MARINE TECHNOLOGY REPORTER

July/August 2018

www.marinetechnologynews.com

The 13th Annual

MTR 100

Volume 61 Number 6

Powerful

Ease of Use

VideoRay ROVs are powerful and easy to configure, deploy, operate, and maintain due to our simple and intuitive design. This is the result of listening to our customers and building their experiences into our products.

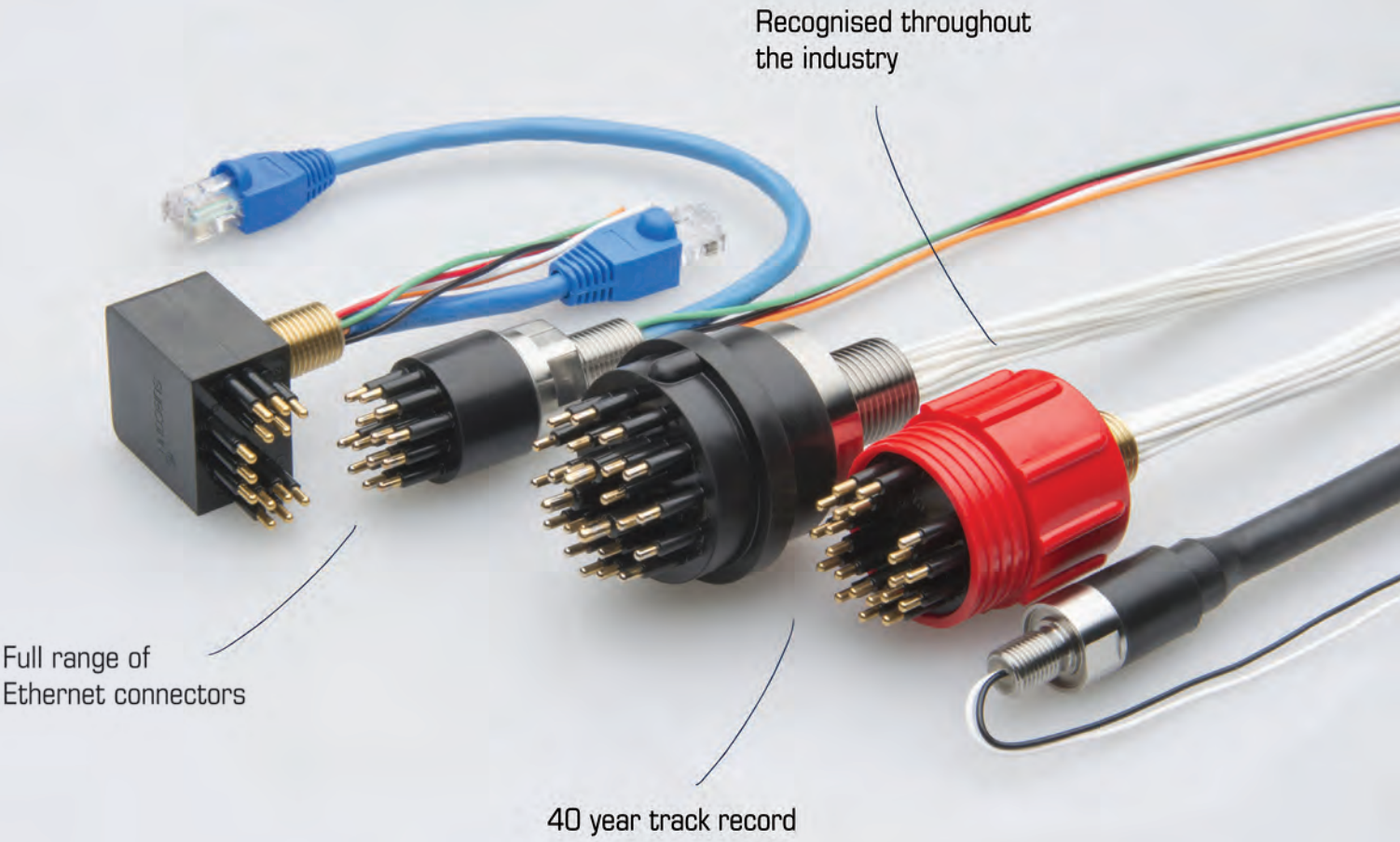
www.videoray.com

VideoRay

212 East High Street, Pottstown Pennsylvania USA | PHONE: +1 (610) 458-3000 | EMAIL: sales@videoray.com

SubConn®
DEPENDABILITY AT EVERY LEVEL

Wet-mate connectors



Available worldwide

Denmark | Norway | Sweden | Finland | United Kingdom
Netherlands | Germany | Poland | France | Spain | Portugal
Italy | UAE | Israel | Turkey | South Africa | USA | Canada | Mexico
Colombia | Chile | Brazil | Singapore | China | India | Pakistan
Russia | Belarus | South Korea | Japan | Taiwan | Australia

July/August 2018
Volume 61 • Number 6

Contents

MTR 100

"Top 10"

The 'editor's choice' of Top 10 ocean influencers globally.

"Ones to watch"

The 'editor's choice' of five companies on the move.

"Blowin' in the Wind"

Offshore wind is hot, and these eight companies lead the way.

NAVIGATOR

A one man navigation and sonar reconnaissance unit

SHARK MARINE TECHNOLOGIES INC.

The Navigator, a second generation Sonar Imaging and Navigation system, designed by Shark Marine primarily for MCM and SAR use.

Proven

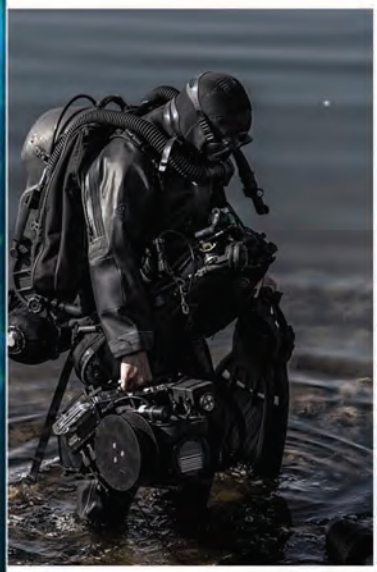
Tested and proven, the Navigator is the trusted choice of 17 Navies, as well as Law Enforcement, Search and Rescue Teams and Scientific Researchers spanning the globe. The Navigator has become a critical part of the Standard Kit and has reshaped SOPs. The modularity of the system and numerous advanced sensors available allow the Navigator be to become a force multiplier, enabling smaller groups to cover more ground efficiently with increased safety.

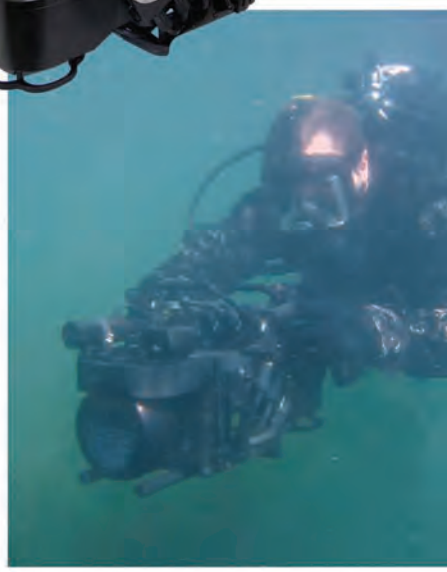
Mission Ready

The Navigator is the most modular system of its kind, enabling it to be quickly configured for any application.

Intuitive

Shark Marine's DiveLog software controls all operations of the navigator and its accessories, operators need only learn one software to master all their equipment.





www.sharkmarine.com sales@sharkmarine.com Ph: (905) 687 6672

© ulyankin/Adobe Stock

www.marinetechnologynews.com

NEW YORK
118 E. 25th St., New York, NY 10010
Tel: (212) 477-6700; Fax: (212) 254-6271

FLORIDA
215 NW 3rd St., Boynton Beach, FL 33435
Tel: (561) 732-4368; Fax: (561) 732-6984

PUBLISHER
John C. O'Malley
jomalley@marinelink.com

Associate Publisher & Editor
Gregory R. Trauthwein
trauthwein@marinelink.com

Managing Editor
Eric Haun
haun@marinelink.com

Special Projects
Gabby DelGatto
delgatto@marinelink.com

Contributing Writers
Capt. Edward Lundquist, USN (Ret.)
Elaine Maslin, Aberdeen
Tom Mulligan, Ireland
Claudio Paschoa, Brazil

Production Manager
Irina Vasilets
vasilets@marinelink.com

Production & Graphic Design
Nicole Ventimiglia
nicole@marinelink.com

Corporate Staff
Manager, Marketing
Mark O'Malley
momalley@marinelink.com

Accounting
Esther Rothenberger
rothenberger@marinelink.com

Manager, Information Technology Services
Vladimir Bibik
bibik@marinelink.com

Circulation
Kathleen Hickey
mtrcirc@marinelink.com

Advertising
Vice President, Sales and Marketing
Rob Howard
howard@marinelink.com
Tel: (561) 732-4368 • Fax: (561) 732-6984

Advertising Sales Manager
Mike Kozlowski
kozlowski@marinelink.com
Tel: (561) 733-2477 • Fax: (561) 732-9670

Editor's Note

Gregory R. Trauthwein
Associate Publisher & Editor
Email: trauthwein@marinelink.com

This year's effort to 'herd cats' for the 13th Annual "MTR100" was one of the most seamless efforts to date, as our online application process drew a record number of entrants. This is, of course, our annual look at 100 leading companies and individuals in the subsea space, my favorite edition of the year and from what I hear, a valuable resource for many both inside and outside this industry.

To keep things fresh we introduce a new wrinkle this year in the form of naming the "Top 10" influencers, starting on page 6. To start, I want to offer a sincere bit of thanks to everyone who took the time to send in their nominations for a "Top 10" spot, as we recieved many more nominations than there were spots available.

The selection of the "Top10" was neither simple or fast, as we enjoyed much internal debate as well as discussions with trusted industry insiders to hash out what I think is a balanced and global list. I welcome your thoughts on our selections, and more importantly I welcome your participation and nominations for next year's 14th Annual MTR100.

In addition to the "Top 10", we asked trusted European contributor **Elaine Maslin** to take an inside look at five up-and-coming companies with interesting technology in this space. Her picks – Foressea, Houston Mechatronics, Stinger Technologies, WISUB and Cellula Robotics – are profiled starting on page 34.

Finally, managing editor **Eric Haun** had the task of looking inside the burgeoning offshore wind market, which is shaping to be a promising area of growth for years to come. He found eight companies of particular interest, and his "Blowin' in the Wind" report starts on page 62.

MARINE TECHNOLOGY REPORTER
www.marinetechnologynews.com
Vol. 61 *No. 6*
ISSN 1559-7415
USPS# 023-276
118 East 25th Street,
New York, NY 10010
tel: (212) 477-6700
fax: (212) 254-6271

Marine Technology Reporter (ISSN 1559-7415) is published monthly except for February, August, and December by New Wave Media, 118 E. 25th St., New York, NY 10010-1062. Periodicals Postage Paid at New York, NY and additional mailing offices.

POSTMASTER: Send all UAA to CFS. NON-POSTAL AND MILITARY FACILITIES send address corrections to Marine Technology Reporter, 850 Montauk Hwy., #867, Bayport, NY 11705.

Subscription:
To subscribe please visit
www.marinetechnologynews.com

These vehicles have two things in common:

Water and us.

Greensea's open operating platform is a proven technology, already in use in more than 800 manned, unmanned, surface, and subsea marine vehicles. Our platform integrates inertial navigation and supervised autonomy, allowing critical data to be shared throughout the system. Station keeping, dynamic positioning, target tracking, and target reacquisition are at your fingertips. All our systems are supported by Workspace, our intuitive, one-screen interface. With Greensea on board, you can stay squarely in control of your vehicle and your mission.

For more information, download our brochure at Greensea.com/brochure or call 802.434.6080.

GREENSEA

Nippon Foundation

01 Sasakawa

Yohei Sasakawa, Chairman
Nippon Foundation

Yohei Sasakawa, Chairman, Nippon Foundation, leads a huge philanthropic organization with a simple mission, social innovation. While its activities today cross many activities and borders, when founded in 1962 its efforts focused largely on the maritime and shipping fields.

Today still, Sasakawa and the Nippon Foundation are laser focused on the world's oceans because of their importance in sustaining human life on earth.

The Nippon Foundation has the luxury to take the long-view … (we're talking 5,000 years!) … when it discusses the health and well-being of the world's oceans, as Sasakawa explained to *MTR*: "Today we live in speedy times; everything moves quickly, and people tend to focus on what might happen tomorrow or maybe 10 years. But if you think about the health and the sustainability of the ocean, this is directly related to whether the humans will be able to live

their life on earth 5,000 years from now. These are the bigger, longer span questions that we keep in mind of when living our lives, because the ocean is in danger, especially from overfishing and the various other problems."

Education is core to many Nippon Foundation endeavors, and it is no different when it comes to the world's oceans.

"We feel that the human capacity building is essential, to educate people and having the expertise to manage this ocean (from a global perspective). For the last 30 years we have been educating 1,200 people from 140 different countries, educating from the standpoint of expert capacity-building. Scientific knowledge, such as measurements for the topography and bathometric chart-making, is essential.

At the same time, (this creates) educated people who would be able to run the maritime, or port, related to the sea agendas. And having these experts in place, we feel that these people would now be able to collaborate in a cross-border manner in order to build more of a comprehensive system, or organization, in order to be responsible to oversee the oceans around the world."

Just as critical, Nippon Foundation is a leader in the Seabed 2030 project. Seabed 2030 is a collaborative project between the Nippon Foundation and GEBCO aiming to bring together all available bathymetric data to produce the definitive map of the world ocean floor by 2030, making the information available to all.

"When I visited the Johnson Space Center (recently), I noticed that they already have a very detailed topography – the map of the Mars that are 15 million kilometers away from this earth. But we still do not have the topographic chart – the seabed bathometric chart – for our earth. So we are targeting 2030 as a landmark year for us to be able to complete the project to (create this seabed chart), to identify where resources may lie, and at the same time help the potential of the further exploration in the future of the required resources for the livings of the people in a more effective, safer manner."

If that's not enough: The World Maritime University (WMU) and The Nippon Foundation late last year announced to operationalize the WMU-Sasakawa Global Ocean Institute (Ocean Institute), a concrete response to the United Nations Sustainable Development Goals and in particular Goal 14 – the Ocean Goal – that commits governments to "conserve and sustainably use the oceans, seas and marine resources for sustainable development.

Chief of Naval Operations (CNO) Adm. John Richardson, Commandant of the Marine Corps Gen. Robert Neller, and Commandant of the Coast Guard Adm. Paul Zukunft participate in a panel discussion, moderated by retired Adm. James Stavridis during the AFCEA/USNI WEST 2018.

U.S. Navy photo by Mass Communication Specialist 1st Class Nathan Laird/Released

02 US Navy

The United States Navy &
Admiral John M. Richardson, Chief of Naval Operations

Hydrographer Ryan Beets, assigned to the U.S. Navy Fleet Survey Team, tracks data from a hydrographic undersea vehicle surveying the structures of the USS Arizona Memorial during the 2018 Rim of the Pacific (RIMPAC) exercise, July 13, 2018.

U.S. Navy photo by Mass Communication Specialist 1st Class Nathan Laird/Released

The United States Navy, led by Admiral John Richardson who graduated from the U.S. Naval Academy in 1982 with a Bachelor of Science in Physics, a master's degrees in electrical engineering from the Massachusetts Institute of Technology and Woods Hole Oceanographic Institution, and National Security Strategy from the National War College, is one of the world's leading purveyors and developers of subsea technology. Several years ago at the home of then-CNO Admiral (Ret.) Gary Roughead, *Marine Technology Reporter* was invited to take part in a meeting and discussion on the future of unmanned underwater systems, a meeting with a clear signal: improve subsea technologies, particularly in the area of power density, to allow the Navy to carry out its missions in a safer and more efficient manner. That mandate stands today, as the U.S. Navy continues to push the envelope on subsea systems.

U.S. Navy photo

(Photo courtesy of Paul G. Allen)

03 Allen

Paul G. Allen & Vulcan Inc.

Paul G. Allen, co-founder of Microsoft, needs no introduction, as he is an internationally acclaimed entrepreneur, technologist and philanthropist. Allen today is still exploring the frontiers of technology and human knowledge, and acting to change the future. He is a leader in the wave of wealthy individuals using their money and influence for the betterment of the world and humanity, and through his company Vulcan Inc., Allen is working to save endangered species, slow climate change, improve ocean health, share art, history and film, develop new technology, tackle epidemics, research how the human brain works and build sustainable communities.

Allen is deeply invested locally in his hometown of Seattle and the Pacific Northwest, but his endeavors regarding the ocean span the globe.

In 2016, Allen purchased the R/V Petrel, a 250-ft. research and exploration vessel and equipped it with a suite of advanced underwater equipment and technology to make it one of the few ships on the planet capable of exploring to 6,000 meters. Following a 2017 retrofit, Petrel and its crew use state-of-the-art underwater technology for deep-sea expeditions.

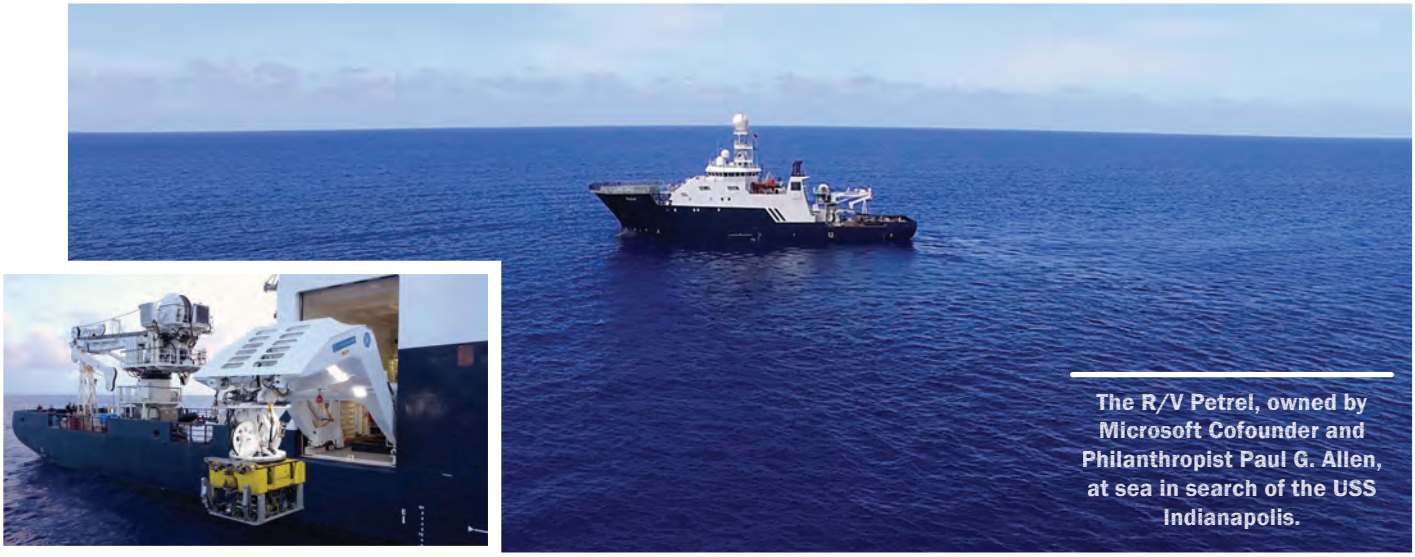
To date those deep-sea expeditions have yielded a treasure trove of finds, most of which are covered in the pages of *MTR* and on *MarineTechnologyNews*.com. A few of his ocean activities in the past 18 months include:

- USS Indianapolis: Wreckage from the USS Indianapolis was discovered on Aug. 19, 2017, 5,500 meters below the surface in the North Pacific Ocean. Indianapolis was lost in the final days of World War II when it was torpedoed by a Japanese submarine. The Indianapolis sank in 12 minutes, making it impossible to deploy much of its life-saving equipment. Of the 1,196 sailors and Marines onboard, only 316 survived.

- USS Juneau (CL-52): Wreckage from the USS Juneau (CL-52) was discovered on March 17, 2018. The Juneau was sunk during the Battle of Guadalcanal, ultimately killing 687 men including all five of the Sullivan brothers. The Atlanta-class light cruiser was found 4,200 meters (about 2.6 miles) below the surface, resting on the floor of the South Pacific off the coast of the Solomon Islands. The R/V Petrel's AUV first identified the ship in its side scan sonar on March 17. Upon analysis of the sonar data, the Petrel crew deployed its remotely operated underwater vehicle (ROV) on March 18 to verify the wreckage through its video capabilities.

- Bluntnose sixgill shark: While ex-

ploring a World War II ship wreckage in the Philippines, crew members of R/V Petrel were caught by surprise when they spotted a large shark swimming out of the darkness. Using cameras on their ROV, her crew zoomed in to catch a better look and were able to identify the species, a bluntnose sixgill shark. Reaching up to 15 feet long, the bluntnose sixgill shark (Hexanchus griseus) is one of the largest sharks in the world, but uncommon in the area. Reflecting primitive characteristics from the Triassic period, the sixgill shark has more extinct relatives than alive.



The R/V Petrel, owned by Microsoft Cofounder and Philanthropist Paul G. Allen, at sea in search of the USS Indianapolis.

(Photo courtesy of Paul G. Allen)

Professor Cui Weicheng, the project leader and first deputy chief designer of the 7000m 3-man submersible Jiaolong, waves as he emerges from his submersible after a dive to 6,671 meters in 2012.

Professor Cui Weicheng, Shanghai Ocean University

04 Cui

Professor Cui Weicheng, Shanghai Ocean University
Director, Hadal Science and Technology Research Center,
Co-Founder, Rainbowfish Ocean Technology Company

Professor Cui Weicheng, Director of Shanghai Ocean University's Hadal Science and Technology Center (HAST), Lingang (New City), Pudong District, is one of those leading and influencing the development of advanced deep-sea technology. He is on an extraordinary mission to build a fleet of manned and unmanned vehicles capable of routine dives to the bottom of any ocean trench. His approach to solving the basic start-up funding problem is likely the first in the Chinese experience, using government-private-public partnerships seen in other parts of the world.

Over the course of his career, Professor Cui was project leader and first deputy chief designer of the 7,000m Jiaolong 3-man submersible (HOV), now operated by the National Deep Sea Center, State Oceanic Administration, Quingdao, Shandong province. The Jiaolong has made 151 dives, reaching a record depth for an active submersible program of 7,062m (23,169 ft.), piloted by Cui himself. Cui has already made test dives of an 11,000m autonomous remote vehicle (ARV), and three different 11,000m Hadal Landers that incorporate both foreign and domestic components. His team is in the process of building two new Generation 2 benthic landers. Cui's team at HAST has tested a new 4500m ARGO-like "Floater" using a 17-in. glass sphere for the housing and flotation, with the variable ballast pod on the keel. A surface ship can track the "Floater" using a miniaturized USBL system. In addition to the manned and unmanned vehicles, Professor Cui used his training in ship design to work with Shanghai ship builders to construct two surface support ships for his manned and unmanned vehicles, what Cui refers to as "movable laboratories." These are the 97 m (318 ft.) RV Zhangjian and launched in 2016, and a smaller SWATH surface support ship RV Shen Gua launched in June 2018. A third vessel, an ice-hardened mothership has been designed, with no specific plans for construction.

Another measure of Cui's influence is in the work done by his students, whom he guided through their PhDs to develop their natural talents, and his trusted colleagues. His students have brought to operational status a submarine crew Rescue Bell, and a 500m ADS (advanced diving system), that functions like a Newtsuit. Cui started and passed to colleagues the development of 4,500m manned submersible, named Shen Hai Yong Shi (Deepsea Warrior). Professor Cui modestly accepts no credit for this work.

Cui is currently leading the development of the 11km three-man Rainbowfish submersible. He has proposed a

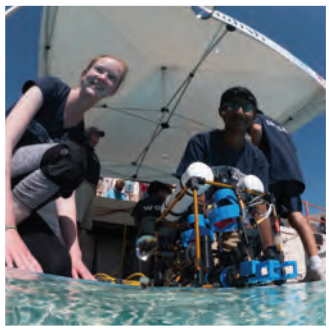
Professor Cui Weicheng, Shanghai Ocean University

Professor Cui Weicheng receiving the title "National Hero of China", from PRC President Xi Jinping, following his successful dives to over 7,000m in the submersible Jiaolong.

clever "nested pressure chamber" design, with a personnel sphere inside a first pressure chamber, inside a second pressure chamber, in order to reach hadal pressures with only a 10ksi step in pressure across each of the two pressure chamber walls. Also unique to modern China is Cui's entrepreneurial technology-transfer mechanism that links HAST with the commercial Rainbowfish Ocean Technology Company, Cui's college friend, Dr. Wu Xin, is the Rainbowfish Company managing director. The company plans to charge customers to use its research ship and submarines. In implementing their business plan, Rainbowfish acquired Graham Hawkes' Deepflight Submarine Company, and is starting production of six new Deepflight tourist submersibles.

By Kevin Hardy, ScD, Global Ocean Design.

Professor Cui's career will be profiled in greater detail in the October 2018 edition of Marine Technology Reporter.



Imagos: MATE II

ABOVE: Industry icon and long-time MATE competition judge Marty Klein speaks to the all-female ROV team from Saudi Arabia during the 2017 international event.

LEFT: Students of different ages, genders, and ethnicities compete in MATE.

05 Zande

Jill Zande, President/Executive Director, MATE Inspiration for Innovation (MATE II) and Associate Director, MATE Center,

Jill Zande, President/Executive Director, MATE Inspiration for Innovation (MATE II) and Associate Director, MATE Center, is a familiar figure in subsea circles, the face a globally renowned and fast-growing ROV competition that has and continues to inspire young minds, from kindergarteners through collegians. Zande is humble, and 20 years ago could not have imagined her position today.

As a research associate at the Dauphin Island Sea Lab (DISL), she knew that career-wise, the Ph.D. path was her only realistic options. But she knew deep down that the Ph.D. path was not for her.

As fate had it her former major professor at Louisiana State University told her about MATE, helping to launch her career in education that has touched tens of thousands of young lives and brains, and contributed mightily to grooming that oft-discussed 'next generation'.

As Zande celebrates her 20th anniversary with MATE, our "Number Five" in the *MTR* Top 10 shares the challenges and rewards of building and maintaining its signature student ROV competition.

The ROV Competition

As with most great ideas, the MATE ROV competition was born through study, collaboration, perspiration and a little bit of luck. When Zande joined MATE it conducted a number of workforce studies, and ROV technicians emerged as an occupation in need of skilled individuals. At the same time, it found the little yellow book (How to Build Your Own Underwater Robot and Other Wet Projects) and the Marine Technology Society ROV Committee came looking for help, as they recognized the need for ROV technicians and that those currently applying for the positions didn't seem to have the right skills.

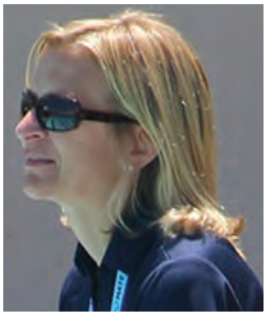
"So, literally, on the back of a napkin, the idea for the ROV competition was born," said Zande. "We needed someone to take the lead on this; I raised my hand."

