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DIGITAL PATH

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Digitalization.

A simple word, perhaps overused, with as many meanings as there are people. While saying 'digitalization' is the path toward efficiency and profitability may be trite, there is a core and fundamental truth to the notion that embracing and properly deploying advanced digital solutions across operations offers real potential for efficiencies that can impact the bottom line.

This edition is filled with content exploring the possibilities that digital solutions unlock. Recently I had the opportunity to connect with a pair of executives from Seequent to discuss a very specific problem – unexploded ordnance (UXO) and other explosive remnants of war (ERW) sitting on, or buried just beneath, the seabed – millions of targets that could potentially end a project or end a life. Seequent's answer is its UXO Marine module within Oasis montaj—built as part of a modular, end-to-end geophysics workflow.

Another tech in focus this month is from Tonics and is literally pushing the limits of directional drilling with high-performance digital MEMS inertial sensors, providing downhole well intelligence real time – Measurement While Drilling (MWD) that is designed to provide accurate real-time data to guarantee the borehole trajectory follows the predetermined path.

Our cover feature this month from our Norway-based correspondent Josefine Spiro takes a deep dive into a technology that celebrates its 20th anniversary this year, the development and delivery of the Ulstein X-BOW. Spiro sat with Chair of the Board Tore Ulstein for a behind the scenes review of the story behind that revolutionary hull, a design and advanced marine and offshore energy solution that all began with a simple question: "What does the bow actually look like that?"

Check out the 2026 Media Kit via the QR Code Below

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JY Chew is the Head of APAC Upstream Research at Welligence Energy Analytics, with over 21 years of experience in the upstream and energy industry. Prior to Welligence, JY held the position of Vice President at Rystad Energy, where he managed a research team covering Asia's renewables and energy transition journey. He also served as a Senior Petroleum Economist at Wood Mackenzie, where he was a subject matter expert and led the upstream valuation products for Asia-Pacific.

Cameron Dreyer, based in Houston, Texas, serves as the Oil & Gas Industry Manager at igus®. A Texas State University graduate, he focuses on advancing reliable, efficient solutions for offshore and oil & gas applications.

Cinnamon Edralin is Americas Research Director for RigLogix and has been covering the offshore rig market since 2006. She began her career with ODS-Petrodata, which was acquired by IHS (later becoming IHS Markit), where she managed the Americas offshore rig team, along with the Americas marine team and the US/Canada land rig team. Cinnamon then moved to Esgian, where she helped raise brand awareness for offshore rig services, along with supporting offshore wind. She joined Westwood in 2023 and provides support for the subsea team in addition to her rig analyst duties. Cinnamon holds a BA in Liberal Arts from the University of St. Thomas in Houston, Texas.

Sofia Forestieri is a Senior Analyst at Esgian, specializing in offshore rig market analysis, energy economics, and sustainability. She has global experience in field operations and analytics.

Pierre Gazull is Product Marketing Manager for High-Performance MEMS inertial sensors at Tronics Microsystems, a TDK Group Company. Since 2021, he oversees the implementation of Tronics's product strategy towards key markets, customers and applications. Pierre started his career in the semiconductor industry at STMicroelectronics in 2006, where he held several positions in hardware IC design and technology R&D. He transitioned to product marketing and business development by joining Dolphin Design in 2018, where he managed a portfolio of semiconductor IP for ultra-low power chips designed in advanced silicon technology nodes. Pierre graduated in 2006 with a master's degree in electronics and microelectronics from ESIEE Paris. In 2015, he received an executive master's degree in management of technology and innovation from Grenoble Ecole de Management.

Markus Kraess has been a product manager at Altech Corporation in New Jersey for over 15 years. He has a Dipl.-Ing. in Electrical Engineering.

Wendy Laursen has 20 years of experience as a journalist. In that time, she has written news and features for a range of maritime, engineering and science publications. She has completed a Master of Science research degree in marine ecology as well as diplomas in journalism, communication and subediting.

Philip Lewis is Director Research at Intelatus Global Partners. He has extensive market analysis and strategic planning experience in the global energy, maritime and offshore oil and gas sectors. Intelatus Global Partners has been formed from the merger of International Maritime Associates and World Energy Reports.

Erik Milito is the president of the National Ocean Industries Association (NOIA), representing the interests of the offshore oil, gas, wind, carbon capture, and ocean mineral industries.

