connectors Ltd
FLIR Commercial Systems
FMC Schilling Robotics
Focal Technologies Group
Forum Subsea Technologies
Fugro
G.A.S s.r.l. - Geological Assistance and Services
G.O.S.S Consultants Ltd
Gardline Marine Sciences
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General Acoustics e.K.
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www.lindenphotonics.com

iXBlue Gyrocompass Systems to RFA Tankers

iXBlue will supply Quadrans fiber-optic gyrocompass systems for installation aboard the four new Tide Class tankers of the U.K. Royal Fleet Auxiliary (RFA). The systems to be supplied to Kelvin Hughes Limited will be integrated as a sub-system of the Integrated Bridge Systems for delivery to Daewoo Shipbuilding and Marine Engineering (DSME) in South Korea where the vessels are under construction.

The deliveries will comprise twin QUADRANS gyrocompass units, control and display and data distribution units (DDU) plus a comprehensive network of ancillary repeaters from U.K.-based Marine Data Limited.

www.ixblue.com

Ecuador Adds TRIAXYS Wave Buoys

AXYS Technologies delivered three TRIAXYS Next Wave Directional Wave Buoys to Instituto Oceanográfico De La Armada (INOCAR) of Ecuador. These TRIAXYS buoys will be added to the existing coastal wave monitoring network of TRIAXYS buoys owned by INOCAR and deployed along the Ecuador coastline. The mission of INOCAR is to plan, direct, coordinate and control the technical and administrative activities related to Hydrographic Service, Navigation, Oceanography, Meteorology, Marine Sciences, Marine Signaling and administration of specialized equipment to its activity.

www.axystechnologies.com

HydroComp NavCad: New Submarine SWATH Capabilities

HydroComp NavCad is a software tool for the prediction and analysis of vessel speed and power performance. It also provides for the selection of suitable propulsion system components – engines, gears and propellers.

A recent development effort has been undertaken to provide new submarine and SWATH performance analysis in NavCad. This includes new definitions for submerged hull form geometry, and the prediction of resistance and hull-propulsor interaction coefficients.

The definition of the submerged hulls of submarines and SWATH vessels in NavCad is a new treatment of traditional parametric descriptions of "body-of-revolution" submarine hulls (e.g., Jackson 1992). The traditional parametric data has been expanded to provide for non-cylindrical sections, as well as increased detail of nose geometry. It also includes definition of single strut geometry suitable for SWATH vessels. NavCad now provides the user with three different resistance prediction methods for bare-hull drag – a SWATH-specific algorithm and two submarine-derived prediction methods. One of the submarine methods is based on HydroComp's recent reanalysis of the Series 58 tests (including the extended "parallel mid-body series"). On-going HydroComp research for submarine resistance includes a study for added wave-making resistance when running at shallow depth. Added resistance for appendages will leverage NavCad's existing prediction functions.

The standard framework for NavCad is built around surface vessels that follow prescribed prediction methodologies. The Submarine/SWATH predictions are treated as supplemental calculations that are "defined" outside of the standard framework. The appropriate performance results array will be calculated and locked, and the prediction method identified in the "Defined" caption.

This new extension for NavCad is the first of a number of focused "modules" to the standard prediction framework. On-going module development for similar new capabilities includes re-analysis of barge train resistance and new hybrid wave-making codes. The new Submarine/SWATH features are available immediately to all NavCad customers with an active update subscription.

Allspeeds Webtool HP690

Allspeeds Ltd., designers and manufacturers of the Webtool range of products, nominated the Webtool HP690 intensifier panel for the Subsea UK Innovation for Safety Award. Safety concerns were being expressed from those working offshore in deep water with regards to the use of high pressure hydraulics and traditional ROV hydraulic intensifier panels. Allspeeds identified that the main safety issue was that standard pressure intensifiers contain a check valve. This check valve requires a deliberate reversal of pressure in order to relieve the high pressure circuit after the intensifier has completed its task. Failure to reverse this pressure manually or in the event of an HPU or ROV breakdown causing the inability to reverse the pressure, will result in a high pressure circuit at approximately 700Bar (10,000psi) this will remain energised whilst the ROV resurfaces.

