

SEA TECHNOLOGY®

www.sea-technology.com

FEBRUARY 2022



**Instrumentation:
Measurement
Processing &
Analysis**

FEATURING:

**Sensors for Sustainability
Calibration-Free pH Sensing
Fiber-Optics for Energy Transition**

You could catch *a wave*...



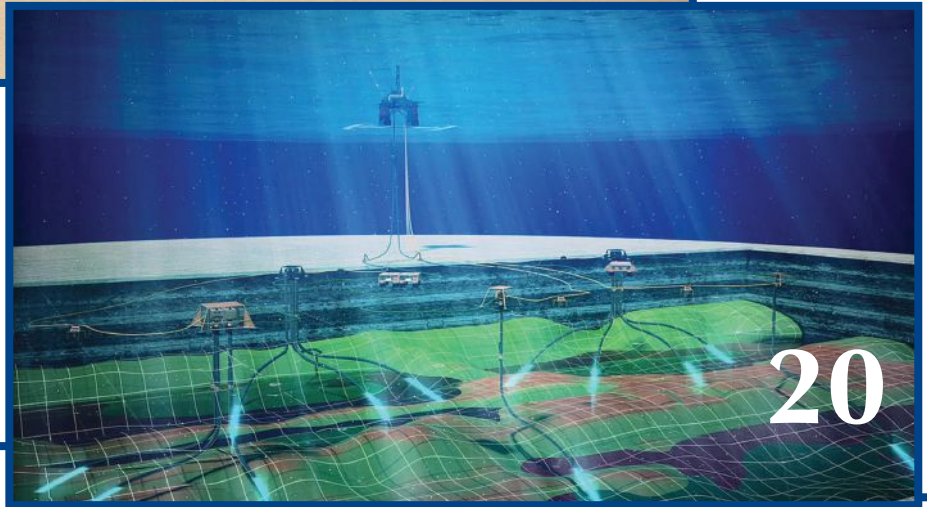
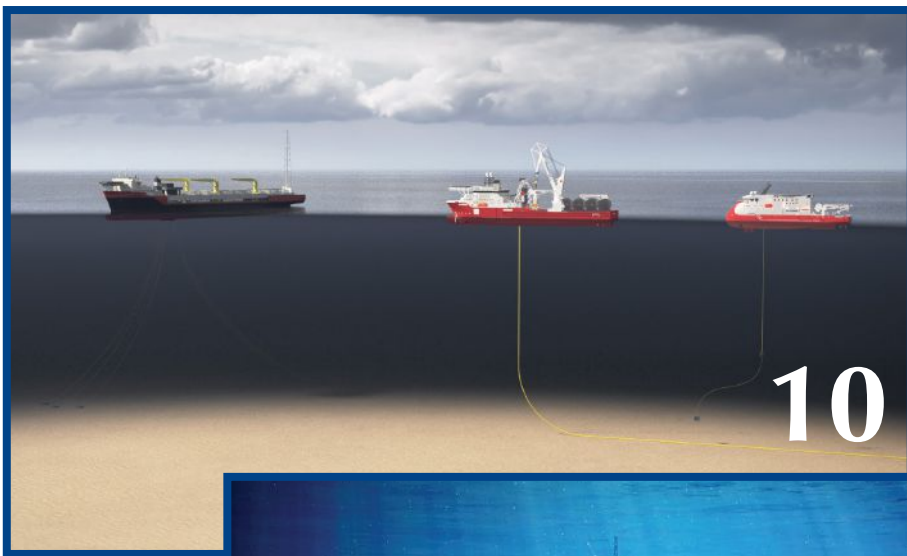
Or catch *every wave*.

Equipped with the proven Paroscientific Digiquartz® pressure sensor, the **RBRquartz³ Q|plus** tide and wave logger is intended for long-term autonomous or realtime observations of water level, tides, and waves. With flexible measurement schedules, continuous and burst sampling up to 16Hz, large battery and memory capacity, and a novel no-tools-required housing, the **RBRquartz³ Q|plus** is the pressure logger of choice for coastal dynamics.

RBR

SENSORS | **LOGGERS** | SYSTEMS | OEM

rbr-global.com



CONTENTS

FEBRUARY 2022
Volume 63, No. 2

FEATURES

10

SENSORS FOR SUSTAINABILITY

Ignacio Marre (*4Subsea*) explains how the Internet of Things, artificial intelligence and machine learning enable smarter monitoring and decision making.

15

SIMPLIFYING OCEAN PH SENSING

Nathan Lawrence and Kay McGuinness (*ANB Sensors*) introduce the S Series of calibration-free pH sensors.

20

BEYOND OIL AND GAS

Garth Naldrett (*Silixa*) describes the role that advanced fiber-optics can play in the energy transition and seafloor monitoring.

23

USV SWARMS FOR SURVEY

Sören Themann (*Subsea Europe Services GmbH*) and Stephen Ferretti (*Maritime Tactical Systems Inc.*) outline how USV swarms can support growth in the offshore wind industry and maritime research and defense.

28

LOCATING LOST ROVS

Rachel McAlpine (*Tritech International Ltd.*) presents a new USBL to find, track and retrieve vehicles with severed tethers.

DEPARTMENTS

6 Soundings

7 Editorial

31 International

33 Ocean Research

34 Product Development

36 Marine Renewables

38 Marine Resources

39 Marine Electronics

40 Contracts/Meetings

41 People

42 Professional Services Directory

43 Soapbox

44 Advertiser Index

COVER IMAGE

A digital twin representing the real-life responses of a vessel in various swell and wind-driven sea states can define, with high accuracy, expected motions and corresponding operability. See story on p. 10. (Credit: 4Subsea)

NEXT MONTH

Methanol-to-hydrogen conversion as a breakthrough in achieving hydrogen on demand for ship propulsion ... Why the maritime industry needs to start thinking about PFAS "forever chemicals" ... Tackling GHG emissions and invasive species with biotechnology ... Updates on autonomy for homeland security ... NAVTOR ENC's integrated with Argos sonar.

Copyright 2022 by Compass Publications, Inc. *Sea Technology* (ISSN 0093-3651) is published monthly by Compass Publications, Inc., 4600 N. Fairfax Dr., Suite 304, Arlington, VA 22203; (703) 524-3136. All rights reserved. Neither this publication nor any part of it may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior permission of Compass Publications Inc. Periodicals postage paid at Arlington, Virginia, and additional mailing offices. Due to the COVID pandemic, printed issues will not be available in 2021. Digital subscriptions may be purchased for US 40 for one year. Printed back copies, where available, are US 6.00 each plus shipping and handling.



Sea & Sun
Technology

» CTD PROBES
» MSS PROBES
» SENSORS
» EQUIPMENT
» CALIBRATION
» SERVICE



up to 11.000 m



» conductivity » turbidity
» temperature » pH, Redox
» pressure » fluorometers
» oxygen » and much more



sales@sea-sun-tech.com
+49 4323 910 913

)) Ocean Enterprise Report 2015 to 2020. The U.S. Ocean Enterprise Report, released by NOAA, shows significant growth in businesses that provide the technological means to observe and measure ocean dynamics. Called the ocean enterprise, this cluster of businesses, which provides essential support to the \$2 trillion global blue economy and has revenues of \$8 billion, saw a 60 percent growth of businesses, from 500 to 800, between 2015 and 2020. These businesses deliver essential information services to support sustainable use of ocean resources, understand Earth's climate and protect ocean health. Building on the foundational study conducted by NOAA in 2015, this report analyzes trends in the ocean enterprise as it responds to the growing and changing information needs of the blue economy. The report also details: the changes in the markets for ocean enterprise products and services as it pivots toward rapidly developing areas, such as offshore renewable energy; the changes in technologies to meet the needs of present and future blue economy markets, most notably a doubling of the number of businesses providing autonomous surface and underwater vehicles as platforms for ocean observations and measurements; and the opportunities and challenges the ocean enterprise faces in supporting a growing blue economy, particularly in terms of navigating changing markets and the technological means of serving them. The report is available for download at: <https://tinyurl.com/msvt7b3p>.

)) Rapid Growth of Offshore Wind Will Trigger Unprecedented Race for Ocean Space. The exponential growth of offshore wind power will be the main driver of a nine-fold increase in demand for ocean space by the middle of the century, according to DNV's Ocean's Future to 2050 report. The report forecasts that by midcentury, offshore wind will require ocean space equivalent to the landmass of Italy. The growth will be particularly pronounced in regions with long coastlines that presently have low penetration of offshore wind. Demand for ocean space is set to grow 50-fold in the Indian subcontinent and 30-fold in North America. The rise of wind will be pivotal to the transformation of the blue economy. Currently, 80 percent of capital expenditure (capex) in the blue economy is invested in the offshore oil and gas sector, but by 2050 that number will have dropped to 25 percent. By then, offshore wind will receive the largest investments, accounting for half of all capital expenditure (capex). The blue economy will be more focused on Asia, with greater China set to account for more than a quarter of capex by 2050 as it builds out its offshore wind capacity and marine aquaculture. After years of faster-than-GDP growth, seaborne trade will only grow 35 percent to 2050, while global GDP almost doubles. Aquaculture production will more than double by midcentury, approaching the level of wild catch. Total sustainable annual catch is forecast to be 95 million metric tonnes by midcentury, stressing the need for optimal fisheries management. DNV's report covers food, energy, shipping, tourism, desalination, ocean health and spatial planning: www.dnv.com/oceansfuture.

)) Zero-Emissions Hydrogen Vessels. British marine operator Attollo has unveiled designs for \$100 million zero-emissions autonomous hydrogen vessels fitted with ultramodern technology and crew facilities. The futuristic concepts are part of a multigenerational research and development mission known as Project Zero, with the vessels named after the three pillars of the project: United Hope, United Destiny and United Progress. Dedicated to deploying future technology to support the next generation of offshore marine projects, Project Zero's autonomous ships utilize zero-emission hydrogen fuel cells, benefiting from onboard renewable power generation (solar and wind power) and built-in, state-of-the-art technology from computer vision to AI. All three vessels are designed for optimum working conditions, with smart, ergonomic environments that minimize noise and vibrations and personalized cabin settings. Additional features include advanced sensors, 3D-printing capability and hydroponics to increase the vessels' ability to operate independently, with drones replacing helicopters to ensure safe transit between assets. The vessels are set to hit waters by 2030. The U.K.'s Climate Change Act commits the government to reduce greenhouse gas emissions by at least 100 percent of 1990 levels (net zero) by 2050. Attollo's vessel design has been funded with help of government support and assistance from V&A Dundee Design Accelerator for low-carbon technologies. CENEX transport consultancy conducted vital research into the zero-emissions propulsion technologies.

)) Founder of Sea-Bird Electronics Passes. Art Pedersen, founder of Sea-Bird Electronics, has passed away. His designs are firmly cemented into Sea-Bird's CTDs, and he leaves behind profound impacts on how scientists make measurements in the ocean. Dr. Norge Larson, former president of Sea-Bird Scientific (2004 to 2013) and long-time colleague of Pedersen, spoke about the early days and Pedersen's legacy as an engineer and president: "He was sort of an everyman and a jack of all trades. He had an electronics degree, an M.B.A. and a lot of mechanical engineering experience," Larson recalled. "And he ran the company with his even temper and his straightforward 'North Dakota' philosophy. He approached things in a plain and simple way. You didn't make them complicated. One of Art's mantras was: 'We do what we know how to do, and we don't do what we don't know how to do.' It kept us incremental, and from overreaching—real North Dakota." Pedersen established Sea-Bird Electronics as a successful facilitator and co-practitioner of oceanography. The company continues to make important contributions to the scientific community. By the end of 2021, it had developed and provided more than 70 different instruments to that community. **ST**

**publisher
managing editor
production manager
assistant design/
website manager
advertising
service manager**

**C. Amos Bussmann
Aileen Torres-Bennett
Russell S. Conward
Joshua Ortega
Susan M. Ingle Owen**

ADVERTISING REPRESENTATIVES:

HEADQUARTERS

C. Amos Bussmann
4600 N. Fairfax Dr., Suite 304
Arlington, VA 22203-1553
Tel: (703) 524-3136
seatechads@sea-technology.com

EASTERN U.S.A. & CANADA/G.O.M.

Ray Mahr, Jr.
KRK Consultants Ltd.
17476 Slipper Shell Way, Ste. 6
Lewes, DE 19958
Tel: (302) 569-0019 (M)
rmahrjr@gmail.com

WESTERN U.S.A. & CANADA

John Sabo
Barbara Sabo
Gregory Sabo
John Sabo Associates
447 Herondo St. #305
Hermosa Beach, CA 90254
Tel: (310) 374-2301
bsabo@jsaboassoc.com

EUROPE

John Gold
John F. Gold & Associates
"Highview"
18a Aultone Way
Sutton, Surrey, SM1 3LE, England
Phone/FAX Nat'l: 020-8641-7717
Int'l: +44-20-8641-7717
johnfgold@gmail.com



Sea Technology back issues available on microform.

Contact: NA Publishing, Inc.
P.O. Box 998, Ann Arbor, MI 48106-0998
1-800-420-6272

COMPASS PUBLICATIONS, INC.

4600 N. Fairfax Dr., Suite 304
Arlington, VA 22203-1553
Tel: (703) 524-3136

oceanbiz@sea-technology.com
www.sea-technology.com

publishers of:

Sea Technology
Commercial Fisheries News
Fish Farming News
Commercial Marine Directory
Fish Farmers Phone Book/Directory
Sea Technology Buyers Guide/Directory
Sea Tech e-News

*Celebrating more than 58 years
of serving the global ocean community
- Since 1963 -*

Maritime Trends for 2022 And Beyond

With 2022 beginning to get into full swing, it seems appropriate to explore the forces that will shape the maritime industry in the years ahead. I believe that there are three key trends, inextricably linked.

One is decarbonization, particularly the uncertainty over measures to limit CO₂ emissions. Compared to the early 2010s, the shipping industry is doing much to reduce emissions. But are we doing enough? In absolute terms, the answer is no.

However, we are heading in the right direction, and momentum is building. Major players in the industry acknowledge the need to reduce emissions, but lack of clarity remains around objectives and policy affecting decarbonization initiatives.

In 2018, the International Maritime Organization (IMO) announced the goal of reducing emissions by 50 percent by 2050, using 2008 as a baseline. Today, we know we need to achieve net zero. Unfortunately, emissions reduction goals are in a constant state of flux—and indecision. At the recent UN COP26 talks and MEPC 77 (IMO's Marine Environment Protection Committee meeting), decision making was deferred for a year.

It is clear, though, that governments and other authorities will introduce more stringent measures to reduce emissions, with market-based measures providing a financial impetus to limiting CO₂ emissions.

A second trend is digitalization, with the goal of looking to tomorrow by making a difference today. While clean fuels may allow us to cut emissions in 20 years, action is needed immediately. Digitalization holds the greatest potential to reduce emissions in the short and medium terms by improving the efficiency of vessel operations both at sea and in port.

There are about 4.2 million port arrivals annually. Using technology to improve communication between ships and ports enables ships to adjust speed and arrive at the optimal moment to dramatically cut fuel consumption and CO₂ emissions. Vessels often spend 10 percent of their time waiting to get into port, unnecessarily burning large amounts of fuel. With technology, we can make that a thing of the past.

Digitalization also brings efficiency improvements to vessel operations at sea, such as route optimization (including weather routing) and the ability to adjust speed to facilitate just-in-time arrivals. By reducing speeds across the global fleet by 20 percent for optimal port arrival times, we may be able to reduce shipping's overall greenhouse gas emissions by up to 34 percent.

Global trade is the third trend, specifically, shoring up supply chains. Shipping is the glue that holds our globalized economy together. This became apparent during the COVID-19 pandemic, when consumers felt the pain from disruptions to the global supply chain. Supply chain failures during the pandemic demonstrated the need for improved visibility of supply chains—which can be best facilitated by greater use of technology. Acknowledging that a lack of transparency is a major cause of disruption, government is finally taking action to shore up supply chains and improve the sharing of data.