Josefine Spiro is an award-winning journalist with nearly 20 years of experience, specializing in feature journalism, business, technology, and innovation. She is based in the heart of the Norwegian maritime cluster.

Michelle Yeo is a Market Analyst at Fearnley Offshore Supply, covering the offshore support vessel market, including both O&G and renewables. Based in Singapore, she focuses on market fundamentals, supply-demand dynamics, and macro drivers shaping the offshore sector, with a focus on the Asia Pacific region. Michelle holds a Bachelor of Science in Maritime Studies from Nanyang Technological University.


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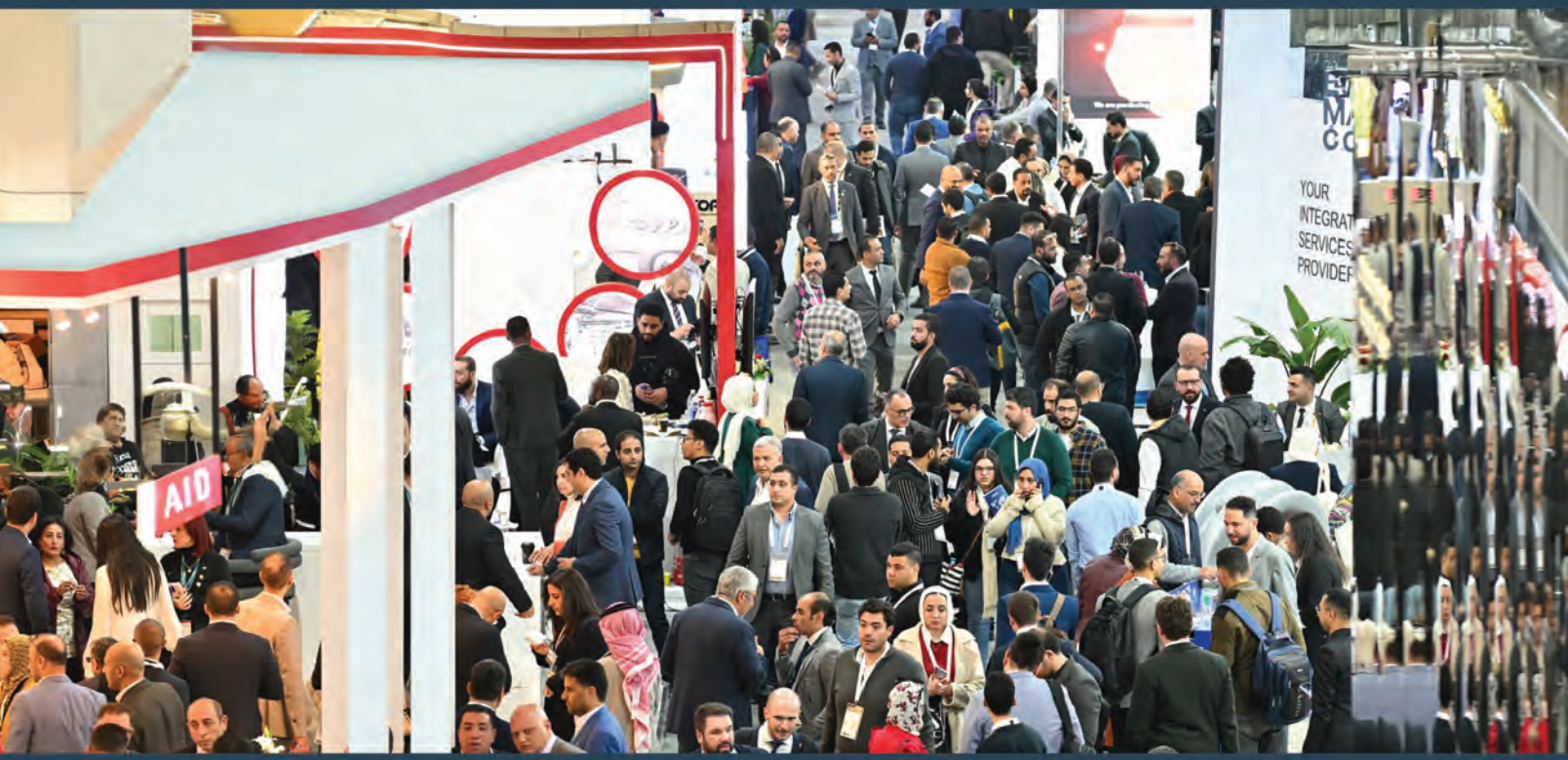

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OPITO meets critical skills demand with new High Voltage qualifications

OPITO's progressive framework delivers industry-recognised training for some of the most vital specialist electrical skills in the energy transition.

