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MARINE TECHNOLOGY REPORTER

March 2006
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Q&A with Dr. Andrew Clark



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St. John's, New Foundland and Labrador



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SOUTHCOAST MASSACHUSETTS MARINE SCIENCE & TECHNOLOGY CORRIDOR



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As plans are set for the 9th Annual International Autonomous Underwater Vehicle Competition, a roster of some of the brightest minds gets set to compete.

— by *Maggie L. Merrill*

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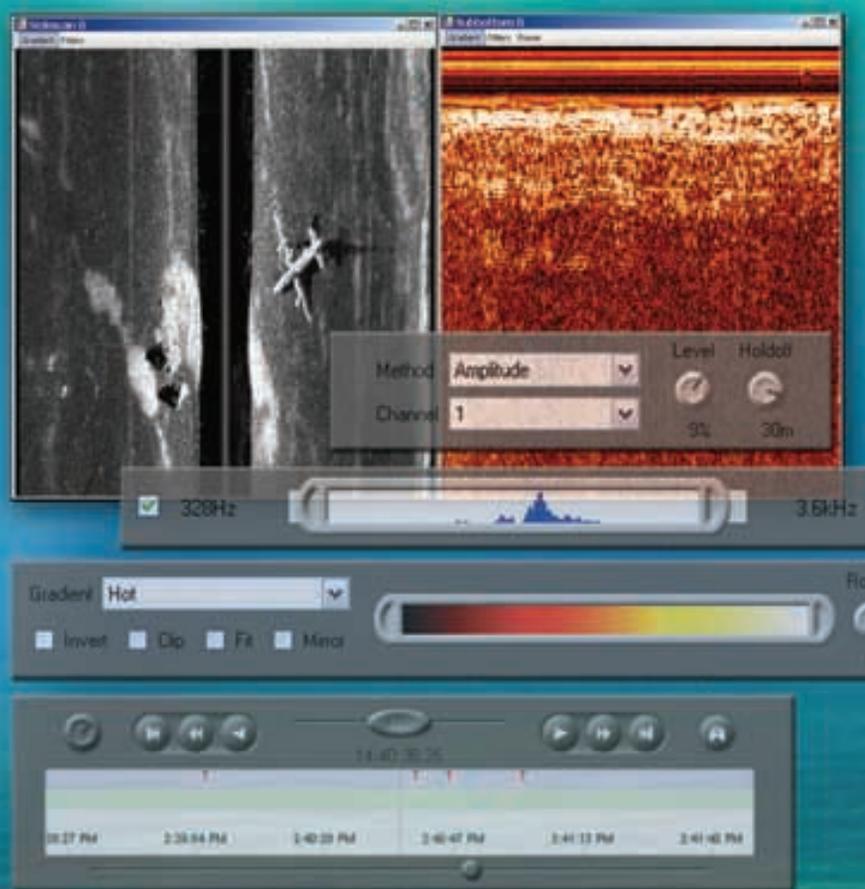
As Oceanology International 2006 gets set for London's ExCel center later this month, MTR reviews new products and services from exhibiting companies.

In the Background: The Ice Tank in St. John's is the world's longest refrigerated indoor pool. NRC researchers use it to study the design of vessels and structures that operate in ice-covered waters. See story on page 20.

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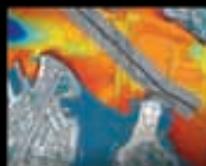
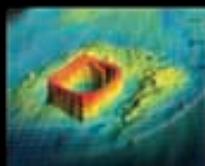


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on the **Cover**

The new 150 hp Triton XLS, with a high specification survey suite and high thrust output. Triton XLS-11 has recently been delivered to Geoconsult AS and is scheduled for installation on their new build vessel Geoholm in Q1 2006

the **Authors**



Maggie Linskey Merrill is the founding editor and publisher of *Marine Technology Reporter*. She has 20 years experience communicating marine science, technology, environmental and engineering news and information. She has held positions at the Woods Hole Oceanographic Institution, Massachusetts Institute of Technology, HA Perry Foundation and Sea Data Corporation. In 1993 she founded *MTR* and the Marine and Oceanographic Technology Network (MOTN). **(Story on page 34)**



Dr. Robert Ballard is presently the Director of the Institute for Archaeological Oceanography at the University of Rhode Island's Graduate School of Oceanography after spending 30 years at the Woods Hole Oceanographic Institution where he founded the Deep Submergence Laboratory. **(Story on page 24)**



Dr. Stephen R. Hammond is Acting Director the NOAA Ocean Exploration program. He has served as the program's Chief Scientist and is Division Director for the Ocean Environment Research Division of NOAA's Pacific Marine Environmental Laboratory. Dr. Hammond has a Ph.D in marine geophysics and has been involved in submarine volcanic and hydrothermal research for more than 30 years. **(Story on page 24)**



Dr. Larry Mayer is the director of the Center for Coastal and Ocean Mapping at the University of New Hampshire and the co-director of the NOAA/UNH Joint Hydrographic Center. Larry's present research deals with sonar imaging and remote characterization of the seafloor as well as advanced applications of 3-D visualization to ocean mapping problems. **(Story on page 24)**

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NOAA Awards Hydrographic Survey Contracts

The National Oceanic and Atmospheric Administration (NOAA) in late February awarded five-year contracts, with a total ceiling of \$50 million each, to five hydrographic services providers including: C&C Technologies Inc. of Lafayette, La.; SAIC of Newport, R.I.; David Evans and Associates of Portland, Ore.; TerraSond Ltd. of Palmer, Alaska; and Fugro Pelagos of San Diego, Calif. All five contracts are subject to available budget funding and are national in scope covering all waters for which NOAA has nautical charting responsibility. Specific locations for work will be established once survey needs and priorities are determined. Two projects, the Approaches to Port Fourchon, La., and survey work in the Gulf of Mexico to support U.S. interests defined in the United Nations Convention on the Law of the Sea, will be carried out by C&C Technologies Inc. The 2005 hurricane season, which released debris and other possible obstructions to navigation into the Gulf, makes survey updates of this region a top priority. The contracts were awarded in August 2005, after a solicitation process that followed Architect Engineering (Brooks Act) Qualification Based Selection procedures. The contracts will expire August 31, 2010.

"Addressing the hydrographic needs of this nation is critical to the safety and prosperity of the U.S. marine transportation system which in 2004 moved more than 2.5 billion tons of domestic and international freight at a value of more than \$2 trillion," said Capt. Roger Parsons, director of NOAA's Office of Coast Survey. "These contracts will allow us to better meet the demand for accurate hydrographic information to maintain and produce up to date and reliable navigational charts. One of NOAA's missions is to support the nation's commerce with information for safe, efficient, and environmentally sound transportation."

Seen at UI 2006

Right: Seimac President, **Jim Hanlon** takes a break while promoting the new Seimac rescue locator now being utilized in many search and rescue operations.

(Photo Credit: Maggie L. Merrill, MTR)



Left: **Chris Coombs**, VP Marketing of JW Fishers takes a moment to thumb through the pages of MTR while tending to his booth at UI '06 in Tampa, Fla.

(Photo credit: Maggie L. Merrill)

NOAA Submits '07 Budget Request

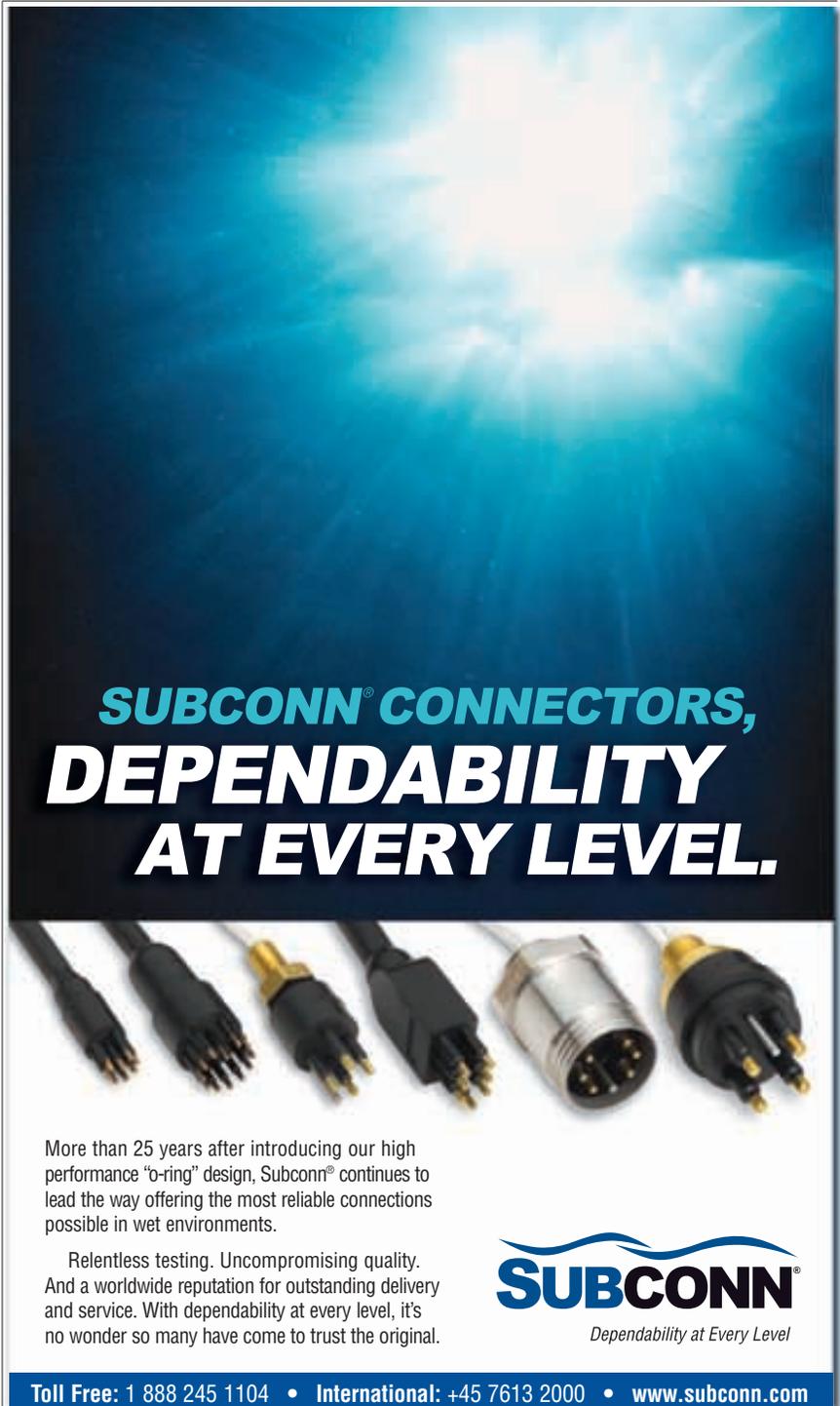
news

President Bush's proposed 2007 budget includes \$170 million for NOAA's Commerce and Transportation Program, including a net program increase of \$19.5 million. NOAA's total budget request is \$3.68 billion, including a net program increase of \$345 million.

Retired Navy Vice Adm. Conrad C. Lautenbacher, Ph.D., under secretary of commerce for oceans and atmosphere and NOAA administrator, unveiled the proposed budget for the Commerce Department's National Oceanic and Atmospheric Administration.

"The U.S. economy relies upon transportation to move people, cargo and commerce around the nation and around the world," Lautenbacher said. "NOAA services have never been more important to the nation and this budget request will provide increases to ensure transportation safety, as well as environmental satellite continuity, improvements to fisheries management, and tsunami and hurricane warnings." The requested amount for the Commerce and Transportation Program includes an increase of \$10.5 million, which will allow NOAA to collect approximately 500 additional square nautical miles of hydrographic survey data, in addition to its planned schedule for approximately 3,000 square nautical miles of hydrographic data. The request also includes \$1.9 million to build and maintain digital charts for electronic navigation, and \$1.8 million for two additional

Navigation Response Teams for adequate regional response to emergency incidents in U.S. waterways. These teams enabled Gulf of Mexico ports to reopen quickly after the 2005 hurricanes with assurances of clear channels.



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Kongsberg Wins \$6.7M Contract

Kongsberg Underwater Technology Inc., Lynnwood, Wash., won an estimated \$6.7m indefinite-delivery/indefinite-quantity, firm-fixed price, performance-based contract to provide Multibeam Sonar Systems (MBSS) for permanent installation aboard T-AGS 60 class survey vessels operated by the Naval Oceanographic Office (NAVOCEANO). The contract includes option periods, which if exercised, would bring the cumulative value to an estimated \$29.5m.

All American Delivers for NOAA

All American Marine launched a 56 x 21 ft. catamaran built under contract for the National Oceanic and Atmospheric Administration (NOAA). The high-speed patrol vessel has been assigned to operate in the Florida Keys National Marine Sanctuary (FKNMS) and its Tortugas Ecological Reserve off the Southern coast of Florida. The vessel will serve as a long-range law enforcement patrol boat in the lower Keys.

The patrol vessel is owned and maintained by NOAA's National Marine Sanctuary Program in the Florida Keys. The boat offers accommodations for four officers and can comfortably endure long patrols. The long distance traveled between home port and the patrol area requires that the vessel operates with extreme fuel efficiency. As a law enforcement vessel, the boat regularly runs at a high cruise speed and has the ability to sprint at very high speeds during pursuit. "The speed, fuel efficiency and stability of this state-of-the-art law enforcement vessel will assist our officers as they patrol the remote, open seas of the Florida Keys National Marine Sanctuary's Tortugas Ecological Reserve," said Billy Causey, acting superintendent for the National Marine Sanctuary Program's Southeast Region. "This vessel's capabilities will help fulfill our commitment to protect the reserve's coral reefs and abundant marine life for future generations."

The patrol craft is powered by twin MTU 8V2000 M92 engines, each delivering 1085 hp at 2450 rpm. The propulsion package includes Hamilton Jet 403 water jets. The vessel has a 42 knot cruise speed in mission condition and can perform at speeds in excess of 44 knots. The Teknicraft designed hull and hydrofoil technology offers peak performance, while maintaining excellent seakeeping ability and high fuel efficiency. "All American Marine built the vessel to exactly what was specified and met all of the requirements. We got everything we asked for and more," states FKNMS law enforcement officer, Lieutenant Scarpa.

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Part of Benthos Property Available for Start-ups

The Falmouth Economic and Industrial Corporation (EDIC) is working hard to support the creation and growth of Marine Technology Businesses in its region. Three years ago it purchased 22 acres of land owned by Benthos, Inc. surrounding that company's facility.

At build out, 250 new jobs will be created in the new Raymond Business and Technology Park (named after Benthos' founder Sam Raymond). This is in addition to the EDIC's Falmouth Technology Park, currently home to approximately 400 jobs, and projecting 600 total over the next few years.

Now the EDIC is moving into a more direct support role with the Marine Science

Industry. The Regional Technology Development Center (RTDC) is designed to stimulate commercialization of important technologies. The RTDC will facilitate the formation and growth of new companies while assisting existing technology companies with market development, team building, equity capital raising and other business assistance services. With MOU's with Marine Biological Laboratory and the Woods Hole Oceanographic Institution in Woods Hole in place, as well as funding for an initial three year start-up phase, the RTDC is uniquely positioned to offer assistance to marine scientists and entrepreneurs. Contact Chris Bailey at (508) 563-9777.

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Commercial Ships for Oceanographic Research

As the 36,000-ton ferry *Norröna* makes its weekly trip from Denmark to Iceland, it not only carries a load of up to 1,500 passengers and 800 automobiles, it will also help scientists learn about the movement of warm and cold waters into and out of the Nordic seas. It is the latest among a small group of commercial vehicles that oceanographers are enlisting to aid in their research. The vessel is equipped with an acoustic Doppler current profiler. The device measures the velocity of water moving beneath the ship - from the surface to as deep as 800 m - by calculating the speed and direction of floating zooplankton. Since many merchant vessels travel the same route week after week and year after year, they are ideal for collecting the necessary data. Once it is installed on a ship, the acoustic Doppler current profiler

takes measurements without requiring any human assistance. Due to natural variability in the oceans, the *Norröna*, built in 2003, will likely need to collect data for at least five years to provide enough useful information to analyze, and even longer than that to determine long-term trends. Other scientists has been collecting similar information from the freighter *Oleander*, which travels between New Jersey and Bermuda and which is equipped with the same instrumentation in 1992. The first 12 years of data collected by the *Oleander* demonstrated that the Gulf Stream off the U.S. East Coast is quite stable and varies little. The same data also showed that cold water from the Labrador Sea moves west and exhibits significant variability. Merchant vessels have been used for many years to collect sea surface temperature data and weather observations, but more complex measurements have required sending a scientific observer

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along, which is usually cost-prohibitive. It has only been in recent years that technological advances have made it convenient for equipment like acoustic Doppler current profilers to be placed in service on such vessels. Ships in Japan, Holland and Long Island Sound, as well as a Miami-based cruise ship and a Denmark-to-Greenland container ship, are among the vessels now collecting data for researchers.

International SubSea Charters **Pertinacia**

International SubSea (ISS) of Houston, announced a charter for the use of CV/DSV *Pertinacia* in the Gulf of Mexico. This vessel will support International SubSea's salvage support services to the offshore infrastructure as a result of damage caused by Hurricanes Katrina and Rita.

Initially, ISS intends to use the *Pertinacia* for ROV/Dive Support salvage operations.

ISS is presently in negotiations for additional vessels. *Pertinacia*, owned by Elletra Itc. of Italy, is a 430 ft. Cable Ship designed to perform cable installations as well as sub-sea construction/installation services. Placed in service in 2002 this DP-2 vessel is equipped with a 200 shp Triton ROV, 65 metric ton heave compensated A-Frame, 25 te Knuckle Boom Crane, ISS Light Work / Inspection ROV.

Aker Kvaerner Wins Drilling Equipment Contract

Aker Kvaerner signed a contract with Daewoo Shipbuilding & Marine Engineering Co. for delivery of drilling systems for two semi-submersible drilling rigs ordered by SeaDrill. The total contract value for Aker Kvaerner is approximately \$136.6 million.

The scope of work for Aker Kvaerner MH is to deliver two complete drilling packages

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consisting of engineering, equipment deliveries and commissioning services. The contract between Daewoo shipbuilding & Marine Engineering Co. Ltd. and Aker Kvaerner MH includes opportunities for options to be agreed and amended at a later stage. The deepwater semi-submersible drilling rigs are scheduled for delivery in Q1/2008 and Q3/2008. The drilling rigs will be designed for worldwide operation, including operation on the Norwegian continental Shelf.

