Profile: Hafmynd (Gavia) • Sea SERPENTS • "Looters" Go High Tech

MTR "JOBS" Marketplace
See Details on page 60

MARINE TECHNOLOGY REPORTER

November 2005
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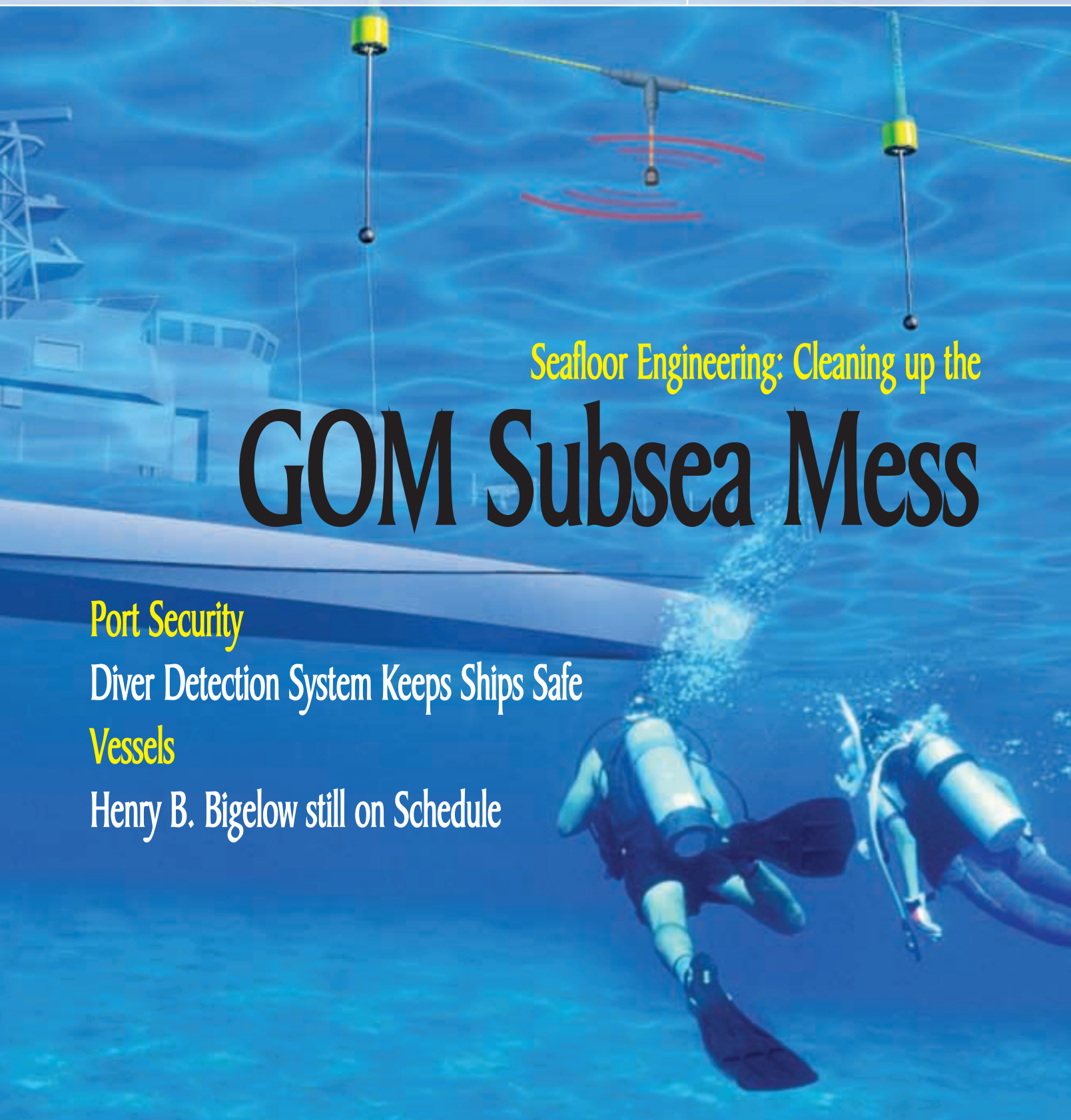

Seafloor Engineering: Cleaning up the GOM Subsea Mess

Port Security

Diver Detection System Keeps Ships Safe

Vessels

Henry B. Bigelow still on Schedule

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SouthCoast MASSACHUSETTS
THE NEXT WAVE

November 2005

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on the Cover

The harbor fence and the underwater sentry system protecting a ship in port. (See story on page 34)

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 22)**

Larry Pearson is a freelance writer from Metairie, La. Pearson is currently a contributor to *MTR* sister-publication, *Marine News*, and has edited his own publication, *Passenger Vessel News*, and was managing editor of *WorkBoat*. This month in MTR he writes on the new FRV Henry B. Bigelow. **(Story on page 18)**

Writer-photographer **Don Sutherland** has operated as an "embedded photojournalist" on location for over 30 years. He's sometimes described as "the inventor of digital photography." Evidence is at www.don-sutherland.com. **(Story on page 30)**

also in this Edition

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editorial

When "Seafloor Engineering" was tapped as the feature topic of this edition, little did we know that a pair of powerful hurricanes would serve to make the coverage all too timely. At press time, nearly two and a half months after the first and worst hurricane — Katrina — blew ashore and swamped the coastal areas of Louisiana and Mississippi, government and industry were still working overtime to produce a full assessment of subsea damage and determine a timeline for recovery. While realistic numbers are still difficult to conjure, it is safe to state that undersea and salvage work in the area will be at full capacity for many months. Maggie Merrill doggedly pursued endless leads to deliver an overview of the damage, with insights on specific technologies employed to get the job done. Freelance writer Don Sutherland, a regular in the pages of MTR sister-publication MarineNews, was down south for more than three weeks, and we deliver his unique perspective starting on page 30.

Greg Trauthwein
Associate Publisher & Editor • trauthwein@marinelink.com

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Companies with editorial mention in this edition

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USV Industry Day Held in Washington

By Edward Lundquist

The U.S. Navy's Unmanned Surface Vehicle Industry Day, held at the Washington Navy Yard October 18-20, called for industry ideas and solutions to support the anti-submarine warfare (ASW) mission packages for the Littoral Combat Ship. The conference was hosted by the Program Executive Office for Littoral and Mine Warfare. The service is requesting assistance from industry for research and development (R&D) of Unmanned Surface Vehicle (USV) for ASW applications.

"The Navy's goal is to procure up to four (prototype) USVs in the near term and as many as 52 USVs for ASW Mission Packages in the far term," said Capt. Walt Wright, Program manager for the LCS Mission Modules. "We're seeking a single USV design to support all ASW mission systems," Wright said. "This will support a common USV effort for all LCS Mission Packages. Acquiring a USV for the LCS ASW Mission Package is a top-level requirement, according to Ken Michaud, assistant program manager for the ASW mission package. Industry has some flexibility, Michaud said. "Our objective is to articulate the governments needs and to establish the hard and soft boundaries in the trade space that industry can balance to meet the Navy's near term needs in support of the ASW Mission Package."

The USV will be used for sensor mission systems. The three ASW systems currently being considered for application from USVs are the Unmanned Dipping Sonar (UDS); the Umanned Towed Array System (UTAS); and the Multi-Static Off-Board Source (MS-OBS). "Up to four prototype USVs will be procured under this contract," Michaud said. "The program plans to award a contract in January 2006 for two ASW USV prototypes with an option for two additional units. The first two units will be required by March 2007. The option for two additional prototype units may be awarded by June 2006 for delivery by August 2007."

The Navy wants industry to focus on the platform and core control sensors and systems. The communication radio sets and host control stations will be government furnished equipment (GFE).

The LCS and ASW Mission System Integration requirements define the trade space. The Navy and industry will work together to identify requirements and best achieve the ASW mission capabilities, meeting or exceeding the requirements wherever possible. "We will provide industry trade space to meet the top level requirements," Michaud said. "We're seeking a low risk solution."

The top level requirements and Request for Proposals ("Technology developments leading to demonstrations of improved capabilities in unmanned ground, sea surface, underwater, and air robotic systems" - Announcement number N66001-04-X-6001) are available online:

https://e-commerce.spawar.navy.mil/command/02/acq/navhome.nsf/homepage?readform

"Innovative design in the trade space is required to balance USV requirements and LCS programmatic objectives within the available timeframe," said Chris. Hillenbrand, Unmanned Surface Vehicle Customer Advocate, USW Weapons and Vehicles Product Area.

According to program office officials, the LCS "sea frame" will be a major factor for mission module design. The mission packages must fit within the seaframe volume allocation. The davits must be able to lift the vehicles, and the systems must mate up to the standard interfaces. The communication links must utilize the VRC-99 radio to talk to the operator. "We want to open up the USV's design to the greatest extent possible while still being bound by the LCS sea frame and ASW mission system's requirements," Hillenbrand said.

Rising Cost for a Sinking Ship

The cost of a project to scuttle the aircraft carrier Oriskany 22.5 miles southeast of Pensacola Pass as the world's largest artificial reef project has escalated from $2.8 million to $12.73 million in just 12 months, according to a report from the Pensacola News Journal. The new reef is intended as a major draw for fishing and diving. A string of red-tape to sink the vessel, as well as the need to tow it to Texas to ride out the hurricane season, were cited as reasons for the cost escalation.

OTF to Search for Bonhomme Richard

One of the most memorable battles of the American Revolution took place off the coast of England on September 23, 1779 between the British ship Serapis and the Bonhomme Richard, captained by American naval hero John Paul Jones. Ultimately, he emerged victorious and took control of Serapis, and 36 hours later watched his own ship sink into the North Sea. The Ocean Technology Foundation (OTF) is spearheading an expedition in the summer of 2006 to search for the remains of the Bonhomme Richard. "Finding Jones's ship will vividly bring to life an inspiring chapter in America's past using ocean technologies that are vital to America's future," said Dr. Sylvia Earle, a member of OTF's Board of Directors. Project collaborators include the U.S. Naval Historical Center, the University of New Hampshire Center for Coastal Ocean Mapping/ Joint Hydrographic Center, the College of Exploration, and English Heritage, which advises the British government on the historic environment.

One of the search team members, Peter Reaveley, is considered an expert on the battle between Bonhomme Richard and H.M.S. Serapis. OTF has also created a computer model of the ship, which will simulate how it may have drifted after the battle. OTF and its partners will conduct surveys of the ocean floor using a magnetometer, which can detect large amounts of metal ballast underwater, and high-tech sonar systems that can identify anomalies on the ocean bottom. When found, the wreck of the Bonhomme Richard will be one of the most important archeological discoveries in U.S. Naval history.

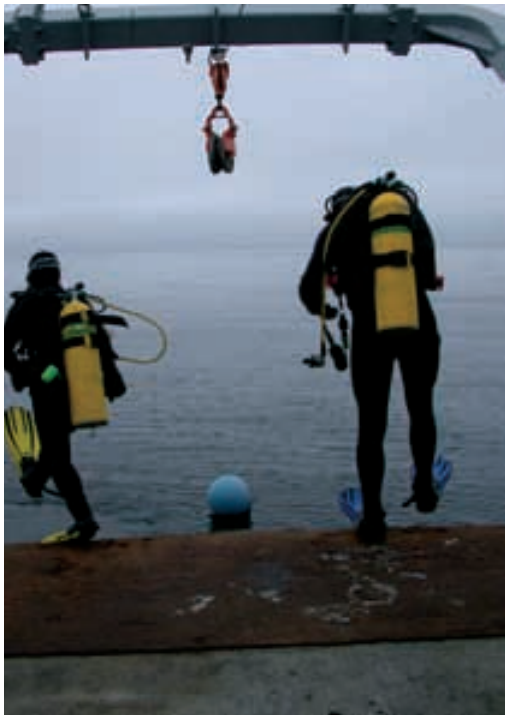
Loco for Microscopic Sea Life

Miniscule life forms such as phytoplankton, bacteria, and viruses sometimes converge into patches called "thin layers." The centimeter- to meter-thick layers have densities as great as 1,000 times that of the water around them and can have profound effects on the way light and sound move through the water. Little is known about them, and they are the latest oceanographic mystery being investigated by the Office of Naval Research.

A five-year, $9 million project dubbed LOCO, for "Layered Organization in the Coastal Ocean," is bringing together researchers from several universities and research institutions to answer the most basic questions about thin layers. Among them: Why, where, when, and how do they form and dissipate? Does the layering differ between nearshore and offshore environments? What are the biological and optical properties of the layers? Can we create models to predict their occurrence?

One of the AUVs that will swim through the water and thin layers in Monterey is REMUS, developed by Hydroid, Inc., with support from ONR. LIDAR (similar to radar but based on light scattering), bioacoustical instruments, and straight water sampling will also contribute to understanding thin layers.

Above:
Dr. Mark Stacey of the University of California Berkeley (right), Chris Ostrander, and Brian McLaughlin of the University of Hawaii (middle and left) deploy a bottom mounted acoustic Doppler current profiler (ADCP) in Monterey Bay, Calif., during project LOCO (Layered Organization in the Coastal Ocean), which is funded by the Office of Naval Research.
(Photo courtesy of Dr. Margaret McManus of the Univ. of Hawaii.)



RIght:
University of California Santa Cruz divers Craig Mueller (right) and Jared Figurski (left) participate in the LOCO (Layered Organization in the Coastal Ocean) project, which is sponsored by the Office of Naval Research.

LOCO brings together researchers from the Naval Air Warfare Center Aircraft Division Patuxent River, Md. (NAVAIR), University of California at Berkeley and at Santa Cruz, University of Hawaii, University of Massachusetts Dartmouth, University of Rhode Island, the Monterey Bay Aquarium Research Institute, Oregon State University, Woods Hole Oceanographic Institution, and BAE Systems.

$5B Pipeline Underway

German Chancellor Gerhard Schroeder and Russian President Vladimir Putin announced a $5 billion underwater pipeline that pumps natural gas from Siberia to Germany. The pipeline, nearly 745 miles long, will stretch under the Baltic Sea from the Russian port of Wyborg to Greifswald in northeastern Germany.

Russian energy giant Gazprom will ink the deal for the North European Gas Pipeline with German companies BASF, E.on and Wintershall.

Sub Returned to Royal Navy

A yellow submarine reeled in by island fishermen more than five months ago has been collected by the Royal Navy - along with a specially-bottled case of whisky to mark the occasion. HMS Blythe arrived at Islay off the west coast of Scotland to retrieve its remotely-operated vehicle (ROV). The 10 ft. (3 m)-long craft, which weighs 0.84 tons (850kg) and is used to detect mines, had become a major tourist attraction on the island. To commemorate the event, a local distillery has produced 12,000 bottles of Yellow Submarine whisky and presented a case to the captain of the minesweeper. The unmanned submarine was found by John Baker when he was fishing for lobsters in May, floating about three miles from the Mull of Oa. The vessel was kept on display in the garden of his brother-in-law Harold Hastie, who helped him bring it to dry land.

Subsea Contract Awarded

Aker Kvaerner Subsea won a $33.8 million contract for two subsea pump stations for use at the King field in the Gulf of Mexico. The installation will set a new world record by applying this technology in deep water and more than 29 km from the platform. The pump station system will be manufactured at Aker Kvaerner Subsea's facility in Tranby, Norway.

SERPENT Image Competition

Kongsberg Maritime extends its support of the SERPENT project by sponsoring, alongside BP, a flagship underwater image and video competition. The competition is seeking entries in five categories with the aim of showcasing the best biological and technical images taken in the deep sea.

The SERPENT (Scientific and Environmental ROV Partnership using Existing Industrial Technology) project was founded by Dr. Ian Hudson from the DeepSeas Group in the George Decon Division of the National Oceanography Center, Southampton (NOCS) and oil and gas industry partners. The project unites research establishments and oil and technology companies in a bid to increase our knowledge of the sea, by utilizing the spare time of ROVs (Remotely Operated Vehicles).

"With so little known about the deep ocean and so many ROVs, rigs and vessels engaged in oil and gas work worldwide the potential for getting data back to science from industry is huge," said Dr. Ian Hudson. "The competition will find the best of images to show the world the wonders of the deep."

The image competition is open to industry, scientists, support staff and professional photographers. The five categories consist of: Underwater Images (>200 m depth), Technical Underwater Images (>200 m depth), Microscopic/specimen images of deep-sea species or features, fieldwork/experimental set-up/vessels and vehicles/equipment and underwater video footage. Judging criteria includes visual impact, importance to science, the novelty, the rarity of the subject, but most of all the way the images capture the essence of the deep ocean and how we explore it today.

The competition results will be announced at the 11th International Deep-Sea Biology Symposium, to be held at the National Oceanography Centre, Southampton on July 9-14, 2006. Each category will have three cash prizes: 1st = $870 (£500), 2nd =$522 (£300) and 3rd = $348 (£200).

Sea SERPENTS

The Scientific and Environmental ROV Partnership using Existing Industrial Technology - or SERPENT - is a project where science is working with the oil industry to capture rare subsea species on film. Animals in the deep oceans are being filmed by robotic cameras and vehicles as oil companies go about the business of seeking new oil reserves or performing maintenance. The teaming is allowing scientists to vastly expand their capability to discover new species and document patterns. For more information, visit http://www.soc.soton.ac.uk/GDD/serpent

New Insights on Ocean's Crust

Scientists have produced images of the oceanic crust and found that its upper and lower layers are likely formed from different magma pools. Geophysicists Robert Detrick and Juan-Pablo Canales of Woods Hole Oceanographic Institution (WHOI) and colleagues used reflected seismic (sound) waves to image the structure of the lower crust across the flanks of the Juan de Fuca Ridge, analyzing about 1,500 km (935 miles) of data off the coast of Washington, Oregon and northern California. The study was funded by grants from the National Science Foundation.

Prospective R/V McArthur Transfer

Elliott Bay Design Group (EBDG) completed an analysis of repair, reconfiguration, operation, and maintenance costs for the inactive NOAA ship McArthur in support of a feasibility study prepared by SRI International of Menlo Park, Calif. Based on this study, the government is evaluating the scope and cost of a proposed transfer of the McArthur, a 175 ft. (53.3 m) survey vessel, to the Utrok Atoll Local Government (UALGOV) within the Republic of the Marshall Islands.

As part of the transfer, the government wants to be sure the vessel will meet its intended use and whether other opportunities exist that would make it economically viable, since the transportation mission is not expected to provide long-term economic support for its operation and maintenance. Under a grant from the government, SRI was selected by the UALGOV to conduct a feasibility study of the proposed transfer. Working with SRI, EBDG inspected the McArthur and developed an economic forecast of likely operation and maintenance costs. EBDG also calculated the capital costs to meet current regulatory requirements and to provide adequate officer and crew support during the transfer.

AMSI Raises Competition Issues with DEFRA, CEFAS

The Association of Marine Scientific Industries (AMSI) has been in discussion with DEFRA (Department for Environment, Food and Rural Affairs) and the leaders of CEFAS (The Centre for Environment Fisheries and Aquaculture Science) to raise issues of competition within the marine science and technology sector. In a recent meeting, AMSI representatives met with senior scientists and executives from Defra and CEFAS to raise concerns from some of its members about competition in the market place. In particular AMSI sought clarification that where government funded departments and agencies were competing for commercial contracts, they did so on a fair basis. Officials gave assurances that in the case of DEFRA and CEFAS, they operate their commercial activities according to Treasury rules utilizing a full economic costing model. Further, it was explained that CEFAS continued to seek 'commercialization' of its technology through the private sector to exploit their intellectual property and expertise. To this end, it was agreed that CEFAS and other DEFRA agencies would use AMSI as a communication channel to make industry more aware of their needs with a view to seeking stronger relationships with the private sector.

AMSI Chairman, Paul Ridout, said "I am pleased to have been able to raise these issues at such a high level within Defra. Our member companies possess many leading technologies much sought after in the global market place and their success is shared by all in the UK."

Safeguard Concludes SALVEX

USS Safeguard (ARS 50) completed the first Salvage Exercise (SALVEX) with the Indian Navy on September 24, after conducting 12 days of combined dive exercises off of India's western coast city of Cochin and its surrounding waters.

U.S. Navy divers worked closely with their Indian counterparts at SALVEX, a combined classroom and in-port training with at-sea dives and salvage exercises. In the course of two weeks, Safeguard crew members toured Indian training facilities, completed familiarization dives on Safeguard's dive system with Indian divers, conducted in-harbor salvage exercises and salvaged the wreckage of an Indian navy aircraft.

Safeguard (ARS 50) is a forward deployed rescue and salvage ship operating out of Sasebo, Japan, and is part of Task Force 76, the Navy's only forward-deployed amphibious force.

Joint Subsea Ops in Asia

Technip and Subsea 7 signed a MOU whereby their affiliates Technip Oceania and Subsea 7 Singapore will form a jointly operated company for subsea offshore activities in the Asia Pacific region (excluding India and Middle-East). Technip and Subsea 7 will bid for and carry out all EPCIM (engineering, procurement, construction, installation, commissioning and/or maintenance) contracts for the subsea production and transportation of oil and gas within the Asia Pacific region, including the supply of flexible pipe via the Technip/Subsea 7 joint venture.

Bluefin Wins BPAUV Contract

Bluefin Robotics won a $6.6m cost-plus-award-fee/cost-plus-fixed-fee contract for Battlespace Preparation Autonomous Undersea Vehicle (BPAUV) design and development. The BPAUV is a system capable of bottom-mapping and gathering other oceanographic data to support the Littoral Combat Ship Mine Warfare Mission Module. The BPAUV is intended as an autonomous unmanned system capable of meeting clandestine intelligence, surveillance, reconnaissance, and survey requirements. Work will be performed in Cambridge, Mass.

High Tech Aids Undersea "Looters"

Greece is embarked in a battle to thwart illegal discovery and recovery of an estimated 12,000 ancient shipwrecks and the potential archeological treasures they house in the Aegean and Mediterranean Seas. According to a report on www.boston.com, smugglers are increasingly emboldened to find these potential underseas riches, aided in large part by the plethora of advanced technologies that makes the task of finding such treasures easier. Many of the submerged gems off the Greek coast, which has the longest coastline in Europe, date back to the Golden Age of the fifth century BC. A local police source tasked with finding smugglers before they exit the country with the valuable goods said that some looters are coming to Greece and posing as wealthy tourists on yachts. In turn, the Greek government has been embarked on a plan to discover and protect ancient wrecks, which has resulted in 30 finds in the last five years.

New Ship Enhances Survey and Research Capacity

Marin Mätteknik AB fleet's latest ship investment has been completed. M/V Franklin came into ownership and will now be upgraded to a Swedish flagged top-modern, ocean survey and research vessel. The vessel was in Göteborg for upgrading work.

"It is indeed reassuring to finally close this business deal and it is yet another step in our expansive strategy. We will target larger shares of the world survey market than today and M/V Franklin is the perfect platform for launching high-resolution surveys in bathymetry, geophysics and environmental investigations in both our Scandinavian home waters and abroad on the seven seas" said Ola Oskarsson, CEO, Marin Mätteknik AB.

The ocean survey world market in 2004 was valued by Douglas Westwood Ltd. to $2.5 billion, a growth of $1.5 billion since 2000. According to the company, the trend continues in the near term, with a projected value of $2.8 billion in 2008. Shipriders AB manages the Marin Mätteknik AB ships.

"M/V Franklin gives us other possibilities to act ocean-wide than our smaller, littoral surveying vessels do today. Our survey vessel M/V Triad is with her current configuration exceptionally good within the depth interval of 5 - 500 m but, with the lesser size, has constraints to what is feasible due to weather, sea and endurance when sea borne. M/V Franklin is therefore a powerful and expansive addition to us and with her, the oceans are open to worldwide survey and research assignments," said Svante Johansson, CEO, Shipriders AB.