As global energy systems diversify and wind power rapidly expands, employers face a growing challenge: a shortage of highly skilled personnel capable of operating, maintaining, and controlling increasingly complex electrical infrastructure driven by rising high-voltage requirements.

To bridge this gap, OPITO, the global, not-for-profit skills body, has launched a suite of High Voltage qualifications to set clear, industry-recognized training certificates and offer a progressive learning framework for these critical skills.

The skills gap holding back high voltage capability

OPITO's decision to develop High Voltage qualifications was driven by clear changes unfolding across the energy sector. Growing electricity demand and the shift towards high-capacity, higher-voltage networks mean engineers are now required to work with greater electrical loads – and more complex switching operations – than ever before.

As the operating environment becomes more demanding, employers are competing for a limited pool of experi-

enced high voltage personnel for a range of specialist roles, such as Senior Authorised Persons and Control Engineers

This skill pressure for these specialised roles has been intensified even further by the lack of an industry accepted qualifications. Without this, experienced personnel often have to repeat training or complete customised solutions when moving between organizations. This limits the mobility of the workforce and increases costs for employers.

Together, these challenges highlighted the need for an industry recognised and globally applicable qualification framework that allows personnel to transfer easily between organizations and OEMs for these specialised roles.

In response, OPITO has collaborated with industry experts to develop a standardized, industry recognised and globally applicable suite of High Voltage qualifications that will build the electrical expertise required to support the energy transition for decades to come.

OPITO's High Voltage qualifications: what employers and learners can expect

OPITO's High Voltage qualifications are designed as a structured learning programme for developing specialist high-voltage competence.

With each qualification representing around 280 guided learning hours, all learners begin with the High Voltage Training Certificate. Depending on their role, they then progress to either the Advanced Training Certificate or the Control Engineer Training Certificate.

"As learners move through the qualifications, the scenarios they face become progressively more complex", explains Lucie Booth, Product Development Manager at OPITO.

"They start with core tasks such as performing isolations, interfacing with network operations, and applying switching programmes, that involve a single turbine on a wind farm before advancing into deeper planning, coordination, and decision-making activities, that involve interfacing with the network operator."

OPITO's High Voltage qualifications sit at SCQF (Scottish Credits and Qualifications Framework) Levels 7 and 8, matching the complexity of advanced technical programmes. They're ideal for experienced electrical technicians ready to move into high-voltage specialist positions.

Creating a standardized, industry-led framework for high voltage competence

Combining a consistent technical foundation with industry-led design, OPITO's High Voltage qualifications offer a progressive framework to support technicians, employers, and the wider energy transition.

The qualifications – informed by foresight work from ORE Catapult and developed collaboratively with a consortium of industry experts and employers – all share the same consistent technical foundation:

- Underpinned by the European Standard EN 50110 for the operation of electrical installations
- Aligned with the Safety, Health & Environment (SHE) standard from the Energy Networks Association (ENA)
- Formal SCQF credit rating to give learners recognized credit points that remain with them throughout their careers and support their lifelong learning journey.

While each certificate stands alone, the qualifications build progressively from authorised person through to senior authorised person through to control engineer.

The result is an internationally aligned framework developed with industry, for industry, and grounded in real operational needs.

"These qualifications address the specific skills shortage in specialised high voltage operations.," says Booth. "They align the industry around a consistent approach and support the wider need for a skilled high voltage workforce, particularly within the wind sector for the specialist roles identified".

A future-ready benchmark for building high voltage capability

With the launch of High Voltage qualifications, OPITO is providing employers with something the energy transition truly needs: a globally applicable, industry-recognized high voltage specialist pathway.

For experienced technicians, the qualifications offer transformative career progression into some of the most technically demanding roles in the energy sector.

And for the industry, OPITO's progressive framework marks a significant step toward the safe, consistent, and scalable high voltage capability required to power the energy systems of the future.

Looking ahead, OPITO remains committed to diversifying its offerings as global safety-critical systems evolve.

"OPITO will continue to support the future of the energy transition with industry-recognized qualifications and standards that ensure the workforce is ready for the challenges ahead," says Booth.

To learn more, please visit **www.opito.com**.