\$9.5M Investment in Tranby Subsea Facility

Aker Kvaerner intends to invest \$9.5 million to develop its Tranby manufacturing operation into the most efficient subsea tree manufacturing facility in the world. The

new streamlined operation(s) is designed to increase Aker Kvaerner's ability to respond to customer needs with reduced lead times, more rapid execution and new subsea boosting products.

"This investment positions our manufacturing resource base for future growth and will give us additional supply and testing flexibility across a range of products and services. Tranby will become the world's most efficient subsea tree and pump manufacturing plant," said Sverre Ivar Fure, senior vice president operations, Aker Kvaerner Subsea.

The investment in new machining technology and a new subsea tree assembly line will expand subsea tree production capacity by 25 percent and increase manufacturing efficiency. The addition of a dedicated subsea pump assembly and testing facility will

Oceans 2006 Set for Boston

The Oceans '06 MTS/IEEE-Boston Conference and Exhibition will be held in Boston Massachusetts from September 18-21, 2006. The New England region enjoys a centuries-old relationship with the ocean; from the fishing and whaling ports of Gloucester and New Bedford to the premier technology centers of the Woods Hole Oceanographic Institution and the U.S. Navy's Undersea Warfare Center.

The OCEANS '06 MTE/IEEE-Boston technical program will continue to emphasize the traditional core areas of marine science and technology development. Researchers from academia, industry, and government are encouraged to submit their recent work on topics such as:

- Underwater Acoustics and Acoustical Oceanography
- Sonar Signal/Image Processing and Communications
- Ocean Observing Platforms, Systems, and Instrumentation
- Air and Space Ocean Remote Sensing
- Ocean Data Visualization, Modeling, and Information Management

- Marine Environment, Physical Oceanography, and Meteorology
- Optics, Imaging, and E-M Systems
- Offshore Structures and Technology
- Marine Law, Policy, Management, and Education

Submissions should include a 500-1000 word extended abstract clearly outlining the technical contribution. Revised abstracts deadline is March 31, 2006.

For information contact OCEANS 06 - Boston Publicity Co-Chair, M. L. Merrill at 781 740 1456, or via e-mail at martrep@aol.com.

For additional Technical Program information contact Technical Program Chair: Dr. Vincent Premus, MIT Lincoln Laboratory at techchair@oceans2006mtsieeboston.org or at (+1) 781-981-5341

For additional Student Program information contact Student Program Chair: Prof. Alexandra Techet, Dept. of Mechanical Engineering, Massachusetts Institute of Technology, at ahtechet@mit.edu or at (+1) 617-452-2266.

Congratulations Katy Croff



Katy Croff, interviewed by MTR in conjunction with an article in the January 2006 edition on the new Archaeological Oceanography doctorate program at the University of Rhode Island ("Evolution at URI", January 2006, page 22), was recently named a "2006 Emerging Explorer" by National Geographic.

enable the company to grow within the emerging subsea boosting market.

Aker Kvaerner is also establishing a new \$36.7 million manufacturing center in Kuala Lumpur, Malaysia, scheduled to be operational in late 2006. The upgraded Tranby facility will be a training ground for Malaysian employees in preparation for operation of the new Malaysian facility.

The Tranby facility employs approximately 500 people and supplies equipment for clients including Statoil, Total, BP, Murphy, Shell, Marathon and Norsk Hydro, among others.

Wind Farm Installation Ships Have O&G Future

A 14,000-ton ship called MV Resolution originally designed to install offshore wind turbines is expected to be sold and converted for use in the oil and gas market, accord-

ing to a report on www.telegraph.co.uk.

The move is a blow to the Government, which is pushing for 10 percent of the U.K.'s energy to be generated from renewable sources by 2010 in line with the Kyoto agreement. Resolution, which is based in Teesside and cost about \$70 million to build, is one of only two vessels in the world that can install offshore wind farms.

The buyout, made through a company called Marine Projects International (MPI), led by chief executive Paul Gibson and backed by Japanese bank Mizuho International, safeguarded about 60 jobs in Teesside. Close Brothers is understood to be advising on the Resolution sale and to have talked to several interested parties. Bidders are expected to include companies from the oil and gas, construction and shipping sectors.

(Source: www.telegraph.co.uk)

news

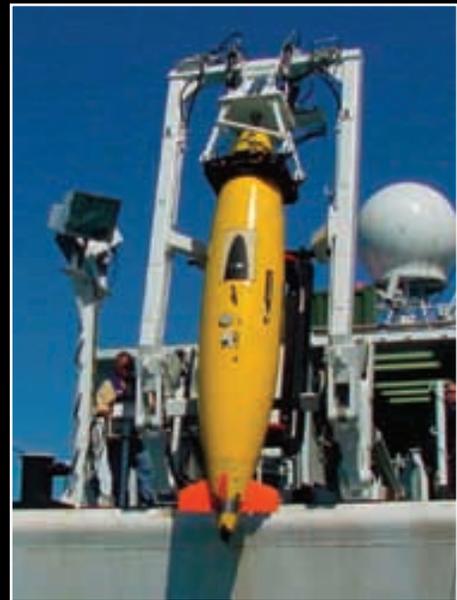
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Diesel-Electric Power for Natural Gas Research Vessel

MAN B&W Diesel A/S, Denmark, won a contract for the supply of four gensets for a diesel-electric Natural Gas Hydrate Integrated Research Vessel newbuilding in China. The vessel, which will be built by Wuchang Shipyard, Wuhan, is to be powered by three MAN B&W Diesel main Holeby gensets — type 6L27/38 — together with harbor/auxiliary gensets type 9L16/24.

Upon the shipyard's completion and commissioning in 2007 the research vessel will be taken over by the owner and operator, the Chinese organization, GuangZhou Marine Geological Survey.

The newbuilding is designed by the MARIC Design Institute, Shanghai, and is optimized for comprehensive marine survey and natural gas research operations.

The twin screw diesel-electric propulsion and drive system is based on a low voltage Siemens package powering a pair of Schottel thruster propellers.

GuangZhou Marine Geological Survey (GMGS), under the China Geology Survey, is a multi-discipline and multi-functional marine geological investigation organization. It mainly carries out the basic, strategic and public marine geological investigation in China. GMGS owns three geophysical inves-

Main Particulars

Ship type	Natural Gas Hydrate Integrate Research Vessel
Ship designer	MARIC
Length, o.a.	106 m
Length b.p.	96 m
Breadth	17.4 m
Depth	8.3 m
Design draft	5.5 m
Est. trial speed	17 knots
Endurance	15,000 nm - unrestricted service
Main GenSets	3 x MAN B&W Diesel type 6L27/38
Output	3 x 1980 kW
Aux/harbor GenSet	1 x MAN B&W Diesel type 9L16/24
Output	810 kW

Diesel-electric

Alternators/motors Siemens

Thrusters/propellers Schottel

tigation vessels, one drilling vessel, and two fuel ships which are equipped with advanced instruments such as a DGPS, 2D/3D seismic recording system, sub bottom profiling system, gravitometer, magnetic gradiometer, depth-sounder, multi-frequency probing system, side-scan sonar system, CTD instrument, sea bottom camera sediment corers, multi-beam system and so on. GMGS can conduct the sea floor topography, geomorphology and hydrocarbon resource investigation and marine geological engineering in deep sea and shallow water with these vessels and instruments.

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VT Halter to Build Fourth NOAA Vessel

VT Halter Marine, Inc., a subsidiary of Vision Technologies Systems, Inc., will build another fisheries survey vessel (FSV) for the National Oceanic and Atmospheric Administration (NOAA). NOAA exercised an option for about \$30 million to build the fourth planned vessel under an existing contract. Construction will begin in 2006 with delivery planned during the second half of 2008.

VT Halter Marine designed the 208-ft. FSVs in accordance with guidelines for acoustic quieting set by the

International Council for Exploration of the Seas. The first ship in the class-Oscar Dyson-was delivered on Jan. 5, 2005, and is one of the most technologically advanced fisheries ships in the world. The second ship-Henry B. Bigelow-was launched on July 8, 2005, and is expected to be delivered to NOAA in mid-2006. Construction began on the third ship in the class, FSV 3, in July 2005; this ship, yet to be named, is expected to be delivered in late 2007. It will initially be home ported in Pascagoula, Miss.

These NOAA sister ships, with cutting-edge low acoustic signatures, will have the ability to perform hydro-acoustic surveys of fish. They will also be able to conduct bottom and mid-water trawls while running physical and biological oceanographic sampling during a single deployment; a combined capability unavailable in the private sector.



Fastwave Wireless Communications

Fastwave Communications develops advanced wireless communication solutions for global monitoring, control and tracking applications. These solutions include autonomous and mobile data acquisition, logging and telemetry devices built to withstand harsh environmental conditions. The company has recently developed a global system for transmitting near real time data from wireless sub-sea sensors and control systems. The system uses the Iridium constellation of 66 low earth orbit satellites, which provides global, two-way, real time data capability from any location, including small floating platforms such as buoys, enabling the integration of surface monitoring and control systems with underwater wireless networks.

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Oyster PE: Alternative to Data Loggers

The Oceanscience Group released Oyster PE, a ruggedized, water-resistant, full-featured miniature computer. The Oyster PE's is designed to be easy to use, with large data capacity, expandable I/O, versatile communications and networking capabilities.

Created for industrial use, the PC incorporates a Celeron processor in a rugged IP67 aluminum case. Windows XP or optional Linux operating systems provide familiar user interfaces and minimize training. Wireless 802.11 b/g LAN allows ad hoc or infrastructure networking; options include RF and Iridium satellite communications. The standard configuration includes a 4 GB solid state compact flash hard drive, 512MB SDRAM, 4 serial inputs and 2 USB ports. Low power consumption and versatility position the Oyster PE as a platform for supporting sea- and land-based data collection and monitoring.

The Oceanscience Group manufactures a wide variety of waterproof communications and oceanographic / hydrologic instrument platforms for universities, government agencies and private industry

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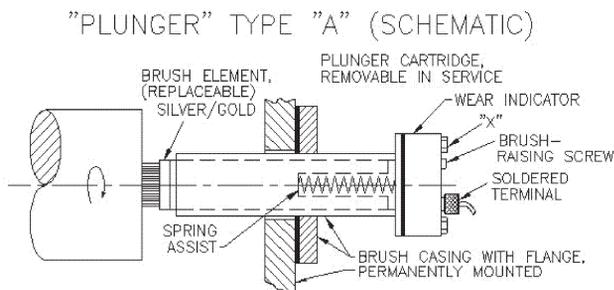
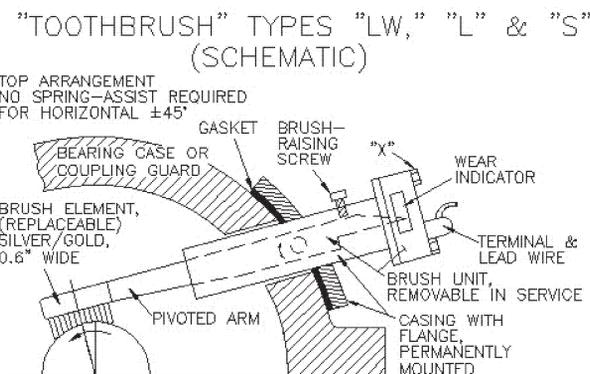
Underwater Electromagnetic Technology Partnership

Tritech International of Aberdeen, Scotland and Wireless Fibre Systems of Livingston, Scotland announced a partnership agreement to promote radio frequency solutions for specific offshore oil and gas industry use where elec-

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tromagnetic techniques address niche underwater applications. "It has been clear that existing acoustic systems have their limitations, particularly in noisy underwater environments or where transmission at very high data rates is required," said Richard Marsh, Managing Director of Trittech International. "This was the problem I posed to Wireless Fibre System Ltd. in early 2005. They have responded magnificently with a range of pioneering ideas and solutions. So much so that Trittech has now formed a partnership with WFS to jointly promote these exciting new products and concepts." The companies plan to launch a number of innovative products in the near future including:

- Dual mode Acoustic / RF modems to provide robust, high availability communications for safety critical applications
- RF solutions for: High data transfer rate for ROV or AUV to sensor/data loggers; Real time AUV control; High resilience safety applications; Sensor synchronization; Through water - air interface communication links; Diver texting and telemetry.

"We are developing a short range, broadband communications system for Autonomous Underwater Vehicles (AUVs)," said Brendan Hyland, Chairman & CEO of WFS. "This will support faster and more covert communications between AUVs and sub-sea data loggers, surface vessels and docking stations."

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MTN Provides Live Video, Cellular Service from Submarine

Maritime Telecommunications Network (MTN) has joined with the American Broadcast Companies (ABC) to provide a live, real-time broadcast on board a submerged submarine. ABC's Good Morning America segment "Run Silent, Run Deep" was broadcast recently from aboard a US Navy submarine while the sub was under water, and under way. This was reportedly the first broadcast of its kind. The nuclear submarine, USS Scranton, and the US Navy support vessel USNS Dolores Chouest, which followed the sub, were each equipped with a 1900 MHz high-gain CDMA antenna and microwave communications equipment. The sub had cellular telephones installed below deck and the ship was equipped with a CDMA PICO Cell and cellular telephones outfitted by Wireless Maritime Services, a joint venture between MTN and Cingular Wireless. The submarine transmitted the live video broadcast to the Chouest using bi-directional microwave radios. The cellular technology was used to support all of the live two-way communications between the studio in New York and the sub below the surface. All of the video and cellular traffic was uplinked via MTN's video broadcast network using satellite communications technology. MTN's technology allows live real-time, full bandwidth satellite video feeds at the site of the action, enhancing the quality of news coverage by not only reporting the scene, but taking the viewers into the scene itself.

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Delta Wave Offers New Sat Phone Kit

Delta Wave Communications released its new ST2900FIP portable satellite phone system. Delta Wave's (FIP) has passed Globalstar's testing and is now a Globalstar certified product. Designed specifically for the offshore oil and gas Industry, it is a turnkey Globalstar satellite phone that was designed for quick and easy deployment. It also has terrestrial applications where customers require communications where land lines or cellular service do not exist, and is especially ideal for emergency backup communications. The below-decks equipment is housed in a NEMA enclosure which requires minimal space for installation. The kit includes a corded and cordless handset system which is connected to a standard RJ11 port. Though a corded/cordless phone set is included, it may also be ordered without one in cases where customers might want to use their own, or to wish to integrate the system into their PBX or Key system. The RS232 data port offers e-mail and internet connectivity at speeds of up to 56kbps when using Globalstar's Express Data package. All data software is included in the package. 55-ft. of coax cable is included. An unprecedented feature is that it may also be quickly deployed to areas where power is not available. With its battery backup, the system can run for 24 hours (3.5 hours talk time) before recharging the battery.

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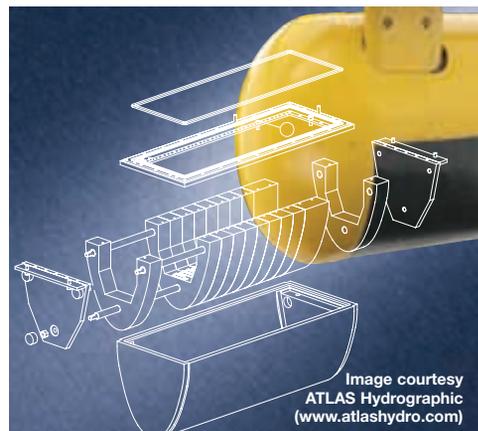


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Q&A with Dr. Andrew Clark

More Industry Input needed for IOOS

MTR's Maggie Merrill spent some time with Dr. Andrew Clark — Industry Liaison for the National Office for Integrated and Sustained Ocean Observing (Ocean.US) and the Integrated Ocean Observing System (IOOS) — in the Marine Technology Society (MTS) booth at the MTS/ADC Underwater Intervention Conference in Tampa, Fla. The topic du jour: IOOS and the need for additional industry input.

MTR: Andy, most of us know you as President of HARRIS Corporation's Maritime Communications subsidiary — so what is this role that you have with the Integrated Ocean Observing System or IOOS?

Clark: During my term as President of the Marine Technology Society, I was asked to testify before the then just created U.S. Commission on Ocean Policy (USCOPS) — this was so shortly after 9-11 that all the buildings on Capitol Hill were still shut down over the anthrax scare and we held that session at the Navy Memorial. I emphasized in my testimony that a nationally integrated ocean observing capability (not yet coined as "IOOS") was critical to the nation and that such an ambitious undertaking would require a full partnership with the private sector — particularly U.S. Industry. This really resonated with the Ocean Commission as in their report, not only was the IOOS among their priority recommendations to the President, they also emphasized that its success would hinge upon the participation of U.S. Industry. In the interim I wrote a paper for an Oceans conference and an op-ed piece emphasizing the issues. A little over a year ago, I got a call from some of the senior government leadership who are responsible for establishing IOOS saying that they agreed that U.S. Industry must become engaged and asked if I could help.

MTR: So a classic example of "be careful what you wish for?"

Clark: Something like that - actually, I was honored to be asked and fortunate to be in a position that I could essentially "take a sabbatical" from my day job and pitch in. I consider this my "answer to the call of public service." Actually, most of the staff of The Office for Integrated and Sustained Ocean Observations



L-R **Emily Speight**, Marine Technology Society and **Dr. Andrew Clark**, Industry Liaison for IOOS (photo credit: Maggie L. Merrill, MTR)

(www.Ocean.US) are also "on loan" from their posts either at other Federal agencies or from universities and oceanographic institutions around the country. I am only unique in that I was the first recruited from industry.

MTR: Are there opportunities for companies in the marine technology sector in this IOOS initiative and if so, how do they find and respond to them?

Clark: Yes there are. Actually, as we speak, there is an RFQ (Request for Quotations) that has just been posted seeking firms who are interested in providing conceptual designs for IOOS. By the time this interview runs, these response will have been received and in the evaluation process. Prior to this, two other awards were already made; one to Boeing and the other to Northrop-Grumman, to develop some demonstration products of how IOOS could address some of the complex problems faced by NOAA and the U.S. Navy. Aside from these national procurements that will be posted at the Federal Register (www.gpoaccess.gov), Federal Business Opportunities (www.fedbizopps.gov), and/or the U.S. General Services Administration (www.ebuy.gsa.gov/advgsa/ebuy/) companies, both large and small need to get involved with IOOS at the regional level. An important aspect of IOOS is that it will be user-driven largely from eleven Regional Associations that comprise the coastline of the U.S. and its territorial

waters. Companies interested in participating with IOOS should contact some or all of these Regional Associations (or RA's) to see about becoming a member.

MTR: And how do they contact them?

Clark: Two very good "one stop shops" for reaching some or all the RA's is through our website (www.ocean.us) or that of the National Federation of Regional Associations (NFRA at www.usnfra.org www.nfra.org)

MTR: What contribution can be made by the private sector?