Main Particulars

Type	Oceanographical and Hydrographical Research Vessel
IMO No.	8301797
Propulsion	Wärtsilä 12V22MD diesel engine
Propeller	Lips BV CPP
Date of commission	March 1985
Length, o.a.	55.6 m
Length, b.p.	48.6 m
Breadth (Molded)	11.8 m
Draft	3.8 m
GRT	1,179
Net registered tons	353
Displacement	1218 mt

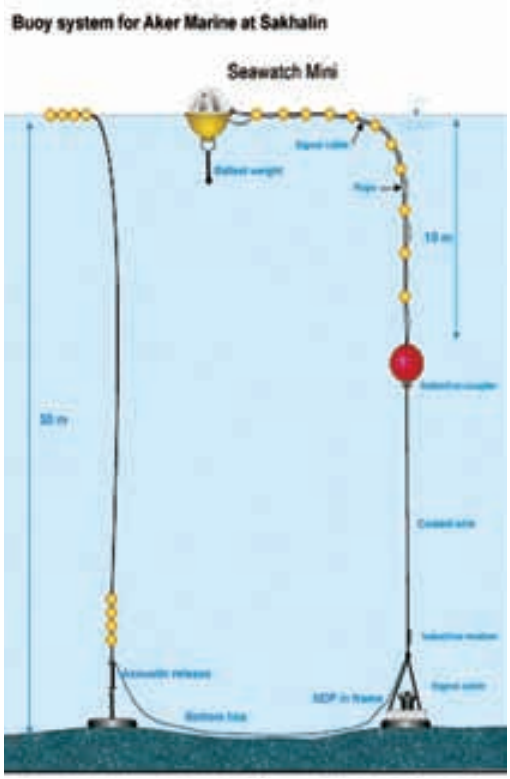
Sat Tech Helps Track Sharks

Electronic tags broadcasting from the dorsal fins of salmon sharks reveal that these top predators migrate from the glacial waters of Alaska to the warm seas off Hawaii, according to a new study in the journal Science. The salmon shark's ability to survive such a broad range of thermal conditions is attributed to high levels of specialized proteins that keep its heart muscle cells beating at very low temperatures, say the study's authors.

Sakhalin II Tow-Out Depends on Fugro Geos

Above: The tow out of concrete gravity base substructures (CGBS) for the Lunskoye A (LUN-A) and Piltun-Astokhskoye B (PA-B) platforms.

Right: The Seawatch mini buoy.



Fugro Global Environmental & Ocean Sciences (Fugro GEOS) played a role — providing real time information on weather, waves, current profile and water level — during the tow-out, positioning and installation of two concrete gravity base substructures (CGBS) for the Lunskoye A (LUN-A) and Piltun-Astokhskoye B (PA-B) platforms for the Sakhalin II Phase 2 Project for Aker Marine Contractors. This is thought to be the biggest single integrated oil and gas project ever undertaken.

Fugro GEOS' Weather Forecasting Division supplied senior meteorologists to provide real time weather information. They were based onshore for the tow from the port to the holding area and then accompanied the tow based on a support vessel. The Measurement Division was involved in measuring waves, current profile and water level during the tow-out and installation of the two gravity based platforms. Both were contracted to Aker Marine Contractors. "The most critical part of the meteorological operation was moving from the port to the holding area,"

said Hong Wang, Fugro GEOS weather forecaster. "The weather criteria was very low, less than 0.5 meter significant wave height and less than 10 knots of wind. The meteorologists' services were in heavy demand during this period as any unforeseen changes in the weather would need to be quickly and carefully managed. Once the structures were at the holding area the meteorologists joined a supply vessel to provide ongoing weather coverage for the tow and final positioning on site.

The Measurement Division had a five-month contract with Aker Marine Contractors to build up a complete understanding of waves, current profile and water level that could be expected during the tow-out and installation of the two CGBSs.

"The current profile and sea elevation were measured by a bottom mounted ADCP (Acoustic Doppler Current Profiler) and pressure sensor," said Jan-Petter Mathisen, the Fugro OCEANOR project manager responsible for this measurement contract. "During the towing operation the data were transmitted by means of an electrical cable to a Seawatch mini buoy, which measured wave directional parameters.

All data were then transmitted to one of the towing vessels by the Inmarsat satellite system and presented by our StationGuard software. The measurements were carried out at two locations at water depths of 30 and 50 m."

USCG Buys Underwater Port Security Robots

VideoRay won a Blanket Purchase Agreement (BPA) by the United States Coast Guard (USCG) in conjunction with its recent General Services Administration (GSA) Schedule award. The agreement expires in September, 2010, and involved a VideoRay Port Security configuration that has been deployed in nine Maritime Safety and Security Team (MSST) locations over the last two years. The task order includes training and maintenance services with each system, and at the completion of this task order all MSST units will be equipped with VideoRay systems.

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Drilling in Iran's Caspian Blocks

Three-dimensional seismological operations are underway at Iranian blocks in Caspian Sea in preparation for spudding two wells. Deputy minister of oil for Caspian Sea oil and gas affairs told Petroenergy Information Network that a bid is underway for choosing a foreign contractor with experience in working at deep waters, the results of which will be announced in two weeks. (Source: IranMania)

C-Surveyor II Works in GOM

C&C Technologies' second deepwater AUV, C-Surveyor II, began field operations in the Gulf of Mexico. Over a period of three months, C&C system engineers integrated proprietary hardware and software into this next generation AUV and mobilized it on its mother ship the R/V Northern Resolution. The C-Surveyor II AUV is modeled after C & C's existing AUV, C-Surveyor I.

NOAA to Convert Ship

NOAA awarded a contract for $13.4 million to Todd Pacific Shipyards Corporation of Seattle, Wash., to convert a former U.S. Navy surveillance vessel to a NOAA research ship that will explore the world's oceans. "This ship is the first in the NOAA fleet to be designated exclusively for ocean exploration, and the scientist-explorers who sail on her will add their observations to the world's body of knowledge about this largely unexplored frontier," said retired Navy Vice Admiral Conrad C. Lautenbacher Jr., Ph.D., under secretary of commerce for oceans and atmosphere and NOAA administrator. "Once its conversion is complete, the ship will be an important link in the Global Earth Observing System of Systems." Following the transfer of the USNS Capable to NOAA last September, the Navy also transferred $18 million of its appropriated operating funds in FY 2005. The funds will be applied to the conversion contract and a separate purchase of highly specialized onboard and shore side equipment to connect expeditions at sea in real time to teams of scientists, and to teachers and students ashore via satellite and high-speed Internet pathways.

Under the contract, Todd Pacific Shipyards will develop drawings and specifications incorporating NOAA's conversion items. Concurrently, the shipyard will overhaul all equipment on the ship that NOAA has identified for repair or upgrade. Other equipment will be opened up and inspected to determine if maintenance or repairs are needed. Once all conversion item requirements and costs are determined by the shipyard, NOAA will choose which items to authorize under the parameters of the contract.

The ship will be renamed Okeanos Explorer as a result of a nationwide NOAA ship-naming contest. The winning name was submitted by a team of students from Woodstock High School in Woodstock, Ill., and was one of nearly 400 entries received.

Following conversion, the ship will support NOAA's Office of Ocean Exploration on ocean expeditions to unknown and poorly known areas of the ocean. It will be equipped for ocean floor mapping, deployment of remotely operated vehicles, scientific work in onboard laboratories, and real-time transmission of images and data collected during ocean expeditions.

IODP Tahiti Sea Level Expedition

Scientists have set sail for the Integrated Ocean Drilling Program (IODP) Tahiti Sea Level Expedition, an expedition to investigate global sea level rise since the last glacial maximum, approximately 23,000 years ago. For six weeks aboard the DP Hunter off the coast of Tahiti, scientists will take samples of fossil corals from the ocean seafloor to analyze the environmental records. Scientists expect the reefs to yield records on changes in sea surface temperature and information on climatic anomalies.

Since the climax of the last ice age, global sea level has risen by about 393 ft. (120 m).

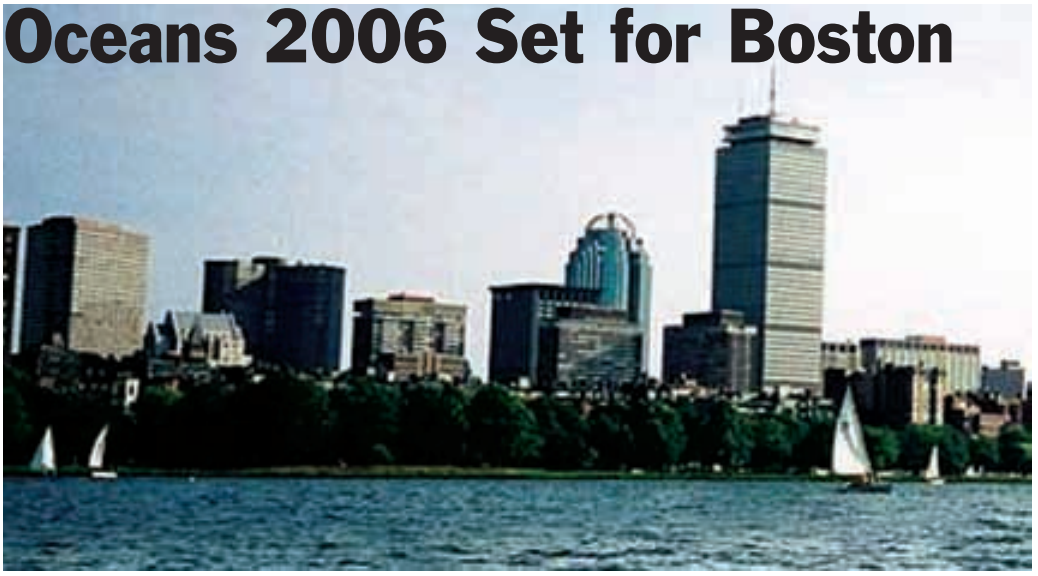
ESO, the ECORD (European Consortium for Ocean Research Drilling) Science Operator, is managing the Tahiti Sea Level Expedition on behalf of IODP.

J. Ray McDermott Wins Offshore LNG Contract

J. Ray McDermott, S.A. won a contract with Ras Laffan Liquefied Natural Gas Company Limited to provide engineering, procurement, construction and installation services for new facilities in Qatar's North Field, as part of the Phase 2 Offshore Expansion Project. Contracts of this type are typically valued at approximately $500 million.

The Phase 2 Expansion Project includes two LNG processing trains, and the development of offshore facilities to supply feed gas produced from the North Field to the onshore LNG Train 6, and subsequently Train 7. J. Ray will perform the engineering, procurement, construction and installation of two sets of topsides for the Train 6 remote unmanned wellhead platforms WH6 and WH8, weighing approximately 2,200 short tons each; the jackets of which J. Ray recently engineered and installed under the Phase I expansion project. The project also requires EPCI of two 38-in. wet-gas export trunklines and risers, approximately 62 miles long, from WH6 and WH8 to onshore receiving facilities. Two separate combined power and fiber optic subsea communications cables will be installed to connect the existing RasGas Alpha Complex to the two new platforms, WH6 and WH8. The cable length to WH6 will be approximately 16 miles and approximately 21 miles to WH8. J. Ray's work on Train 7 facilities initially will be limited to hook-up and mechanical completion of additional wells on existing live gas production platforms.

Oceans 2006 Set for Boston



The Oceans'06 MTS/IEEE North America Conference and Exhibition will be held in Boston, Massachusetts September 18-21, 2006. The birthplace of the American Revolution, Massachusetts and the surrounding New England region enjoy a centuries old relationship with the ocean. Nearby are the fishing and historic whaling ports of Gloucester, Nantucket and New Bedford as well as many world-class scientific and technology centers. Crisp autumn weather and many tourist sites and activities will make this conference an attraction for attendees and their families.

The technical program at this Oceans Conference will emphasize what's new and innovative in the field of marine science and technology. Scientists from all over the world will present the results of their work on topics such as: underwater acoustics, sonar signal processing, current measurements, seafloor mapping, deep ocean exploration and engineering, undersea vehicles, submarine cables and much more.

Technical Committee chair, Vince Premus of Lincoln Laboratory explained, "the Boston technical committee anticipates a great deal of interest in the fact that we are gathering experts from around the globe to discuss topics such as port security applications, Tsunami early warning systems; autonomous underwater vehicles and glider technologies; marine archeology; ocean observatories; marine mammal classification; Arctic ocean science; optical properties of water and non-acoustic imaging.

Over 200 companies and organizations are expected to showcase their equipment and their services. At the time of this notice, 68 companies had reserved space. The exhibit hall will be chock full of attendees from all over the globe. There will be frequent coffee breaks and hosted receptions throughout the duration of the show to ensure maximum traffic through the booth area. The organizing committee is casting a wide net to attract attendees from the many government, academic and commercial operations located within a short distance of Boston. "Both ocean technology and the excitement of Boston's attractions have progressed by leaps and bounds since Oceans was last hosted in this city," commented Dr. Stan Chamberlain, the General Chair Oceans Boston 1981.

"I know for a fact that coming to Boston will result in an extremely effective exchange of information about new marine science and technology discoveries. It's a great place to meet new and old colleagues as well as see what's new on the trade show floor. With over fifty educational institutions and government installations within earshot of Boston, one can really get an accurate snap shot of what's hot," said Mike Stewart, Exhibits Chair of M.J. Stewart Associates.

vessel profile

Second of Four FRVs Nears Completion

By Larry Pearson

Although VT Halter Marine, Pascagoula, Miss., received significant damage during Hurricane Katrina, the company continues on schedule to complete the second of four planned fisheries research vessels (FRVs) for the National Oceanographic and Atmospheric Administration (NOAA) by mid 2006. "Fortunately, the vessel was in the water when the hurricane hit us and we had it tied down well anticipating the strong winds we received," said Boyd E. "Butch" King, president and CEO, VT Halter. Halter lost many welding machines including its two NC cutters, and received structural damage to many buildings, including its main office, but the fisheries vessel Henry B. Bigelow had advanced its construction beyond the steel fabrication stage, so its schedule will slip very little according to shipyard officials.

Launched July 8, 2005, the $39 million, 208- by 49.2-ft. (63.4 x 15 m) vessel will be the second fisheries vessel in the planned series of four. The first ship in the series, Oscar Dyson, was christened May 28, 2005 in Kodiak, Alaska, where it will be home ported and will conduct extensive studies of the Alaskan Pollock as well as other fisheries research projects.

The vessel Henry B. Bigelow will support NOAAs mission to protect, restore, and manage coastal and ocean resources. Its primary objective will be to study, monitor and collect data on a wide range of sea life and ocean conditions, primarily in U.S. waters from Maine to North Carolina. The area includes Georges Bank one of the world's best known and most productive marine areas. The vessel is named after Henry B. Bigelow (1879-1967); a Harvard-educated zoologist whose work helped lay a scholarly foundation for oceanography as a scientific discipline. Bigelow was an internationally known expert on the Gulf of Maine and in its sea life. He served on the faculty of Harvard University for 62 years.

Henry B. Bigelow — the ship — has been designed for a wide range of fisheries research with capabilities for midwater trawling, bottom trawling, hydroacoustic surveys and oceanographic and hydrographic operations.

Capabilities also include handling specialized gear such as MOCNESS frames (Multiple Net System with one square meter net opening when frame is towed at 45 degrees), floating and moored buoys,

Henry B. Bigelow under construction on land at a VT Halter shipyard.

towed vehicles, dredges and bottom corers.

All fluid discharges are on the port side of the ship to avoid contamination of sampling devices deployed from the starboard side.

The vessel will feature a dynamic positioning system to ensure trackline, course speed and heading are maintained during operations. The engine room is designed for unmanned operation and centralized controls for fishing systems, ship speed and maneuvering are provided by the Aft Control Station on the bridge.

Additional controls for speed and maneuvering are located at the main bridge console and on two wing stations. Local controls are provided for each winch and lifting device. The Aft Control Station is located to give the operator maximum visibility of the working deck. Closed circuit TV systems give the operators a view of below-deck winches and other areas of the main deck.

A unique centerboard (drop keel) is provided so sensitive scientific transducers can be lowered away from the ship out of the region of hull-generated noise. Noise control is a key design feature of the ship. Underwater-radiated noise influences fish behavior and sonar self-noise can limit the effectiveness of hydroacoustic surveys and

Heavy Lifter

Rapp Hydema was selected by VT Halter Marine in May 2005 to supply the deck machinery for the third of its NOAA FRV-class vessels. Rapp provided hydrographic, oceanographic, traction, CTD, and trawl winches for the first vessel, the Oscar Dyson, and is presently working on installing same package for the second vessel, the Henry B. Bigelow. Additionally, Rapp supplied its PTS Pentagon computerized winch control system, which provides sophisticated auto-tension and another features. Rapp has acted as single-system vendor (SSV) for most electronics integration from deck to wheelhouse. Deck machinery underwent very rigorous shock and vibration testing, among other qualification measures, to meet NOAA's high standards prior to installation.

Visit www.maritimeequipment.com/mt & Click No. 25

With the Henry B. Bigelow launched, the 208-ft. vessel was moved to a fitting out pier where hundreds of systems will be installed before the vessel is sent on sea trials and officially accepted by NOAA.

other functions.

The International Council for Exploration of the Seas (ICES) has established a standard for ships' underwater radiated noise and the Henry B. Bigelow meets this noise standard by utilizing specially constructed and balanced propulsion motors and mounting diesel generators on double isolated raft systems.

The hull form and a highly skewed five-blade propeller were carefully designed and tested and pumps, ventilation systems and piping systems were designed for low noise.

The Henry B. Bigelow basically utilizes a diesel electric propulsion system. A pair of 1,542 hp electric motors are mounted on a common shaft driving a 4.3 m propeller.

There is also a 966 hp AC induction azimuthing bowthruster also driven by an electric motor. Power for the motors come from a pair of 1,360 kW generators and a 910 kW diesel generator. Generators are by Caterpillar.

The Henry B. Bigelow can reached a sustained speed of 14 knots and has a range of 12,000 nm and an endurance of 40 days.

Crew complement includes four commissioned officers, three licensed engineers and 12 other crewmembers. The vessel can carry a maximum of 19 scientists. Total bunks are 38.

Most of the main deck is reserved for mission functions. The aft working deck has 1,560 sq. ft. of open space for fishing and other over-the-side operations with an additional 335 sq. ft. of deck space at the Side Sampling Station. Space and support connections are provided for a laboratory van on the aft working deck.

There are seven laboratories on the main deck utilized by scientific personnel. In addition there are electronics, machine and bos'n shops to support the vessel by repairing and occasionally modifying scientific sampling equipment at sea.

Henry B. Bigelow is a stern trawler capable of working in water depths of 1,000 fathoms. A split drum net reel is located over the forward end of the trawl way, which can stow two nets. Many features common to commercial trawlers such as Gilson and outhaul winches and a net sonde winch are included in the design.

Each of the two trawl winches can deploy 13,120 ft. of 1.2-in. diameter trawl wire. Each winch generates up to 35 metric tons of line pull. Smaller sampling nets and towed fishing gear can be launched over the stern, over the side of the working deck or from the starboard side-sampling station. Longlining and other types of fishing can also be conducted.

The vessel mounts two extendable boom cranes, one articulated and one telescoping servicing the working deck. Each crane can lift 8,000 lbs and can be used to lift the cod

end of the trawl net to dump the catch on the sorting table. Once onboard the net contents are brought into the fish laboratory for sorting, weighing, length measurements and sex and age characteristics for selected samples.

Wireless and hardwired systems are used to monitor the shape of the trawl net during fishing operations. The systems work with an autotrawl system that sets trawl depth and trawl wire tension.

Modern fishing management relies heavily on sonar systems. The most critical system on the Henry B. Bigelow is the Scientific Sonar System, which can accurately measure the biomass of fish in the survey area. The Scientific Sonar System is the primary tool for selected pelagic (off-bottom) fish with trawling used as a means to verify species composition of observed fish schools and to obtain biological information. Not only can the Henry B. Bigelow conduct fishing operations, it is fully rigged to support oceanographic and hydrographic missions. It can deploy and recover floating and bottom-moored sensors. Surface buoys up to eight ft. in diameter can be handled through hinged doors on each side of the working deck.

Water temperature, conductivity and fluorescence can be measured as a function of depth using the winches and a CTD system. Local water currents are measured with an Acoustic Doppler Current Profiler while a multi-beam sonar system provides information on the content of the water column and on the topography of the seafloor while underway.

A traction-type oceanographic winch can deploy up to 16,400 ft. of wire up to .68 in. in diameter. It is located below the main deck and configured to support operations with the large hydraulically operated stern gantry. Up to 13 metric tons of line pull can be generated by this winch.

Two hydrographic winches serve the Side Sampling Station via the side A-frame. Each winch can deploy 11,480 ft. of .375-in. electromechanical wire. The A-frame is configured so that up to three scientific packages can be rigged for sequential operations.

Henry B. Bigelow: "Father" of Oceanography

Henry B. Bigelow

Henry Bryant Bigelow, born in 1879, developed an early passion for nature, sailing and fishing that would ultimately lead to the foundation of modern oceanography. Raised on the Massachusetts coast, Bigelow enrolled at Harvard in 1897 and graduated cum laude in 1901. In 1921, Bigelow joined Harvard's faculty as Associate Professor of Zoology. In 1927, Bigelow was asked to prepare a scientific paper for the US National Academy of Sciences' Committee on Oceanography to address "...whether the United States was contributing as broadly as was desirable to the study of the oceans and if not, what should be done to improve the situation." His work on this project persuaded the Committee that more needed to be done in the field of oceanography, which led to the establishment of the Woods Hole Oceanographic Institution (WHOI); incorporated in 1930. Bigelow served as its first Director from 1930 to 1939, and his report, titled Oceanography: Its Scope, Problems, and Economic Importance, was published in 1931. Upon his retirement as director in 1939, he was a member on the Board of Trustees and, in 1960, was named Founder Chairman of the Board in recognition of his achievements there. Additionally, in 1961, the Institution established the Henry Bryant Bigelow Medal in his honor, of which he was the first recipient. Bigelow remained a member of the Harvard faculty during his time at WHOI and after; teaching for a total of 62 years. In jest, he remarked that the university owed him a bottle of whiskey for his loyal service; to his surprise, upon his retirement, he was presented with such a gift, "compliments of the President and Fellows." His autobiography notes that he is the only one to ever have been presented a bottle of whiskey on behalf of Harvard University. Bigelow died on December 11, 1967, at the age of 89. His last papers were published following his death, in 1968.

Subsea Clean-up Begins in

Hurricanes

By Maggie L. Merrill

When the subject "Seafloor Engineering" was conceived as the primary editorial topic of MTR's November edition many months ago, little did we know that a trio of powerful hurricanes would wreak havoc in the Gulf of Mexico, both above and below the Gulf's waters. Though we are now more than two months removed from the first and the worst, Hurricane Katrina (pictured: NOAA Photo), we find obtaining primary sources for reports on the damage and recovery of offshore oil rigs and underwater moorings and pipelines difficult. Companies are often remiss to divulge full damage details, in fear of market or competitive repercussions. In addition, the owners of the rigs, operators of the survey and salvage boats and government agencies are all working overtime to return systems to full speed. Assistant Secretary for Land and Minerals Management Rebecca Watson testified before the Senate Energy and Natural Resources Committee in Washington, D.C., in early September regarding the status of offshore oil and natural gas production in the Gulf of Mexico.

Wake

"Our focus now is to ensure that the offshore oil and gas operations are brought on-line safely and as soon as possible," said Watson. "Although Hurricane Katrina (and Rita and Wilma) moved through a core area of offshore operations and damaged many production and exploration facilities, early reports indicate that the vast majority of facilities could be ready to come back on line in days and weeks, rather than months."

Oil and gas production in the Gulf of Mexico supplies 29 percent of domestic oil production and 21 percent of domestic gas production. At its peak on August 30, 2005, 95 percent of daily oil production and 88 percent of daily gas production was shut in for environmental and human safety. Those percentages have fluctuated greatly during the approach and damage assessments of each storm as it passes through the Gulf of Mexico.

Several of the companies contacted, specifically Science Applications International Corporation (SAIC), Oceaneering, C & C Technologies and Fugro Geoservices are providing inspection, survey, assessment and recovery services directly to the offshore oil and gas business. They, as well as many other survey companies, have been on the scene since early September and expect to be there through the winter. These companies were working full-time to obtaining damage assessments for the owners and operators of the rigs, and were not at liberty to discuss specific details.