The Biden Administration's \$1 trillion infrastructure bill includes \$17 billion in funding for port improvements and plans to standardize data-sharing requirements for shipping lines, terminal operators, warehouses and land-based transport. Interoperability between systems and the transparent sharing of information are key to ensuring the resilience of supply chains. The sooner other governments and businesses around the world follow suit, the better it will be for the decarbonization trajectory we have embarked upon to improve our collective future. **ST**

SEA TECHNOLOGY® 2022

ADVERTISING CLOSES ON THE 15TH OF THE MONTH PRECEDING ISSUANCE

JANUARY

Annual Review & Forecast

***OCEANS 2022 Chennai*, February 21-24, Chennai, India

FEBRUARY

Instrumentation: Measurement, Processing & Analysis

***Oceanology International*, March 15-17, London, Excel, U.K.

MARCH

Electronic Charting/Vessel Management/
Ports & Harbors/Dredging/Homeland Security

***AUVSI XPONENTIAL 2022*, April 25-28, Orlando, FL

APRIL

Offshore Technology/Alternative Energy & Ocean Engineering

***Offshore Technology Conference*, May 2-5, Houston, TX

MAY

Communications, Telemetry, Data Processing

***Undersea Defence Technology (UDT)*, June 7-9, Rotterdam, The Netherlands

***EUROMARITIME*, June 28-30, Marseille, France

**Sea Technology supports these shows via media partnerships.

BONUS INFORMATION TO KEEP OUR READERS UP-TO-DATE

- Capital Report
- Company Profiles
- Contracts
- Environmental Monitoring
- International
- Marine Renewables
- Marine Resources
- Meetings
- Navy Currents
- Ocean Business
- Ocean Engineering
- Ocean Research
- People
- Product Development
- Soapbox

EDITORIAL CONTACT: Aileen Torres-Bennett, oceanbiz@sea-technology.com

Compass Publications, Inc., 4600 N. Fairfax Dr., Suite 304, Arlington, VA 22204

1963 – 2022 Celebrating More Than 58 Years

22

Editorial Calendar

UE DATE

JUNE

Seafloor Mapping/Sonar Systems/Vessels

JULY

Deck Gear, Cable, Connectors, Power Systems & Salvage

AUGUST

Geophysical Exploration/Seafloor Engineering

***IMAGE '22, August 28-September 2, Houston, TX*

SEPTEMBER

Ocean Resources Development & Coastal Zone Management

***OCEANS 2022 Hampton Roads, October 17-21, Virginia Beach, VA*

OCTOBER

Environmental Monitoring, Remote Sensing & Pollution Control

***Offshore Energy 2022, November 29-30, Amsterdam, The Netherlands*

NOVEMBER

Undersea Defense/Antisubmarine Warfare

DECEMBER

Diving, Underwater Vehicles & Imaging

Follow Us On:



OTHER OPPORTUNITIES

- Advertorials
- Sea Technology Buyers Guide/Directory
- Sea Tech e-News
- Commercial Fisheries News
- Fish Farming News
- Fish Farmers Phone Book/Directory
- Commercial Marine Directory
- Direct mail list rentals
- Article reprints/PDFs
- Banner and skyscraper Web ads
- Sponsored e-blasts

• **ADVERTISING CONTACT:** Sue Ingle Owen, seatechads@sea-technology.com

ngton, VA 22203-1553 • Tel: 703.524.3136 • sea-technology.com

ars of Serving the Global Oc ty

Sensors for Sustainability

Internet of Things, AI, ML for Smarter Monitoring, Decision Making

By Ignacio Marré

The energy industry is undergoing a rapid and extensive digital overhaul. The dash for data to drive down costs and improve safety and sustainability is seeing offshore assets, rigs and vessels transform into sophisticated sensor hubs. The generation and collation of vast amounts of historical and live data can now be converted and interpreted into valuable insights and shared at the touch of a button to reduce emissions and significantly lower the cost of operations.

In addition, advances in machine learning (ML) algorithms and artificial intelligence (AI) can further eliminate unnecessary overconservatism, detect and predict anomalies, and ensure smarter decision making in the future.

4Subsea, a leading provider of digital technology and services to the energy and maritime sector, was recently tasked by Subsea 7, a global leader in the delivery of offshore projects and services for the evolving energy industry, to deploy its Internet of Things (IoT) sensors in conjunction with its data analytics platform, 4insight, to digitally transform vessel operations and optimize performance. Using the same technology and service, the company has also worked closely with Odfjell Drilling, an integrated drilling contractor, to enhance global rig operations.

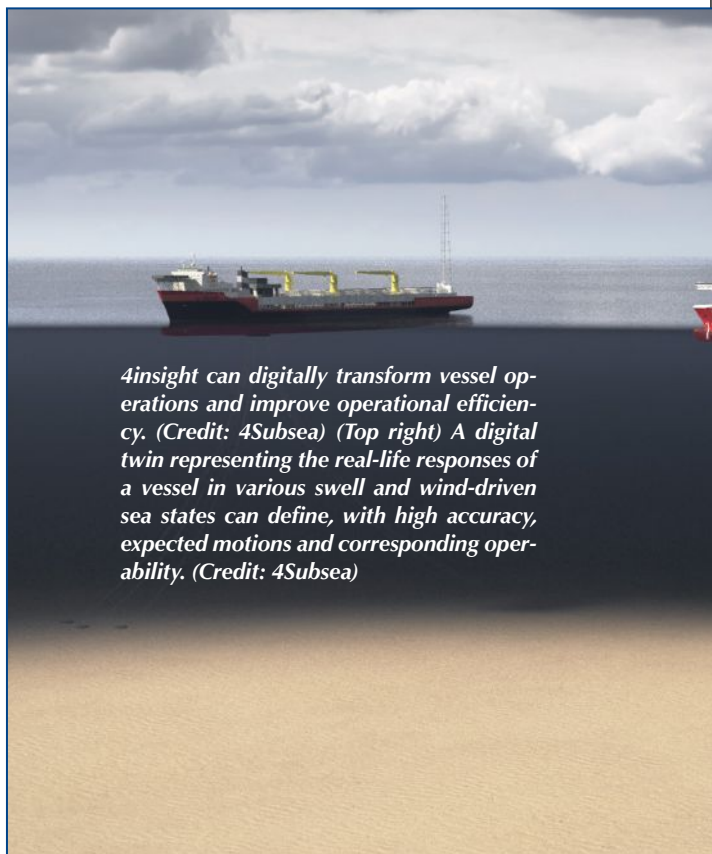
Sensor Technology for Critical Decision Making

Digitalization and automation are vital enablers for the energy and maritime sectors if they are to meet commitments to cut carbon emissions by mid-century. In tandem with decarbonization efforts, smart and insightful technologies and solutions are also being used to enhance operational efficiency and preserve the safety of the workforce, the workplace and the environment.

For example, sensor technology, in conjunction with wave and weather forecasts, can be used to predict vessel behavior ahead of time and allow both crew and engineers to take preemptive action before a situation es-

calates. It can also be used to augment power generation and assess vessel operability.

Established in 2007, 4Subsea combines domain expertise with data analytics and digital services to maximize the lifetime of assets, reduce operational cost and risk, and optimize future projects through data-driven design. The company's custom-built, IoT-enabled sensors are small, robust, easily installed, and only require external power and internet access through LAN or Wi-Fi.



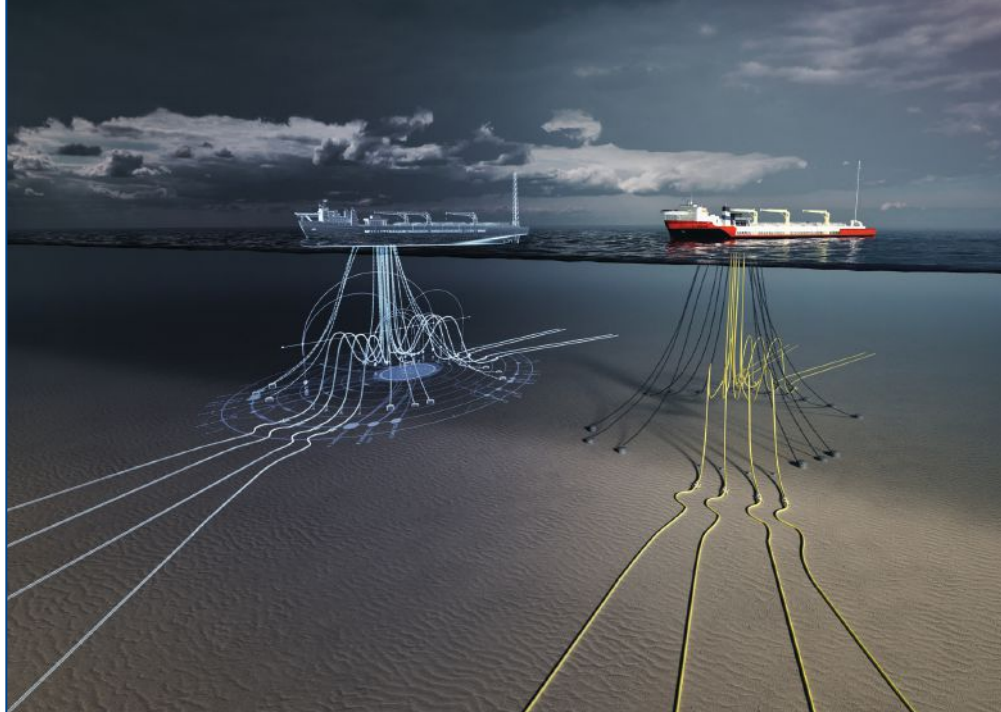
4insight can digitally transform vessel operations and improve operational efficiency. (Credit: 4Subsea) (Top right) A digital twin representing the real-life responses of a vessel in various swell and wind-driven sea states can define, with high accuracy, expected motions and corresponding operability. (Credit: 4Subsea)

In addition, remote access to the sensors means that no technicians are needed for the installation, and all configuration is managed from shore.

Once connected, the sensors automatically start streaming data to the cloud, making it available through an open application programming interface (API). The unit boasts 8 GB memory and a storage capacity of 32 GB, which also allows for offshore configuration with other smart monitoring sensors and satellite-based forecasting services, where advanced algorithms interpret data to create the insight and decision support needed.

Built on Microsoft Azure, the digital service is tailored to stream high-resolution, time-series data from large amounts of sensors, contextualizing and cleaning the data, thereby releasing its true potential to ensure the best possible decision support for operators.

A key principle behind the digital service is its open-architecture accessibility allowing operators to hook onto any data stream of raw or processed data via REST or Python APIs, for example. This provides engineers with a choice for ingesting the data into their own applications. The operator is also free to safely share access to data with any third-party organization to further support and



plan fleet or rig operations and enable increased automation across a range of engineering processes.

Supporting a Safer, Smarter, More Sustainable Maritime Sector

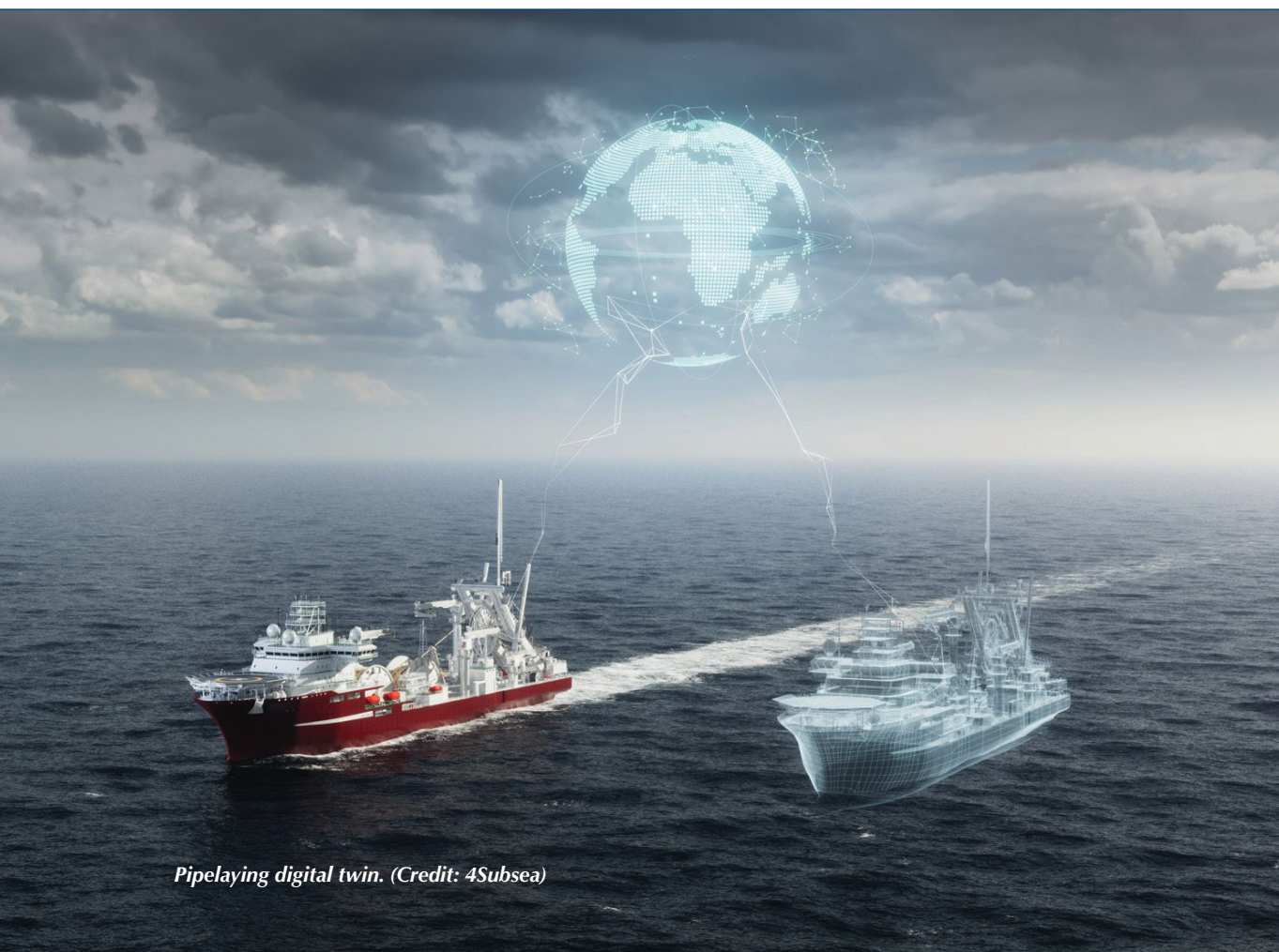
Data streams from sensors and other sources of information are being widely adopted for more astute decision making and swifter action to improve monitoring, control, quality assurance and verification. Modern offshore vessels and rigs may already have tens of thousands of sensors monitoring the condition of various equipment during installation. However, while the data are mostly used for simple alarms, running analytics can garner substantial value to ensure operations run safely and smoothly.

4Subsea's IoT sensors, in conjunction with its data analytics platform, 4insight, were recently used by Subsea 7 to digitally transform and optimize the performance of its vessel operations. Data scientists worked closely with operational experts from Subsea 7 to create ML algorithms that gave the vessel crew the enhanced prediction of expected vessel motions and corresponding operability needed to make informed data-driven decisions. The aim was to gain a better understanding of vessel operability and fuel consumption, thereby reducing cost and emissions from the fleet.

4Subsea's IoT SMS Gateway sensors, existing vessel sensors and third-party environmental forecast services were used in combination with Microsoft Azure and data science competence to provide vessel motion predictions on 4insight.

With sensor data streaming securely to the data platform, vessel operators can now use real-time information from sturdy sensor technology installed on board their fleet to eliminate unnecessary conservatism, optimize power generation, improve vessel operability and detect anomalies based on ML algorithms and AI. ML is used to predict vessel behavior, for example, based on wave and





Pipelaying digital twin. (Credit: 4Subsea)

weather forecasts. In the future, AI can be used for the early detection of anomalies, giving the crew time to take mitigating actions before situations escalate.

Live data from vessel motion measurements, combined with recorded weather and wave forecasts, has improved Subsea 7's operating envelopes and significantly reduced downtime of its versatile fleet of vessels.

"4Subsea's data-driven approach of linking predicted vessel motions with in-depth installation engineering analysis unlocked optimum performance of our fleet in complex subsea operations and challenging weather conditions," Marcelo Xavier, vice president of sales, marketing and planning at Subsea 7, said.

This data-driven approach enhances the safety and sustainability of Subsea 7 vessels, which perform a wide range of operations for the energy industry, including pipelay cable installation, construction of wind farms, survey, remote intervention, diving support, heavy lifting operations and decommissioning.

Enhancing Offshore Rig Operations

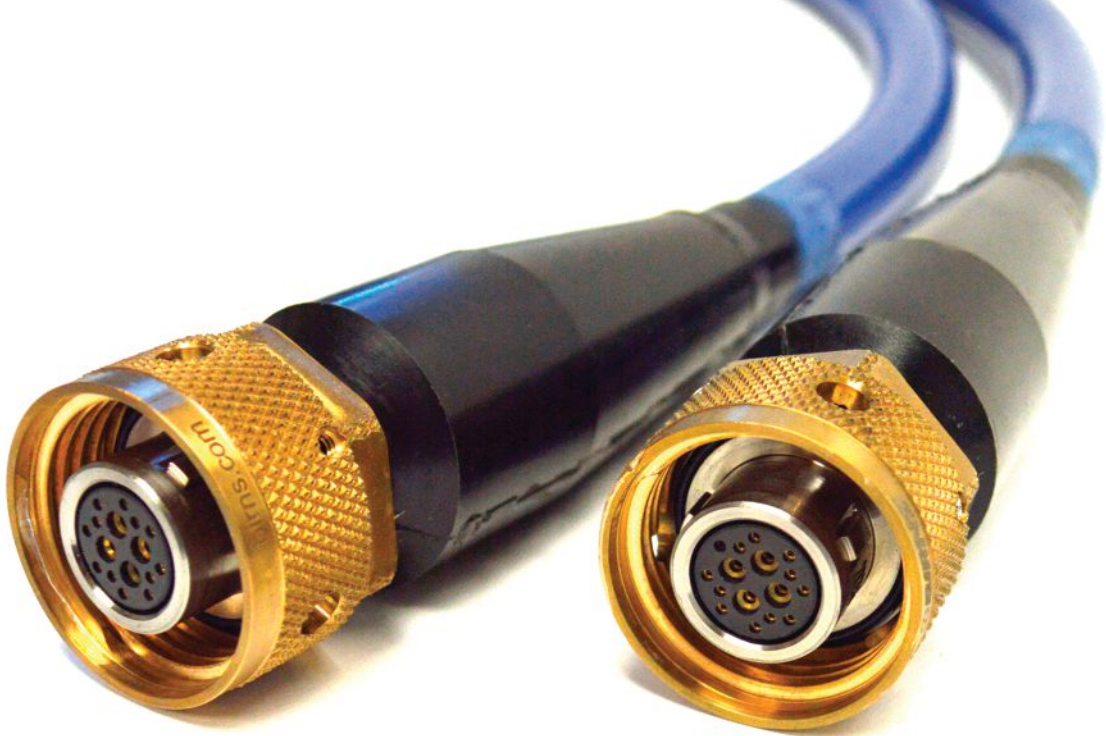
Odfjell Drilling, an international drilling, well service and engineering company, recognized the need to make better use of its data to optimize operating procedures, reduce energy and fuel consumption, and share essential data with its clients.