Clark: Actually, from the inception of IOOS through its development, deployment, operation, maintenance and continual upgrade and improvements there will be critical roles that can best be fulfilled by Industry. The national calls or solicitations to date have been focused primarily at the very front-end of design and architecture of this "system of systems". In a very real sense, the offshore oil & gas sector has already become actively involved in IOOS data, both in gathering and utilizing it.

Q&A

(Continued on page 64)

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Ocean Excellence

Anchors in St. John's, Newfoundland and Labrador



St. John's, the capital city of Newfoundland and Labrador, boasts a mature and comprehensive concentration of marine technology research and development performers and companies.

The Executive Director of Memorial University's Fisheries and Marine Institute in St. John's has already worked well past closing time. It's evening now and Glen Blackwood, a marine biologist by profession, is still in suit and tie, ready to meet parents of first year students.

But he's more than willing to squeeze in some time to talk about the school, and its role in building a flourishing marine and ocean technology sector that is making waves in St. John's, Newfoundland and Labrador, and other communities on the province's Avalon Peninsula. "We're the best kept secret in the country," says Blackwood about the Marine Institute, the largest of its kind in North America.

Blackwood is not only talking about the Marine Institute, he's referring to the city's under-the-radar status as a hotbed of ocean and marine technology.

St. John's has a concentration of some of the most renowned research and development facilities in the world. The National Research Council Institute for Ocean Technology (NRC-IOT) evaluates the design of vessels and offshore structures in its ice tank, towing tank and offshore engineering basin. The IOT's wave tank is used regularly to test yacht designs for Americas Cup syndicates.

Memorial University's Ocean Sciences Center is a leading Canadian cold oceans research facility. The Marine Institute has a flume tank that looks at how currents affect nets and fishing gear and C-CORE specializes in ice engineering and other activities related to natural resource industries.

That's just the tip of the iceberg, so to speak. Many of these facilities are one of a kind and cater to an interna-

tional clientele that includes port authorities, fisheries departments, coastguards, and academic institutions. This world-class research and development infrastructure has helped grow local expertise and drive technology advances.

Dr. Mary Williams, Director General of NRC-IOT, sees an ocean of potential for the sector. She put it this way when she spoke to New England governors and Eastern Canadian premiers when they met in St. John's last August.

"When you think of the really big problems today, you think about things like global warming, energy supplies, sovereignty and security, the global food chain, and sustainable communities. What do oceans have to do with these issues? The answer is everything. Oceans are of vital importance to our survival as a society."

She held their attention, and not just because she's well-spoken. The issues she raises are ones political leaders must grapple with. The province's Premier, Danny Williams, sees this as an opportunity.

"Ocean technologies enable us to work in the ocean more safely, more efficiently, more effectively, less intrusively," she says. "But we don't just do it from the good of our hearts. There's an economic spin-off to this. We know the ocean, we live beside it, it's part of our life. What better place for that economic spin-off to happen than here?"

About 50 companies working in the city's ocean and marine technology sector would agree. Located within a 20 km radius of each other, small and medium-sized companies are building their own particular expertise in everything from ice management to electronic navigation and communication systems, to lifeboat safety and design. And with security given increased priority in this post 9/11 era, companies are offering up and developing high



Marine Institute's Offshore Survival and Safety Center's marine base at Pier 25 in St. John's harbor delivers nautical science and offshore safety and survival training.

tech surveillance and security systems.

It's all adding up to a cluster of ocean excellence. Partly by design, partly the natural outcome of living and working in close proximity - scientists, entrepreneurs, government officials, and academic institutions are creating synergy. The atmosphere is more collegial than competitive.

"We hope to foster and build on this collaborative approach through our provincial marine strategy," says Kathy Dunderdale, Minister of the provincial department of Innovation, Trade and Rural Development. "We're really building on a long standing tradition in this province that says we're all in this together."



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The Ice Tank in St. John's is the world's longest refrigerated indoor pool. NRC researchers use it to study the design of vessels and structures that operate in ice-covered waters.

"In my career I've never seen anything quite like it," said Elizabeth Lawrence, Director of Economic Development, Tourism and Culture for the City of St. John's. "Clusters are common, but the wow factor is that we've got this community working together. It is significant. Momentum is building."

That momentum is partly fueled by the success of local entrepreneurs exporting their know-how to customers around the globe. Companies like ICAN Marine Solutions that design electronic charting systems, mobile and shore-based tracking technology and marine data management systems.

ICAN's list of repeat customers includes Transport Canada, the American, Canadian and Icelandic Coast Guards, the RCMP, the US Army Corps of Engineers and the Singapore Maritime Port Authority.

Founded in 1997 by Neil Chaulk, a graduate of Memorial University's electrical engineering program, and a former systems engineer with the Canadian Coast Guard, the company struggled for years to build its client base.

But things are different now. ICAN was named Exporter of the Year by the Department of Innovation, Trade and Rural Development. The company appreciates the recognition from the hometown crowd.

"We're really exporting our intelligence, building capacity in our economy. We have talented people here who could work anywhere," says Chaulk from the company's boardroom, where a textured map of the world covers most of the entire front wall.

Just a few kilometers away at NavSim Technology in the city's east end, Piotr Waclawek, is plotting a course he expects will lead to global success — some day soon! A naval architect by profession, and a former NRC scientist turned entrepreneur, he started up his business four years ago. NavSim is developing autopilot technology for the shipping industry.

As a way to increase cash flow, NavSim's team of engineers and computer scientists has also developed automated navigation systems for pleasure boats. Map Cruiser and Boat Cruiser are software products getting good reviews.

Madrock Marine Solutions is one of the newest compa-

nies trying to carve out a place for itself in the market. Madrock develops products related to marine safety, and recently graduated from the Young Entrepreneur Program offered at the Ocean Technology Enterprise Centre, which is housed at the NRC-IOT.

At the helm of Madrock are Dean Pelley and Jason Dawe, graduates of both Memorial University engineering and the Marine Institute.

Madrock's leading edge technology is actually a piece of hardware, a lifeboat release mechanism that Pelley says will save lives. The company is also working on a better lifeboat design for use in hostile ocean environments.

The value of all this activity isn't lost on Elizabeth Lawrence at the City of St. John's. Two years ago she

helped convince city council it should adopt a new way of positioning St. John's from a business development perspective.

"We're trying to put our heads above the crowd," she says. "We're a small center and we needed to focus. From our perspective (the oceans piece) made a whole lot of sense. It's where we came from."

A province with 17,000 km of spectacular coastline, more than 500 years of experience fishing in the North Atlantic, and a growing offshore petroleum industry should really know a thing or two about oceans.

"You wouldn't expect us to be experts in topsoil," jokes Glen Blackwood, on a whirlwind tour of the Marine Institute.

MOTN Signs MOU with Ocean Advance

On January 29, 2006, at a luncheon hosted by the New England - Canadian Business Council and Governor Don Carcieri of Rhode Island, MOTN President Hugh Murphy signed a Memorandum of Understanding with Mr. Les O'Reilly, Executive Director of OceansAdvance of St. Johns, Newfoundland. The MOU was one of three signed at the luncheon and is an outline of various initiatives and cooperative measures that can be taken to foster business collaborations between member companies of MOTN and OceansAdvance. The other MOU's which were signed were between (1) the Graduate School of Oceanography at the University of Rhode Island and Memorial University's Marine Institute for collaborations on research and education and (2) the State of Rhode Island and the Province of Labrador-Newfoundland for state level cooperation on energy and business development issues. The luncheon was the focal point of a trade mission lead by Premier Danny Williams of the Province of Labrador-Newfoundland to New England. The trade mission was intended to build upon discussions held during the New England Governors and Eastern Canadian Premiers (NEG-ECP) conference this past August in St. John's. The mission is a follow up to a reverse trade and technology mission of New England businesses and institutions that was held in conjunction with the conference.

"Proximity, historical ties and common interests make Newfoundland and Labrador and New England natural trading partners," said Innovation, Trade and Rural Development Minister Kathy Dunderdale. "Through our New England Trade and Investment Initiative, we are able to foster those relationships to the benefit of local companies and organizations and, ultimately, to the benefit of the province."

With the establishment of the province's Marine Technology Development Strategy, introduced in 2004, Newfoundland and Labrador has the ability to establish itself as the Canadian centre of excellence in marine and ocean technology by fostering a strong cluster of technologically-advanced companies, educational institutions and research facilities. Government has allocated \$1.5 million to implement the strategy and seize this remarkable opportunity. In the first endeavor under the MOU, MOTN and OceansAdvance will form Action Committees and develop a milestone plan for a series of joint meetings and collaborative efforts over the coming year.



L-R Les O'Reilly of OceansAdvance with Hugh Murphy of MOTN at New England Canadian Business Council event in Providence, RI.

(Photo credit: Joey Libby Photography)

NOAA's Ship Okeanos Explorer and

Telepresence



Technology

A person in a control room is looking at a computer monitor. The monitor displays a grid of images, possibly satellite or aerial views. The person is wearing a headset and is illuminated by a red light. In the background, other people are visible, suggesting a busy control center environment.

by
Dr. Robert Ballard
Dr. Steve Hammond
& Dr. Larry Mayer

Similar command/control center to be placed aboard Okeanos Explorer.

When NOAA's new ship of exploration, the Okeanos Explorer, begins its first mission in late 2007, it will introduce a new exploratory paradigm based upon "tele-presence" technology.

Unlike traditional oceanographic programs lead by a small team of scientists with very specific scientifically driven objectives, the Okeanos' mission is "to go where no one has gone before" on planet Earth.

The ship's continuing mission will be conceived by a multi-disciplinary group of experts; including individuals drawn from the physical, chemical, biological, and geological marine sciences as well as the social sciences of history, archaeology, and anthropology.

Since the ship's mission objective is of such a broad magnitude and its sensor array will be probing for anomalies across a broad spectrum of indicators, it's impossible to know in advance what this exploratory program will encounter. For that reason, the principal sources of scientific intellect guiding this program will not be aboard the Okeanos Explorer, waiting patiently for new discoveries to occur. Nor, however, will that intellect have to wait until the ship returns from its mission to determine the results of its exploratory efforts; having missed opportunities to react in real-time with critically valuable follow-up observations to an important discovery.

For that reason, the Okeanos Explorer will be equipped with a high bandwidth satellite system linked to a new command control center or "Inner Space Center" that is being built on the University of Rhode Island's Graduate School of Oceanography's campus.

Funded by the citizens of Rhode Island in a 2004 State \$14 million Bond referendum, the Inner Space Center will have a replicate of the command/control center aboard the Okeanos with its personnel standing watches day and night, similar to those aboard ship. Similar to the Navy's "Blue and Gold Teams" for the operations of its ballistic missile submarines, members of teams aboard the Okeanos Explorer and the Inner Space Center will rotate from ship to shore and back to sea.

The Okeanos Explorer will carry a broad range of oceanographic sensors including a hull mounted multi-beam sonar and other sensors under development but at the heart of the sensor suite aboard Okeanos Explorer is a family of deep submergence vehicle systems including towed sonar, imaging, remotely operated, and autonomous vehicles.

Data generated from this array of sensors will flow into the ship's command control center, and displayed on banks of high definition plasma and CRT screens for use by the exploration team.

Data on displays on the command/control console at which the watch leader aboard the Okeanos Explorer sits will be transmitted in real time via satellite to an identical command/control console within the URI Inner Space Center, operated by members of the team of engineers and technicians that rotates on a regular schedule between the Okeanos Explorer and the Inner Space Center.

From the Inner Space Center, the same data stream will follow via Internet2 to a host of sites across the country. Members of the multi-disciplinary team monitoring the exploration mission will be able to go to those sites should their expertise be needed to exploit any discoveries. Each site will also have a command/control console identical to those on the Okeanos Explorer and in the URI Inner Space Center. All consoles will have 16-channels of two-way communications so that the personnel aboard ship and those ashore can freely discuss what actions need to be taken. An expert at a participating university, for example, can take over the role of shipboard watch leader in real time directing that team as it carries out critical follow-up observations; talking direct-





USNS CAPABLE as it is turned over to NOAA and now has been renamed OKEANOS EXPLORER. Presently undergoing major overall that includes **installation exploration technology** (inset).

ly into the ear of the ROV pilot as both look at the same high definition images coming up from below; as well as seeking advice from colleagues working at other remote consoles.

In the summer of 2005, a cruise was conducted aboard NOAA ship Ronald H. Brown to test this new paradigm for exploration. The mission centered on a cruise to "Lost City" on the Mid-Atlantic Ridge, a newly discovered hydrothermal vent field driven by the exothermal reaction of seawater with the mantle, through a process called "serpentiization".

The expert leadership for this mission was under the direction of Dr. Deborah Kelley and her team, the very team that was responsible for the original discovery of Lost City in 2001. Dr. Kelley and her colleagues, however, were not aboard the Brown, but located instead at a command/control console that had been installed at the University of Washington some 4,500 miles away — where communications were routed via Internet 2 to the URI Inner Space Center and then via satellite to the ship.

Another remote command/control console was located at the University of New Hampshire where a team of cartographers received and processed in real-time the Seabeam sonar data being collected aboard the Brown. That data stream, as it will with the Okeanos Explorer, was fed via satellite to the URI Inner Space Center and

then via Internet2 to UNH where it was made into bathymetric maps that were then fed via Internet2 to URI and UW and then via satellite from URI back to the team aboard the Brown. Locations of the ship and its underwater vehicle could then be superimposed on the bathymetric maps to guide the team at sea working within the submerged landscape.

Unlike future missions for the Okeanos Explorer, the 2005 expedition on the Brown took place at a previously discovered site and for that reason was not the ultimate test of the exploration paradigm. This is anticipated to occur in 2006, and expand when Okeanos Explorer becomes operations for projects and expeditions sponsored by NOAA's Office of Ocean Exploration when uncharted regions will be explored with teams of experts monitoring progress from a network of remote command/control consoles ashore.

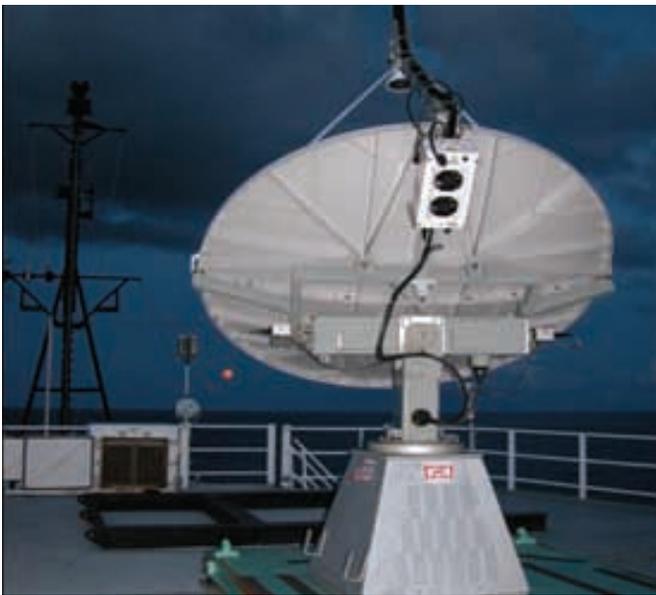
As these tests of the exploration paradigm continue and while the Okeanos Explorer's conversion to a ship of exploration is completed, NOAA's Science Advisory Board (SAB) has created a standing Ocean Exploration Advisory Working Group. The purpose of the group will be to provide the Ocean Exploration program with perspectives and guidance on both exploration priorities and protocols for the program's projects and expeditions, including a hoped for first global mission which may

NOAA's Ocean Exploration Program

The NOAA Ocean Exploration program (OE), begun in 2001, was established for the purpose of acquiring knowledge about the still largely unknown ocean by means of interdisciplinary projects and expeditions based on relatively broadly stated hypotheses. The program's mission is thus to explore and discover. To accomplish this, the program's purview extends across all scientific disciplines of oceanography and also includes support of projects focused on discovering and exploring the nation's marine cultural heritage. The program also specifically funds an ongoing commitment to education and outreach.

For the past five years, OE has funded a diverse portfolio of proposals, solicited through an annual announcement of opportunity, that have resulted in discoveries of fundamental ocean processes, new marine ecosystems, a plethora of new species, and historically important shipwrecks. OE has established national and international partnerships, as well as partnerships with other NOAA line organizations (notably the National Ocean Service and the National Marine Fisheries Service) and has become a major contributor to use and support of UNOLS vessels and platforms. Now, the program is poised to expand its exploration capabilities with a dedicated exploration and research vessel, the Okeanos Explorer. The Okeanos Explorer is a 84-m T-AGOS vessel provided to NOAA by the U.S. Navy. The ship is currently undergoing a major overhaul and refit and will have, when it becomes operational in 2007, satellite communications and a wide variety of ocean-going instrument systems, including a state-of-the-art swath sonar system, dynamic positioning capability, and a dedicated 6000 m science configured ROV.

The most technologically innovative and exciting aspect of the Okeanos Explorer, however, is that it will introduce a new exploratory paradigm.



High bandwidth satellite antenna (left) to be mounted on OKEANOS EXPLORER will be linked to "Inner Space Center" at the University of Rhode Island's Graduate School of Oceanography (right).

begin in 2008.

Specific explorations will continue to be selected on the basis of a peer-reviewed proposal system.

Many questions remain unanswered as to exactly how this new paradigm of global ocean exploration will be implemented by an oceanographic community that is accustomed to carrying out research-guided programs using a very different paradigm. Hopefully the ocean

community will turn to examples from their colleagues in NASA's Space Program who have been using the exploratory paradigm successfully for many years.