Allspeeds designed HP690 which safeguards the user with automatic protection from the possibility of locked in high pressure hydraulic fluid. There is no longer any need for the user to manually reverse the pressure to make the hydraulic system safe, this will happen automatically. In addition to this, the input pressure will be automatically compensated for depth via the ROV's own HPU, so as the ROV surfaces, the high pressure side of the circuit also compensates. These features also allow any pressure build up due to temperature variation to be vented back to the ROV's pressure tank.

www.allspeeds.co.uk

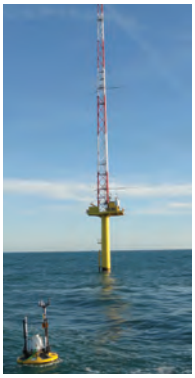
Pile Installation Tool

The Acclaimed Software Company Ltd. announced a new software system designed for Harkand Andrews Survey to support pile installation operations. The Total Controller and Total Viewer systems have been put into operation on a construction support vessel conducting precise pile installations. Harkand Andrews Survey have developed a technique for installing monopiles and transition pieces in offshore wind farms which allow observations to be collected remotely. This removes the necessity for a surveyor to physically access the pile for measurements during piling operations and therefore reduces risk to survey personnel. By utilizing remote observations it is possible to achieve higher accuracies than accessing the pile directly, due to the increased observation baseline. The system reduces the amount of time required to make the observations and automatically communicates results to the deck crew and hammer operator.

To achieve this, The Acclaimed Software Company developed Total Controller: Designed to be easily operable by the survey team using keyboard/mouse or touch screen, the software provides consistent and reliable results, quality control analysis, reporting and data logging facilities.

www.harkandgroup.com

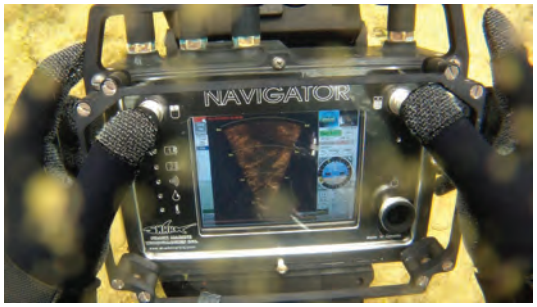
Buoy Mounted LIDAR



Fugro's Seawatch LiDAR buoy provides a cost-effective way to collect metocean data for offshore wind farm developments Successful trial results of the next generation of multi-purpose buoys tailored for the renewable energy industry have led to recent orders from operators in the wind energy sector. Dutch energy company Eneco has purchased Fugro's new wind LiDAR buoy while a Japanese company is to deploy its buoy close to a floating power generation system.

Fugro recently developed an accurate and cost-effective alternative to the traditional method of wind profile measurements for offshore wind farms. In January 2014 Fugro's SEAWATCH wind LiDAR buoy was deployed 75 km off the coast of Ijmuiden in The Netherlands where wind data will be compared with data from three levels on a met mast at the site, together with data from a LiDAR mounted on the mast. This testing will enhance a field trial which took place off the coast of Norway in spring, 2012.

www.oceanor.com



Navigator Diver Held Sonar for Irish Navy

The Irish Naval Service has acquired a NAVIGATOR Diver Held Sonar and Navigation System manufactured by Shark Marine Technologies Inc. of Ontario, Canada. The Irish Naval Service is the State's Principal Seagoing Agency. The Naval Service exercises and upholds the States sovereignty and obligations over Ireland's maritime jurisdiction which is an area 12 times larger than the island of Ireland. The Naval Service Diving Section (NSDS) is the primary State diving team, carrying out varied tasks for a number of State Agencies.

Members of the NSDS used the NAVIGATOR system while training with the Royal Canadian Navy's fleet diving unit. The divers believe the NAVIGATOR system equipped with forward-looking multi-beam sonar will assist them in their diving operations, in particular in search and recovery operations and underwater security.

www.sharkmarine.com

SubConn Micro Connector Range

SubConn introduced SubConn Micro 'G2' connectors to streamline its range of micro connectors. The SubConn Micro 'G2' connectors have enhanced sealing capability and use a uniform pin size and design. SubConn micro connectors were developed to suit the increasingly more compact design of underwater instruments, equipment and systems. SubConn micro connectors are available with 2 to 21 contacts in the standard in line version and in bulkhead versions, while low profile connectors available with 3, 7 and 9 contacts. The streamlining of the range entails that all connector types are now available with a uniform pin size and design, featuring extensive rubber sealing of each pin along with three o-rings in all female connector sockets - for optimal water sealing capability. SubConn micro connectors are available in four standard shell sizes with contacts rated for 300 V at 5 to 10 A. All SubConn Micro bulkhead connectors come with numbered or color coded Teflon leads.