All companies contacted were fully committed, with 100 percent of assets and personnel in the field, with a backlog of work awaiting their return. It is clear, there is plenty of steady work for those who conduct surveys using multi-beam bathymetry, side scan sonar, remotely operated vehicles (ROVs) and salvage of sunken and or beached boats and in some cases oil rigs. According to one company, " the offshore work is high volume because we are working 24 hours a day seven days a week." The companies who had dive boats; survey boats and special salvage equipment were hired immediately, reaping the financial benefit of the massive destruction in the Gulf of Mexico.

Pipeline inspections using remotely operated vehicles as well as autonomous underwater vehicles have been in big demand. Preliminary results indicate that there was less pipeline movement and tangling caused by hurricanes Katrina and Rita, as compared with hurricane Ivan last fall. Initial pipeline inspections have revealed damage, but generally damage and displacement was better than expected.

Pipelines can be shut in and turned back on fairly quickly. Many were shut in immediately before and after the storms came through. According the MMS, there have been no spills reported. Much of the shut in issues are centered on the wait for shoreside refineries to become operational. As they come on line, the pipelines will be turned on.

Rigs and pipelines broke free of huge moorings and drifted from one to 120 miles off their locations. Several came ashore near the Mississippi River.

MMS has reported significant damage and displacement of several platforms. Of the roughly 4,000 Outer

You can't fool Mother Nature, and you cannot engineer structures to always withstand her full wrath, as evidenced by these "before" and "after" photos of the the Mars Tension Leg Platform.

Continental Shelf production facilities, 37 shallow water platforms were destroyed; however, they only produced about one percent of total Gulf production.

Four large deepwater platforms suffered extensive damage that could take up to three to six months to bring back on line. Six rigs were reported adrift after Katrina. The Rowan-New Orleans rig capsized off the Louisiana coast. The Diamond Offshore-Ocean Voyager took a voyage on its own, as it broke its moorings and drifted nine miles north. The Noble-Jim Thompson drifted 17 miles northeast. The Transocean-Deepwater Nautilus was secured by company personnel 80 miles off its location. The Glomar Arctic-1 had eight 26,500 lb anchors, each with 5,100 ft. of three-in. chain.

This rig/platform broke free and beached near the mouth of the Mississippi River.

Charbonneau Flies to DMR's Rescue

Bill Charbonneau, of Benthos, Inc. of N. Falmouth, Mass., was called by one of his key Gulf Coast clients to help repair the C3D Side Scan Bathymetric control and display system. The system was sitting on the lab bench at the Mississippi Department of Marine Resources (DMR) facility in Gulf Port, Miss., when Katrina hit. All staff had to evacuate leaving the topside unit to become flooded in over eight ft. of water that infiltrated the entire lab. Charbonneau gathered up the necessary equipment that included a topside processor and interface module and personally delivered it to Gulfport.

Charbonneau arrived at the Gulfport airport; the second flight after reopening of the airport on Thursday September 8. He was picked up at the airport by the customer in one of the few remaining vehicles at the DMR facility, and he said the devastation was complete. At Oceans 2005, Charbonneau showed photos of his old haunts that included several casinos as well as the Naval Oceanographic Office's Boat Operations building. Those docks were completely destroyed and the building was gutted. Obviously everything inside was also ruined.

Once on site and with everything hooked up, Charbonneau accompanied his client to conduct surveys in the Gulfport Harbor area. They were looking for objects that may pose a hazard to navigation. Among the debris located, shipping containers were found which had fallen into the harbor from the local commercial shipping piers. They were able to identify objects and mark them for others to visually inspect with remotely operated cameras or divers. DMR, whose main objective is marine fisheries, was called into service due to their highly sophisticated survey equipment and the availability of their survey vessel. DMR used the same dock as scientists from the completely demolished Gulf Port Aquarium. The marine mammal rescue team was going out into the bay to check on the eight dolphins that escaped from the Aquarium during Hurricane Katrina The team asked the DMR to survey the area to find a good spot to place the capture net. In just an hour the bottom was surveyed, all depths were known and a better place for the net was identified. This made it easier to feed, treat and monitor these mammals. — *Maggie L. Merrill*

The National Ocean Service dock facility in Gulfport, Miss., completely ruined after Hurricane Katrina (photo courtesy Bill Charbonneau/Benthos, Inc.)

Mississippi Department of Marine Resources survey boat preparing to do survey after Hurricane Katrina. (photo courtesy Bill Charbonneau/Benthos, Inc.)

NRT's Step in to Assess Damage

NRT working in New Orleans with Jacson Square in Background.

Hurricane Katrina barreled into the mouth of the Mississippi on Sunday Sept. 4-5, 2005, bringing with it a tremendous underwater force that caused major damage to the shipping channels. Many ships and structures were damaged during the storm and some of the bridges and waterways within the mouth of the Mississippi were blocked. The USCG closed the port to commercial shipping traffic, a significant event when one considers that 95 percent of overseas trade goods pass through American ports each year, and the Port of New Orleans is the fifth largest U.S. port.

To determine the safety of the waterways, the USCG contacted the Emergency Response Team of NOAA's National Ocean Service to come to MS to survey the channels. "It requires an immense coordination between the various divisions of NOAA, the U.S. Army Corps of Engineers, U.S. Coast Guard, Navy, local port authorities, state officials and our assets on site to ensure that all critical waterways are clear," said Captain Roger Parsons, NOAA Corps, who is director of NOAA's Office of Coast Survey.

NOAA's teams worked around the clock to help restore safe navigation channels. "The currents of the Mississippi River are so rapid that obstructions that are identified are sometimes washed away before they can be removed, requiring the Navigation Response Teams to go back and resurvey," said Parsons.

Three days before Katrina hit, NOAA dispatched four of its trailerable NRTs Navigation Response Teams to the Gulf area in preparation for the storm's aftermath. The NRTs are 30 ft. boats manned by three persons, equipped with side scan sonar to survey waterways for underwater hazards to vessels. When sonar detects an obstruction on the sea bottom, divers determine what it is. Sonar also provides exact water depth over the obstruction. These boats are used for the close to shore and inner harbor work and the larger NOAA ships, Nancy Foster and Thomas Jefferson were deployed to conduct survey work offshore.

Waterways must be surveyed and cleared before oil tankers, cargo ships, and other vessels can safely transit the area. In recent years, ships have gotten longer, wider and deeper, and determining precise water depths is imperative

for safe navigation. Hurricanes can play havoc with the sea bottom, rendering the depths and obstructions on nautical charts obsolete.

These findings are reported to the Coast Guard, which has authority to open and close waterways, mark shipping channels with aids to navigation (buoys), and send out its daily Report to Mariners that publishes changes to nautical charts.

The Army Corps of Engineers, which is responsible for dredging the Mississippi River and port areas to maintain safe depths, is responsible for removing the obstructions NOAA finds.

The U.S. Navy also dispatches salvage ships and divers to the area to aid in removal of wrecks, and check out

obstructions in the extremely polluted waters.

NOAA's Office of Coast Survey is maintaining a Web site with current information relating to post-Katrina surveys, including areas of operation and findings. Please see: http://chartmaker.ncd.noaa.gov/nsd/katrina.htm.

— Maggie L. Merrill

Behind Every Sonar Track: Great Sonar Data Processor

NOAA's Office of Coast Survey Development Lab, Hydrographic Systems and Technology Program technician, Steve Brodet and his team were dispatched to assess the ability of NOAA's closest offshore research vessel, the 180-ft. Nancy Foster to be retrofitted to conduct high resolution bottom bathymetry of key shipping channels and approaches to Mobile Bay right after Hurricane Katrina hit. Ms. Shyla Allen was the lead hydrographer for the team, which also included Michael Annis and Eric Moore.

Steve Brodet and Rob Downs, both of NOAA's Office of Coast Survey in Silver Spring, Maryland at Oceans 2005 in Washington DC

Nancy Foster was on station and ready for surveying on Saturday September 10. The crew installed a RESON 8124 MultiBeam sonar on pole mounted over the side of the ship and conducted multi beam surveys of the approaches to Mobile Bay starting at the MOA buoy off the bay. One feature they did observe was the shifting of a sand bar that resulted in soundings that were 46 ft. prior to the storm and had shoaled up to 42 ft. afterward. The Triton ISIS software system was used to acquire the data from the RESON unit. To correct for the sonar's positioning, an Applanix vessel position motion sensor was installed. The team also used the CARIS HIPS system to evaluate the raw data to determine the difference between actual bottom features and stray acoustic shadowing. All the data that resulted was put into a Digital Terrain Model, which compares new soundings with old ones. The final data is used to update hydrographic charts, which in turn was used immediately by the USCG to determine the status of the main shipping channel.

Most of the time in standard hydrographic surveys, side scan sonar is also used to provide a larger scale picture of the bottom. In this case, the Klein 3000 towed fish was installed and ready for use, by it was not used on this particular mission.

USGS
Stepping Up to Assess Damage

When Hurricane Katrina hit the mouth of the Mississippi near New Orleans, the United States Geological Survey (USGS) was asked to assess the damage to the barrier islands; the wetlands and the bird foot delta (mouth of the Mississippi). What USGS saw was remarkable and can be seen in the before and after shots shown on the opposite page.

The USGS used LIDAR Mapping data supplied by NASA as well as aerial videos taken from the LIDAR aircraft. The information showed the decimation of the Chandelier Islands, located immediately east of the delta. "We can define the health and stability of a barrier island by its length, width and height, and volume of sand comprising the barriers. Before Katrina hit, the islands were in excellent health. Now they are about gone. The big question now is: what can be expected in terms of these islands re-forming. Will all the sand migrate back as has been seen in the past, or was the intensity of Katrina such that the sand has gone elsewhere for ever," said Jeff Williams, Sr. scientist, USGS, Woods Hole, Mass.

The USGS Coastal and Marine Geology team studies how the coast has evolved over time. The organization looks at barrier islands, beaches, rivers, lakes and wetlands and they make maps, lots of maps. USGS constantly updates its coastal and offshore atlas via annual surveys. The USGS is constantly surveying the coastlines of the U.S. Its mapping is part of a national research program to better understand changes to areas of the coast that are most vulnerable to storm damage and sea-level rise. Thus, USGS, has a huge database of coastal features around the U.S., including all along the Florida, Georgia, Louisiana, Alabama, Texas coast lines in the Gulf of Mexico.

The USGS has been studying the degradation of the mouth of the Mississippi and the barrier islands and wetlands that protect New Orleans for more than 20 years. It is a fact that New Orleans is sinking and sea level is rising. Coupled with two 100-year storms such as Katrina and Rita, the devastation we now see is not surprising. According to Williams relative sea level is increasing at about one meter/100 years. At the same time the city of New Orleans and its surrounding area is subsiding (sinking). The reason for the subsidence is due to a combination of natural and man-made causes, such as 200 years of water being pumped out from under the city to keep daily

(L-R) Tom O'Brien, technical operations manager; Chris Polloni, Image Processing Director; S. Jeffress Williams, Sr. marine scientist, all of the Coastal and Marine Geology Program at the USGS science center located on the Quissett Campus of the Woods Hole Oceanographic Institution.

flooding at bay and because of the gradual impact of all the oil and gas being pumped out from under the wetlands and barrier islands.

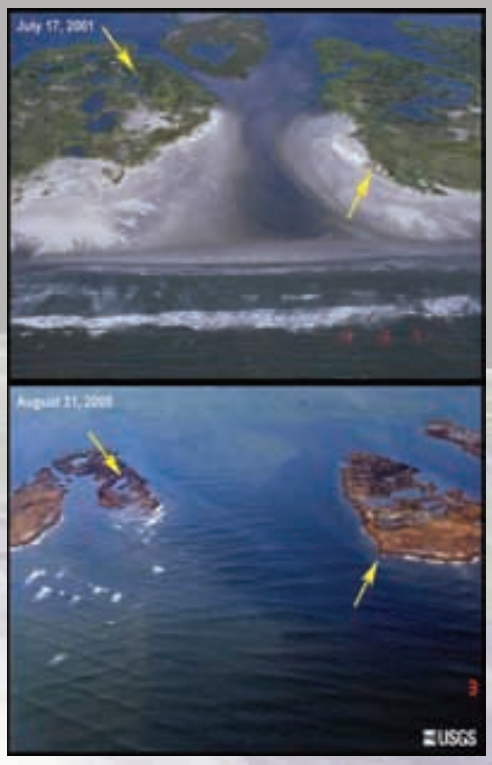
Basically, the land on which New Orleans and its surrounding communities sits is like a big sponge that has had the moisture and air squeezed or sucked out of it, leaving it compacted. USGS and Army Corps of Engineers data show that 80 percent of the area's "sinking" is due to subsidence from natural compaction as well as oil removal and 20 percent is due to global sea level rise. According to USGS documents, sea level has been increasing for the past 20,000 years due to glaciers melting and the oceans warming. Lately it has, however increased due to warmer ocean water temperature. Warmer water expands and takes up more room, hence sea levels rise.

Williams and his colleagues have a huge data base and know a great deal about the geologic history and evolution of the delta plain, New Orleans and the surrounding marshes and barrier islands. Now they want to update that and re-survey the entire region and compare the after Katrina and Rita storm data to prior to the storms. With that information they will be able to provide accurate information about where rebuilding would be most suc-

cessful. USGS has submitted a proposal to the U.S. Department of Interior to do near and long term mapping and research to provide scientific information on the affect of major storms on barrier islands, wetlands and offshore sea floor features. The resulting information will assist with predicting the impact of storms on other coastal cities at risk to storms and sea-level rise such as New York, Galveston, Norfolk and Miami, for instance. USGS in Woods Hole will collaborate with all other branches of the Geological Survey including St. Petersburg, Fla., and Lafayette, La., as well as other partner federal and state agencies. It is possible that conducting this type of work may fall into a "pure science" category. It may be a tough sell when competing with other more pressing budget allocations such as storm relief, department of defense spending, or social security, for example. But one must ask: can we afford not to do this work while we see these storms increasing in frequency and intensity? Given the severity and frequency of hurricanes in the last two years; Ivan, Dennis, Katrina and Rita does this portend an ominous trend for the future? "Probably, but not necessarily" says Williams, " I will feel better about blaming these storms on global warming after two or three more years of storms of their power." There is no doubt that the ocean is warmer and the rate of sea level rise has increased in the past 20 years. There is no doubt that sea level has risen and the sea surface temperature has increased at about the same rate as green house gasses are being emitted into the atmosphere. Water is experiencing thermal expansion and many of the glaciers are melting at a frightening rate. But, says Williams we are also about 10 years into a period of increased storm activity that seems to be part of a 30-year natural cycle, and not related to climate warming.

Technologies Used

United State Geological Survey is quite efficient in how they go about obtaining the information needed to understand the changes occurring to various parts of the US coast. USGS works closely with NOAA and the U.S. Army Corps of Engineers. When the USGS needs oceanographic data, it often uses "vessels of opportunity" to obtain this information. In some cases the USGS uses its own research vessel, the RV Gilbert, a 50-ft. boat that operates out of St. Petersburg, Fla.. Mostly, USGS leases private survey boats or piggy back with NOAA and combine surveys done by the National Ocean Service. To create an overview of the sea floor, SWATH Bathymetry is used. This is a sonar transmitter which employs a single transmit array and multiple receiver arrays that projects and acoustic impulse that spreads like a fan to the sea floor. The reflected backscatter is sensed by the multiple receivers and displayed as side scan sonar and bathymetry data on the surface vessel. The systems used by the USGS for the after Katrina work were built by SEA, Ltd. of Bath, England. In addition to the SWATH and Side Scan, CHIRP technology is used to provide even more detailed information about the bottom compositions. Edgetech 512 I Chirp system at 500 - 12,000 hertz and the Edgetech 424 4000 - 24000 hertz are the CHIRPS of choice for this part of the USGS.



Before and After Photo Comparisons: Chandeleur Islands

The Chandeleur Islands are a north-south oriented chain of low-lying islands located approximately 100 km east of the city of New Orleans, La. Above, photo pairs reveal the nearly complete destruction of the islands in recent hurricane seasons. The first image in each pair was taken in July 2001, before Hurricanes Lili (2002), Ivan (2004), Dennis (2005), and Katrina (2005, the strongest and closest in proximity to the Chandeleurs). The second image was taken on August 31, 2005, two days after Hurricane Katrina made landfall on the Louisiana and Mississippi coastline.

The first image, taken in July 2001, shows narrow sandy beaches and adjacent overwash sandflats, low vegetated dunes, and backbarrier marshes broken by ponds and channels. The second image shows the same location on August 31, 2005, two days after Hurricane Katrina made landfall on the Louisiana and Mississippi coastline. Storm surge and large waves from Hurricane Katrina submerged the islands, stripped sand from the beaches, and eroded large sections of the marsh. Today, few recognizable landforms are left on the Chandeleur Island chain.

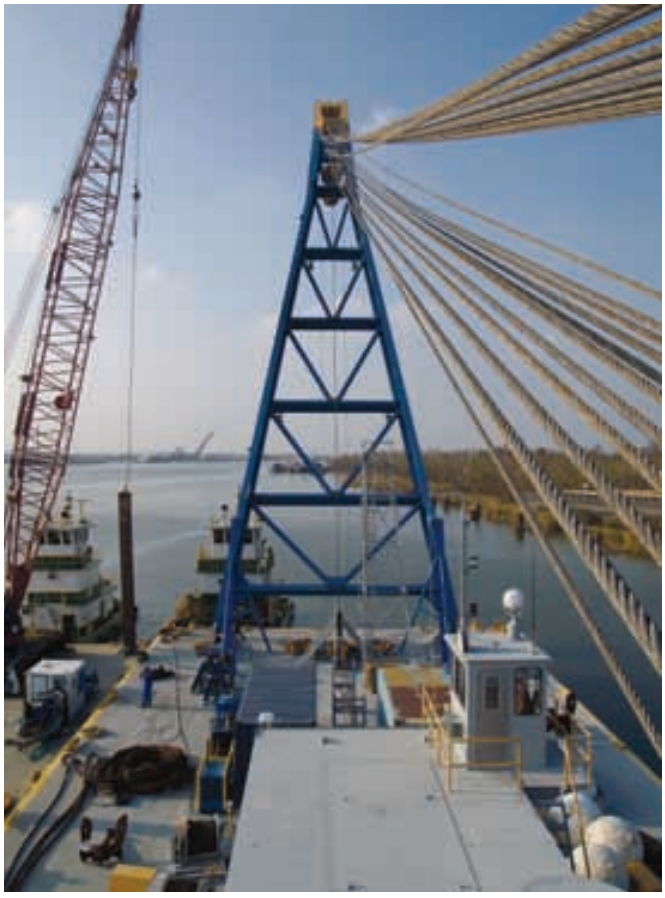
Salvage takes

Center Stage

Story and photos by Don Sutherland

Houses were in the water, and boats were on the land. They were up on the levees, out on the highways, deep in the woods - towboats, barges, shrimpers, sometimes behind tall trees that looked too thick to bend out of the way. How, in the name of Mother Nature, did they get in there? How would they get out? How would they all get out? It was a spectacle for the first few minutes as the helicopter sped past, with rooftops poking through waters and motorboats, upside down, drifting through onetime back yards. But as the helicopter continued south, the spectacle became more like a sideshow, something to gawk at, like an accident at the side of the road -- a battered church here, a pile of school buses there, cars that might have been new weeks before - all in the water, up to the sills and higher. The panorama was unbroken, continuous, contiguous, blending waters here blue, there brown, some smeared in dark rainbow hues, punctuated by flotsam pressed against the stands of trees, the shoulders of highways.

The helicopter sped over the littered, lifeless landscape for twenty minutes, thirty, after a short stop at New Orleans for fuel. "Who had the big idea of putting headquarters in Alexandria?" said Rudy Teichman, the founder of T&T Marine Salvage of Galveston, Texas. He had parts to deliver, a small box for something aboard the Big-T, the company's 600-ton crane barge that arrived in position a few days before. The drive by car would have been four hours or more -- from Alexandria, to Lafayette, to Baton Rouge, to New Orleans, to Belle Chasse, to Venice where the crane was - if the roads were open. Information was still spotty that 18th of September, within three weeks of Katrina's hit, but it was a safe bet there were closures east and south of Baton Rouge. The helicopter sped past bits and pieces, the roof of a house on one side of a bridge, a wall with a doorway on another, ongoing for forty minutes, fifty.



View from atop the Big T, T&T Marine's 600-ton floating crane, taken in Venice, La.

Port Sulphur, Buras, they were down there somewhere, or at least the memory of them was. They were part of the territory in Katrina's eye when she came ashore. Near Empire was the icon of the storm for southern Louisiana, two large yellow boats, 160-footers, high

and dry with their keels on the divider of La. 23. Nearby, a stack four or six deep, of shrimpers of all sizes, outriggers broken and tangled. Everywhere, in ones and twos, a quarter or half mile inland from the Mississippi, lay the large steel shrimpers, some standing upright, some on their sides.

"You think this is bad?" said Teichman. "Wait till you see Empire. We can't fit the Big-T through on the Mississippi side, so we'll have to come in from the Gulf side, past the bays and bayous. That's the long way around. I'd hate to get stuck in there during hurricane season."

Teichman and the pilot, down for the duration from Alaska, discussed places to land at Venice, whose littered terrain looked treacherous. A small open patch along a short channel looked like it would work, across from an enormous crane barge - Southern Hercules was the name on the stern -- with half to three-quarters of its length driven up on the shore. At on the opposite shore was the Big-T and its entourage of tugs and small workboats. The Big Boomer, all foredeck and fenders, sped Mr. Teichman and the box of parts to the Big-T. Updates were exchanged, a few instructions given, then the helicopter rose for the return to Alexandria before the sun disappeared. It was early in a salvage operation of exceptional scale, but some of its patterns were already clear. Nothing would be easy. Nothing would be quick. There was much to learn.

T&T crew helps preparations for a look at a hang-up underwater.

Incident Command Alexandria

Whosever idea it was, Alexandria had its attractions from a logistical point of view. Foremost, perhaps, was the airport - a regional setup in scope, but accustomed to mid-size commercial jets and, unlike New Orleans, mostly intact. "We'd like to welcome and thank the relief workers who've joined us," came the voice from the cockpit in a flight out of Atlanta, although there was only one white vest with a red cross aboard, "emergency relief" printed beneath.

Alexandria was far enough north for the worst of the storm to miss, most of the locals describing a hosing and high winds. But then came the flood of humanity from New Orleans and south, and active Coast Guard and reservists, and Navy personnel, and people from the Corps of Engineers and NOAA, and VPs and presidents of salvage operators working through the ASA (American Salvage Association). "The Louisiana Convention Center?" said an officer in an Alexandria P.D. prowler, "make a right on MacArthur, it's almost straight across from the motel, used to be a Day's Inn, don't know what they call it now ... "

Including its access or frontage roads, MacArthur Drive is an eight-lane thoroughfare, with US. 71 AND US 165 combined for a link to I-95, thence I-10, the road to New Orleans and beyond - places like Gulfport, Stennis and Pascagoula in Mississippi, and points south in Alabama. Considering the range of destruction, Alexandria among towns unscarred must have seemed centrally located.

The buildings on both sides of MacArthur are low like most along suburban byways, malls and fast-food stops, and perhaps the area's greatest concentration of hotels and motels - all of them packed, dirty according to residents including Coast Guard personnel whose own homes had been lost, trashed by civilian transients according to managers, but with roofs overhead and clean linens. Within short range of the lodgings was the equally squat convention center. It was no Hynes or Javits or Moscone, or even Moriel, but its offices had doors that could close-in on briefings, its exhibition floor had a broad open expanse where tables and chairs, computers and charts, formed offices of sorts where people from each service could mix and confer.

"It's the first time so many different agencies have come under one roof," said Capt. Jim Wilkins, Supervisor of Salvage and Diving for the U.S. Navy's Sea Systems Command, "military and industry together. But each has a jurisdiction and responsibility. Sometimes they might overlap, there sometimes could be gaps. They can coordinate here face to face."