An additional benefit of this "tele-presence" technology is the ability to use NOAA's real-time exploration to excite and motivate the next generation of ocean explorers through a series of "live" educational programs being produced and distributed by a newly formed Marine



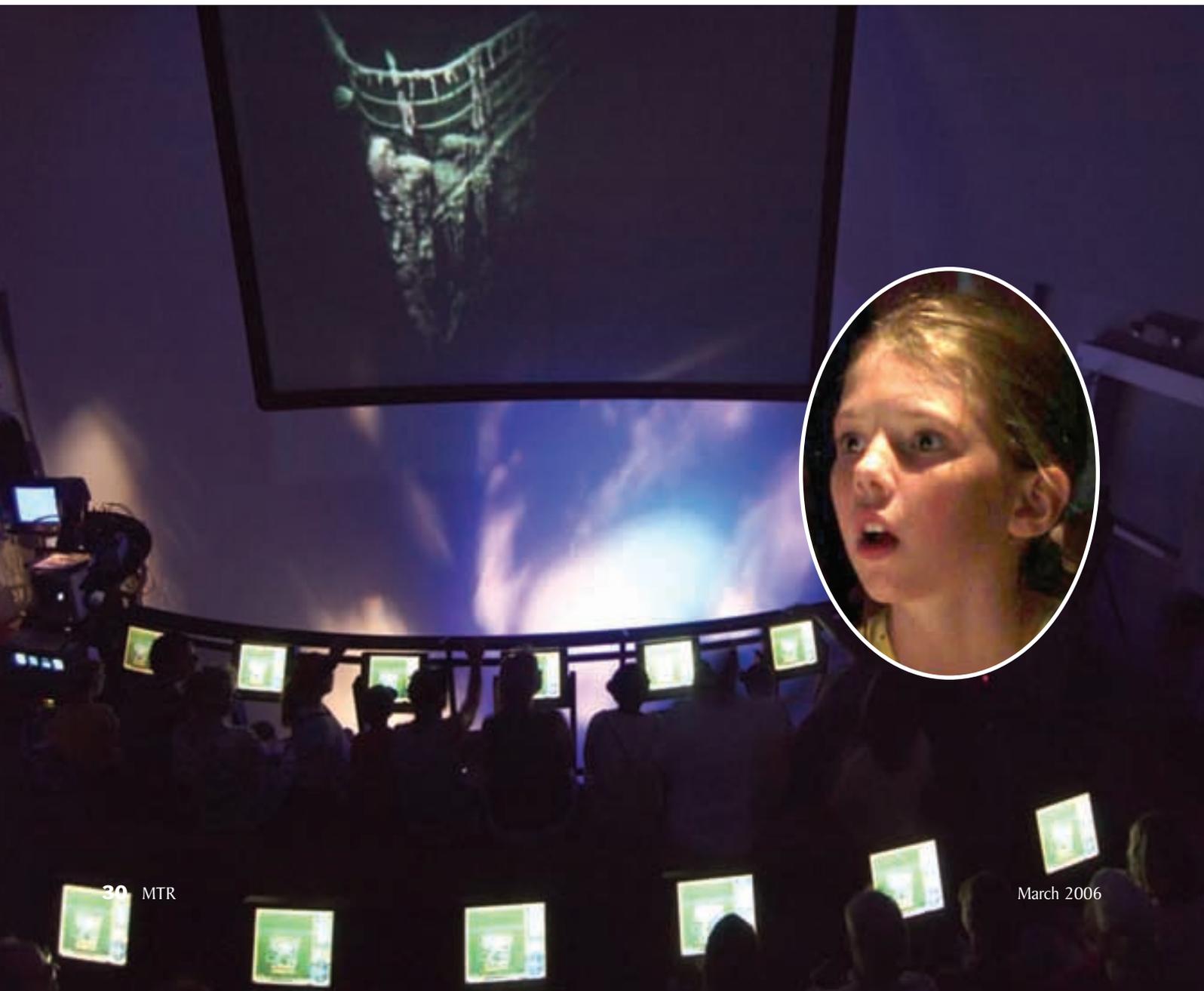
Dr. Debra Kelly (far left) at the University of Washington discussing sampling strategy with HERCULES pilot Tom Orvash aboard R/V BROWN while team at the University of New Hampshire (right) processes SEABEAM data sent from BROWN via URI which is then sent on to University of Washington

Educational Consortium. Lead by ImmersionPresents, based at the Mystic Aquarium and Institute for Exploration in Mystic, Connecticut, this consortium includes a growing network of Museums, Science Centers, and Aquariums as well as Boys and Girls Clubs sites and the Web-based JASON Project.

Using newly constructed studios and production facilities next to URI's Inner Space Center and in Mystic; a team of producers and educators have, over the last two years, used the "live" feeds coming from the Brown to produce a series of educational programs feed to millions of K-12 students and teachers, and to the general public across the country, making them more aware of the importance of the oceans to their daily lives.



Production center next to Inner Space Center at URI/GSO (upper right) creates "live" programs transmitted via Internet2 to a network of museums, science centers, and aquariums headquartered at Mystic Aquarium and Institute for Exploration in Mystic, Connecticut (bottom).



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OCEAN TECHNOLOGY SECTOR

Newfoundland and Labrador Ocean Technology Sector

A vast, resource-rich expanse of ocean has shaped the history, culture and economy of the province of Newfoundland and Labrador for centuries. That undeniable attachment to the sea, combined with the steadfast determination and creativity of its people, has placed Newfoundland and Labrador at the forefront of Canada's ocean technology industry. From offshore systems evaluation to underwater acoustics and integrated marine navigation, the Province's ocean technology enterprises are achieving worldwide prominence.

Industry Profile

Newfoundland and Labrador is home to approximately 45 knowledge-intensive, small and medium-sized enterprises developing innovative ocean technology products and services for niche markets in Canada, the United States, Europe, Central and South America and Asia. These companies employ approximately 1,000 workers and generate total estimated revenues in the order of C\$250 million.

Provincial Profile

- **Most Easterly Province in Canada**
- **Time Zone: EST + 1.5 hrs**
- **Population: 515,946 (2004)**
- **Capital City: St. John's**
Population: 179,938 (2004)
- **Total Coastline: 17,542 kms**
- **Gross Domestic Product (2004): C\$19.6 Billion**
- **Estimated GDP Growth 2006: 5.0%** (highest of all Canadian provinces)



Ocean Technology Expertise in Newfoundland and Labrador

Ocean ICT and Marine Operations:

- **Instrumentation / communication**
- **Underwater acoustic technologies**
- **Ocean mapping / sonar technologies**
- **Remote sensing / radar technologies**
- **Electronic charting, integrated marine navigation and course prediction systems**
- **Wireless biotelemetry species monitoring systems**
- **Marine geomatics**
- **Ship voyage data recorder technology**
- **ROV technology, underwater robotic control**

Ocean Technology Development and Marine Services:

- **Numerical and physical modeling and testing**
- **Boatbuilding, fabrication and repair**
- **Fishing vessel design**
- **Geotechnical services, marine weather and sea state forecasting**
- **Marine transportation, port operations and cargo handling**
- **Security technologies and ocean surveillance**
- **Renewable ocean energy systems**
- **Escape, evacuation, survival, safety and rescue solutions**

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OCEAN TECHNOLOGY SECTOR

Clusters of Expertise, Partnership and Collaboration

St. John's, the capital city of Newfoundland and Labrador, boasts a mature and comprehensive concentration of marine technology research and development performers and companies. Much of the capacity is co-located within just a few city blocks, forming a unique environment conducive to intellectual and entrepreneurial interaction. This clustering of small and medium-sized enterprises, research facilities, educational institutions, municipal, provincial and federal infrastructure and related personnel has created tremendous synergy and encouraged a culture of collaboration.

Our world-class research and development infrastructure has created a cluster of ocean excellence. In fact, a key ingredient of our success is a unique partnership of companies, institutions and government agencies called Oceans Advance. This multi-stakeholder innovation cluster initiative facilitates world-class capability and aims to make the St. John's region an international location of choice for ocean technology.

Infrastructure and Research and Development

The Centres of Excellence, a term used to describe Newfoundland and Labrador's key ocean technology research and development facilities, serve as a backbone of the ocean technology community. These Centres, all located near or within Memorial University of Newfoundland, provide fundamental research, technology development expertise, industry incubation, testing, training and scientific validation services.

Facilities such as the National Research Council-Institute for Ocean Technology evaluate the design of vessels and offshore structures in its ice tank, towing tank and offshore engineering basin. Memorial University's Ocean Sciences Centre is a leading Canadian cold oceans research facility. The Marine Institute's flume tank evaluates how currents affect nets and fishing gear, and C-CORE specializes in ice engineering and other activities related to natural resource industries.



That's just the tip of the iceberg, so to speak. Many of these facilities are one of a kind and cater to an international clientele that includes port authorities, fisheries departments, coastguards, and academic institutions. In fact, we have all the unique ingredients of history, culture, economics and resources that few other places in the world can bring together in one marine and ocean technology focused location.

Newfoundland and Labrador has positioned itself as a high quality, innovative, and reliable supplier of specialized marine and ocean technology products and services to national and global markets. Our interest for the future is not only developing new technologies but to develop and provide integrated management solutions for the pursuit of the environment, resource extraction and resource management.

Canadian Centre for Fisheries Innovation _____ www.ccfi.ca

Canadian Centre for Marine Communications _____ www.ccmc.nf.ca

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Faculty of Engineering & Applied Science – MUN — www.engr.mun.ca

Marine Institute – MUN _____ www.mi.mun.ca

Offshore Safety and Survival Centre _____ www.mi.mun.ca/oss

Centre for Marine Simulation _____ www.mi.mun.ca/cms

Centre for Aquaculture and Seafood

Development _____ www.mi.mun.ca/casd

MI International _____ www.mi.mun.ca/mi_international

Centre for Sustainable and Aquatic Resources www.mi.mun.ca/csar

**National Research Council Canada -
Institute for Ocean Technology** _____ www.iot-ito.nrc-cnrc.gc.ca

Ocean Sciences Centre – MUN _____ www.osc.mun.ca

For further information about the ocean technology sector in Newfoundland and Labrador contact:

Innovation, Research and Advanced Technologies Branch - Department of Innovation, Trade and Rural Development

Government of Newfoundland and Labrador

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ROVs • AUVs • UUVs

Young Guns

by Maggie Merrill

Racers start your computers, turn on your propulsion systems, click on the video cameras and get underway. No wires, no tethers, no antennae, just a torpedo-like vehicle with batteries, sensors and propellers; and a beacon should it become disoriented. Off it goes into the distance tracking on a pre-programmed course; ready to tackle some important tasks.

Although no one has officially registered to compete in the 9th Annual International Autonomous Underwater Vehicle Competition, organizers are confident up to 20 vehicles will be on hand.

The rules are just being finalized, and the "Intent to Compete" forms along with a \$500 entry fee are due April 28, 2006. If you think you can just hop into this competition, think again. There are seasoned teams vying for the top spot. This event is the Division 1 of AUV competition. Look for MIT, University of Florida, Duke University, University of Southern California, Cornell

University, University of Rhode Island, and, hopefully, Amador Valley High School will all be back this year.

The 2006 event is scheduled to take place August 5-6, 2006 at the Space and Naval Warfare Systems Center San Diego (SSC San Diego). This is the U.S. Navy's research, development, test and evaluation, engineering and fleet support center for command, control and communication systems and ocean surveillance. They also host a number of remotely operated vehicle competitions including air, land and ocean based events. The idea behind these events is to spur ideas and innovations right out of the best universities in the country. The competition is organized jointly by AUVSI (Association for Unmanned Vehicle Systems International) and ONR (Office of Naval Research).

The Association for Unmanned Vehicle Systems International (AUVSI) is the world's largest non-profit organization devoted exclusively to advancing the

Space and Naval Warfare Systems Center San Diego (SSC San Diego) where the 9th Annual AUV competition will take place in August 2006.



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University of Florida, Gainesville, Florida design team proudly displays the **2005 AUV Competition Champion** vehicle, Subjugator.

unmanned systems community. AUVSI, with members from government organizations, industry and academia, is committed to fostering, developing, and promoting unmanned systems and related technologies. Running these competitions is their way of getting new young minds involved in all the exciting aspects of remote technology.

According to the AUV competition's technical director, David Novick, of Sandia Laboratory, "we wish to challenge the new generation of engineers and advance the state-of-the-art of Autonomous Underwater Vehicles (AUV) by performing realistic missions. Last year the rules were made more challenging with the addition of having

to dock the vehicle; follow a pipeline and drop markers; and surface directly above an acoustic pinger. Only the top three contenders were able to complete all three tasks. The rules will be much the same this year. Those who experienced last year will surely have a leg up."

Cornell University is at it again with more vim, vigor, red outfits and engineering secrets and breakthroughs. There are at least 49 students enrolled in this year's two semester course. Cornell was the world champion in the 2003 event. In 2004 the team ranked second and in 2005 it ranked eighth overall, which put them a bit in the "underdog" category. The team did receive very high marks in static judging which (which is based on technical

merit, website, technical paper, and presentation to judges)

"We placed 8th at the last competition because we were overambitious with our technical goals. There's a dichotomy between building a good vehicle for the competition and building a technically good AUV. The way the competition is designed encourages vehicles specifically designed for the competition but may not be very useful outside of it. It's a reality that we're forced to accept and as a result, we're being more conservative this year with our list of features. Our biggest focus is going to be on reliability. We've been testing early and often to identify before the competition," explained Ian Wang, Cornell's team leader.

The 2006 vehicle retains the twin hull design that CUAUV has become associated with. The upper hull houses electronics, while the lower hull houses batteries and motor controllers. An aluminum frame holds together the two hulls and provides mounting points for four thrusters and sensors. Two thrusters are mounted on each side for turning and moving forwards and backwards. Two other thrusters are at the front and back of the vehicle and control depth and pitch. Sensors are mounted downwards and forwards at the front of the vehicle.

When asked who their nemesis is in the competition, Wang stated that "the competition atmosphere is very friendly and we're on great terms with a lot of the teams, especially ETS (Ecole de Technologie Superior) from Quebec. There's a lot of mutual respect between the teams because we understand what everyone is going through so you'll see teams hang out and share tools and advice at the competition. Historically, our team and MIT have had a few close finishes, alternating first and second. So if anything, it would be MIT."

Ian will graduate next fall with a B.S. in Electrical and Computer Engineering. He feels that his career plans are wide open but he definitely wants to continue working with robotics.

There are three principle missions outlined for the contestants to accomplish in this summer's competition. -- Machine Vision Processing. In this area the vehicle must identify visual markers and coloration, locate specific beacons and shapes; and follow underwater pipelines.

- Acoustic Sensing using Doppler based navigation to navigate to an underwater acoustic beacon.
- Waypoint Navigation for onboard decision making and vehicle navigation based on complex sensor inputs as well as advanced control techniques for



2006 Cornell University AUV Design Team
(Photo Credit: Cornell AUV Team)

autonomous docking.

The fundamental goal of the mission is for an AUV to demonstrate its autonomy by completing three tasks. The first is to rendezvous with a "docking station." The second is to inspect a pipeline, with the vehicle finding and mark-

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Top: **Amador Valley High School AUV2005 Design Team**
(photo credit: HW Edwards Co.)

Bottom: **Amador Valley High School 2005 AUV placed 5th in the 2005 AUV competition.**

ing one of four bins in the pipeline. The third task is to home in on an acoustic beacon and breach within a surface zone marked on the surface with floats. These three tasks can be completed in any order. A random order light box will be positioned just outside the gate and will be used to signify which of the four bins from Station B to drop markers in.

Each vehicle will have 15 minutes to complete the tasks (with an additional 5 minutes of dock preparation time). Any vehicle that touches the docking station, places at least one marker in the bin or on the target area and has the vehicle surface (at least briefly) fully within the recovery zone (no part outside the zone) will receive bonus points proportional to the unused time. Each vehicle must

begin the run by passing under a validation gate. At any time during the run, if a vehicle breaches the surface, the run is terminated. For the 9th International AUV Competition, each entry must fit within a six-foot long, by three-foot wide, by three-foot high "box" (1.83 m x 0.91 m x 0.91 m). To enter the competition and to learn much, much more, check out this web site. <http://www.auvsi.org/competitions/water.cfm>

If you want a job in robotic engineering, the best thing to do is to join one of these competitions. Corporate sponsors such as Lockheed, Boeing and EG&G arrive in force to nab the best, brightest and the most motivated students. There have been at least seven students hired directly out of earlier competitions and so many receive incredibly useful hands on experience. These kids are not out partying every night. They live for the thrill of solving the most complex problem sets. They lust after smaller power supplies and tighter tolerances. These guys and gals are so hip they are in fact rocket scientists. You automatically feel smarter just sitting next to them.

2005 Standings

First Place	University of Florida
Second	Ecole de Technologie Superieure
Third	MIT
Fourth	Duke University
Fifth	Amador Valley High School
Sixth	University of Rhode Island
Seventh	University of Southern California
Eighth	Cornell University
Ninth	University of Colorado at Denver
Tenth	Southern Polytechnic State University
Eleventh	University of Texas at Dallas
Twelfth	Georgia Tech - Marine Robotics Society
Thirteenth	University of Central Florida
Fourteenth	Virginia Tech
Fifteenth	University of Ottawa
Sixteenth	University of Victoria
Seventeenth	DeVry
Eighteenth	North Carolina State University
Nineteenth	Indian Underwater Robotics Society

Prizm's Acquisition Adds to its Spectrum

By Melissa Mendoza

Founded more than 10 years ago through a joint partnership between David Clifford and Scott Griffin- the current president and head of engineering, respectively - Prizm Advanced Communication Electronics, Inc. (Prizm) designs, engineers, manufactures and distributes fiber optic multiplexer systems, rotary joints and payout spools for the Navy, other government agencies, universities, scientists, researchers, among others. Prizm is based in Elkridge, Md., and has an Autonomous Underwater Vehicle (AUV) manufacturing facility in Yorktown, Va.

According to sales manager Bob Sullivan, the ability to design, engineer and manufacture products in-house, is one of Prizm's distinguishing qualities as a fiber optic communication system manufacturer. "We take pride in the fact that we engineered all the electronics and fiber optics we manufacture," he said.

Prizm has three primary business lines. The first is its fiber optic and wireless video and data multiplexer.

The multiplexer is designed to convert multiple streams of data, or multiple inputs, into a single stream of information, or output. "It is a telemetry system which can



Fiber spooler equipment.

take electro signals and break them down, simplify them and convert multiple data into one serialized stream of light," Sullivan explained. "By converting the information to laser, we give our sub-sea customers greater control of the mission by giving them the ability to transmit signals from afar."

PRIZM Purchases Sias Patterson

MTR met with the Prizm, Inc. President, David Clifford and Sales Manager, Bob Sullivan. In Clifford's opinion, there are three AUVs in what is considered the small class: the Bluefin, the new PRIZM Fetch and REMUS. Bluefin was developed at MIT. Sias Patterson was developed at VIMS and REMUS at WHOI. Both Bluefin and Remus have left their university nests and are being commercialized by Bluefin-Battelle and Hydroid, respectively. Prizm is the commercialization partner, if you will for the Sias Patterson AUV.

According to David Clifford, Prizm purchased all assets of Sias Patterson from Jim Sias and Mark Patterson because he wants to create a hybrid AUV using Prizm's existing talent and demonstrated abilities in fiber optic transmission. He will marry Prizm's expendable fiber optic cable spools with the AUV. The fiber optic cable is connected to AUV upon launch. Very high bandwidth data can be sent and received in real time while the cable pays out. The 20 km cable will transmit any signal that the vehicle can generate including: video, sonar, currents, water column data. There are many applications for this sort of hybrid system in the military and the intelligence communities. Eventually, the PRIZM Fetch class AUVs will serve the offshore diving, oceanographic and environmental communities as well. — *Maggie Merrill*



Bob Sullivan, Prizm Sales Manager proudly displays the Fetch Class AUV that is now being commercialized by PRIZM

(Photo Credit: Maggie L. Merrill, MTR)

ROVs • AUVs • UUVs

The second product in Prizm's business line is its disposable fiber optic spooler designed for in-sea and in-land use, making it a versatile product. In robotic operations, the multiplexer is attached or placed into the robotic instrument. Even if the user is at a distance from the robot, the spooled fiber which can stretch as far as 25 km allows for communication to take place between the user and the instrument. Once the mission is finished, the user can take the inserted multiplexer, throw it away and insert a fresh system into the robotic instrument for a new or different project. "This product is very useful for robotic operations, like the ones being performed by the marines in Iraq," Sullivan said. "It can be used in naval operations as well. The spools can be placed inside a torpedo, giving the Navy the chance to control the torpedo even after the torpedo is fired from the ship," he added.