The main obstacle in a project of this kind is bringing together and rationalizing multiple sources of collected data stored across several sensors and control panels, which are commonly siloed in respective vendor control systems on the rig. To enable easy access to data generated by different operational systems and allow that data to be available to a single cloud application, Odfjell Drilling implemented 4insight to capture and catalog all time-series data.

The data are cleaned and processed by data analytics tools and distributed securely and efficiently to the customer. The results are presented as clear and concise, easy-to-interpret insights, and as contextualized dashboard reports to simplify the complex analysis process and effectively support critical decision making.

As part of the project with 4Subsea, a local, physical connection had to be established to all control systems while ensuring the necessary security and control access to limit cybersecurity risks. A data connector was therefore deployed to the rig to collect and map the data from various sources. As a component of 4insight, this interfaces with local sensors and rig control systems, sending data safely and securely to the cloud.

By gaining access to operational and sensor data from their rigs, Odfjell Drilling made significant progress to digitally transform and improve its rig operations. For in-



Built for Speed

9+Gb/s Data Rates for 6km-rated Subsea Cable Assemblies

Get groundbreaking new ultra-high speed data transfer rates of up to 9.4+/- 0.1 gigabits per second with BIRNS Millennium™ cable assemblies in a range of pin configurations, with our exclusive 52A-278 cable constructed for Cat 8.2 use.

Perfect for high definition video, monitoring and sonar digital data downloads, or any subsea application requiring incredibly high bandwidth data delivery.

Testing for this revolutionary subsea connectivity solution has data consistently transmitted at this rate over the entire range of pressures from 0 to 8700 PSI/600 bar (6,000m equivalent depth).

Ask our team for an exciting solution for your system to get your data delivered when and how you need it!

 **BIRNS**®
*High Performance . . .
Under Pressure®*

www.birns.com



See us at stand 300 at
Oceanology International in London



Control room with 4Subsea dashboards. (Credit: 4Subsea)

stance, monitoring energy consumption patterns meant rig crews could analyze rig performance and share best practices. This allowed greater innovation of business models as insight on fuel consumption could be used to maximize efficiency, lower costs and, most notably, reduce the environmental impact of operations.

Uploading these data to the cloud allowed the operations team and selected clients the opportunity to create their own detailed analyses into the performance of semisubmersible drilling rigs without requiring physical access on site. This safe and secure transfer of critical, time-series data can then be used to support more efficient field development planning in the future.

"4insight has opened many ways to access data," said Andre Baadsvik, project manager with Odfjell Drilling. "When you open that door and get access to the data, you begin presenting insights to the team that change the mindset. We get a constant flow of ideas about smart things to do."

A Digitally Driven Energy Transition

Digital data and advanced analysis techniques can be used as the basis for digital twins and other operational, design and construction simulations. This has a dramatic effect on how the offshore energy and maritime sectors view information while strengthening risk management approaches and opening up new business models.

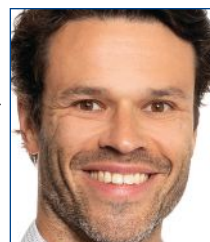
Since 2009, 4Subsea has provided critical digital decision support with digital twins to the oil and gas industry and now sees a large potential for the same technology in the renewables market. Over the past decade, the company has transferred and transformed its pioneering

sensor technology from the oil and gas sector to make it as valuable to decision makers, asset managers and engineers in offshore wind. Currently being piloted on both onshore and offshore wind turbines, such technology transfers have already assisted operators in reducing the levelized cost of energy (LCOE) and improving operational efficiency.

Offshore wind shares many of the challenges of the oil and gas industry, such as soil support, scouring, corrosion and structural fatigue. Using the same technology to create digital twins of wind farm infrastructure, in conjunction with modified ML algorithms, it is now possible to extend the service life of wind farms and reduce production downtime with anomaly detection.

4Subsea has also been involved in several concept studies for semisubmersible floaters for wind turbines in the range of 10 to 12 MW at various locations. The transition to green energy such as offshore wind requires digitalization to handle the system complexities necessary to improve costs, maximize operations, and ensure efficient and safe operations of such complex subsea infrastructures as offshore wind farms. **ST**

Ignacio Marré is the executive vice president (EVP) of operations at 4Subsea, with previous experience as EVP for well intervention and drilling. He holds a master's degree in marine technology from the Norwegian University of Science and Technology. Marré has more than 15 years of experience in the oil and gas industry and has published a number of scientific papers.



Simplifying Ocean pH Sensing

Introducing the S Series Calibration-Free pH Sensors

By Nathan Lawrence • Kay McGuinness

Since the beginning of the Industrial Revolution the ocean has become increasingly more acidic due to uptake of atmospheric carbon dioxide. It is evident there is an urgent need for in-situ pH measurements to provide high spatial and temporal resolution. However, today's ship-based and tethered mooring measurements cannot achieve this, and while the introduction of intelligent and low-cost underwater vehicles (UVs) provide the platform to obtain the data, the development of small, fast, low-power and reliable pH sensors for deployment on these smaller UVs is lagging behind.

Current Technology

Today's ocean pH sensors include optical sensors that use a dye that changes color in different pH test fluids; an ion-selective field-effect transistor (ISFET) system, where the current through a semiconductor device changes when hydrogen ions are present in the test fluid; and the standard glass electrode, which uses electrochemical technology, placed in a suitable housing.

The colorimetric systems, while being very accurate, are generally large and expensive, require replacement dye bags and have relatively long measurement times (circa 5 min.). Such technology does not measure at a high enough frequency for fast-moving UVs. The ISFET technology, while producing a high measurement frequency, requires annual recalibrations and specific corrections for depth and salinity. The glass electrode is not very robust, must be kept in a storage solution when not in use, and requires frequent recalibration due to reference electrode drift.

Advanced pH Sensing

pH is one of the key ocean variables, and for too long the pH sensor has been the "problem child" of the sensor suite. At ANB Sensors, we set about the task of developing a pH sensor that would avoid all the drawbacks of



A) The S1100 package, and B) the sensor transducer.

the current available technologies: It would be calibration free, robust and small, with no storage issues, and easy to use and maintain.

The S Series pH sensors are based on patented electrochemical technology to provide a calibration-free sensor. The biggest reason why electrochemical-based pH sensors require frequent recalibrations is reference electrode drift, where the reference to which the pH is measured against is not stable and moves with time, making the measurement inaccurate until the sensor is recalibrated. ANB's technology contains an innovative reference tracker, which follows any drift in the reference and accounts for it in situ, removing the need to manually recalibrate. The S Series is made from robust materials and is all sol-

id state, making it ideally suited for the extreme environments found in the world's oceans.

The key element of the S Series is its sensing transducer, which is where ANB's innovative sensing chemistry is found. It contains a series of solid-state-carbon-impregnated electrodes from which the electrochemical measurements are conducted. The onboard computer on the sensor analyzes the electrochemical measurement and the temperature of the solution and combines these factors to produce a pH, with no compensation for depth required. The outputs of the sensor are time, pH, temperature and health.

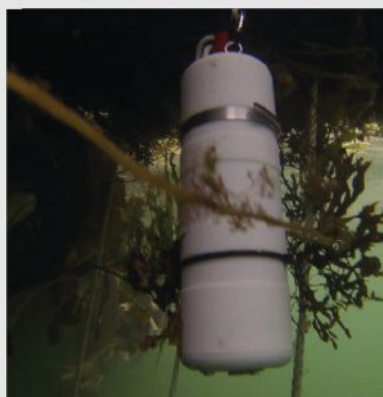
The output of health is key to the end-user experience, as it provides a qualifier on the accuracy of the pH response and gives a heads up if maintenance of the sensor is required in real time. Maintenance is a simple abrasion over the surface of the transducer, with the supplied abrasion block. This process replenishes the transducer interface, and after abrasion is carried out, the sensor is ready for deployment, with no recalibration necessary.

The lifetime of the transducer is dependent on the number of measurements the sensor records, and therefore depends on the measurement profile set by the end-user. The transducer provides approximately 15,000 measurements before maintenance is required, so on a continuous measurement profile, it will last for about five days; on a 15-min. measurement interval profile, it will last for about 50 days before it requires an abrasion.

The transducer survives for 25 to 30 abrasions before a replacement is required. Replacing the transducer is a simple process conducted by the end-user. Once a new transducer is installed, the sensor is ready to start measuring straight away; no calibration is required.

The sensor responds instantly to the pH of the solution in which it is immersed. The nature of the measurement that is recorded at each electrode on the transducers surface means that the S Series current maximum measurement rate is circa 23 sec. The challenge to lower this measurement frequency for fast-moving vehicles is being taken on at ANB with concepts and processes already being trialled. This is in conjunction with increasing the salinity range in which the sensor operates. The S Series operates across the salinity range of 10 to 37 ppt—from the higher salt end of brackish water to full-ocean salinities. ANB is developing a full-salinity sensor, which will operate without the need for salinity compensation.

The S Series sensors have been designed to be mechanically robust and can be stored wet or dry, with minimal user intervention. The sensors come in a range of depth ratings and sizes to make them accessible for different platforms, such as buoys, vehicles, floats and



Images of the S1100 in different deployments: buoy, stand-alone, underwater vehicle and flow cell.

sondes. The S Series uses a digital output, making it easy to integrate into the control systems of UVs and can be configured to provide the desired output to the end-user.

Its sleek design means it can be tethered to a UV. Should the end-user wish for a tighter integration, the OEM kit is available. This allows for the sensor's electronics to be housed inside the vehicle with the transducer sealed in the vehicle wall using its double O-ring design. Flow-loop integration for ferry box and sample lines is also achieved simply by placing an ANB flow cell on the front face of the sensor. The sensor can just as easily be tethered to a rope or mooring for open-ocean profiling and buoy surveys.

Field Trials

Multiple sensor field trials have been conducted by ANB Sensors in the last couple years, including on a ferry box traveling the brackish waters between Stockholm, Sweden, and Helsinki, Finland; integrated on an ROV in California; on a mooring in Southampton, U.K.; and in the river Cam in Cambridgeshire, U.K. Each of these trials has been invaluable to ANB Sensors to improve and optimize the sensor.

One field trial in particular highlights the accuracy of the sensor. The trial was carried out in October 2021 at the Scottish Association for Marine Science (SAMS) campus near the village of Dunbeg, 3.5 mi. northeast of Oban on the west coast of Scotland. A sensor was de-

SubConn®

DEPENDABILITY AT EVERY LEVEL

Wet-mate connectors

Recognised throughout
the industry

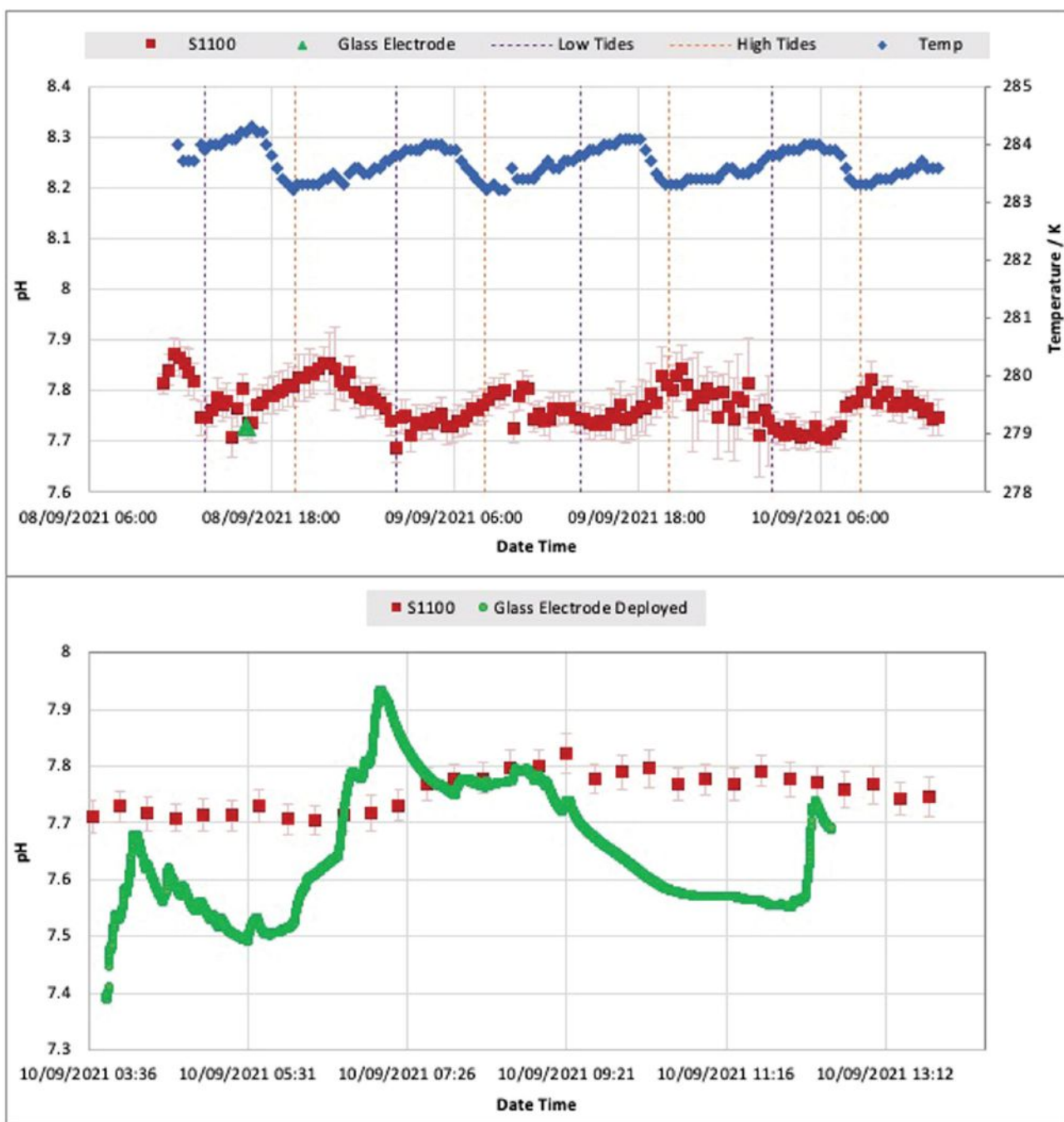
Full range of
Ethernet connectors

More than 40 years
proven track record

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





(Top) S1100 data obtained from the SAMS field trial showing tidal variations in pH. (Bottom) S1100 pH data alongside data obtained from a standard glass electrode.

ployed from the static research vessel that is stationed on a pontoon adjacent to the SAMS campus. The sensor was positioned at approximately 2-m depth and connected to a battery at the surface via a SubConn cable. Water samples were taken alongside the sensor so the pH could be independently measured back in the laboratory. Also, an oceanographic glass pH electrode was deployed over the same time scales for a direct comparison.

The data output from the sensor after 36 hr. of measuring on a 15-min. measurement interval showed the bi-daily variations in pH ranging from 7.7 up to 7.9, con-

sistent with the natural ebb and flow of the tidal waterways at Oban. At high tide, the river water mixes with the incoming seawater, producing a higher pH value. The data were corroborated by sampling taken during the course of the trials, whereby the pH was measured using a freshly calibrated glass electrode.

During the course of this trial, an oceanographic glass-based pH sensor was tested alongside the S Series sensor. The glass electrode data show a wide variation in pH during the course of its deployment, which did not follow the tidal variations highlighted by the ANB Sensors technology.

The SAMS trial shows the efficacy of the sensor compared to the competition. With funding from the European Union, ANB Sensors is now pushing its technology

“The S Series pH sensors are based on patented electrochemical technology to provide a calibration-free sensor.”

with tests in harsher conditions (higher temperatures and salinities) and areas where biofouling is prevalent. The results of these tests will facilitate further advancements and ultimately enable accurate, long-term measurement of pH in environments that fall outside of the workable range of current technology.