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PUSHING THE LIMITS OF DIRECTIONAL DRILLING WITH HIGH-PERFORMANCE DIGITAL MEMS INERTIAL SENSORS

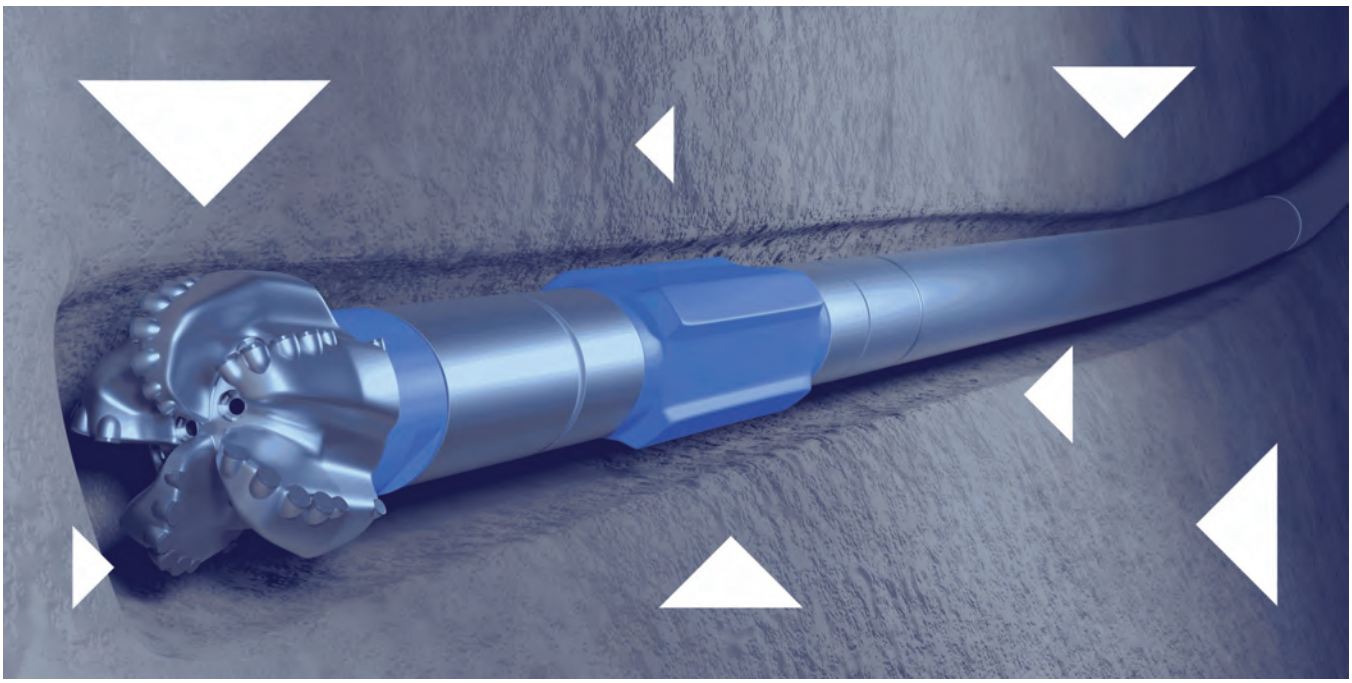
By Pierre Gazull, Product Marketing Manager for High-Performance MEMS inertial sensors at Tronics Microsystems

Directional drilling goes unconventional

After decades of exploiting conventional oil reservoirs, complex and unconventional complex wells have become the new standard in the energy landscape, calling for downhole well intelligence and advanced drilling technologies that can meet the accuracy and productivity requirements of energy operators.

Deep oil reservoirs dispersed over large areas that had remained inaccessible can now be reached using techniques such as Measurement While Drilling (MWD) that provide extremely accurate real-time data to guarantee the borehole trajectory follows the predetermined path.

An MWD tool is made of a directional module, a telemetry system for data transmission, as well as a battery pack. It is located close to the drill bit to determine its position and attitude. The directional module embeds a set of electronics devices and sensors to measure the two key parameters needed for precision tool guidance: **inclination**, which is the angle formed between its sensitive axis and the vertical gravitational force, and **azimuth**, the angular distance with respect to the geographic or magnetic north pole.



Inertial sensors, the heart of downhole navigation

Analog quartz accelerometers have been considered as the gold standard for measuring inclination, as they are known to be very accurate with excellent thermal behavior. However, these bulky devices tend to be fragile and may cause field failures that negatively impact the equipment uptime and drastically increase the costs of maintenance.