The last of Prizm's three primary business lines is its Fetch class AUVs. This is a recent development for the company, having acquired Sais Patterson LLC, an AUV manufacturing facility in Yorktown, VA, last December. "This acquisition represents a key element of Prizm's strategy to integrate cutting edge technology which will expand the horizon of possibilities in the Sub Sea Industry," said Clifford. The Fetch class AUV is designed for scientific purposes, such as sub-sea mapping. With full speed at 10 knots, the Fetch class AUV is fast moving underwater vehicle that Prizm is working to enhance with fiber optic capabilities. Simply put, Prizm aims to make its Fetch class AUV, tethered or not, capable of collecting different forms of data and then transmitting all of the gathered information to the main ship in almost real-time. "It is going to be a hybrid," noted Sullivan, "between an AUV and a fiber optic-capable vehicle for the customers and missions where time is critical."

Prizm's three primary business lines may seem separate from each other, but one of Prizm's goals is to bring the three markets together and create new technologies utilizing each product's strengths and potential. "With the Fetch class AUV, you can really see how these three business lines can be interconnected," explained Sullivan. "That's what we're trying to do. We are trying to bring together our resources and find a way to service a market that others haven't been able to figure out yet."

Another priority is to try and find a way to develop technology that is simple and efficient. One of our goals is to make sure that our products are simple and easy to use,"

said Sullivan. "I believe that that's going to be a big trend in the Remotely Operated Vehicle (ROV) market in the upcoming years, with more manufacturers making user-friendly products. Technology can be overwhelming, but it doesn't have to be complicated to operate. That's the challenge that we in the industry have to overcome; to simplify the technology so that others, not just the engineers, can use it."

At the moment, the company's best selling products include the Video 3 Family, a work-class ROV rackmount system, and the MiniMux, a small pressure-tolerant multiplexer for small sub-sea vehicles.

Sullivan credits the successful development of these and other company products to an integral part of Prizm's research team; its own customers. As it turns out, a good amount of dialogue usually takes place between Prizm and the customers when it comes to developing new products or enhancing old ones. "Our relationship with our customers is more like a working partnership," Sullivan described. "We go to our customers and ask 'what can we do to help you?' They then tell us what it is they need and it becomes our job to think of how we can deliver the solutions the customers are looking for. Sometimes, it's the customer that will approach Prizm and say 'I need to solve this problem.' Once we look at the situation and once we figure out how we can help, we offer them a solution."

An encounter with Woods Hole Oceanographic Institution, or WHOI, about four years ago highlights this company-customer relationship. The organization had requested a specific telemetry requirement for its Jason 2 vehicle, a ROV which can conduct multiple experiments at depths of up to 6,500 m. "They needed a system that could collect and transmit photographs and data, something that could operate at a super deep level," said Sullivan. The end result that Prizm provided was a semi-custom multiplexing system, which combined a core component of Prizm's fiber optic products with WHOI's specific needs. According to Sullivan, Prizm customers can expect the same treatment; the same attention to detail and custom engineering; when seeking out Prizm's services. "We listen to what the customers want because the needs and wants of each customer are unique, and we always try to give the solutions best suited for the situation. Again," Sullivan stressed, "it's a working partnership."

ROV Picked for Advanced Habitat Research

Marine science is turning to the new generation of intelligent ROVs for demanding survey and sampling research projects. Latest to lead the trend is the Agriculture, Food and Environmental Science Division of the Department of Agriculture and Rural Development in Belfast, Northern Ireland. Delivery of their vehicle from Seaye Marine follows orders from Scottish Natural Heritage and the Environment and Heritage Service Water Management Unit in County Antrim. Success for Seaye has come from their development of a range of vehicles that are designed to be lighter, less costly to operate and, through the use of intelligent electronics, better able to do increasingly complex tasks with more sophisticated data acquisition systems. The Belfast unit, for instance, needed an ROV that could operate at 1000 m in strong currents working in coastal waters out to the shelf edge. The Seaye Tiger they ordered will allow them to complete synoptic maps of key areas in GIS format including developing a video database of benthic habitats. Subsequent analysis will indicate sensitivity to fishing, aquaculture and land run off. To achieve this, the Tiger is fitted with a Kongsberg broadcast quality video camera, a digital stills camera and strobe, a Trittech laser image scaling zoom camera and spare interfaces for scientific sensors and an acoustic tracking system. Scottish Natural Heritage, working under the European Habitat Directive in the search for conservation of biodiversity in Scotland, seeks to identify animals and plants as part of a rolling pro-



gramme of 34 marine sites. In choosing the Falcon ROV from Seaye they specified top quality video imaging and picked a 3CCD broadcast quality camera with video multiplexed and transmitted over fiber optics in the umbilical. For the second camera they needed image scaling down to one millimetre, so they chose a Trittech laser image-scaling color zoom camera. Also important for SNH was the Falcon's maneuverability, which gives access to those sites with cliffs over 115 m deep and where only an ROV such as this can perform the role needed. The Seaye concept allows a range of task-specific modules to be simply bolted on to the standard-build Falcon ROV and changed in minutes, allowing the core operating vehicle to be easily tailored to perform a variety specialized tasks by using dedicated modules.

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Underwater Robotics Techniques for Port Security

A one-day Underwater Port Security, Law Enforcement and Public Safety Micro-ROV Mini-School conducted after the VideoRay International Partner Symposium (VIPS) was a success for the six coast guard units and members of St. Louis County Sheriff's Office and Rescue Squad who attended. The course was conducted by leaders from USCG Maritime Safety and Security Teams (MSSTs) from Seattle and the St. Louis County, Minnesota Sheriff's Office. Afternoon sessions consisted of skills development exercises at MarineLab Undersea Laboratory. One option for attendees was to plan, organize, and execute a wide area search for a drowning victim using a combination of side scan sonar, and VideoRays. Another was to rotate through four simultaneous hands-on stations: a retrieval exercise, a pier sweep, an obstacle course, and a vessel inspection. "In order to use new technology like this to its potential, we need training, and we need to share what works and what doesn't" said CWO Mike Spute of MSST 91108 in St. Mary's, Georgia. "This event was excellent on both accounts."

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Side view of Pro III thrusters showing improved seals and larger props.

Benthos Stingray ROV

The Teledyne Benthos Stingray ROV is designed to be an affordable, rugged, powerful, lightweight (72 lbs) high performance inspection class vehicle that is capable of working in high currents and at depths to 400 m (750 m optional). It can be configured with as many as three video cameras, displaying images from two cameras simultaneously. With a total of 84 lbs of forward thrust, it has been designed to perform in the most demanding conditions and can be configured with numerous options including one, two or three function manipulator, scanning sonar, digital still camera, large-object recovery system, additional thrusters, additional buoyancy, custom tools, lights and sensors. The Stingray is designed to be easily interfaced with user supplied devices and sensors via RS-232, RS-485, analog and digital interfaces. An optional fiber optic communications link is offered for operations requiring a long tether.

Applications include port and harbor security, ship hull inspections, in-situ biological sampling, dam and tunnel inspections, under-ice surveys and operations, internal and external pipe inspections, inspections of nuclear reactor facilities, marine casualty investigation and salvage operations, offshore structure surveys, inspection of water



tanks and systems, search and rescue operations, police evidence search and recovery operations, monitoring of marine construction projects and artificial reef monitoring operations.

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PSS Sells Two Triton XLS ROVs

Perry Slingsby Systems (PSS) said that Deep Marine Technology, Inc. (DMT) has purchased two additional Triton XLS Systems, XLS 21 and 22. The two new ROVs will be configured with 15-in. thrusters, 150 HPU with 30 HP auxiliary



The new 150 hp Triton XLS, with a high specification survey suite and high thrust output. Triton XLS-11 has recently been delivered to Geoconsult AS.

capabilities and enhanced survey suite interfaces including Ethernet. The system will be configured for heavy-work operations and includes 600 m neutral tether on the Tether Management System. The ROVs will be installed onboard DMT's new 300 ft. MSV the DMT Emerald which is expected to be in service in November 2006. Martin Anderson, Managing Director and CEO, Perry Slingsby Systems, said "We were awarded this contract

ROVs for Dam Inspections

In the past, inspecting hydroelectric dams was difficult and expensive due to the need to put divers in the water. Today, more companies are using ROVs to perform inspections, allowing them to perform an inspection whenever they want, and JW Fishers ROVs have become a popular choice for these inspections.

Ontario Power in Toronto is one of the companies that routinely inspect their dams and adjacent structures using an ROV. They used Fishers SeaLion ROV for inspection operations at several of their hydro plants. Spokesman Mike Ostroski said, "In our Smokey Falls plant in northern Ontario the SeaLion inspected tail-race concrete piers, went up the draft tube to the underside of the runners, inspected the headworks concrete, and checked for erosion under the sluiceway aprons. At our Sir Adam Beck plant we inspected the headworks concrete piers, the headgate, and its gains on one of the units. We've found the ROV to be an effective tool for this work and it has quickly paid for itself. One advantage of the ROV is that we don't have to shut down the units on either side of the one being inspected, letting us maintain a higher operating capacity. Also, we can put it in on the downstream side of the trash racks and it's perfectly safe."

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Engineers at Ontario Hydro ready SeaLion ROV to do inspection Sir Adam Beck power plant



Benefits of modularity are numerous and include rapid battery replacement, reduced maintenance cost and customization options.

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Curvetech ROV

SMD Hydrovision (SMDH), an independent WROV/Trencher manufacturer, will be exhibiting the latest Curvetech ROV components at UI 2006. In addition to thrusters, intelligent valvepacks and ROV control demos, the company will be displaying footage of the new QUANTUM heavy construction WROV and QUARK ultra compact WROV.



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SpiderBot ROVs

The SpiderBot ROV by Oceaneering International Inc was created to penetrate shipwrecks and achieved recognition during exploration of the Titanic by conducting underwater surveys of tight interior spaces. The SpiderBot ROV is suited for work considered too dangerous or inaccessible for divers, larger ROVs, or manned submersibles. The system provides high-resolution imaging, close-in inspection of subsea equipment, and documentation of shipwreck and other debris. It is rated to 20,000 fsw and is driven by a pressure-compensated High Energy Electron Accumulator Array power source, allowing for up to 18 hours of operation.



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ROV from AC-CESS

AC-CESS' AC-ROV employs four vectored horizontal thrusters and two vertical thrusters for inspection of confined and hazardous targets and environments. Designed by North Sea engineers All Oceans Engineering Ltd, the standard system components include AC-ROV, surface control unit, intuitive hand controller, monitor & stand options, tether configuration to client requirement, tether deployment system (TDS), flight assist functions, tool kit, storm case, instruction manual, training, operators online secure area.



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Schilling Robotics Earns MTS ROV Corporate Excellence Award

The Remotely Operated Vehicle Committee of the Marine Technology Society (MTS) presented its Corporate Excellence Award to Schilling Robotics at Underwater Intervention 2006 in Tampa, Fla. The award was accepted for Schilling Robotics by CEO Tyler Schilling, who said "We entered the ROV market 6 years ago because we wanted to make significant contributions to ROV technology, so we are very pleased to be recognized by the ROV Committee for the second time during that 6-year period." Schilling continues, "A primary goal was to increase ROV operational efficiency, and to that end we've introduced industry-leading features such as station-keeping and operator touchscreen interfaces. Our latest ROV, the hydraulic, ultraheavy-duty UHD, will introduce gigabit Ethernet and HDTV technologies. And we plan to continue to offer the industry the latest and most reliable technologies available."



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NAVSEA Takes Option for REMUS System

Hydroid said that NAVSEA exercised options against contract N00174-03-D-0018, awarded to Hydroid in 2003 to design and fabricate a prototype system to meet U.S. Navy operational requirements and in accordance with Navy specifications. Kevin McCarthy, Hydroid's vice president said "The modified REMUS 100 vehicle will be utilized for Search-Classify-Map (SCM) by U.S. Naval forces in conducting Very Shallow Water Mine Countermeasures (VSW MCM) operations. The custom configuration, named "Swordfish" will be



capable of performing low visibility VSW exploration and reconnaissance in support of amphibious landing, MCM operations, and hydrographic mapping in the very shallow water zone." The production contract has a six-year period of performance from 2005 through 2010, with a total contract ceiling of approximately \$32m.

Hydroid Presents REMUS AUV

The REMUS 100 (pictured) is designed to be a light-weight, compact AUV designed for operation in coastal environments up to 100 m in depth used for a wide array of hydrographic and environmental monitoring applications. The new REMUS 600 is designed as a highly versatile, modular AUV used for the collection of oceanographic data in water depths up to 600 m, and can also be configured for 1500 or 3000 m operations. The vehicle was designed to provide extended mission endurance, increased payload capacity, and greater operating depth. The new REMUS 6000 is capable of highly intricate deep-water operations in water depths up to 6000 m, allowing for a wide spectrum of autonomous operations. The vehicle can be configured to operate at depths of 4000 m.

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Navy UUV Program, Small Businesses Develop Energy Technology

The U.S. Navy's Unmanned Undersea Vehicles (UUV) Program Office (PMS 403), small businesses and the NAVSEA Undersea Warfare Center are developing safer, more efficient energy sources for UUVs. "Our efforts promise to pay dividends not only for the [military] user community, which will end up with safer products for use aboard fleet platforms, but for small business as well, which has an opportunity to expand a market and make a key contribution to our mission," said Capt. Paul Ims, UUV program manager. PMS 403 is responsible for developing UUV platforms and payload technologies to meet a broad spectrum of mission requirements. The Defense Department's Small Business Innovation Research (SBIR) program is designed to adapt technologies to meet military requirements, benefiting both small business and the government. The program provides up to \$850,000 in research and development funding directly to small firms for early-stage technology development projects, such as the ongoing UUV energy source effort. During 2004, the Navy awarded two SBIR Phase I contracts, worth \$70,000 each, to firms to develop improved

battery technology for UUVs. The Navy project, called Advanced Pressure-Tolerant UUV Batteries for Fleet Use, is focused on the development of high energy density, renewable, air-independent submarine-safe power sources to increase UUV endurance and thereby increase the submarine range of influence, according to Navy project documents. Demonstrating the kind of battery technology that may benefit Navy UUVs, Phoenix International's remotely operated vehicles, called xBots, entered the shipwrecked RMS Titanic in July 2005. Each xBot carried two rechargeable lithium-ion batteries, each containing eight cells, providing 10 to 12 hours of energy, as developed during the first phase of the Navy SBIR project. Energy sources developed for military use, such as new lithium-ion batteries, may offer significant cost savings and safety for commercial users. As the market broadens for new UUV battery technology, the unit price for the Navy and commercial users may decrease. PMS 403 and its partners in government and industry are developing UUVs and related technologies to meet the goals detailed in the Navy's UUV Master Plan. *(Source: Navsea)*

New President of Hydroid

Christopher von Alt has been appointed President and CEO of Hydroid. Mr. von Alt was formerly the Head of the Oceanographic Systems Laboratory (OSL) and a Principal Engineer at the Woods Hole Oceanographic Institution (WHOI) in Woods Hole, Massachusetts. Mr. von Alt co-founded OSL in 1989 and established and led the engineering team that developed REMUS, as well as many other undersea robotic systems over the past 15 years. Mr. von Alt will retain his association with WHOI by becoming an Adjunct Oceanographer, but departs from full-time status at the Institution after 20 years of service. Mr. von Alt joined Hydroid as Chairman when he and other members of OSL founded the company in 2001 to commercialize REMUS technology. "I am excited to be joining Hydroid full-time as President and CEO. I've been focused on the development and commercialization of REMUS from its conception at OSL during the early 90s." Mr. von Alt holds a Bachelor of Engineering in Electrical Science from the State University of New York at Stony Brook and a Masters of Science in Ocean Engineering from the Massachusetts Institute of Technology.

New Ownership for RESON

LD Equity 2 has acquired the shares of the Steenstrup family in Reson A/S, and consequently, a new CEO and President and a new Board of

Directors have been appointed.

The goal of the shareholders is to cooperate with the Board and the new management to accelerate and continue the development of a newly finished technology platform. This new platform will be the core in the expansion of RESON's product range and will also allow the company to expand the use of its sonar systems into new market areas.

Allan J. Vestergaard has been appointed CEO and President of Reson A/S. The RESON management team is hereafter as follows: Allan J. Vestergaard, CEO and President; Laust Nyvang, CFO; Kim Christiansen, VP-Group Sales & Marketing; Peter K. Eriksen, CTO; Flemming Bekker, Executive Assistant

Bernier Joins Schilling Robotics

Schilling Robotics said that Ron Bernier has joined the company as sales manager for remote systems. He is based in Schilling Robotics' Houston office, which offers support for project management, applications engineering, sales, spare parts, and service. Bernier brings to Schilling more than 15 years of experience in the ROV industry, in positions at Sonsub Inc., Sonsub International, and Oceaneering International. He has held such diverse positions as project



manager, technician supervisor, operations manager, and ROV pilot technician. Most recently, he was project manager for the BP Americas ROV services accounts for the deepwater Holstein, Atlantis, Mad Dog, and Thunder Horse projects.

Szabo Joins Woods Hole Group

David Szabo has joined Woods Hole Group as head of Houston operations. He has more than 25 years of experience in all aspects of metocean services, product and numerical modeling. He will be responsible for managing all aspects of business operations on the ground for WHG in the area. Prior to joining Woods Hole Group, Szabo worked with Mobil Research and Development Corporation. Additionally, he directed operations and initiated many innovative projects with Fugro GEOS, Inc. Mr. Szabo obtained his Masters of Science from Florida State University in 1978 in oceanography. He graduated from New York University in 1970 with a BS in meteorology and oceanography.

MSI Delivers Multibeam Transducer Array

Materials Systems Inc. (MSI) of Littleton, Mass., delivered the production version of the first-of-its-kind transducer array to Sonartech-ATLAS (Sydney, Australia). The wideband (100-200 kHz) parabolic-shaped transducer is a key component of the newly introduced ATLAS Hydrographic FANSWEEP Coastal



(FS 30C) shallow-water multibeam system.