Conclusion

The S Series has been designed with the end-user in mind to minimize the pain of monitoring pH. In designing and producing the S Series, ANB Sensors has engaged with end-users and integrators of pH sensors to understand their needs. Overwhelmingly, the issues of recalibration, storage conditions and deployment difficulties were found to be the key pain points. The calibration-free, solid-state, plug-and-play nature of the S Series addresses all these issues. The S Series has been demonstrated under a number of deployment conditions and shown to provide accurate, stable measurements without the shortcomings of other available pH sensors.

Acknowledgments

The authors would like to acknowledge the excellent team of scientists and engineers at ANB Sensors: Christina Day, James Dyer, Ben Legg, Brett McElwaine, Brandon McHale, Monica Miranda Mugica, Richard Seymour and Neel Sisodia, along with the support staff: Carl Clemans, Chris Copping and Vicki Georgiadis. Furthermore, we are grateful to Gareth Lee and Daisy Pickup from the University of East Anglia for facilitating the field trials at SAMS. **ST**

Nathan Lawrence is the CEO of ANB Sensors and a senior lecturer at Hull University. He has a DPhil. in electrochemistry and is a Royal Society of Chemistry (RSC) fellow. He has written 130 research papers and holds more than 30 patents. Lawrence led a team that entered the Ocean Health XPRIZE, which was the catalyst for the birth of ANB.

Kay McGuinness is the COO of ANB Sensors. She has a DPhil. in polymer chemistry and 15 years' experience in sensors for the oil and gas industry. At ANB Sensors, she is responsible for technical direction and business development.



Oculus Multibeam Imaging Sonars

High resolution imaging in turbid water for improved situational awareness and target identification. Available in 375kHz to 3.0MHz. Depth rated to 500m, 1000m, or 4000m.

ogulus



Twitter Instagram LinkedIn Facebook YouTube

www.blueprintsubsea.com
enquiries@blueprintsubsea.com

Beyond Oil and Gas

Fiber-Optics for the Energy Transition and Seafloor Monitoring

By Garth Naldrett

As the world transitions toward a carbon-free future, many innovative technologies that were developed for the oil and gas industry are finding uses in sectors that are driving environmental and renewable services. The oil and gas sector is heading into a transitory period, with pressure growing to accelerate the supply of renewable energy generation to meet future demands. The International Energy Agency reports that annual clean energy investment will need to more than triple by 2030, to around \$4 trillion, to achieve 2050 net-zero emissions.

As the oil and gas industry transitions to a renewable energy focus, energy security and reliability remain primary concerns, and multiple technologies are available to help keep production online or help accelerate recovery from downtime.

Monitoring technology is crucial, as this drives safety, optimization and security of high-value assets. For offshore oil and gas rigs, offshore wind farms, and subsea ocean mapping, monitoring technology can take the form of fiber-optic cables housed on the seafloor, connecting subsea infrastructure to surface platforms.

Mapping the Subsurface

Silixa's Carina Subsea 4D fiber-optic monitoring solution is the world's first permanent ultraHD seismic data acquisition system that can be used for both in-well and subsea cables, enabling operators to perform more frequent seismic acquisitions at a much lower cost. This helps accelerate production and increase ultimate recovery. The system is unique in that it does not require any complex electronics to be placed on the seafloor. Acquisitions are performed from the topside facility through existing fibers in the subsea umbilicals. Integration complexity and costs are therefore substantially reduced, and data management simplified.

Interrogators can easily be maintained and upgraded. The long offset distance between the surface interrogator and subsea well does not compromise data quality;

Silixa's Constellation fiber-optic cable and novel optical architectures allow the same high-quality data to be achieved as on existing land and platform systems.

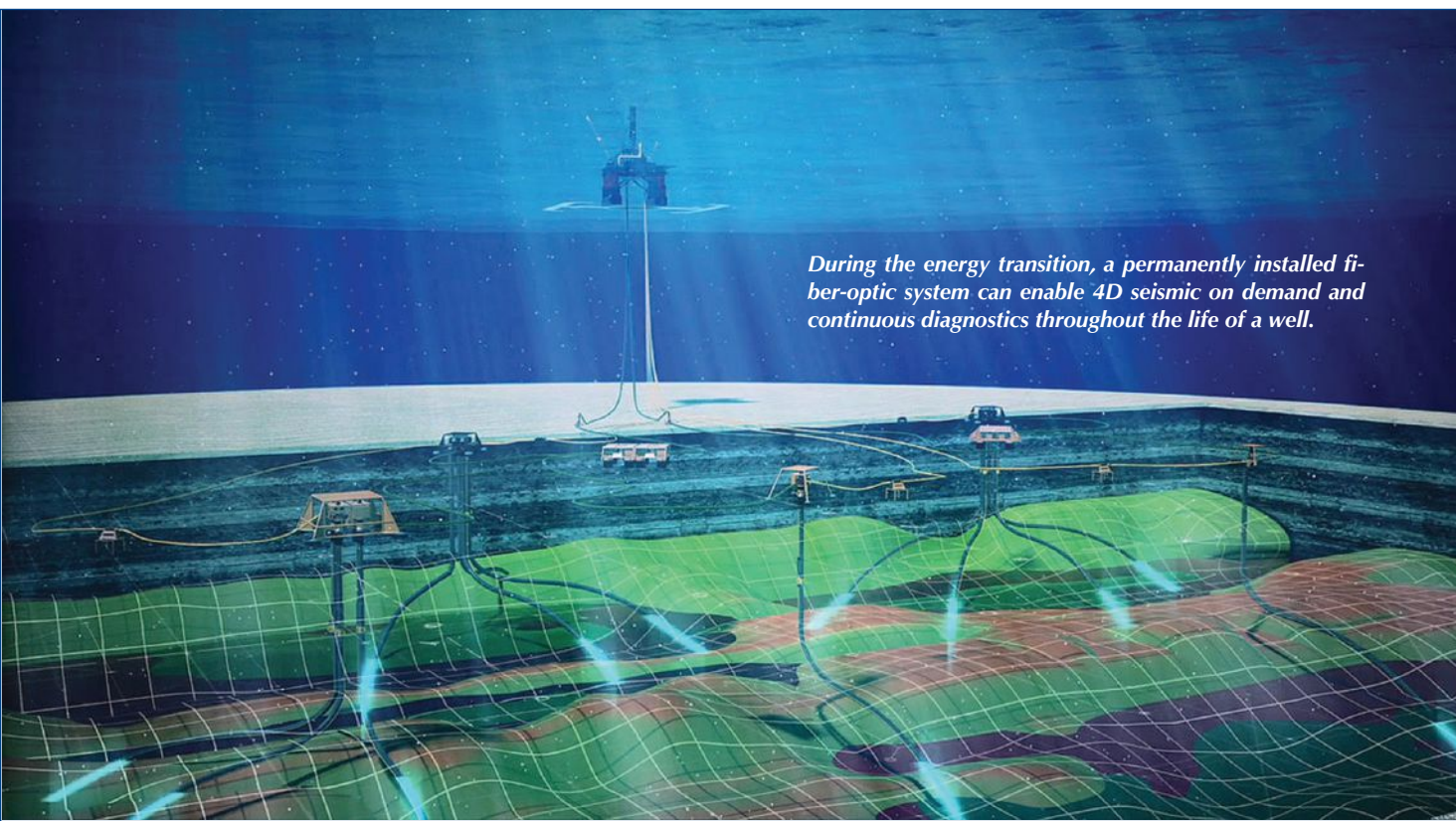
Fiber-optics are already in use in subsea infrastructure for communications purposes, and innovations such as Carina Subsea 4D enables fiber-optics to also be used for distributed sensing. Sensors along the fiber can take measurements of acoustics, temperature and strain along a continuous distance and time. For example, sensors on an umbilical or asset tens of kilometers long can record a measurement at every meter along the asset, meaning it is easy to pinpoint the time and exact location of an event.

Advances have been made with the fidelity of these sensors, so they can operate over longer ranges and with greater clarity. Rather than just being able to detect a disturbance along the asset, it is now possible to listen to the event with the same fidelity as you would get from a microphone. From that point, it is much easier to determine the cause of the disturbance, e.g., a passing fishing trawler, an anchor running along the seabed or a leak coming from the pipeline.

Another benefit of using fibers is that, because they are relatively cheap to include in the umbilical, the presence of additional fibers at the ready inside an umbilical is typical, creating a lot of spare capacity for redundancy or future applications. In many installations, dark (unused) fibers are available because of the inbuilt redundancy.

Extending Operational Lifetimes

On mature oil and gas assets, there is always going to be a push to extend the design life because of the way the industry operates. For example, BP discovered and developed the Forties oilfield in the 1970s. By 2003, BP had a global portfolio of opportunities with greater investment return than could be achieved from Forties. As a result, BP sold the field to a smaller independent op-



During the energy transition, a permanently installed fiber-optic system can enable 4D seismic on demand and continuous diagnostics throughout the life of a well.

erator, Apache (APA Corp.). Apache has since published plans to extend the field operation to beyond 2030. For field-life extension, the monitoring of risers and other dynamically stressed components can enable the operator to better understand if the design capacity has been exceeded, or if it can be extended.

Temperature, Acoustic Monitoring for Wind Energy

For asset integrity in wind energy, there are three types of fiber-optic-based monitoring technologies in use: acoustic sensors, temperature sensors and strain sensors. Operators can tell whether an asset has been operating within its design specification, or if it is exceeding the design specification, using these tools. If the design specification is exceeded, there is clearly a problem within the system, and either the design life needs to be reduced or the maintenance frequency needs to be increased.

If there is a monitoring system in place, it is going to help extend the operational life of an asset by making it much easier to determine whether equipment has been operated within its design envelope. This helps operators make better decisions on whether to extend the operational life of equipment.

Ensuring Integrity of Carbon Storage

Monitoring is also an essential part of the emerging carbon capture and storage (CCS) industry, which stores vast amounts of captured carbon in underground geological formations, preventing it from entering the atmosphere. If the well in which the carbon is stored is not capped properly, the carbon dioxide can leak out, so monitoring, measurement and verification techniques

are used to validate the integrity of the storage complex.

There are three areas where monitoring takes place. First, during the site development stage, it is used for site characterization; this is where the viability of a formation for carbon capture and storage is assessed. Second, in the reservoir where the carbon is injected, seismic interpretations are used to determine where the carbon has gone. Finally, in the wellbore itself, the integrity of the tubing and the casing strings are monitored. CO₂ is aggressive when combined with water, as it creates carbonic acids that can corrode the tubing. There is always a risk that the integrity of the system is going to fail, so it is important to identify leaks from wellbores at the earliest possible stage.

Marine Exploration

By using customized single-mode or multi-mode fiber, or using dark fiber in existing subsea telecom networks, Silixa's marine and shoreline monitoring solution enables several innovative applications that can help predict environmental hazards, such as earthquakes, tsunamis, landslides, or other hazardous events caused by erosion or sediment transportation. These distributed sensing-based applications minimize the risk of environmental damage, potential loss of life and damage to infrastructure.

The broadband sensitivity of the iDAS (0.01 mHz to 50 kHz) combined with the high-resolution measurements of Silixa's ULTIMA DTS and XT-DTS (less than 1-m spatial resolution, with fine spatial sampling of 12.5 cm) and iDSS makes it suitable for mapping subsea faults, detecting microseismic events, recording remote earth-

114' Supply/Research Vessel For Sale

Wind farm development/construction
incl. guard services & marine mammal watch



Overnight accommodations,
A-frame, and associated winches

608.788.3210

info@pinnaclemarine.com

www.pinnaclemarine.com

PINNACLE
MARINE CORPORATION

***“Silixa’s Carina Subsea 4D
fiber-optic monitoring solution
is the world’s first permanent
ultraHD seismic data acquisition
system that can be used for
both in-well and subsea cables”***

quakes, measuring physical properties of seawater, and monitoring ground deformation and subsea critical infrastructure.

iDAS and active (heated) DTS measurements can be used for sediment transport monitoring in ports, estuaries and other coastal environments, improving dredging procedures and significantly reducing maintenance costs.

Advances in Silixa’s phase-coherent iDAS technology have also opened new opportunities for continuous environmental monitoring using ambient noise tomography techniques to minimize data acquisition costs.

Subsea Oil and Gas

Fiber-optic technology has some roots in the oil and gas sector, and a recent project in the Gulf of Mexico highlights the benefits. Fiber-optic cables in pre-existing subsea umbilicals have been able to record seismic shots. In 2019, at the Atlantis field in the Gulf of Mexico, a seismic shot was recorded from a concurrent ocean bottom nodes (OBN) campaign via a subsea umbilical that connects subsea infrastructure and surface platforms. Distributed acoustic sensing (DAS) data with clear seismic signals at both low and high frequencies were obtained.

Comparing DAS data recorded by the umbilical with the horizontal and vertical geophone data acquired using OBN at the same location, results indicate that the DAS data from the fiber umbilical show very close similarity to the OBN geophone data. DAS data show good signals in the low-frequency band, making it an area of great future potential for DAS. The DAS data were acquired, visualized and transmitted to shore in real time, making it possible to perform continuous quality control on the source vessel, while the OBN data were only delivered months after the survey was completed.

The advancements in the phase-coherent iDAS technology in recent years have opened new geophysical and geotechnical applications. The ability to employ the extensive web of underutilized subsea fiber-optic cables in even the most remote environments for monitoring purposes is invaluable. Collecting distributed acoustic data on dark fibers enables detailed mapping of the seafloor to assess the potential for offshore seismic hazards for both private and public benefit. **ST**

Garth Naldrett is the chief product officer at Silixa. He has 25 years of experience in the oil and gas industry, with a variety of roles related to the measurement and optimization of upstream assets.

WEATHER WORKHORSES

INSTRUMENTATION ENGINEERED
AND BUILT FOR THE LONG HAUL

MARINE
WIND MONITOR

YOUNG

WWW.YOUNGUSA.COM

MARINE WIND TRACKER

WIND • TEMPERATURE • PRESSURE • RELATIVE HUMIDITY • PRECIPITATION • VISIBILITY

USV Swarms for Survey

Supporting Growth in Offshore Wind and Maritime Research, Defense

By Sören Themann • Stephen Ferretti

The Intergovernmental Panel on Climate Change (IPCC) states that greenhouse gas emissions must be cut by 45 percent no later than 2030 to stay within a temperature rise of 1.5° C, the threshold at which the effects of global warming are predicted to become catastrophic across the planet. If we can manage this, 10 million homes and 2 million sq. mi. of permafrost will be saved, when compared to the previous 2.0° C target. Disappointingly, last year's COP26 meeting in Glasgow did little to catalyze the necessary steps toward such drastic decarbonization, with all pledges equal to a worrying temperature rise of 2.4° C by 2030.

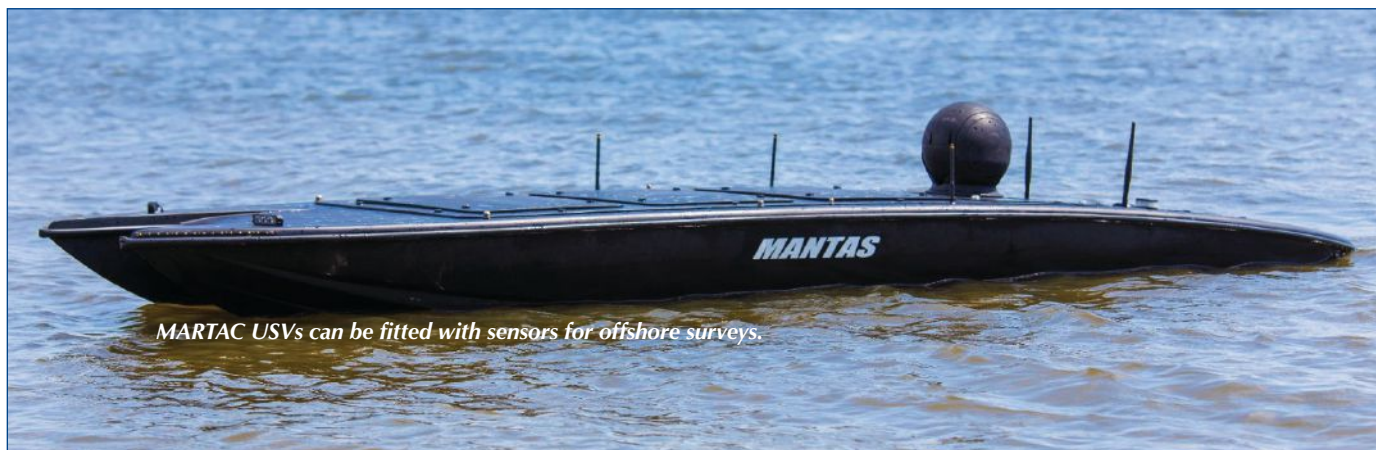
Efforts to decarbonize continue apart from the mostly political wrangling at COP26, however, with many countries already setting their own targets in line with the Paris Agreement and the IPCC. The U.K.'s decision to cease the sale of new fossil fuel-burning vehicles from 2030 is perhaps one of the most extreme targets, but wind energy could be where the world stands to make the most gains in decarbonization this decade.