The MATE competition has only two full-time employees, some part-time help, and more than 1,600 volunteers. By the numbers, the MATE ROV competition has grown exponentially. Starting in 2002 the MATE international competition included 22 teams from two countries; today there are 31 regional events annually, with an additional regional in Tennessee in 2019. For the 2018 season, starting in April, nearly 8,000 students representing 715 teams from across the country and around the world competed in regional events or submitted video demonstrations. Nearly 800 students and 100 mentors qualified and participated in the international competition,

with 65 teams from 19 countries and 20 U.S. states. As the competition has grown, its focus has evolved too. While the 'hands-on' tech portion of the program is still central, in 2011 it took on an entrepreneurial focus. "We were very deliberate in requiring students to transform their teams into companies – to "think like entrepreneurs" – and structure themselves that way," said Zande. "Who would be their CEO? CFO? Who would head up R&D? We laid out our mission scenarios as an RFP. The student-lead, mock companies were to respond to this RFP by designing and building an ROV that could meet the specified requirements."

Zande is humble in her approach and effusive with praise for the students, families and volunteers that are core to the organization's success.

"We have people like Marty Klein, who has volunteered since the very beginning and travels each year, no matter where we are, to be a part of the international competition," said Zande. "We have working professionals who make the competition a regularly scheduled part of their year, building their vacation around it and, in some cases, paying out of their own pocket to get there."



Zande keeps a watchful eye over the ROV competition she helped to build.

Predictably, funding is the perpetual challenge. "MATE Center was established with funds from the National Science Foundation (NSF), and continues to receive funds from NSF today," said Zande. "We recently launched MATE Inspiration for Innovation (MATE II), a 501(c)(3) non-profit organization that was created to support the competition. MATE II's goal is to give the competition a life beyond federal grant funding and allow the program to continue well into the future. We want to keep the competition going and the dream alive for students who are 'inspired to innovate' and tackle the challenges that our global community is facing, today and tomorrow."

The full interview with Jill Zande will publish in the September 2018 edition of Marine Technology Reporter.

SOI's Research Vessel Falkor and an aerial drone.

Schmidt Ocean Institute

06

SOI

Schmidt Ocean Institute
Palo Alto, CA

Schmidt Ocean Institute (SOI) is disrupting the way science at sea is conducted and shared. Over the past year it has supported research that use multiple underwater platforms simultaneously and allow for adaptive planning of science in real time. It has also supported image annotation software and cloud-based data sharing services. Schmidt Ocean Institute (SOI) is a 501(c)(3) private non-profit operating foundation, founded by Wendy and Eric Schmidt and established to accelerate the understanding of our ocean with innovative research technologies, operational practices, advanced data analysis, engaging storytelling and open sharing of new knowledge. SOI prides itself on providing facilities aboard RV Falkor that help to propel marine science forward such as its high performance computing system, global internet connectivity, dedicated custom-built remotely operated vehicle (ROV SuBastian) and advanced shipboard sensors. SOI also encourages the development and integration of video data management systems, collaborative image annotation programs and shipboard data infrastructure. SOI addresses complex questions in marine sciences by building strategic partnerships across broad international user communities. SOI offers at-sea exposure to scientists, students and artists, sharing their research and experiences across multiple platforms. To date SOI has hosted more than 565 scientists and 216 students representing over 160 institutions from 27 countries. SOI puts technology at the forefront of its scientific program, accelerating innovation in autonomous ocean sampling, coordinated robotics operations, data technologies and deep learning while keeping oceanographic data and research program outcomes open to the public. Software developments for data stewardship, sharing, interpretation, visualization and analysis have been a focal point of SOI activities. In association with Grey Bits, SOI has successfully launched a shipboard version of Squidle+, a web-based marine scientific image annotation software that allows researchers to collaborate on ROV image data processing in real time. Additionally, SOI has provided unique opportunities for data processing and holographic visualization. Ben Knorlein, from Brown University, was onboard Falkor in 2017 to help scientists use virtual reality (VR) to see plankton in 3D space. The resulting visualizations helped scientists interpret how the phytoplankton are congregating in relation to each other. The high performance computing aboard Falkor has helped with projects such as these, establishing a pipeline for processing images and running data analysis in parallel. The HPC has also been used to run open source software such as Maptracker, a program that visualizes the locations of multiple simultaneously operating robotic platforms, monitoring their status and performance.

Photo courtesy Kip Evans

07 Earle

Dr. Sylvia Earle
"Her Deepness" & "Living Legend"

An American oceanographer and explorer known for her research on marine algae, Dr. Sylvia Earle has lived by her mantra, "no blue, no green." She has spent her lifetime protecting and conserving the world's oceans.

Sylvia Earle is President and Chairman of Mission Blue/The Sylvia Earle Alliance. She is a National Geographic Society Explorer in Residence, and is called Her Deepness by the *New Yorker* and the *New York Times*, Living Legend by the Library of Congress, and first Hero for the Planet by *Time* magazine. She is an oceanographer, explorer, author and lecturer with experience as a field research scientist, government official, and director for several corporate and non-profit organizations

Earning undergraduate and post graduate degrees in botany helped form Dr. Earle's belief that understanding vegetation was the first step in understanding any ecosystem. Dr. Earle's 1966 Duke University dissertation, "Phaeophyta of Eastern Gulf of Mexico," shed new light on the region's aquatic plant life, and when combined with her other Gulf research, the body of work stands today as the definitive study of the region's abundant and rich aquatic plant life.

Dr. Earle has led more than 100 expeditions and logged more than 7,000 hours underwater. In 1970, she led the first team of women aquanauts on the government's historic Tektite II deep-sea research project, during which time the team conducted groundbreaking work on the effects of coral reef pollution. She has participated in 10 saturation dives and set the women's solo diving record in 1,000 meters depth. Dr. Earle's recent research focus is on developing a global network of marine protected areas—called "Hope Spots" to safeguard the living systems that provide the underpinnings of global processes. Most recently, she was honored by the Botanical Research Institute of Texas (BRIT) as its 2018 International Award of Excellence in Conservation, the first ocean conservationist to receive BRIT's conservation award in its 23-year history.

Sir David Attenborough at Cammell Laird keel lay with John Syvret, CL CEO, Jo Johnson minister and CL apprentices.

Cammell Laird

08

RRS Sir David Attenborough

RRS Sir David Attenborough
Aka "Boaty McBoatface"

As the subsea industry collectively turns its attention to unmanned, autonomous vehicles to provide a consistency of presence and economy of scale that is unmatched by manned operations, *MTR* thought it appropriate to go 'old school' on number eight with a nod to Cammell Laird shipyard, the U.K. Natural Environment Research Council and British Antarctic Survey courtesy of its state-of-the-art polar research ship, the 129-m, 10,000-ton RRS Sir David Attenborough.

The vessel is still under construction, but recently passed a major milestone when hull number 1390 was launched, scheduled to come into operation in 2019. RRS Sir David Attenborough drew global attention before she was even named, as a public contest to name the vessel arrived on "Boaty McBoatface." While authorities eventually settled on the more appropriate RRS Sir David Attenborough – named for the famed naturalist and television personality, dubbed 'the father of the modern nature documentary' – the vessel will carry an AUV named Boaty McBoatface. The new research ship is part of a Government polar infrastructure investment program designed to keep Britain at the forefront of world-leading research in Antarctica and the Arctic.

The commitment represents the U.K. government's largest investment in polar science since the 1980s.

"Britain began exploring the Antarctic over a century ago when it seemed to be an empty wilderness of little importance to the world as a whole," said Sir David Attenborough. "Now we recognize that what happens at the Poles is of the greatest importance to everyone, everywhere.

The U.K. and the British Antarctic Survey have been making discoveries in both regions that enable us to better understand these global processes and this wonderful new research ship will enable British scientists to continue their crucial work in both the Arctic and Antarctic for decades to come."

Copyright : BOURBON

09 Bodénès

Gael Bodénès, CEO, Bourbon Corporation

Gael Bodénès, CEO, Bourbon Corporation, took the helm at this offshore company in the midst of the worst energy crisis in history, starting in early 2018. In short order he put his stamp on what will be the 'new' Bourbon. #BOURBONINMOTION.

So what is #BOURBONINMOTION? Essentially the immediate change in business plan, a reinvention of Bourbon, which includes:

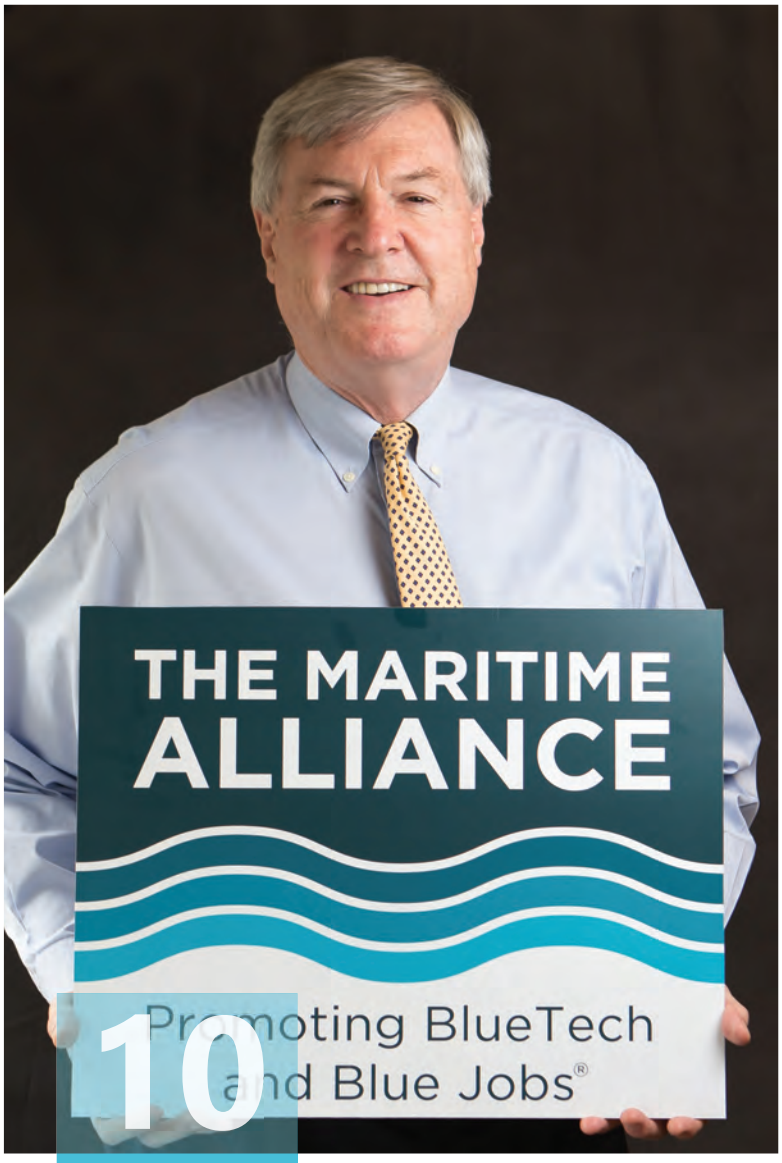
• Developing integrated services with performance based on data. Not simply by adding new functions, but pragmatically, step-by-step, taking measured risks thanks to digital technology.

• Splitting BOURBON into three independent companies: Bourbon Marine & Logistics; Bourbon Mobility and **Bourbon Subsea Services.** #BOURBONINMOTION means enhancing operational excellence at optimum cost by capitalizing on digital revolution to connect the fleet. Its Smart Shipping program is designed to improve safety and reduce crew, building on technological partnerships and divesting the "non-smart fleet" (41 vessels).

BOURBON Subsea Services is a fleet of 22 MPSV and 25 ROVs for 220 million euro in 2017 turnover. Bourbon Subsea is a team of 1,000 globally, 100 of whom work in BOURBON engineering offices.

The company has a track record of 500 subsea connections and 350 wellheads installed.

Will #BOURBONINMOTION succeed? Only time will tell, but Bodénès' bold action in the face of market collapse earns him a spot in *MTR's* 'Top 10'.



The Maritime Alliance

Michael Jones, President, The Maritime Alliance "Mister Cluster"

You would be hard-pressed to find many in the subsea sector that have not run across, to or through Michael Jones, President of The Maritime Alliance, a leading BlueTech Cluster in the U.S. Jones was a driving force that caused the U.S. DOC to focus on BlueTech, and why the U.S. Commercial Service decided to form a global marine technology team.

While Jones is "Number 10" in our subsea influential leaders ranking, you would search long and far to find any with the combined drive, work ethic, connections and passion for matters maritime. *Marine Technology Reporter* has been a long-time media sponsor of The Maritime Alliance led BlueTech Week in San Diego. In short, Jones is sees the 'big picture,' methodically stitching together a tapestry of collaboration among academia, industry and government internationally. He has systematically placed the building blocks over 11+ years to enable society to continue to thrive in a way that optimizes conservation and economic development.

As his *MTR* moniker "Mister Cluster" suggests, Jones is a 'glue that binds' sort of leader, working to link people, businesses and governments in the name of raising awareness and investment in all matters 'Blue.' He was the driving force behind the creation of the BlueTech Cluster Alliance, an organization of influential clusters in eight countries. Pro bono, Jones founded and serves as President of The Maritime Alliance, setting the vision and creating this eco-system of collaboration that is hard to find elsewhere. Highlights include:

- Jones was a driving force in getting Representative Duncan Hunter (R-San Diego) to focus on BlueTech years ago. After Jones' testimony in Washington, D.C. at the House Sub-committee on Coast Guard and Maritime Transportation, the Congressman submitted a bill to create a BlueTech Center of Excellence within the Coast Guard.
- He is the founder and driving force behind BlueTech Week, preparing for its 10th edition.
- Driving Force behind convincing the U.S. Government and the Michael Porter Institute at Harvard to include BlueTech clusters in its program, which were previously not recognized.
- Co-authored NOAA's first Ocean-Enterprise study that looked at the economic value of Ocean Observation, Forecasting and Measurement
- He was the driving force for TMA being selected to launch the first-ever Maritime Technology Export Initiative on behalf of the United States
- Jones is helping this year to develop a BlueTech Investment Fund in San Diego.

"Michael is that rare combination of ability, entrepreneurial drive, understanding, and vision who has the international contacts to bring seemingly unrelated people from around the world together to promote sustainable, science-based ocean and water industries," said Greg Murphy, Executive Director of The Maritime Alliance. "It's an honor and quite the experience to learn from and work with Michael." The Maritime Alliance is a nonprofit industry association whose mission is "Promoting Sustainable Science-Based Ocean & Water Industries" and a member of the BlueTech Cluster Alliance.

The 10th annual BlueTech Week is scheduled for November 5-9, 2018 in San Diego, California.

VESSELS AND TETHERS ARE *SO* LAST SUMMER

WWW.HOUSTONMECHATRONICS.COM

BIRNS, Inc.

Oxnard, CA
www.birns.com
President & CEO: Eric Birns

BIRNS started out in the subsea industry creating underwater camera housings, and then soon moved on to developing lighting solutions for the U.S. Navy. The company began developing its own connectors in 1990, and that soon flourished into one of the most successful divisions of the organization. The company was called on in the early days to provide unique, advanced connectivity solutions for applications from defense to deep submergence work-class ROVs. By 1998, BIRNS designed a 186-conductor waterproof electromechanical cable assembly to withstand 3,000 pounds of load in any direction—for a robot used in the high-radiation environment inside Chernobyl. Over the years BIRNS lighting systems were used in high profile excavation and archeological projects, from the Titanic to what was at the time the oldest shipwreck ever found, a 3,500 year old discovery in Turkey.

BIRNS connecters were in the University of Wisconsin's Physical Sciences Laboratory for the IceCube Neutrino Project, to instrument 1 Km3 of ice at the South Pole. BIRNS supplied high-power BIRNS Primum metal shell connectors for IceCube's submersible pumps.

In 1997, BIRNS introduced its acclaimed BIRNS Millennium connector series, a high density dry-mate connector range suitable for deep submergence applications to 6km. The series can be used with solid or oil-filled cables and is available in high and low voltage, coax, fiber-optic, and hybrids of electro-coax, electro-optical and electro-opto-mechanical formats. Non-coax configurations are open-face rated to 6,000 meters and preclude pressure vessel flooding without need for glass-sealing. The series introduced revolutionary coax contacts in 2015 that are open face pressure rated to 1433m. BIRNS developed fiber optic penetrators to add to its lines of ABS PDA certified penetrators in 2013.

BIRNS achieved ISO 9001:2015 certification in 2018 by DNV GL, having been ISO certified to the former standard (ISO 9001:2008) since 2009. Its technicians are skilled at electrical termination and assembly of complex connectors, custom cable assemblies, high performance lighting solutions and electrical devices. All BIRNS expert electrical technicians, assembly and relevant inspection personnel hold J-STD-001 Class 3 and WHMA-A-620-A Class 3 certification to add to the company's impressive list of rigorous industry qualifications. BIRNS' world-class molding facility has been NAVSEA S9320-AM-PRO-020 certified since 2012, and thus is one of the few facilities approved to develop outboard cables for U.S. Navy submarines. The company regularly overmolds terminated connectors—made by BIRNS and by others—to cable, per customer requests, and repair and splice a wide variety of unique cable assemblies.

BIRNS has been contracting with the U.S. Navy, other navies worldwide and a wide range of defense contractors during its more than six decade history. BIRNS advanced lighting systems are often found illuminating military docks, and its chamber lights are widely used in PVHO applications. BIRNS connectors are customized for subsea defense applications, with custom configurations including all titanium components and zero magnetic signature. BIRNS' high voltage connectivity solutions guard against dielectric breakdown with high voltage conductors by including arc prevention crowns (APC) on contacts, providing a longer and more circuitous voltage path, greatly reducing the risk of arcing. More recently, BIRNS developed corona-mitigation technology for high-voltage connectors, further enhancing long-term performance.

BIRNS has been trailblazing in the technology of connector hybridization with elegant solutions that include combinations of electrical, optical and coaxial contacts along with mechanical terminations. Miniature configurations have become increasingly popular, like the company's BIRNS Millennium 3O-2F2, with two optical fibers and two 16 AWG electrical contacts, a hybrid connector that's extremely versatile, given its powerful design and performance capabilities in a tiny footprint – it can transmit gigabits of data per second and more than 24 amps of power with just a one-inch/2.5-cm diameter hull penetration.

AMETEK SCP

Westerly, Rhode Island
www.ametek-ecp.com
President & CEO: Dave Zapico

AMETEK SCP is a provider of harsh environment interconnect solutions for challenging undersea applications such as submarines, UUVs, full ocean depth rated systems, and downhole systems. Technology advances are demanding interconnect solutions that accommodate higher power, higher frequency RF, laser, video, fast ethernet and complex fiber optic signals.

AMETEK SCP, located in Westerly, Rhode Island is a global supplier of custom electrical and optical connectors, cable assemblies and hull penetrators. AMETEK SCP products are battle proven and provide mission and life critical reliability. AMETEK SCP is a business unit of AMETEK, Inc., a global manufacturer of electronic instruments and electromechanical devices. AMETEK SCP products are widely found on the U.S. submarine fleet as well as many other of the world's navies. AMETEK SCP has a primary, dedicated manufacturing facility and access to multiple additional AMETEK manufacturing locations as needed to support customer needs. AMETEK SCP understands the materials required for connectors, cable assemblies and hull penetrators to maximize integrity and sustainable life and reduce weight and cost in submarines, based on environment and application. AMETEK SCP has expertise with stainless steel, nickel, aluminum, bronze, specialty alloys, nickel alloys, copper alloys and titanium, and uses this expertise to select the optimal material for the optimal connectivity system. AMETEK SCP is certified to ISO9001:2015, NAVSEA S9320-AM-PRO-020/MLDG, MIL-C-24217, MIL-C-24231, US Level 1 SUBSAFE, and UK MOD First Level compliance.

AMETEK SCP currently offers more than 2,500 products using key technologies such as high density glass-to-metal-seals, state-of-the-art cable assembly molding/bonding and transmission technologies, including RF/microwave, Ethernet and fiber optics. Its cable, connector, and molding capabilities save weight and ensure reliable communications for rapidly advancing critical submarine system technologies. Higher frequencies and higher throughputs are required due to the demands of RF; Wi-Fi; Fast Ethernet; ship-to-shore; high-energy outgoing laser signaling; and even high-resolution, 4K video for enhanced imaging from photonics mast arrays. It provides US SUBSAFE Level 1 and UK MOD First Level Hull Penetrators.

Blue Robotics, Inc.

Torrance, CA
www.bluerobotics.com
President & CEO: Rustom Jehangir

Blue Robotics has grown up quickly in the subsea space, launched in 2014 courtesy of a Kickstarter campaign and today boasting 27 employees and more than 200 products.

Since 2014, Blue Robotics line of low-cost subsea components and systems has enabled hundreds of researchers, companies, and explorers to access the field of marine robotics. Its flagship product, the BlueROV2, is a popular mini-ROV with more than 1,000 units in use.

While working on a project to send an autonomous solar powered surfboard from California to Hawaii, Blue Robotics' founder Rustom Jehangir realized a need for affordable components for marine robotics. After almost a year of development in a garage, the T100 Thruster was launched in 2014 and was the first of the more than two hundred products that the company now offers. Today, the company's mission is to provide accessible and high-quality marine robotics components to encourage ocean exploration, to enable industry growth and innovation, and to inspire ocean stewardship. Its customers range from high schools competing in ROV competitions to researchers at NASA's Jet Propulsion Lab studying under the Arctic ice. Blue Robotics is dedicated to supporting the future of marine robotics and science education and is a proud sponsor of seven different marine robotics competitions globally, while also running marine robotics educational events for students in the Los Angeles area in collaboration with AltaSea and the Boys and Girls Club.

Blue Robotics' product line covers a breadth of technology areas and consistently leverages innovative designs, inspiration from proven technologies, and an emphasis on affordability. The product line includes thrusters, actuators, watertight enclosures, buoyancy foam, sensors, lights, cables, control system electronics, acoustic positioning systems, and its flagship product, the BlueROV2 subsea vehicle. Its patented thruster design is considered be the company's most important technology, using a unique brushless motor design that is compact, inherently pressure tolerant and affordable. The BlueROV2 sports a vectored six-thruster configuration, making it stable and highly maneuverable. There are several expansion options including additional thrusters for 6-degree-of-freedom maneuvering capability, an acoustic positioning system and a single-function manipulator.

Bordelon Marine

Lockport, LA
www.BordelonMarine.com
President & CEO: Wes Bordelon

Bordelon Marine is an example of how innovation can lead to success. Bordelon designed and built a fleet of specialized light subsea intervention vessels, vessels that differentiated themselves from the pack and remained competitive through the worst offshore energy downturn in two generations.

Bordelon Marine is a privately held subsea and dive support company that specializes in IMR and light subsea intervention projects. The company designs and builds its own vessels at its shipyard in Houma, LA, Bordelon Marine Shipbuilders. The company owns and operates three subsea vessels that are named Stingray 260 Class (ULIV) Ultra-light intervention vessels. They are DP2 260-ft. vessels that feature a 50t AHC crane with 3,100m wire, (60) POB, two work class ROV systems installed, with internal control rooms and offices. Duel thru-hull USBL systems, helo-deck, and 6,200 sq ft of deck..

The Stingray vessels incorporate a number of high spec cutting edge tech: full vessel wide automation and power management systems controlling Tier3 diesel and electric propulsion systems; DP2 and bridge integration technology usingduel Ranger2Pro INS USBL, Cyanscan, RadaScan, and multi-DGPS inputs for positioning and tracking. The vessels can track two ROVs, multiple divers and deep-water positioning beacons simultaneously.

Greensea Systems

Richmond, VT
www.greensea.com
President & CEO: Ben Kinnaman

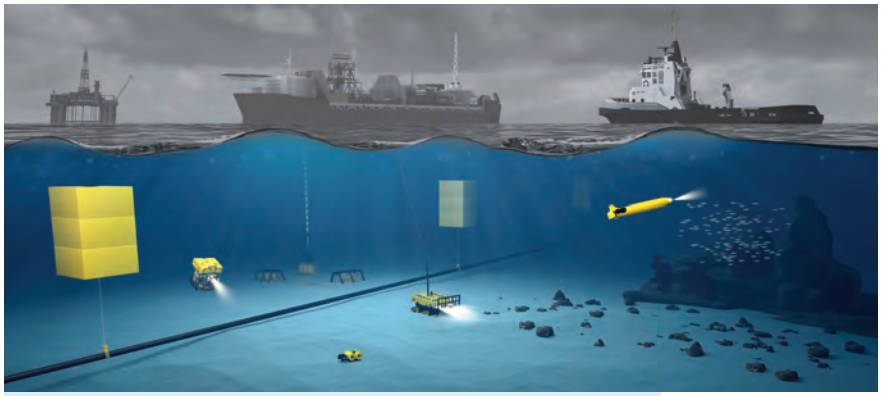
Greensea's brand-agnostic software platform, OPENSEA, is designed to provide a stable architecture for rapid prototyping and accelerated deployment of technologies. The fully-integrated system supports intervention as well as interoperability of manned, unmanned, surface and subsea vehicles. The modular system is used for operations as diverse as autonomous diver retrieval and bridge positioning.

Greensea Systems, Inc. is a growing leader in advanced robotic systems for high-level tasking, interoperability, and intervention. Greensea's OPENSEA operating platform provides a fully-distributed, open software framework for highly integrated systems across all brands of sensors, devices, and equipment while cutting-edge technologies for navigation and autonomy elevate system intelligence. One cohesive operator interface, workspace, fuses system data into a comprehensive command and control center for streamlined workflow and improved productivity. Greensea's commercial products are easily customizable and all systems are fully supported with documentation and knowledgeable, field-experienced engineers. Core competencies include:

- Interoperability, intervention, and high-level tasking for advanced robotic systems
- Full & supervised autonomy for surface, subsea, and diver vehicles including over-the-horizon communications
- Systems integration and payload management
  -Simultaneous Localization and Mapping (SLAM)
  -SWaP-C optimized navigation customized by application for heightened accuracy Differentiators
- Open, modular, brand-agnostic technologies
- Proprietary Extended Kalman Filter and patent-pending heading algorithms
- Navigation and control past performance
- Current provider of navigation and supervised autonomy for U.S. & international militaries:
- *U.S. Navy and worldwide EOD*
- *Worldwide combat diving*
- *Worldwide bridge erection vessel control*

OPENSEA, is an enabling platform for advanced robotic technologies, as its architecture supports real-world applications, complex intervention tasks and interoperability. The unified system integrates data from vehicles, sensors, and equipment (regardless of manufacturer). Networkable and fully-distributed, OPENSEA's modular design allows for scalable and accelerated deployment while keeping customization costs in check.

- BALEFIRE: Autonomy and vehicle control
- WORKSPACE: A human-machine interface
- INSPECT GS: Navigation and localization



ALSEAMAR

Six-Fours, France
alseamar-alcen.com
President & CEO: Marc Boisse

ALSEAMAR designs and manufacture subsea and naval systems, specializing in underwater gliders, unmanned vehicles and swimmer delivery vehicle, underwater acoustic positioning equipment, naval radio communication systems, syntactic foams for deepwater applications, life extender services: inspection, maintenance and upgrade of naval weapon system and offshore oil and gas installations.

In 2018 ALSEAMAR built three new operational plants in the south of France: one 4,000 sq. m. plant in Aix en Provence dedicated to robotics and underwater vehicles; and two plants in Toulon : 4,600 sq. m. dedicated to subsea buoyancy and 1000 sq. m. dedicated to life extension services and radiocommunication.

The second generation of ALSEAMAR's glider (SeaExplorer X2) was launched in 2018, with new features and capabilities, such as a 1,000m depth rating, +40% rechargeable battery capacity or the ability to be powered with primary batteries for extended mission durations. This adds to the technological breakthrough initially brought by the SeaExplorer, which is the glider with the lowest cost of ownership on the market thanks to its rechargeable battery and its fully and easily interchangeable payloads that greatly simplify its maintenance.

Kongsberg Maritime

Horten, Norway
km.kongsberg.com
President & CEO: Egil Haugsdal

Kongsberg Maritime's sonar, multibeam echo sounders, positioning and underwater communication systems, and AUVs are used in survey and inspection operations worldwide. Working closely with customers to develop technology that pushes the limits in subsea applications, Kongsberg Maritime is also dedicated to developing innovative autonomous and digital solutions.