In addition, their integration into modern digital-centric MWD tools can be a challenge in terms of electronics complexity, with a need to manage data acquisition and analog-to-digital conversion at system-level. Finally, their high price point limits their usage to premium solutions.

Azimuth can be measured with a **magnetometer**, or with a **gyroscope** using a technique called gyro-compassing. Magnetometers act as a compass to determine the heading of a system with respect to the magnetic north. They are currently widely used in directional modules, but their high sensitivity to metallic environments can degrade their performance when used in mineral-rich or magnetically disturbed soils.

Gyro-compassing can be used for azimuth determination with a gyroscope that is accurate enough to sense the rotation of the Earth (only 4 millidegrees per second) and determine the heading of the drilling tool with respect to North. This technique, known as Gyro-While-Drilling (GWD) is implemented with mechanical gyros (spinning wheels architecture) which are insensitive to magnetic environments, at the expense of a high price, high sensitivity to shocks and high failure rate due to their internal moving parts.

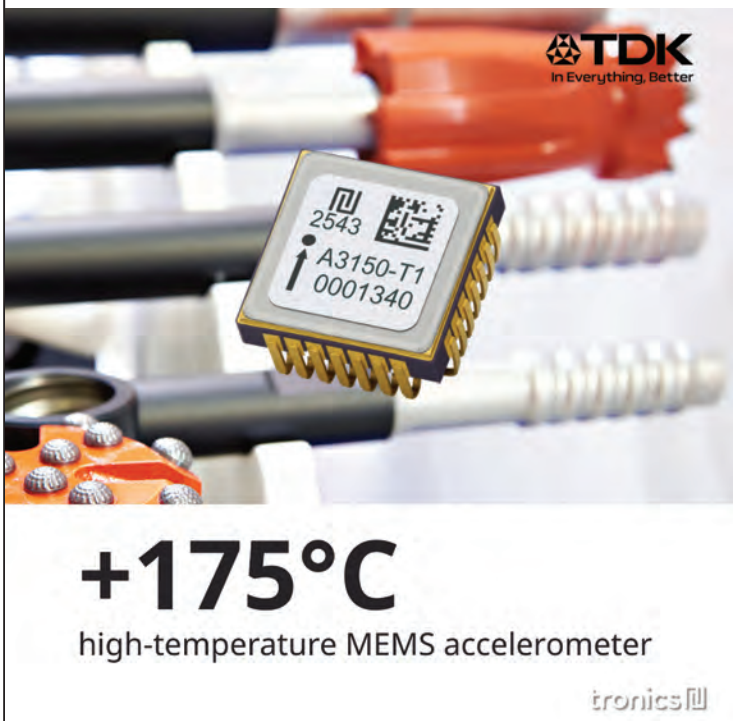
The emergence of MEMS inertial sensors for demanding applications

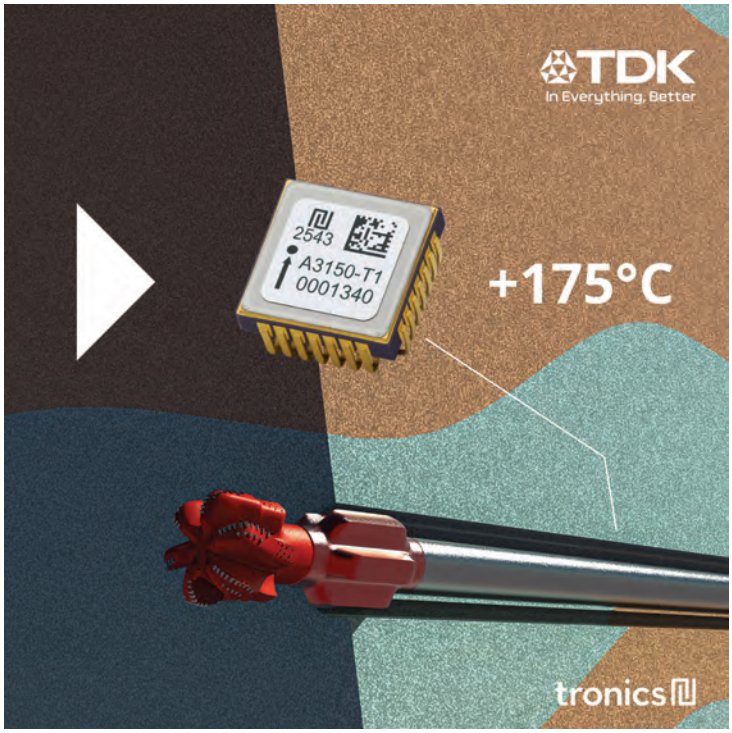
Micro-Electro-Mechanical Systems (MEMS) emerged in the 1980's as a cost-effective approach to overcome the technical limitations and high cost of conventional inertial sensing technologies. MEMS manufacturing leverages large-scale production techniques inherited from the microelectronics industry, which drastically contributes to reducing their unit price. MEMS are known to demonstrate higher reliability, especially when it comes to shocks resistance, and their miniature size and power consumption allow them to get embedded in reduced spaces and battery-operated systems.