Already on an amazing growth trajectory from the beginning of the previous decade, offshore wind pow-

er has become a cornerstone in the fight against climate change. One of the key takeaways from Research and Markets' "Offshore Wind Market by Component - Global Forecast to 2026" report is that the offshore wind market is projected to reach \$56.8 billion by 2026 from an estimated \$31.8 billion in 2021, at a compound annual growth rate of 12.3 percent during the forecast period.

Offshore wind came about because the need to replace burning fossil fuels as our primary source of energy with a less damaging, renewable and clean source became urgent. Until recent years, in most developed nations, the companies building offshore wind farms were able to do so with significant government subsidies. Today, though, the technology and methodology of offshore wind energy production has advanced to such an efficient state that there is profit without subsidy. Wind energy is no longer the underdog and can compete with other renewable and nonrenewable energy sources on price alone.

But before profit there is always cost. In fact, wind farm operations and maintenance (O&M) make up 25 percent of those costs, a figure that represents the largest



MARTAC USVs can be fitted with sensors for offshore surveys.



The MARTAC MANTAS USV will be integrated with Subsea Europe Services' iHSS and other sensors and systems according to project requirements.



These developments certainly put large technology and offshore service companies in the spotlight, but cost reductions enabled by innovation from countless small and medium enterprises working across the entire offshore wind farm value chain will provide the foundation for the primaries to optimize the balance between O&M and kWh costs.

From simple mechanical innovations, such as new bolt torque monitoring systems, to artificial intelligence (AI) and machine learning-driven decision-support tools, the ongoing technology development by companies working in particular supply chain niches are all contributing to more capacity and

keeping costs as low as possible.

Optimizing the acquisition of hydrographic data is another area that can contribute to lower O&M costs. An accurate view of the seabed and the water column is needed from the planning stages throughout the entire life cycle of a wind farm, and subsea hydro-acoustic surveying can meet this need. Standalone new developments are already delivering gains, but when new technologies and methodologies are unified, the cost reduction potential is even greater.

Swarm surveying, where multiple small USVs launched and managed from a central mothership work together to cover more ground faster than manned survey vessels, is one such development. The concept has already been demonstrated by Florida-based USV manufacturer Marine Tactical Systems Inc. (MARTAC) and is being further developed as part of a partnership with hydroacoustic technology specialist and systems integrator Subsea Europe Services GmbH that started in September 2021. The

team plans to leverage the task endurance and payload flexibility of MARTAC's USVs against the simplified operation of integrated hydroacoustics in the context of subsea survey at wind farms.

The starting point for the partners is the integration of MARTAC's MANTAS T12 USV with hydrographic sensors and equipment combined in a tight system architecture, as demonstrated by Subsea Europe Services integrated Hydrographic System (iHSS). Able to acquire data to the new IHO S-44 Exclusive Order standards, the iHSS is a ready-to-mobilize solution including the highest performance multibeam echosounders, sound velocity instru-

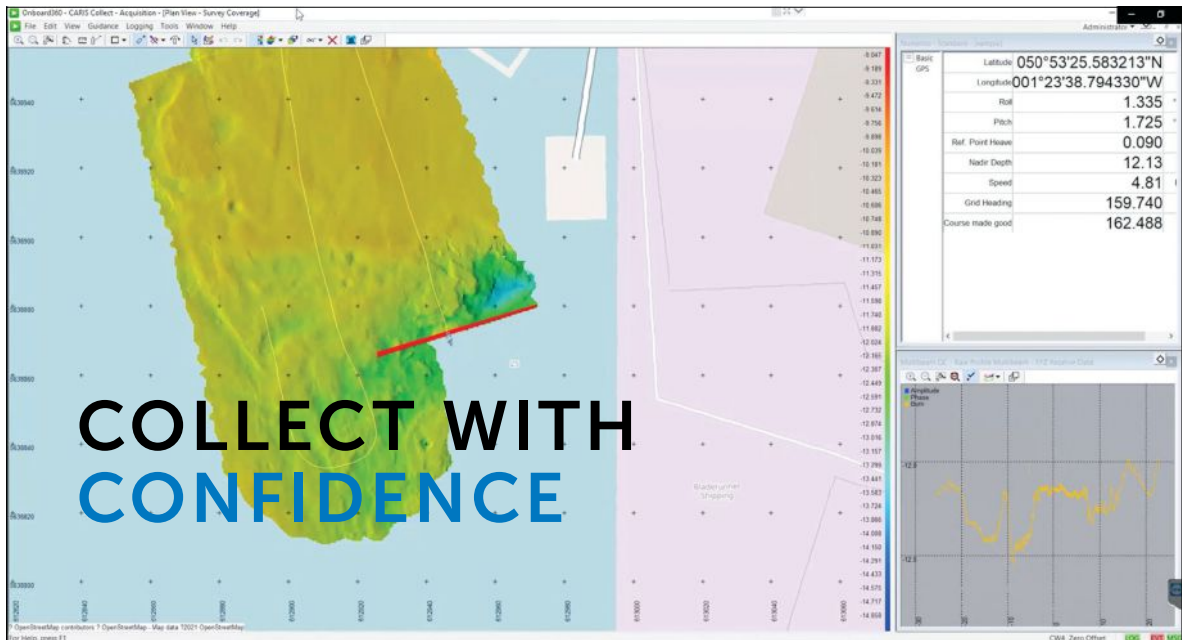


single life-cycle cost. But as the cost per kilowatt-hour (kWh) of energy produced by offshore wind farms continues to fall, it's critical to ensure financial sustainability and future investment by reducing operating costs at the same time as building out facilities to deliver on the inevitable extra demand.

Swarm Surveying for Offshore Wind

Cost reduction programs are more essential than ever, and it's clear that even more efficiency will be needed as the industry looks toward a future of much larger and more powerful wind turbines, located further from shore.

Teledyne Geospatial
Imaging Solutions for Land and Water



THE EVOLUTION OF CARIS ONBOARD HAS ARRIVED **CARISCOLLECT**

FEATURING

- CARIS Collect module for sonar and lidar acquisition
- Seamless integration into survey operations
- Complete Ping-to-Chart workflow solution

Available as a perpetual or SaaS annual license

CARIS Collect brings the most cost-effective acquisition software package to market.

FOR MORE INFORMATION:

www.teledynegeospatial.com/cariscollect



© 2021 Teledyne CARIS and Teledyne Optech, are both
Teledyne Technologies companies. All rights reserved.
Specifications are subject to change.



(Top) MANTAS T12 Environmental Monitoring System (EMS) in transport cradle. (Bottom) MANTAS T12 EMS in the water.

Services will deploy the first USVs in conjunction with a manned mothership, overseeing the autonomous operations of the USVs and conducting survey tasks at the same time. The so-called “mothership” concept for marine survey is expected to ultimately operate as a completely autonomous and unmanned service.

Prior to the partnership, MARTAC had already successfully demonstrated hydrographic USV swarms in multiple exercises, showing a future where synchronized unmanned platforms can survey an area of the seafloor many times faster than a single manned platform.

In the context of renewable energy, smaller USVs can operate in an offshore wind farm much faster and without the associated safety risks of normal survey vessels. A swarm of high-speed USVs can be dispatched from shore to perform

a survey job quickly—even as wind farms move further from shore—and deliver data within hours rather than days. Multipurpose USVs could also present the very attractive prospect of wind farms having a permanently resident swarm ready to go into action wherever needed—for marine surveying and other engineering, monitoring or security applications.

USVs and Ocean Observation

Aside from supporting decarbonization efforts by serving as a new alternative to conventional marine survey

processes at wind farms, the combination of USVs and integrated technologies is also being deployed to support marine scientists in the study of the ocean environment. A partnership formed between NOAA and the U.S. Navy is driving both technology and application development in this regard.

The partnership formalizes the U.S. Commercial Engagement through Ocean Technology Act of 2018 that directs NOAA to coordinate with the U.S. Navy on a wide range of functions, including research in emerging unmanned technologies, such as those developed by MARTAC. As a result, the performance and potential of the MARTAC USVs were studied during a month-long environmental monitoring evaluation set up by the Naval Meteorology and Oceanography Command (CNMOC), which also included an advanced naval training exercise (ANTX) in July 2020.

Prior to ANTX, which took place in the Gulf of Mexico south of Gulfport, Mississippi, the CNMOC team configured an extensive ocean monitoring system for installation on the MANTAS T12 USV, including an underwater modem, pan-and-tilt marine thermal camera, CTD monitor, ADCP DVL, multibeam echosounder, LiDAR, meteorological sensors and a wave-height sensor. Solar panels were also installed, giving the USV a mission duration of longer than 30 days, without the need for human intervention on the vehicle itself.

ments, workstations, software and inertial navigation systems. Uniquely, the iHSS features an all-in-one mount design with multibeam, IMU and GNSS antennas in a single reference frame, which simplifies installation and reduces potential errors from inconsistent or wrong offsets, ultimately enabling better quality raw and post-processing data.

The iHSS also contributes to faster and more effective deployment on both manned survey vessels and unmanned remote or autonomous craft, such as the MANTAS T12. The MARTAC USV has been selected as the platform for the partner’s turnkey marine survey solution development due to its speed and agility in getting to the survey site and performing the work, as well as its highly flexible payload potential. A relatively small craft at 12 ft. long, the T12 is designed to provide high utility with low operational costs. Importantly, considering the somewhat lagging regulatory framework for the operation of unmanned craft offshore, the MANTAS T12 can be operated in fully autonomous, semiautonomous or remote operator control modes.

A single MANTAS T12 is less costly than a manned vessel collecting the same data, and a multiple-USV swarm approach to marine survey magnifies the operational advantages and the cost savings. To overcome the current uncertainties with regard to operating an unmanned vehicle close to offshore assets, Subsea Europe



MANTAS swarms enable fast, unmanned surveys.

Key success criteria included the ability of the USV to conduct surveys in rough seas with strong currents. While the stakeholders had tested several USVs previously, all had failed to meet this criteria reliably, while the MANTAS T12 USV was able to cope with any of the conditions it encountered.

The need for reliable data communication was another important criteria, so the CNMOC scientists installed a highly redundant multichannel system including line of sight (LOS), 4G, radios and Iridium short-burst data. The communications payload allowed for both the transmission of data collected by the MANTAS T12 and for the team in the control room to set new mission parameters for the MANTAS based on the received data. Such real-time control enables interesting or unexpected results to be looked at immediately, rather than waiting for the data to arrive on a USB stick and embarking on another verification survey, potentially weeks or months later.

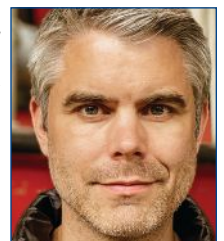
Payload flexibility is another reason that MANTAS USVs are well suited to commercial survey applications. Subsea Europe Services is called upon by its clients to support a huge variety of requests, from common or garden dredging surveys in ports or rivers to searching for unexploded ordnance (UXO) during the development or operational phases of an offshore wind farm (UXO being a legacy of World War II that has made some areas of the North Sea more dangerous than others due to the existence of mines and hastily dumped live munitions).

Each application requires a different tool set, and Subsea Europe Services has developed processes to install tools for both efficiency and performance. The final step is platform and technology integration, and, as demonstrated by CNMOC and MARTAC for ANTX, MANTAS is well ahead of the field on this front. In fact, the solution performed so well in the initial tests that the CNMOC team deployed a second MANTAS with a different pay-

load of hydroacoustic sensors to test. While not the primary driver, the addition of a second USV led to further confirmation of the operational efficiency enabled by the swarm survey approach, especially as the operator was able to control and manage both USVs as they conducted their surveys along specified paths with ease.

While two USVs may not be classed as a swarm, both NOAA and the U.S. Navy witnessed the potential for cost and manpower efficiencies that marine surveying using multiple small, fast craft can unlock. By also looking at the more commercial applications, such as offshore wind farm survey, it's clear that USV swarms will become a common sight offshore and nearshore in the future. Companies like MARTAC and Subsea Europe Services are providing the sensors and system solutions that make them possible, and key organizations like NOAA and the U.S. Navy are starting to deploy them effectively. **ST**

Sören Themann is the CEO of Subsea Europe Services GmbH, a Hamburg, Germany-based hydroacoustic technology specialist with an extensive equipment rental pool for high-quality marine data acquisition.



Stephen Ferretti is the chief marketing officer of Maritime Tactical Systems Inc. (MARTAC), a Florida-based manufacturer of fast, rugged unmanned surface vessels for defense, commercial and scientific applications.



Locating Lost ROVs

New USBL to Find, Track and Retrieve Vehicles with Severed Tethers

By Rachel McAlpine

In October 2021, Tritech International Ltd., a Moog Inc. company, released the new MicronNav 200 USBL tracking system. The MicronNav 200 is the latest generation of ultrashort baseline (USBL) tracking systems from Tritech, designed for small underwater vehicles and diver-supporting applications. The system offers marked improvements on the previous version, the MicronNav 100, with the integration of Google Maps and a smaller, more accurate transducer head to start.

The tracking system was designed with a number of different applications in mind, and one of the primary ones is in the hunt for lost ROVs. Every year, ROV owners and operators fly their underwater vehicles through harsh environments—often in place of a diver in order to reduce the risk to human life—and encounter vari-

ous hazards along the way. These hazards can include pieces of sharp, broken machinery, discarded rubbish such as shopping trolleys, and even large objects such as abandoned cars. All of these hazards pose a threat to the integrity of the ROV, and it is not uncommon that an ROV tether can become severed and all control and communications with the ROV are lost.

Retrieving an ROV with a severed tether is a costly and time-consuming operation that often results in operators being forced to abandon the task—and their expensive vehicle. In the MicronNav 200, Tritech has effectively developed a way in which these severed vehicles can be located, tracked and, ultimately, retrieved. ROV pilots and owners can benefit from the reduced risk of permanently losing the vehicle, which could positively impact insurance premiums, or at least offer peace of mind regarding expensive vehicles.

Tritech's MicronNav 200 is compatible with Tritech's recently released Micron Battery Modem: a self-powered modem for ROV and diver applications. The Micron Battery Modem is self-powered for up to 700 hr. (about 29 days) in receiver mode and 160 hr. (about six days) transmitting at 0.5 Hz, meaning that if an ROV does become lost, it can be located within a month following the severed tether.

This same technology can be applied to diver operations. Formally, the diver using a USBL system would need to power a through-water communications modem with a pony-mounted battery system, or work while attached to a tether, which is not always appropriate and can cause further risk. Now, the Micron Battery Modem can be pony-mounted to the diver, and the same tracking technology can be applied. This means the topside diving team has ex-



The MicronNav 200.



Carrying case for the MicronNav 200.

cellent visibility of where the diver is at all times, making diver operations safer and diver rescue missions quicker and more efficient.

System Design

The system comprises a subsea Micron Modem or Micron Battery Modem; a surface USBL transducer with integral magnetic compass and pitch/roll sensors; a surface MicronNav 200 interface hub; and bespoke operating software under control of a topside PC/laptop.

The Micron Modem is a standalone device that either responds to acoustic interrogation from the USBL head (transponder mode) or is triggered by RS232/RS485 (responder mode) through the main port.

Both the USBL transducer and the Micron Modem/Battery Modem can be commanded to switch from positioning mode to data-transfer mode, allowing the same hardware to be used to establish an underwater acoustic communications link.

The team at Trittech also worked to improve the magnetic compass by 1° on the new system to give greater locational accuracy. The USBL transducer can provide 180° hemispherical coverage below the transducer, which allows vehicle tracking in very shallow water. Omnidirectional coverage is provided by the Micron Modem and Micron Battery Modem.

The MicronNav 200 uses spread-spectrum acoustic technology, which provides a robust method for communication between the dunking transducers and the vehicle

modem. In order to make the system more user-friendly to the topside team, the MicronNav 200 tracking system has been integrated with Google Maps, meaning users benefit from easier to understand, more visual mapping services that update in real time. By improving situational awareness for open-water operations, operators can focus on the task at hand and avoid hazards and obstacles.

The MicronNav 200 is supported by Trittech's bespoke software package, Genesis. This means that when multiple sensors are being used on a vehicle, including subsea cameras and, for poor visibility conditions, multibeam imaging and mechanical scanning sonars, they can all be displayed on one platform through Genesis. This software is easy to use and has a built-in calibration process for the MicronNav 200, meaning this can be done quickly and effortlessly on site. Trittech has a dedicated software team who continually add new features and developments to Genesis, making it a cutting-edge piece of software within the subsea industry. Genesis goes through its own qualification and testing process, ensuring ease of use by identifying and eliminating any potential bugs before the scheduled software release.