Topping the agenda was the creation of an agenda -- building a list of priorities in the wake of "the most devastating hurricane to strike the United States," in the

words of the Coast Guard. A national emergency was already underway and the object now was to avert a national crisis. The waterways of the region, the rivers and canals and ports, are the principal routes of domestic petroleum and seafood inbound, grain and coal outbound. The place to start, for national agencies, was the national well-being -- local regions' needs were also high on the agenda, but they would be next.

While many ports were damaged - or nearly obliterated, in the case of some between Belle Chasse and Venice - the main maritime arteries were in fairly good shape. The Intracoastal Canal and the Mississippi were relatively clear of wrecks and debris, and could quickly be opened to daylight navigation. Along most of the routes, the main task was to re-establish aids to navigation and get transit back to 24 x 7. "That we should have by the end of this week," said the Coast Guard's Master Chief David Coffman by Sept. 17. "We had to wait for searches and researches to be completed," with NOAA and the Army Corps ascertaining where, perhaps, even a trailerable 55-footer might not wish to go. Besides maritime wrecks, there could be trees in the water, and pieces of bridges, and sometimes people. There were more than 900 navigational devices in the Gulf Intracoastal alone, Master Chief Coffman said, but the day before they'd worked 208. They were getting there.

In many instances, it was not necessary to use underwater technology to find wrecked boats.

"The thing we always try to impress upon folks," said Roger Parsons, Director, Office of Coast Survey, "is that our assets are deployed during non-emergencies, teams are pre-staged. We had 22 NOAA vessels ready to go, with fathometers and sidescan sonar to determine what's sunk in the water, or where it's silted-in." Said Howard Danley, Chief of the Navigation Services Division, "In Alexandria, we had two phone conversations daily, conducted with the Captain of the Port of New Orleans and all Federal players, to keep positive on what assets were available, what their capabilities were, what results of previous days results. I thought the coordination was outstanding."

It was the Industrial Canal, toward the east end of New Orleans, connecting the Intracoastal, the Mississippi, and Lake Pontchartrain, where immediate attention had been required. Katrina's storm surge had tossed massive structures around - towboats, barges, drydocks - like bathtub toys. Before bargeloads of rocks could be brought to the lake to patch-up the levee, the way had to be cleared. Bisso Marine was near at hand.

With commercial navigation on the verge of recovery, attention in that third week was turning to local conditions -- things off the national highway, but requiring prompt attention. "We have two heavy lifters," said the Navy's Capt. Wilkins, "Donjon Marine, and they've subcontracted T&T.

Other ASA members have contracted privately for removing large barges from levees, raising the larger vessels and the like, and the smaller commercial and recreational vessels can be assisted by local sources."

The costs would be charged to the insurers, or to the otherwise responsible parties "the salvage operation will not come out of the taxpayer's pocket."

Season's Greetings

"We have been contracted to the U.S. Navy for salvage and related services in the southern Atlantic zone; which includes the Gulf," said John Witte Jr. of Donjon Marine, "a contract we've won every five years since 1979. But in an event as all-encompassing as this, nobody's ever had the training." Witte describes a triad set-up by FEMA, the Corps of Engineers, and the Coast Guard, to identify and fund wreck removal. The Navy was brought in to work as a conduit for technical expertise. "We joined the effort on the Saturday after the storm," said Witte, "to support the Navy with salvage assistance and our employees. We also supplied a commercial mechanism to provide all the services that are needed," which by the third week of October included subcontracting to local operators. Witte describes the "shock value" of his first flyby over Plaquemines Parish - where everything from Belle Chasse to Venice and Pilot Town beyond is or was located - as "sobering." As much as the sight of it all would prompt immediate responses, the future in this scenario was as sobering as the past.

(Continued on page 64)

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Port Security System designed to

Detect Divers

It's a grim fact that ships in port, whether they are Navy ships or pleasure cruisers, are at increased risk of terrorism. A single diver, or a team of divers can easily slip into the water from shore or a nearby boat and approach a ship at pier side without detection. Reports earlier this year noted that terrorist organizations linked to Al Qaeda were providing training in scuba diving for attacks at sea and in port.

Currently, our commercial and military ports are increasing security levels, but are the systems up to the task? Threats range from low-tech suicide bombers to sophisticated terrorists and include introduction of a WMD into a port area in a shipping container. A wide variety of integrated, disparate sensors are necessary to generate a high level of situational awareness in and around the port while facilitating rather than hampering the flow of commerce.

As a leading company of integrated port security solutions, Science Applications International Corporation (SAIC) has developed multiple, layered security systems aimed at providing broad based situational awareness, early threat detection and event management. Using both SAIC-developed technology and commercially available hardware as appropriate, the systems are designed to produce cost-effective solutions that enhance maritime security. One important element of port security is often the last to be enhanced. Waterfront security has traditionally been largely ignored except at military ports. With the current level of threats, ignoring this aspect is now done at our peril.

The requirements for successful maritime security are to intensify surveillance and security measures, provide command situation awareness on and around the water, ensure a rapid and effective threat response and provide the overall security for high value assets and critical infrastructure. To do this, a variety of sensors and subsystems are integrated to allow coverage in depth and notice of intrusion from any quarter.

Undersea threats, such as divers, have exacted a heavy toll on moored ships and on facilities in several areas in the world. Undersea mines or limpets strategically placed on a ship's hull can create substantial damage. To counter this threat, a Diver Detection Sonar is one of the primary components of a harbor security system. Sonar provides the initial detection and tracking of divers, swimmers and mini submersibles at sufficient ranges to allow response forces time to act. SAIC's Integrated Harbor Security System employs a state-of-the art diver detection sonar with many adjustable elements that provide optimal long-range performance in shallow water. Upon the initial detection of intrusion, effective signal processing allows the system to automatically track and display divers in high clutter environments, such as noisy harbors.

SAIC offers a swimmer detection system designed to provide an easily deployed and re-configurable detection barrier around ships or other high value targets in harbors or channels. The system is called the Acoustic Fence.

"The Acoustic Fence is really a line of cable deployed at any desired standoff distance around a docked ship, a pier or across a channel," said Larry McDonald, senior scientist at SAIC and one of the inventors of the Acoustic Fence. "Every 20 feet there is a sonar transducer that pings and looks for anything that moves underwater in the area near the fence. Some processing is done in the transducer nodes, and the data is communicated back to a laptop computer for further processing and display. It can be deployed under any existing boom line, or integrated with SAIC's Harbor Fence system." The Harbor Fence is a portable, reusable, environmentally friendly floating device designed to provide a visible line of demarcation around a ship moored pier side, across choke points or entrances, or around other waterfront high-value assets. It

The harbor fence and the underwater sentry deployed around cruise ships in port. The harbor fence and underwater sentry are controlled via a laptop computer interface. If the systems are breached or disturbed by anything other than a natural sea state — cut or bumped — an alarm will sound and the breach is indicated on the laptop. Depending on rules of engagement, the appropriate action will be taken.


STAY
AWAY

is a string of lightweight "smart" fence posts (buoys) incorporating multiple embedded sensors in each post. A major feature of the fence is that it keeps small boats and other "nuisance" traffic well away from the high-value asset, simplifying the surveillance and security task. If the Harbor Fence is breached in any way by surface craft, the embedded sensors transmit data to a laptop control console and alarms are automatically generated. The system provides unattended waterside intrusion detection night or day in all weather conditions, and provides a map display showing the location of the intrusion. Options include remote alarms, system operation over the internet, automatic camera pointing, and audible warnings on the fence posts themselves. "The Acoustic Fence (whether coupled with the Harbor Fence or other boom line) is essentially a tripwire - you can place it wherever you want to and change the shape as necessary," said McDonald. "It's built in 120 foot sections for easy assembly and connection, and can be taken on ships for redeployment in foreign harbors or deployed as a fixed system. "We designed the system to be set up and taken down from a small boat in an hour or so, depending on the length required," he said. "Once the system is turned on, it doesn't require an operator to watch over it. It sends out an alarm if it detects an intrusion, and if what it detects acts like a diver, it sends out an even higher level of alarm. The system does not require the high acoustic power needed by most diver sonar. This eliminates the

The harbor fence and the underwater sentry system protecting a ship in port.

concern over environmental issues in ports."

The Harbor and Acoustic Fences were deployed and tested around the aircraft carrier museum USS Midway in San Diego for six months. It recently passed its proof of concept for the Navy and Coast Guard.

McDonald pointed out that the Acoustic Fence can be adapted for other anti-swimmer applications.

"For a more fixed installation, it can be placed on the sea bottom and set to look upward to detect divers, or other intrusions," he said. "It can also be placed on the pilings of a pier looking outward. This ensures a diver can't approach or hide explosives under the pier."

The need to exclude or intercept hostile personnel and dangerous material in our seaports is the first line of domestic defense. By incorporating multiple layers of sensors and surveillance, SAIC's Integrated Harbor Security Systems provide a cutting-edge technology solution to respond rapidly and effectively to threats to help keep the trade and supply chain open with a minimum of risk and personal safety.

Richard Theisen (left) and Rick Barnes study the computer interface for security breaches in the fence and the underwater sentry system. The harbor fence was deployed around the USS Midway, a carrier museum in San Diego.

Above: The harbor fence deployed around the Sapphire Princess.

Left: Deployment of the harbor fence from pierside.

Lessons Learned

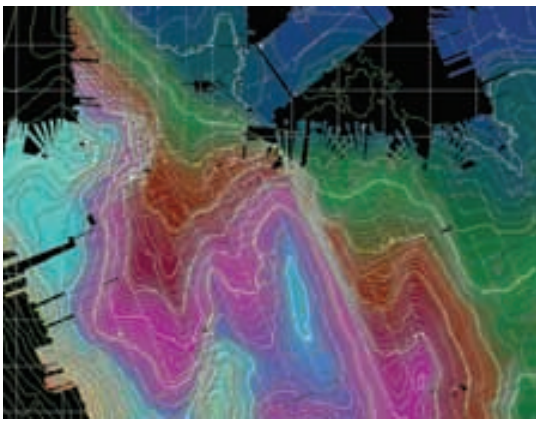
Military Ops with Hugin AUVs

Since 2001, the Royal Norwegian Navy (RNoN) Mine Warfare Flotilla has used HUGIN autonomours under water vehicles (AUVs) in a number of military operations around Europe. A dedicated military system, HUGIN 1000, was delivered to the Flotilla in January 2004. The AUV is operated from a RNoN mine hunter, and has been deployed in NATO's Immediate Reaction Force MCMFORNORTH from October 2004. Various types of operations have been performed, ranging from route surveys to covert mine reconnaissance and Rapid Environmental Assessment (REA) missions.

Equipped with side scan or synthetic aperture sonar, multibeam echo sounder, and a state of the art integrated inertial navigation system, the HUGIN AUVs provide high quality, high resolution imagery and bathymetry with excellent position accuracy. A proven launch and recovery system allows safe and efficient operation in high sea states. In parallel with the use of the HUGIN 1000 system in the RNoN, a new version with an improved capability is being developed. Lessons learned during four years of operational military use of HUGIN vehicles will help form the next generation, called HUGIN 1000-MR. The RNoN recently placed an order with Kongsberg Maritime for such as system, for delivery in 2006.

From the start of the HUGIN AUV program in the early 1990s, a dual use strategy has been followed where technologies and solutions have been developed for both the military and the civilian market. HUGIN has been developed jointly by the Norwegian Defence Research Establishment (FFI) and Kongsberg Maritime. A total of 10 vehicles have been built or are under production.

The HUGIN 3000 vehicles have enjoyed success in the commercial survey industry over the past eight years - the accumulated billed survey distance exceeds 50,000 km. Survey companies in Norway, USA, and The Netherlands currently own and operate HUGIN vehicles around the world. On the military side, the Royal Norwegian Navy Mine Warfare Flotilla has operated HUGIN vehicles since 2001. In response to a NATO initiative to accelerate national force goals, the RNoN in January 2003 instructed FFI to deliver a pre-production military version of HUGIN for MCM and REA operations. The vehicle, HUGIN 1000, was delivered in January 2004 and started operations shortly thereafter.



Detail of EM3000 bathymetry data transferred in real time from HUGIN 1000 in Norway to Norfolk, VA. The gaps are caused by drop-outs in the acoustic data link from HUGIN. Note the near-perfect match between the real-time bathymetry contours (grey) and the 10-m contours from an earlier surface survey.

Before the dedicated military HUGIN 1000 AUV was delivered, the test and development platform HUGIN I was made available to the RNoN on several occasions. A permanent installation of the infrastructure necessary to run full-capability HUGIN missions from the mine hunter KNM Karmøy was completed in the summer of 2002. The limitations of the aging HUGIN I vehicle (short endurance, COTS survey sensors, etc) notwithstanding, this increased the Navy's understanding of AUV operations, and of the strengths and weaknesses of the civilian HUGIN versions. Thus, the Navy was able to assist in the specification of the HUGIN 1000 based on actual experience.

Operations

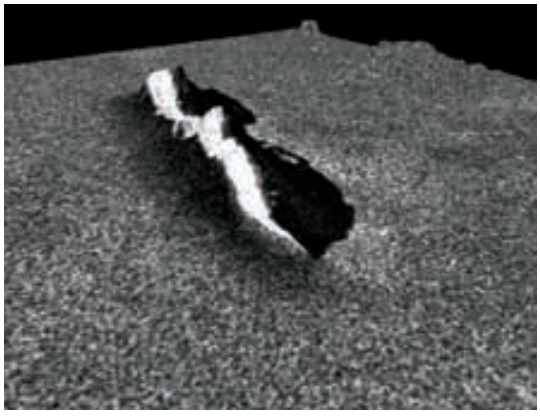
On several occasions in 2002 and 2003, KNM Karmøy performed route surveys in key areas around Norway. This was combined with testing of the HUGIN infrastructure and training of key personnel onboard the mine hunter. Bathymetric maps with sub-meter resolution were produced using data from the Kongsberg EM3000 multi-beam echo sounder onboard HUGIN I, and a low-cost side scan sonar from Sonar Equipment Services provided seabed imagery.

HUGIN played a role in an early CDE (Concept Development and Experimentation) operation in the preparatory phase of the Northern Light 03 NATO exercise. The objective was to survey a corridor

HUGIN 1000 being launched from KNM Karmøy in the Baltic Sea during its 2004 deployment in MCMFORNORTH.

500 m wide and 12 nautical miles long in Luce Bay, Scotland. The data collected was to be used to verify historic data and plan MCM operations before an amphibious landing. HUGIN I completed four successful missions in 48 hours, operating the vehicle on a tight schedule: To maximize area coverage in the shallow water (10-30 m), each mission was performed during the six hours of highest tide, while the batteries were recharged during the six hours of lowest tide. The vehicle also had to combat tidal currents of up to three knots. While the AUV primarily operated autonomously, the mine hunter was usually located within a few nautical miles of HUGIN I. Two-way acoustic communication was available at up to 2-3 nautical miles in very shallow water. Data from each mission was brought to shore for immediate processing on a provisional shore lab set up by NURC (NATO Undersea Research Center). In the days following the AUV operations, data was processed further at FFI in Norway and NURC in Italy. The end result, a set of AML (Additional Military Layers) files, was then transferred to the exercise headquarters in Northwood, UK for use by MCMVs during the clearance operation.

Bathymetry of part of the amphibious landing route surveyed by HUGIN I for Northern Light 03. Grid spacing 1 x 0.5 ft., water depth 14-32 m. The green lines indicate the area to be surveyed, 6 nmi x 500 m; white lines indicate HUGIN's trajectory.



The US submarine Nautilus sunk outside Bergen in 1931. This image, using side scan imagery draped over multibeam bathymetry, was produced with the Triton Imaging post-processing software on the mine hunter and transmitted to the US 2-3 hours after AUV recovery.

2003 MCM demo, Finland

Less than two weeks after Northern Light, KNM Karmøy

and HUGIN performed a series of MCM demonstrations for the Finnish Navy outside Hanko, Finland. The AUV CONOPS demonstrated included route survey, mine mapping, and covert REA. Change detection was used to locate mine-like objects laid between two AUV missions. Some of the missions were performed fully autonomously, with the ship anchored outside the operations area. While the crew were asleep, HUGIN mapped a three sq. km area in approximately six hours. Challenges encountered in Finnish waters included operating in a low salinity environment (salinity approximately 7 parts per thousand).

2004 NATO exercises

Just six weeks after the delivery of the HUGIN 1000 pilot system, the mine hunter and the new AUV participated in the Joint Winter 04 NATO exercise outside Northern Norway. 13 AUV missions were completed, mainly covert REA and MCM surveys. In May 2004, HUGIN 1000 participated in the NATO exercise Blue Game 04. Missions executed included a survey of the narrow harbour areas around Arendal, Norway.

2004 MCMFORNORTH deployment

In 2004, KNM Karmøy and HUGIN 1000 were deployed in NATO's standing MCM Force North. AUV missions were executed in the waters of Lithuania, Latvia, Germany and Denmark. Among the missions performed were mine clearance operations in the Baltic Sea, which is littered with tens of thousands of mines and other unexploded ordnance from the last century.

Azalea Festival 2005

On April 20, 2005, HUGIN 1000 executed a mission outside Bergen, Norway with real-time data transmission to the U.S. In conjunction with the annual Azalea Festival in Norfolk, Va., a NERA F77 Inmarsat satcom system was installed on the mine hunter, providing 128 kbps data transfer rate and Internet access. Data was transmitted acoustically between HUGIN and the mine hunter, then via the Inmarsat system to a display computer in Norfolk. Visitors to the festival were thus able to see bathymetric maps of the seafloor being built in real time by an AUV on the other side of the Atlantic. As the connection was two-way, it was also possible to send commands from Norfolk to the AUV.

MCMOPLAT 2005, Latvia

In May-June 2005, KNM Karmøy and HUGIN 1000 were once again in the Baltic Sea. Two mine-like objects detected and classified from HUGIN 1000 sonar data were investigated by divers and turned out to be live mines, later neutralized.

Lessons Learned

From the very beginning, an important tenet of the HUGIN AUV program has been to use the sea as our laboratory. New concepts, new techniques and new subsystems are tested at sea early in the development cycle, instead of spending large amounts of time in simulations before the first sea trials. We believe that bringing the systems to the sea, while obviously not completely risk-free, results in a much steeper learning curve and frequently provides new insights that simulations cannot. By going to sea early, lessons learned from sea trials can be fed back to the development process at an early stage, while there is still room for major design changes. Kongsberg Maritime's development and manufacturing facility in Horten, Norway is set up so that HUGIN sea trials can be performed at modest cost and only a few days' notice.

The HUGIN MRS program has followed the same principles. HUGIN 1000 is the first HUGIN vehicle developed and produced specifically for a military customer. However, the deployments of the older HUGIN I vehicle with the Navy during the development provided extensive input as to what improvements were needed. Some improvements (e.g., to the operator system software) were made available to the Navy before the new vehicle was delivered, allowing Navy personnel to evaluate them at the earliest possible stage.

In addition to ensuring that the end product is well suited to the task, this process has the additional benefits that the Navy personnel feels ownership of the technology, and that they are able to follow the progress of the development closely.

A significant challenge encountered with the HUGIN 1000 development was with the main sensor, the EdgeTech 4400-SAS sonar. Early field experience identified some issues in the control system and SAS processor, many of which are now resolved. Furthermore, the sonar design limited the data quality of the SAS in some challenging conditions. Unfortunately, Norwegian coastal waters are among the most challenging areas in the world for SAS, and it has taken a substantial amount of work to get the sonar up to an acceptable level of performance.

Another issue with synthetic aperture sonar is that SAS images have some fundamental differences from high frequency side scan images. It takes time for a trained side

Visitors at the Azalea Festival watch the real-time HUGIN data, including US Secretary of the Navy Gordon England, Norwegian Minister of Defence Kristin Krohn Devold, and Norwegian Ambassador to the US, Knut Vollebæk.

scan sonar operator to get used to the characteristics of SAS images, and to be able to properly use SAS data.

A major part of the HUGIN MRS program has been to transition the deep-water technology designed for HUGIN 3000 to military operations, which generally take place in relatively shallower water. While it is generally true that deep-water operations are more difficult, the challenges unique to shallow-water operations should not be underestimated. This is especially the case for fully covert, fully autonomous operations in confined and/or unknown areas. The development model followed is rewarding, but also challenging. At times, it has been frustrating to the Navy operators that procedures and interfaces change several times. Even though a change is for the better, it can take time for users to adjust to the new situation, and it may hamper the desired "second nature" interaction. As a rule however, we find that the positive aspects of the development process more than compensates for this. An example of the difficulties of testing autonomous systems in real-world environments is the dangers imposed by fishing vessels. During the Joint Winter 04 exercise, a HUGIN mission had to be interrupted because a trawler was headed straight for the AUV - inside a military exercise area. The trawler ignored hails and warning flares from KNM Karmøy, HUGIN's mother ship. Such a situation would obviously not occur if the area was mined, but it is difficult to fully avoid in times of peace.

The Future

In May 2005, the Royal Norwegian Navy ordered a next generation HUGIN 1000-MR system from Kongsberg Maritime. This will be a full capability system, compared to the reduced capability HUGIN 1000 pilot system delivered 2004. The most significant changes concern the payload suite. HUGIN 1000-MR will feature a more robust, more capable SAS as its main sensor. The design of this sonar is being verified with the high end SENSOTEK SAS sonar, which started sea trials in early 2005.

A principle of early testing of new developments at sea has been followed. As a consequence, many potential design flaws have been caught early. The close participation of the end customer in the development process has resulted in a common understanding of the issues and their relative priorities.

The preceding was authored by Per Espen Hagen and Nils Størkersen, Norwegian Defence Research Establishment (FFI); Bjørn-Erik Marthinsen, Royal Norwegian Navy Mine Warfare Flotilla; Geir Sten, Norwegian Defence Logistics Organization; and Karstein Vestgård, Kongsberg Maritime AS.

profile

Hafmynd (Gavia)
Putting The Pieces Together

By Kate Elizabeth Queram

Hafmynd, based in Reykjavik, Iceland, develops and manufactures underwater technologies. Originally formed as a result of a collaboration with the University of Iceland in order to study seafloor impacts due to fishing, the company is now best known for its Gavia Northern Diver Autonomous Underwater Vehicle (AUV).

"The name Gavia was suggested to us by Professor Jorundur Svavarsson at the University of Iceland," said Arnar Steingrimsson, Marketing Manager. "Gavia is short for Gavia Immer, which is the Latin name for a bird that is local to Iceland and parts of North America. The bird is referred to as "the great northern diver" for its diving skills, which are remarkable," suggesting that the diving capabilities of the AUV - which weighs a scant 150 lbs. and is depth-rated to 2,000 m — are worthy of the name.