In the past decades, MEMS inertial sensors witnessed a tremendous growth in both consumer and industrial markets. Their performance improved year after year, minimizing drifts and improving their stability, to eventually find their way into high-performance Inertial Measurement Units (IMU) used for positioning, navigation, and heading systems in demanding aerial, terrestrial and maritime applications.

Directional drilling with MEMS

In the energy market, MEMS accelerometers have been envisioned as a miniature and cheaper alternative to legacy technologies such as quartz sensors. Providers of drilling equipment started to evaluate MEMS sensors initially qualified for the automotive market, but their performance was too limited to be used extensively in energy applications requiring extreme operating temperatures. The recent emergence of new MEMS sensors qualified for 150°C





and even 175°C changed this paradigm and enabled the creation of MEMS-based directional modules able to operate at extreme temperatures for long period of time.

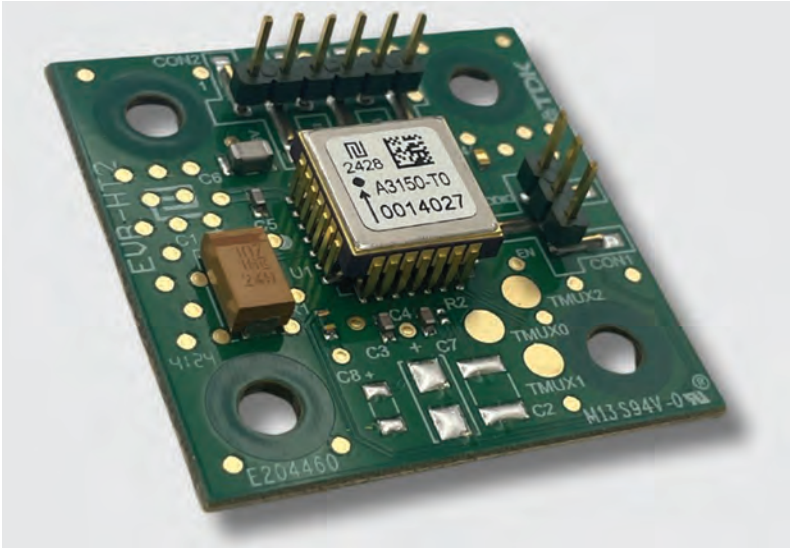
However, most of the high-temperature MEMS accelerometers available on the market tend to demonstrate a highly degraded accuracy under high vibrations and shocks, limiting their usage to static measurement with successive start-and-stop sequences of the drilling motor. In addition, these devices often rely on analog-centric electronics architectures, requiring electronics engineers to handle analog-to-digital conversion at system-level with additional discrete components.

A breakthrough in high-temperature MEMS accelerometers

Tronics Microsystems, a TDK Group company based in France, is recognized as a leading provider of MEMS inertial sensing technologies for precise motion sensing, positioning, navigation and condition monitoring of critical assets in transportation, energy and industrial markets.

The company recently launched AXO315T0 and AXO315T1, a series of high temperature digital MEMS accelerometers for oil and gas applications operating in extreme temperature and vibrations conditions.

Tronics leverages the ingredients that made the success of their AXO product line in demanding aerospace and railway applications: a hermetic ceramic package with excellent thermal and mechanical behavior, a high-stability MEMS sensing element manufactured in its clean room, and a digital electronics architecture.



More specifically, Tronics' accelerometers leverage a unique closed-loop electronics architecture which guarantees a high level of accuracy and linearity, even in the presence of high vibrations and shocks. The bias error caused by operational vibrations is typically 10 times lower than conventional open-loop MEMS accelerometers available on the energy market, enabling true MWD with continuous inclination measurement.