Testing

The Trittech system has been through rigorous testing, including in-house pressure testing and software testing, as well as several open-water tests to ensure optimal design. The testing process is extensive. An in-house team focuses on qualification of the product, including pres-

Ocean Power



OI oceanology International
16-17 MARCH 2022
LONDON, ENGLAND

COTS
Vehicle
RD & System Integration
Energy Storage System
Subsea

API177 Offshore certified

Li-Ion PowerPack™ - Underwater power solutions

Highly reliable, efficient and safe Li-Ion batteries
Made for harsh offshore and subsea conditions
such as offshore Oil & Gas, scientific and
AUV or ROV equipment

Learn more

SubCtech GmbH
www.subctech.com
info@subctech.com

UN 38.3
ISO 9001

subCtech

sure, salt spray and EMC testing to ensure the product meets both internal standards and European/global requirements. In addition, the qualification team puts the product through its paces, essentially trying to find issues with it, so that it will be a reliable, robust sensor when out in the field. Any issues found are rectified prior to product release, even if that means a redesign.

The MicronNav 200 was also taken out for open-water testing on a number of occasions. Three key tests were conducted. The first involved mounting the new Micron Battery Modem on an ROV and using the MicronNav 200 to track the ROV across a quarry. The test brought up an issue with the mounting of the Micron Battery Modem, which resulted in a redesign of the mount. This also brought about questions regarding how the modem would be mounted on a diver, which was addressed during diver trials focused on Tritech's Diver Mounted Display (DMD).

The third key test took place on Lake Windermere in England in September 2022. The focus was on the tracking ability of the MicronNav 200 in true-to-life conditions. Three Micron Battery Modems were attached to buoys and dropped in a circle with 10-m distance between them, at varying depths between 5 and 10 m. The boat, with the dunking transducer head hung off the front, was then sailed over a distance of 1,000 m toward the modems, and the journey was tracked up to 1-m radius. The data from each modem were recorded, and the performance of the MicronNav 200 was proven. This test highlighted the importance of qualifying a product in real-life conditions to ensure the full product function can be achieved by users out in the field.

Conclusion

"At Tritech we continue to improve the products that we supply to the market, and the MicronNav 200 is part of that plan," David Bradley, managing director at Tritech, said.

"The product provides more accuracy in terms of navigation based on USBL techniques, and the design provides a much more robust solution for our customers."

"MicronNav 200 builds on the proven MicronNav 100 system, with improvements throughout," Paul McMaster, principal engineer responsible for the MicronNav 200 project at Tritech, said.

"We've spent many days putting the system through its paces out on the lake and each time come back to the factory and made something a little bit better. The end result is a system which is easier to use and offers useful new features like Google Maps integration and the ability to seamlessly interleave data transfer with USBL positioning."

Tritech is a U.K.-based technology company with representatives around the world. Tritech continues to develop new technology and is working to bring novel developments to market in 2022 and beyond. **ST**

Rachel McAlpine has been with Tritech International Ltd. for over three years and is responsible for all marketing activities at the company. She lives and works in Edinburgh, Scotland, and has two degrees from the University of Glasgow.



YOUR "HOMING DEVICE"

SEEKER - Acoustic Directional Receiver

The small and rugged RJE SEEKER is used to assist AUV and ROV operators in tracking underwater beacons and transponders, from 25kHz to 45kHz at full ocean depth.

-500m
-1,000m
-6,000m
-8,000m

RJE

Enabling ROV and AUV operators to track and relocate

RJEINT.COM | 949-727-9399

f **t**

international

Competence Standard for Vessel Remote Control

DNV has introduced the shipping industry's first competence standard for vessel remote control center operators (RCCO). The standard is supported by a new recommended practice that offers a certification scheme for RCCOs. Together, they provide a framework for training, assessing and certifying personnel working in remote control centers that support or manage operations at sea.

The new DNV competence standard for remote control center operators (DNV-ST-0324) and the supporting recommended practice (DNV-RP-0323) were developed in collaboration with Kongsberg Maritime, Wilhelmsen, the University of South-Eastern Norway and the Norwegian Maritime Authority.

Amazon Web Services Recognizes Fugro

Fugro has achieved Amazon Web Services (AWS) Energy Competency status. This designation recognizes that Fugro has demonstrated deep expertise in helping clients leverage AWS cloud technology in complex data systems, such as Fugro's ROAMES, which provides remote asset monitoring and vegetation analysis for Fugro's power utilities clients, to accelerate the transition to a sustainable energy future.

Seabed 2030 Adds Partner

The Nippon Foundation-GEBCO Seabed 2030 project has signed a memorandum of understanding with Map the Gaps. Seabed 2030 is a collaborative project between The Nippon Foundation and GEBCO to inspire the complete mapping of the world's ocean by 2030 and to compile all bathymetric data into the freely available GEBCO Ocean Map. Seabed 2030 is formally endorsed as a Decade Action of the UN Decade of Ocean Science for Sustainable Development.

Green Logistics Offerings for Energy Transition

DSV has a new set of customer offerings called Green Logistics, aimed at accelerating the green transition in global supply chains. The solutions include CO₂ reporting, green supply chain design and optimization, sustainable fuel offerings across all transportation modes and carbon offsetting.

Maritime Data Collection Acquisition

Danelec Marine A/S has signed an agreement to acquire KYMA A.S., a Norway-based specialist in digital ship-performance monitoring. The combined company will be the world's largest maritime data collection solutions provider, with over 10,000 ships using its solutions globally to optimize travel routes and vessel performance, as well as reducing CO₂ emissions.

iXblue Navigation Added to Rental Fleet

Ashtead Technology has added iXblue subsea navigation systems to its rental fleet. Rovins and Rovins Nano inertial navigation systems, as well as Octans attitude

and heading reference systems, are now available to rent throughout the company's nine international technology and service hubs.

Developing Remote Engine-Monitoring Tech

A technology development project called "R&D on Next-Generation Coastal Ships Utilizing Remote Engine-Monitoring Technology" has begun. NYK Group's MTI Co. Ltd., Nabtesco Corp., ClassNK, Nihon Shipyard Co. Ltd. and BEMAC Corp. are participating, in cooperation with NYK Line. The goal is to determine the cause of engine operation failure by utilizing simulators as the core technology and to develop a remote engine-monitoring system that can judge how to recover from failure.

Polar International Search and Rescue Exercise

Bureau Veritas (BV) has participated in the world's first international search and rescue exercise (SAREX) in a remote polar zone. BV tested and certified maritime safety equipment on board the polar exploration vessel *Le Commandant Charcot* during a trial voyage to the North Pole organized by cruise ship operator PONANT.

The SAREX was performed to identify and address the challenges, constraints and opportunities involved in Arctic massive rescue operations (AMRO) in order to support safe navigation in polar waters. The exercise brought together teams from Russia, Greenland, Iceland, Canada, the U.S. and Norway. This international initiative involved academic experts, the ship's officers and crew, and remotely connected teams.

Cybersecurity Partnership

ABSG Consulting Inc. has created a strategic partnership with Nozomi Networks to enhance its comprehensive operational technology (OT) network monitoring and managed services. This joint solution is aimed at organizations within industrial sectors such as oil and gas, power and energy, maritime, chemical, and manufacturing. By combining knowledge and expertise in OT and Internet of Things (IoT) cybersecurity, ABS Consulting and Nozomi will help organizations meet their unique industrial cybersecurity challenges to address the ever-changing threat landscape.

Seed Investment in Open Ocean Robotics

Open Ocean Robotics has completed a \$4 million round of seed financing to advance its solar-powered autonomous USV technology and ocean data analytics platform for maritime monitoring. This includes a \$2.8 million nondilutive investment from Sustainable Development Technology Canada and \$1.2 million from a syndicate of international investors, including Rhiza Capital and Cindicates.

Crowley Aims for Net Zero by 2050

Crowley has committed to net-zero greenhouse gas emissions across all scopes by 2050, pursuing a path aligned with the latest climate science to limit global warming to 1.5° C. To reach this target, Crowley estimates that it will reduce overall emissions by 4.2 million

NEW

Improved Electronics
Low Power Consumption

**Mini Rosette®/CTD Water Sampler
1018 M
with Model 316 or 320 Idronaut CTD**

- Lightweight, small, compact
- Allows operation from a small boat
- Conducting cable or battery-powered
- Programmable timed operations
- Pressure-activated bottle closing (optional)
- Deep & shallow water models available
- Optional Teflon®-coated Water Sampler
- CTD compatible
- Flag Pulse to CTD A/D input



General Oceanics Inc.

1295 N.W. 163 St., Miami, FL 33169
Tel: (305) 621-2882, Fax: (305) 621-1710
E-mail: Sales@GeneralOceanics.com
<http://www.GeneralOceanics.com>

metric tons of greenhouse gases per year, or the equivalent of removing more than 900,000 cars from the road every year.

Crowley is creating partnerships across the industry with government and nongovernmental organizations to collaboratively achieve decarbonization and climate action. These include the Blue Sky Maritime Coalition, which is focused on the North American maritime value chain, and the World Shipping Council, focusing on the global container shipping industry.

Underwater Laser Scanner for 3D Metrology

Thomas Myers, Duke 3D Metrology manager, and Brad Medlin, Duke 3D Metrology design engineer, were assigned the difficult task of creating an accurate 3D model of pressurized water reactor (PWR) head thermal sleeves. Previously hindered by inaccurate historical as-built information, PWR reactor head thermal sleeves have experienced failure modes that have prompted utilities to take mitigating actions.

Utilizing Newton's NM200UW Laser Scanner, accuracies up to 0.005 in. can be realized. Medlin engineered a special fixture to position the NM200UW under the reactor head for laser scanning. The thermal sleeve laser scans produced an accurate 3D CAD model.

Jamaica Remains on IMO Council

Jamaica has affirmed its commitment to the marine environment and blue economy as it was re-elected to Category C of the Council of the International Maritime Organization (IMO) through 2023. The council approves the work of various committees, proposes the budget, appoints the secretary general for the assembly's approval and makes policy recommendations, including the IMO's strategic plan.

Small Business Award for Art Anderson

Art Anderson, a Bremerton, Washington-based multidisciplinary engineering services firm, has been named the Society of American Military Engineers (SAME) Small Business Award recipient for 2021 for "outstanding results in support of the Air Force, Army, Coast Guard, and Navy, as well as company support for the professional development of its employees through participation in SAME education and activities."

Art Anderson has supported federal, state and local governments for over 60 years. Starting as a naval architecture and marine engineering firm supporting projects at Puget Sound Naval Shipyard in Bremerton, the company has grown to include facilities engineering, construction management and marine research activities.

Aqua Survey Expands Vibracoring Fleet

Aqua Survey is expanding its fleet of dedicated sediment vibracoring vessels from six to nine. Three 24-ft.-long pontoon vessels are under construction, to be ready in early 2022. The easily trailered vessels will collect sediment electro-vibracores inshore. With Aqua Survey's 11 electro-vibracore systems, they can handle several sediment sampling projects simultaneously. **ST**



UNDERWATER LIFT BAGS
ENGINEERED FROM THE BOTTOM UP!

**The World's Best
Underwater Lift Bags
from 25 lbs. to 50 tons.
Water Load Test Bags to 50 tons.
IMCA Compliant.
ABS Approved.**

INNOVATORS IN BUOYANCY AND ENGINEERED INFLATABLES.

MARK VIORCA • RAPID RECOVERY SYSTEMS • AIRCRAFT LIFTING BAGS
WATER LOAD TEST BAGS • VEHICLE RECOVERY SYSTEMS • CABLE & PIPELINE FLOATS
LIFEBOAT DAVIT TEST KITS • FEND-AIR • INFLAT-A-TANK • PIPE PLUGGERS

P.O. Box 2030, North Kingstown, RI 02852, USA
Tel: +1 401 884 8801 Fax: +1 401 884 8868
www.subsalve.com richard@subsalve.com

Study of Ocean Oxygen During First Mass Extinction

Discovering the root cause of Earth's mass extinctions has long been a hot topic for scientists, as understanding the environmental conditions that led to the elimination of the majority of species in the past could potentially help prevent a similar event from occurring in the future.

A team of scientists from Syracuse University's Department of Earth and Environmental Sciences; the University of California, Berkeley; the University of California, Riverside; Université Bourgogne Franche-Comté; the University of New Mexico; the University of Ottawa; the University of Science and Technology of China; and Stanford University have co-authored a paper in *Nature Geoscience* exploring the Late Ordovician mass extinction (LOME), which is the first, or oldest, of the "big five" (approximately 445 million years ago). Around 85 percent of marine species, most of which lived in shallow oceans near continents, disappeared then.

The researchers investigated the ocean environment before, during and after the extinction to determine how the event was brewed and triggered. The seas were full of biodiversity during the Late Ordovician. Oceans contained some of the first reefs made by animals, but lacked an abundance of vertebrates.

Unlike with rapid mass extinctions, like the Cretaceous-Tertiary extinction event where dinosaurs and other species died off suddenly some 65.5 million years ago, LOME played out over a substantial period of time, with estimates between less than half a million to almost 2 million years.

One of the major debates surrounding LOME is whether lack of oxygen in seawater caused that period's mass extinction. To investigate this question, the team integrated geochemical testing with numerical simulations and computer modeling. Measurements of iodine concentration in carbonate

rocks from that period contributed to important findings about oxygen levels at various ocean depths. The concentration of the element iodine in carbonate rocks serves as an indicator for changes in oceanic oxygen level in Earth's history. The data, combined with computer modeling simulations, suggest that there was no evidence of anoxia strengthening during the extinction event in the shallow-ocean animal habitat where most organisms lived, meaning that climate cooling during the Late Ordovician period combined with additional factors was likely responsible for LOME.

On the other hand, there is evidence that anoxia in deep oceans expanded during that same time, a mystery that cannot be explained by the classic model of ocean oxygen.

Recognizing that climate cooling can also lead to lower oxygen levels in some parts of the ocean is a key takeaway from this study.

While the causes of Late Ordovician extinction have not been fully agreed upon, the team's study rules out changes in oxygenation as a single explanation for this extinction and adds new data favoring temperature change as the extinction mechanism for LOME.

MARACOOS, MARCO Expand Mapping, Research Partnership

Maritime industries, government agencies, researchers and members of the public will have access to improved oceanographic data through a memorandum of understanding signed between the Mid-Atlantic Regional Association Coastal Ocean Observing System (MARACOOS) and Mid-Atlantic Regional Council on the Ocean (MARCO). This formalizes a long-standing partnership between the region's two leading ocean data sharing, mapping and planning organizations.

MARACOOS offers real-time information on ocean and meteorological conditions through its OceansMap (oceansmap.maracoos.org), and MARCO offers map products that support long-term

regional ocean planning through its Mid-Atlantic Ocean Data Portal (portal.midatlanticocean.org). These are free and publicly accessible GIS mapping tools focused on ocean areas and estuaries from Cape Cod to Cape Hatteras.

MARACOOS and MARCO have also committed to continue co-coordinating the Mid-Atlantic Coastal Acidification Network (MACAN), a consortium of public and private sector scientists and industry representatives exploring the implications of increasing acid levels in the region's ocean waters and estuaries and what steps communities and industries can take to prepare and adapt.

Overboard Handling Systems For New MBARI Vessel

MacGregor, part of Cargotec, will deliver a suite of advanced overboard handling systems for the new oceanographic research vessel *David Packard* owned by Monterey Bay Aquarium Research Institute (MBARI). Founded in 1987 by David Packard, MBARI's mission is to advance marine science and technology to understand a changing ocean. The vessel is designed by naval architecture firm Glaston and is currently under construction at Freire Shipyard in Vigo, Spain. Vessel delivery is expected mid-2023.

ReefCloud Wins Award

An Australian Institute of Marine Science (AIMS) innovation that allows the world's coral reef monitoring community to work together in real time to improve reef monitoring and management has been named a Pacific regional winner at the Asia-Pacific Spatial Excellence Awards (APSEA). ReefCloud is an open-access, cloud-based platform co-designed by reef scientists from Pacific island nations that uses machine learning and artificial intelligence to analyze photographs of coral reefs to rapidly extract and share data. It is set to consolidate international coral reef monitoring efforts, inform more timely conservation decision making and improve the long-term resilience of coral reefs around the world. **ST**

SEA TECH
e-NEWS



34 ST | February 2022

Two white, cylindrical industrial fans or blowers are shown side-by-side. They have a ribbed body and circular end caps with visible internal fan blades.

Users of the GTReplicate data replication solution for ships can now make use of SharePoint functional-

ity. This is the first step in providing full cloud storage integration. Users can seamlessly integrate existing operational processes and synchronize data between SharePoint and vessels using GTReplicate, and upload data directly to SharePoint. GTMaritime.

E-Signature Program

OceanSign software will enable participating CSBL members and their clients to complete the Charter Party signature processes instantly and securely. Unlike other established e-signature programs in the market, OceanSign allows users to track and control the whole process in one place. Veracity by DNV and Competitive ShipBrokers Ltd.

Tidal Data

Tidal API platform has expanded coverage for the coastlines of the British Isles and the Republic of Ireland, as well as new tidal data information to support mariners in British and Irish waters. This service is the U.K.'s largest authoritative source of tidal height predictions for standard and secondary tidal level stations. UK Hydrographic Office.

Intelligent Voyage Control



JETsense utilizes autonomous navigation, multi-sensor fusion and computer vision for waterjet vessels. It uses AI and advanced autonomy to perceive the domain and maintain precise control of steering and speed during a voyage, and re-route to avoid traffic and obstacles, while enabling a new level of streaming data to improve on-water operations. Sea Machine Robotics Inc. and HamiltonJet.