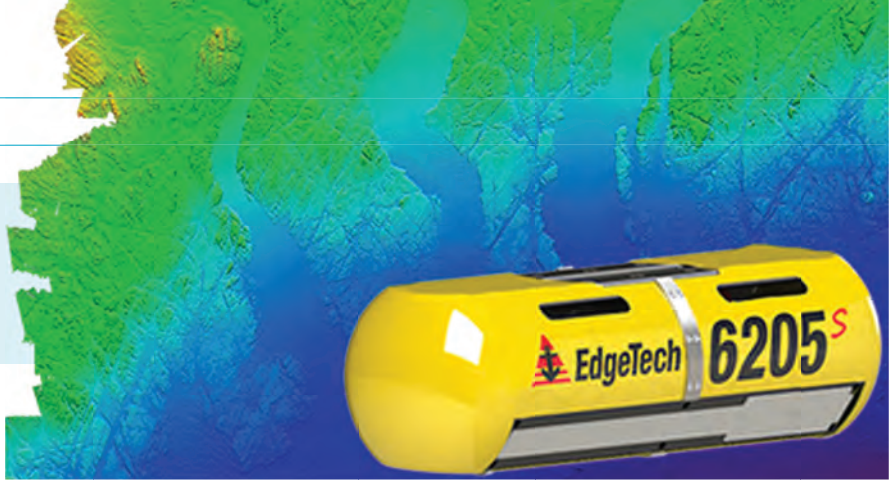
The Digital Ocean. Collect. Distribute. Analyze. Kongsberg Maritime is a marine technology company providing innovative solutions for all marine industry sectors including merchant, offshore, subsea, naval and fisheries. The company offers a new portfolio of integrated vessel concepts and technologies for autonomous operation and digitalization above and below the water and is recognized as a leader in the development of subsea technology, with expertise in all areas of operation; from commercial survey, underwater intervention and naval operations through to marine science, fish farming and commercial fishing. Kongsberg Maritime has developed the Digital Ocean, a new concept that harmonizes data processes, from the oceans to the office. The Digital Ocean is enabled by the combination of Kongsberg Maritime's leading underwater technology for the collection of data by marine researchers and commercial operators, the interconnectivity to distribute the data and the digital, cloud-based foundation to analyze it. By integrating the entire journey that data takes using connected solutions from Kongsberg , the Digital Ocean becomes a single ecosystem for more efficient, lower cost and better performing operations.

Alongside its AUV portfolio, and class-leading operational and digital technology for research vessels, ships/autonomous ships, Kongsberg offers hydroacoustic systems including; multibeam/single beam echo sounders/sonars, positioning and subsea communication equipment, heading/motion sensing instruments, and sound velocity sensors and processing software. Digital Ocean brings it together in an integrated value chain to transform subsea operations.

- ***Collect:*** Kongsberg systems collect diverse data and can be combined to deliver an unmatched breadth of information from e.g., multibeam and side-scan, and Methane, CO2 and Oxygen levels, to sub bottom profiling and backscatter, ensuring the most complete picture of what is below the surface can be created.
- ***Distribute:*** Distributing data efficiently is vital to ensure that the right decisions can be made by experts on shore quickly. Kongsberg technology is a key enabler; from underwater modems and transponders to distribution of data from ship to shore via the unique Marine Broadband Radio, fast, reliable and high quality data streams deliver the Digital Ocean.
- ***Analyze:*** With cloud-based working, personnel ashore can process/analyze data and interact with domain experts, while working on multiple survey projects. The Kognifai digital platform securely hosts data and offers in-depth analysis and processing that enables a high quality finished product. Kognifai is an open ecosystem, home to Kongsberg and third-party technology.

EdgeTech

West Wareham, MA
www.edgetech.com
President & CEO: R.Jablonski



EdgeTech develops, sells and supports leading edge underwater technology solutions including: side scan sonars, sub-bottom profilers, bathymetry systems, reliable USBL acoustic tracking and positioning systems, transponder beacons, deep sea acoustic releases, shallow water and long life acoustic releases, underwater acoustic command and control systems and custom-engineered acoustic products.

The company traces its history back to 1965 when it started out as a division of EG&G Marine Instruments. In 1995, EdgeTech became a private company and selected its name in part to honor the late Dr. Edgerton, an MIT professor, marine instrumentation pioneer and a founder of EG&G. In 2012 ORE Offshore, a leading provider of acoustic releases, transponders and USBL systems, adopted the EdgeTech name after over 10 years operating as an affiliate organization within the company. EdgeTech continues to provide industry-leading side scan sonars, sub-bottom profilers, bathymetry systems underwater actuated and transponding deep sea acoustic releases, shallow water releases, long life acoustic releases, transponders, reliable USBL acoustic tracking and positioning systems, and custom-engineered acoustic products. With its worldwide network, EdgeTech provides equipment and support to customers including the U.S. Navy, foreign navies, survey firms, ocean researchers and the oil and gas industry on every continent. The company employs approximately 100 people between two locations in Wareham, Massachusetts and Boca Raton, FL. EdgeTech has extensive in-house testing facilities including a test pool, acoustic test tank, pressure test chamber and two company research vessels for sea trials. These facilities allow the company to fully test and calibrate every system ensuring the highest quality solutions are provided to customers.

EdgeTech is developing a number of new products this year. EdgeTech has redesigned the new 6205s in a smaller, lighter package with additional features and functions. The 6205s offers co-registered dual frequency side scan and bathymetry with EdgeTech's motion tolerant side scan sonar feature for operation in more adverse weather conditions. EdgeTech will release a new version of its Multi-Purpose Side Scan Sonar Survey System. The new EdgeTech 4205 provides crisp, high resolution imagery of the seafloor and comes with a number of new features which makes the system even more flexible and powerful in offshore operations. The 4205 is available in either a tri-frequency side scan sonar configuration or motion tolerant and multi-pulse configuration. Additionally, target positioning has been improved with the integration of a more accurate heading sensor that can be coupled with an optional USBL beacon. In the sub-bottom profiling product group EdgeTech will introduce the 3400 sub-bottom profiling system later this year. The EdgeTech 3400 comes equipped with dual 2-16 kHz transducers and new PVDF receiver arrays segmented for standard sub-bottom profiling operations or a unique "pipeliner" mode for optimal location and imaging of buried pipelines. The newly designed towfish can either be towed behind a vessel or pole mounted over the side of the vessel.

5 Minutes with Mike Read, President

Teledyne Marine Group

Teledyne Marine Group has been a consolidator in the subsea space for more than a decade, today totalling 23 companies. Teledyne Marine's MTR100 entry is focused on insights on the moves in the market from Mike Read.

As we continue to navigate through a historic downturn in the offshore energy sector, can you give us your view of the market. Where you see opportunity in the coming 12 to 24 months?

We are optimistic on the health of the marine market across all market sectors over the next 12 to 24 months. Our interconnect and instruments businesses are beginning to see the effects of stabilization in what has been a weak energy market over the past few years. Interest in our autonomous subsea vehicles and interconnect for both U.S. and international government applications has been strong with expectation to continue to grow. Finally, due to the aging of U.S. infrastructure and increased demand on the global fish supply, we expect the civil engineering market and aquaculture markets to strengthen over the next few years. Overall, our outlook on the market is positive with expectation of measured growth.

Teledyne Marine obviously has a broad technology offering. But if you could narrow it down to just three, what do you consider the three most significant technological offerings introduced by Teledyne Marine in the last year & why are they your 'top 3'?

Teledyne Marine has held several successful new product launches between 2016-2017, technologies that focus on providing new capabilities and range of performance, reduced footprints and reduction in price point to expand access across our customer spectrum. For example, we have released a new generation of subsea imaging and bathymetric sonars providing never before seen range and resolution while achieving incredible cost targets. Our depth-rated sonar technology combined with the launching of a 6,000m depth rated AUV supports industry's drive to explore areas not previously surveyed. Our new Doppler Velocity Log technology offers extended range in a miniaturized frame to enable industry's move to smaller, lower cost autonomous systems where navigation and positioning are key performance parameters. Finally, we are also very excited about opening new market capabilities with our new generation of explosion proof interconnect, including the world's first flame proof well head connector.

Looking at your recently announced collaboration with Research Products Development Company (RPDC) at OTC, can you share your thoughts on the importance of such collaborations?

The future of Teledyne Marine is driven by our ability to understand our customer's problems in order to provide solutions. Teledyne Marine has a strong history of collaboration agreements with our customers across many of our markets. By working together, we provide technological expertise to tackle the most challenging problems our customers face in real-word testing environments. A testament to the successes we have is the customer investment in continuing our R&D partnerships. Across Teledyne Marine, we have a healthy pipeline of customer funded investments in R&D that total approximately $25m this year. We are very excited about

our collaboration agreement with Research Products Development Company to develop technologies for Saudi Aramco and other leaders within the Middle East region, starting with the SWIM-R, Shallow Water Inspection Monitoring Robot.

As Teledyne Marine has continued to evolve, please discuss the strategic advantage(s) that have come to fruition as the various brands continue to meld?

Since Teledyne Marine first formed, the essence of our One Team approach is that, from first point of contact, customers will be aligned with an individual, or team of individuals, who will expertly address all aspects of their current application. With technologies broken into five core segments; Imaging, Instruments, Interconnect, Seismic and Vehicles, our Teledyne Marine sales staff is now able to address not only brand level solution, but turn-key systems and capabilities by leveraging our full range of technology solutions. Our engineering teams are able to leverage expertise across common technologies through our technology based global centers of excellence. With more than 1,600 employees focused on a single Teledyne Marine, we provide a unique customer-market focused mentality to technology development and customer support.

R&D is the heart of any company in this sector. What is the strategy regarding R&D at Teledyne Marine?

Research and Development is fundamental to Teledyne Marine's continued success in designing revolutionary products. Teledyne Marine invests heavily in internal research and development, as evidenced by our continued portfolio of product launches. At Teledyne Marine, we tightly couple our focus on the customer in every phase of development from concept through product support. We do so through a common engineering process across all of our businesses. The process is driven through customer insight and innovation, providing information to the right people at the right time to ensure that optimal decisions are made with regard to new product development. We have Technology Centers of Excellence located around the world including an Interconnect Center of Excellence in Florida, an Acoustic Imaging Center of Excellence in Denmark, and an Unmanned Vehicles/Platform Integration Center of Excellence in Massachusetts. Teledyne Marine also benefits significantly from a close relationship with Teledyne Scientific, an internally funded Research & Development Center located in Thousand Oaks California.

ABOVE: SeaBat IDH sonar system

BELOW: A new generation of subsea imfaging and bathymetric sonars.

Teledyne Marine Group

Teledyne Marine is comprised of 23 undersea technology brands assembled by Teledyne Technologies Inc. Teledyne Marine's technologies are broken out into five categories:

Teledyne Marine Imaging

Teledyne Marine Imaging group develops and manufactures acoustic and digital subsea imaging systems for a variety of application areas including offshore, hydrography, civil engineering, dredging and defense & security. Brands include: BlueView, Bowtech, Odom Hydrographic, PDS, RESON, and new tech in 2018 includes:

• Teledyne Odom Hydrographic launched its next-gen **Echotrac E20** singlebeam echosounders: easy-to-use, dual-frequency, compact, robust and fast to mobilize.

• Teledyne RESON introduced **3D MotionScan MBES SeaBat T20** with a 3-operation modes and pan & tilt.

• Teledyne RESON launched the **SeaBat F50** forward-looking multibeam sonars in a single and dual-head configuration, operating at 200kHz or 400kHz, depth ratings up to 6000m.

• Teledyne Bowtech launched a range of IP networkable low light and HD technology **cameras**.

• Teledyne Bowtech's **LED-K-Series lamp** now includes four lumen outputs; 2100, 3200, 4200 or 5000 lumens.

Teledyne Marine Instruments

The Teledyne Marine Instruments provides subsea and surface sensors that span a range of technologies, including: navigation; ocean currents/waves measurements; CTDs; acoustic communications, positioning and releases; pipe and cable tracking; corrosion monitoring, and more. Instruments brands include: Benthos, Cormon, Oceanscience, RD Instruments, and TSS, and new tech in 2018 includes:

• Teledyne TSS reports high demand for its compact new **660 Pipe Tracker**, enabling smaller electrical vehicles to perform pipe and cable detecting tasks; it also rolled out new additions to the **Saturn** and **TOGs** family of INS products.

• Teledyne RDI continues to add new features to the its ultra-compact **Pathfinder DVL**; real-time data, bottom tracking capability, and software enhancements have been applied to the **Sentinel V ADCP** product line; more to come in Q4.

• Teledyne Benthos added the coastal **R500/ReleaseIT** to its family of **R-Series acoustic releases/deck units;** it also announced a new lower cost Compact Acoustic Modem for **A-comms** and positioning applications with up to 1500m range.

• Teledyne Oceanscience advances its **Q-1250** portable, value-priced remotely operated boat for inland ADCP surveys.

Teledyne Marine Vehicles

Teledyne Marine unmanned underwater vehicles span the operational area from the water's surface to the seafloor. Teledyne is a one-stop supplier of surface, shallow, mid, and deep water unmanned vehicles and towed systems. Vehicles brands include: Benthos, Gavia, Oceanscience, SeaBotix, and Webb Research, and new tech for 2018 includes:

• Teledyne Gavia **SeaRaptor AUV** is a survey grade deep water AUV designed to operate at depths up to 6000m.

• Teledyne SeaBotix **SWIM-R** is a specially modified **vLBV300** with manipulating arm and dual measurement sensor (cathodic protection probe (CP) and thickness probe (UT)), an ultra-cavitation spot cleaner, automated navigation package, and tracked crawler designed to perform underwater inspection tasks in shallow water environments up to 100m.

• Teledyne Oceanscience **Z-Boat 1250** and **Q-Boat 1250** are both single person portable and deployable vehicles for shallow water survey or current profiling.

Teledyne Marine Interconnect

Teledyne Marine Interconnect integrates the resources of multiple Teledyne product lines into a single market-focused organization. It offers a broad portfolio of electrical, optical and hybrid interconnect capabilities. Solutions for these harsh environments include wet-mate, splash-mate and dry-mate connectors, pressure boundary penetrators, cable assemblies, cable terminations, and custom-engineered encapsulation and molding. They are available as stand-alone items, or as complex higher-order solutions that integrate cross-platform technologies into advanced, value-added systems. Interconnect brands include: DGO, Impulse, Impulse PDM, ODI, Cable Solutions, and new tech for 2018 includes:

• Teledyne ODI developed the new **FlameGuard P5-200** as a key enabling technology for a 5 kV - 200 A, three-phase dry mate electrical feedthrough system.

• Teledyne Cable Solutions developed a range of National Electric Code (NEC) and Canadian Electric Code (CEC)-approved interconnect packages rated for hazardous locations.

• Teledyne Impulse-PDM has released a **12,000m rated dry mate underwater optical connector**.

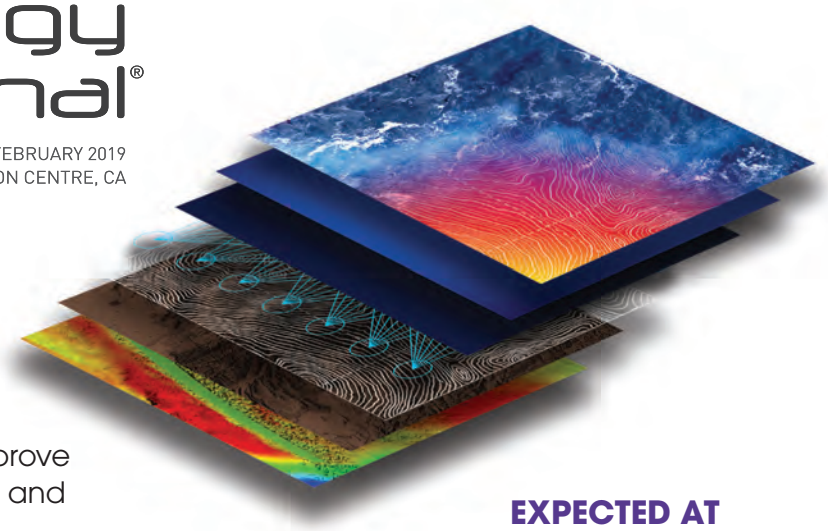
Teledyne Marine Seismic

The Teledyne Marine Seismic group supplies the world's marine seismic fleets with submersible connectors, energy sources, source management systems and complex hydrophone systems for geophysical surveys and other marine market applications. Allied contributions from ODI and Impulse add capabilities for subsea electrical and optical connectivity to create Life of Field Seismic systems. Teledyne Interconnect brands include: AGG, Bolt, Geophysical Instruments, RTS, and new tech for 2018 includes:

• Teledyne Real Time Systems (RTS) has released its new **SmartPhone D System** with an integrated 24-bit digital near-field hydrophone (NFH) system for real-time monitoring of near field acoustics.

Oi oceanology international® AMERICAS

25-27 FEBRUARY 2019
SAN DIEGO CONVENTION CENTRE, CA



Oceanology International will connect you with **2,750 buyers and influencers** from the Americas looking for innovative solutions to improve strategies for exploring, monitoring, developing and protecting the world's oceans.

Demonstrate and promote your company's capabilities, generate qualified leads and strengthen your networks at the global ocean meeting place.

Why exhibit at Oi Americas?

- **Meet different geographies in one location at one time:** Meet 1000s of international buyers of marine science technology from across the Americas and other regions
- **Reach multiple buyers from multiple industries all under one roof:** Oi Americas attracts buyers from a variety of end-user sectors, including oil and gas, marine science, maritime security and aquaculture, all looking for cutting edge technology solutions
- **Meet your clients face-to-face:** Three days of opportunity to arrange dedicated "Meet The Buyer" sessions using the new Oi Americas Matchmaking system
- **Cutting edge content bringing senior level attendees:** The world-class conference and panel discussions attract a high-level audience seeking the latest technology and marine science updates
- **Develop new business relationships:** VIP networking events and matchmaking tools help connect you with international buyers

EXPECTED AT Oi Americas 2019

2,750 ATTENDEES

200 EXHIBITORS

450 CONFERENCE DELEGATES AND SPEAKERS

150 PRESENTATIONS

Contact the sales team today and secure your preferred location at **Oi Americas**

Ashley Juras
E: ajuras@reedexpo.com
T: +1 203-840-5487

Mark Lewis
E: mark.lewis@reedexpo.co.uk
T: +44 (0)20 8439 8858

Oi oceanology international® AMERICAS 25-27 FEBRUARY 2019 SAN DIEGO CONVENTION CENTRE, CA

Oi oceanology international® 2020 17–19 MARCH 2020, LONDON, EXCEL

Oi oceanology international® CHINA 青岛国际海洋技术与工程设备展览会 23-25 OCT 2018, QINGDAO

50 ANNIVERSARY

oceanologyinternationalamericas.com

Organised by Reed Exhibitions® Energy & Marine

In association with THE MARITIME ALLIANCE Promoting BlueTech and Blue Jobs

Host City

Technical Programme in association SUT Society for Underwater Technology

Endorsed by Institute of Marine Engineering, Science & Technology IMAREST

Editor's Choice

The Ones to Watch

Based in Aberdeen, ***Elaine Maslin*** *is* MTR's *'eyes & ears' on the ground scouting new tech for our pages. Her mandate for the MTR100 was simple: 'find five companies to watch closely in 2019.' This is what she found.*

Forssea: Leveraging Machine Learning & AI

Machine learning and artificial intelligence have made a huge impact on our day to day lives, from image recognition in Facebook to cars parking for themselves. These technologies are entering the subsea space in various shapes and forms.

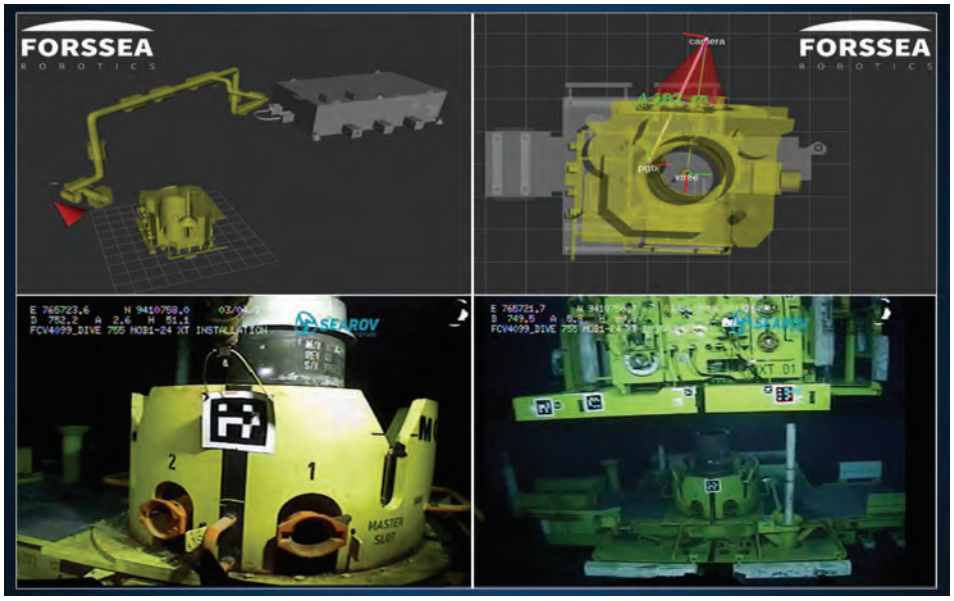
Paris-based Forssea Robotics is a subsea robotics and research and development (R&D) startup company, set up in 2016 to reduce operating costs in the ROV market. Forssea was launched at France's Ecole Polytechnique as a spin-out from ROV operator Searov Offshore, now part of DeepOcean, which brings offshore experience to Forrsea's R&D.

Forssea believes that use of augmented reality, computer vision and machine learning can enable greater traceability and field digitization. The company currently has 12 full-time engineers with experience spanning from mechanical engineering and computer vision and machine learning to electronic and robotics engineering.

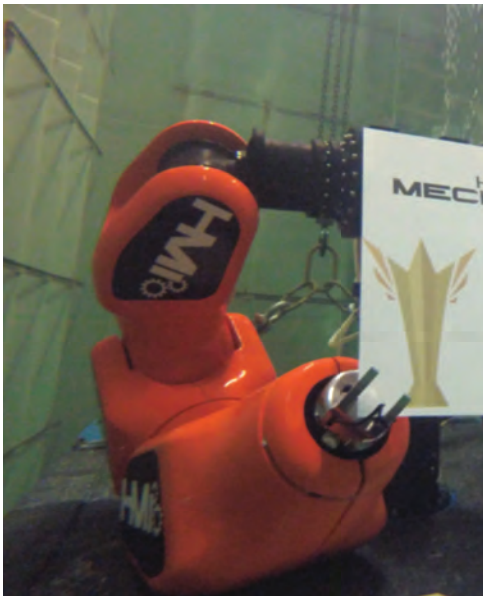
Forrsea is designing, building and qualifying a new autonomous ROV called ATOLL. It is designed to use machine vision technology to dock on subsea infrastructure. Because vision-based technology is critical to the autonomous docking of ATOLL, Forssea has developed a range of vision-based products, ranging from low-cost Ethernet cameras, adapted to augmented reality applications, to an enhanced vision product called 'Polar X', which improves the visibility factor and target identification in turbid underwater conditions by a factor of three.

Forssea's most recent development is V-LOC, which uses QR code markers on subsea assets and a Smart camera on ROVs, supported by specialist computer programming, to obtain real-time positioning with six degrees of freedom measurements displayed between the ROV and the asset or two separate QR code marked assets.

A major operator recently trailed V-LOC in West Africa. Target markers were installed on a subsea Xmas tree and rigid Jumper and real-time positioning data was acquired through



Forssea



the ROV camera to aid the ROV pilots and optimise vessel positioning during the installation and landing phase of the subsea assets.

The firm's primary focus will continue to be the development of artificial intelligence technologies for the subsea environment.

Houston Mechatronics: Robots in disguise

Innovation and disruption are often seen as two sides of one coin these days. Houston Mechatronics, Inc. (HMI) comes under at least one of those titles. The firm is a Houston-area startup subsea service company, founded in 2014, by former NASA roboticists.

The company's business model is Robotics as a Service (RaaS) – in itself a new concept within the subsea industry – which uses what HMI calls its in-house full stack robotics capabilities. HMI's first investor was oilfield services giant Schlumberger (2015), while drilling firm Transocean led HMI's most recent Series B investment (2018), giving some idea of the interest in the firm.

HMI's first splash is the Aquanaut, a subsea service robot that can perform long range yet meaningful in-close manipulation tasks over low bandwidth networks, eliminating the need for surface ships. To accomplish this, Aquanaut is an all-electric underwater transforming vehicle, i.e., it can transform between being an autonomous underwater vehicle (AUV) and a remotely operated vehicle (ROV) with work class manipulators. The vehicle, in prototype stage, can efficiently transit long distances and conduct conventional AUV-based sonar and visual surveys and when the vehicle is required to manipulate something, the system initiates a subsea transformation, which exposes two 1.5m eight degree of freedom manipulators.

Aquanaut only needs a sparse data connection back to shore via long range acoustics, which HMI says shifts conventional operational ROV and AUV paradigms and opens entirely new business models, says HMI.

Unlike conventional ROV technology, Aquanaut is equipped with advanced robotics technology including machine learning, classification, and perception guided force feedback manipulation.

This affords HMI to transition ROV operators to a higher cognitive and a more value added supervisory role, according to HMI. No joystick manipulation of the vehicle or its manipulators is required and as such HMI's motto for Aquanaut is 'mouse clicks not joysticks'.

Led by Aquanaut, HMI says it intends to continue developing novel subsea capability and other robotic technology for use in oil and gas and defence applications with an objective to increase reliability, efficiency, capability and safety.

Stinger Technology: Small but well formed

Stavanger, Norway, based Stinger Technology, is something of a boutique firm in the subsea space. It's a small firm – with seven staff – but this year it's been making ingress into sub-

LEFT: Forssea is applying computer vision and machine learning to subsea operations easier.

CENTER: *MTR* does not present an "MTR100 Creative Photo" award, but if we did this year's winner is Houston Mechatronics. Pictured is Houston Mechatronic's Aquanaut in wet testing earlier this year. holding it's MTR100 'trophy'.

RIGHT: A model of Stinger's drone docking station concept, developed for Equinor.

Houston Mechatronics

Elaine Maslin

sea docking station technology, with support from Norway's Equinor (previously known as Statoil).

Stinger designs and produces solutions focusing on lightweight and cost efficient subsea systems, for subsea intervention and monitoring, with a strong focus on systems that can access confined spaces, mostly for the offshore oil and gas sector, but also the fish farming and shipping industries.

The firm has been in the subsea business since 2003, when it started out by developing a soil sampling system, called the Soil Stinger. It's since been leading, in Norway, the use of small and flexible remotely operated vehicle (ROV) systems for tasks traditionally performed with larger systems and dedicated vessels.

Stinger's recent projects include development of an underwater docking station, a project Stinger is working on under a contract with Equinor. It is being designed to support any subsea resident vehicle, or underwater intervention drone (UID), a term Equinor is using for the project.

The 9m-long UID docking station would be modular and could be a standalone station or retrofit inside a production template. It would include a vehicle "landing plate" and a tool induction plate, for various interchangeable tools and sensors for resident vehicles to use. Equinor is planning a number of test installations with this system offshore at the Åsgard field and at inshore locations, as part of qualification work.

These would have Lego-like inductive power supply and wireless communication connection points for vehicles to plug into, which will also mean operations rooms onshore will see live what tools are in place and how well charged they are, etc. The docking station would also have batteries, a bidirectional smart charger. The UID docking station also has a "little sister" design, which could act as a bolt on subsea power socket for tooling or systems where needed.