Reliability and cost-effectiveness with no compromise on performance

Tronics ran extensive qualification campaigns on several hundreds of devices to make sure their performance remains stable in severe conditions. This includes aggressive thermal cycling, wide-spectrum vibration tests with amplitude of up to 20 g rms at high temperature, start-up tests in cold and hot conditions to ensure the sensors can be triggered at any time, as well as accelerated aging at high temperatures to guarantee an operating lifetime of more than 1000 hours up to +175°C.

The miniature ceramic package of AXO351T0 and AXO315T1 perfectly fits into applications with constrained form-factors, such as the ones encountered in downhole directional modules with small diameters (typically less than 2 inches). The built-in 24-bit SPI interface removes the need for additional components at system level and helps decrease the bill of materials.

With AXO351T0 and AXO315T1, Tronics Microsystems offer a digital, cost-effective and low-SWaP alternative to high-temperature quartz accelerometers for directional drilling applications, with no compromise on performance.

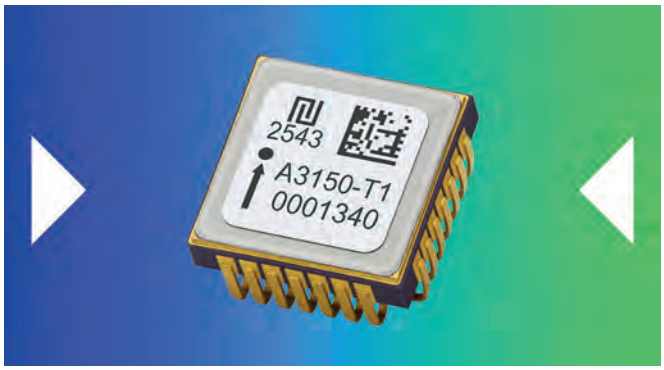
Towards a 100% MEMS-based directional module

Tronics is currently ramping up a new MEMS gyroscope with an extremely high level of resolution, able to sense the rotation of the Earth and determine azimuth with an accuracy of less than 1 degree in only one minute.

This new MEMS gyroscope will start pre-production by mid-2026 and is currently being used by key providers of drilling technologies for prototyping their next generation of directional modules.

Combining the recently announced high temperature MEMS accelerometers with this new ultra-low noise gyroscope into a single system will result in a 100% MEMS-based MWD module, able to eliminate field failures, decrease maintenance and calibration costs, and guarantee first-time drilling success even for the most complex borehole trajectories.

After decades of enabling land, air and sea applications with its MEMS products portfolio, Tronics Microsystems positions itself as a key provider of high-performance MEMS inertial sensors serving the ever-increasing productivity and reliability requirements of the energy market.



THE ASIA PACIFIC OSV MARKET:

DOWNSHIFTING FOR THE LONG HAUL

2025 was a year of recalibration, continuing the softness experienced since the fourth quarter of 2024. Rather than a slowdown, this period can be better described as a collective deep breath as the industry prepares for the next upcycle in the Asian Pacific region.

By Michelle Yeo, Market Analyst at Fearnley Offshore Supply

Compared to 2024, the composite dayrates, calculated as a weighted average across size categories, declined by approximately 16% for PSVs and 14% for AHTS vessels. In tandem, utilization also softened, with the number of working vessels down 19% and 8% respectively, a direct reflection of weaker underlying demand.

Across geographies, this theme was evident as global markets cooled from the momentum of earlier strong years. From the waters of Southeast Asia to the coasts of Australia, the industry pressed pause on some of its largest bets with projects such as North Ganal, Lang Lebah, Dorado, and Browse seeing their final investment decisions pushed back from their initial planned dates. On the surface, these headlines may appear negative, but these deferrals have also helped spread out the investment cycle, creating a more balanced pace for the rest of the decade.

Towards 2028, we expect to see a modest but meaningful uptick in the number of FID announcement, primarily driven by deepwater FPSO developments in Indonesia and Australia. These projects are uniquely positioned to lead the next growth phase, offering compelling returns and longer lifespans, making them a cornerstone of future investment.

This increased focus on deepwater projects will complement the ongoing, essential role of conventional shelf projects – both remaining vital pillars of the global energy mix for decades to come. As new projects gain momentum and deferred developments are eventually revisited, demand is poised to rise. In the near term however, contracting activity will maintain a cautious posture well into mid-2026.

In the medium term, the regional drilling landscape presents a rather nuanced picture. Demand for floating rigs remains on solid ground, supported by ongoing deepwater drilling campaigns across the region that align with the global pivot toward deeper developments. For jack-up rigs, we anticipate a temporary dip before a recovery gathers pace later in 2026 and into 2027.