Micro-AUV

YUCO is ideal for oceanographic exploration of the continental shelf. It weighs less than 10 kg and is 1 m long. YUCO has up to 10 hr. of au-

tonomy at speeds up to 6 kt., with a depth rating of 300 m. SEABER.

Ballast Water Management

Filterless EcoOne and EcoOne Hybrid have received U.S. Coast Guard (USCG) type approval. The EcoOne BWMS works effectively as a single-step treatment, without a filter, under all operating conditions in brackish and marine waters. Ecochlor Inc.

Ship Management App

PrimeShip-PSC Intelligence improves ship management and PSC performance, free of charge. The app was developed for seafarers to manually input PSC data on their smartphones and convert PSC reports shot with a camera into data using AI-OCR. The app also has a chat function. ClassNK.

Alternative Energy Data Source

Floating Wind Designs of the World provides data, specs and images of all the currently marketed designs. FWD includes designs in current

or planned projects, designs that are commercially available, and designs that are conceptual. There is a free version and a paid version with data in MSExcel. Quest Floating Wind Energy LLC.

USV Profiling Winches

Compact and programmable, these winches enable USV systems to safely deploy and recover instrumentation at specified depths during an operation. Surveys can be carried out in places that are too high risk or inaccessible for crewed vessels. The winches are easily integrated into most USV control systems. They have been successfully proven in the field in Arctic conditions. OSIL.

Configurable Manned Subs

Triton 660/9 and 660/7 AVA feature a free-form acrylic pressure hull and can dive up to 200 m (660 ft.) with up to eight guests, plus a pilot. A 360° panoramic view is available for all occupants. Triton Submarines LLC. **ST**

marinerenewables

Marine Renewables Canada Promotes Tidal, River Energy

In response to the need for more clean electricity to meet net-zero by 2050 targets, Marine Renewables Canada has launched “Our Current Future,” an initiative aimed at providing education about renewable energy from tides and rivers (www.ourcurrentfuture.ca).

As Canada addresses climate change and works to reduce emissions by moving away from using fossil fuels, studies have shown that it will need upward of two to three times the amount of clean electricity currently being generated. While solar, wind and hydro will generate much of that new clean electricity, Canada will need a full sweep of renewable resources, technologies and solutions.

Tidal and river energy technologies offer a clean electricity solution that has been largely untapped.

Unlike dams, which span entire waterways and force water through a turbine, tidal and river stream devices use the natural, passive flow of water. They can be installed, and removed, one by one.

Wing Sail Installation

Tharsis Sea-River Shipping has concluded the installation of two retractable wing sails on its 88-m, 2,364-dwt, diesel-electric general cargo vessel, *MV Tharsis* at the Neptune Shipyard in Hardinxveld-Giesendam, near Rotterdam. The work was undertaken at the same time as the vessel was having its air lubrication system upgraded.

The 3-by-9-m TwinFoil units are supplied by Netherlands-based eConowind, and the units are integrated in a specially designed aluminum Flatrack, from which the folding TwinFoil's can be deployed.

The TwinFoil is a further inno-

vation by eConowind next to their previously designed VentiFoil. The TwinFoil is a wing with a flap principle, similar to those used by aircraft during landing and take-off.

The wind-assist equipment will be carefully monitored and evaluated as part of the Wind Assisted Ship Propulsion project, funded by the Interreg North Sea Europe program, part of the European Regional Development Fund. It brings together universities and wind-assist technology providers with shipowners to research, trial and validate the operational performance of a selection of wind propulsion solutions.

Alliance for US Offshore Wind

ABSG Consulting Inc. and Global Maritime have created an alliance to support the U.S. offshore wind sector. Global Maritime's U.S. subsidiary, American Global Maritime Inc., and ABS Consulting will combine their respective expertise in the maritime market into a comprehensive service offering



BUILT BY INNOVATION

The future won't build itself. But it doesn't need to — because of you. Side-by-side with your peers, you're working hard to break down barriers and forge the future of autonomous systems. Across different sectors, information bridges are built here at AUVSI XPONENTIAL. This is where real-world opportunities and challenges are shared, and the industry learns from our collective success and failure. Together — as a community — we are engineering the future.

REGISTER NOW AT XPONENTIAL.ORG



APRIL 25 - 28 | Orlando, FL
Orange County Convention Center

that supports the offshore wind life cycle, from concept design through decommissioning.

Together, ABS Consulting and Global Maritime have significant records in several fields, including geoscience, asset performance management, marine warranty, risk management and cybersecurity.

Acoustic Monitoring for Celtic Sea Floating Offshore Wind

Marine-i is helping Research Development UK (RDUK) establish a marine acoustic monitoring service for the emerging Celtic Sea Floating Offshore Wind (FLOW) opportunity to aid deployment strategies.

RDUK gathers data from inshore and offshore waters to better understand the effects of increasing human commercial and leisure activity. RDUK uses the LoRaWAN network (long-range, wide-area network), a wireless technology that uses VHF to send data from multiple sensors at sea back to shore, which are then made available on the internet in near real time.

Using LoRaWAN alongside a data buoy, a marine mammal acoustic monitoring network will be developed around the southwest coast and beyond, sending back live cetacean data from coastal and remote offshore locations to improve current data sets and knowledge. This will support work on renewable energy innovation and help improve mitigation and protection of cetaceans.

Marine-i will provide guidance to RDUK by detailing the infrastructure and feasibility of the LoRaWAN marine monitoring network, detailing the key FLOW development areas, and identifying the underlying environmental data and acoustic monitoring needs over the FLOW life cycle.

Equinor, EWP to Grow Offshore Wind in South Korea

Equinor has signed a memorandum of understanding with Korean East-West Power (EWP) to cooperate on 3 GW of offshore wind projects in South Korea.

The South Korean government aims to grow renewables by about

60 GW to 2034, of which 12 GW is targeted for offshore wind by 2030.

TechnipFMC, Orbital Collaborate on Tidal

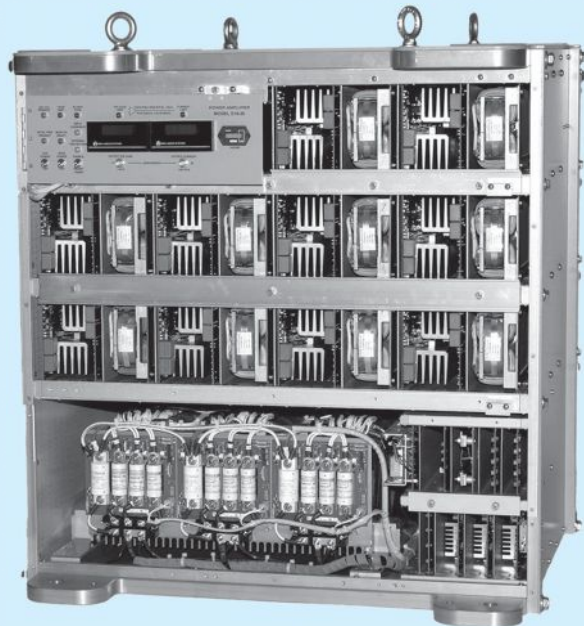
TechnipFMC has signed a memorandum of understanding with Orbital Marine Power to collaborate in tidal energy to accelerate the global commercialization of Orbital's technology and deliver the first commercial-scale floating tidal field.

Orbital's floating turbine can harness underwater currents generated by tides, which can then be converted into electricity and exported to shore.

Because of its predictability, tidal energy offers a reliable and consistent form of renewable energy. Tidal energy has the ability to make a cost-effective contribution to net-zero transitions around the world at utility scale. **ST**

POWER AMPLIFIERS SWITCHING & LINEAR

**For more than 30 years we have been
building amplifiers to drive reactive loads.**



Model S16-20
20kVA continuous; 50kVA 20% duty
35 x 31.5 x 35.5 inches; 985 lbs.

Visit our Web site www.instrumentsinc.com



Instruments, Inc.

7263 Engineer Rd., San Diego, CA 92111-1493
(858) 571-1111 FAX (858) 571-0188 info@instrumentsinc.com
Copyright 2022

DNA Toolkit to Detect Illegal Wildlife Trade

With funding by the nonprofit organization OCEARCH, a new project to detect illegal trade in sharks and other marine and freshwater wildlife provides a vital tool in the global effort to reverse the decline of vulnerable and endangered species. Led by Dr. Diego Cardeñoso of Florida International University and Dr. Demian Chapman of Mote Marine Laboratory, the development and deployment of the “DNA Toolkit” in Latin America, Europe and Southeast Asia is a much-needed breakthrough to combat illegal trafficking in shark, eel, turtle, tuna and other wildlife products.

The goal is to expand the use of this toolkit to other key countries and make in-port DNA testing a daily practice.

The DNA Toolkit uses toaster-size, portable units to conduct DNA testing of wildlife products, with results obtained within a few hours at a fraction of the previous cost of such work—less than a dollar per sample. In each country where this is deployed, inspection officers are trained to use the tool to identify species and incorporate DNA test results into their evidentiary record and prosecutions against wildlife smuggling and illegal trade.

The toolkit has been successfully used in Hong Kong and Peru, where it can often be difficult to identify species of wildlife products by visual inspection alone. With their new funding, the researchers will deploy the units in Colombia, Spain, Guatemala, Belize and Indonesia, countries that face challenges in illegal trade of shark products and other marine and freshwater wildlife.

With an additional grant, two DNA Toolkit units will be deployed in Spain’s two largest fishing ports to fight illegal shark trade and provide for enforcement of the bluefin tuna quota there. Fishers and dealers will not be able to call illegal products by another name.

The OCEARCH-funded component of this project has a one-year

timeline. Results at the end of the year are expected from the deployments in Spain, providing a blueprint for broader implementation of this toolkit in wildlife trade centers around the world.

Support for Ocean Infinity’s Ammonia Propulsion System

Ocean Infinity is a winner of the Clean Maritime Demonstration Competition, enabling the company and its partners to build a marine propulsion test facility with an integrated ammonia marine propulsion system (AMPS). The test facility will demonstrate clean-fueled technology eventually capable of powering Ocean Infinity’s Armada fleet, using an innovative ammonia-based fuel cell system.

Directly targeting key elements of the U.K. Government’s 2050 Clean Maritime Plan, Ocean Infinity and its partners are introducing innovative new technologies and techniques for clean vessel propulsion. This project, due to deliver a zero-emission marine propulsion system, is crucial for developing a robust understanding and, thus, optimization of AMPS, suitable for integration into Ocean Infinity’s Armada fleet and beyond.

MITRE BlueTech Lab Launches

The University of Rhode Island (URI) and MITRE have launched the new MITRE BlueTech Lab, a national resource for advancing undersea testing, innovation and collaboration. It is a state-of-the-art, all-weather maritime test facility.

Along with URI, the founding members are: Northeast BlueTech Science and Engineering Acceleration (BlueSEA) Coalition, MITRE, Woods Hole Oceanographic Institution, MassChallenge, and the Naval Undersea Warfare Center, Division Newport.

MITRE works through public-private partnerships and federally funded research and development in partnership with industry in order to solve problems to enable a safer world.

Parts of Papahānaumokuākea Could Become Sanctuary

NOAA has initiated the process to consider designating the marine portions of Papahānaumokuākea Marine National Monument as a national marine sanctuary. This designation would build on existing management in the marine portions of the monument by adding the conservation benefits and enhanced long-term protection of a national marine sanctuary.

Papahānaumokuākea Marine National Monument is the largest contiguous fully protected conservation area under the U.S. flag, encompassing an area of 582,578 sq. mi. of the Pacific Ocean—an area larger than all the country’s national parks combined. Home to the highly endangered Hawaiian monk seal, threatened green turtles, extensive coral reef habitat and many species found nowhere else on earth, the complex and highly productive marine ecosystems of the monument are significant contributors to the biological diversity of the ocean.

Development of Methanol As Emission-Free Fuel

The Fugro-led consortium MENENS (Methanol as Energy Step Towards Emission-free Dutch Shipping) has been awarded a grant from the Dutch Government’s Rijksdienst voor Ondernemend Nederland (Netherlands Enterprise Agency) for the development of methanol as a low-carbon shipping fuel.

For large-scale introduction of a marine-diesel alternative, methanol is a highly viable option.

The 22 partners in the consortium represent the whole Dutch maritime sector, from equipment suppliers, designers, shipbuilders and shipowners to geodata and survey specialist Fugro.

Fugro’s leading role in the consortium is to safely convert the engine of the *Fugro Pioneer* survey vessel to run emission-free on methanol by the beginning of 2023. Fugro will also contribute to the wider development of the engine technology, energy management, ship design, safety procedures and technology validation of this fuel. **ST**

Over-the-Horizon USV Control

Inmarsat has installed a new connectivity solution using virtualized networks that will establish higher standards for over-the-horizon uncrewed vessel control.

The installation connects the SEA-KIT International USV Maxlimer to the best available network at all times by switching as necessary between Fleet LTE, Global Xpress (GX) and FleetBroadband satellite services when out of range. The combination will set new standards in continuous connectivity to serve a broader range of USV situations and support the next phase of SEA-KIT technology trials, which started in September off the coast of Plymouth, U.K.

The project requires installation of a GX antenna to join an existing FleetBroadband antenna that together will deliver full Fleet Xpress capabilities, plus Fleet LTE hardware for seamless switching between networks on board the 12-m-long autonomous vessel.

In inaccessible areas, USVs can complete tasks faster, more efficiently and with reduced risk to personnel than conventional crewed vessels.

Last year, SEA-KIT took part in a transatlantic survey project co-funded by the European Space Agency to demonstrate the capabilities of current technologies in deep-ocean surveying. In July 2021, the company secured the first Unmanned Marine Systems (UMS) certificate from Lloyd's Register.

AutoNaut Gathers Met Data

A 5-m, zero-carbon uncrewed boat arrived at Penzance, England, after 16 weeks in the Atlantic, where it spent time at the edge of the continental shelf gathering scientific data on surface currents that govern Europe's weather. The expedition proves the robustness of the AutoNaut wave-propulsion system.

Remote operators guided the AutoNaut via satellite from its launch from the Scottish Association for Marine Science (SAMS) at Oban in

Scotland. The AutoNaut made its way out to the Rockall Trough off the Hebrides, carrying out precision transects over moored subsurface arrays of sensors to gather contemporary surface data.

Such surface currents data are vital to the scientific understanding of the subpolar meridional overturning current that governs Europe's weather.

Other data gathered include passive acoustic monitoring (PAM) to listen for whales and dolphins, and water temperature and salinity. The AutoNaut also gathered wave data near two U.K. Met Office buoys moored deep offshore. Eventually, this should provide Met Offices with a zero-carbon option for gathering important weather forecasting data without the need for ships and people at sea.

From the Rockall Trough, the AutoNaut made its way south, crossing the edge of the continental shelf numerous times some 200 mi. off western Ireland to return south of the Isles of Scilly to Penzance.

Innovate UK has funded further work to make the AutoNaut capable of operating in the most extreme environments, such as the Southern Ocean and Arctic, eventually in winter. Significant work has gone into anti-icing technology and hardening the vessel.

This proving trial was in partnership with SAMS and involved international oceanology institutions, including the Irish Marine Institute, the U.K. Met Office and National Oceanography Centre. Data from the operation will be made freely available to partners for analysis.

Partnership for Electromobility

Volvo Penta and Danfoss's Edison division have established a partnership agreement to take the industry's electromobility development to the next level.

The partnership will help both companies to progress sustainable power solutions to deliver the highest quality futureproof technology to customers.

This supports the Volvo Group's commitment to the Science Based Targets initiative, made in May 2020, which laid out the company's next steps in adjusting and future-proofing in line with the ambitions of the Paris Climate Agreement. Meanwhile, Danfoss is currently on an ambitious journey to become CO₂ neutral in all of its global operations by 2030.

By leveraging their combined strengths, the two companies will work to optimize offerings to provide electromobility solutions for the marine industry. By cooperating on research and development activities, they will rapidly deliver robust, reliable and efficient electrification packages to a broader part of the marine commercial market.

In working together from the design phase through to installation, commissioning and aftermarket support, the goal is to secure a seamless experience for the delivery of vessels.

Echandia Opens Hub in UK

Swedish company Echandia, specializing in zero-emission energy solutions for heavy-duty maritime electrification, has opened a business development hub in Aberdeen to serve the U.K. market.

The U.K. market for maritime electrification is growing, with increased demand for maritime battery systems.

Echandia's U.K. hub is headed by former Caterpillar executive Richard Davidson, in the role of business development manager for the U.K. market. He has a background of maritime and heavy-duty technical roles from companies such as Berg Propulsion, Caterpillar and Global Marine Service Group.

The global market for maritime electrification is entering an intense growth phase. A recent DNV report highlights a growth of batteries from 0.3 percent of current ships in operation to 3.85 percent of ships in the orderbook in 2021. This is driven by political ambitions to reduce shipping emissions to net zero by 2050, and the ambition for zero-emission vessels to enter commercial service by 2025. **ST**

contracts

Bureau Veritas Marine & Offshore Singapore (BV M&O) has signed a memorandum of understanding to promote additive manufacturing through initiatives that will support innovation, decarbonization and sustainability in the maritime, offshore, and renewable energy sectors. MolyWorks Materials Corp.