Photo Credit: Kevin Durose

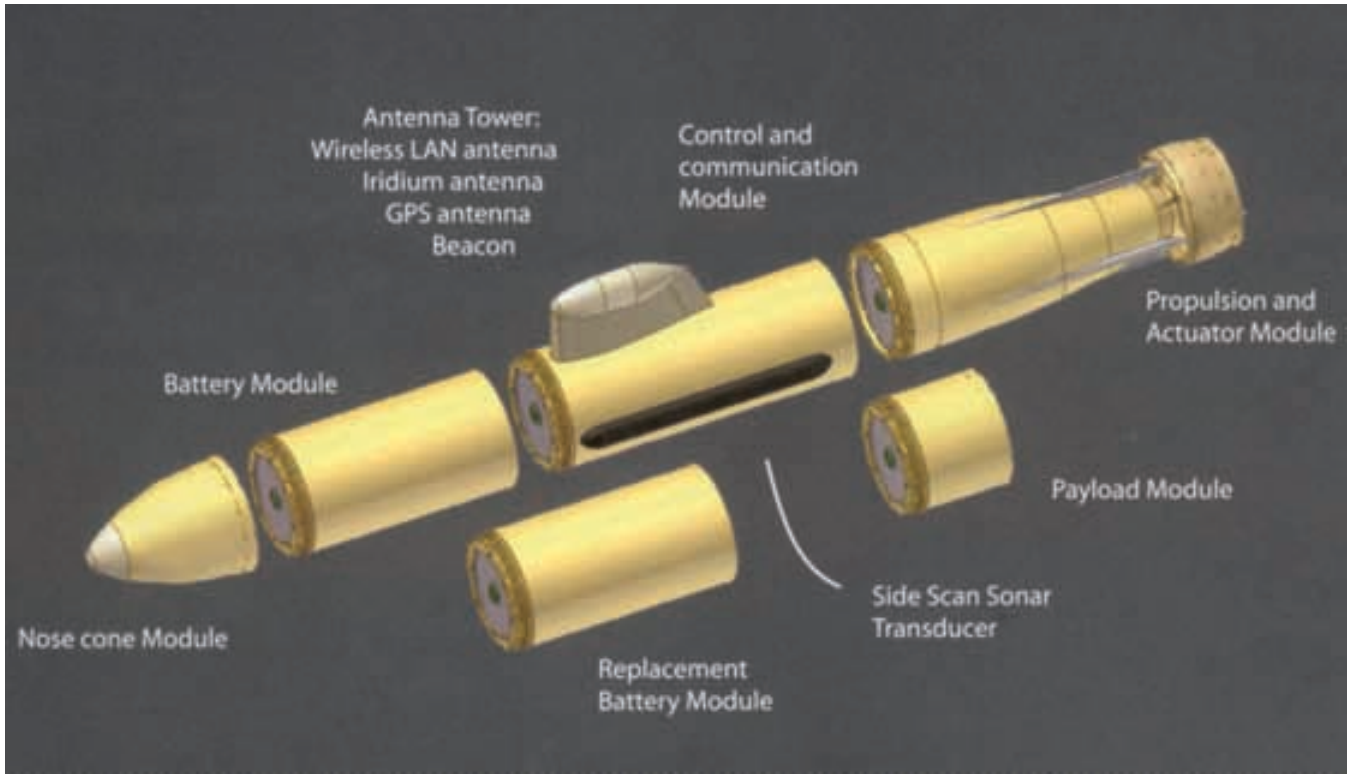
"Gavia is short for Gavia Immer, which is the Latin name for a bird that is local to Iceland and parts of North America. The bird is referred to as "the great northern diver" for its diving skills, which are remarkable"

— Arnar Steingrimsson

For all its fanfare, the premise of the Gavia Northern Diver is relatively simple. Customers purchase the base model of the AUV, which consists of four major parts: a nose cone, a battery module, a command/control module, and a propulsion module. The base model is a fully functional unit, but can be tailored for specific missions by adding or taking away sensors and modules. For example, a standard configuration for a scientific mission adds to the base model: an optical backscatter sensor, a side scan sonar unit, a nose cone camera, and an ADCP (Acoustic Doppler Current Profiler).

According to the company, Gavia is unique in its user-friendly modular design; meaning it can be taken apart and reconfigured to perform a range of tasks - all by hand. Modules are

The Gavia Northern Diver is a modular-designed AUV that can be tailed for specific missions; commercial, scientific or military.



fitted together by the user, using Gavia's patented QuickLock system. "Other companies offer modular designs, but ours is the only one that is put together by the user," said Steingrimsson. "With all others, the reconfiguration must be done at the factory."

Hafmynd's vision specifically incorporates this plug-and-play technology; hinging on the belief that AUVs will play a major role in the future research, monitoring and surveying of the underwater world. Hafmynd believes the modular design of Gavia will allow previously inaccessible regions of the ocean to now be visible and open to exploration. The company foresees success for the AUV, due to the many advantages which include; ease of transport, reduced cost and downtime, and upgradability.

The Gavia Northern Diver is the product of extensive research and development, which began in mid-1996, with the first prototypes available in early 2003. "Development was financed by a combination of funds from the University of Iceland, The Icelandic technology development fund, and private shareholders," said Steingrimsson, adding that "The exact figures for the cost are hard to pin down and of the course the development is never really finished, is it!"

"The pricing of the Gavia is in line with that of other small AUVs," said Steingrimsson. To date, three Gavia AUVs have been shipped, each configured for their own specific missions. The first went to the Space and U.S. Naval Warfare Systems Center (SPAWAR), in San Diego, Calif., a branch of the US Navy. This Gavia vehicle, intended for military use, is configured for Mine Counter Measures (MCM) with a dual frequency sonar, camera and strobe, and a DVL aided Inertial Navigation System with GPS, designed for accurate underwater positioning. It also features a high-speed wireless LAN; underwater acoustic link, and dual-battery module operation.

The second Gavia was ordered by the Canadian National Research Council (NRC) to fulfill their requirement for a multi-mission-capable AUV. The primary mission of the vehicle here is to maneuver on the inside of potable water pipes and conduct inspections of the line for possible damage using sonar and customer-developed payload modules. The secondary use for the vehicle is for oceanographic surveys. "The modularity of the Gavia vehicle and the ability of the NRC to develop custom payload modules is primarily why it was selected by the NRC," said Steingrimsson. Finally, the Department of Mechanical Engineering at the University of British Columbia will use the Gavia AUV to perform survey and sampling operations in the deepwater lakes located in British Columbia, Canada. The University's Gavia vehicle is a 500 m rated vehicle outfitted with a suite of scientific sensors, including the SeaBird SBE 49 FastCAT Conductivity Temperature Depth recorder (CTD), Imagenex Ltd. dual-frequency side scan sonar, and a Wetlabs ECO-BB3 Optical Backscatter sensor. Underwater navigation and two-way acoustic communication are provided by a Long Base-Line (LBL) system from LinkQuest Ltd. In addition to its commercial success, the Gavia procured real-world experience earlier this fall, when a small boat sank just outside of its home base of Reykjavik. To assist with the search-and-rescue operation the Gavia AUV was pressed into service. The company deployed a vehicle equipped with a side scan sonar and a DVL-aided Inertial Navigation System, Roughly two hours after deployment, the AUV had covered a 150,000 square meter search area. Icelandic Coast Guard divers then used the side scan sonar images taken from the Gavia to limit their search areas to regions containing possible targets; thus allowing for a more thorough search in a smaller amount of time and ultimately leading the divers to within arm's reach of thesunken boat. Hafmynd is extremely optimistic about the future for the Gavia vehicle. Said Steingrimsson, "Gavia is well-suited for a variety of missions and is a platform that a user can readily upgrade to meet requirements as they arise." Therefore, customers who purchase the Gavia today can continue its use for years to come by changing only small parts of the system, rather than buying an entire new one. "Hafmynd is working with many sensor manufacturers to integrate new sensors as they become available," Said Chris Roper, North American marketing and sales agent for Gavia, "the development of Gavia was a turning point for the company, and we have a number of pending orders."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3D Advanced Technologies LLC
Product: 3D holographic display in high res., underwater cameras for realtime capabilities, security, exploration, surveying, CAD data
Exec. VP Fred Barber
Phone: 313 359-0635
Email: fredbarber@comcast.net

Atwood Oceanics
Product: Offshore oil drilling
PM Administrator Gary Austin
Phone: 281-749-7861
Fax: 281-749-7931
Email: gaustin@atwd.com
Url: www.atwd.com

Autonomous Undersea Systems Institute
Product: Not-for-profit research institute focused on promoting commercial applications of Autonomous Underwater Vehicles (AUVs), platforms and sensors.
Phone: 603-868-3221
Email: ausi@ausi.org
Url: www.ausi.org

Beijing Ocean Seeker Technical Co.,Ltd
Product: Undersea vehicles and imaging
GM Junying Ye
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Fax: 86-10-88589235
Email: alvinunderwater@yahoo.com.cn

BIDCO Marine Grup
Product: Undersea vehicles and imaging
Captain Tom Maciejczyk
Phone: 617-529-3898
Fax: 309-424-3444
Email: capttem@yahoo.com
Url: www.bidcomarine.com

CDL
Product: Ring laser gyrocompasses, inertial navigation, sonar, bathymetry, multiplexers, tilt sensors and video/data transmission.
Managing Director Matthew Blair
Phone: +44 1224 706655
Fax: +44 1224 709840
Email: mb@cdltd.net
Url: www.cdltd.net

Center for Marine Science & Technology, Curtin University
Product: Underwater stereoscopic video cameras, underwater sound recorders,
Director Kim Klaka
Phone: +61 8 9266 7380
Fax: +61 8 9266 4799
Email: Andrewmr@liberty.curtin.edu.au
Url: www.cmst.curtin.edu.au

Conusub
Product: Commercial diving, instrumentation fabrication, data collection and underwater imaging.
President Stephen Moy
Phone: 401-848-7495
Email: steve@conusub.com
Url: www.conusub.com

CSIRO Marine & Atmospheric Research
Product: Marine and atmospheric research
Scientific Equipment & Technology
Manager Simon Allen
Phone: +61-3-6232-5476
Fax: +61-3-6232-5000
Email: simon.allen@csiro.au
Url: http://www.cmar.csiro.au

Deep Marine Technology, Inc.
Product: ROV/DSV; DOV; diving; tooling
Vice President Business Development Wade Abadie
Phone: 713-896-8555
Fax: 713-849-4021
Email: wabadie@deepsubs.com
Url: www.deepsubs.com

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Category: Undersea vehicles and imaging
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EIVA a/s
Product: Software, hardware and integrated systems solutions for marine surveying.
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Email: ph@eiva.dk
Url: www.eiva.dk

Electronica Naval Patagonica
Product: Technology assistant; oceanographic investigation
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Phone: +54-294-452-7747
Email: navalpatagonica@educ.ar
Url: ar.geocities.navalpatagonica.com

Falmouth Scientific, Inc.
Product: Precision oceanographic instrumentation.
VP, Sales & Marketing Rick Babicz
Phone: 508-564-7640
Fax: 508-564-7643
Email: rbabicz@falmouth.com
Url: www.falmouth.com

GHD
Product: Engineering and environmental services
Environmental and Oceanographic Consultant Dr Raymond K Steedman
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Fax: 61 8 6222 8555
Email: raymond.steedman@ghd.com.au
Url: www.ghd.com

Hafmynd - Gavia Ltd
Hafmynd is a developer of novel underwater technologies. With our GAVIA range of autonomous underwater vehicles (AUVs) we provide solutions to customers undertaking research, surveying, and monitoring tasks under water.
Phone: +354 5112990
Fax: +354 5112999
Email: sales@gavia.is
Url: www.gavia.is

Hawaii Undersea Research Laboratory
Product: Operation of 2 deep-diving (2000 m) manned submersibles and an ROV for research around Hawaii and the Western Pacific.
Data Dept Manager Rachel Orange
Email: shackelf@hawaii.edu
Url: http://www.soest.hawaii.edu/HURL

Hydracon Company Inc
Product: Subsea Switches, solenoid actuators, solenoid valves.
Alex Pullos
Phone: 714-281-2460
Fax: 714-281-1199
Email: hydracon@hydracon.com

Hydroid Inc.
Product: REMUS 100 Autonomous Underwater Vehicle (AUV).
VP Marketing Kevin McCarthy
Phone: 508-563-6565
Fax: 508-563-3445
Email: sales@hydroidinc.com
Url: www.hydroidinc.com

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Product: Ocean engineering, ROVs, AUVs, imaging
Prof. Dr.-Ing. Mario A. Jordan
Phone: (54-291) 486-1112/1519/1309 - Ext. 169
Fax: 54-291) 486-1527/1112/1519
Email: mjordan@criba.edu.ar
Url: http://www.criba.edu.ar/iado

Imaging Science Resarch, Inc
Product: Imaging Marine radar for ocean wave spectrum monitoring and harbor surveillance; HF radar-current mapping.
President Dennis Trizna, Ph.D.
Phone: 703-801-1417
Email: support@isr-sensing.com
Url: www.isr-sensing.com

Imternational Industries Inc.
Product: Undersea Vehicles & Imaging
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Phone: 410-349-4080
Fax: 410-349-9390
Email: chic.ransone@internationalindustries.net
Url: www.internationalindustries.net

iXSea
Product: Navigation and positioning systems, underwater acoustics systems and seabed imagery, seafloor mapping
Phone: +33 (0)1 30 08 98 88
Fax: +33 (0)1 30 08 88 01
Email: info@ixsea.com
Url: www.ixsea.com

KOCECO (Korea Ocean Engineering & Consultants Co. Ltd.)
Product: Underwater engineering and construction, submarine cable, pipeline, salvage and underwater archaeology.
President Kim, Do Hyun
Phone: +82 (0)31 254 8190
Fax: +82 (0)31 254 8195
Email: koceco@chol.com

Kongsberg Maritime
Product: Underwater positioning and navigation, transponders, acoustic telemetry vertical and horizontal, acoustic BOP emergency control, echo sounders, sonar.
Manager Director Freddy Pøhner
Phone: +47 (99) 20 38 37
Email: lisbeth.johanne.ramde@kongsberg.com
Url: http://www.km.kongsberg.com

Lake Erie Diving, Inc.
Product: Commercial diving and ROV services
President Patrick Murphy
Phone: 440-352-9472
Fax: 440-352-8471
Email: pmurphy@lakeeriediving.com

Magazzu' Research Group s.r.l
Product: Research, development, design and building of advanced marine systems
President Alfredo Magazzù
Phone: +39091223715
Fax: +390916737463
Email: research@magazzu.com

National Oceanography Center
Product: Undersea vehicles and imaging
Processing and Data Manager Dr Tim Le Bas
Phone: +44 23 8059 6557
Fax: +44 23 8059 6554
Email: tlb@noc.soton.ac.uk

National Undersea Research Center/UCONN
Product: ROV Operations in support of science and research
Craig Bussel
Phone: 860-405-9144
Fax: 860-445-2969
Email: craig.bussel@uconn.edu
Url: www.nurc.uconn.edu

NAUTEC Srl
Product: R.O.V., video submarine systems, technical assistance and analysis.
GM Vincenzo Venza
Phone: +39 031 442068
Fax: +39 031 552976
Email: v.venza@nautec.it
Url: www.nautec.it

Nautronix MariPro
Product: Engineered solutions for undersea sensing and communication systems for defense, scientific, and commercial applications.
Ocean Engineer Pat Harwell
Phone: 805-879-0154
Fax: 805-967-0367
Email: pat.harwell@nautronixmaripro.com
Url: www.nautronixmaripro.com

Naval Oceanographic Office
Product: Oceanographic survey operations
Head of Technology Support Michael P. Jeffries
Phone: 228-688-5659
Fax: 228-6884124
Email: jefriesm@navo.navy.mil

NOAA
Phone: 301-713-3028
Email: sirblatman@yahoo.com

Outland Technology Inc.
Product: Underwater cameras, lights and ROV
Owner Buddy Mayfield
Phone: 985-847-1104
Fax: 985-847-1106
Email: sales@outlandtech.com
Url: www.outlandtech.com

RELTEK LLC
Product: Proprietary specialty adhesives and sealants for hard-to-bond substrates and harsh environments, cable waterblocking, cable termination, including custom splice kits for electrical cables. Manufacturing process consulting.
Sales Director Steve Brumme
Phone: 707-284-8808

Fax: 707-284-8812
Email: reltek@reltekllc.com
Url: www.reltekllc.com

Remote Ocean Systems
Product: Harsh environment cameras, lights, positioners, and specialized systems designed for oceanographic, nuclear, and military applications.
Phone: 858-565-8500
Fax: 858-565-8808
Email: sales@rosys.com
Url: www.rosys.com

Robert A Corbett & Sons
Product: Private and commercial small craft surveyors and consulting
Bob Corbett SA
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Fax: 506-488-9103
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Url: www.marinesurveyoratlantic.com

SAIC
Product: Sediment profile imaging, video, hydrographic, oceanographic surveys, sediment programs
Marine Scientist Benjamin Allen
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Fax: 401-849-1585
Email: benjamin.t.allen@saic.com
Url: http://www.saic.com/aquatic-sciences/

Sakhalin Research Institute of Fisheries & Oceanography
Product: Undersea vehicles and imaging
Dr. Gennady Kantakov
Phone: 7(4242)456768
Fax: 7(4242)456778
Email: okhotsk@sakhniro.ru
Url: www.sakhniro.ru

Schilling Robotics
Product: Remote systems products, including electric and hydraulic ROVs and remote manipulator systems
VP & Regional Manager Jason Stanley
Phone: 281-854-2049
Fax: 281-854-2249
Email: jason.stanley@schilling.com
Url: www.ssaalliance.com

SeaBotix Inc.
Product: SeaBotix LBV ROV system
President Donald Rodocker
Phone: 619-239-5959 ext. 111
Fax: 619-239-5915
Email: don@seabotix.com
Url: www.seabotix.com

Seaeye Marine Ltd.
Product: Electric ROVs
CEO Chris Tarmey
Phone: +44(0) 1329 289000
Fax: +44 (0) 1329 289001
Email: ctarmey@seaeye.com

Seaglider Fabrication Center - University of Washington
Product: Seagliders, operator training, and glider refurbishment
General Manager Fritz Stahr, Ph.D.
Phone: 206-543-7886
Fax: 206-685-3354
Email: stahr@ocean.washington.edu
Url: http://seaglider.washington.edu

SeeByte Ltd.
Product: Intelligent systems for autonomous or remote platforms and processes.
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Fax: +44 (0) 131 447 4911
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Url: www.seebyte.com

Singapore Technologies Marine
Product: Undersea vehicles and imaging
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Southampton Oceanography Centre, Southampton
Product: Marine science
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Teledyne RD Instruments
Product: Acoustic Doppler Current Profilers (ADCPs) and Doppler Velocity Logs (DVLs).
Sales Gina Lopez
Phone: 858-693-1178
Fax: 858-695-1459
Email: sales@rdinstruments.com
Url: www.rdinstruments.com

Transonics, Inc.
Product: Custom underwater acoustic transducers, hydrophones, wideband composite projectors, preamplifiers, replacement transducers and acoustic testing services.
President- Engineering Russell J. Paskoski
Phone: 435-649-2930
Fax: 435-649-3052
Email: russp@transonics-co.com
Url: www.transonics-co.com

UCSB
Product: University
Dr Ira Leifer
Phone: 805 893-4931
Fax: 805 893-4927
Email: aira42@yahoo.com
Url: www.bubbleology.com

University of Colorado
Product: UUVs with special low speed maneuvering capability
Professor Professor Kamran Mohseni
Phone: 303-492-0286
Email: mohseni@colorado.edu
Url: http://enstrophy.colorado.edu/~mohseni/

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University of Rome "Tor Vergata"
Category: Undersea vehicles and imaging
Biologist Maurizio Giganti
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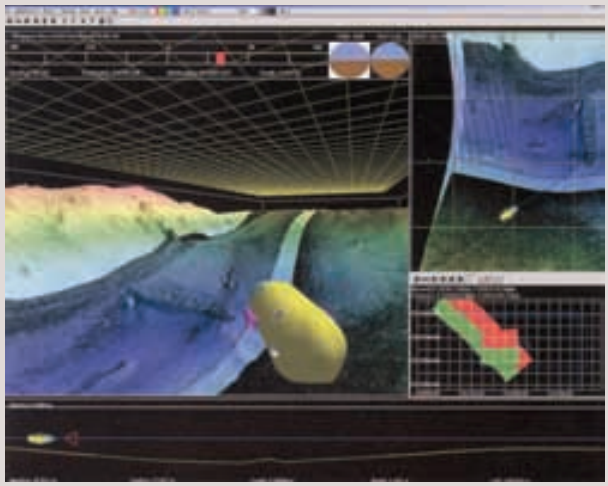
Email: mauriziogiganti@libero.it

University of the Virgin Islands
Product: Physical oceanographic research.
Virgin Islands St. Thomas, USVI 00802
Professor Roy A. Watlington
Phone: 340-693-1391
Fax: 340-693-1385
Email: rwatlin@uvi.edu
Url: http://www.uvi.edu

Zevulun Marine Systems Ltd.
Product: Design and manufacture underwater electrical connectors, cable assemblies, and cable terminations.
Director Eli Bar-Hai
Phone: +972 4 6763863
Fax: +972 4 6762682
Email: zevulun@012.net.il
Url: www.aquamate.biz

ROVer's Eye

ROVer's Eye Main GUI in real-time, showing the ROV in a two-up view of Sydney Harbor, using Klein 5500 sidescan sonar and Seabat 8101. ROVer's Eye provides a high-fidelity of the physical relationship between the ocean bottom derived from multibeam sonar and a texture image that is overlaid upon the ocean bottom structure, typically derived from sidescan sonar; and a perspective-accurate, properly scaled model of a target vehicle. The system enhances the situational awareness of the ocean environment for mission targets and obstacle avoidance and provides a method to plan missions and paths for vehicle navigation. ROVer's Eye functions in low light or poor water clarity environments and may be used in a variety of applications including terrain visualization, search and recovery, route surveys, oil field inspection and general seabed mapping.



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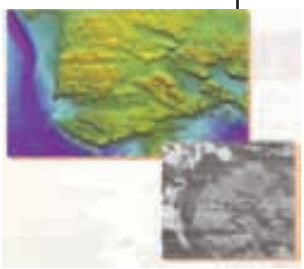
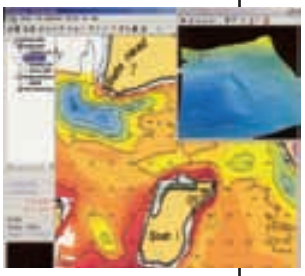


Multibeam Bathymetry



Triton Hydrographic

AN/WLD-1 Remote Minehunting System

FrogEye

Multibeam Bathymetry and Acoustic Imagery

Fugro Pelagos, Inc. has made advances in the collection and processing of high-resolution acoustic bathymetry and imagery from Multibeam Echosounder Systems. Benefits of use include improved quality from Multibeam Acoustic Imagery (higher signal-to-noise ratio and higher resolution); precise geo-referencing of image pixels; and interactive web delivery of data and images. Vessel motion is applied to improve geo-encoding, and backscatter data is refracted, with backscatter from bad soundings discarded completely. The system features improved sounding accuracy and fully implemented Applanix TrueHeave.

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Triton Hydrographic Bundle

Triton's Hydrographic Bundle is an integrated suite of software designed for all phases of multibeam surveys and can be used for survey planning, data acquisition, real-time processing and off-line data analysis. The system's components include applications for data acquisition, sonar interface, real-time data processing, GIS for processed data display, and survey planning/control. The modularity of the software enables expansion as survey capabilities grow. The system features include accurate logging of all data associated with a multibeam system (including beam amplitude, backscatter, etc), real-time correction and filtering of bathymetry and line planning and control during survey.

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AN/WLD-1 Remote Minehunting System

Lockheed Martin's AN/WLD 1(V) Remote Minehunting System (RMS) is designed to allow combatants to react swiftly and independently to mine threats without impacting other warfare missions. Launched and controlled remotely from forward-deployed ships, RMS gives Carrier and Expeditionary Strike Groups an organic, real-time, over-the-horizon mine reconnaissance capability. The unmanned, semi-submersible RMV tows a Variable Depth Sensor to detect, localize, classify and identify moored and bottom mines. Other key elements of the system include line-of-sight and over-the-horizon real-time data links, a shipboard launch and recovery subsystem; and a software segment, which integrates AN/WLD-1(V)1 into the ship's AN/SQQ-89(V)15 Undersea Warfare Combat System.

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FrogEye Amphibious Camera

FrogEye FC-2 is a second generation amphibious camera for applications in science, military and industry. The model FC-2 is designed specifically for long-standoff reconnaissance and surveillance applications. Features include

- Rugged, amphibious design, useable underwater and on land.
- Long-standoff shore reconnaissance from sea and diver insertion supported by free-flooded telephoto lens.
- Three night vision modes including on-demand night vision without an intensifier tube, and dual-stage night vision for extreme low light conditions.
- Multi-spectral imaging in NIR and UV regions defeats camouflage.
- High frame-rate, high-resolution motion imagery captures fleeting targets and minimizes operator exposure.
- Remote and autonomous operating modes minimize manpower requirements for target surveillance.