The MSI FANSWEEP transducer array is unique in its ability to provide continuous, gap-free, high-resolution bathymetry out to extreme swath angles using curved face geometry to evenly distribute maximum sound energy to all ensonified seafloor sectors.

"Our company's distinctive capability to injection-mold and layer our array elements into complex shapes and contours, as well as our ability to exploit the inherent wideband performance of 1-3 piezocomposite material were the keys to making this program a success" said Dr. Les Bowen, MSI Founder and President.

Sonartech's Managing Director, Gordon Hargreave, agreed stating: "The FS 30C is arguably the single biggest advance in multibeam technology, made possible through the exploitation of MSI's transducer technology. We are obviously delighted to have now set the new performance benchmark for multibeam systems."

Despite the significant distance and time differences between the compa-

nies, the MSI and Sonartech design teams successfully collaborated to develop and demonstrate a truly innovative transducer array for the world's most advanced multibeam sonar system.

Lockheed Martin Gets \$144.3M for Navy's ADS

The U.S. Navy awarded Lockheed Martin \$144.3 million for continued development of the Advanced Deployable System (ADS), a rapidly deployable undersea surveillance system. The work will be performed under an option to a \$21 million contract awarded to Lockheed Martin in 2004. Under the option, Lockheed Martin will provide system engineering, detailed design and program management required to conduct a Detailed Design Review and build a system that will be deployed from a Littoral Combat Ship (LCS) for technical and operational evaluation. ADS uses distributed passive acoustic bottom mounted arrays wirelessly linked to an analysis and reporting system to provide continuous acoustic coverage over large areas of the ocean. If all options of the ADS contract are exercised, the cumulative value will be \$243 million.

PSS Sells Olympian 5 ROVs to China

Perry Slingsby Systems (PSS) reports that a Chinese client purchased an Olympian Class WROV. Depth rated to 3,500m, the Olympian 5 will interface with PSS'

previously supplied TMS, umbilical & electric heave compensated deployment winch and surface control system. The contract includes on site training and sea trials support in China, and the integration of the client's ROV Dynamic Positioning System (DPS) and Virtual Monitoring System (VMS). The Olympian 5 is scheduled for delivery in May 2006.

Teledyne RD Instruments' Free Online Seminars

Using WebEx technology, Teledyne RD Instruments has implemented an e-learning program designed to provide the industry with ongoing internet-based ADCP (Acoustic Doppler Current Profiler) and DVL (Doppler Velocity Log) training. All courses are fully interactive and include a PowerPoint presentation, led by a qualified instructor. Designated as Teledyne RDI University, this program allows busy ADCP and DVL users and potential users to attend free courses via the internet from the comfort of their own office. Courses have been designed to cover a wide array of timely and interesting topics including Teledyne RDI's hardware, software, data analysis, and field applications, as well as tips and tricks to make data collection easier and more efficient.

Visit

www.rdinstruments.com/webex/.html
for full details.



PSS Leases Triton XLS 19 and 20

Perry Slingsby Systems (PSS) said that Aberdeen-based TSMarine (Contracting) Ltd., has signed three-year lease contracts for Triton XLS 19 and 20 ROV systems with PSS. The two vehicle systems are being assembled and tested at PSS' U.K. facility and also include the new "Enhanced Type III" extended excursion capability TMS units, the latest evolution of the highly successful PSS TMS range, now capable of storing over 700 m of 35 mm diameter tether.

Sparton Wins \$20M Contract

Sparton Electronics, DeLeon Springs, Fla., won a \$19,990,726 firm-fixed-price modification to previously awarded contract (N00164-05-C-6760) for procurement of AN/SSQ-53F sonobuoys and associated data. AN/SSQ-53F sonobuoys are dropped from various airborne platforms and utilized for search and detection of submerged submarines. Work will be performed in DeLeon Springs, Fla., and is expected to be completed by February 2008.

FarSounder Wins GSA Schedule Contract

FarSounder earned inclusion in the U.S. General Services Administration (GSA) Federal Supply Schedule 58-I contract list. Under the five-year contract, FarSounder will be listed as a preferred government-approved vendor and can provide advanced Sonar systems to federal, state, and local governments. To further simplify

ordering, FarSounder's listing will also be available on GSA Advantage. (www.gsaadvantage.gov), the government's electronic ordering system. Only authorized purchasing agents for the government are able to purchase through GSA.

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Sonar Upgrade Contract Awarded

Lockheed Martin Corp., Maritime Systems and Sensors, Manassas, Va., won a \$28.9 million cost-plus incentive-fee/award-fee modification to previously awarded contract for production of sonar upgrade spares kits and sonar system for SSGN Class and SSN 774 Class submarines, respectively, under the Acoustic-Rapid Commercial Off-The-Shelf Insertion (A-RCI) program.

3U Supports ROV Development

3U Technologies completed a long-term support contract to assist the Schilling Sub-Atlantic Alliance with development of Schilling Robotics' UHD, an Ultra Heavy-Duty, hydraulic remotely operated vehicle (ROV). 3U Technologies supported Schilling Robotics in designing and developing hydraulic power and control, electric power, and mechanical systems for the UHD. The UHD combines 21st century electronics and controls with mechanical and hydraulic systems in an ROV package designed to provide superior performance and reliability in performing complex subsea work tasks.

SeaRobotics



SeaRobotics Corporation (SRC) has a family of Unmanned Surface Vehicles (USV) capable of fully autonomous execution of a pre-defined mission plan, or they can be remotely operated. Ranging in length from 2 to 5 m and weighing 15 to 120 kg, the USVs can carry payloads ranging from 3 to 40 kg at velocities up to 5 m/sec. Working in conjunction with the US Geological Survey (USGS), the US Army Corp of Engineers (USACE), and Water Survey Canada (WSC), SeaRobotics is completing the development and testing of two USVs which are designed to carry ADCPs for the stream gauging process.

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Gulf Recovery is Slow

According to the U.S. Minerals Management Service (MMS), as of February 22, 2006, shut-in oil production remained at 362,796 barrels per day, or 24.19 percent of normal production of 1.5 million bpd. Natural gas output shut was 1.504 billion cu. ft. per day, or 15.04 percent of normal daily output. That was only slightly improved from the February 8 report.

OI 2006 • March 21-23, 2006

"Ocean Technology in Service to Society" is the theme of this year's Oceanology International Exhibition (OI 2006) set to convene at London's ExCeL center from March 21-23, 2006. The bi-annual event will attract 600 companies from 25 countries to exhibit the latest technologies and products, as well as an expected 7,000 visitors.

"This year's theme, Ocean Technology in Service to Society, will examine the exciting integration and interplay between science, technology, policy, data management, and society," said Dr. Richard Spinrad, the OI 06 chairman. Under this theme, issues such as Ocean Resource Management and Global Stewardship, Natural Hazards, Security and Safety, and Precision Position and Navigation will be discussed in various presentations and discussion panels.

Additional OI 2006 meetings on schedule are as follows: Engineering Committee for Oceanic Resources Symposium 2006 (ECOR); Inter-Agency Committee on Marine Science and Technology (IACMST); UK Moorings Group Meeting, coordinated by FRS Marine Laboratory; Global VSAT Forum; the GIS Conference; the IIDC Conference;



for Coastal Ocean Benthic Observatory (COBO); Emerging technologies for monitoring the coastal zone, hosted by the Institution of Civil Engineers; Ships of Opportunity, Ferry Systems and Other Automated Observing Systems; Systems, Sensors and Applications for Oceanographic, Chemical and Biological Monitoring; and the International Marine Contractors Association (IMCA).

In addition to exhibits and meetings, OI 06 will also feature a "floating" exhibition. As ExCel is located at the London Docklands by the Thames, it is feasible for OI 06 to accommodate company vessels to dock alongside the exhibition center. As a result, event-goers will have the

opportunity to examine and observe catamarans, survey boats, research vessels and ROVs up close. Thus far, 12 vessels are scheduled to participate.

Lastly, new at this year's exhibition is the Spill International Exhibition and Interspill Conference. "We welcome alongside OI a new event - the Spill International exhibition and the Interspill conference, which will increase the oil spill, pollution control & monitoring element of our audience at OI," organizers said on the event website, www.OI06.com. With this new addition to the OI program, organizers aim to provide a forum in which spill technology and awareness can be discussed. Exhibitors will display the latest technology and research regarding oil spills at sea or on shore. The conference will serve as a discussion forum where ideas regarding oil spill prevention and response can be exchanged. Both the Spill International Exhibition and Interspill Conference will be permanently added to future OI programs.

For more information, visit
www.oi06.com

OI Conference Committee

- Dr. Richard Spinrad, Assistant Administrator & Conference Committee Chairman, NOAA, USA
- Dr. Keith Alverson, Director, Intergovernmental Oceanographic Commission of UNESCO, France
- Mr. Richard Binks, Managing Director, iXSea, UK
- Mr. Ian Gallett, Executive Secretary, Society for Underwater Technology, UK
- Dr. John Wickenden, Technical Director Sea Systems Division, QinetiQ, UK
- Mr. Nick Langhorne, US/UK Collaboration, US Office of Naval Research, UK
- Dr. Steven Ramberg, Director, NATO Undersea Research Centre, Italy
- Dr. Ralph Rayner, Managing Director, Fugro GEOS, UK
- Dr. Martin Sayer, Director, UK National Facility for Scientific Diving, UK
- Ms. Nadia Sbeih, Communications Specialist, National Ocean Service, USA
- Mr. Christopher Shaw, Engineering Manager MetOcean, Shell International Exploration & Production BV, Netherlands •
- Mr. Carl Tiltman, Leader UW Systems, dstl Winfrith, UK

The following is a compendium of information received from companies exhibiting at the Oi06 exhibition in London. Please use this as a handy guide in your search for breaking news and new technologies scheduled to debut at the exhibition.

4H FerryBox

4H FerryBox is an automated monitoring equipment. This system is an operational tool using ferries as carriers and platforms for automated monitoring equipment. The system consists of a seawater intake, a debubbling device, a main loop with sensors for temperature, salinity, pH, oxygen, turbidity and algae abundance. The water of another loop is filtered for analysis of ammonium, nitrate/nitrite, o-phosphate and silicate.



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Compass Probes from AOS

EZ Compass Probe is a three axis Magnetometer-Compass with tilt and temperature compensation produced by Advanced Orientation Systems. The water-proof probe transmits heading, pitch, roll, magnetic field and temperature over RS232 or RS422 ports. Compass probe measures tilt angles up to +/-75 arcdeg and includes hard and two types of soft iron calibrations. The Probe includes all the required mathematics to accurately calculate vertical and horizontal directional vectors.

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Atlas Hydrographic Echosounders

Atlas Hydrographic extended its Atlas Deso range of survey echosounders with the introduction of a new advanced three-channel system featuring a networked Windows interface with associated software, Atlas Deso 35. Available as a compact rack-mounted assembly for ease of installation or one that can be operated direct from a PC, the system provides full-size split-screen LCD displays of port and starboard measurements with internal data storage. Atlas Deso 35 very low frequency operation down to 3 kHz with a 3 kW power output enables enhanced sub-bottom penetration over depths down to 6,000m.



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Brooke Ocean Technology

Brooke Ocean Technology's (BOT) Laser Optical Plankton Counter (LOPC) counts and provides shape profiles (for larger species) of zooplankton. The Free Fall Cone Electrometer (FFCPT) is used to determine seafloor sediment geotechnical strength and sediment type. Both instruments can be deployed from the Moving



Vessel Profiler (MVP). A new product, SeaCycler is an energy efficient subsurface winch and profiling system which can collect data profiles for up to 12 months.

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AUV from C&C

C&C Technologies features the C-Surveyor I AUV rated for water depths up to 3,000 meters. The AUV's sensor payload included multibeam swath high resolution bathymetry and imagery, chirp side-scan sonar and sub-bottom profiler, differential GPS integrated with acoustic / inertial navigation and acoustic communications. Since delivery in January 2001, C & C's C-Surveyor I AUV has completed over 55,000 km of survey lines for a variety of worldwide clients.



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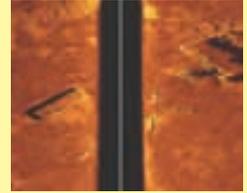
C-MAX Deck Units

C-MAX introduces two new deck units for its CM2 Sidescan Sonar System. The Sonar Transceiver (STR), with a laptop linked to its USB interface, provides a compact and economical acquisition capability. As an alternative, the C-Case all-in-one weather-



EdgeTech Introduces Side Scan System Options

EdgeTech will introduce a new dual simultaneous 300/600 kHz option for its existing 4200-FS Dual Mode Side Scan System. The current 4200-FS System operates dual simultaneous 120/410 kHz frequencies. The new high frequency option aims to provide the user with superior imagery at ranges of at least 230 m/side on the low frequency and 100 m/side on the high frequency. In High Definition Mode (HDM) the system operates conventional dual simultaneous 300/600 kHz frequencies. In High Speed Mode (HSM) the system operates in MultiPulse mode on either selected frequency at speeds of up to 10 knots while meeting IHO and NOAA specifications for surveys. Real time selection of these two modes allows the user to choose the one best suited to his task at hand. **Visit www.maritimeequipment.com/mt & Click No. 11**



proof deck unit has been updated with a higher resolution display and the ability to run MaxView or third-party acquisition and mosaicing software.

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C-Products Sells Two Systems



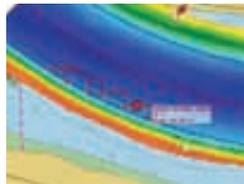
C-Products Ltd. announced two C-Boom system sales. One C-Boom system has been sold and delivered to GEUS, the Geological Survey of Denmark and Greenland based in Copenhagen. This follows on from its evaluation of a system last year. The second system along with a C-Phone Mini Hydrophone streamer has been sold to EGS(Asia) Ltd and will join their other C-Boom sub-bottom profiler systems based in Asia.

The low voltage boomer technology is proving very popular with survey companies and institutes alike, with systems now owned by companies in over 10 countries worldwide

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CARIS Port Management System

CARIS offers a full product line for port management, which includes CARIS BEAMS for survey management and storage and for engineering functions such as bathymetric analysis such as volume calculations, surface differences and channel condition



reports. CARIS PORTIS enables all the stakeholders to access information from wherever they may be on virtually any PC connected to the Internet.

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Chelsea Technologies

Chelsea Technologies Group announces a new Fast Repetition

Rate Fluorimeter for phytoplankton / algal monitoring. The FASTtracka II combines a conventional chlorophyll fluorimeter with a photosynthesis-probing fluorimeter in a single package. The FASTtracka II weighs in at 6 kg, and is about 4.5 inches in diameter and 11 inches long. The FASTtracka II is the flagship of a new range of instruments from Chelsea Technologies Group and incorporates as standard a large internal data store, whose entire contents can be downloaded within a few minutes.



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ESRI Software

ArcGIS for Ocean and Coastline Management Geographic information system (GIS) software is used to understand and manage geographic areas such as coastal zones. ESRI's ArcGIS software helps coastal managers collect, organize, and interpret vast amounts of data. In addition, 2D and 3D mapping tools of ArcGIS Spatial Analyst and ArcGIS 3D

Analyst help analysts represent data in a format that readily shows trends and patterns.

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Fastwave Wireless Communications

Fastwave Communications develops advanced wireless communication solutions for global monitoring, control and tracking applications. These solutions include autonomous and mobile data acquisition, logging and telemetry devices built to withstand harsh environmental conditions. The company has recently developed a global system for transmitting near real time data from wireless sub-sea sensors and control systems.

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General Acoustics Products

General Acoustics GmbH specializes in acoustic measuring devices and develops, produces and sells its own high-technology devices from their headquarters in Kiel, Germany and through their network of representatives around the world. The products include Water Level and Wave measuring Systems as well as special echo sounders for the hydrographical and-geological operations.

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GeoAcoustics Sonar

GeoAcoustics' new 24-bit digital side scan sonar provides full 24-bit data, digitized directly at the transducers, thus providing surveyors with high quality resolution. With sonar frequencies based upon the combination of 100kHz and 400kHz, this sonar is designed to provide a high level of image clarity. The system can also be mobilized as a modular sonar on ROVs and AUVs. Integral sensors provide motion readings and the user friendly data format is compatible with existing processor.

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Global Marine Services

Global Marine is an independent provider of submarine cable installation and maintenance. Offered services include: Cable joint assembly and installation; Cable storage and logistics; Charting; Equipment leasing; Network planning and design; Offshore wind-farm installation; ROV and deepwater plough services, training and leasing; Submarine telecommunications cable installation & maintenance; Subsea site planning and survey; Subsea technology training and engineering and Undersea research equipment installation & maintenance.

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Hägglunds Drives

Hägglunds manufacture complete hydraulic drives systems including hydraulic motors, power units and control systems. Our services include



pipin, installation and commissioning. Our products are designed to give direct hydraulic drive to many applications, eliminating the need of gearboxes. In the motor product line, you will find names like Viking, Marathon and Compact. All the motors come in varied sizes with many options and accessories. You achieve benefits of simplicity, saving space, improved control, reduced costs and gain high reliability with low maintenance in almost any environment.

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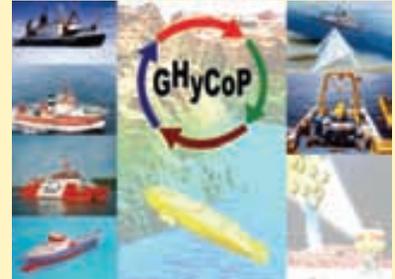
Hydroid's Remus AUV

The REMUS 100 from Hydroid is designed to be a light-weight, compact AUV designed for operation in coastal environments up to 100 m in depth used for a wide array of hydrographic and environmental monitoring applications. The new REMUS 600 is designed as a highly versatile, modular AUV used for the collection of oceanographic data in water depths up to 600 m, and can also be configured for 1500 or 3000 m operations.



GHyCoP - German Hydrographic Consultancy Pool

The German Hydrographic Consultancy Pool is an association and public-private-partnership (PPP) of 25 German companies and research institutes. GHyCoP is backed by the two German agencies BSH and BGR responsible for hydrography, marine management and monitoring. Teaming-up and bundling portfolios and expertises plus operating in close cooperation with large research institutes and agencies provides far better access to and stronger positions on the world-markets. GHyCoP's products and services cover the full range of hydrographic and oceanographic platforms, equipment and associated services. The pool's product portfolio includes survey vessels, monitoring and maritime security systems and the full scope of investigation platforms, instrumentation and sensors. Services comprise surveying, mapping, simulation, operator training and a wide range of consultancy and applied research activities. This enables GHyCoP to operate as a one-stop maritime technology and service provider and shop. GHyCoP exhibits on OI-2006 on the German Pavilion and several pool members will be also present with individual booths.