Svitzer, Copenhagen, Denmark, will build the TRAnverse Tug, which will be able to generate higher steering forces than most designs of similar dimensions. The tug will have the ability to push, pull and maneuver in all directions. Robert Allan Ltd. and Sanmar Shipyards.

Kongsberg Digital, Horten, Norway, has secured a renewal of a long-term system support program (LTSSP) contract for another five years. The LTSSP is in support of a K-Sim offshore crane simulation system, which features digital twins of semisubmersible construction vessels, ships and barges. Heerema Marine Contractors.

Strategic Marine, Singapore, has secured a new contract for a 42-m fast crew boat from a repeat client. The vessel will incorporate robust hull engineering designed for tough commercial environments and demanding offshore conditions. Centus Marine Sdn Bhd.

Wärtsilä Voyage, Dublin, Ireland, has entered into a strategic partnership to integrate with Azure IoT Edge to accelerate its efforts toward industrializing IoT for shipping through a highly scalable cyber-secure platform. Microsoft.

Ocean Technologies Group (OTG), Bergen, Norway, has signed an agreement for the Ocean Learning Platform to provide interactive maritime learning solutions and competence management and crew assessment tools. Marlow Navigation.

TechnipFMC, Newcastle, U.K., through Gulf Automation Services

and Oilfield Supplies LLC, has been awarded a 10-year framework agreement for wellheads, trees and associated services. TechnipFMC will further grow in-country talent and expand existing manufacturing, assembly and test capabilities in Abu Dhabi in order to deliver the company's complete portfolio of surface wellheads and trees locally. Abu Dhabi National Oil Co. **ST**

meetings

Note: The coronavirus (COVID-19) pandemic could affect event dates. Check event websites for the latest updates.

MARCH

March 1-3—The Economist World Ocean Summit, Lisbon, Portugal. <https://events.economist.com/world-ocean-summit>.

March 1-3—Floating Wind Solutions, Houston, Texas. <https://floatingsolutions.com/fws-22>.

March 15-17—Oceanology International, London, U.K. www.oceanologyinternational.com/london/en-gb.html.

March 18-19—Blue Economy Summit, Durham, North Carolina. brittany.tholan@duke.edu or <https://sites.duke.edu/oceansatduke/blue-economy-summit>.

March 28-31—HYPACK 2022, Long Beach, California. <https://support.hypack.com/hypack/2022/default.aspx>.

APRIL

April 4-7—Nor-Shipping, Oslo, Norway. +47 932 56387, sn@nor-shipping.com or www.nor-shipping.com.

April 12-14—MCEDD Deepwater Development, London, U.K. 713-520-4470, Sara.Wilkins@GulfEnergyInfo.com or <https://mcedd.com>.

April 12-14—Tech Surge: Florida Estuary and Coastal Monitoring - Looking Ahead to 2030, Fort

Pierce, Florida. www.mtsociety.org/fl-techsurge.

April 20-22—NOIA Annual Meeting, Washington, D.C. aparkins@noia.org or www.noia.org/noia-2022-annual-meeting.

April 25-28—AUVSI XPONENTIAL, Orlando, Florida. www.xponential.org/xponential2022.

MAY

May 2-5—Offshore Technology Conference, Houston, Texas. www.otcnet.org.

JUNE

June 1-2—Navigate, Turku, Finland. info@navigate.fi or www.navigate.fi.

June 6-9—Canadian Hydrographic Conference (CHC), Gatineau, Canada. chc2022.org.

June 7-9—Undersea Defence Technology (UDT), Rotterdam, Netherlands. www.udt-global.com.

June 19-24—Frontiers in Hydrology Meeting, San Juan, Puerto Rico, and Virtual. www.agu.org/FIHM.

June 21-23—Interspill, Amsterdam, Netherlands. www.interspill.org.

June 27-July 1—UN Ocean Conference, Lisbon, Portugal. <https://www.un.org/en/conferences/ocean2022>.

JULY

July 3-8—International Coral Reef Symposium, Bremen, Germany. www.icrs2022.de.

SEPTEMBER

September 18-23—International Marine Debris Conference, Busan, South Korea. www.7imdc.org.

OCTOBER

October 9-12—Maritime Cyprus, Limassol, Cyprus. <https://maritimecyprus.dms.gov.cy>.

For more industry meetings, visit sea-technology.com/meetings. **ST**

people

Greensea has hired **Deborah Townsend** as program manager. She will lead several newly contracted U.S. Department of Defense programs, as well as Greensea's partnership with Kraken Robotics. She joins Greensea after many years as a senior program manager for HII Technical Solutions. Townsend is a member of the Air National Guard specializing in mobile combat communications and fiber-optic cyber network infrastructure solutions.



Saildrone has brought on **Tom Alexander** as vice president of government relations. Alexander brings nearly two decades of experience in senior roles at the Pentagon, White House and with Congress. Most recently, he served as the associate director of the White House Office of Management and Budget (OMB),

where he managed the federal budget for homeland security and was the principal advisor to the OMB director on issues involving the departments of Transportation, Homeland Security and Justice, and the General Services Administration.

Bill Chilton has joined the International Marine Contractors Association (IMCA) as diving technical adviser. He has 25 years' experience in the commercial diving industry. He was previously at the U.K. Health & Safety Executive (HSE) for 12 years as an offshore diving specialist inspector.

Cliff Lim has rejoined ChartWorld as business development director for Asia. His most recent role was sales director at Wärsilä Voyage. Prior to that, he was sales director of ChartWorld, having joined the company in 2015. Lim will capitalize on the significant advancements in digitalization within the maritime industry for ChartWorld.

Ocean Technologies Group (OTG) has appointed **Ian Hepworth** as chief technology officer (CTO). He is an experienced CTO and senior technology professional, specializing in transformation and growth, with in-depth technical knowledge in software development, infrastructure architecture and program management.

Crowley has awarded cadets **Justin Kern** and **Ryan Tobin** of SUNY Maritime College with its Thomas B. Crowley Sr. Memorial Scholarships in recognition of their success and pursuit of maritime careers. Kern is a senior studying for a bachelor's degree in marine operations. Tobin is a senior pursuing a bachelor's in facilities engineering. Both have a U.S. Coast Guard deck license. **ST**

Did You Miss The Boat?

Didn't get your company listed in the *Sea Technology Buyers Guide/Directory*?

Good news - you're not dead in the water. Act now and your company listing can still be part of the current electronic version of the *Buyers Guide* in our Newcomers section.

Enjoy 24/7 exposure online with direct URL and email linking directly to your website.

Click here to
view the
Sea Technology
Buyers Guide/Directory
2022 edition

SEA TECHNOLOGY

magazine

<https://sea-technology.com/bg-listings>

professional services directory

An effective medium reserved for listing professional and consulting services. Size: 3-3/16" wide x 1" deep, to a maximum depth of 3". Rates: \$95 per one-inch insertion for 1-6 times; \$90 each for 7-12 consecutive times. Payment terms: net 30 days. Discounts: 10% for advance payment for 6 or more insertions without copy change; no agency commissions. No charge for typesetting. Send your electronic file or text and images (300 dpi) to seatechads@sea-technology.com by the 10th of the month preceding insertion month.

Relax.
We can take the pressure.



Subsea Instrumentation Housings and Junction Boxes
Contact us for a FREE Brochure

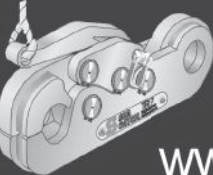
10,000 N. Technology Drive, Fountain Hills, AZ 85268
877-3PREVCO [Toll-Free] 480-837-0100 480-718-7723 [Fax]
noleaks@prevco.com www.prevco.com

SONOTRONICS
MARK YOUR EQUIPMENT



Mark your underwater equipment for later recovery in case of loss. With *close to 50 years* of experience in the manufacture of sonic pingers, hydrophones, and receivers, SONOTRONICS can provide equipment for your underwater tracking needs.

www.sonotronics.com
(520)746-3322



SEA CATCH
TOGGLE RELEASE

McMillan DESIGN, INC.
9816 Jacobsen Lane
Gig Harbor, WA 98332
USA

Tel: 253-858-1985 Fax: 253-858-1986
Email: jmcmillan@seacatch.com

WWW.SEACATCH.COM

GALVANIC TIMED RELEASES

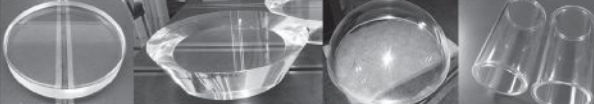
Cost-effective electrochemically degraded links available in durations ranging from one minute to 100 days. Trigger closure mechanisms, open escape panels, release cable support buoys or subsurface instrument locator floats. Stock and custom-designed releases available from:

International Fishing Devices, Inc.
935 Town Hall Ave., Unit 1, Jupiter, FL 33458
Ph: (954) 574-9517

André LaBonté
P.O. Box 60, Waipū, New Zealand 0545
Ph.Fax: 011-64-9-432-0645

underseareleases.com

HYDROSPACE Group
PVHO Windows and Acrylic Pressure Vessels



**Fabrication – Certification – Engineering – Repair
Replacement – Hydrostatic Testing – Custom Design**

Contact: Michael Azer Tel + (909) 989-7773 - pvho@HydrospaceGroup.com
www.HydrospaceGroup.com



Sea Technology magazine
Since 1963, Sea Technology has been the industry's recognized authority in providing information in design, engineering and application of equipment and services in the global ocean community.

Let Sea Technology work for you by providing published editorial content to validate your marketing initiatives.

Electronic Reprints
Digital versions of ST articles in high-resolution PDF format can be posted directly on your company's website.

For additional information, please contact:
Compass Publications, Inc.
T 703.524.3136 • F 703.841.0852 • seatechads@sea-technology.com • sea-technology.com

The Winds Are a Blowin' for Natural Ship Propulsion—Laurent Corbel and Bradley Golden

Laurent Corbel is a serial entrepreneur who grew up in Brittany and moved to New York City in 2004 to start FircoSoft Americas, a software company.

He produces “Hoisting the Sail,” a supply-chain podcast, for Wind Support NYC. Bradley Golden (pictured) is an assistant professor of naval architecture at Webb Institute. He was previously a practicing naval architect, marine engineer and surveyor.



Tuesday, November 16, 2021, was a calm day with fine weather, but all the talk that day was about the wind at a conference hosted by Webb Institute and jointly organized with Wind Support NYC and the Maritime Research Institute Netherlands (MARIN). Representatives from academia and industry came together to discuss the latest developments in wind propulsion for large merchant ships to help reduce the effects the maritime industry has on the global environment.

The idea of the conference was originally conceived by Wind Support NYC, an organization committed to promoting and supporting the decarbonization of the marine transportation sector by using the wind to power ships. Through the weekly podcast “Hoisting the Sail,” the organization raises awareness of the issues facing the maritime industry and solutions being proposed and implemented. These topics are of particular importance to the younger generations who will inherit and, thus, have to deal with these issues for decades and centuries to come, and this is where Webb’s students came into the picture.

Webb Institute is a highly specialized, four-year college in New York that focuses on naval architecture and marine engineering. It was founded by the 19th-century shipbuilder and philanthropist William H. Webb, who recognized that

ships were becoming more complex with the development of new shipbuilding materials and technologies, and that a more formal education was needed to learn how to design and build ships in the most efficient way possible.

From the outset, Webb provided this education to disadvantaged students free of charge, and his generosity and legacy continues in the form of full-tuition scholarships for the approximately 100 students that attend Webb Institute today. In addition to providing a strong foundation in naval architecture and marine engineering, Webb’s faculty strive to incorporate the latest developments impacting the maritime sector in the courses they teach, including such topics as energy efficiency, emissions reduction and the developing methodologies that could make these things possible.

Together, Wind Support NYC and Webb saw the parallels in their missions and agreed to work together to share this information with Webb’s students and the greater community. With the help of contacts at MARIN, one of the largest and most respected marine research facilities in the world, the three organizations teamed up to produce a conference with a focus on natural propulsion in ship design.

The conference was held in person at Webb and broadcast virtually worldwide. Speakers from North America, Central America and Europe presented to the roughly 300 guests who attended from 22 different countries. Topics included: the pathways to zero-emission “green” fuels considered in a “well-to-wake” approach and the challenges inherent to the complex, inefficient production of these low-density fuels; the theories supporting natural propulsion, including hydrodynamics, aerodynamics and performance assessment; wind-assist and wind-propulsion technologies that have been developed and are being

put into practice, including wing sails, wing foils and weather-routing systems; and case studies on wind propulsion to show how these ideas can be used in the real world, including several designs that are in various stages of production and a feasibility study into the effectiveness of large, wind-powered merchant ships.

The event’s highlights included two keynote addresses by prominent members of the maritime industry who have devoted a significant amount of time and effort into wind power. Roger Strevens, VP of global sustainability for Wallenius Wilhelmsen, spoke about his company’s approach to decarbonization and some of the options they’ve considered. Strevens described his company’s latest project, the *Orcelle Wind*, a 220-m-long ship that can carry up to 7,000 private automobiles at speeds of 10 to 12 kt. using only wind power. Delivery of the first vessel could come as early as 2025.

Danielle Doggett, CEO of Sailcargo Inc., also addressed the attendees by describing the company she founded, whose mission is to deliver cargo in a zero-carbon environment. Starting off sailing tall ships in Canada, Doggett quickly developed a strong connection with the sea, which has taken her to the mangrove forests of Costa Rica, where she built her own shipyard and is currently constructing the first of two cargo sailing vessels that have already been contracted to carry cargo worldwide.

It was inspirational to hear about the numerous projects underway in the maritime industry to help tackle the climate challenges our world faces today. It was also equally rewarding to see the large turnout, both in person and online, which signifies the growing winds of change and support for decarbonization in shipping. Future generations are relying on it. **ST**

february advertiser index

AUVSI XPONENTIAL	36
www.xponential.org	
BIRNS, Inc.	13
www.birns.com	
Blueprint Subsea.....	19
www.blueprintsubsea.com	
EvoLogics GmbH.....	45
www.evologics.de	
General Oceanics, Inc.	32
www.generaloceanics.com	
*Instruments, Inc.	37
www.instrumentsinc.com	
Pinnacle Marine Corporation.....	22
www.pinnaclemarine.com	
RBR Ltd.	3
www.rbr-global.com	
RJE International, Inc.	30
www.rjeint.com	
Sea & Sun Technology	5
www.sea-sun-tech.com	
SubConn.....	17
www.macartney.com	
SubCtech GmbH	30
www.subCtech.com	
*Subsalve USA Division	32
www.subsalve.com	
Teledyne Geospatial	25
www.teledynegeospatial/cariscollect	
R.M. Young Company	22
www.youngusa.com	

*For more information, consult the digital 2022 *Sea Technology Buyers Guide/Directory*:
<https://lsc-pagepro.mydigitalpublication.com/publication/?i=736936>

MISSION STATEMENT

Sea Technology is the worldwide information leader for marine business, science & engineering. Our goal is to provide our global audience with current information on the various segments of the worldwide marine/ocean industry through state-of-the-art and application articles, news columns, and staff reports; and to provide our advertisers with a cost-effective, valuable, and useful vehicle by which to promote their products and services.

For permission to photocopy portions of *Sea Technology*, please contact the Copyright Clearance Center • 222 Rosewood Dr. • Danvers, MA 01923 • Phone (978) 750-8400 • FAX (978) 750-4470

Sea Technology news magazine, including Underwater Engineering, UnderSea Technology, Oceanology International Offshore Technology, and its website, is edited for executives, scientists, engineering and technical personnel in industry, government, and education engaged in the field of undersea defense, oceanography, anti-submarine warfare, marine sciences, underwater exploration, diving and construction, drilling, and mining. While effort is made to verify material published, opinions of authors are not necessarily those of the publisher, and the publication accepts no responsibility in connection with any liability that might occur as a result of published material.

SEA TECHNOLOGY

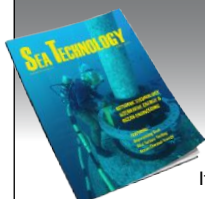
Available free of charge to qualified individuals (those involved in the marine industry) – in digital format.

www.sea-technology.com/subscribe-free

Also available, at no charge: our bi-weekly e-newsletter, *Sea Tech e-News*. Sign up here:

<https://sea-technology.com/enews>

If you prefer a more personal touch, please contact us at +703 524 3136 or seatechads@sea-technology.com.





Evo
Logics®

SMART SUBSEA SOLUTIONS

Delivering data in most adverse conditions: underwater acoustic modems with advanced communication technology and networking

Accurate USBL and LBL positioning of underwater assets

Modem emulator and other cost-saving developer tools

Autonomous surface vehicle for bathymetry, monitoring, search & rescue, and AUV support



Meet us at

**OCEANOLOGY
INTERNATIONAL 2022!**

15 - 17 March
London, ExCel

STAND C251