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Obituary: Andreas B. Rechnitzer (1924-2005)

Andreas "Andy" Rechnitzer passed away August 22, 2005 at Grossmont Hospital, La Mesa, Calif., after a sudden illness. Andy was a student of Scripps Professor Dr. Carl Hubbs. In 1955, Hubbs and Rechnitzer discovered and identified the striped yellow fish that now serves as the official logo of Scripps' Birch Aquarium (Chaetodon falcifer). While at Scripps, then part of UCLA, Andy, Connie Limbaugh, and Jim Stewart developed the first SCUBA diver training program for ocean scientists, which included such innovations as ditch-and-don, buddy breathing, and the buddy system. That SCUBA training program is the basis of all major sport diving certification programs in the world today, including PADI and NAUI. Upon graduation from SIO, Andy considered staying at Scripps, but Roger Revelle told him to head out into the world. Later, Andy recalled, "It was the best advice he could have given me." As a member of the U.S. Navy-ONR Evaluation team, Rechnitzer was instrumental in negotiating the purchase of the deep diving bathyscaphe, Trieste, from Swiss physicist Auguste Piccard. Rechnitzer, along with Scripps alumni, Art Maxwell, Scripps researcher Willard Bascom, and Captain Charles Bishop, USN, (later with MPL), had Trieste brought from Italy to San Diego's Naval Electronics Lab (NEL), on Point Loma. Rechnitzer, a civilian scientist, was made Scientist-in-Charge of Project NEKTON. On January 23, 1960, Trieste dove with pilot Don Walsh and observer Jacques Piccard to 35,800-ft. into the Challenger Deep in the Mariana Trench, the deepest ocean depth. The success kick-started deep submergence development in the U.S., and many businesses in San Diego. Rechnitzer was awarded the Navy Department Distinguished Civilian Service Award by President Dwight Eisenhower. He then led the development of the Beaver IV diver LILO submersible at Rockwell International. Andy then joined the scientific staff of the Chief of Naval Operations and Oceanographer of the Navy from 1970-1984. He later joined SAIC as Senior Scientist from 1985-1998.

Dr. Andreas Rechnitzer (3rd from left) appears in the photo with Larry Shoemaker, Don Walsh, and Jacques Piccard aboard the bathyscaphe Trieste, following the historic dive to the bottom of the Mariana Trench in January 1960. (Photo: U.S. Navy)

In 2002, the History Channel aired the special "The Deepest Dive," co-produced by Andy and Ed Cargile, recounting the obstacles and milestones on the way to the bottom of the sea. Andy was also an early advocate of K-12 outreach, authoring segments of books on hands-on marine science for young students. He founded and was first president of the Ocean Institute (Dana Point, Calif.), which continues to collaborate with Scripps and other scientists as an informal center of marine education today. "A great man passed my way, and I shall miss him", said former Trieste pilot Tony Dunn. Andy was a warm and outgoing friend to so many. Over the years, National Geographic Society photographer Ralph White would comically refer to himself as Andy's illegitimate son. I suppose, in hindsight, Andy did foster a sense of kinship with many by offering encouragement and expressing pride, especially to those younger, as a good father might. A memorial service at Scripps Institution of Oceanography is being planned, and will be announced in the SoCal eNews.

(Bibliographic material from the Scripps Institution Archives. Personal reflections by Kevin Hardy, khardy@ucsd.edu)

Webb Honored

Photo credit: Clayton Jones, Webb Research Corporation

Douglas C. Webb, of Webb Research Corporation (Falmouth, Mass.) received two awards honoring his contributions to ocean research technology. During the MTS/IEEE (Marine Technology Society/Institute of Electrical and Electronic Engineers) Oceans 2005 conference in Washington, D.C., Webb received the IEEE Oceanic Engineering Society's 2005 Distinguished Technical Achievement Award. The award states "Through his technical innovation, from drifting floats to underwater gliders, Mr. Webb is changing the way that we observe the oceans."

The second honor came at Rutgers University Coastal Ocean Observation Lab in New Brunswick, N.J. A classroom at the facility was named the Webb Room in recognition of "a lifetime of achievement providing future generations with new tools to explore and understand the world's oceans."

Webb, who was born in Canada in 1929, received his Masters degree in electrical engineering in 1954 from Manchester University in England. With his wife, Shirley, he moved to Falmouth in 1962 to join the Woods Hole Oceanographic Institution (WHOI). Webb retired from WHOI in 1982 as a Senior Research Specialist.

During his career he authored or co-authored 45 scientific publications and participated in more than 50 research cruises. In 1988, Webb was a co-recipient of the Henry Bryant Bigelow Award in Oceanography, awarded by WHOI, in recognition of development of SOFAR, a technology used to map deep ocean currents. Webb founded Webb Research Corporation (WRC) in 1982. He remains active in managing the company, which employs 22 and is located in the Falmouth Technology Park. WRC develops and manufactures specialized instruments used in ocean research, and serves customers in 17 nations.

Scripps Marine Ecologist Honored

Paul Dayton, professor of oceanography at Scripps Institution of Oceanography, University of California, San Diego, has been selected as winner of the 2004 NOGI Award, science category, by the Academy of Underwater Arts and Sciences (AUAS).

The NOGI (New Orleans Grand Isle) Award dates back to the 1950s, when it was initially presented to world-class spearfishing champions. In the 1960s, the award began to be presented to top achievers in the underwater world by the Underwater Society of America. Each year it is presented to distinguished divers in the categories of arts, science, sports/education and distinguished service. Past winners of the NOGI Award include diving luminaries Jacques Cousteau, Robert Ballard and Sylvia Earle, as well as Scripps diving officer emeritus, James R. Stewart.

A biological oceanographer in the Integrative Oceanography Division at Scripps, Dayton's research focuses on coastal and estuarine habitats, including seafloor (benthic) and kelp communities, as well as global fisheries. He studies California kelp communities, Antarctic benthic communities and the impacts of overfishing on marine ecosystems.

Yoder to WHOI Post

James Yoder, a professor of oceanography and former associate dean at the University of Rhode Island Graduate School of Oceanography, has been chosen Vice President for Academic Programs and Dean at the Woods Hole Oceanographic Institution (WHOI). Yoder was elected at the Board of Trustees meeting at the Institution October 14 and will assume his new duties November 28.

A biological oceanographer, Yoder is well known in the oceanographic research community, having served as a researcher, professor and Director of the Division of Ocean Sciences at the National Science Foundation in Washington, DC.

He has worked at NASA headquarters, been a member of numerous national and international commit-

tees and panels on oceanographic research, taught graduate and undergraduate courses in oceanography at URI, and advised graduate students on their master's and Ph.D. theses.

Yoder will be responsible for the Institution's formal and informal education programs and activities, including the postdoctoral program, the graduate program, undergraduate summer programs, and K-12 activities. James Yoder will succeed John Farrington, who is retiring after serving as Vice President for Academic Programs and Dean for 15 years. Farrington joined the Institution in 1971 as a postdoctoral investigator and subsequently held successive positions in the Marine Chemistry and Geochemistry Department for 17 years, serving simultaneously for six of those years as Director of the WHOI Coastal Research Center. In 1988 Farrington was appointed Michael P. Walsh Professor and Director of the Environmental Sciences Program at the University of Massachusetts, Boston, serving in that capacity until his present appointment at WHOI in 1990.

Everett Joins Schilling Robotics

Schilling Robotics said that industry-veteran Garry Everett has joined the company as director of program management.

Using his experience in setting up and managing production for Sonsub's Innovator ROV build program, Everett will initially focus on the build program for the ultraheavy-duty Schilling UHD ROV at

Garry Everett

Schilling headquarters in Davis, California.

"Garry brings almost two decades of experience in diverse areas of the offshore oil/gas and telecommunication industries," said Schilling Robotics CEO Tyler Schilling. "His offshore experience gives him an excellent perspective on ROV design and manufacture, and will enhance our ability to produce reliable, cost-effective vehicle systems." Schilling continues, "We are rapidly expanding into new segments of the ROV market, and Garry's proven ability to manage resources for complex production programs will be invaluable. We feel fortunate that we can continue to add top-level industry experts such as Garry since this is a key ingredient in our sustained growth."

Before joining Schilling, Everett held various positions in his 18 years with Sonsub, including ROV pilot technician, procurement manager, project engineer, project manager, and production manager.

Most recently, he was responsible for the ROVs and tooling designed and built for BP's deepwater Holstein, Atlantis, Mad Dog, and Thunder Horse projects.

Tyco Signs Contracts

Tyco Telecommunications recently debuted its SEAHORSE Asia Pacific marine maintenance service, and announced the award by Asia Netcom of a long-term maintenance contract for the entire EAC cable system. Asia Netcom awarded Tyco a contract for the marine maintenance of its entire EAC cable system spanning 19,500 km. Tyco will employ its SEAHORSE Asia Pacific service, a two cableship service featuring Reliance Class vessels.

Also, Transoceanic Cable Ship Company, Inc. (TCSC), a subsidiary of Tyco Telecommunications (US) Inc., signed a two-year contract extension with the 48 member companies that comprise the consortium of the Atlantic Cable Maintenance and Repair Agreement (ACMA). The extension adds two years to the contract with TCSC. Under its terms, TCSC utilizes three cable ships and ROVs for the maintenance and repair of ACMA member submarine cables in the Atlantic and Caribbean oceans.

Aker Kvaerner Wins Subsea Umbilical Contract

Aker Kvaerner Subsea won a contract for supply and manufacturing of steel tube umbilicals from Technip Offshore Norge a.s for the operator Hydro's development Fram Øst and Vilje Subsea Project in the Norwegian Continental Shelf.

The contract value for both projects is approximately $15.6 million.

Aker Kvaerner Subsea will deliver engineering, procurement and construction of steel tube umbilicals and associated equipments.

The Fram Øst umbilical, which is a tie-back to the Troll C platform, is approximately 20 km in lengths including both dynamic and static cross section.

The Vilje umbilical is a static umbilical and will be tied-back to the riser base at the Marathon's Alvheim FPSO.

Subsea Tie-in and Connection Contract

Aker Kvaerner Subsea has been awarded a contract for supply of tie-in and connection system for Hydro's Fram Øst and Vilje Field Development in the North Sea through Technip Norge AS. The total contract value for the two projects are approximately $3.5 million.

The Fram Øst field is located in Block 35/11 and will be tied back to the Troll C platform.

The Fram Øst scope of supply is engineering, hardware supply of flowline termination heads, clamp connectors, hubs, porch structures and various caps.

In addition to the hardware equipment, rental of tools and hire in offshore service personnel from our service group will be provided. Delivery of the hardware equipment is February 2006 with offshore service and support July 2006.

The Vilje field, PL036, is located in the North Sea and will be tied back to the Alvheim production facility 19 km away. Aker Kverner Susbea will supply engineering and tie-in equipment for the two wells development. The delivery of the hardware is February 2006 with installation and service support July 2006.

Perry Slingsby Systems For Subsea 7

Perry Slingsby Systems (PSS) said that Subsea 7 purchased five Heavy Lift Tether Management Systems (TMS) to interface with their latest fleet of Hercules ROV systems, which are currently in build. PSS will provide Subsea 7 Ltd. with its latest design of high performance heavy lift capacity TMS, the Enhanced Type III system.

The system features an extended tether length capacity; a control system providing proportionally controlled tether pay-in and pay-out modes, and programmable automatic line speed/pull routines for optimized and safer ROV/TMS docking under unfavorable heave conditions subsea.

TSS Equipment for NOAA Ships

TSS (International) Ltd. announced multiple sales of the Meridian Standard Gyrocompass to the NOAA Marine Operations Center Pacific (Seattle, WA). TSS (International) Ltd. specializes in the manufacturing of motion sensors, gyrocompasses, pipe and cable trackers, and steering control systems.

The systems will be used on the NOAA ship Hi'Ialaka, Ka'Imimoana (Honolulu, HI) and the Rainier (Seattle, WA).

Shell Opens Technical Learning Facility

Shell International Exploration & Production (Shell) opened a technical learning center in its new international headquarters in Rijswijk, the Netherlands. The site will be the primary venue for Exploration & Production (EP) technical training, and is designed to accelerate the technical development of staff.

JDR Cable Appoints Gahm

Paul T. Gahm has been appointed Executive Vice President, Sales & Marketing, worldwide. Formerly Sales & Marketing Manager for Oceaneering Multiflex, Gahm is a 30-year veteran in the offshore oil & gas industry, with emphasis in subsea umbilical markets in North America, the North Sea and Far East/Asia Pacific regions.

Lockheed-Martin Wins Contract

Lockheed-Martin Services Inc. won a $13,305,476 indefinite-delivery/indefinite-quantity, cost-plus-incentive fee, award term, performance based contract to provide services for the operation of the Towed Array Depot to include production, repair, refurbishment, installation, and testing of towed array sonar systems and the associated engineering, technical and logistics sup-

port services.

The contract includes four one-year option periods and three award term years which, if exercised, would bring the cumulative value of the contract to $116,512,788.

Work will be performed in Norfolk, Va. (98 percent) and Pearl Harbor, Hawaii (2 percent) and is expected to be completed by September 2006 (September 2013 with options and term years). Contract funds will not expire at the end of the current fiscal year.

The Space and Naval Warfare Systems Center, Charleston, S.C., is the contracting agency activity.

Perry Slingsby Systems, Geoconsult Sign Contract

Geoconsult AS recently purchased two 3,000 m Triton XLS 125 hp systems from Perry Slingsby Systems. Both systems will be permanently installed on one of Geoconsults new vessels during the first quarter of 2006.

FPI Wins 3-Year Contract

Fugro Pelagos, Inc. (FPI) negotiated a contract with the U.S. Army Corps of Engineers (USACE), Mobile District to provide surveying and mapping services in support of the Joint Airborne LIDAR Bathymetry Technical Center of Expertise (JALBTCX) Regional Coastal Mapping and Charting Program, as well as other USACE programs. The contract will primarily employ Airborne Hydrographic LIDAR, but also includes several other Remote Sensing technologies. The Indefinite Delivery Indefinite Quantity contract is for three-years, and not-to-exceed $12 million.

To more effectively support this contract and FPI's existing Airborne Hydrographic LIDAR support contract with the U.S Navy's Naval Oceanographic Office (NAVO), the company has opened a permanent office in Kiln, Miss., at the Stennis International Airport.

Scripps Scientists Participate in First Surface Vessel Voyage

Two ships taking part in a recently completed research voyage investigating the oceanography, marine geology, geophysics and ice cover of the Arctic Ocean have become the first surface vessels to traverse the Canada Basin; the ice-covered sea between Alaska and the North Pole.

The Swedish vessel Oden and the U.S. Coast Guard's Healy, both icebreaking vessels outfitted for oceanographic research, completed the historic south-to-north trek in September as part of a recently concluded expedition to explore the marine environment in this unknown region.

Although the same area had been crossed by submarines, the central Arctic Ocean had been Earth's least explored ocean area by surface ships due to its heavy concentration of floating sea ice, which in some areas spans more than 10 ft. thick.

Jim Swift, a research oceanographer at UCSD's Scripps Institution of Oceanography, participated in the voyage as leader of a five-person team on board Oden that analyzed ocean conditions in an effort to better understand the Arctic's role in the earth's ocean and climate system. Other scientists on board Oden and Healy hailed from Sweden, Finland, Canada, Germany, Norway and Denmark.

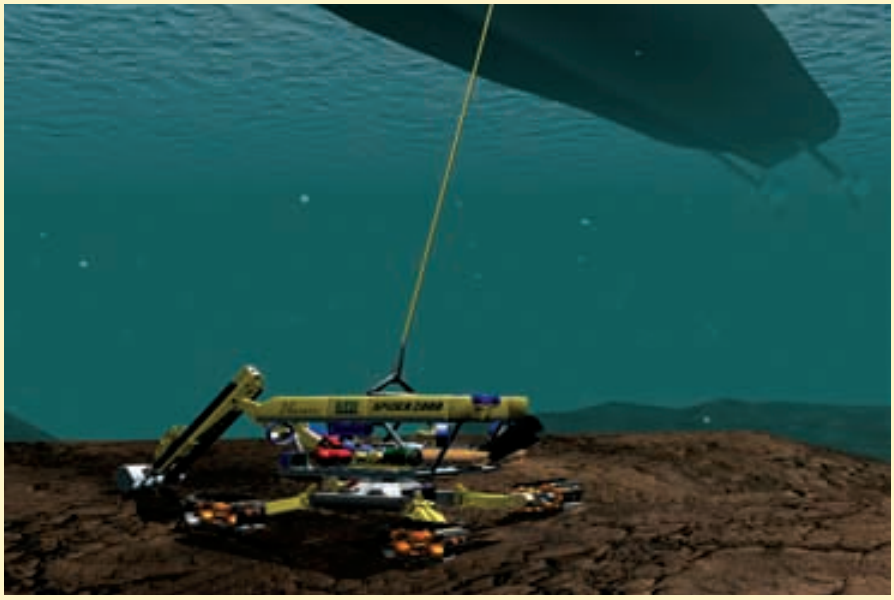
According to Swift, part of the reason the Canada Basin surface crossing could be attempted and achieved at this time is because the ice cover over much of the Arctic Ocean has thinned in recent decades, opening the door to surface ships. However, the two vessels still encountered areas of extremely thick ice, forcing the ships to work in tandem to cut through the ice and forge a passage to the North Pole.

Strategic route planning using satellite ice images and frequent helicopter ice reconnaissance aided the navigation.

Swift's investigations aboard Oden, research funded by the U.S. National Science Foundation Office of Polar Programs, involved examinations of ocean properties to help evaluate recent changes in ocean climate and global change studies.

Swift and his team measured the seawater's temperature, salinity and chemical characteristics. Ultimately, the new data will aid assessments of climate change and be used to improve and test scientific models that describe the climate system.

Spider Dredging System by Nexans



Nexans has developed a terrain dredger/sub-sea intervention system called the Spider. The Spider combines powered tracks with an articulated walking leg system, enabling it to function in uneven sub-sea terrain with up to 35 degrees slope. It is built to work in water depths of approximately 1,000 m. The Spider's movements are controlled by operators located aboard a support vessel, it is launched via a specialized Launch & Recovery System (LARS). Power and signals between the vessel and Spider are supplied through an umbilical.

During deployment, the operator follows the Spider's movements via underwater cameras.

When disturbed sea bed material reduces visibility.

Use of a virtual 3D computer image of the seabed, which is prepared by the onboard survey operator and loaded into the Spider's data system can provide an alternative view of the environment.

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SeaBotix Inc. Adds LBV

LBV1500F

SeaBotix added to the LBV range of ROV systems. There are five primary categories: LBV1502, LBV3002, LBV6002, LBV15002 and "Fly Outs". The number designates the LBV's depth rating in meters and the "Fly Out" category offers three systems in the greater depth ratings. Each model has standard features; including powerful thrusters, small diameter umbilical, two forward cameras, lamp tracking camera, lateral thruster, auto depth/heading, and video overlay.

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Cable Tracking

Innovatum International developed a method of locating and surveying submarine power cables at five meters burial depth, by "magnetizing" the armor of the cable and using the Innovatum ULTRA magnetic cable and pipe tracking system. The method was tested during cable burial trials in June 2005.

Trials consisted of two phases - magnetizing the cable and subsequently proving the tracking performance. The barge installer was used to deploy and bury a test section of the cable, and all work was carried out from this vessel. The cable was magnetized during the lay process

and tracked after burial to five meters. The tracking array was suspended from a long reach crane, and results showed the cable could indeed be tracked and its position pinpointed.

Visit www.maritimeequipment.com/mt & Click No. 3

Sonavision's New Hawkeye Camera

Sonavision Limited's new model for the Hawkeye range of video cameras is the Hawkeye 65CT, designed as a lightweight titanium-housed color camera, with an electronics balanced line driver capable of delivering video over a 500 m twisted pair cable, or via a 1,000 m coaxial cable. Designed for use by commercial divers over long umbilicals, the camera weighs 150 g, is 140 mm long and 36 mm in diameter.

Visit www.maritimeequipment.com/mt & Click No. 4

Simrad's Multibeam Echosounder for Fisheries Research

Simrad and IFREMER (French Marine Institute) developed the ME70, a new multibeam echo sounder for fishery research purposes. The first ME70 will be installed onboard French research vessel, Thalassa and Simrad is also working

on a version for the IMR (Norwegian Marine Institute). Simrad ME70 is designed to provide a greatly increased sampling volume, and is also designed to see fish close to the bottom. It operates in the 70 to 120 kHz frequencies with a configurable acoustic fan containing 3 to 45 stabilized beams. Each beam is from 2° - 3° wide depending on operational frequency, with a maximum total swath width of ±45°. Minimum acquisition depth is less than 1m below the surface and maximum acquisition depth is approximately 700 m for a -20 dB single target and 800m for a -40 dB volume target.

Visit www.maritimeequipment.com/mt & Click No. 5

UUV Modular Batteries

Lithion Inc. a division of Yardney Technical Products, offers a new, high-capacity modular battery system using Lithium-ion technology. Based on the ASDS (Advanced SEAL Delivery System) battery developed for the U.S. Navy, it is designed to allow for the safe storage of more than 1.2 MW-hours of energy.

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SUNWEST delivers CTFM Sonars to USN

Sunwest Technologies, Inc. delivered three Super Search SS300 CTFM sonars to the Naval Undersea Warfare Center. The high-resolution, long-range systems are designed to perform search and obstacle avoidance functions during practice torpedo recovery operations. According to the manufacturer, operators report excellent target detection with the digital sonars which provide unique audio tone characteristics related to range and target composition. The systems are equipped with pinger receivers tunable over a 20 - 50 kHz band.

Visit www.maritimeequipment.com/mt & Click No. 7

DeepSea Power & Lights' SeaSphere

DeepSea Power & Lights' SeaSpheres are engineered to be the highest performance buoyancy product available for missions to depths greater than 4000 m, and the company recently released the largest SeaSphere to date, a 216 mm (8.5 in.) diameter seamless, hollow ceramic sphere.

SeaSpheres are currently being manufactured as the primary floatation for a new ROV/AUV that will be used to explore the deepest areas of the Challenger Deep (10,912 m). SeaSpheres are cast from high purity alumina (Al2O3), a strong and lightweight ceramic.

Visit www.maritimeequipment.com/mt & Click No. 8

Waterproof ROV Surface Control Equipment

A new, completely sealed and waterproof surface control unit for ROV operations has been developed by Seaeye. The unit is rated to the international standard IP68, and is designed to withstand emersion to one meter. Designed for use with their Seaeye Falcon ROV, the unit's special sealing arrangements and slip-ring hinge between base and lid, means it is also fully protected against dust ingress in any hazardous shore-based environment.

Visit www.maritimeequipment.com/mt & Click No. 9

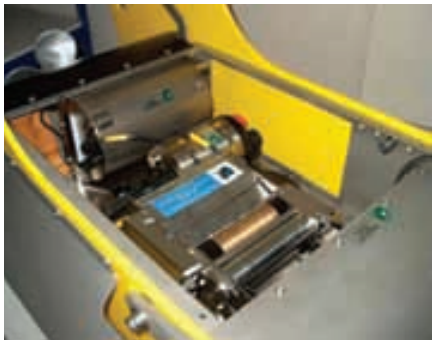
Schilling Debuts Titan 4

The newest model of Schilling Robotics' Titan manipulator series, the Titan 4, is designed to be a lighter-weight, simplified system. The Titan 4 design relocates the slave arm electronics from a separate enclosure to the manipulator forearm, eliminating the subsea slave controller, slave cable, and 79-pin wiring harness. The new design also reduces Titan system weight by approximately 18 kg (40 lb) in air and 9 kg (20 lb) in water. The standard depth rating has increased to 4,000 m, and a 7,000-m model is also available.