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The vehicle was designed to provide extended mission endurance, increased payload capacity, and greater operating depth. The new REMUS 6000 is capable of highly intricate deep-water operations in water depths up to 6000 m, allowing for a wide spectrum of autonomous operations. The vehicle can be configured to operate at depths of 4000 m.

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Software from Hypack

HYPACK develops Hypack Max, which is designed to provide the surveyor with all of the tools needed to design their survey, collect data, process it, reduce it, and generate final products. The Tin Model and 3D Terrain Visualization (3DTV) programs of Hypack Max provide tools to view and present your data. 3DTV allows users to fly a 'camera' across the edited XYZ surface and display the results or save them to a

AVI file for distribution to clients. In addition, Hypack's Hysweep is an optional module that integrates the collection and processing of multi-beam and multiple transducer sonar systems into Hypack Max. Hypack also develops Dredgepack used for providing precise digging information on dredges. The program can also create complex dredging plans.

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Underwater Pluggable Cables

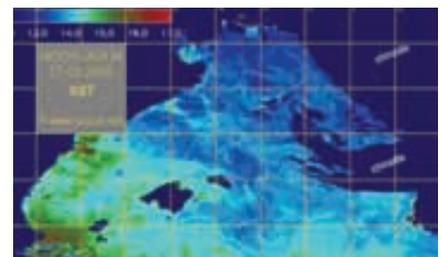
Impulse's underwater pluggable cables feature a pressure balanced design, which allows underwater mating and unmating of connectors with the power off. Depending on the connector type, neoprene molded bulkhead connectors have either brass or stainless steel bodies. Circular or low profile bulkhead connectors are available with 1 to 8 contacts and neoprene molded in-line connectors.

The cables have up to 10,000 psi pressure rating in the mated position; bulkhead connector design in the open face position is rated to 5,000 psi.

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SISCAL from Informus

Informus GmbH exhibits the SISCAL service for the generation and distribution of Earth Observation (EO) data products in near-real-time at Oi06. SISCAL has been developed within the framework of an R&D project supported by the European Commission. The service is actually targeting the aquatic environment, but is also a generic tool for the gen-



eration and distribution of spatial information within interest communities and for individual customers.

SISCAL does not provide "one-size-fits-all" products, but offers tailor-made solutions for individual needs including product generation schedule, area of interest, geographic projection, data formats and choice of algorithms. Customers access their orders via the internet at www.siscal.net without the need to download and process large data files and can even make use of a dedicated GIS solution allowing the combination of SISCAL products with their own GIS information layers.

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Innespace Technology

Innespace Technology will be displaying its Windows XP based survey sounders and peripheral hydrographic products and announced the new, 620 PHSS, a complete hydrographic data collection system in a single, waterproof transit/operating case. The 620 is designed for both



military and commercial shallow water and littoral zone applications.

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Innomar Technologie Profiler

Innomar Technologie GmbH presents its new system variant SES-2000 deep, a portable parametric sub-bottom profiler for deep-sea operations is rated for



water depths of 5 to 6000m. It has a very narrow sound beam of $\pm 1.5^\circ$ for low frequencies between 2 and 7kHz with a transducer of 0.8m x 0.75m.

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Innovative Technology Projects

The Acoustic Systems Trainer for SONAR has been designed and manufactured for underwater studies.

The system is comprised of a control Console, containing the CW and Pulse gating electronics, and the hardware/software-processing

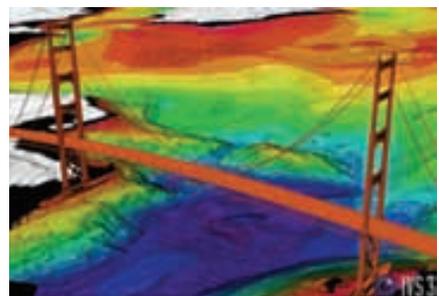
(Sonar Signal Analyzer - SSA) interface with the computer. The transparent Acoustic Tank is constructed from acrylic material, measuring 1.2 meters in length, 600mm deep, and 600mm wide, with a

capacity for 400 liters of water.

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IVS3D's Fledermaus Software

Interactive Visualization Systems' (IVS3D) Fledermaus software suite provides users with a set of interactive 3-D visualization tools for data preparation, analysis and presentation. Fledermaus allows users near real-time, interactive 3-D display of very large complex scenes at their full resolution. Data such as backscatter, side scan, geo-referenced aerial photographs or images (still images from an ROV) can be draped over topograph-



ic or bathymetric data sets. Fledermaus also enables the user to import and geo-reference vertical images, such as seismic sections or geological profiles.

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Kongsberg Maritime

Kongsberg Maritime will launch the EM 302, a new version of the EM 300 multibeam echo sounder, a product for marine geology mapping of the seabed for depths to 5000 - 6000

Noise Control Engineering, Inc.

Shipboard Noise & Vibration Control
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 ♦ Treatment Selection

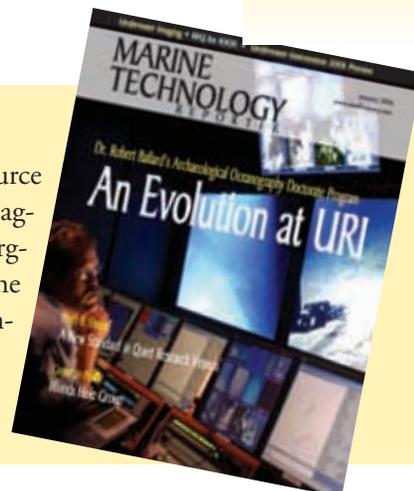
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Marine Technology Reporter

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m. The new product will include all earlier features, and will use chirp technology to obtain extended range capability. It will also offer high-density signal processing and increased number of soundings for improved resolution. Also from Kongsberg Maritime is the SBP 300 multibeam sediment profiler, designed for integration with EM 302.

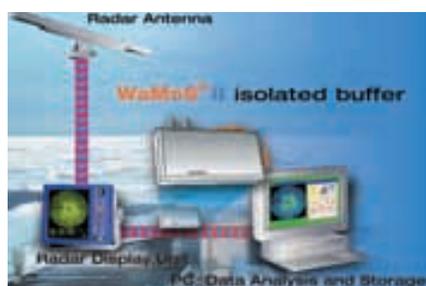
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E-sea Sound MP 35

Marimatech has manufactured Hydrographic Survey Equipment for more than a decade. Its E-sea Sound MP 35, used for shallow water surveys as well as full ocean dept, is able to perform sup-bottom penetration, multiple layer tracking and advanced heave, roll and pitch correction. Mud layer detection is yet another feature. The E-sea Sound MP 35 has now been equipped with a flash drive memory.

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OceanWaves GmbH



OceanWaveS GmbH develops, produces and markets the Wave Monitoring System WaMoS II. This operational remote sensing system permits reliable measurements of the actual sea state with a conventional nautical X-Band radar. Full directional ocean waves spectra and sea state parameters like significant wave height, period, and direction as well as currents are detected in real time. WaMoS II is participating in several international research projects. The type approved system is continuously expanded as new features for single wave detection, high-resolution current measurements and water depth estimation are implemented.

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Martec's METOCEAN

Martec METOCEAN Data Systems designs and manufactures air-deployed and ship-deployed drifting buoys. The buoys, prior to deployment, has a diameter of 8-in. and weighs 23.5 pounds. The buoys are constructed using heavy gauge, marine-grade aluminum, has four, quarter-cylinder foam floats and a top-loaded, truncated, monopole argos antenna with active GPS element antenna above. The buoy can operate in an air temperature of -20° C to +35° C, fresh or water temperature between -2° C to +35° C, and a significant wave height of 8 meters.

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Crawler from Meerestechnik Bremen

Meerestechnik Bremen's Crawler — which measures 3.3 x 2.3 m and weighs 900 kg — is equipped with a TSS 350 cable tracker, and is designed to drive four knots under water, at an operating depth of 200 m. The Crawler drives automatically over the sea cable because of the smart

driving software that uses the cable tracker data to steer the vehicle.

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Metocean Services International

Metocean Services International provides a range of oceanographic and meteorological services to the offshore oil and gas market, coastal engineers, dredging companies and port authorities. These include physical measurement services, desktop studies, data processing/reporting and weather forecasting.

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Ocean Monitoring System

Tsunami and flood forecast, environmental information, help in search and rescue operations and improved home land security are the focus of OMS. Over-the-Horizon Radar WERA, buoys located on the surface and landers on the sea floor provide data on water quality, currents and wind speed as well as seismic data. These are combined with bathymetric data, sea floor topography, wave propagation modeling and near coast wave height measurement. OMS is being developed by a regional cluster of companies, consultancies and institutions based in Schleswig-Holstein, northern Germany. The system will be operational in early 2007.

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ORE Offshore to Showcase USBL

ORE Offshore will display the new TrackPoint 3P Portable USBL Acoustic Tracking System



at OI 2006. The TrackPoint 3P System includes a deck unit; an integrated USBL acoustic signal processor designed to operate with up to four targets sequentially for a wide range of subsea navigation and relocation tasks. It is contained in a portable, water resistant enclosure.

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Oil Detection System



OSIL introduces the Slick Sleuth from InterOcean Systems, an above water oil detection system. In addition to InterOcean Systems, OSIL is a distributor for AML, Guildline, Sontek and YSI. Monitoring systems are custom built for coastal, offshore and ports and harbors.

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RBR Enhances Data Loggers, Buoys

A new module has been developed

that adds SD/MMC removable flash memory (up to 2GB capacity) and USB2.0 connectivity to the flexible RBR data loggers and data buoy controller. The USB connection is designed to allow for ultra high-speed data transfer, and is especially useful when removal of the card is not feasible or the user does not have access to an SD/MMC card reader.

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Remote Ocean Systems' Spotlight

Remote Ocean Systems unveiled an underwater spotlight, the LED SmartLIGHT. It uses a solid state light engine to produce a high intensity light output equivalent to a 125 watt incandescent bulb. The ROS SmartLIGHT is depth rated to 3000 m. It operates on 24 VDC, is fully dimmable, and produces a video image with its 5500k color temperature. Illumination life is over 50,000 hours.



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Sonavision Launches RoxAnn GD

Sonavision launched the RoxAnn



TRDI Launches New Products

Teledyne RD Instruments will launch two products for measuring water in motion and one product for motion in water. The two new tools for measuring water in motion include the DVS, Doppler Volume Sampler, and a new scaled-back version of the Workhorse ADCP. The DVS was developed by Teledyne RDI to support a multi-year contract from NOAA/PMEL for a next generation moored current profiler. The new low power DVS offers an advanced alternative to single point current meters. DVS incorporates Teledyne RDI's patented four-beam solution to detect mooring line interference, and can measure velocity shear near the instrument. Teledyne RDI is also introducing a new entry level Workhorse ADCP designed for moored current profiling applications. The Explorer Doppler Velocity Log (DVL) is the newest addition to the Teledyne RDI family of DVL products for measuring motion in water. Explorer has been designed to provide Workhorse precision in a package that meets the stringent weight and power constraints of this next generation of smaller, littoral vehicles.

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GD-A Seabed Classification system, the successor to the RoxAnn System. RoxAnn was developed more than 20 years ago as an aid to the commercial fisherman, as it automatically linked the seabed type information available from an echosounder with the position of the vessel. The system was further developed for scientific use and has been routinely used in many seabed mapping studies with applications as diverse as dredging, fisheries habitat management, environmental pollution control, sea grass and coral population research and assisting hydrographic offices in creation of navigation charts. At 200 x 110 x 60 mm and 600g, it is considerably smaller and lighter than the older version.

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Tools from Rotech

Rotech Subsea's Mass Flow Excavation tools offer three sizes of tools that can accomplish various

subsea excavation requirements. The patented gyroscopic technology allows for complete stability and control as the tool is lowered into the water. As the counter rotating impellers bring in the water, it is redirected to the seafloor creating a high velocity, yet low pressure column that can cut through sheer strengths as great as 1,750 psf. The tools can work in depths from 5 to 5,000 ft.

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Products from RS Aqua

RS Aqua will feature the WaveRadar Rex, which measures wave activity and precision sea surface level from structures; the OptodeSys, optical sensors; the AADI "Mira" Visibility Sensor; the Trilogy, the new bench top fluorescence, absorbance and turbidity laboratory fluorometer from California based Turner Designs Inc.; the Aanderaa Optode; the Datawell Directional Waverider buoys, which offer HF radio and

Orbcomm satellite data transmissions to a centralized reporting center run by service provider Gardline Environmental Ltd; Vitrovex glass products, OBS-3+ Turbidity sensor from USA manufacturer D&A Instrument Company, among many others.

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Positioner from Sidus Solution

Sidus Solutions' SS250 pan and tilt is a powerful robotic positioner. Users are able to position heavy loads with ease and accuracy. The SS250 blends dependability and effectiveness thru integration of synchronous motors and low backlash drives into a modular assembly.

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Trilogy Laboratory Fluorometer

Turner Designs announced the Trilogy Laboratory Fluorometer, a compact, multifunctional laboratory instrument that uses snap-in Application Modules to measure fluorescence, absorbance and turbidity. Trilogy features a Touch-Panel graphics user interface for intuitive operation and calibration.



Eighteen named calibrations can be stored by Trilogy significantly saving calibration time. For extracted chlorophyll measurements using EPA 445, Trilogy automatically calculates the concentration using the filtered and solvent volumes. The Turbidity Module uses an IR LED with a wavelength of 860 nm to meet ISO 7027 requirements for Turbidity water quality measurements.

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Tritech International

Tritech International specializes in the production of acoustic, video & mechanical subsea products for professional underwater markets. Tritech's SeaKing and SeaPrince sonars will be incorporating CHIRP technology for the very first time. The all-new digital CHIRP systems offer advanced acoustic features for subsea surveying and exploration and come with a depth rating of 3000 m.

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Veripos



Veripos will feature the Verify QC for real-time position and quality control information with full calculation configuration flexibility as well as performance monitoring. It is designed for a wide range of differing GNSS receivers while supporting unlimited numbers of single and multi-reference station calculations.

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Werum Software&Systems

Werum Software & Systems has equipped the new German research vessel Maria S. Merian with its data management system DAVIS-SHIP. DAVIS-SHIP is able to integrate devices and sensors of any kind and is designed for largely unattended operation. The scientific network onboard the Maria S. Merian is based on fiber optics technology. Once put into service the vessel will be based with the Institute for Baltic Sea Research Warnemuende (IOW) and be operated for marine research. Over the next few years, a group of up to 22 scientists aboard the Maria S. Merian will study the effect of climate change on the world's oceans on expeditions from the northernmost reaches of the

Gulf Stream to the Arctic Circle. The construction of this new vessel is being jointly funded by the Federal States of Schleswig-Holstein, Bremen, and Mecklenburg-Vorpommern as well as by Germany's Federal Ministry for Education and Research.

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Deepsea Debuts Whiter, Brighter Xenon



DeepSea Power & Light offers the ultra bright Xenon-S Thru-Hull SeaLite, designed to be a more affordable, whiter and brighter. The new low voltage (8-32V), 35-watt gas discharge light produces intense white light for maximum penetration in seawater, and was engineered specifically to be a competitively priced, yet superior Xenon light. The Xenon-S comes standard with unique features. The sapphire crystal port is used for its strength and thermal characteristics. The manufacturer claims that sapphire crystal allows the light to run cooler for improved lamp life and safety. A fully sealed design (front and back) is incorporated to ensure that water in the bilge does not intrude through the back of the light, and if the front port were compromised, water will not leak into the boat.

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For information on posting a job on these pages and on the "JOBS" site at www.seadiscovery.com, contact Dale Barnett at tel: 212-477-6700; fax: 212-254-6271; or e-mail: barnett@marinelink.com

FIELD ENGINEER

Job Location: USA, WA Lynnwood

Kongsberg Underwater Technology, Inc., a US subsidiary of Kongsberg Maritime, currently has an opening in Lynnwood, WA for a Field Engineer. Primary responsibilities will include the installation, service, customer support and customer training for Kongsberg's wide range of maritime products including hydrographic survey systems, autonomous underwater vehicles, underwater navigation systems, and underwater surveillance systems. Successful applicants must have a strong technical background in the maritime/ocean engineering field, be capable of working independently in the field, and interfacing directly with the customer. Associates degree in a related field or equivalent work experience required, BS degree is desired. Position requires extensive domestic and international travel and work aboard offshore vessels. Must be a US citizen and capable of obtaining a US Government security clearance.

Kongsberg Underwater Technology, Inc. is an Equal Opportunity Employer.

Darlene Burt
Kongsberg Underwater Technology, Inc.
19210 33rd Avenue West
Suite A
Lynnwood, WA 98036

Phone: 425-712-1107
Fax: 425-712-1197
Email: darlene.burt@kongsberg.com

ENGINEER/DIVER

Job Location: USA, NY West Nyack

The McLaren Engineering Group, a New York based firm with assignments both domestic and international has an immediate opening, for an Engineer/Diver to work out of their West Nyack, New York office. The desired applicant will have a minimum of 5 years experience in design, and report generation for marine/bridge structures and port facilities. Only licensed engineers that are computer proficient, have strong organizational/communication skills and diving certification will be considered.

Our salary and benefits package is one of the

best in the industry including but not limited to 401k, medical, dental and long-term disability plans. EOE/M/F/D/V.

John F. Hackett
McLaren Engineering Group
100 Snake Hill Road
West Nyack, NY 10994
USA

Phone: 845-353-6400
Fax: 845-353-6509
Email: jhackett@mgmclaren.com
WEB: <http://www.mgmclaren.com>

SENIOR HYDROGRAPHIC SURVEYOR

Job Location: United Kingdom, Southam

NetSurvey Limited are a specialist multibeam services company. As we continue to expand we have a requirement for more specialist multibeam surveyors. We are looking for surveyors with at least 5 years experience and who are preferably trained to IHO Cat A status. NetSurvey's work is varied both in type and geographical extent. You could be surveying for a pipe route across the Magellan Straits and then performing SOLAS charting surveys off the Orkneys on the next project. We perform multibeam surveys from ROVs,

harbour launches, vessels of opportunity all the way up to construction vessels. Typically we will install, acquire and process the multibeam data and produce the project deliverables. If you are interested in varied work with a small but expanding company and you are an experienced hydrographic surveyor then please contact us.

Duncan Mallace
NetSurvey Limited
Office 4
Manor Farm, Northend Road,
Fenny Compton
Southam, Warwickshire CV47 2YY
United Kingdom

Phone: +44 1295 770011
Email: jobs@netsurvey.co.uk
WEB: <http://www.netsurvey.co.uk>

FIELD SALES ENGINEER

Job Location: USA, NH Portsmouth

With over ten years in the highly dynamic IT sector of the ocean industry, IVS 3D has emerged as a world leader in 3D analysis and processing in the ocean environment with our award winning Fledermaus software. We are experiencing record growth, and looking to

add new members to our team.