Other recent projects include a cavitation cleaning robot, a short and long-term deployable Videoray ROV garage system with tether management system, and an autonomous net cleaning robot for the fishing industry.

WiSub: A subsea Thor

Bergen, Norway, based tech-focused firm WiSub is hoping to create a storm with its pinless wet-mate connectors.

Formed in 2011, the firm made a splash with its Torden (meaning Thunder and alluding to Thor, the roman God that the Vikings believed caused Thunder and lightening), a wet-mate connector, which is able to transfer 24v DC 1,000 Watt of power across a 0-10mm seawater gap, alongside 100 Mbps Ethernet and serial data transfer. Developed for the subsea market in general, one of its initial goals, in collaboration with NOV, was to increase connection reliability between a blow-out preventer and lower marine riser package during subsea well intervention operations.

The firm is also gaining traction for its Maelstrom and Fonn connectors. Maelstrom is suitable for data-only or low-power applications, with 24v DC, 50 Watt power transfer and 100 Mbps Ethernet plus serial data transfer, while Fonn offers 24v DC, 250 Watt power transfer. Both have the same Ethernet and serial data transfer as Torden.

WiSub's connectors use high-frequency microwave communication electronics to transfer data at high speed and use inductive resonance to transfer power, as they can coexist without interference. Using induction and microwave electronics also means the connectors have axial freedom and wide angular misalignment tolerances and don't face wear issues – unlike traditional pin-based wet-mate connectors. The ethernet and serial communication interfaces also allow the use of a variety of market-ready available converters.

WiSub's mantra is that it is "changing the way the subsea industry thinks, connects and communicates," and it's making steps towards that goal, in subsea oil and gas, but also other applications, including military.

For example, the Maelstrom connector has recently been used in the U.S. defense market for autonomous underwater vehicle (AUV) docking, including for large clients operating in the aerospace and underwater autonomous systems domain.

In the oil and gas space, Brazil's University of São Paulo recently purchased a Maelstrom connector and a major operator on the Norwegian Continental Shelf has ordered WiSub's Fonn connector to use as part of an underwater resident vehicle pilot project offshore Norway. WiSub has also been supporting Cellula Robotics' Imotus subsea vehicle testing and deployment with its connector technology.

As wireless subsea power and data transfer grows in use, standardization will become increasingly important. WiSub is in the second year of a two-year research and development project to standardize on AUV pinless electrical power and data communication interface. WiSub equipment was deployed earlier this year with project participants; primary charging interfaces are now under development for delivery later this year. Expect more to come from WiSub.

Cellula: Taking a different tack

Cellula Robotics has taken a new look at how autonomous underwater vehicles (AUVs) operate.

The firm, founded in 2001, near Vancouver, Canada, initially focused on hard rock mining robotics, but then moved into the ocean space, developing seafloor mining robotics systems and then seafloor drilling systems. One of its latest projects, however, is a hovering AUV technology and fuel cells for long-range, long-endurance AUVs.

It's a natural progression for Cellula, whose founder Eric Jackson's background is in AUV technologies. For more than 20 years, Jackson worked at International Subsea Engineering, also near Vancouver, working on submarine control systems and AUVs and project management.

Under Jackson, Cellula has developed the Imotus AUV; a hovering AUV, able to work on a tether, but also jettison the tether, should it become entangled, and then recover itself to a docking station, where it will download data and recharge. Imotus is being developed for visual and non-destructive testing, e.g. ultrasonic thickness (UT), inspection work in con-

fined spaces, such as inside the concrete legs of oil platforms.

The unit is quasi-spherical, 0.8m-diameter, with cameras (HD video and still), UT sensor, cleaning brush and navigation equipment, including a low-resolution sensor for mapping. Subsea lidar is also planned. Unlike traditional AUVs or ROVs, Imotus' primary mode is to hover relative to something, using its inertial navigation system and simultaneous localization and mapping (SLAM) algorithms. Control is based on a mission plan or commands, eg. go down 10cm, turn 10 degrees, or go to port. Cellula, which started to design the Imotus system in February 2017, did its first demos in November 2017, in Vancouver, which included holding station, waypoint tracking, manoeuvring around obstacles, autonomously findings its docking station, then docking, uploading data and recharging using Sonardyne technology and WiSub pin-less connectors, respectively. It was then due to perform work in the North Sea this year.

Meanwhile, Cellula is also working on onboard fuel cell technology for long-duration, long-endurance AUVs. The fuel cell system will incorporate a novel hydrogen peroxide oxygen delivery system. Complementary to the fuel cell is a suction anchor system so that a fuel-cell-supported long-duration AUV doesn't need to dock to something to sit on the sea floor, it can just sit on the sea floor, where it can rest and listen.

"Robotics is an extremely interesting field to be working in," says Jackson. "Subsea robotic applications add another element to the challenge. It's definitely not a consumer business. It's not a race to the bottom, it's more about trying to solve problems, how to make innovative things that are going to make someone else more competitive.

"And I think the market for AUVs is going to increase and there're continuously new applications for AUVs arising," adds Jackson. "There will be a lot more opportunities, different shapes and sizes and pay loads."

Cellua has about 25 staff plus a network of contractors, with offices in Vancouver and the U.K., and agents globally. It also has two joint ventures: Ocean Floor Geophysics, a subsea geophysical firm, which owns and operates AUVs with and has its own sensor development and data processing group; and Subsea Geo Services Inc., set up to operate Cellula's seafloor drills on behalf of clients.

WiSub

RIGHT: WiSub's Torden, ready to offer something a little more benign than lightening.

Imotus

BELOW: Cellula's Imotus underwater vehicle.

RBR, Ltd.

Ottawa, ON, Canada
rbr-global.com
President & CEO: Greg Johnson

RBR has maintained a year-over-year growth rate of over 20%. To fuel continued growth, RBR released the new Generation³ product line in 2018, expanded product offerings to sensors, loggers, systems and OEM components, and collaborated with commercial partners to enable innovations in Argo floats and autonomous vehicles (ASVs, Gliders, AUVs).

Since 1976, RBR has been designing and manufacturing oceanographic instruments in Ottawa, Canada, and have steadily expanded to include offices in Atlantic Canada, California, and New Zealand. From the ocean abyss to the polar ice cap; lakes, rivers and coastal zones, RBR's sensors and loggers track water parameters including conductivity, temperature, depth, salinity (CTD), dissolved gases, pH, and many others. RBR employs a team of 50 highly-qualified engineers, technicians, scientists, support, and technical sales professionals. The dedicated OEM technical team develops responsive partnerships with vehicle manufacturers and system integrators by listening carefully to the challenges and bringing electronics, mechanical, and scientific expertise to the solution. RBR sensors, loggers, integrated systems, and OEM products have been delivered to all corners of the globe and have been deployed in all oceans and great lakes. Research and industry leaders select the RBR equipment because of the trusted world-class accuracy and stability, robust engineering, and dependable technical and scientific support. RBR staff are invited to give scientific presentations and technical workshops at most major meetings and conferences, including the AGU Ocean Sciences Meeting, IEEE/MTS OCEANS (Anchorage and Kobe), JCOMM Marine Instrument Workshop (China), and OCB Biogeochemical Profiling Float Workshop (Seattle).

RBR makes high-precision instruments used for measuring the blue planet. Designed to improve the user experience, RBR's instruments measure up to 10 parameters. RBR's new Generation³ platform includes several improvements to offer increased flexibility for the customer. Communication is available with USB-C as the standardized connector on every instrument, and Wi-Fi connectivity is available on every standard logger. All platforms run on AA batteries – any AA battery – on every instrument. By having one cable that fits all, with widely available batteries, preparing for deployments has never been easier. The Wi-Fi connectivity allows the user to control, download, and view data via Ruskin Mobile, the RBR mobile app. Other Generation³ updates include reduced power consumption and faster sampling. The lower power platform also enables vertical profiling floats, such as Argo, and autonomous underwater vehicles, such as ocean gliders, to sample more frequently or extend their mission duration, greatly reducing costs or enabling extended missions. By increasing the sampling rate up to 32Hz, RBR instruments can be used for mixing studies and to resolve thin layers in the ocean. For system integrators, the RBR loggers act as a 'sensor hub' to control and communicate with a suite of sensors (sound velocity, density, CTD, dissolved oxygen, turbidity, etc). The sensor hub approach improves operational efficiency by reducing redundant system integration efforts.

EvoLogics GmbH

Berlin, Germany
https://evologics.de/
President & CEO:
Dr. Rudolf Bannasch &
Dr. Konstantin Kebkal

EvoLogics GmbH is a German high-tech enterprise, founded in 2000 by a group of international scientists and R&D experts. The company's mission is to develop innovative technologies for maritime and offshore industries through interdisciplinary cooperation between engineering and life sciences. The company designs and manufactures underwater information and communication systems based on bionic concepts, combining engineering with the best ideas found in nature. Advanced product features have become enabling technologies for deep water exploration and production. EvoLogics are experts in cutting-edge underwater communication and positioning systems, as well as novel robotic solutions. The company's advanced spread-spectrum technology allows to deliver optimal results for various subsea applications. EvoLogics products include several lines of underwater acoustic modems, underwater acoustic positioning systems (USBL, LBL), as well as the Sonobot autonomous USV for bathymetric surveys.

EvoLogics' products offer highly reliable, flexible and cost-effective solutions for multiple underwater communication, positioning, navigation and monitoring applications. EvoLogics' developments are based on the patented S2C (Sweep Spread Carrier) technology - the reliable acoustic telemetry that provides an independent bidirectional data link along with positioning, broadcasting and networking capabilities. S2C devices can simultaneously facilitate telemetry and navigation of unmanned underwater vehicles. They enable retrieving information from various sensors and allow to control complex processes by seamlessly combining communication with highly accurate positioning. Moreover, EvoLogics caters to the needs of scientists, developers and commercial customers with a series of underwater acoustic devices and software tools that offer an open development and testing framework, providing endless opportunities for new implementations. S2C systems have been carefully designed for operations in harsh underwater environments and enhanced with special algorithms for signal processing and data management. The company's extensive experience with sensor integration allows it to provide customers with turn-key solutions ranging from initial deployment up to recovering the equipment.

Sonardyne

Yateley, Hampshire, U.K.
www.sonardyne.com
President & CEO: John Ramsden

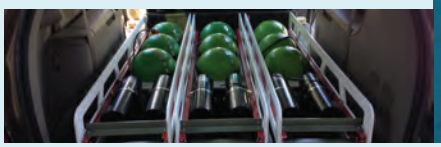
Enabling users to access their data where they want, when they want continues to drive developments from U.K.-based subsea technology company Sonardyne. Its underwater acoustic, inertial, sonar and optical technologies are helping clients within science, energy, defense and marine robotics to lower operating costs, reduce risk and improve decision making.

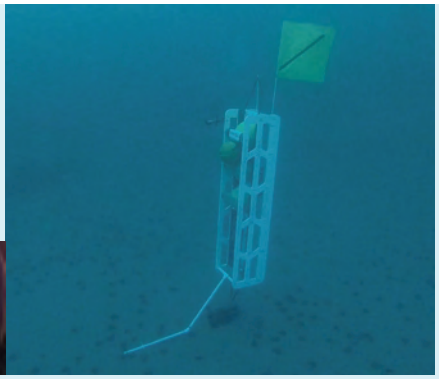
The growing emphasis on ocean observing systems requires a wide spectrum of solutions to support ocean data collection on a variety of spatial and temporal scales, ranging from physical collection of samples by diver or submersible, to long-term autonomous and remote monitoring of marine environments. The latter is also driving a requirement for ever increasing volumes of data direct to the shore for assimilation into models. Independent subsea technology and engineering company Sonardyne is meeting this challenge. It offers a variety of low-power sensing solutions designed for long-term seabed deployment, high bandwidth acoustic and optical telemetry, and optimized communications and positioning solutions for unmanned underwater and surface vehicles and other platforms. In many cases, vessels, underwater systems and operating environments are unique. Sonardyne's philosophy of 'everything under one roof' means that where standard off-the-shelf products cannot meet your specific space, weight, depth and functionality demands, the company can quickly and economically adapt its hardware, sensor and software building blocks. Sonardyne's sea trials and training center in Plymouth, south-west England supports the research and development of emerging technologies and techniques. Resources include two 12m long survey vessels, a floating classroom, training room and workshops.

Sonardyne continues to expand and extend the capabilities of its core acoustic technologies while also growing its expertise in other areas, including underwater optical communications and imaging technologies. A key driver is to make equipment not only more capable, but also simpler to use, and ultimately, help make survey operations and sustained ocean observation projects faster and more efficient. An example is Sonardyne's SPRINT-Nav subsea navigation instrument for underwater vehicles. It combines inertial, Doppler and depth instrumentation and capability into one compact, low-power unit that frees up valuable payload for additional mission sensors. The company's sixth generation hardware, meanwhile, remains a highly regarded choice for supporting positioning, tracking and autonomous monitoring applications. 2018 has seen the arrival of Micro-Ranger 2 USBL – Sonardyne's smallest ever underwater target tracking system and a new family of acoustic release transponders – with more announcements promised before the end of the year. Sonardyne has been working with partners, with public funding, to prove the potential for long-term and autonomous unmanned subsea/surface survey, CO2 leak detection and inspection operations. This work has used Sonardyne's BlueComm optical modem, for real-time high-speed communications between subsea and surface assets, Sentry subsea monitoring sonar, to detect gas bubbles, and its low power, high definition Solstice multi-aperture sonar.

Global Ocean Design

San Diego, CA
www.globaloceandesign.com
President & CEO: Kevin Hardy





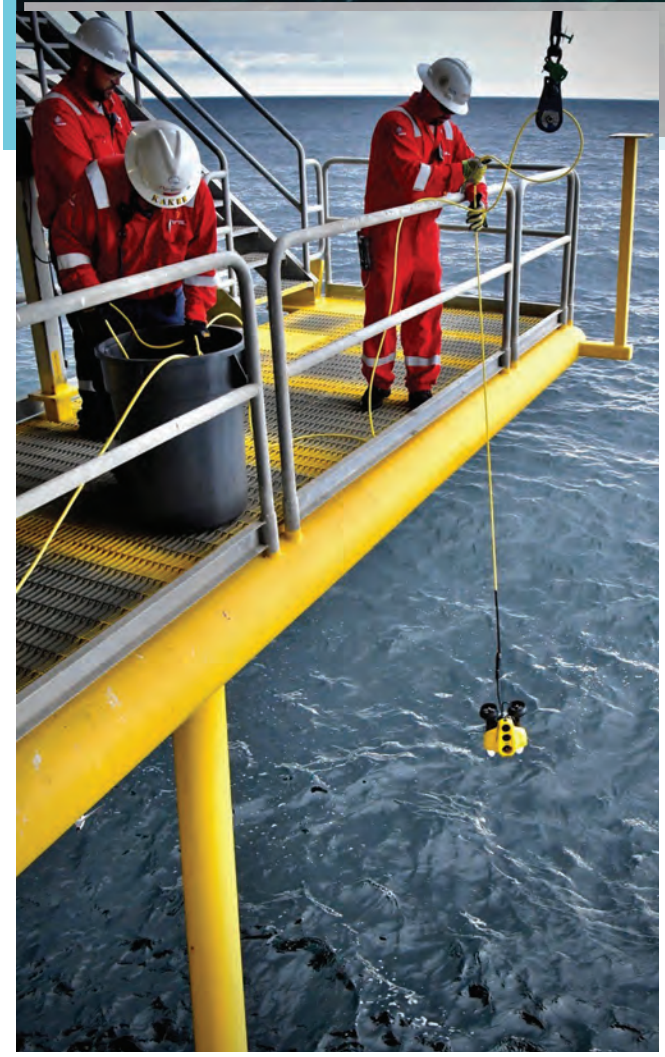
Global Ocean Design LLC invokes a unique approach in the design of its undersea benthic landers. System integration and diverse material choices make these landers small, lightweight, cost-effective, user-friendly, and robustly reliable. The combination enables researchers in every country to explore the seas adjacent to their coastlines using available ships.

The company was formed in 2011 in the quest to reach the Marianna Trench as part of James Cameron's DEEPSEA CHALLENGE Expedition. The new company brought a legacy of experience from its founder, Kevin Hardy, following his globe-spanning 40-year career at the Scripps Institution of Oceanography/UCSD. This year, Hardy received a Doctor of Science (Sc.D.), honoris causa, from the Shanghai Ocean University (Founded 1914), recognizing his "substantial and sustained contributions to marine science and technology." A diverse worldwide customer base, including graduate students, commercial firms, and defense programs, use Global Ocean Design products. The company has developed two standard free-vehicles, the Nanolander, and the larger OmegaLander, to satisfy the growing global Landerian community. Its business model utilizes a flexible horizontally disbursed supply chain. In-house 3D solid modeling supports its suite of independent, certified machine shops. Offsite contract manufacturing provides the support for routine production requirements. Critical components, including all pressure case elements, are tested in-house to a maximum of 1,225-atm. Global Ocean Design maintains a rich online reference library.

Global Ocean Design invents custom UUV components, surface support equipment, and UUV benthic landers. The Nanolander is an untethered benthic lander using three 10-inch hollow spheres for long duration benthic and mid-water operation. The 10-inch polystyrene Instrument Spheres are rated to 1km, provide 11-lbs of buoyancy, and come with four connector ports. Glass 10-inch spheres can go to 10km. Glass and polystyrene spheres will not corrode in seawater, are electrically inert, and invisible to WiFi and magnets. The Beacon Board is a surface location device for UUVs, providing the ship with an unambiguous, direct range-and-bearing to a surface target, up to eight nautical miles, night, rain or fog. A second GPS Tracker provides position updates to a phone or e-mail if the lander has surfaced with no one around. The OmegaLander, with two 17-inch spheres, is our heavy lift benthic lander, capable of full-ocean trench excursions. One was first to the deepest spot in the Peru-Chile Trench, 8,081m. The Deck Purge Box (DPB) dynamically removes moisture vapor from undersea housings of every kind prior to deployment. When used with Self-Sealing Purge Ports, a negative interior partial vacuum is held, allowing the technician to carefully clean and install our Pressure Proof Cap. A Pressure Activated Switch turns on or off with just 3-4 atm of pressure, yet survives over-pressure of 1,225-atm. Our LiPo Battery Pod provides 16vdc-32Ah capacity, and is +4-lbs buoyant.

VideoRay LLC

Pottstown, PA
www.videoray.com
President & CEO: Scott Bentley



VideoRay introduced its first ROV in 2000 and has since become a leader of inspection-class ROVs. VideoRay underwater robots help prevent terrorism, find and retrieve objects, inspect infrastructure both inland and offshore, and keep divers safe from hazardous conditions. As VideoRay innovates with new designs and capabilities, its ROVs assist in increasingly challenging situations and environments, and owners have learned to trust them to perform in more demanding missions. The hallmarks of VideoRay systems are ruggedness, reliability, portability, ease of use, and integration with a wide range of sensors and tools available for inspection-class vehicles.

Mission Specialist Series (MSS), VideoRay's latest technology, is based on modular components providing unrivaled flexibility. The latest MSS configuration, the Defender, is optimized for precise control, heavier payloads, lifting, and specialized operations,. VideoRay Mission Specialist technology, as used in MSS Defender vehicles, delivers several innovative capabilities - extreme power efficiency, minimal weight, a stable but extremely agile vehicle platform, a small operational footprint, multiple reconfigurable sensor and payload options, and infinite endurance afforded by efficient topside power delivery. VideoRay MSS ROV modules include cameras with a wide range of resolutions, LED lighting, powerful thrusters capable of up to one horsepower operation, power systems as well as an on-board battery option, different manipulators, positioning and navigation systems, radiation sensors, water quality, metal thickness, imaging and multibeam sonars, and a purpose-built frame.

Hydrex NV

Antwerp, Belgium
www.hydrex.be
President & CEO: Boud Van Rompay

Hydrex is an innovative solution provider for problems encountered with vessels below the water line. It can immediately mobilize our diver/technicians to any location around the globe to carry out necessary repair work without the need to drydock. Hydrex has a long track record of performing complex permanent underwater repairs to thrusters, propellers, rudders, stern tube seals and damaged or corroded hulls, and in fact the company helped to pioneer many of these more complex operations which used to require drydocking but can now be carried out with the vessel afloat. By creating drydock-like conditions around the affected area, Hydrex diver/technicians can carry out these operations on vessels in port or at anchor.

Hydrex has an in-house R&D department that can take care of the engineering aspects of an operation. In this way turnkey solutions can be offered for both simple everyday operations and complex repairs that require the construction of specific equipment. Hydrex continues to invest in the research necessary to continue evolving repair techniques and procedures. For example, new versions of the Hydrex propeller blade cold straightening machine are regularly put into use to allow repair teams to straighten bent blades that could previously only be cropped. The Hydrex R&D department also keeps improving its flexible mobdock technique to make it possible to perform permanent repairs on seals, thrusters and almost any other part of the underwater vessel without drydocking. Hydrex has developed a repair system that allows Hydrex to perform permanent underwater repairs to every type of propeller in dry conditions. Hydrex can now perform permanent repairs to all parts of the underwater ship propulsion system in drydock-like conditions.

InterMoor

Houston, TX
www.intermoor.com
President & CEO:
Mark Jones

InterMoor provides mooring solutions in support of global marine applications. It achieves this through research and development, combined with design and delivery of the high-value services, technologies and experience at every stage of their mooring and offshore installation projects.

For operators and contractors who require rig moves or who need to anchor FPUs, MODUs, TADs, barges and other floating structures, InterMoor's mooring services provide an integrated solution that focuses on reducing cost, time and risk. InterMoor engineers actively participate in the planning, design, logistics, installation, inspection, maintenance, and recovery operations for the vast majority of its mooring projects. Consequently, its knowledge of installation equipment, vessels and offshore methods allows InterMoor to offer the expertise needed to realize safe and efficient installation jobs. InterMoor also extends its oil and gas expertise to aquaculture and renewable projects such as floating wind and marine energy converters. InterMoor is present in 17 locations and has 10 shore bases around the world, including in the U.K., U.S., Norway, Brazil, Asia Pacific, and Australia.

In 2018, InterMoor launched the Inter-M Release, a new acoustic release mooring connector. The device was designed using the proven platform of sister company SRP's Rocksteady mooring connector and its secondary actuated release system, with a control system developed in conjunction with Teledyne Marine. The control system uses high-fidelity acoustic modems, and implements domain key authorization, unique addressing, network relay and frequency hopping techniques, ensuring the mooring connectors are not affected by obstructions or noise. These features eliminate the possibility of an inadvertent release and allows for the connector to be actuated individually, in clusters, or even sequenced in any order. These new features have been implemented without sacrificing battery life, which has been improved from 18 months to 5 years. More importantly, the new connector weighs a quarter of the weight of other connectors yet can disengage at 100% of its rated break strength; 900t compared to less than half of that in older products. The Inter-M Release is available to drilling contractors and operators who are looking to save valuable time and money not only in the case of weather or emergency avoidance but also in the context of drilling optimization, allowing for faster rig moves with simplified connect/disconnect operations from pre-laid mooring lines.

JW Fishers Mfg., Inc.

East Taunton, MA
www.jwfishers.com
President & CEO: Karen Fisher

Hitting a 50-year milestone in April 2018 JW Fishers Mfg continues to specialize in the design and manufacture of high-tech, reasonably priced underwater search equipment. Their sonar systems, underwater metal detectors, ROVs, and magnetometers are in use by commercial diving companies, public safety dive teams, government agencies, police and military units worldwide

JW Fishers was founded in the mid-sixties by Jack Fisher. Fisher, an avid diver, needed an underwater metal detector to use on a salvage project. Over the next several years he developed and built his own underwater metal detector. Today JW Fishers designs/manufactures all of its underwater search systems at its factory in the U.S. Its expansive line includes hand-held and boat-towed metal detectors, magnetometers, underwater video systems, ROVs, sonar systems, acoustic pingers and receivers, pipe and cable trackers, a sub-bottom profiler system and the Pulse 8X underwater metal detector. In 2017, the SAR-1 metal detector was specifically designed for projects that need to locate metal objects in poor visibility, underwater environments.

The unit alerts the user to the presence of metal by vibration which is transmitted through the handle and a bright red LED display. It's "snareless" design with no external wires or cables, rugged construction, streamlined configuration, and bright yellow search coil help the end user find any target in ZERO visibility waters. In 2018 JW Fishers debuted the fifth generation magnetometer, the Proton 5. The fully digitized system displays the current five-digit measurement on a new easy to read six-inch LCD screen that is backlit for night operations. A new "auto tuning" feature greatly simplifies set-up when operating in different locations. It allows the user to quickly tune the magnetometer without having to disassemble and manually configure the device without even opening up the fish. A unique feature of the towfish is its ability to be separated into two parts so it easily fits into a watertight case for storage and transportation.

Klein Marine Systems, Inc.

Salem, NH
www.KleinMarineSystems.com
President & CEO: Guy Malden

Klein has 50 years of experience with the development and manufacture of high performance sonar products including side scan and bathymetry systems and maritime surveillance and security solutions. Our side scan sonar systems are respected as the standard of excellence in the industry and are deployed by governments, navies, port authorities, surveyors, oil companies and universities worldwide.

Founded in 1968, Klein Marine Systems, a wholly owned subsidiary of Mitcham Industries, Inc., is a supplier of side scan sonar equipment and waterside security and surveillance systems, deployed by governments, navies, port authorities, surveyors, oil companies and universities worldwide.

The System 5900 Multi-Beam Side Scan Sonar represents Klein's advanced multi-function sonar platform and includes high resolution multi-beam side scan sonar, swath bathymetry sonar, gap filler sonar, and integrated tow body sensor and subsystems. The sonar employs advanced signal processing techniques and superior acoustic design to improve overall along track target resolution. The UUV 3500 side scan and bathymetry sonar is a flexible payload designed to support a broad base of manned and unmanned marine vehicles in numerous off-the-shelf configurations. Depth rated from 600 to 6,000 meters, the UUV 3500 utilizes Klein's proprietary CHIRP wideband technology for unmatched range and resolution delivering superior performance. The Klein HydroChart 3500 is a lightweight, low-cost, wide-swath, professional shallow-water underwater survey mapping instrument that supports IHO SP-44 Special Order quality bathymetric survey data collection, co-registered with high-resolution side scan imagery for navigational charting, dredging and engineering support, habitat characterization and other shallow-water mapping applications. The Klein System 4900 is a versatile Side Scan Sonar that can be used for many different survey and recovery applications. The high-fidelity, high-definition imaging abilities and the portability of the System 4900 make it an ideal tool for search and recovery (SAR) missions.

Kraken Robotic Systems, Inc.

St. John's, NL, Canada
www.krakenrobotics.com
President & CEO: Karl Kenny

Kraken is a leader in the development of SAS systems and underwater robotics, such as the KATFISH and ThunderFish. Most recently it developed the SeaVision, a full-color, underwater laser imaging system.

Kraken is engaged in the design and development of high performance, software-centric sensors, underwater robotic systems and 3D laser scanning systems. The Kraken Active Towfish (KATFISH), engineered using SAS technology, is designed to provide highest resolution seabed pixels at the lowest cost. KATFISH acquires more than 3 billion pixels per 3 km2 per hour of area coverage rate.

ThunderFish is a 6,000-meter rated, hovering AUV (H-AUV). It is a mid-size AUV and first in a planned series. Versatile payload options and a modular battery system allows ThunderFish to be adaptable to different missions of varying depths, duration, and applications.

SeaVision is touted by the company as the world's first full-color, underwater laser imaging system that offers the resolution, range and scan rate to deliver dense 3D point cloud images of subsea infrastructure with millimeter resolution in real time. The system is designed for deployment on underwater robotic platforms such as ROVs and AUVs, and Kraken is incorporating the SeaVision system onto KATFISH and for offshore wind farm inspections. The company is embarked on a mission to implement a Robotics as a Service (RaaS) model. RaaS lowers technical and financial barriers to implementation and deployment of robots in the field, meaning that the team operating the underwater robotic vehicle is the same team that designed and built it.