Visit www.maritimeequipment.com/mt & Click No. 10

CTG Presents Nv-Shuttle

Chelsea Technologies Group (CTG) delivered an instrumented towed undulating oceanographic recorder, N?-Shuttle, to the Marine and Coastal Management Group of the Department of Environment and Tourism, Cape Town, South Africa to be utilized within their monitoring programs in the Benguela system. The Nv-Shuttle will first be used on the RV Africana and the RV Algoa to complement the routine St Helena Bay and SARP monitoring lines. The monitoring at fixed locations will be complemented by either towing continuously back along the monitoring line or by towing between stations and retrieving the Nv-Shuttle every 10 nautical miles.



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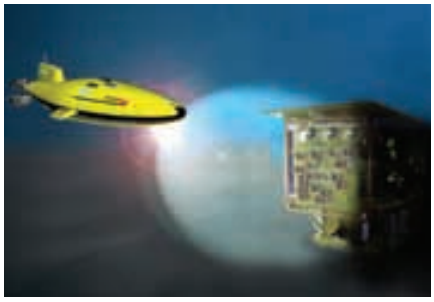
ECA to Conduct AUV Trials in GoM



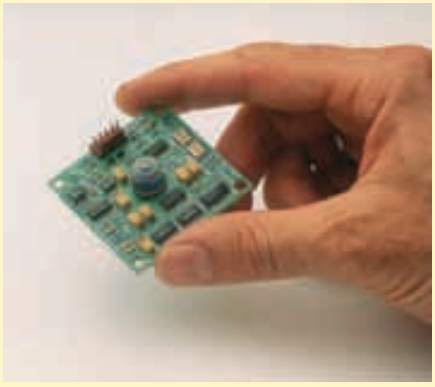
The offshore sea trial using the Alistar 3000 Inspection AUV was designed by BP to evaluate the technology. It will be located in the company's deepwater King Field in the Gulf of Mexico and will comprise:

- Passive pipeline inspection: Alistar 3000 will locate and follow a pipeline at various altitudes above the pipeline while recording video, sonar data and actual flowline position,
- Active pipeline inspection: Alistar 3000, using on-board sensors that can automatically detect anodes or anomalies while tracking the flowline, will modify its mission to carry out closer General Visual Inspection (GVI) of the detected features,
- Structure inspection: Alistar 3000 will follow the flowline to a pipeline end structure and will process in real time, sensor information to maneuver around the structure to perform a GVI.

Visit www.maritimeequipment.com/mt & Click No. 12

AGI Clinometers Monitor Tsunami Prediction Modules Position

The National Data Buoy Center (NDBC) installed 50 tilt monitors from Applied Geomechanics Inc. (AGI) of Santa Cruz, Calif. The Model 900-45 clinometers are designed to read the orientation of seafloor water-pressure recorders for early detection of tsunamis in the open ocean. NDBC has deployed bottom pressure recorders (BPRs) paired with moored surface buoys in numerous locations worldwide. The seafloor instrument/acoustics package to which each buoy is tethered allows early identification and real-time monitoring of developing tsunamis. This effort is the Deep Ocean



Assessment and Reporting of Tsunamis (DART) project, a component of the U.S. National Tsunami Hazard Mitigation Program.

Data transmitted from a BPR to its companion buoy by an acoustic link are relayed via satellite to ground stations, which demodulate the signals for immediate dissemination to NOAA's Tsunami Warning Centers and NDBC. In their standard monitoring mode, the BPRs report 15-minute average values of sea surface height each hour. When the internal software identifies a possible tsunami event, 15-second values are transmitted during the first few minutes, followed by 1-minute averages. If no further events are detected, after four hours the system returns to standard mode.

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TRIAXYS Directional Wave Buoy

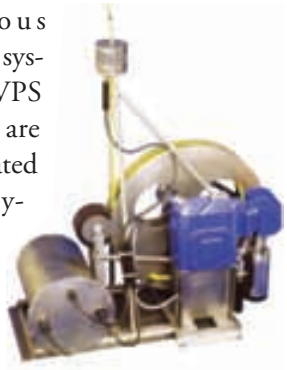
TRIAXYS Directional Wave Buoy is a precision instrument designed to be an economical buoy for accurate measurement of directional waves. The buoy is solar powered and easy to handle during deployment, as it can be rolled off a ship deck without concern of sensor damage due to spinning. The TRIAXYS sensor unit is comprised of three accelerometers, three rate gyros, a fluxgate compass and the proprietary TRIAXYS Processor. Wave and sea surface temperature data are processed and logged on the buoy and then transmitted via VHF, cell or satellite telemetry to a base station hosting AXYS' WaveView software which allows for full presentation and archiving of data along with diagnostic utilities.

www.seadiscovery.com

Visit www.maritimeequipment.com/mt & Click No. 14

InterOcean Systems Underwater Winches

InterOcean's underwater winches are designed for use in any vertical profiling application. They are available separately or as part of a complete Vertical Profiling System (VPS). These winches are offered in a range of sizes with a variety of capabilities, for integration within an underwater ocean observatory or as an autonomous stand-alone system. VPS winches are sized and rated for deployment in coastal regions in water depths down to 300 m, or may be installed on moored subsurface buoyancy platforms in deep water applications. They are fully automated and feature stainless steel construction, underwater mateable connectors, pressure compensated (oil-filled) components, premium slip ring assemblies, regulated power systems, and serial interface for diagnostic, control, and command functions.



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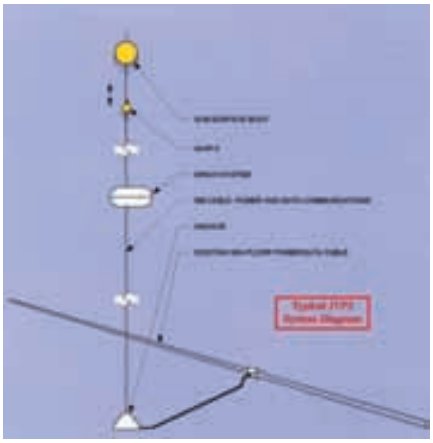
Autonomous Vertical Profiling Systems

InterOcean's Vertical Profiling System (VPS) autonomously collects and telemeters high resolution time-series vertical profile data, providing a complete spectrum of oceanographic parameters in real-time. Each unit collects detailed vertical profiles for the target depth range on a regular automated cycle, providing time-series data sets for long-term deployments. Each VPS consists of four major subsystems: winch system, S4VP-3 sensor platform, subsurface buoy with system controller, and bottom mounting system.



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SHOALS-1000T

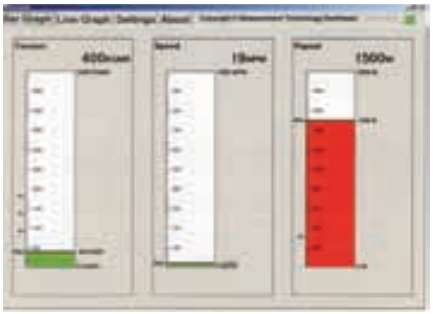
SHOALS-1000T is a complete airborne laser bathymetry survey instrument for shallow water and coastal regions. Coupled with a fully integrated flight planning and data processing software subsystem, SHOALS-1000T is a total coastal survey management solution,

designed for surveys in shallow water, with land/water interface, hazardous areas, and areas requiring rapid environmental assessment. It features area coverage rates as high as 70 sq. km/hr and collects data with a high-accuracy laser, mounted in the aircraft floor.

Visit www.maritimeequipment.com/mt & Click No. 17

WinchDAC Winch Monitoring and Data Logging System

The WinchDAC monitoring system displays line tension, payout, and speed for multi-winch installations through a central operator computer interface. Signals from count and force sensors mounted on each winch are captured and converted into engineering units by an LCI processor, and the resulting data moves through



a serial interface to a central PC with optional touch-screen display. The program has the ability to log and summarize data for each winch and cast, replay the time history plot for any parameter from past casts on a second screen, calibrate winch tension and count sensors directly from the central computer, and allow operators to customize the display to their specific requirements.

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GAVIA - The Great Northern Diver

The GAVIA autonomous underwater vehicle (AUV) is a fully modular, small torpedo shaped vehicle capable of diving to 2,000 m. It is an autonomous system in a small package that can be configured for a wide range of research, surveying or monitoring tasks. The system features fully shrouded propeller and control surfaces, over-the-horizon operation and servicing, expandable control software and chart-based graphical mission planning. Benefits of modularity are numerous and include rapid battery replacement, reduced maintenance cost and customization options.

Visit www.maritimeequipment.com/mt & Click No. 19

Saft Lithium Batteries LSX Series

The LSX Series of lithium batteries from Saft features corrosion-proof containers and an operating range of -60º C to 85º F. The batteries are non-restricted for transport and have a low self-discharge rate (less than 2% after one year of storage at 20ºC) and an operating voltage greater than 3V. The batteries are suited for a range of applications; including utility metering, radio communication, emergency location buoys, memory back-up, real time clocks, and night vision.

Visit www.maritimeequipment.com/mt & Click No. 20

Expendable Bathythermograph (XBT)

The XBT contains a precision thermistor located in the nose of the probe. Changes in water temperature are recorded by changes in the resistance of the thermistor as the XBT falls through the water. It is capable of temperature accuracies of ±0.1ºC. Temperature profiles and computed sound velocity data obtained by the XBT are used by Anti-Submarine Warfare (ASW) operators to identify the impact of temperature on sonar propagation and acoustic range prediction. The XBT also provides a means of collecting temperature data for oceanographic and geophysical studies. It is available in air-launched and sub-launched configurations.

Visit www.maritimeequipment.com/mt & Click No. 21

Low Drag ADCP Buoy

The Flotation Technologies StableMoor is designed to reduce drag and increase mooring stability in extreme flow regimes. With a theoretical drag coefficient of 0.3, StableMoor is a solid syntactic foam, torpedo-shaped buoy featuring a new stainless steel mooring swivel to provide smooth transitions to changes in current direction.

Visit www.maritimeequipment.com/mt & Click No. 22

Ethernet Data & Power Module (EDPM-4)

The Ethernet Data & Power Module (EDPM-4) allows the user to see all the sensor data from the Acrobat in real time, and can also power payloads, providing up to 150

W of 12 and 24 VDC. The system utilizes SDSL technology to provide adaptive data rates based on wire length, noise, etc. All data is transferred over a single pair of twisted wires. The onboard Acrobat control station has a second SDSL and Ethernet switch. One or more computers can plug directly into the switch to become part of the Acrobat network.

Visit www.maritimeequipment.com/mt & Click No. 23

Sutron's Main Tide Station

Sutron worked closely with NOAA's National Ocean Survey to develop the Main Tide Station, which is designed to detect an array of events. It is built to survive in harsh, coastal environments, and to support a variety of water level monitoring and weather instruments. The system provides pre-programmed support for all NOS-required tidal data processing, including: six minute GOES self-timed transmissions, one-hour GOES self-timed data transmissions, DQAP (Outlier elimination) water level averaging, redundant data transmissions, and tsunami and storm surge data processing and transmission.

Visit www.maritimeequipment.com/mt & Click No. 24

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

MECHANICAL ENGINEER

Job Location: India, mumbai
ship repairing tasks;
1.hull repairing jobs-steel renewal and refitting works.
2.rotary machinery works-overhauling and installation
3.engine overhauling works-six cylinder,eight cylinder, twele cylinder engine such as dihatsu engine, bergine diesel engine, nohab diesel engine.
4.gear box overhauling works and installation such as ulstein propeller gear box.
A.RAJ
INDUS MARINE PVT. LTD
G-21, ROOM NO-11,
ML CAMP, MATUNGA-POST, MUMBAI
MUMBAI, SD
Australia
Phone: 022-24096392
Email: antorajmech@yahoo.co.in

OCEANOGRAPHIC FIELD TECHNICIAN

Job Location: USA, TX Houston
Fugro GEOS is the world's foremost provider of commercial oceanographic measurement, assessment and consulting services, with offices in the US, UK, Norway, Malaysia, UAE and Singapore. The Company is part of the multi-national Fugro Group that provides a complete range of integrated geotechnical, environmental, survey and positioning services world-wide. To meet the demands of our rapid market expansion throughout the Americas, we are seeking to employ the following high caliber staff members to be based in Houston:
OCEANOGRAPHIC FIELD TECHNICIAN
The chosen individual will be a core member of our operational team that has an excellent reputation for the provision of reliable and accurate oceanographic measurement services. The role will involve a number of key activities including:
- The deployment, recovery, and servicing of oceanographic measurement instrumentation.
- The installation and maintenance of real-time measurement systems and their associated deployment systems.
- The maintenance of accurate and detailed instrument service records, trip reports, and logs.

The ideal candidate will be:
- Experienced in testing, installation, and data handling of real-time serial and analog data acquisition systems.
- Experienced in servicing and maintaining marine scientific equipment or similar devices.
- Prepared to travel both domestically and internationally and to work aboard offshore vessels and installations.
- Willing to work a flexible call-out schedule involving 150 - 250 field days per year with time off between jobs.
- Attentive to details and able to work independently in the field.

In return Fugro GEOS offers a dynamic team based, working environment in an exciting and developing market, as well as the long-term potential for you to develop your skills and career. Compensation will be commensurate with qualifications and experience and includes a full benefits package. EOE. If you are up to the challenge please fax resume to (713) 346-3605, e-mail to geosus@geos.com or mail to Fugro GEOS, Inc., P.O. Box 740010, Houston, TX 77274. Deadline for application 25 November 2005.
Jan van Smirren
Fugro GEOS Inc.
6100 Hillcroft
Houston, TX 77081
USA
Phone: 713-346-3611
Email: smirren@geos.com
WEB: http://www.geos.com

OCEANOGRAPHIC ENGINEER

Job Location: USA, TX Houston
Fugro GEOS is the world's foremost provider of commercial oceanographic measurement, assessment and consulting services, with offices in the US, UK, Norway, Malaysia, UAE and Singapore. The Company is part of the multi-national Fugro Group that provides a complete range of integrated geotechnical, environmental, survey and positioning services world-wide. To meet the demands of our rapid market expansion throughout the Americas, we are seeking to employ the following high caliber staff members to be based in Houston:
OCEANOGRAPHIC ENGINEER
The chosen individual will be a core member of our operational team that has an excellent reputation for the provision of reliable and accurate oceanographic systems. The role will involve a number of key activities including:
- The design and specifications of metocean data acquisition systems, including custom systems integration.
- Documentation of Systems including maintenance of accurate and detailed records pertaining to the system, instrumentation and offshore reports
- Development of Acceptance Testing Procedures and Implementation
- Offshore installation, servicing and maintenance of systems.

The ideal candidate will be:
- Educated in electronics, with experience in design and building of metocean systems.
- Prepared to travel both and internationally, with experience of working in the offshore environment both aboard vessels and fixed installations.
- Attentive to detail
- Be able to work independently or as part of a team on a wide range of projects
- Have excellent written and oral communication skills in English
- Familiar with AutoCAD

In return Fugro GEOS offers a dynamic team based, working environment in an exciting and developing market, as well as the long-term potential for you to develop your skills and career. Compensation will be commensurate with qualifications and experience and includes a full benefits package. EOE. If you are up to the challenge please fax resume to (713) 346-3605, e-mail to geosus@geos.com or mail to Fugro GEOS, Inc., P.O. Box 740010, Houston, TX 77274. Deadline for application 25 November 2005.
Jan van Smirren
Fugro GEOS Inc.
6100 Hillcroft
Houston, TX 77081
USA
Phone: 713-346-3611
Email: smirren@geos.com
WEB: http://www.geos.com

OCEANOGRAPHIC CONSULTANT

Job Location: USA, TX Houston
Fugro GEOS is the world's foremost provider of commercial oceanographic measurement, assessment and consulting services, with offices in the US, UK, Norway, Malaysia, UAE and Singapore. The Company is part of the multi-national Fugro Group that provides a complete range of integrated geotechnical, environmental, survey and positioning services world-wide. To meet the demands of our rapid market expansion throughout the Americas, we are seeking to employ the following high caliber staff members to be based in Houston:
OCEANOGRAPHER - CONSULTANCY DIVISION
The chosen individual will be a core member of our consultancy team that has an excellent reputation for the provision of meteorological and oceanographic consultancy. The role will involve a number of key activities including:
- The preparation of operational and design criteria reports for the Gulf of Mexico and worldwide.
- Physical oceanographic and meteorological data processing, analysis and report writing.
- Project management.

The ideal candidates will demonstrate the following attributes:
- Educated in marine science with interest/experience in all aspects of physical oceanographic data analysis.
- Familiar with metocean criteria preparation.
- Highly resourceful and PC literate with strong problem solving instincts and close attention to detail.
- Experienced in use of Matlab
- Knowledgeable of the current processes that occur in the Gulf of Mexico.
- Commercial awareness.

In return Fugro GEOS offers a dynamic team based, working environment in an exciting and developing market, as well as the long-term potential for you to develop your skills and career. Compensation will be commensurate with qualifications and experience and includes a full benefits package. EOE. If you are up to the challenge please fax resume to (713) 346-3605, e-mail to geosus@geos.com or mail to Fugro GEOS, Inc., P.O. Box 740010, Houston, TX 77274. Deadline for application 25 November 2005.
Jan van Smirren
Fugro GEOS Inc.
6100 Hillcroft
Houston, TX 77081
USA
Phone: 713-346-3611
Email: smirren@geos.com
WEB: http://www.geos.com

DRAFTSMANS AND NAVAL ARCHITECT

Job Location: United Arab Emirates, Dubai
Exomos is looking for its design department several draftsmen and one naval architect to work on new designs and existing hulls. Drawing, drafting, 3D, CAD, hull resistance and speed predictions.
Herve Jaubert
Exomos
Jebel Ali Free zone
Dubai, Dubai 18681
United Arab Emirates
Phone: 971 488 35222
Fax: 971 488 35228
Email: hjaubert@emirates.net.ae
WEB: http://www.exomos.com

WIG ENGINEER

Job Location: United Arab Emirates, Dubai
To design,develop and build commercial wing in ground effect hovercrafts and vessels.
Herve Jaubert
Exomos
jebel Ali Free zone
Dubai, Dubai 18681
United Arab Emirates
Phone: 971 488 35222
Fax: 971 488 35228
Email: hjaubert@emirates.net.ae
WEB: http://www.exomos.com

CHIEF MECHANICAL ENGINEER

Job Location: USA, WA Redmond
Sound Ocean Systems, Inc. (SOSI) is a leading and innovative manufacturer of specialized marine equipment and related engineering and design services. Our hardware products range from shipboard equipment such as winches and handling systems, in-water systems such as towed bodies, oceanographic data buoys and bottom platforms, to marine mining and other deep water systems capable of operating in 6,000 meters of water. Our engineering services related products include feasibility studies, conceptual design, detail design, engineering and project management services. We have an immediate opening for an experienced chief mechanical engineer.
This is an excellent opportunity for an individual with the right skills. We are looking for someone with ten or more years experience in the engineering and design development, manufacture, and test of marine equipment similar or comparable to SOSI's existing products. Additionally, experience with industrial field fabrication will be beneficial. The applicant must possess good communications skills and be capable of not only working independently with minimum supervision, but must be able to effectively manage the company's small engineering and design team. The candidate must be detail oriented, a team player, a motivated self-starter, and have a BS or advanced degree in mechanical engineering. A Professional Engineering license in the State of Washington is highly desirable. Extensive experience in AutoCAD and Inventor software is required as is experience with Microsoft office products.
The successful candidate will be hired as the Engineering Design Manager & Chief Engineer of the company. As such, the successful candidate will be responsible for all engineering and design activities of the company including the day to day management, allocation and direction of the company's internal and external engineering and design resources. The Chief Engineer will be responsible for implementing the Configuration Management and other engineering and design related processes of the company. The Chief Engineer will assist estimating, project management and sales efforts by providing estimates of engineering labor hours and timelines for new product development and other required engineering activities.
Ted Brockett
Sound Ocean Systems, Inc.
P.O. Box 2978
Redmond, WA 98075
USA
Phone: 425-869-1834
Fax: 425-869-5554
Email: ted@soundocean.com
WEB: http://www.soundocean.com

SYSTEMS ANALYST / PROGRAMMER

Job Location: Australia, Hobart

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

We are seeking a scientific systems analyst/programmer with experience in real time data acquisition and display, and data analysis to join our Data Acquisition and Processing Group. The successful applicant will be responsible for undertaking a review of our current vessel based data acquisition, display, logging and processing systems and practices and benchmarking them against our international peers.
Based on the results of the review the applicant will develop a strategy for the upgrade or replacement of the scientific data systems on the Austrlian Marine National Facility that will be both best in class and adaptable for future needs.
Simon Allen
CSIRO Marine & Atmospheric Research
Castray Esplanade
Hobart, Tasmania 7000
Australia
Phone: +61 3 6232 5476
Email: simon.allen@csiro.au
WEB: http://www.cmar.csiro.au

INSTRUMENT TECHNICIAN

Job Location: USA, LA Cocodrie
The Louisiana Universities Marine Consortium (LUMCON) has an opening for an Instrument Technician to maintain and assist in the deployment of a growing system of coastal monitoring stations. See http://weather.lumcon.edu/.
Each station has weather and water property sensors, and a data gathering communications package for sending information to the LUMCON Marine Center. The LUMCON Coastal Monitoring Technician is responsible for all aspects of station design, parts procurement and inventory, fabrication, testing, installation and trouble shooting at all LUMCON Coastal Monitoring Stations, and regular cleaning, calibration and maintenance of the station instrumentation. Responsibilities also include maintaining accurate and detailed metadata records for all actions pertaining to the stations and instrumentation, and working with LUMCON IT personnel to upgrade the web-based data display protocol. The Instrument Technician will participate in the planning and installation of new stations, and establish maintenance schedules for all stations under the supervision of the Director for Operations and Facilities.
A bachelor's or master's degree in an Earth Sciences program and experience with field instrumentation is recommended.
Specific skills include the ability to maintain and troubleshoot analog and digital electronic instrumentation systems, batteries, solar arrays, and rf modem communication systems. Familiarity and demonstrated proficiency with Campbell Scientific Loggernet software, Campbell Scientific dataloggers, Microsoft Windows 2000 operating system, serial and TCP/IP communication protocols, radio communication hardware interfaces, and Microsoft Excel or similar data manipulation/visualization software, along with field experience and small boat handling capabilities are desired.
Salary range commens
Brenda Leroux Babin
LUMCON
8124 Highway 56
Chauvin, LA 70344
Phone: 985-851-2878
Fax: 985-851-2874
Email: bbabin@lumcon.edu
WEB: http://weather.lumcon.edu

SEA GRANT MARITIME EXTENSION EDUCATOR

Job Location: USA, MN Duluth
Applications and nominations are invited for the position of Sea Grant Maritime Extension Educator. The office is at Washburn Hall, University of Minnesota Duluth (UMD). The position is in the University of Minnesota's academic staff category with the title of Extension Educator. The Maritime Extension Educator will work with the maritime industry, policy makers, natural resource professionals, the Great Lakes Sea Grant community, and Great Lakes researchers to increase cooperation among organizations, improve environmental management, and apply university research results to help solve problems and improve efficiencies. Complete position responsibilities can be found at http://www.d.umn.edu/umdhr/umdjobs.html

The candidate must have a Masters degree and three years experience. Preferred qualifications include: 1. Understanding of Great Lakes maritime issues such as supply chain security, short sea shipping, intermodal transportation, economic and environmental impacts, waterway infrastructure maintenance, ballast water management to minimize invasive species introductions, and trade and regulatory policies. 2. Ability to coordinate and manage multiple projects and to keep and maintain good records. 3. Good skills in managing schedules, budgets, and contracted services. 4. Strong interpersonal skills, particularly the ability to work effectively with a diverse group of individuals, both within and outside the college and university. 5. Demonstrated ability to work as part of a team including experience leading project teams. 6. Demonstrated ability to develop and implement a successful outreach program related to the GLMRI and Sea Grant missions. 7. Ability to communicate complex maritime related issues effectively to lay audiences. 8. Demonstrated ability to use new technologies to conduct educational programs and to conduct routine office management. 9. Experience in developing and implementing regional and national extension programs.