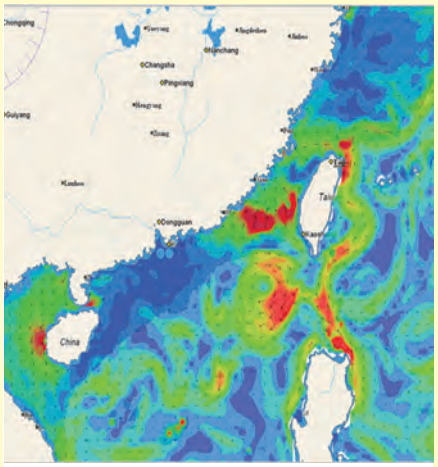
www.macartney.com

OSI to Deliver TDNS to Navy

OSI Maritime Systems (OSI) announced the award of a contract for the company's Tactical Dived Navigation System (TDNS). The Systems will be delivered to ThyssenKrupp Marine Systems AB as part of a Royal Swedish Navy submarine upgrade program, and includes OSI's subsurface WECDIS software.

Navies worldwide have made ECPINS their choice for WECDIS (Warship ECDIS) because of the advanced features and OSI's extensive experience in warship navigation, OSI said. As a result, ECPINS is the fleet standard for many NATO and allied navies including Canada, Australia, U.K. and Denmark, the company added.

www.osimaritime.com



(Photo: Courtesy Tidetech)

Vessel Optimization Data

A vessel optimization application offering combined tidal and non-tidal (ocean) current data has been launched for integrated vessel speed and route optimization. Developed by Tidetech, the application offers resolution of six nautical miles at 60-minute intervals in a six-day forecast. Significant passage time savings have been demonstrated in simulations.

Tidal currents are fast moving, dynamic and dominant inside the continental shelf – in water depths of 200m or less – and are inherently predictable years ahead. Non-tidal currents are slow moving and dominant in the deep ocean, driven by entirely different processes that cannot be accurately forecast beyond five to six days. Tidetech also offers additional high-resolution tidal current models for highly trafficked, tide dominant regions with resolutions ranging from 200m to two nautical miles, and multiple global ocean models.

www.tidetech.org

ASMAR Uses FORAN for New Research Vessel

FORAN has been the CAD/CAM System used by the Chilean shipyard ASMAR in the development of an Oceanographic and Fisheries Research Vessel, a state of the art design built for worldwide oceanographic and fishing service and geological research. The vessel, Cabo de Hornos, has been already delivered.

With a length overall of 74.1 m, breadth molded of 15.6 m and depth to main deck of 8.5 m, the vessel can reach a speed of 14.3 knots, with accommodation for 68 persons. The vessel has been classified by Germanischer Lloyd, CLASS +100 A5 E +MC AUT E Oceanographic Research Vessel. The vessel will perform multidisciplinary functions, such as the study of climatic phenomena and ocean-atmosphere interaction and geological oceanography for the characterization of the sea bottom and subsoil, up to 8,000 m.