Kraken has an industrial lab space where it engages in manufacturing, testing and assembly. On site it has a test tank that is 5.5m x 1.8m x 1.5m and holds 12,115 liters of water. In addition, the company is investigating the possibility of joining forces with other companies, industry associations and governmental organizations to start this province's first ever technology center where tech companies can come together to share resources and test equipment. This is in the very early planning stages but Kraken has been spearheading the movement.

In addition, Kraken has access to, and makes regular use of, the facilities of the Marine Institute. MI's test facilities include:

- Acoustics Tank. 4m x 4m x 5.5 and holds 88,000 liters of water. Kraken's use of this tank is for the design, development, testing and calibration of sensors.
- Flume Tank. The institute has the world's largest flume tank. This facility is used to carry out performance evaluations in simulated underwater or shallow water conditions.
- The Holyrood Marine Base supports at-sea research and training. Kraken has used this facility, its docking facilities, vessels and staff when conducting sea trials.
- Hydrostatic test chamber. The 70 liter chamber is able to simulate ocean depths of up to 1,800 metres.
- Several vessels or varying sizes and capabilities.

L3 OceanServer

Fall River, MA
www.ocean-server.com
President & CEO: Chris Kubasik

Since its inception in 2003, L3 OceanServer has established itself within a growing specialized market, providing highly capable UUVs to a wide array of military and commercial customers. The new Iver4 PW offers users a 300-meter workhorse system featuring long duration capability and no shipping restrictions with L3 OceanServer's lithium-free standard design.

L3 OceanServer develops and manufactures autonomous, lightweight unmanned undersea vehicles (UUVs). The Iver family of AUVs are used in a variety of missions including: mine counter measures (MCM), hydrography, intelligence, surveillance, and reconnaissance (ISR), environmental monitoring, anti-sub warfare, research, survey and search and recovery. Built with leading edge technology and a battlespace understanding, the Iver family of vehicles are capable, modular, reliable and field proven. L3 OceanServer has sold more than 300 units worldwide.

The Iver3 AUV is designed to be an affordable, commercial vehicle used by customers for sensor development, water quality, general survey work, sub-surface security and research. The OceanServer Iver3-580 is a fully autonomous vehicle capable of operating unattended for up to 10 hours and 100-200m deep while carrying a variety of sensors. With this endurance the Iver3 is capable of covering more than 20km of survey lines on a single charge. The payload sensors can produce detailed bathymetry, side scan imagery, magnetometer, water quality and camera systems. These AUVs are single person-portable and feature simple point and click mission planning. The platform uses a series of sophisticated sensors to navigate the pre-programmed path while maintaining a constant height off the bottom, regardless of the water conditions. The Iver4 PW offers users a new 300-meter workhorse system featuring long duration capability and no shipping restrictions with L3 OceanServer's Lithium-free standard design. The Iver4 comes standard with rechargeable NiMH battery packs supporting up to 20-hour runtimes or > 74 km mission duration for long ingress/egress missions. The Iver4 comes standard with tracking and safety communications, precise repeatable measurement, high accuracy navigation and low drag side scan and bathymetry transducers.

LinkQuest Inc.

San Diego, CA
www.link-quest.com
President & CEO: Ning Xiao, Ph.D.

LinkQuest Inc. is a manufacturer of acoustic instruments for offshore oil exploration, construction, drilling, survey, environmental study and other oceanographic applications in the world. It manufactures precision acoustic instruments for offshore oil exploration, construction, drilling, survey, environmental study and other oceanographic applications. The company's acoustic communication and positioning products are based on the Broadband Acoustic Spread Spectrum (BASS) Technology. LinkQuest's high speed underwater acoustic modems transport more than 95% of the world's acoustic communication data, according to the company. These systems have set a series of technical performance records in field deployments globally. LinkQuest's line of TrackLink Acoustic Tracking Systems are designed to provide robust, accurate and cost-effective Ultra Short Baseline (USBL) solutions.The FlowQuest Acoustic Current Profilers, FlowScout Acoustic Flow Meters and NavQuest Doppler Velocity Logs (DVL) were designed to provide solutions for current profiling, wave measurement, flow measurement or precision underwater navigation applications. These products offer significantly longer range with high accuracy. LinkQuest also manufactures PinPoint LBL acoustic positioning systems and Precision Marine Geodetic Systems used for tsunami and earthquake monitoring and prediction.

Liquid Robotics

Sunnyvale, CA
www.liquid-robotics.com
President & CEO: Gary Gysin

Liquid Robotics is a pioneer of the Wave Glider, unmanned surface vehicle. It has completed hundreds of missions from the Arctic to Antarctica, in extreme sea states and over months to a year.

Liquid Robotics, a wholly owned subsidiary of The Boeing Company, is based in Silicon Valley with an engineering and test facility in Hawaii. With 120+ employees, it produces the Wave Glider, a wave and solar powered ocean robot. Since first production, the company has manufactured more than 45.

Liquid Robotics was born out of a man's passion for Humpback whales songs. In 2003, Joe Rizzi set out to design a way to capture the whales' singing and communicate it back to shore. The goal was to design an unmanned system that could hold its position at sea and operate 24/7 without harming the environment or the whales. With Roger Hine, they designed the Wave Glider and established Liquid Robotics in January 2007. For 11 years, the company has worked with customers and partners to pioneer new uses for the Wave Glider, develop key enabling technologies, and successfully complete missions all over the world. Today, they work to create a connected ocean sharing data in real time between sensors, manned and unmanned systems. Providing ubiquitous access to data from anywhere in the ocean, at any time is their vision for the Digital Ocean. Wave Gliders have traveled over 1.5+ nautical miles at sea collecting data for weather forecasting, seismic detection, environmental monitoring, anti-submarine warfare and vessel detection (illegal fishing, human and drug smuggling).

Wave Glider is an unmanned surface vehicle that operates individually or in fleets delivering real time data for up to a year. This persistence with real time communications between the seafloor to space enables immediate access to data previously too costly or risky to obtain. The Wave Glider uses a two-part architecture that leverages the difference in motion at the ocean surface and below. It's composed of the float and a sub with wings. Connected by 8-meter tether, the float is on the surface of the ocean where conditions are the harshest with the sub below where it is calm. It converts the up and down motion of the waves into forward thrust. Solar energy powers the on-board computing, communications, navigation and sensor payloads. Mission Management Software enables unique data collection capabilities, multi-mission operations from a single console, and the flexibility to adapt vehicle missions to changing needs. It supports the development of new solutions and integration with other third-party systems. In September 2017, the Next Generation Wave Glider was released with advancements to operate in high sea states and high latitudes and designed to operate in Sea State 6 and above (wave heights from 4-6 meters/13-20 feet).

MacArtney A/S

Esbjerg, Denmark
www.macartney.com
President & CEO: Claus Omann

The MacArtney Group is a global supplier of underwater technology systems, products and integrated solutions specializing in design, manufacture, sales and after-sales service of a wide range of systems to offshore oil and gas operators, surveyors, the renewable energy sector, ocean science institutes and defence and navy industries across the world. The company offers an extensive variety of advanced and reliable product and system solutions which are designed and tested to supply high quality, efficiency and dependable performance in challenging underwater environments. All MacArtney systems and components are backed by an international network of subsidiaries and representatives providing local access to global support.

MacArtney has been carrying on a prosperous business for 40 years and is a privately owned corporation with group headquarters in Esbjerg on the west coast of Denmark. From the head office, MacArtney has been providing logistical, technical, financial and marketing support to all of the Group companies since 1978.

MacArtney supplies include SubConn, OptoLink, TrustLink and GreenLink connectivity, cable and termination solutions, advanced NEXUS and EMO fiber optic telemetry systems, electric CORMAC and MERMAC winches, handling and LARS systems including active heave compensation (AHC) winches for ROVs. The MacArtney range of fast and precise remotely operated towed vehicles (ROTV) includes the MacArtney FOCUS 2, FOCUS 3 and TRIAXUS vehicles. MacArtney also designs and manufactures CEMAC offshore cable handling equipment intended for pipeline and cable-laying deployment. Moreover, MacArtney supplies a versatile range of LUXUS underwater cameras, lights, media controllers, pan-and-tilt units and accessories as well as a LOTUS data acquisition and telemetry buoy system.

System design and integration by qualified, experienced engineers is an important part of the MacArtney portfolio. Combined with a wide range of products and systems, MacArtney can provide turnkey solutions designed specifically for requirements and installed ready for use wherever needed.

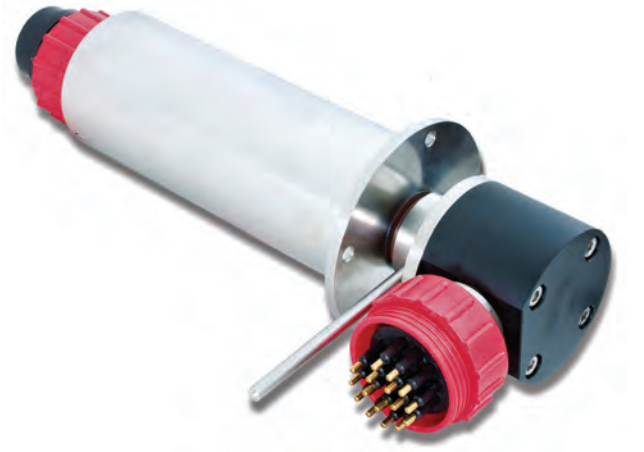
McLane Research Labs, Inc.

E. Falmouth, MA
www.mclanelabs.com
President & CEO: Susumu Honjo

McLane Research Laboratories, 2017 Small Business Exporter of the Year for the Commonwealth of Massachusetts, is a leader in-situ time-series oceanographic profilers, samplers, and flotation. McLane products help worldwide investigators achieve their research and scientific goals by providing advanced, cost-effective instrumentation.

McLane Research Laboratories, Inc. was founded in 1983 to manufacture and develop advanced time-series instrumentation to the international oceanographic community. Through long-term R&D programs, and its association with diverse research projects, McLane has established a significant base of knowledge and proven technology in support of our objective. A leader in technology transfers in the field of oceanographic instrumentation, the company maintains significant development, innovation, and commercialization capabilities. McLane's commitment to its customers and their science is a core value, with emphasis on support, service, and training.

The company produces three main product lines: profilers, samplers and flotation. Within profilers, McLane offers the Ice Tethered Profiler (ITP) and the McLane Moored Profiler (MMP). Samplers include flagship Sediment Traps, as well as the Remote Access Sampler (RAS), Phtoplankton Sampler (PPS), and Large Volume Pumps. In addition, McLane's in-situ laboratory platforms, Environmental Sample Processor (ESP) and Imaging FlowCytobot (IFCB), support emerging genomic and optical research methods for automated time-series oceanography and limnology. McLane also manufactures glass and steel flotation, as well as custom instrument housings. McLane instruments are central to many long term global projects and cruises including such initiatives as OOI, GEOTRACES, and the RAPID array.

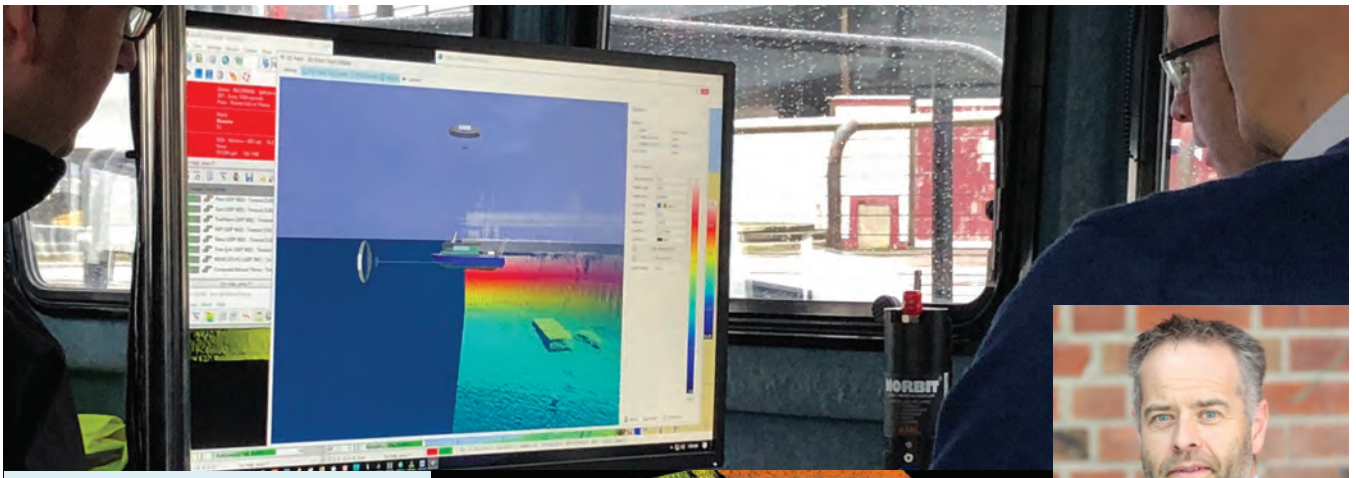


Moog Focal

Dartmouth, NS Canada
www.moog.com/focal
President & CEO: Craig Bowers, Managing Director

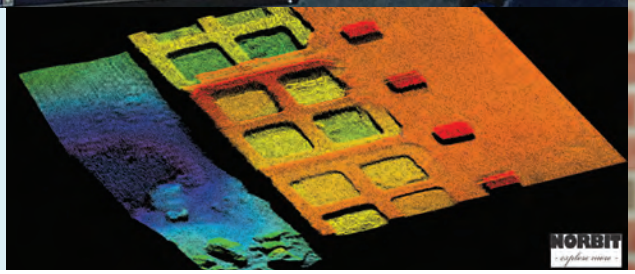
Focal Technologies, a Moog Inc. company, specializes in providing electrical slip rings, fiber optic rotary joints, hydraulic utility swivels and fiber optic multiplexer solutions for the worldwide marine industry including ROV, seismic, FPSO turret and oceanographic applications. Product features include hybrid packages that combine fiber, electrical, and fluid rotary joints for harsh environments, explosion proof/flameproof for hazardous locations and adaptation to customers' size and mounting constraints.

Electrical slip rings are electromechanical devices that allow the transmission of power and electrical signals from a stationary to a rotating structure. A slip ring can be used in any electromechanical system that requires unrestrained, intermittent or continuous rotation while transmitting power and/or data. It can improve mechanical performance, simplify system operation and eliminate damage-prone wires dangling from movable joints. Focal also designs, manufactures and delivers unique floating production system (FPS) swivels to meet the demanding requirements of offshore operators worldwide. FPS swivels are used in a variety of floating production systems including buoys, turret moorings and offshore loading towers. Focal multiplexer products offer a range of time division multiplexers and wave division multiplexers. These multiplexing techniques can be used to simplify optical transmission systems and reduce cost, improve reliability, reduce weight and enhance performance. Fiber optic rotary joints are a means to pass signals across rotating interfaces, particularly when transmitting large amounts of data. Ruggedized for harsh environments, compact sizes and a variety of custom configuration options. Fluid Rotary Unions are currently used around the world to ensure reliable transmission of life support, process, power and control fluids. Condition monitoring solutions reduce operating costs using optical monitoring and slip ring sensors to enable preventative maintenance.



NORBIT Oceans

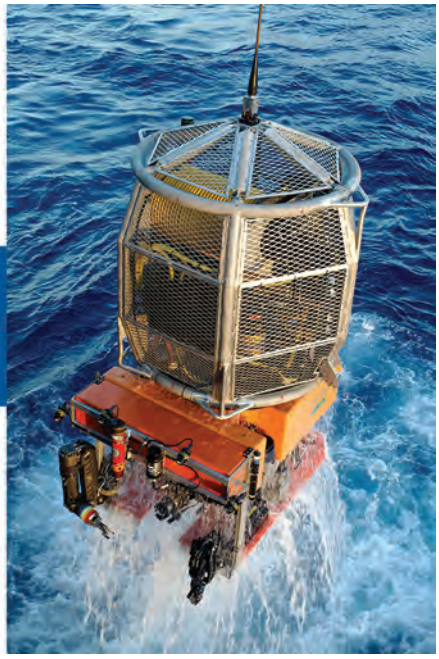
Trondheim, Norway
www.norbit.com
President & CEO:
Per Jørgen Weisethaunet



NORBIT Oceans provides technology, products, solutions and services in the full "Ocean Space" domain. Together, the business unit NORBIT Oceans comprises four ocean-related specialists market fields under a single identifiable brand, operating in defense and security, maritime surveillance and environmental monitoring, oil and gas, renewables; transportation, and research and engineering. NORBIT Subsea is well known for high resolution, ultra-compact wideband multibeam sonar systems for permanent or temporary installations. Aside from leading bathymetric and forward-looking visualization sonars, NORBIT also produces tightly integrated survey solutions.

NORBIT Aptomar provides integrated smart monitoring for the marine sector by delivering complete systems, sensors, control systems, and support services. Further capability exists through the Aptomar Global Maritime Control Center, which monitors global remote operations through professional mariners on a continuous, permanent basis. NORBIT Defence combines a selection of products from across the NORBIT Group, using NORBIT technology experience in underwater acoustics, solutions are ultra-compact and low in power that does not sacrifice performance. It is suitable for deployment on a variety of platforms supporting security applications. NORBIT Aqua designs a range of products for fisheries and the aquaculture industry.

The NORBIT Subsea range of ultra-compact, high resolution, wideband MULTIBEAM sonar systems are renowned for permanent or temporary installation on vessels, USVs, ROVs, AUVs. Systems benefit from curved array technology and frequency agility which in some models range from 200kHz to 700kHz with narrow beam spacing resulting in an exceptionally high seabed or object data sounding density.



Ohmsett

Atlantic Highlands, NJ
www.ohmsett.com
President & CEO: Paul Meyer,
BSEE Technical Representative

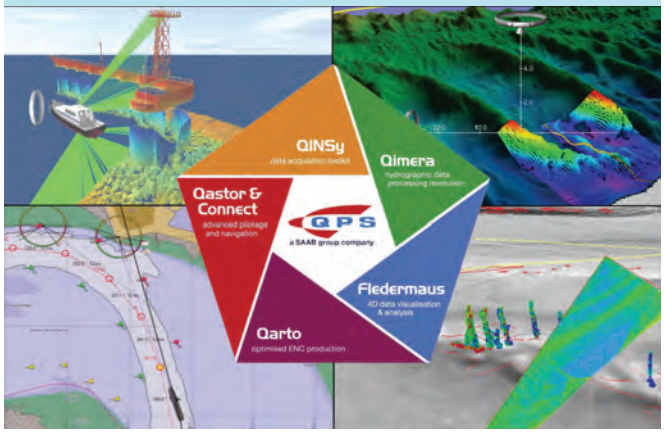
Ohmsett - The National Oil Spill Response Research & Renewable Energy Test Facility is managed by the Bureau of Safety and Environmental Enforcement (BSEE) and is the largest outdoor facility of its type in North America. It provides the Bureau and other facility users from around the world with a unique oil spill response training and testing environment that simulates real-world conditions in a safe and controlled environment.

Ohmsett conducts research, testing and training with full scale equipment using real oil in repeatable simulated marine conditions. Government agencies, academia and private companies come to the facility to conduct early development and prototype testing of emerging response countermeasures for offshore spill response. In addition, Ohmsett provides a venue for first responders with the most realistic hands-on training available.

Ohmsett is the test bed for some of the most innovative technologies used in the spill response industry. Customers come to the facility to test skimming vessels, sorbents, dispersants, sunken oil detection, oil-in-ice recovery, remote sensing, and much more. Ohmsett provides independent and objective performance testing of full-scale oil spill response equipment and marine renewable energy systems (wave energy conversion devices). Its most notable feature is the above-ground concrete test tank measuring 667 feet long by 65 feet wide by 8 feet deep filled with 2.6 million gallons of crystal clear salt water. The wave generating capabilities include programmable amplitude, frequency and wave length, creating random waves that more closely approximate waves in the ocean, and waves that can be break at specific locations within the tank. Ohmsett has the infrastructure necessary to support customer testing with its equipment tow bridges, 32-channel data collection system, fully equipped machine shop, on-site oil/water laboratory, oil distribution and recovery system, and dispersant application system.

QPS, Inc.

Portsmouth, NH
www.qps-us.com
Managing Directors: Jonathan Beaudoin & Almar Hollaar



Quality Positioning Services BV (QPS), headquartered in Zeist, The Netherlands, is an independent software design company founded in 1986. QPS subsidiary offices are located in Portsmouth U.S., in Fredericton Canada, and in Banbury U.K. In late 2012, the HITT group of companies became a wholly owned subsidiary of Saab AB and so a member of the Saab group of companies. QPS is focused on system integration of survey sensors and the development of software applications used for hydrographic surveys, sea-floor mapping, portable pilot units and Electronic Navigation Charts (ENC) production. QPS is seen as market leader in these fields. The key technology of QPS is based on precise navigation, the collection and presentation of large volumes of navigation and depth data. This also includes new techniques for 3D visualization of the underwater environment. QPS navigation and positioning software is used on board offshore construction vessels, pipe-lay barges, drilling rigs, seismic research vessels and hydrographic survey vessels. QPS has a fast growing market share in the offshore oil and gas industry, dredging industry and port communities.

Riptide Autonomous Solutions

Plymouth, MA
www.RiptideAS.com
President & CEO: Jeffrey M. Smith

Riptide is developing and fielding game changing UUV capabilities as a major market disruptor, developing a flexible, extensible architecture, designed to provide significantly better efficiencies and longer endurances at a lower price point.. Since last year's award for the micro-UUV, Riptide has released multiple new sizes of vehicles and just announced extended depth options. Riptide is a small business dedicated to advancing Autonomous Underwater Vehicles (AUVs) and their usage. Riptide's modular architecture permits customization to meet specific end-user operational requirements. Its extensible architecture provides for drop-in future upgrades and planned product improvements, or can support the lowest logistics, turn-key operations out of the box. Riptide developed and fielded its first sonobuoy-sized class of man-portable AUV, known as the Micro-UUV, and started product deliveries in 2016. Riptide successfully developed this platform coupling the latest low-power electronics, superior hydrodynamics, and state of the art manufacturing processes to field this lowest cost, yet highly capable, next generation AUV platform. Since delivering Micro-UUVs for almost two years (nearly 100 UUVs in total), in 2017 Riptide scaled this base platform up into 1 Man-Portable (1MP – 7.5" Diameter) and 2 Man-Portable (2MP – 9.375" Diameter) AUV platforms that leverage the same proven hydrodynamic and electronics capabilities. Depending on the energy solution, Riptide vehicles can transit 1000 nmi or more. The standard operational depth rating of the micro-UUV is 300m, but Riptide is in the process of fielding a 1500m rated variant of the 1MP and intends to demonstrate a 6000m rated micro-UUV by mid-2018.

Rowe Technologies

Poway, CA
www.rowetechinc.com
President & CEO: Dan Rowe

Rowe Technologies is an oceanographic and hydrographic acoustic sensor company that is dedicated to research and development. With an engineering workforce staff of more than 85% of company personnel, Rowe's highly technical employees account for over 250 years of acoustic sensor experience

Rowe Technologies Inc. (Rowe Tech) was founded in 2009 by Fran Rowe, the originator of the Acoustic Doppler Current Profiler (ADCP) and founder of Teledyne RDI. Rowe Tech is an oceanographic and hydrographic sensor company that designs and manufactures industry leading Acoustic Doppler Current Profilers (ADCPs) and Doppler Velocity Logs (DVLs). The ADCP transmits a 4-8 beam sound signal [ping] of a specific frequency and measures the Doppler-return frequency that is reflected from particles in the water column. This translates into a velocity relative to the reflection point, either a water layer or the bottom. An ADCP measures current profiles in the water column at discrete cells selected by the user and call also measure directional waves and wave energy. A DVL tracks the seafloor or river bottom, and additionally, provides a current profile to the bottom. This tracking allows calculation of underwater positions using an Inertial Navigation System [INS]. These systems enable accurate underwater navigation for submarines, autonomous and remotely operated vehicles. All Rowe Tech products have dual functionality and can function as an ADCP or as a DVL.

Saab Seaeye

Fareham, Hampshire, U.K.
www.saabseaeye.com
President & CEO: Jon Robertson

Saab Seaeye is the largest manufacturer of electric underwater robotic vehicles in the world.

Founded in 1986, it strives to offer innovative solutions trusted to perform complex tasks in the most challenging environments on the planet. A wholly owned subsidiary of Saab, its has facilities in the U.K., Sweden and the U.S., along with substantial water tank and lake test facilities. More than 80% of its systems are exported to markets that span the globe where it is represented in 25 countries. Many different market sectors deploy our robotic systems in a vast array of demanding tasks in situations where our vehicles work tirelessly for extended periods in arduous conditions.

Saab Seaeye systems come in various sizes, power and tasking options, from man-portable inspection to deep-rated work systems, and from tethered and autonomous vehicles to remote resident robotics. The iCON intelligent control architecture accelerates system development and provides customers with easier operation and training, simpler repair and maintenance, easier upgrades and lower real through-life cost. While under operation, iCON effectively 'thinks for itself', leaving the operator free to concentrate on the task at hand. Saab Seaeye is certified by DNV GL to ISO 9001, ISO 14001 and OHSAS 18001.

Seafloor Systems, Inc.

Shingle Springs, CA
www.seafloorsystems.com
President & CEO: John Tamplin

Seafloor Systems was founded in 1999 by Navy Veteran, John Tamplin. Its primary focus is the development and manufacturing of survey equipment and platforms for hydrographic survey applications, turnkey solutions are ideal for narrow rivers and streams, lakes and ponds, shallow water and harbors. Seafloor serves hydrographic, dredging and academic communities across the globe, providing a full spectrum of hydrographic survey equipment, software, training and support.

Seafloor developed the Hydrolite echosounder system to meet the needs of the U.S. Army Dive Teams. The Hydrolite was designed to integrate into a customer's GNSS survey kit and data collector, bringing hydrographic survey technology to the land surveyor. With interfaces to suit Trimble ACCESS and SCS9000, Leica VIVA and Captivate, Topcon MAGNET, and Carlson SurvCE, the Hydrolite covers most, if not all, survey data collection software packages used today. Seafloor developed the HyDrone remote control USV in 2010, in order to deploy survey equipment in hazardous and inaccessible areas, including rivers, lakes, canals, mines, and harbors. In 2014, Seafloor introduced the EchoBoat, a 1.8m mono-hull USV, which can deploy a multibeam echosounder remotely and is complete with an inertial position and orientation system and sound velocity sensor. Integrated to the vehicle is a powerful industrial PC capable of collecting data from all survey sensors, cameras, and environmental systems, as well as enabling the user to remotely connect to the vehicle over RF telemetry to monitor and control the data acquisition process. Complementing both the HyDrone and EchoBoat systems, the industry-disrupting AutoNav autopilot module was introduced in 2015. This product makes it possible to pre-plan a survey mission, upload it to the vehicle, and have the vehicle carry out the survey autonomously. Once the survey is complete, the vehicle automatically returns to the launch point for ease of recovery.

Southwest Electronic Energy Corp.

Missouri City, TX
www.swe.com
President & CEO: Len Benckenstein

Since 1964, SWE has been a pioneer in innovative energy solutions serving the needs of original equipment manufacturers in diverse fields such as oil and gas, oceanographic, military and remote. SWE has changed the game in subsea and oceanographic applications with SWE SeaSafe, SeaSafe II and SeaSafe-Direct, lithium-ion battery solutions that power subsea vehicles, control systems and oceanographic equipment safer and longer with four times the energy of a sealed lead acid battery. SWE leads downhole battery solutions with Lithium primary battery packs for high temperature Measurement While Drilling (MWD) and Logging While Drilling (LWD) applications. SWE also provides custom battery solutions for the exploration of the earth's oceans by powering the infrastructure, vehicles and buoys that collect needed data.