Our Field Sales Engineers play a key role in helping existing and prospective clients understand and use our visualization, analysis and processing software suite. This is also a key position in our customer training program, where we offer public and in-house courses geared toward advancing client's knowledge and use of Fledermaus.

The ideal candidate will have a strong geosciences background and the following skills and experience:
Salary and overall compensation are commensurate with experience. This position will be based in Portsmouth, NH, and may require travel up to 50% of the year (domestic and international).
Please send your application to IVS 3D by 28 February 2006 by e-mail to hr@ivs3d.com or fax to (603) 766 0485.

Carole Mahoney
IVS 3D Inc.
1500A Lafayette Rd
Portsmouth, NH 03801 USA
Fax: (603) 766 0485
Email: hr@ivs3d.com
WEB: <http://www.ivs3d.com>

ROV-MULTIBEAM TECHNICIAN POSITION

Job Location: USA, FL Key West

Nautical Archaeology Research Vessel
ROV-Multibeam Technician Position

Position for individual possessing combined abilities of ROV pilot/maintenance technician and multibeam echosounder technician. Selected applicant will serve on a 37.5 meter research vessel specifically designed for nautical archaeology survey and site examination research. Vessel equipped with Kongsberg/Simrad 1002S and 3002D multibeam echosounder systems and software, and an ROV system that includes a Reson 6012 sonar. Experience with Surfer, CARIS, PDS2000, ArcView, and/or HyPack softwares desirable. RPM Nautical Foundation is a non-profit archaeological research institution with its Mediterranean operations based in Malta. For more information please visit www.rpm-nautical.org. Contact cjones@rpmnautical.org or royal@rpmnautical.org; Telephone (USA) 305-294-3400; Fax (USA) 305-294-7520.

Chris Murphy

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E-mail: sales@jackvilas.com



Jack Vilas and Associates have supplied and equipped the Industrial, Marine, and Commercial Diving Industries with unique products for over 20 years. A few of the product names are: Synthoglass, Miko Magnets, Fireblockade, Pelican Cases. We also carry oil, greases, brass fittings, hoses, gauges, radios, cameras, custom made manifolds, environmental control units and many other items. We strive for customer satisfaction while supplying quality products.

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Materials Systems Inc. (MSI)

543 Great Road
Littleton, MA 01460 USA
Phone: 978-486-0404
Fax: 978-486-0706
Web: www.matsysinc.com
E-mail: ideas@matsysinc.com

Materials Systems Inc. (MSI) designs and manufactures custom sonar transducers and arrays for a wide range of applications, including side-scan, obstacle avoidance, sub-bottom profiling, swath bathymetry, mine hunting, and acoustic communications. MSI's piezocomposite technology offers extremely broad bandwidth, high receive sensitivity, high source levels, and conformability for curved arrays.

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SonTek/YSI, Inc.

6837 Nancy Ridge Drive, Suite A
San Diego, CA, USA 92121
www.sontek.com
Tel: 858.546.8327
Fax: 858.546.8150
E-mail: inquiry@sontek.com



SonTek/YSI believes that precision water velocity measurement should be practical, affordable, and easy. Our product line includes acoustic Doppler current profilers (ADP), velocimeters (ADV) and 3D current meters (Argonaut-MD, Triton). Our systems can also seamlessly integrate ancillary sensors to create a full data collection platform.

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RPM Nautical Foundation
6000 Peninsular Ave
Key West, FL 33040
USA

Phone: 305-294-3400
Fax: 305-294-7520
Email: cmurphy@rpmnautical.org
WEB: http://www.rpmnautical.org

Factory Service Engineer - Houston Texas

Responsible for repairs, technical assistance, training, and inventory management. Key resource for all customer contact relating to quotes and orders for spare parts, service orders, returns, and shipping/receiving of all systems, spares, returns and service work. Occasional local deliveries required. Technical background required.

Please see our website at
www.ssaalliance.com

Please send resume to the following:

Schilling Robotics
11757 Katy Freeway, Suite 1300
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schilling.houston@schilling.com
281-854-2049
281-854-2249 fax

Jason Stanley
Schilling Robotics
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TX 77079 USA

Phone: 281-854-2049
Fax: 281-254-2249
Email: schilling.houston@schilling.com
WEB: http://www.ssaalliance.com

Field Service Engineer - Houston Texas

Responsible for repairs, technical assistance, and customer training. Receiving, inspection and testing of all systems. Diagnosing and repairing of equipment to factory standards. Compiling job quotations and reports for all service repairs. Responding to customer technical queries. Occasional offshore work and international travel required. Technical background in hydraulic and electronic systems required.

Please see our website at

www.ssaalliance.com

Please send resume to the following:

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Phone: 281-854-2049
Fax: 281-854-2249
Email: schilling.houston@schilling.com
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PROJECT MANAGER ROV/ETO

Job Location: USA, CA Davis

Headquartered in Davis, California, Schilling Robotics designs and delivers the world's highest-performing, basic building blocks for subsea equipment operating in the world's harshest environments. The company brings technology expertise and innovation in control, communication, and actuation (gained through 20 years of market leadership) to the challenges facing customers in subsea environments. This combination of expertise and experience has led to the development of a revolutionary modular component approach, the Remote Systems Engine™ (RSE), and to the design of subsea equipment that leverages commonalities across systems and applications to deliver highly reliable, easily integrated, lower-cost solutions. Schilling Robotics is an employee-owned company that emphasizes high personal standards, team focus, accountability, and honesty from its employees.

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Please send resume to the following:

201 Cousteau Place
Davis, CA 95616
hr@schilling.com
530-753-6718
530-753-4283 fax

Amy Strecker
Schilling Robotics
201 Cousteau Place
Davis, CA 95616
USA

Phone: 530-753-6718
Fax: 530-753-4283
Email: hr@schilling.com
WEB: http://www.ssaalliance.com

PROFESSIONAL DIVERS & DMT

Job Location: USA, WI Milwaukee
Experienced construction divers and DMT/Divers sought for 3 year pipeline project. Prevailing wages + fringes. Serious inquiries only! Possible career opportunities available.

Eric Hogden
Tri-State Diving
W11490 Spaulding Road
Black River Falls, MN, IL, IO, MI 54615
USA

Phone: 715-797-6949
Fax: 715-284-1799
Email: tristatediving@aol.com

DIVING SUPERVISOR / MANAGER

Job Location: USA, WI Milwaukee

Experienced diver/supervisor sought for large diameter pipeline installation. Career oriented Marine construction personnel only. Business and Marketing background a plus. Serious inquiries only!

Eric Hogden
TSD
W11490 Spaulding Rd
Black River Falls, WI 54615
USA

Phone: 715-797-6949
Fax: 715-284-1799
Email: tristatediving@aol.com

ALL ROUND ASSISTANT FOR MARINE SALVAGE OPERATION

Job Location: Virgin Islands, Road Town

My son (25 years' experience in the Virgin Islands) is looking for a hardworking, fit individual who has all round experience in boat handling (power and sail; commercial and yachting), has skills in marine maintenance (mechanical and electrical)and possibly some diving experience (not mandatory). There are excellent financial opportunities for a suitable applicant who is flexible and willing to work hard in a small company environment. He does salvage, towing and yacht rescues in one of the world's most beautiful boating environments. Contact me for further information.

Cathleen Rowlette
Husky Maritime Services
5242 Blenheim Street
Vancouver, B.C. V6N 1N8
Canada

Phone: (604) 263-4881
Email: crowlett@shaw.ca

MARINE STRUCTURAL ENGINEER

Job Location: USA, NJ Gibbsboro

Ocean and Coastal Consultants, Inc. is looking for a qualified structural engineer to work in their Gibbsboro, NJ office. The successful candidate must have a minimum of 6 years relevant experience and have passed the E.I.T. exam. A P.E. license is strongly preferred. Relevant work experience must include design of steel, concrete and timber structures. It is desirable to have design experience with relieving platforms, wharves, piers, docks, and other waterfront structures, the design of berthing and fendering systems, and geotechnical work related to waterfront structures. Design of marinas and coastal protection systems is a plus. SCUBA and surface supplied air diving experience is also highly valued. The position will include some field assignments. If you have the requisite qualifications and would like to work for a growing company involved in a wide variety of exciting work, please send your resume.

Doug Gaffney
Ocean and Coastal Consultants, Inc.
20 E. Clementon Rd., Suite 201N
Gibbsboro, NJ 08043
USA

Phone: (856) 248-1200
Fax: (856) 248-1206
Email: dgaffney@ocean-coastal.com
WEB: http://www.ocean-coastal.com

OCEAN ENGINEER/CIVIL/MECHANICAL

Job Location: USA, HI Waimanalo

Looking for a talented and fast-learning civil/ocean/mechanical engineer, preferably with previous work experience, to become a permanent member of our technical staff. Duties would be varied depending on current project commitments and may include computer programming, hydrodynamic and hydraulic analysis, structural design, pipeline design and analysis, limited duration offshore assignments, proposal and report writing, and various marine survey and construction observation duties. Important assets for this position include: An ability to think clearly through technical problems, strong written/oral communication skills, willingness to adapt to a flexible work schedule, willingness to travel, and a desire to learn new skills. Working knowledge of Word, Excel and Autocad are desirable skills. Knowledge and experience in concrete and steel design is a big plus. A Bachelor's degree in one of the above mentioned fields is a minimum requirement. Three years work experience or a graduate degree is preferred. Candidates should hold U.S. citizenship or a green card. Please submit a cover letter and resume with references, date of availability and citizenship/immigration status.
Dale Jensen
Makai Ocean Engineering
PO Box 1206
Kailua, HI 96734 USA

Phone: 808-259-8871
Fax: 808-259-8238
Email: dale.jensen@makai.com

SOFTWARE ENGINEER

Job Location: USA, HI Waimanalo

Makai's submarine cable group is looking for a Software Engineer with strong program-

SR. EMBEDDED HARDWARE ENGINEER

Seeking a Sr. Embedded Hardware Engineer for design & development of embedded applications running on Linux operating system. Must have firm understanding of real time operating system concepts, interrupt handlers, device drivers and in debugging highly integrated systems. Ability to work closely in a development team environment and complete tasks with min. supervision. Also provide technical advice for future projects. Requires BSEE (MSEE preferred), Computer Engineering or closely related field. Preference given to experience in Xilinx Virtex-II Pro, Virtex-4 and Monta Vista Linux.

Send resume and salary requirements to:
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11 Klein Drive, Salem NH 03079 or
chris.arnold@L-3com.com
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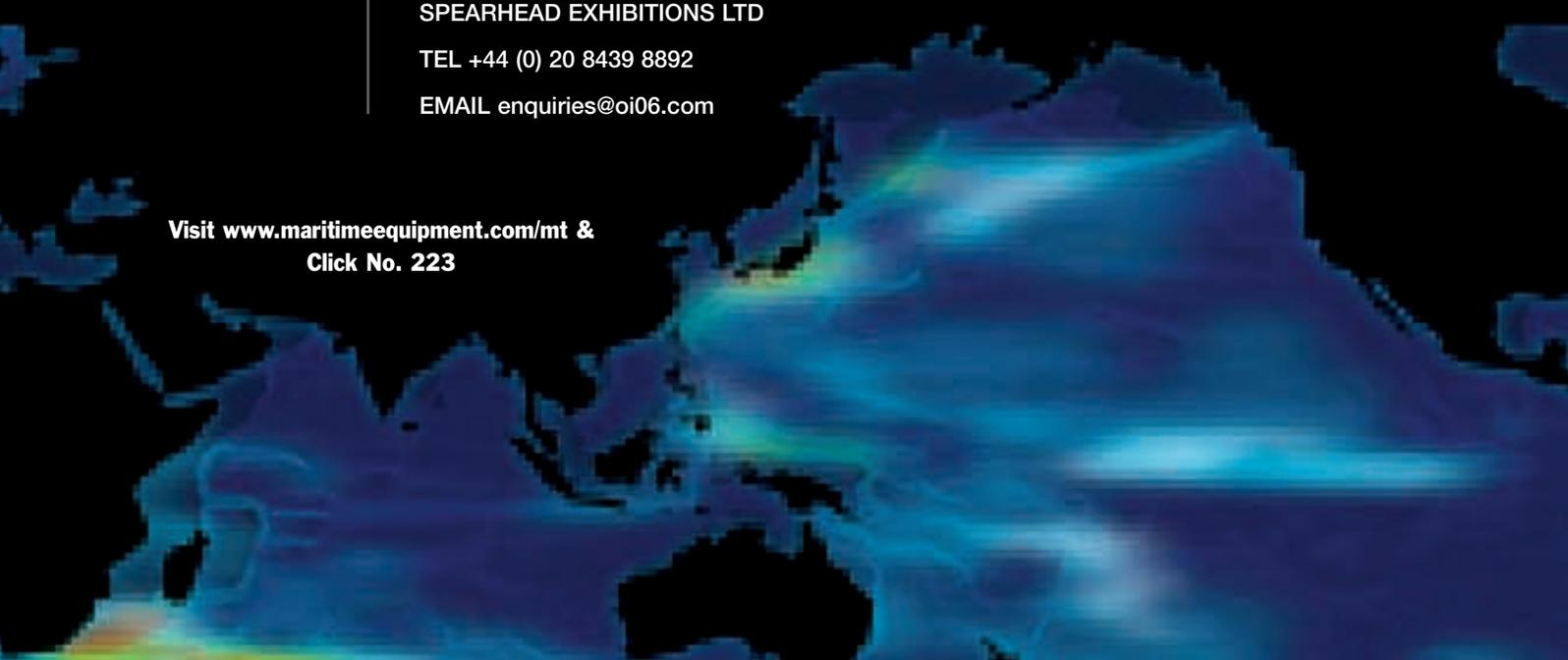
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ming skills to perform maintenance, development and occasional offshore operation of our PC-based cable lay planning, simulation and control software. This individual will be responsible for the ongoing software development, customer support, and installation and troubleshooting of software on client platforms at-sea. Important assets for this position include: Engineering or physical science degree, willingness to occasionally perform at-sea work, strong self-confidence, excellent English communication skills, strong interpersonal skills, and have experience with the Windows programming environment with the aptitude and willingness to learn more. Specific expe-

rience with Windows 2000/XP, AutoCAD, ArcView or GeoMedia, FORTRAN, C++, Visual Basic and TCP/IP networking is helpful. Applicant must be qualified to work in the U.S. (Foreign born nationals must already possess a green card.) Please send a cover letter and resume to Dr. Jose Andres at Jose.Andres@makai.com.

Jose Andres
Makai Ocean Engineering
PO Box 1206
Kailua, HI 96734

USA

Phone: 808-259-8871
Fax: 808-259-8238
Email: jose.andres@makai.com
WEB:

ENGINEER/PHYSICIST

Job Location: USA, HI Waimanalo

Makai's submarine cable group is looking for an Engineer or Physicist with a graduate degree and very strong skills in math, numerical methods and programming. Candidate will be learning, maintaining and expanding the capabilities of existing and new complex numerical models developed in FORTRAN, C++, and Visual Basic. Important assets for this position include: An ability to think clearly through technical problems, strong written/oral communication skills and proposal writing, willingness to adapt to a flexible work schedule, willingness to travel, and a desire to learn new skills. A Masters degree in engineering, physics, or applied math is a minimum requirement, and ideal candidates will have 2-4 years experience in physical modeling/programming. US citizenship is preferred. Please submit a cover letter, resume with references, date of availability and citizenship/immigration status to Dr. Jose Andres at Jose.Andres@makai.com.

Jose Andres
Makai Ocean Engineering
PO Box 1206
Kailua, HI 96794 USA
Phone: 808-259-8871
Fax: 808-259-8238
Email: jose.andres@makai.com

CABLE REPAIR SUPERVISOR

Job Location: USA, TX Houston

Veritas DGC Inc., a \$600 plus million public geophysical information and services provider, is one of the world's leading providers of advanced geophysical technologies. Veritas Marine Acquisition, a division of Veritas DGC Inc., is currently recruiting for individuals for our Cable Repair Supervisor position in the Houston office.

The central role of the Cable Repair Supervisor position is to operate an onshore facility for the repair of marine cables for our global fleet. This position will work closely with representatives of the Marine Resource, ATG and Marine Operations groups to ensure that repairs meet our terms of competitiveness and accuracy. This position will be responsible for managing the overall repair activities, providing repair expertise and knowledge in addition to performing line repair duties when needed. The responsibilities for this position will be to oversee and/or perform the evaluation and repair of incoming cables as workload requires; Manage the inventory for repairs and fixed assets at the Cable Workshop; liaise with Marine Inventory Tracking Supervisor on the status of repairs and incoming/outgoing shipments; and generate technical reports and statistics for management on a regular basis. Will also assist with the start-up of a new facility.

We are looking for applicants in the Texas area. Will consider individuals outside of the Texas and USA area if you have appropriate and useful experience.

For more information on who we are and what we do, please visit <http://www.veritasdgc.com>. Interested applicants may apply by submitting resume to vgshr@veritasdgc.com. Please indicate where you saw this job posting.

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Q&A with Dr. Andrew Clark

(Continued from page 19)

Through the Gulf Coast Ocean Observing System (GCOOS - the RA in that area of the country) and working closely with both NOAA's National Data Buoy Center (NDBC) and the Minerals Management Service (MMS) many major oil companies have installed current meters on some of their offshore platforms and that data is now flowing through NDBC as part of IOOS. In terms of sensors and other hardware required for IOOS, obviously these will substantially be procured from companies just as I'm sure that sensors that will be required but don't yet exist will also be developed by these and other firms. Similarly, there exist in many parts of the country (the Gulf Coast for example) substantial existing infrastructure and assets that can

be called-upon for deployment and maintenance of offshore systems; and it's quite possible that this need may be answered in other regions of the nation by companies that will be stood-up specifically to answer these needs. About a dozen federal agencies, literally hundreds of universities, laboratories, private institutions as well as myriad state and local organizations are presently all involved in conducting ocean observations and collecting data. Perhaps the biggest and most immediate challenge facing IOOS — and one in which US Industry has considerable expertise in solving — is devising and instituting the means, processes, procedures, software, hardware, middleware and metadata that will facilitate the seamless interoperability of all these data

and collection systems.

MTR: Any final thoughts or messages you want to get out to the Marine Technology Reporter's reader base?

Clark: If you think that you and/or your company may have a reason to become involved with IOOS then you should - I can think of almost no sector of the maritime industry who will not ultimately be a stakeholder in IOOS, whether as a contributor, a user, or both. Whether as a user, a provider (or both) you will benefit more (and the system will also benefit) through getting involved at the earliest possible stage - where you can have the most influence on the products it delivers and its usefulness to your enterprise.

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