www.sener.es

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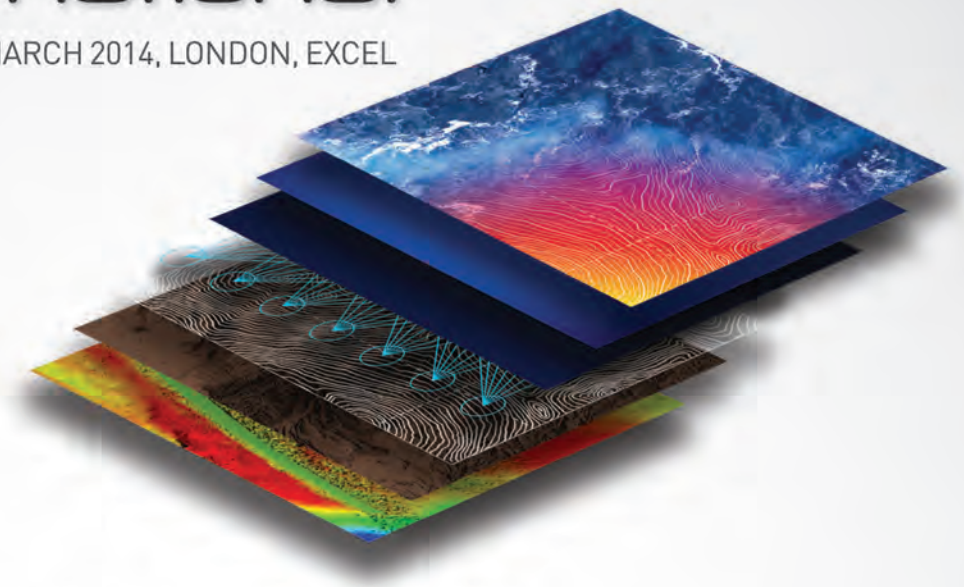

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2014 Editorial Calendar

ISSUE	EDITORIAL	BONUS DISTRIBUTION	AD CLOSE
JANUARY/ FEBRUARY	**Subsea Vehicles: UUVs** **Market:** Harsh Environment Systems: Arctic Ops **Tech:** Scientific Deck Machinery **Product:** Training Resources	**Arctic Technology Conference** Feb. 10-12, Houston **Subsea Tieback** March 4-6, San Antonio	January 21
MARCH	**Instrumentation: Measurement, Process & Analysis** **Market:** Oceanology Intl '14 Technology Spotlight **Tech:** Umbilicals, Cables, Connectors & Power Supply **Product:** Sonar Systems & Seafloor Mapping	**Oceanology International** March 11-13, London	February 18
APRIL	**Offshore Energy** **Market:** Seismic Vessels & Systems **Tech:** Deepwater Positioning, Mooring & Anchoring **Product:** Subsea Pipeline Survey & Inspection	**Offshore Technology Conference** May 5-8, Houston **AUVSI 2014** May 12-15, Orlando	March 27
MAY	**AUV Operations** **Market:** Offshore Renewable Energy: Wind, Wave & Tide **Tech:** Salvage & Recovery **Product:** Remote Sensing & Environmental Monitoring	**Energy Ocean International** June 3-5, Atlantic City	April 24
JUNE	**Hydrographic Survey** **Market:** Comms, Telemetry & Data Processing **Tech:** GPS, Gyro Compasses & MEMS Motion Tracking **Product:** Underwater Imaging: Lights, Cameras, Sonar		May 27
JULY/ AUGUST	**MTR100** Annual Listing of 100 Leading Subsea Companies **Special Report:** Oceans 2014 Preview **Region Focus:** Newfoundland and Labrador, Canada		July 21
SEPTEMBER	**Ocean Observation: Gliders, Buoys & Sub-Surface Networks** **Market:** Research Vessels **Tech:** ROV Tech: Workclass to Micro Systems **Product:** Geospacial Software Systems for Hydrography	**Oceans 2014** Sept. 14-19, St. John's, Newfoundland and Labrador, Canada	August 21
OCTOBER	**Subsea Defense** **Market:** Oil Spill Monitoring & Tracking **Tech:** Seafloor Engineering & Remote Operations **Product:** Fiber Optic and Electrical Connectors	**Clean Gulf** Dec. 2-4, San Antonio	September 25
NOVEMBER/ DECEMBER	**Fresh Water Monitoring & Senors** **Market:** Subea Engineering & Construction **Tech:** Offshore Inspection, Maintenance & Repair (IMR) **Product:** Commercial Diving: Lights, Cameras, Helmets	**Underwater Intervention 2015** New Orleans	November 26

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C2	VideoRay LLC	www.videoray.com	(610) 458-3000

We couldn't resist one final image of the SeaExplorer glider.

For the full story, turn to page 36

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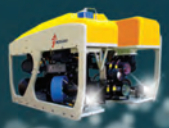




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