To provide safe and reliable subsea battery solutions, SWE designed the SeaSafe Direct Battery Module,which can go directly into the water leaving the subsea pressure vessel and oil case behind.The battery is engineered pressure tolerant to 6000 meters depth, enclosed in flame-retardant urethane, and ready for complete water submersion, with built-in subsea connectors for power and communications. SeaSafe can reliably power subsea AUVs, ROV sleds, control electronics, electric motors, and sensors supporting subsea surveys, workovers, inspections, and maintenance operations. SeaSafe batteries include SWE's patented battery management system (BMS). The BMS within each module has the brainpower to assure safe, reliable operation and prolong battery life with automatic and continuous safety protection, charge control, balancing, and available state of health reporting. Rechargeable with a standard power supply, SeaSafe Smart modules are easy to use battery system building blocks. The modules are easily connected in series and parallel to meet voltage and capacity (Ah) needs. Additional components to support SWE SeaSafe include the Diode OR-ing Module and the SeaSafe Observer Software, to observe the status of the battery in real time. Woods Hole Oceanographic Institution worked with SWE during SeaSafe development, utilizing it in the Nereid UI Hybrid ROV and other vehicles. SeaSafe II and SeaSafe-Direct received a Certificate of Design Assessment from ABS in December 2017.

Teledyne CARIS

Fredericton, NB, Canada
www.teledynecaris.com
President & CEO:Michel Stanier

For more than 35 years, Teledyne CARIS has designed software for the marine GIS community. Developed in cooperation with hydrographic clients and universities, the CARIS toolset provides clients with resource optimization and a true operational advantage. Known for its Ping-to-Chart solution, CARIS' comprehensive portfolio of products, from the processing of the echo-sounder ping, to the production and distribution of the chart have enable the charting of hundreds of thousands of nautical miles of ocean and waterways around the globe. The newest product in the toolset, CARIS Onboard, is a near real-time and autonomous data processing package which has been developed with autonomous underwater vehicles (AUVs) and unmanned surface vehicles (USVs) in mind. This solution acts as a force multiplier when used on survey vessels by fitting seamlessly into the Ping-to-Chart suite of software, and reducing the overall product creation timeline. Not only renowned for its product, but also for outstanding customer service, Teledyne CARIS offers a comprehensive level of support through training sessions and consulting, online technical support, email and multilingual telephone support.

Tritech International Ltd.

Westhill, Aberdeenshire, Scotland, UK
www.tritech.co.uk
President & CEO: David Bradley

Tritech International Ltd., a Moog company, is a high-technology business dedicated to providing the most reliable imaging and ancillary equipment for use in underwater applications. Established in 1991, it began with the aim of producing an innovative range of subsea products for the offshore oil and gas industry, military and other world-wide subsea markets. Tritech continues to adhere to its philosophy of continued research and development, resulting in the evolution of a diverse range of products, comprising high-performance acoustic sensors, video cameras and mechanical tooling equipment; within the industry it is regarded as the reference equipment for subsea operations. The company's commitment to innovation is illustrated in its latest product release – the Gemini 720im. This groundbreaking product is the world's smallest multibeam sonar. Tritech already has to its record one of the smallest mechanical sonars in the world – the MicronSonar. The release of another world first with the launch of the Gemini 720im, strengthens Tritech's position as an innovator.

Tritech's SeaKing DST is the mechanical scanning sonar of choice for many of the world's ROV fleets. For fast, reliable and complete operational flexibility, all products in the SeaKing family can run simultaneously on a single ArcNet communications link.

The Gemini range of multibeam imaging sonars provides operators with the ability to visualize work areas even in zero visibility conditions. The high resolution Gemini 720is and 720ik models have been added to with the smallest imaging multibeam, the Gemini 720im.

Turner Designs

San Jose, CA
www.turnerdesigns.com
President & CEO: James Crawford

Turner Designs provides optical-based solutions for environmental research and monitoring, water quality analysis, pollution control analysis and maritime monitoring. Having a unique focus on fluorescence instrumentation for over 45 years and customers throughout the world, Turner Designs is a leader in filter fluorometer design, manufacture and support. Turner Designs is known for providing rugged, reliable, stable instruments, and it offers submersible, field, handheld, laboratory, and online optical instrumentation varying in functionality, size, and price to fit any type of user need. In addition to holding several patents for product innovations, we continuously focus on quality and repeatedly receive high customer ratings. Its on-site manufacturing team has an average tenure of more than 20 years to provide lead times as short as one week while still meeting our committed delivery dates over 98% of the time.

Turner Designs develops instruments focused not only on performance and reliability, but also on cost. With modular designs, it is able to use parts across platforms, minimizing our lead times as well as costs. Ballast-Check 2, AquaFlash, CyanoFluor, & AquaFluor are built using the same handheld platform with optics and firmware optimized for different measurements. Cyclops-7F, Cyclops-6k, C3, C6P, Cyclops Integrator, FluoroSense, Enviro-T2, and PhytoFind use many of the same optical components with firmware and packaging optimized for different applications.

Valeport Limited

Totnes, Devon, U.K.
www.valeport.co.uk
President & CEO: Matthew Quartley

With a heritage dating back almost 50 years, Valeport has a track record at the forefront of the subsea sector. Based in the UK, the privately owned, independent family business designs, manufactures and services underwater measuring equipment. The company which started by making instruments for measuring the speed of water in London's River Thames, today has a comprehensive portfolio of underwater measuring equipment and supplies a worldwide customer base that includes: environmental, research, defence, oil and gas, renewable energy, construction, port/harbour, dredging and civil engineering sectors. Key to Valeport's reputation for providing affordable, high quality and reliable equipment from shallow water use to full ocean depth, is the firm's philosophy of retaining all aspects of the development and manufacturing processes in-house. This philosophy ensures complete control over every aspect of Valeport products, allowing Valeport to provide customers with the right equipment for each job, with minimum fuss and maximum confidence. Valeport's product portfolio include the world's most accurate sound velocity probes, current flow meters, wave recorders, tide gauges, fluorometers, CTDs, multi-parameter CTDs, altimeters, depth sensors / bathypack and GPS echo sounders. Valeport exports around 80% directly and at least half of the remainder is sold to UK offices of multinational companies, or as OEM to other British exporting companies, so approaching 90% of production ends up overseas.

From shallow to deep water, Valeport continues to set the benchmark for instrumentation; to expand product lines and support the needs of the hydrographic surveying sector. Of note is the advancement of Valeport's latest SVP. The SWiFT, established as the 'go to' highly accurate SVP, has been enhanced with a turbidity sensor. Launched at OI18 the new SWiFTplus uses Valeport's Digital Time of Flight technology and incorporates turbidity observations with sound speed, temperature and pressure sensor technology coupled with the convenience of Bluetooth connectivity and rechargeable batteries. The new portable tidal observation solution, TideStation (Portable), optimises performance of instrumentation, monitoring tide, met and other sensors. TideStation (Portable) has Valeport's tide gauge system, TideMaster, at its core.

The TideStation (Portable) offers either UHF or GPRS telemetry with connection to pressure or radar sensors with interface to other meteorological systems. A low-cost turn-key solution, TideStation is suited to a range of sectors including port & harbour operations, surveying and, dredging. Later this year Valeport will release key revisions to the probe series that allows data profiling whilst a vessel is underway. Latest evolution of the rapidPro SV and rapidPro CTD include: a rechargeable battery for extended deployment times; GPS; dual Bluetooth for easy data download and allowing a surveyor to conduct SV profiles on command.

Advanced Navigation

Sydney, Australia
www.advancednavigation.com.au/
CEO/President: Chris Shaw / Xavier Orr

Advanced Navigation is a privately owned Australian company that specializes in the development and manufacturing of navigation technologies and robotics. The company has a focus on generating quality products, both in terms of hardware and software. The company is experienced in a broad range of fields including sensors, GNSS, inertial navigation, RF technologies, acoustics, robotics, AI and algorithms.

Subsonus Tag is a acoustic positioning transponder that operates with the Subsonus USBL. It offers an 18-month battery life in a compact package, and thanks to its unique seamless encapsulation it is designed to be maintenance free.

Since there are no connectors, fast charging is performed using readily available standard Qi chargers. Highly scalable, with up to 65,000 Subsonus TAGs trackable using one surface Subsonus unit. The small form factor makes it perfectly suitable to for ROV/AUV and diver tracking while the scalability and long battery life make them ideal for subsea asset tracking and remote sensing applications.

Applied Acoustics

Great Yarmouth, Norfolk, UK
www.appliedacoustics.com
CEO/President: Adam Darling

Applied Acoustics was founded in 1989 to supply the newly growing southern North Sea offshore hydrocarbon industry but has since moved into other market areas. Now its customers include not only commercial survey companies but also underwater defense industries and academic institutions monitoring the wellbeing of the oceans. The operation is located on one site in the port town of Great Yarmouth, Norfolk, U.K., and is supported by a network of agents around the world. A steady stream of new products include a new addition to the Dura-Spark range of sub-bottom profiling equipment and an Easytrak Nexus 2 USBL system that comes with a choice of interchangeable transceiver; the directional 2780 that can achieve very long range (up to 3km) with a high degree of accuracy and the omni-directional 2686 ideal for use un extremely shallow water, less than 2m in depth.

Aquatic

Aberdeen, Scotland, U.K.
http://www.aquaticsubsea.com/
CEO/President: Martin Charles

Martin Charles

Aquatic lays and retrieves flexible products from the seabed for the oil and gas and renewable markets. As an operator of modular drive systems, tensioners and carousels, Aquatic provides a service through its equipment, people and expertise to deliver solutions in the harshest environments.

Aquatic was contracted to support a major umbilical installation in the Atoll field in the East Nile Delta. Due to the specialized nature of the umbilical, equipment was required to operate in synchronization with the existing vessel lay spread and support the weight of the umbilical without exceeding its stringent gripping force requirements.

Aquatic's engineering team, along with the client's subcontractors designed and built interface equipment to use with their 4-Track Dual Tensioner System. The customized interface allowed command and telemetry signals to be transmitted between the two systems and let the equipment be controlled from the existing vessel carousel control room.

The team also devised an Emergency Stop system to link with the vessel's safety controller so that the umbilical was protected even during an emergency shutdown.

As a result, Aquatic successfully supported the loadout, transpooling, and offshore installation of a 110km umbilical in the Atoll project.

Blue Ocean Monitoring

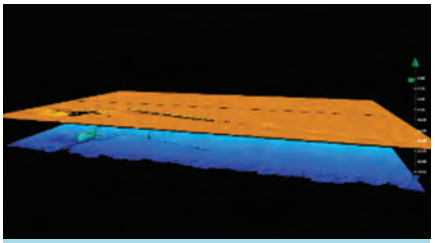
Subiaco, Australia
www.blueoceanmonitoring.com
CEO/President: Simon Illingworth

Blue Ocean Monitoring is an offshore survey company specializing in the deployment of unmanned survey platforms.

As a private company headquartered in Western Australia, BOM has evolved from three-person start up in 2014, to a multinational entity with three international offices, employing 20 people. Currently BOM claims to be the world's largest commercial owner and operator of Teledyne Webb Research's Slocum glider technology, but also offer services using autonomous surface vehicles (ASV) and mini-AUV subsurface technology.

Simon Illingworth

BOM owns and operates autonomous vehicles and associated sensor packages, but also develops vehicle and sensor technology. It has developed, integrated, tested and operated a number of customized sensor packages on a range of autonomous platforms, including: acoustic; geochemical; environmental; visual; gateway communications; and hydrographic.

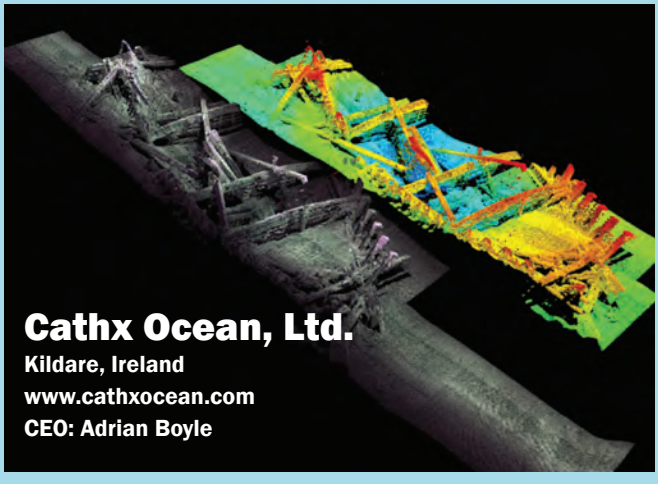


Chesapeake Technology

Mountain View, CA
www.chesapeaketech.com
CEO/President: Eileen Gann

Chesapeake Technology's SonarWiz has grown steadily into an integrated suite of data collection and post-processing software for sidescan, sub-bottom, single-beam and multi-beam bathymetry and magnetometry.

SonarWiz (pictured) is an integrated sonar data collection and post-processing suite. Modules include sidescan, sub-bottom, SBES and MBES bathymetry and magnetometry. Available separately and in various bundles. SonarWiz continuously evolves with added support for new file formats, sonar and sensor types including LiDAR and SAS, while delivering acquisition, processing and visualization tools.



Cathx Ocean, Ltd.

Kildare, Ireland
www.cathxocean.com
CEO: Adrian Boyle

Cathx Ocean have manufactured what it claims is the world's first fully integrated subsea imaging system. The company's multidisciplinary engineering team have developed advanced underwater automation and robotic vision technologies for offshore and industrial operations which are used globally across many applications. Founded in 2009, Cathx Ocean have grown to become one of the principal innovators in the subsea imaging and measurement industry. It is headquartered is in Kildare, Ireland with offices in the U.S., the U.K., China and Australia.

Currently the company is building systems to operate at 10,000m depth. Its advanced laser and optical based imaging systems were developed in-house and are now used worldwide in offshore energy, renewables, environmental monitoring, mapping, archaeology and for collecting evidence on salvage and defense operations.

The company's range includes the Hunter system (AUV Imaging and Laser), the Scout system (Observation Class ROV Imaging and Laser Profiling), the Pathfinder system (Work Class ROV Imaging and Laser Profiling) and the Prowler I & II systems (Towed Vehicle Imaging Range and Scale Measurement). To enable faster and more efficient optical surveys, Cathx Ocean have developed an end-to-end technology architecture for acquiring and processing subsea images and laser data. Traditional vehicles run at speeds of 0.5 knots with ranges of up to 3 meters. By enabling speeds of up to 8 knots and ranges of up to 10 meters, these imaging systems substantially reduce vessel time.

DCL Mooring & Rigging

New Orleans, LA
www.dcl-usa.com
CEO/President: Cody Schnuriger

DCL has been a supplier, partner and vendor to the maritime, oil and gas, subsea and heavy-lift/heavy industries for 73 years. DCL Mooring & Rigging is a recognized leader in supplying a variety of lifting, mooring and inspection products and services to domestic and international customers in the marine, construction, industrial and oil and gas industries. Based in New Orleans, LA with locations in Houma, LA & Houston, TX. DCL fabricates all sizes of wire and synthetic rope slings for heavy lift applications. With wire rope swage capabilities up to 4 ½ inch sleeve diameter, serving as an authorized Slingmax-Twinpath fabricator and with complete round and nylon sling fabrication in-house, DCL can meet any lift requirement. Product lines include all sizes of anchors, anchor chain, wire rope, hardware, deck & dock fittings, buoys, fenders, river ratchets, galley equipment and testing services. Proprietary product lines such as LBNO fittings, PeeWee sockets and its new line of synthetic rope connectors, the company sources product from international and domestic manufacturers.

Deep Ocean Engineering

San Jose, CA
www.deepocean.com
CEO/President: Li Fang

Deep Ocean Engineering, Inc. is a technology-based engineering and manufacturing company that provides integrated robotic solutions for various underwater applications, designing, building and testing its ROVs from its plant in California. Deep Ocean has been in operation for more than 30 years and has sold more than 600 ROV systems globally. Deep Ocean's ROV systems have been utilized in a broad range of industry applications - military, security, salvage, long tunnel and pipeline inspection, customs, nuclear and hydroelectric power plants, dams and lakes, offshore oil and gas servicing, scientific research and education, fisheries and broadcast filming.

It also designs and manufactures ancillary equipment, including manipulators, cable cutters, cable reels (manual and powered) and other tools. Deep Ocean works closely with most third-party tooling and electronic equipment manufacturers to ensure that its ROVs and USVs can accommodate the necessary components to get the job done. Deep Ocean has extensive experience recommending and integrating third-party equipment and has integrated the following sensors and tools with ROVs delivered: Sonar – Sonavision, DIDSON Sonar, Blue View, Reson Multibeam, Mesotech, Imagenex and TriTech sector scanning and profiling sonars; Many types of cameras from all major manufacturers – video, SIT, low light, digital still, broadcast quality, nuclear hardened and high temperature; Tracking systems – ultra short and long baseline, LinkQuest, Sonardyne, ORE Trackpoint, Desert Star, Simrad; and Navigational sensors – DVL from RD Instruments, fiber optic gyro, altimeters.

DeepSea Power & Light

San Diego, CA
www.deepsea.com
CEO/President: Mark Olsson

For more than 30 years, DeepSea Power & Light has manufactured superior underwater lights, cameras, pressure-compensated batteries, lasers, and pressure relief valves for the most demanding deep water applications, including: ROVs, AUVs, divers, and manned submersibles.

Their design criteria includes ease of service, reliability, and high performance.

Since initially manufacturing deep water power systems, the company's product line has grown to include underwater video systems, lighting solutions, pressure relief valves, and lasers.

The Seacam cameras include HD and analog video outputs, and zoom cameras. Common features include sapphire ports and wide angle optics. Many models are available in a titanium housing for long-term immersion and corrosion resistance, and select models have a full ocean depth rating option. Most SeaLite luminaires come with full dimming capabilities for a variety of subsea applications.

A titanium housing and full ocean depth rating option are available on select models. The LED SeaLite offers SeaSense Serial Protocol and Multiray: a compelling technology that enables a single luminaire to separately operate two LED and beam pattern configurations. Other products include the SeaBattery Power Module, a lead acid battery rated to full ocean depth; SeaLasers, available with line or dot outputs; and SeaVent pressure relief valves with adjustable cracking pressure and vacuum attachment options.

DOER Marine Operations

Alameda, CA
www.doermarine.com
CEO/President: Liz Taylor

DOER has solved subsea problems for more than 25 years. It is an independent, woman-owned businesses, and its application is based on contributions to BBC Blue Planet 2, designing and building fully classed housings for cine and ultra-low light cameras on human occupied submersibles

DOER is known for its innovative, nimble approach to subsea research and exploration. The team brings a unique blend of engineering, operations, science, and technology talents together. DOER operates as a B Corp and collaborates with a number of NGOs and institutions. The company works on projects ranging from subterranean infrastructure to coastal restoration to full ocean depth submersibles. While the company is primarily project based, it does produce some standard products and accessories that have been used in both typical and novel applications across a variety of platforms. Most of DOER's subsea systems are designed for a minimum of 1000m with many systems being capable of work in 3,000-6,500m and some up to full ocean depth.

Falmouth Scientific, Inc.

Cataumet, MA
http://www.falmouth.com
CEO/President: John Baker

For 29 years Falmouth Scientific, Inc. (FSI) has provided innovative and reliable solutions for measuring the physical properties of salt and freshwater

environments. Its Bubble Gun low frequency acoustic source was recently highlighted as the enabling technology for a new method of collecting near-surface geophysical data, and FSI continue sto innovate as demonstrated by a recent patent application and the introduction of new members to the PLUS Family of sensors.

FSI offers standard and customized transducers, instruments, and systems to collect and relay real-time data to help our customers characterize the sea floor (side scan sonar), what's below it (sub-bottom & seismic), and the water itself (current, wave, tide).

David A. Capotosto

DeepWater Buoyancy

Biddeford, ME
www.deepwaterbuoyancy.com
CEO/President: David Capotosto

DeepWater Buoyancy claims to be the world's largest supplier of subsea buoyancy to the ocean science community. The product line is more than 35 years old and is known throughout the world and in all offshore marine markets. DeepWater Buoyancy also has a vast and growing product line of buoyancy solutions for offshore oil and gas and technology companies. Though it offers products for shallow water applications, it specializes in deepwater, providing solutions to depths of 6,000 meters and beyond. In 2013, DeepWater Buoyancy acquired the rights and designs for the legacy Flotec material technology and products, and has been producing, improving and growing the Flotec product line. Each year the product line improves and new items are added in response to market conditions, changing technology, and customer requirements. In addition to product innovation, new processes and equipment are added to the companies already wide capabilities. At the heart of the DeepWater Buoyancy product line are the subsurface ADCP buoys, originally developed for Teledyne RD Instruments' ADCPs. Consisting primarily of both spherical and elliptical buoys, the product line also includes the unique StableMoor Mooring Buoys. These torpedo-shaped buoys are engineered to house ADCPs and other sensors for high current data collection applications. By design, the StableMoor reduces drag and increases mooring stability in extreme flow regimes, thereby producing superior data sets. However, DeepWater Buoyancy's product line goes well beyond ADCP buoys. In the oceanographic market there are bottom mounts, instrument collars, and cable floats. For offshore oil and gas, there are installation blocks, modular buoys, deepwater marker floats and ROV buoyancy. In addition to DeepTec syntactic foam products and custom-engineered components, there are also plastic, composite, polyurethane and fabricated metal products.

HydroComp, Inc.

Durham, NH
www.hydrocompinc.com
CEO/President: Jill Aaron

HydroComp has developed a special expertise in the design of high-efficiency small propulsors for submersible vehicles, typically driven by electric or hydraulic motors. New open and ducted propeller design tools provide for optimum designs and true measures of performance.

HydroComp is a pioneer in the very specific area of applied hydrodynamics. Its maritime software and consultancy services for hull and propeller analysis and design is valued by marine companies around the world. This focus shaped a line of unique naval architectural software packages beginning with our flagship product NavCad, and now includes PropExpert, PropCad, and PropElements. Notable is itsexploration of underwater radiated noise. Its propeller design software tools are used by nearly 250 propeller designers and manufacturers around the world. As propeller design experts, HydroComp has served hundreds of clients for projects from small thrusters to the largest ocean-going propellers.

HydroComp, Inc. is a developer and consultancy of design tools for hydrodynamic and propulsion system simulation, with a specialty in propeller design. Its NavCad software is used by some 1000 naval architects and propeller builders from around the world.

Imagenex Technology

Port Coquitlam, BC, Canada
www.imagenex.com
President: Willy Wilhelmsen

Based in Greater Vancouver, Imagenex was founded in 1988 by pioneers in the development of high-resolution imaging and profiling, gradually growing to about 25 employees. The product lines include a variety of mechanical scanning, sidescan, and multibeam sonars, as well as echo sounders/altimeters.

Each system in these product lines integrate the latest in sub-miniature electronics into industry proven, robust underwater housings for a total package that is small, rugged, and will provide years of maintenance-free use.

Ease of use is an integral part of the Imagenex design philosophy. Each sonar system is designed to maximize imaging time and minimize setup time. The custom software available to operate most Imagenex sonar systems has been refined into a package that is user friendly, yet complete with various options for sonar control, data display and recording. New additions to the Imagenex line include a smaller, improved version of the Model 965 Multibeam Imaging sonar has been released - the new 965A, sporting the new Imagenex Xi platform with faster processing capability for real time high-resolution imaging performance. The DT101 Multibeam Echo Sounder, a single instrument integrating the sonar, motion reference unit, and sound velocity sensor into one sleek and compact unit, has also been enhanced and marketed as the DT101Xi Multibeam Sonar.

The newest addition to the Imagenex line of sidescan sonars is the Model 873 BlackFin 1100, a 1.1 MHz high resolution sidescan sonar, available as a towfish or OEM kit.

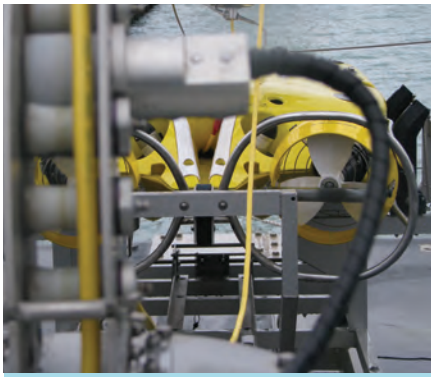
The gyro-stabilized family of Imagenex sonars also has some new additions. An advanced, low drift gyro is integrated directly into these sonar heads, making for an ideal navigation tool and amazingly user friendly drop sonar. The gyro stabilized transducer steering compensates for vehicle motion in real time with unprecedented accuracy, stability, and robustness, thereby eliminating image smearing from vehicle rotation, and simplifying navigation and target tracking.The 881A-GS and 881L-GS now have a 10,000 m depth rated version. There is also a cost-effective, shallow water version (300 m depth rated), the Model 882-GS, available with serial or Ethernet communications. The newest model, the 852-GS, is an ultra-miniature version, designed for use with the smallest of vehicles and can be daisy-chained with the optional echo sounder.

Nautilus Marine Service GmbH

Buxtehude, Germany
www.nautilus-gmbh.com
CEO/President: Steffen Pausch

Nautilus Marine Service offers floatation and instrument housings made of glass in different shapes (spherical, cylindrical, and capsular) and in a wide variety of outside diameters from approximately two- up to 20-in. for deep ocean exploration and research. Depending on the wall size and diameter, they can withstand pressure up to 1,200 bar.

It is a German-based specialized company to manufacture pressure housings made of glass (VITROVEX) for use in the deep sea. The company was founded in 1985, and today it exports more than 90% of its VITROVEX glass products to more than 30 countries. Many well-known marine research facilities are among these customers. The VITROVEX glass housings can be integrated with metal or plastic parts (e.g. made of Titanium) to meet the diverse needs of primarily scientific customers.



Novacavi

Peschiera Borromeo MI, Italy
www.novacavi.it
CEO/President: Gianluca Ramploud

An Italian privately owned company established in 1975, Novacavi supports demanding subsea sector encompassing defence, offshore energy and science with its involvement in developing and manufacturing fit for purpose extra performance cables skilfully applying materials expertise, engineering versatility and production flexibility into creative and reliable cable solutions.

As applications have evolved, so have its engineering and manufacturing capabilities. Recent proofs of Novacavi long term commitment and expertise in designing and providing custom cables to withstand the harsh environments of defence, offshore energy and science/academia sectors are: 4GAX107 tough and size contained custom hybrid cable in support of the Danish Defense subsea demining program. Tasked by the Danish Defense Acquisition and Logistics Organization, Novacavi technical project team developed a high technology underwater hybrid cable that allows ROVs to enhance and extend operational capabilities in Baltic Sea water.

Ocean Sonics

Great Village, NS, Canada
www.oceansonics.com
CEO/President: Mark Wood

Ocean Sonics manufactures the icListen Smart Hydrophone, an innovative passive acoustic monitoring system. Ocean Sonics combines smart electronics with very high signal performance to give customers reliable and easy to use hydrophone systems. This enables users to collect, record, measure and process sounds. Committed to the responsible collection of sound data from our oceans, Ocean Sonics has created hydrophone systems that are non-disruptive to sensitive ocean ecosystems. As a certified B Corp company, Ocean Sonics meets rigorous social and environmental performance standards, rooted in accountability and transparency. Creating digital hydrophone arrays is now simple. Connect two or more icListen Smart Hydrophones together and they self-synchronize, operating as one. Whether using internal hydrophone memory, or logging multi-channel data externally, users record multichannel array data. The Ocean Sonics approach offers a range of geometries, including vertical, horizontal, very small geometrical arrays or spread out over many km.

Massa Products Corp.