Applicants should provide letter of application, vitae, and names, telephone numbers, e-mail addresses and mailing addresses of three references to: Marie Zhuikov, Search Committee Chair, Minnesota Sea Grant, 2305 E 5th Street, University of Minnesota Duluth, Duluth, MN 55812
Phone: (218)726-7677, e-mail: mzhuikov@d.umn.edu

Review of complete applications will begin November 1, 2005 and will continue until position is filled.

The University of Minnesota is an Equal Opportunity Educator and Employer.
Marie Zhuikov
University of Minnesota Sea Grant Program
2305 E 5th St
Duluth, MN 55812
USA
Phone: 218-726-7677
Fax: 218-726-6556
Email: mzhuikov@d.umn.edu
WEB:
http://www.d.umn.edu/umdhr/umdjobs.html

JR. TECHNICAL SALES REPRESENTATIVE

Job Location: USA, TX Houston
MacArtney Offshore, Inc. is looking for an enthusiastic individual to work in the Sales Department at its Houston, TX location. This position will be responsible for inside sales activities of company products and services to the Oil and Gas, Defense and Oceanographic markets.
Position Description:
This position is responsible for Customer service duties and will include Communication with Customer; Preparation of technical proposals/quotes, Purchase and Sales Order Entry and Tracking. The Technical Sales Rep will be responsible for identifying, organizing and maintaining customer accounts, and accurate recordkeeping.
Applicant Requirements:
The ideal candidate will have:
- Strong Technical back ground, electrical or mechanical engineer, field technician etc.
- Good organizational and follow-up skills
- Excellent written and verbal communication skills
- Experienced in Microsoft Office (Word, Excel, Outlook)
- Familiar with Quick books, MRP/ERP and AutoCad
- Experience with Subsea / Marine Products preferred

Applicant must be a self-starter and able to work independently.
Qualified candidates should respond with a cover letter detailing salary requirements and resume to General Manager; email offshore@macartney.com, Fax to 713-266-7519
Job location: Houston, TX
Lars Hansen
MacArtney Offshore
3660 Westchase Drive
Houston, TX 77042
USA
Phone: 713 266 7575
Fax: 713 266 7519
Email: lfh@macartney.com

ASSOCIATE RESEARCH ENGINEER

Job Location: USA, PA State College
Responsible for research and development of new technologies for application to the analysis and control of advanced Autonomous Underwater Vehicles (AUVs). This job provides an opportunity to design and implement control and guidance algorithms in systems utilizing an advanced rapid-prototyping and development process. Contribute to the development and maintenance of system-level simulations of a range of AUVs and participate in at-sea testing of new AUV systems and advanced technologies. Perform advanced research on AUV systems ranging from large (>5 tons) to small (<200 lbs) and slow (2-6 kt) to speeds where there is involvement in developing relevant models of physics. Requires Bachelor`s degree (Master`s degree preferred) or equivalent in Mechanical, Aero, or Electrical Engineering, plus two years of work-related experience. Experience in modeling and simulation of physical systems, control system analysis and design, and programming in Matlab/Simulink and C/C++ preferred, as well as a demonstrated ability to work independently. Candidates selected will be subject to a government security investigation and must meet eligibility requirements for access to classified information. U.S. Citizenship required.
Electronic Job Management System
Penn State University
Position #20439
Apply via web at listed url.
Email: jed8@psu.edu
WEB:
http://www.psu.edu/ur/jobs.html

MATERIALS/PRODUCTION TECHNICIAN OR ENGINEER

Job Location: Canada, Halifax
The Oceanography Department at Dalhousie University requires a materials/production technician or engineer to take a leading role in a grant-paid (renewable) research project on the manufacture, testing, refinement and industrial production of large numbers of small particles with uniform properties. For details and contact information, see:
http://oceanography.dal.ca/ocean_5323.html
Chris Taggart
Dalhousie University
Halifax, Nova Scotia
Canada
Fax: 902-494-3877
Email: chris.taggart@dal.ca
WEB:
http://oceanography.dal.ca/ocean_5323.html

NAVIGATOR

Job Location: , Offshore
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 from all disciplines of marine data acquisition. We have a rewarding opportunity for a Navigator in our various global offshore locations.
The qualified incumbent will be responsible for the recording quality of navigation data onboard the vessel. In charge of the accurate setup and operation of ALL navigation acquisition systems and sub-systems onboard the assigned vessel. Ensure that all components of navigation acquisition operations run efficiently and effectively to minimize down time. Perform installation and maintenance of the above systems and their associated cables and antennas located on the masts, catwalks and on in-water floats. Perform proper layout of seismic recording equipment and ensure proper connections have been made to recording equipment.
Requirements:
Working knowledge of UNIX preferred but not required. GPS - Navigation experience a plus. Associates degree or above in Hydrographic Surveying, Marine Science, Marine Technology or Electronic Engineering a plus. Must possess willingness and ability to travel and work offshore for extended periods of time (current rotation is six weeks offshore / six weeks leave). Must have a valid passport before starting employment. Submit to and pass a drug screening and UKOOA medical. Obtain a Basic Offshore Safety Induction and Emergency Training Certificate before starting employment (this is scheduled and paid for by the company). Team player with strong interpersonal communication and organizational skills. Proficient computer skills.
Company Offers:
Paid travel to and from crew change location. Accommodations and meals provided while onboard the vessel. Bonus Incentive Plan, after successfully completing Trainee period

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

and training program.
Interested applicants may apply online by visiting http://www.veritasdgc.com/ and completing an Online Application by clicking the "Career" tab.
Veritas is an equal opportunity employer.
Human Resources
Veritas Geophysical Corporation
10300 Town Park Drive
Houston, TX 77082
USA
Phone: 832-351-8300
Fax: 832-351-8721
Email: vgshr@veritasdgc.com
WEB: http://www.veritasdgc.com

NAVIGATIONAL ANALYST

Job Location: USA, Offshore
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 from all disciplines of marine data acquisition. We have a rewarding opportunity for a Navigational Analyst in our various global offshore locations.
The qualified incumbent will determine that sufficient raw data is recorded by the Real-Time Integrated Navigation System to fulfill contract specifications with regards to missing data and network redundancy. Ensure a rigorous QC of information including: raw navigation quality, geodetic parameters, equipment offset measurements, data format conformity, and processed navigation data.
Ensure an accurate and consistent set of QC products is generated during the processing sequence. Perform trend analysis of the quality statistics derived from processing in a survey-wide, or chronological mode as an aid in determining hardware failures, network degradation or environmental effects.
Requirements:
A degree in Geodesy, Marine Sciences, Earth Sciences, Mathematics, Physics, Marine Technology or Electrical Engineering or relevant/substitute work experience. Proficiency with PCs and MS Office. Working knowledge of Unix and/or Concepts preferred. Must have a valid passport before starting employment. Submit to and pass a drug screening and UKOOA medical. Obtain a Basic Offshore Safety Induction and Emergency Training Certificate before starting employment (this is scheduled and paid for by the company).
Must be able to travel and work offshore for extended periods of time (rotations are currently 6 weeks offshore/6 weeks leave).
Team player with strong interpersonal communication and organizational skills. Strong verbal and written communication skills.
Proficient computer skills
Company Offers:
Paid travel to and from crew change location. Accommodations and meals provided while onboard the vessel. Bonus Incentive Plan, after successfully completing Trainee period and training program.
Interested applicants may apply online by visiting http://www.veritasdgc.com/ and completing an Online Application by clicking the "Career" tab.
Veritas is an equal opportunity employer.
Human Resources
Veritas Geophysical Corporation
10300 Town Park Drive
Houston, TX 77072
USA
Phone: 832-351-8300
Fax: 832-351-8721
Email: vgshr@veritasdgc.com
WEB: http://www.veritasdgc.com

OBSERVER

Job Location: USA, Offshore
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 from all disciplines of marine data acquisition. We have a rewarding opportunity for an Observer in our various global offshore locations.
Responsible for the accurate setup and operation of all seismic recording systems and streamers onboard the vessel and must ensure optimum performance. Ensure that all components of the seismic recording operations run efficiently and effectively to minimize down time. Ensure that routine and incidental seismic maintenance requirements are met through expeditious use of non-recording time. Ensure that all cable deployment and retrieval operations are carried out as expeditiously as possible, within the constraints of safety of personnel, equipment and quality of data. Ensure that all contractual and internal seismic quality control specifications for the job are met or exceeded.
Requirements:
AS Degree or above in a GeoSciences discipline a plus. Must have a valid passport before starting employment. Submit to and pass a drug screening and UKOOA medical. Obtain a Basic Offshore Safety Induction and Emergency Training Certificate before starting employment (this is scheduled and paid for by the company). Must be able to travel and work offshore for extended periods of time (rotations are currently 6 weeks offshore/6 weeks leave). Team player with strong interpersonal communication and organizational skills. Proficient computer skills.
Company Offers:
Paid travel to and from crew change location. Accommodations and meals provided while onboard the vessel. Bonus Incentive Plan, after successfully completing Trainee period and training program.
Interested applicants may apply online by visiting http://www.veritasdgc.com/ and completing an Online Application by clicking the "Career" tab.
Veritas is an equal opportunity employer.
Human Resources
Veritas Geophysical Corporation
10300 Town Park Drive
Houston, TX 77072
USA
Phone: 832-351-8300
Fax: 832-351-8721
Email: vgshr@veritasdgc.com
WEB: http://www.veritasdgc.com

SHIPYARD MARKETING

Job Location: USA, NJ
We are looking for a mature and experienced person to join our team of experts to market the shipyard drydocking and repair services to ship owners and ship management companies on the East Coast.
ISM
International Shipyard Marketing
Email: cghou@yahoo.com

PRODUCT SUPPORT MANAGER

Job Location: USA, FL Fort Lauderdale
SUMMARY
Diagnose and repair electrical systems, apparatus, electrical and electronic components and products including Electronic Chart Systems, ECDIS, AIS, VHF DSC radios, searchlights, and EPIRBS. Strong troubleshooting skills & excellent verbal & written communication skills required. Provide technical support to internal & external customers & supervise Customer Service Department.
ESSENTIAL DUTIES AND RESPONSIBILITIES include the following. Other duties may be assigned.
- Trains department employees and ensures that the goal of three day turn-time is maintained.
- Determines work procedures, prepares work schedules, and expedites workflow.
- Have a very good understanding of ACR Products and be able to effectively train customer service personnel on product features and benefits. Understand the COPAS-SARSAT satellite system and how it works.
- Supervises and coordinates activities of Customer Service Personnel engaged in service requests and information and repairs.
- Reads work orders, follows drawings and sample assemblies, or receives verbal instructions regarding duties to be performed.
- Occasionally goes out on field calls to customers to troubleshoot and repair RCL-100 lights
- Uses volt meters to assist Incoming Inspection with testing of RCL-100 panels.
- Meets production and repair commitments in a timely manner.
- Answers incoming calls from customers, responding to questions/concerns and giving them appropriate information to ensure complete satisfaction.
- Prepare work orders for products returned from customers & determine best course of action to repair or replace product.
- Follows production drawing and /or sample assemblies or receives verbal instructions regarding the repair completion.
- Contact customer with repair estimates to obtain approval for completion of work to be done.
- Repairs and replaces components, as necessary in order to complete needed repairs.
- Coordinates return of product to consumer.
- Informs Sales & Service Manager of service difficulties, trends, and unique customer requirements or requests.

Qualifications
1. Minimum of 3 years installing, maintaining & repairing ship Bridge Information & Communication Systems, including Electronic Chart Systems, ECDIS, AIS, VHF DSC radios, searchlights, and EPIRBS.
2. Associate's degree (A.A.) or equivalent from two-year college or technical school; or 5-7 years related experience and/or training; or equivalent combination of education & experience.
3. Strong mechanical aptitude & good manual dexterity.
4. Be able to read and understand blueprints and schematics.
5. Ability to effectively communicate in English with customers, clients, Customer Service, and other employees of the organization.
6. Must be proficient using in the use of computer software such as Windows, MS Word and Excel and be able to provide data and required information to various departments utilizing the appropriate software program.
7. The employee must frequently lift and/or move up to 50 pounds. Specific vision abilities required by this job include close vision, color vision, depth perception, and ability to adjust focus.

Debbie Webb
ACR Electronics, Inc
5757 Ravenswood Road
Fort Lauderdale, FL 33312
USA
Phone: 954 981-3333
Fax: 954 961-4403
Email: dwebb@acrelectronics.com
WEB: http://www.acrelectronics.com

NAVIGATOR

Job Location: USA, Offshore
Veritas Marine Acquisition is currently recruiting for individuals from all disciplines of marine data acquisition. We have opportunities in our various global offshore locations. Our work is challenging and we offer exciting career opportunities for talented individuals.
We are seeking candidates for a Navigator position. The qualified incumbent will:
Record quality of navigation data onboard the vessel, in charge of the accurate setup, and operation of ALL navigation acquisition systems and sub-systems onboard the assigned vessel, ensure that all components of navigation acquisition operations run efficiently and effectively to minimize down time, perform installation and maintenance of the above systems and their associated cables and antennas located on the masts, catwalks and on in-water floats, perform proper layout of seismic recording equipment and ensure proper connections have been made to recording equipment.
Requirements:
Working knowledge of UNIX preferred but not required. GPS - Navigation experience a plus. Associates degree or above in Hydrographic Surveying, Marine Science, Marine Technology or Electronic Engineering a plus. Must possess willingness and ability to travel and work offshore for extended periods of time (current rotation is six weeks offshore / six weeks leave).
Additional Job Requirements:
Must have a valid passport before starting employment. Submit to and pass a drug screening and UKOOA medical. Obtain a Basic Offshore Safety Induction and Emergency Training Certificate before starting employment (this is scheduled and paid for by the company). Must be able to travel and work offshore for extended periods of time (rotations are currently 6 weeks offshore/6 weeks leave). Team player with strong interpersonal communication and organizational skills. Proficient computer skills
Company offers: Paid travel to and from crew change location; Accommodations and meals provided while onboard the vessel; Bonus Incentive Plan, after successfully completing Trainee period; Training Program.
Interested applicants may apply via email by sending resumes to vgshr@veritasdgc.com. For additional organization information, please visit http://www.veritasdgc.com/.
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USA
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Fax: 832-351-8721
Email: vgshr@veritasdgc.com

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

WEB: http://www.veritasdgc.com

TECHNICAL SALES

Job Location: USA,
Sea-Bird Electronics, the world's leading manufacturer of CTD instrumentation has a Technical Sales opening for a mid-career professional.
The successful candidate will be self-motivated to quickly develop product and applications expertise, understand and adopt the company sales culture, become familiar with our customers and their needs, and increase sales. He/she will be very skilled in written and oral communication and enjoy engaging customers to communicate technical and scientific explanations, and develop a consultative rapport with customers. The candidate will posses sensitivity to culture and customer differences and the flexibility to work effectively with international end users, factory reps, resellers, and OEMs world wide.
Experience:
A satisfactory candidate will have approx. 8 years experience selling technically complex products to government and academic end users. He/she will have a degree and/or equivalent training and practical experience in electronics or engineering or a physical science, ability to make sales presentations to small groups and to train others.
It will be considered a plus if they have: Knowledge of oceanography and oceanographic or water quality instrumentation, Degree in a Physical Science or Engineering,Knowledge of monitoring system applications, Foreign language skills, 2-3 years sales management experience.
Salary commensurate with experience. Send introduction cover letter and resume by email to dbennett@seabird.com
Thank you
Doug Bennett
Engineering Sales Manager
Sea-Bird Electronics, Inc.
1808 136th Place N.E., Bellevue, Washington 98005 USA
Tel: 425-643-9866 Fax: 425-643-9954
Vist our website at: http:// www.seabird.com
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Bellevue, WA 98005
Phone: 425-643-9866
Fax: 425-643-9954
Email: dbennett@seabird.com
WEB: http:// www.seabird.com

PORT ENGINEER-CLAMSHELL DREDGES

Job Location: USA, NJ
Weeks Marine, Inc., a leader in the Marine Construction & Dredging industry has an immediate opening for a Port Engineer. Qualified applicants must have a minimum of 5 years experience in the marine industry. Familiarity with hydraulic systems, A/C and D/C electrical systems, and hands on experience with diesel engines; the ability to travel frequently and strong computer and organizational skills also required.
We offer a comprehensive benefits package and salary commensurate with experience. Please send resume including salary requirements to:
WEEKS MARINE, INC.
Att: HR/Port Eng.
4 Commerce Drive
Cranford, NJ 07016
Fax: 908-272-3948
E-Mail: MAILHR@WEEKSMARINE.COM
M/F/D/V
Trish McSulla
Weeks Marine, Inc.
4 Commerce Drive
Cranford, NJ 07016
USA
Phone: 908-272-4010 ext 2109
Fax: 908-272-3948
Email: MAILHR@WEEKSMARINE.COM

SUBMARINE MECHANICAL ENGINEER

Job Location: United Arab Emirates, Dubai
To supervise manned submarines construction, machinery design and assembly, HP air system piping, hydraulic transmission, diesel / electric engines installation, test diving, ISO 9001, bureau veritas.
Herve Jaubert
Exomos
Road 1120. Jebel Ali Port
Dubai, Dubai
United Arab Emirates
Phone: 971 488 35222
Email: hjaubert@emirates.net
WEB: http://www.exomos.com

NAVAL ARCHITECT

Job Location: USA, LA New Orleans
Responsibilities:
- Running computer programs for hull calculations and structural analysis
- Check drawings
- Produce concept designs and specifications
- Produce detailed engineering deliverables
- As required, manage a team of engineers and designers to generate contract, functional and production engineering package through construction, vessel trials and warranty
- Prepare calculations including preliminary weight, performance, powering and range estimates.
- Develops new hull forms/lines, general arrangements and basic hull structural definition for concept designs
- Prepares technical reports and/or reviews technical data or reports provided by others as directed
- Performs and checks naval architectural calculations relating to floodable length, hydrostatics, stability or tonnage to assure conformity with applicable classification society, regulatory body or specification requirements. Performs other duties as assigned by management

Requirements:
- BSE in Naval Architecture and Marine Engineering
- 3+ years relevant experience
- Knowledge of exterior design desirable
- Familiar with USCG, DNV, LR, ABS, USN, and BV standards
- Extensive experience with AutoCAD and Microsoft Excel
- Experience with or willingness to learning modeling software such as Rhino preferred
- High degree of computer proficiency
- Good communication skills essential. Position involves coordination with regulatory agencies, clients, and production crew

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USA
Phone: 5048351500
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COMMERICAL CERTIFIED DIVER

Job Location: USA, OR Portland
We are currently accepting resumes for experienced certified divers, requirements are as follows:

A Min. of 5 Years Diving Experience. Topside and Underwater Welding, Propeller Repair & Polishing, General Marine Services & Light Marine Construction.
Must be willing to relocate. This is a full time position.

If You Meet Our Requirements And Are Interested In Applying Please Send Resume By Fax To: (503) 286-2871 or Email To: devinesalv@msn.com
Marvin Smith
Fred Devine Diving & Salvage Co.
6211 N Ensign Street
Portland, OR 97217
USA
Phone: 503-283-5285
Fax: 503-286-2871
Email: devinesalv@msn.com
WEB: http://www.freddevinedivingandsalvage.com

MANUFACTURING ENGINEER

Job Location: USA, CA Oxnard
The Manufacturing Engineer is responsible for ensuring the correct manufacturing procedures, fixtures and tooling are developed and available for all production activities. The Manufacturing Engineer also assists with certain quality activities, e.g. nonconforming item disposition, procedure writing, problems analyses and recommendations. Performs any other manufacturing engineering functions, and assists other departments as needed. Maintains document control, performs other general engineering work, and reports as appropriate.
Eric Birns
BIRNS, Inc.
1720 Fiske Place
Oxnard, CA 93033-1863
USA
Phone: 805-487-5393
Fax: 805-487-0427
Email: ebirns@birns.com
WEB: http://www.birns.com/engrm-fc1.html

HTI JOB OPPORTUNITY

Job Location: USA, WA Seattle
Production Manager: Small engineering firm looking for a production manager/engineer to manage manufacturing. Must be able to produce reliable assemblies, meet deadlines, and effectively manage staff. Position requires a solid grasp of electronic manufacturing techniques, a good understanding of electronic circuit design principles, and demonstrated experience producing sophisticated electronics. Ideal candidate will be a motivated, organized, resourceful, hands-on individual. Sonar experience a plus. See www.HTIsonar.com for product descriptions. Send resume to support@HTIsonar.com . No drop-ins or calls please. HTI is an equal-opportunity employer.
Caroline Mercado
Hydroacoustic Technology, Inc.
715 NE Northlake Way
Seattle, WA 98105
Email: cmercado@HTIsonar.com

PROPELLER TECHNICIAN

Job Location: USA, FL St. Petersburg
Metal finishing technician: To perform reconditioning services on marine propellers. Company specializes in the high performance boating industry. Will train the right person.
Julie Croce
Throttle Up Propeller
10611 Bay Pines Blvd. #1
St. Petersburg,, FL 33708
USA
Phone: 727-531-2255
Fax: 727-393-0292
Email: info@throttle-up.com
WEB: http://www.throttle-up.com

parting shot

COMING IN THE JANUARY 2006 EDITION

Feature: *Marine Science Institutions*
Product: *Underwater Camera & Lighting Systems*
Directory: Electronic Charting & Vessel Management

(Continued from page 32)

The Atlantic zone does not have just hurricanes, it has a "hurricane season," which like hunting and fishing seasons has a formal closing. It's at the end of November. Katrina, in the final days of August, left plenty of time for an encore.

Not every storm for the season of '05 has been a hurricane, of course. With winds under 75, they're just "tropical storms." But they're impressive enough to get names, and to recommend against moving high objects through the ocean. There was, for example, Ophelia, and the Donjon 1,000-ton crane Chesapeake 1000. With the tug Atlantic Salvor, the crane sat in the bay of its name for well over a week. The tug Powhatan with the Columbia, a 400-ton revolving derrick barge, was similarly confined by the elements. With the Powhatan and the Columbia moving on for Alabama, the Chesapeake 1000 finally arrived at Venice on September 29.

"The Captain of the Port of New Orleans had anticipated the hit," said Kevin Teichman, representing a second generation at T&T. "Before the storm had hit, they'd moved to Alexandria - I assume they expected to have quite a lot of damage - and requested our 53-ft. command trailer." Just after the storm, the Coast Guard requested helicopters, and Teichman found himself on his first of several flights over Venice, and the tip of another finger in the Louisiana Gulf, Port Fourchon, "taking note of how many vessels were beached or sunk. I remember the first time I flew over there, and the destruction and devastation was just overwhelming - it's something I'll never forget."

On Sept. 2, they moved the trailer to Belle Chasse "and used it for the air ops at the navy base, where the power had gone out. Meanwhile we were preparing our barges to come over. We didn't expect to find services or hotels where they were headed, so we put quarters by Martin Quarters of Galiano on with complete systems to be totally self sufficient, bunks and showers, and provisions for large supplies of diesel and gasoline. It took about a week to get the barges ready, and we mobilized at Venice on September 10."

The wind has an accomplice. If the tide raises all boats, so does the storm surge. The wind-whipped water becomes a cascade, blown out of its bed into the landscape. Depending on where, by whom, the description is of a wall or a mountain, twelve to thirty feet high (Camille's in 1969 is given at 24 feet), the bearer of bad tidings from everything loose, and much fastened-down that was fragile. How can the surge place vessels beyond both the east and the west banks of the river? "The wind blows from the west," the old pilot explains patiently, "then from the east."

It's a big river around the 50-mile marker, a couple miles wide and deep enough for ocean tankers. There's plenty of water for churning. The wind subsides and the surge subsides, and the objects are dropped as the flood recedes. They look quite mysterious where they sit, great curiosities, but with the facts known, the force of hydraulics is easy to picture. Where it stretches the imagination is further north, at New Orleans proper. The river's still mighty, but twisty and looking civil. The Industrial Canal looks calmer yet, hard to imagine enraged. But drydocks akimbo suggest its mood swing, and then there was Miss Darby, who took a spin from Bollinger shipyard at Algiers up to Gretna - and she was not alone.

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