Hingham, MA / www.massa.com
CEO/President: Donald P. Massa
Annual Sales: $15 million

Massa, founded in 1945 by Frank Massa, is a third generation family business. Massa's business is electroacoustics; sonar and ultrasonics. The company holds over 165 patents, including many of the fundamental patents in acoustics. Massa designs and manufactures sonar and ultrasonic products for use in ocean, air and fluids. Massa is the eyes and ears for naval ships and submarines that protect the U.S. coastline with its undersea technologies. Founded by the man who pioneered the field of electroacoustics more than 70 years ago, the company maintains family ownership and leadership.

Massa has roughly half its business in military sonars, and half in industrial products and sensors. It continues to pioneer the electroacoustic field with new product developments. Many companies and customers have found the MassaSonic brand and products to be the best solution, especially when there are no apparent "off the shelf" options available. Massa's team works well with other companies for custom products that will fit their needs when it makes sense to do so. Massa won the Northeastern University Family Business of the Year Award in June, and has recently been awarded several new contracts in both sectors of the business.

Don Massa & Dawn Massa Stancavish

Massa has been awarded many contracts for the U.S. Navy including recently a $8.46m, federal contract from U.S. Naval Sea Systems Command for the design, fabrication, assembly, testing, inspection, packaging and delivery of TR-302D, TR-355 and TR-355A transducers.

Editor's Choice

Subsea's Future is Blowin' in the Wind

Offshore wind is hot, with the potential to be a significant area of growth for the global maritime, subsea and energy markets for years to come. ***Eric Haun*** *does a deep dive on eight companies leading the way.*

GE Renewable Energy

As offshore wind projects across the globe look to incorporate the latest innovations in wind turbine technology to maximize efficiency and drive down costs, many manufacturers are producing larger turbines on advanced foundation designs for even greater water depths. These larger turbines, which are able to capture more energy and are more efficient, allow for fewer installations and lower maintenance costs.

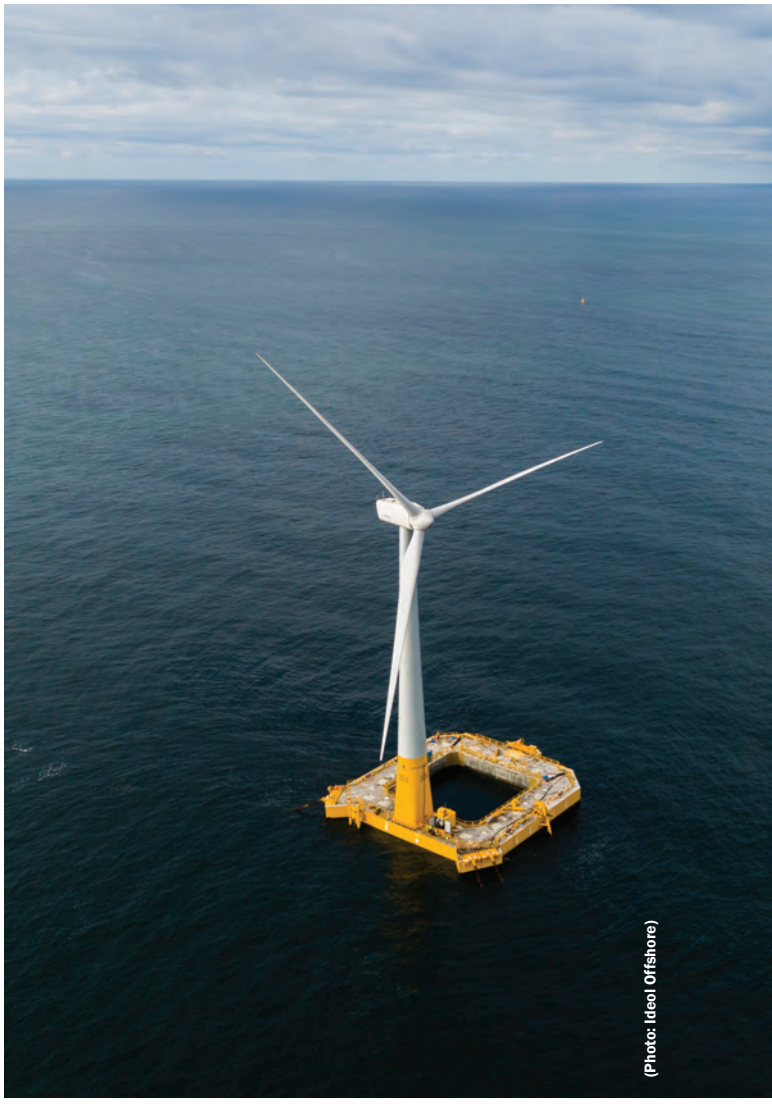
In March 2018, GE Renewable Energy announced it will invest more than $400 million over the next three to five years to develop and deploy the Haliade-X 12 MW, set to take over as the world's largest and most powerful offshore wind turbine. The installation will feature a 12 MW capacity, 220-meter rotor, a 107-meter blade. Towering 260 meters over the sea, Haliade-X will produce 45 percent more energy than any other offshore wind turbine presently available and will generate up to 67 GWh annually, GE said.

Higher power producing turbines offer efficiencies across an entire project by reducing risk and costs for installation (fewer turbines installed), operation, maintenance and repair for developers, which makes offshore wind projects more profitable and ultimately lowers cost of electricity for consumers. The Haliade-X is designed to offer greater power generation efficiency, with a 63 percent gross capacity factor five to seven points above the current industry benchmark, according to GE. Therefore, it will produce more energy per MW installed.

Ideol Offshore, STX Europe Offshore Energy

In several locations across the globe, commercial wind farms are being designed for waters that simply cannot support the fixed structures typically used. For these projects a new generation of floating wind turbines is in development. Offshore substations that collect and export power generated by turbines through underwater cables will also need to be specially engineered to float. Ideol and STX Europe Offshore Energy say they are developing a novel floating substation that will be compatible with both traditional bottom-fixed and new floating offshore wind farms. Ideol develops floating foundation technologies for offshore wind farms, and STX has supplied substations to the bottom-fixed offshore wind industry. Together the partners seek to create, build and install a universal and modular floating substation based on Ideol's patented shallow-draft damping pool concept for floating turbines.The concept involves a ring-shaped floating foundation structure with a central opening that leverages hydrodynamic properties to stabilize the foundation and turbine, or in this case substation. The sloshing of the water contained within the opening effectively counteracts the movement of the floater cause by wave swell. Ideol and STX say the floating substation is being designed to maximize both standardization for cost reduction and modularization for greater project flexibility. The developers aim to have a market ready solution in time for France's upcoming floating commercial tenders.

GE is developing a 12 MW capacity Haliade-X turbine



Ideol Offshore & STX Europe Offshore Energy: Damping Pool concept will be used for these substations

Principle Power

The technologies being developed to enable floating offshore wind farms have generated a lot of buzz, and for good reason. High-tech floating structures unlock the potential for clean wind energy in waters – especially deep waters – such as off the U.S. West Coast and in parts of Asia where traditional fixed-foundations cannot be supported.

Among the leaders in this space is California-based Principle Power and its patented triangular shaped floating wind turbine foundation WindFloat. The semi-submersible three-column offshore platform features water entrapment plates that, through damping effects, reduce motion due to waves. Work to build the floating base and install a turbine atop one of its columns is completed entirely onshore before the full assembly is towed to its final location offshore, significantly reducing installation costs. The WindFloat is also "turbine agnostic", meaning any conventional offshore wind turbine can be installed atop one of its columns.

Working with a consortium of partners, Principle Power deployed a full-scale 2MW WindFloat protype off the coast of Portugal in 2011, and in the time since has taken the technology through its paces to prove its readiness for commercialization. Over a five-year operation period, more than 17 GWh of electricity was produced and delivered to the local grid by subsea cable before the prototype was decommissioned in 2016.

Now, leveraging the operational data and experience gained over the course of the trial period, Principle Power has multiple follow-on projects under development for offshore wind energy projects off the coast of California, Portugal, France and elsewhere. The company is even working to design a floating foundation capable of hosting a next generation 10+MW rated turbine being developed as part of a project involving German turbine manufacturer Senvion.

Principle Power

Principle Power

SkySpecs, Orsted

In less than 15 minutes, a fully automated aerial drone was able to conduct a top to bottom blade inspection of the world's largest offshore wind turbine.

The innovative inspection was recently performed on the 80m turbine blades of an 8MW MHI Vestas V164 turbine at Burbo Bank Extension, 7km off the coast of Liverpool Bay in the Irish Sea, through a partnership between U.S. based SkySpecs and offshore wind farm developer and operator Ørsted.

Denmark based Ørsted (formerly DONG Energy) has roots in the oil and gas industry that go back to the early 1970s. Today, the company is completely focused on clean renewable energy and is the world's largest offshore wind farm company, with projects in operation or under development in Denmark, the U.K., Germany, the Netherlands, the U.S. and Taiwan. Needless to say, the company has a large number of wind turbines in operation, all of which will require inspection throughout the life of the equipment.

David-Lee Jones, Ørsted's senior technical project lead, said that when conducting wind turbine inspections it is often challenging to collect consistent image quality across the largest offshore turbines. That's where robotics and software technology solutions provider SkySpecs comes into play.

SkySpecs, Orsted

SkySpecs cofounder and chief technology officer Tom Brady said information gathered through his company's automated drone inspection service helps owners to form their predictive maintenance strategies with "a mountain of blade data" and analytics tools that help to better understand the health of their equipment.

SkySpecs' aerial drones conduct the inspection fully autonomously without human control, and therefore provide more precise, consistent and robust inspection capabilities, the company said. Data gathered by the drone is automatically uploaded to the SkySpecs software product, Horizon, which classifies images by damage type and severity. An advanced feature set in the software that includes repair planning workflows, analytics dashboards and insights then enable users to spot trends, project repair costs and determine ROI.

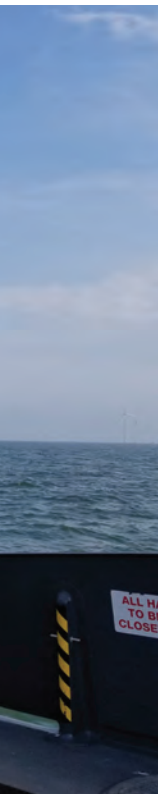
Equinor, Masdor

Partners Equinor (formerly Statoil) and Masdor have installed a battery storage system they call Batwind, which stores energy generated from the world's first commercial floating wind farm. Electricity produced 25 kilometers offshore at the Hywind Scotland wind farm is transported via cables to an onshore substation in Peterhead, Scotland to be stored in the Batwind 1 MW lithium-ion batteries and connected to the grid.

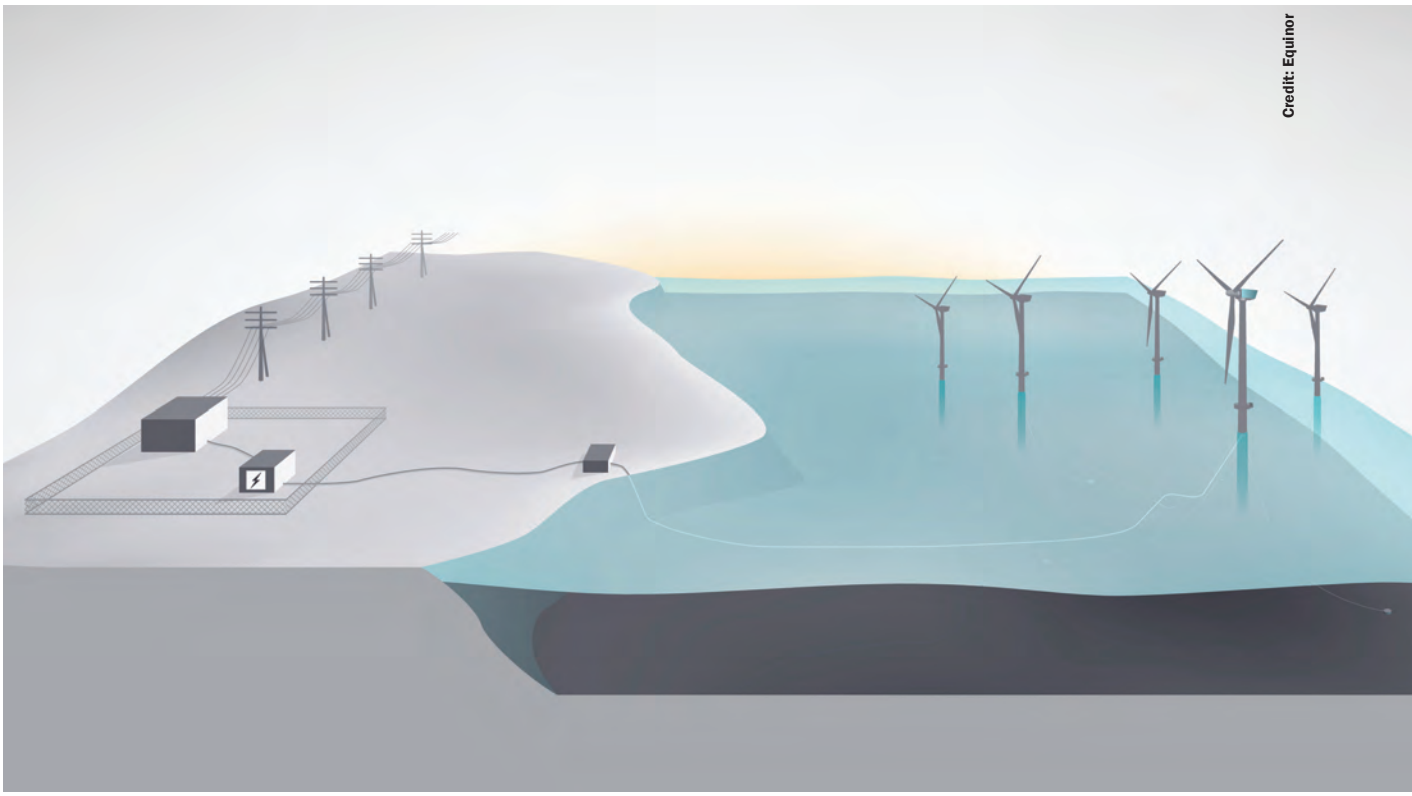
Energy storage technologies like batteries and others are expected to grow increasingly important for grid stability in the years to come, especially as the installed costs of battery storage systems continues to fall. Sebastian Bringsvaerd, development manager for Hywind and Batwind, explained that variability of renewable energy can be managed by the grid to a certain degree, but new, smart solutions for energy storage are needed to provide firm power.

Equinor compares Batwind to an "energy warehouse" that works to mitigate intermittency and optimize output. Its purpose, Equionr says, is to "teach" the battery when to hold back and store electricity, and when to send power to the grid, thus increasing value. In order to make the system as smart as possible, Equinor and Masdar are developing algorithms based on multiple data sources, including weather forecasts, market prices, maintenance schedules, consumption patterns and grid services. Digitalization is a key driver, Bringsvaerd said. Batwind's power management system becomes smarter as its fed more data, he explained, adding that the value in storage is not necessarily in the amount of energy stored, but how its optimized and better controlled.

Illustration of Equinor's Batwind battery project for Hywind Scotland.



SkySpecs



Credit: Equinor

Oceanalpha

Zhuhai, Guangdong, China
www.oceanalpha.com
CEO/President: Yunfei Zhang
Annual Sales: $20 million

Oceanalpha is a company focusing on USV (Unmanned Surface Vehicle) development and offering USV solutions for water environment sampling and monitoring, hydrographic survey, oceanographic survey, nuclear radiation monitoring and water surface cleaning, etc.

Oceanalpha autonomous boat have already served clients from industrial company, government office, research institute and universities in world-wide.

The latest Ocean USV Platform can be used for hydrology research, scientific exploration, hydrographic survey, emergency search and rescue, security patrol and other work on sea.

The M40 is designed to be a medium size autonomous survey platform which designed for bathymetry survey in coastal and ocean. With modular catamaran design and flexible payload for instruments, M40A was developed to provide high performance survey with single or multi beam sonar and different kinds of hydrographic and monitoring instruments in ocean.

OSIL

OSIL offer a wide range of adaptable products to both commercial and academic sectors. Instrumented Data Buoys and standalone platforms can be equipped with multiple sensors to monitor a wide variety of water quality and metocean parameters, or can incorporate a new piece of developing technology for testing, with a selection of telemetry options available to suit deployment location. Seabed frames and instruments throughout the water column can be included in the design specification, and recent systems have included low maintenance non-contact surface oil spill detectors. A full range of sediment sampling systems are available from shallow use grabs suitable for single person deployments, to full ocean depth rated 60m long Giant Piston Corer systems (complete with Launch and Recovery System), to the industry standard multiple corer in regular use in the offshore oil and gas industry. Water column sampling equipment is available, including Niskin bottles that may be in daily use, and Marine Snow Catchers that may be required for academic studies. OSIL's most recent demonstrations of flexible technology appeal to the developing field of marine robotics with the production of systems and components intended for integrated into ROVs, including addressable deep sea solenoid actuators and sediment corers.

Remote Ocean Systems

San Diego, CA
www.rosys.com
CEO/President: Box Acks

ROS' product line includes underwater video cameras, lights, rugged pan and tilt positioning systems, video inspection systems and control systems manufactured primarily for the oceanographic, nuclear and defense industries. ROS manufacturing is a cell-based operation, incorporating one-piece flow and a 5S lean manufacturing environment. ROS' custom product development partnerships with leading ROV manufacturers foster new product designs in deep water camera technology, new LED lighting ideas and revolutionary sonar positioners that are lightweight and accurate. Whether it's the latest LED lighting design or an ultra low-light camera for deep water inspections, ROS offers a choice of technology and products.

RJE International

Irvine, CA
www.rjeint.com
CEO/President: Robert Jechart

As an established leader in acoustic marking and relocation systems, diver navigation, sonar underwater communications and small boat navigation, RJE International Inc continues to provide a wide range of excellent products for the commercial and military markets, as well as for divers, worldwide. As a manufacturer of sonar beacons, diver navigation, diver sonar and underwater relocation products, RJE International Inc also has the design and engineering capabilities to develop custom solutions. Its new Oceanbotics division has developed a cutting edge ROV System: the most agile and maneuverable in the market; as well as an associated ROV Navigation Solution. Its public safety division supplies the most reliable pool safety products for children and pets. Operating on a global scale, RJE International Inc has established distribution points in more than 45 countries. With solid Engineering, Production, Quality and Repair departments, they continue to push the envelope and are currently developing several new products. RJE International Inc is a proud possessor of the ISO-9001:2015 Quality Certification.

Robert Jechart

SBG Systems

Carrières-sur-Seine, France
www.sbg-systems.com
CEO/President: Thibault Bonnevie

This year, SBG Systems has continued its development in the Marine Industry by launching a new solution dedicated to hydrographers. The Navsight Marine Solution aims to make Hydrographers' life easier by offering an easy-to-use motion and navigation solution, dedicated services, and a fast-processing PPK software. SBG Systems is a fast growing supplier of miniature, high performance and innovative motion sensing solutions. SBG Systems headquar-

RS Aqua

Privett, Hampshire, U.K. / www.rsaqua.co.uk
CEO/President: Martin Stemp
Annual Sales: $5 million

RS Aqua's product diversification and investment in staff capabilities has led to 50% growth in revenue since 2016. The company is made up of a small, expert team of marine scientists and engineers, and has made its name by providing high-end marine science sensors alongside a suite of technical and scientific support services. For the U.K. and Irish markets, RS Aqua acts as a distributor and value-added reseller for a network of outstanding international partner companies, and provides technical and scientific expertise for project planning and implementation. In collaboration with leading manufacturers RS Aqua have also developed itsown products for global export, particularly in the fields of wave measurement and underwater acoustics.

The RS Aqua product line includes high specification environmental sensors, subsea acoustic recorders, aquatic animal tracking, asset tracking, subsea power, autonomous surface vehicles, satellite data and software. RS Aqua's in-house products have been developed with consultation with partner companies and government and are supplied globally.

Thibault Bonnevie

ters are based in Carrières-sur-Seine, France. SBG Systems offers a complete line of inertial sensors based on the state-of-the-art MEMS technology such as Motion Reference Uni (MRU), Inertial Measurement Unit (IMU), Inertial Navigation Systems with embedded GNSS (INS/GNSS), etc. Our sensors are ideal for marine applications such as hydrography, ship motion monitoring; SONAR, LiDAR, and Buoy orientation & position ; ROV and AUV control, etc.

Sensor Technology Ltd

Collingwood, Ontario, Canada
www.sensortechcanada.com
CEO/President: Niru Somayajula

Sensor Technology Ltd. is a designer and manufacturer of piezoelectric ceramic solutions, custom acoustic transducers and custom hydrophones with 35 years of experience. Its piezoelectric ceramics and custom acoustic transducers are used to create reliable marine systems, employed in oceans around the globe for a wide variety of marine applications. Its custom acoustic transducers, hydrophones and piezoelectric ceramics are commonly used in the following underwater applications: side-scan sonar, bathymetry, sub-bottom profiling, LBL, SBL and USBL acoustic positioning systems, underwater communications, acoustic telemetry and marine-life monitoring. For more than 35 years Sensor Technology Ltd. has been exporting piezoelectric ceramics and assembled goods to customers in countries around the globe. Consistent piezoelectric ceramics come from a tightly controlled production process, and its piezoelectric powders are made in an environmentally controlled production facility, and it maintains full traceability, from the finished piezoelectric ceramic back to the ingredients from which it was made. We custom manufacture piezoelectric ceramics in a wide range of sizes, from 2.0 mm (0.080”) tubes to long 178 mm (7”) bars. We can hold tight tolerances on size, form (flatness, concentricity, parallelism, etc.), resonance frequency, anti-resonance and capacitance.

Niru Somayajula

SIDUS Solutions, LLC

San Diego, CA
www.sidus-solutions.com
CEO/President: Leonard Pool
Annual Sales: $2.5 million

SIDUS Solutions, founded in 2000, produces a complete line of hazardous area and subsea video systems. In addition to product development, manufacturing and sales, SIDUS offers end-end engineering, system integration and project planning. SIDUS staff have traveled the globe to provide commissioning and technical support.

Currently, one of the main focus point for SIDUS is Situational Awareness, as worldwide, ongoing pressure is being placed on the safe extraction and operation in Energy exploration. With its products, services and target businesses, SIDUS has readily embraced ‘situational awareness’ in support of global safety and security initiatives. Having the right hardware is a good start, but only when the hardware can be put to work in the most efficient way, will the video system truly show its value allowing safety and security to be guaranteed. Tailoring systems to each individual applicant’s demands enables SIDUS’ customers to apply SA in everyday business.

South Bay Cable Corp.

Idyllwild, CA
www.southbaycable.com
CEO/President: Gordon Brown

South Bay Cable is a privately owned company which was incorporated in California in 1957. The company has been owned and operated by the same family for the past 60 years. Corporate headquarters are located in Riverside County in the town of Idyllwild, California with additional manufacturing facilities in Temecula, California. South Bay Cable Corp was founded to provide cables specifically designed to

meet customer's needs, and while customer requirements have changed. the company philosophy of providing purpose built cables, specific to customer requirements has remained the same. Today, South Bay Cable continues to focus on highly engineered cables for use in dynamic applications including: remotely operated vehicles, tow systems, minesweeping, bottom laid, side scan sonar and a host of other underwater uses. From the drawing of the copper rod to the jacketing of the finished cable, South Bay Cable has the production capabilities necessary to perform nearly all manufacturing operations in-house. With a dedication to continually pushing the envelope through innovative engineering, new materials, increased production capabilities and thorough testing the possibilities are endless.

SubCtech GmbH

Kiel, Schleswig-Holstein, Germany
www.subctech.com
CEO/President: Stefan Marx

With 30 years of experience, SubCtech – a privately owned SME from Germany – has established its position among leading manufacturers of ocean and subsea technologies for industry and science. SubCtech develops maritime technologies for industry and science in

two domains: Ocean Power and Ocean Monitoring. Its instruments enable customers to investigate any parameter at any place or in any depth of the ocean. Its portfolio comprises innovative products designed for marine and climate research, offshore oil and gas, environmental monitoring, aquaculture and energy extraction. The company also runs an internal development department to be able to offer state-of-the-art solutions for clients.

Tecnadyne

San Diego, California
www.tecnadyne.com
CEO/President: Andrew Bazeley

Tecnadyne is a leader in the subsea robotics industry, manufacturing underwater equipment for use on remotely operated vehicles (ROVs), unmanned underwater vehicles (UUVs), manned submersibles and other subsea systems. For the past 34 years, Tecnadyne has supplied many of the worlds largest commercial underwater vehicle manufacturers.

Tecnadyne manufactures underwater brush-less DC (BLDC) propulsion systems, 16 models under the standard (ROV) category and eight models under the high-efficient AUV (UUV) category. Within each of the thruster categories, there are many configurations available to meet customer demands, such as voltage offerings from 24vdc-330vdc. Tecnadyne uses the BLDC motor and motor control technology from the thrustes creating building blocks for rotary and linear actuators, BLDC driven Hydraulic Power Units (HPU), and BLDC driven seawater pumps.

Tecnadyne

Silicon Sensing Systems

Plymouth, Devon, U.K.
www.siliconsensing.com
CEO/President: Steve Capers

With a heritage dating back more than 100 years, Silicon Sensing Systems and its predecessor companies have a unique record in delivering gyroscope systems to the marine industry. Today Silicon Sensing Systems is based in Plymouth, U.K., jointly owned by UTC Aerospace Systems, co-located in Plymouth, and Sumitomo Precision Products Amagasaki, Japan. The patented construction of its silicon MEMS gyros – based on a vibrating ring – makes the Silicon Sensing Systems gyros highly resistant to shock and vibration, greatly increasing the reliability and quality of its inertial portfolio. An in-house MEMS foundry has manufactured all of the core gyro technology since the birth of the joint venture. Among its unique fabrication equipment is a deep reactive-ion etching capability, developed in-house in Japan. In recent years, Silicon Sensing has also chosen to develop and produce a range of sophisticated accelerometers to augment its total inertial capability. Most recently, Silicon Sensing Systems has leveraged the inherent capability of its MEMS devices to create a new range of high performance gyros and inertial systems. Sensitive enough to detect earth rotation rate, these devices enable a North-seeking capability to be offered to the market – offering performance equivalent to fibre-optic systems but at a greatly reduced price. Specific new products now on offer include, CRS39 and CRH02 gyros (with performance better than 0.1deg/hr bias instability), plus DMU11 and DMU30 inertial measurement units. Silicon Sensing Systems has a range of highly respected inertial experts on-site in Plymouth, able to assist with requirements definition, design trade-offs, and device selection for your next system design. Both our Plymouth and Amagasaki sites are qualified to ISO9001 and ISO14001.

Blueprint Subsea

Cumbria, U.K.
www.blueprintsubsea.com
Directors: J.R. Baratt, R.P. Sharphouse

Blueprint Subsea has been designing and manufacturing products for the offshore, subsea and commercial diving markets since 2006, aiming to bring the latest advances in technology to customers at an affordable cost without comprising on quality or function. The company's products include multibeam sonars, sidescan sonars, position and data, and diver navigation systems. Designed for across a wide variety of underwater applications, the **Oculus M-series** of multibeam sonars are suited for deployment onto micro sized platforms, while their rugged construction also makes them an excellent choice for larger work-class vehicles and subsea infrastructure. Blueprint Subsea's StarFish Sidescan Sonars are shallow water, high specification and portable towed side-scan sonar systems with a tow body measuring less than 15 inches long, that use the latest advanced digital CHIRP acoustic technology to produce images of the seabed. Its SeaTrac Micro-USBL tracking and data modems are built around a robust broadband spread spectrum signaling scheme. These multipurpose acoustic transponder beacons are capable of simultaneously tracking asset positions and undertaking bi-directional data exchange. The company also produces diver consoles combining sensors such as forward looking sonar, DVL and GPS navigation suitable for use by naval mine clearance divers, commercial divers, police and search and rescue divers who need to quickly and safely locate submerged objects.

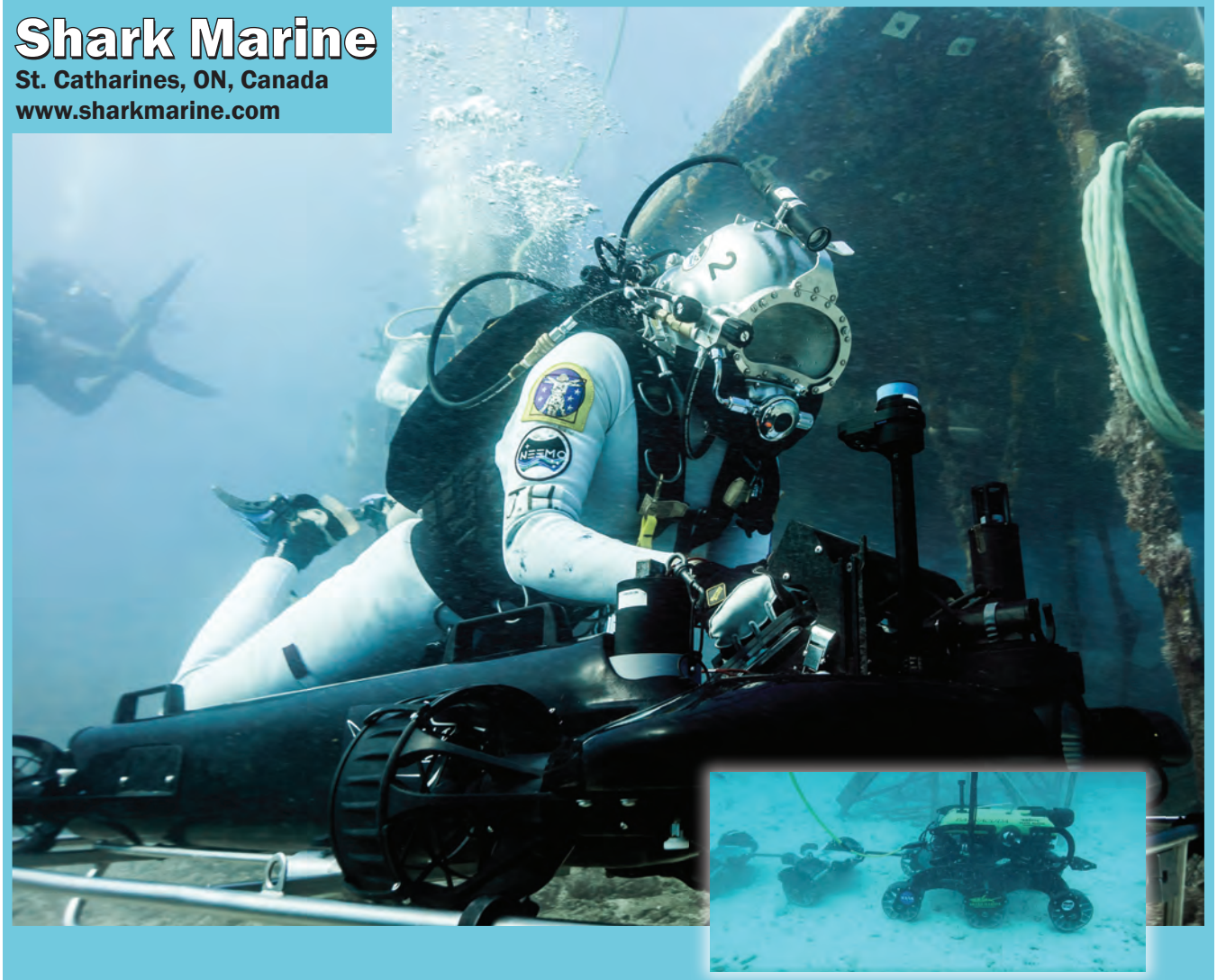
Copenhagen Subsea A/S

Hellerup, Gentofte, Denmark
www.copenhagensubsea.com
CEO/President: Allan Nygård Bertelsen

Copenhagen Subsea A/S is trendsetting in thruster technology, developing what it terms a revolutionary series of powerful and silent subsea thrusters. Headquartered and inspired by its namesake city, Copenhagen Subsea seamlessly melds the technical with the aesthetic, creating a product that is reliable as well as attractive. It uses the newest manufacturing technology for its innovative thruster technology, for example it makes diligent make use of 3D printing for its propellers.

Shark Marine

St. Catharines, ON, Canada
www.sharkmarine.com



Canada-based Shark Marine Technologies Inc., founded in 1984, develops equipment and technologies for some of the most elite military and law enforcement agencies across the globe, search and recovery organizations, scientific research, survey firms, commercial diving, as well as film production companies.

The company supplies diver held sonar and navigation systems, diver delivery systems, software, remotely operated vehicles (ROV) and accessories, sonar systems, magnetometers, tether management solutions, video systems, connectors as well as other custom solutions for customers on all continents and in every ocean.

Since 2014, Shark Marine has supplied equipment for navigation and diver transport to assist in NASA's Extreme Environment Missions Operations (NEEMO) projects, which send groups of astronauts, engineers and scientists to live in the undersea research station Aquarius for up to three weeks at a time. In 2017, Shark Marine Technologies Inc. became involved in another high-profile expedition when it was contacted to participate in the "Raise the Arrow" search for lost CF-105 Avro Arrow aircraft models in Lake Ontario off of Prince Edward County. With one of Shark Marine's Barracuda ROV deployed from Shark's survey vessel, a team from Shark Marine along with Scarlett Janusas Archaeology Inc. were able to inspect 81 of the targets provided by Kraken Sonar's team in eight days using Shark Marine's Total Navigation System, Forward Looking Sonar and HD Video.

The Divers Certification Board of Canada presented the company's CEO, Jim Garrington, with the 2017 Technical Excellence Award for his many contributions to advancing technology for divers and the diving industry, from the first helmet mounted cameras to modular ROVs to today's underwater diver held systems used by military, police, scientists and commercial divers worldwide.

Farsounder

Warwick, RI 02888
www.farsounder.com
CEO: Cheryl Zimmerman

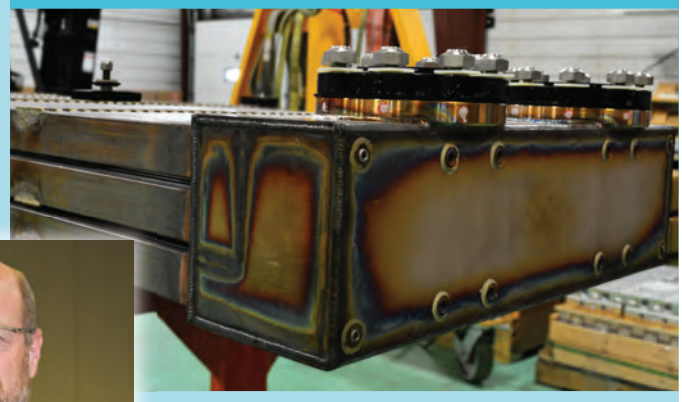
Since 2001, FarSounder has been perfecting a sonar that could show mariners where the water is safe to navigate. Its innovative 3D FLS, built in house from the ground up, now allows vessels look ahead and navigate with confidence. Radar, depth sounders, ECDIS, and electronics charts with GPS are missing an important piece of information: What is under the water in front of my ship right now? The FarSounder navigational sonar systems provide this missing piece of the puzzle. Nautical charts don't know what has changed on the ocean floor; radar can't see through water; and depth sounders only look down.

This state-of-the-art sonar is used by all types of vessels in oceans and seas around the globe to mitigate unknown and unchartered waters, even in polar regions. Ships with this technology can navigate shallow waters comfortably and explore bays, inlets and rivers safely.

FarSounder FLS systems receive real-time 3D images with one single ping and retrieve an underwater image up to 1000 meters ahead. This user-friendly system has no moving parts and is very simple to install and maintain. The innovative software has for chart plotting capabilities and offers real-time chart creation with their exclusive Local History Mapping (LHM). The map created is updated with every ping and can be displayed as an overlay on top of a nautical chart. When used together with the real-time sonar overlay, navigators can quickly see what lies ahead and what they've recently passed over. FarSounder is a leader in the design and manufacture of 3D Forward Looking Sonar. This cutting-edge technology is unique in the marketplace. It provides navigators real-time 3D imagery of what's beneath the waters up to 1000 meters ahead of a vessel detecting various underwater hazards and shallow bottoms.

R.W. Fernstrum & Company

Menominee, MI 49858
www.fernstrum.com
CEO: Sean Fernstrum



R.W. Fernstrum & Company set the standard in marine heat exchangers over 65 years ago, building a reputation focused on innovation. Today, its commitment is to continual improvement, ensuring customers have quality, reliability, and the latest in cooling technologies. Fernstrum's product offerings have grown through strategic partnerships with WEKA Boxcoolers B.V. and TRANTER Heat Exchangers to meet the growing demands of the marine market. Over the years, Fernstrum has grown into a worldwide organization with more than 24 representatives across six continents. Focusing exclusively on marine cooling, this family-owned business has built a respected reputation throughout the industry for exceptional quality and service.

R.W. Fernstrum & Company, a global leader in engineering and manufacturing keel cooling solutions, came to fruition in 1945 when Robert W. Fernstrum patented the first rectangular tube keel cooler for the United States Army and Navy. During World War II, the U.S. Navy encountered engine cooling problems with their landing craft and required a new closed circuit cooling system. After intense research, Mr. Fernstrum developed the basic keel cooler design that is still used today. The GRIDCOOLER Keel Cooler has evolved over the years into a line of keel coolers that offers nearly limitless variations to fit a particular application, on the water and below the water. Each solution is engineered to meet the requirements of the engine, vessel, and operating conditions. Active in all sectors of the workboat and brown water sectors, **Fernstrum is also active in wind and tidal energy projects.** Notably, R.W. Fernstrum & Company received ISO 9001:2015 certification in May (2018).

AXSUB

Rimouski, QC, Canada
www.axsub.com
CEO/President: Eric Gaudreau

The AXSUB team has designed several types of monitoring systems for the underwater and hyperbaric industry. AXSUB manufactures diving equipment such as digital video recorders, low voltage LED lamps, underwater cameras and electronic depth meters, and its systems are used by the key players for video recording and continuous real time depth monitoring of divers.

The AXSUB flagship products are the rackmount AxVIEW V-RM and portable AxVIEW V-P. Designed for commercial diving operations, when used with a computer, it enables video recording and numeric depth meter connectivity which will transform the AxVIEW into a diver control platform. Those are the company's second generation of diving data management system, AxDDM, are available as a 1-, 2-, 3- or 4-diver system. When using the AxVIEW systems with other AXSUB products such as the AxLIGHT 35 LED lamp with the integrated overheating protection circuit and the AxSEE 57i SMART camera equipped with a built-in depth sensor, it becomes an integrated solution that allows managers and supervisors to effectively increase safety and efficiency of diving operations. In partnership with a Florida based company called Darkwater Vision, AXSUB has developed a new product line using UVAS Technology (underwater vision augmentation system), a patented technology. With this technology, divers and supervisors are able to see through dark, tannin-stained, and particulate-heavy waters in real time without having to displace water. The Darkwater Vision product line has user friendly and innovative solutions for divers who need to safely and effectively search or work in dark and turbid water conditions. Darkwater Vision systems easily affix to most popular full-face masks and commercial dive helmets.

Impact Subsea Ltd.

Ellon, Aberdeenshire, U.K.
www.impactsubsea.co.uk/
CEO/President: Ben Grant
Annual Sales: $900,000.00

Impact Subsea was founded in 2015 by Ben Grant and Alastair Mclennan-Murray. Both having previous experience in the design and manufacture of underwater sensors and systems were keen to create a new standard in underwater sensor technology. The company has introduced a significant number of new products within the market in a very short space of time. Each product introduced provides a genuine new capability within the market. Its range includes:

- **Altimeters:** Long range and millimeter accurate, in Titanium, Delrin, Forward Looking or Right Angled configurations. All available with integrated Heading, Pitch & Roll.
- **Depth Sensors:** Titanium or Delrin and in a range of pressure ratings. All survey grade and provide temperature as standard. All optionally available with integrated Heading, Pitch & Roll.
- **AHRS:** Dedicated Heading, Pitch & Roll Sensors - high grade MEMS technology in a very small form factor.
- **Sonar:** A small 360 degree imaging sonar, uniquely with no slip rings - so no parts to wear.

ASV Global

Portchester, Hampshire, U.K.
www.asvglobal.com
CEO/President: Thomas Chance

Since 2010, ASV has been building a world-class team with specialist expertise and experience in ASV concept design, build and commissioning, operation and maintenance, control system development and advanced autonomy research and development. Having delivered more than 100 autonomous systems to more than 60 customers in 15 countries, ASV is a clear leader in the Autonomous Surface Vehicle industry. ASV Global vehicles and control systems are designed, built, fitted and tested from the company's facilities in U.K., U.S. and Brazil. The company undertakes a wide variety of projects which see Autonomous Surface Vehicle technology utilised in a multitude of industry applications. These include hydrography, offshore construction, oceanography, mine countermeasures, security and naval gunnery training. ASV Global maintains an active role in industry working closely alongside relevant authorities and maritime institutions to develop and promote responsible autonomous operations at sea.

Autonomous and robotic systems have emerged as one of the biggest areas of technological growth in recent years. Significant milestone missions for ASV include a 4,000km+ hydrographic survey offshore Alaska and an 11-day over-the-horizon operation off the north coast of Scotland. ASV has spent more than 1400 days at sea operating autonomous vessels. ASV has designed and built 18 different types of custom autonomous vessels. All of these vessels are controlled using ASV's proprietary autonomous control system, ASView. ASView has also been used for the autonomous conversion of 15 manned vessels. ASV is undertaking industry leading research and development to increase the use of safe and reliable vehicle autonomy and artificial intelligence. Current focus is in the areas of advanced autonomy and operating over the horizon safely. ASV employs techniques such as machine vision and deep learning to develop its autonomous navigation and situational awareness capability. ASV is working on autonomy research and development both internally and collaboratively with a wide range of military and commercial technical subject matter experts.

Vryhof

The Netherlands
www.vryhof.com
CEO: Wolfgang Wandl
Annual Sales: $46 million

In today's cost-conscious and challenging market environment, it's more important than ever for operators to improve operations and manage costs. Through innovative anchoring solutions, asset integrity, precision, engineering expertise and the very latest in mooring equipment, Vryhof is achieving this.

Vryhof is a partner to many of the offshore industry's leading companies, and it consists of: Deep Sea Mooring, MoorLink and Vryhof Anchors. **Deep Sea Mooring** provides a comprehensive portfolio of services, including advanced risk assessment studies, marine engineering, the rental of cutting edge mooring equipment, chain inspection services, complete pre-lay and rig move solutions, and a broad range of ancillary services. **MoorLink** designs, produces and installs certified swivel links, connections and wire clamps for use on any chain, wire or rope, and regularly responds to requests for customized components. With more than 10,000 anchors in operation, **Vryhof Anchors** designs and provides drag embedment anchors, chain shortening clutches, such as the STEVTENSIONER, and related mooring equipment for larger floating structures in the offshore energy industries, including FSRUs, FPSOs, FSOs, as well as large-scale wind applications and offshore civil applications.

Vryhof technology helps operators manage costs and increase efficiencies. One example is Vryhof Anchors' STEVSHARK REX anchoring solution which, due to its fluke and shank geometries, can be applied in the hardest soils with up to a 47% holding power increase, opening up drag embedded anchors to the world's most challenging territories. Deep Sea Mooring is also introducing asset integrity innovations covering mooring equipment inspection and servicing, renewal certification work, and the tracking of every component movement through its' tailor made logistics software suite. This includes radio-frequency identification (RFID) marking and identification systems for equipment traceability and identification. Other innovations include the Advanced Distance and Positioning System (ADAPS), a powerful tool for monitoring real-time anchor positioning; mooring and dynamic positioning analyses; and vessel motion analyses that includes wave interaction analysis and response amplitude operators (RAOs) calculation. In conjunction with StormGeo, Deep Sea Mooring is also a leader in forecast response analyses, predicting gangway motions versus rig headings to increase accommodation units' uptime.

The Maritime Industry's Largest Social Media Presence

Maritime Reporter is a member of the Marine Media Network of websites, publications, and social media sources for news, editorial and information including the Maritime Network, the commercial marine industry's largest dedicated Linkedin group.

63,523
Facebook Page Likes

130,096
Linkedin Group Members (industry's largest)

31,453
Twitter Followers

@ShipNews

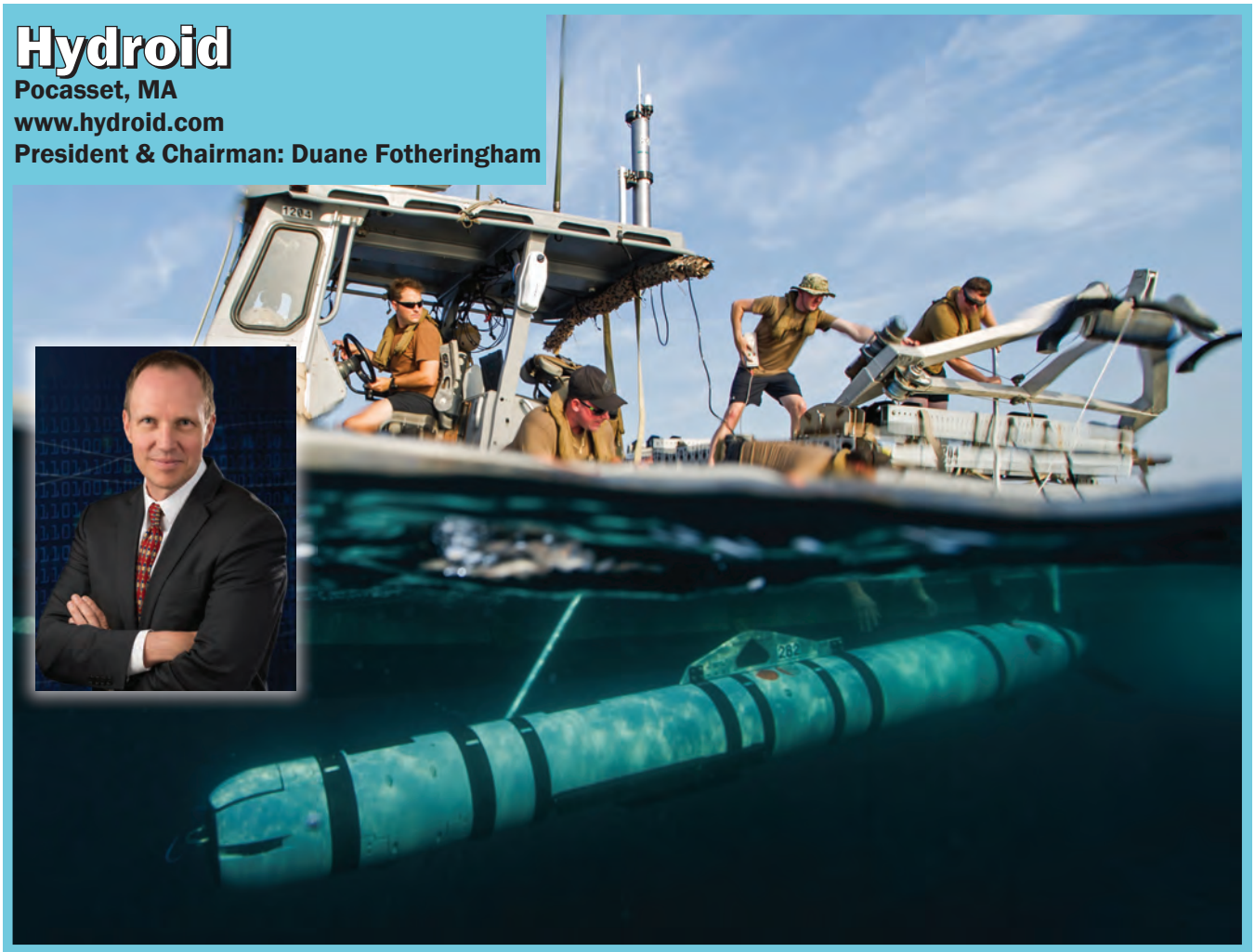
All stats from 01/02/2018

Also part of the Marine Media Network

Page	Likes
Marine Electronics	33,528
Marine Technology Reporter	55,692
Maritime Global News	26,157
Maritime Jobs	46,011
Maritime Logistics Professional	30,947
Maritime Propulsion	22,477
Maritime Reporter & Engineering News	63,515
World Energy News	49,498

Hydroid

Pocasset, MA
www.hydroid.com
President & Chairman: Duane Fotheringham



Hydroid, a Kongsberg-company located in Pocasset, MA, is a ubiquitous name in subsea defense circles with nearly 70% of its business coming from the sector, and it is also one of the longest-tenured AUV makers in the world. Duane Fotheringham is at the helm as the president and chairman of the board, taking over the top spot from Chris von Alt when the ubiquitous founder of Hydroid retired in 2013.

While the company is one of the longest tenured players in the AUV market, Hydroid does not rest on its laurels. In fact, while Hydroid is not even 20-years-old yet, it is a pioneer in the AUV field and one of the mature players. And even though it is owned by maritime and subsea power-house Kongsberg, it maintains its innovative roots, and in fact has made "a significant investment in a small, start-up 'skunkworks' company that does autonomy work for automotive and other industries," said Fotheringham in an interview earlier this year with MTR.

Navy business is a cornerstone for Hydroid, and according to Fotheringham "Ttere is a very clear push – in the military, and more specifically in the U.S. Navy – for the adoption of unmanned systems. Last summer Hydroid was part of an exercise, the Advanced Naval Technology Exercise, or ANTX, for the U.S. Navy and it demonstrated the launch of an unmanned aerial vehicle from a submerged AUV, highlighting a cross-domain solution. As with any manufacturer in this space continual investment is the norm, and Hydroid is a leader in this regard. And the demand today is for not only a dependable vehicle, but one with open architecture, opening the Hydroid solution to outside suppliers, leveraging best available technologies no matter where they emanate. "Our customers are asking for open architecture systems, so all of our new generation of vehicles (and really, existing vehicles did to a point) have an open architecture platform," said Fotheringham. "The vast majority of them come with ROS – or Robotic Operating System –so there are a lot of things that already exist in the whole infrastructure. It allows third parties – whether it's our cus-tomers or other vendors – to develop (software or hardware) applications for our vehicles. We want to build a very solid, reliable platform that performs its core mission, and we also integrate a lot of sen-sors, but we also recognize we're not the only people with good ideas."

PRODUCT, PROFESSIONAL, VESSELS, BARGES & REAL ESTATE FOR SALE

MTR Marketplace

PRODUCT, PROFESSIONAL, VESSELS, BARGES & REAL ESTATE FOR SALE

Advertiser Index

Page	Company	Website	Phone #
17	Blueprint Subsea	www.blueprintsubsea.com	+44 (0) 1539 531536
27	Cellula Robotics Ltd.	www.cellula.com/imotus-1	(604) 540-5530
13	DeepSea Power & Light	www.deepsea.com/products	(800) 487-3775
29	Detyens Shipyards Inc.	www.detyens.com	Please visit us online
49	DOER Marine	www.doermarine.com	(510) 530-9388
C3	EvoLogics GmbH	www.evologics.de	49 30 4679 862 0
5	Greensea Systems, Inc.	www.greenseainc.com	(802) 434-6080
21	Houston Mechatronics, Inc.	www.houstonmechatronics.com	Please visit us online
15	JW Fishers Mfg Inc.	www.jwfishers.com	(508) 822-7330
7	Klein Marine Systems, Inc.	www.KleinMarineSystems.com	(603) 893-6131
41	L3 OceanServer	www.ocean-server.com	(508) 678-0550
33	Oceanology International Americas 2019	www.oceanologyinternationalamericas.com	(203) 840-5487
39	Remote Ocean Systems	www.rosys.com	(858) 565-8500
9	SBG Systems	www.sbg-systems.com	Please visit us online
3	Shark Marine Technologies, Inc.	www.sharkmarine.com	(905) 687-6672
19	Silicon Sensing Systems Limited	www.siliconsensing.com	+44 (0) 1752 723368
23	Sonardyne International LTD	www.sonardyne.com	44 1252 872288
25	South Bay Cable Corp	www.southbaycable.com	(951) 659-2183
1	Subconn	www.subconn.com	(781) 829-4440
43	SubCtech GmbH	www.subctech.com	+49 (0) 431-22039 884
C4	Teledyne Marine	www.teledynemarine.com	Please visit us online
78	Teledyne Marine Technology Workshop	www.teledynemarine.com/events/TMTW2018/	Please visit us online
11	Turner Designs, Inc.	www.tunerdesigns.com	Please visit us online
C2	VideoRay LLC	www.videoray.com	(610) 458-3000

The listings above are an editorial service provided for the convenience of our readers.
If you are an advertiser and would like to update or modify any of the above information, please contact: productionmanager@marinelink.com

Evo Logics®

SMART SUBSEA SOLUTIONS

S2C TECHNOLOGY: COMMUNICATION AND TRACKING COMBINED

- time, space and cost-saving solutions
- low power consumption for autonomous operations
- advanced data delivery algorithms, addressing and networking, remotely configurable settings
- extendable platform with multiple configuration options: power-saving Wake Up module, acoustic releaser, additional sensors, custom solutions, OEM versions availableh

USBL POSITIONING SYSTEMS

simultaneous positioning and communication - no need to switch between positioning mode and modem mode

- flexible SiNAPS positioning software
- reliable data transmissions
- range: up to 8000 m
- accuracy: up to 0.04 degrees

UNDERWATER ACOUSTIC MODEMS

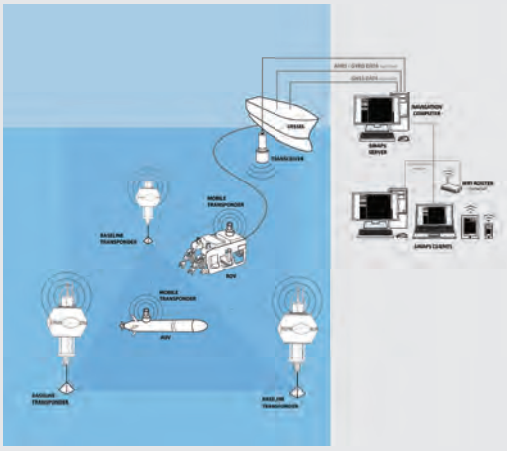
reliable data transmissions even in adverse conditions, customizable R-series modems, light and compact M-series "mini" modems, **new S2CM-HS high-speed modem**, special editions for developers, S2C communication and positioning emulator - remote access or standalone device

- range: up to 8000 m
- depth: up to 6000 m
- data rate: up to 62.5 kbps

LBL POSITIONING SYSTEMS

highly accurate, precise and stable performance, simultaneous positioning and data transmissions

- flexible SiNAPS positioning software
- reliable data transmissions
- range: up to 8000 m
- accuracy: better than 0.01 m



EvoLogics GmbH
Ackerstrasse 76,
13355 Berlin, Germany

tel.: +49 30 4679 862-0
fax: +49 30 4679 862-01

sales@evologics.de
evologics.de

Outfitting an ROV?

One-Stop Shopping at Your Service!

From cameras to connectors, INS to imaging—and everything in between—only Teledyne Marine's **OneTeam** can deliver a full suite of field-proven sensors, software, imaging, and interconnect solutions ideally suited for inspection to workclass ROVs.

Whether your ROV requires a single sensor or a fully integrated solution, you'll find everything you need at **www.teledynemarine.com/blog/ROV_Integration**

Teledyne Marine Integrated Technologies powered by Greensea

TELEDYNE MARINE
Everywhereyoulook™
www.teledynemarine.com