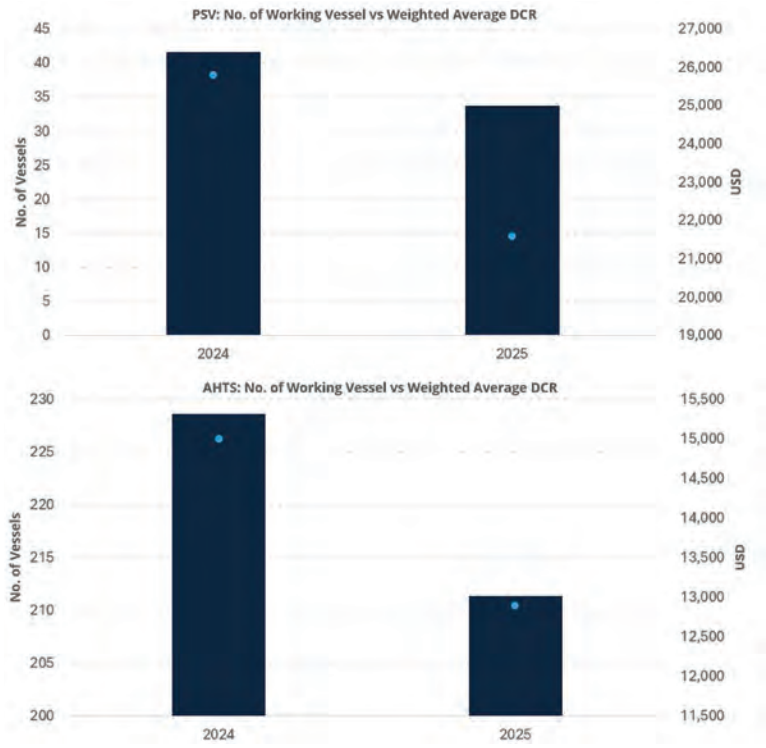
This divergence in the drilling outlook will likely create a clear split in dayrate performance across vessel classes. For instance, dayrates for standard, shelf-oriented PSVs and AHTS, particularly mid-size PSV and smaller AHTS, are expected to remain soft through the first half of 2026. In contrast, demand for high-spec assets such as DP2/3 subsea vessels and large PSVs depends on a more distant catalyst: the firm sanctioning of deepwater FIDs and the revival of previously delayed drilling campaigns.

Critically, neither an FID nor a campaign announcement translates to immediate vessel demand. A typical 12 to 24 months planning and engineering gap follows, during which operators finalize rig contracts, procure long-lead items, and secure specialized support tonnage. Consequently, while the FID and drilling program pipeline is expected to strengthen from late 2026, the tangible uptick in deployment and dayrates for these premium vessels will likely only materialize meaningfully from 2027 onwards, aligning with the first phase of active drilling operations in the field.

Macro Backdrop and Structural Drivers

This market trajectory, characterized by measured growth, regional divergence, and pending FIDs unfolds against the broader economic backdrop. As of early February 2026, Brent crude is averaging in the high USD 60s per barrel. The near-term consensus points to a softer 2026 average, likely settling in the USD 60s as inventories build. Crucially, this price range remains a powerful enabler for offshore projects. Thanks to a decade of efficiency gains and technological advances, breakeven costs have fallen significantly. Conventional shelf projects now average around USD 40 per barrel, while deepwater projects have reached a competitive threshold just below USD 40 – securing a comfortable margin within the current pricing window.

On the supply side, OPEC's spare capacity stands near four million barrels per day at the end of 2025, a slight decline from the previous year. Current projections, including the latest outlook from the US EIA, suggest this buffer could tighten further through 2026 and 2027.



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This gradual reduction naturally raises two questions regarding market stability and supply shocks. First, is a significant price spike likely? The prevailing view suggests it is not. The market appears to have priced in this gradual drawdown, and sufficient non-OPEC supply growth is expected to provide a counterbalance.

Second, could a resurgence of Venezuelan production alter the equation? While the country holds substantial resource potential, the consensus remains skeptical. The significant geopolitical and operational risks under the current administration present a formidable barrier to the rapid, large-scale investment and drilling activity required to materially impact global supply in the near term.

Also, it is worth pointing out that the pivot toward deepwater did not occur in a vacuum. Rather, it is the acceleration of a trend set in motion years ago, with 2023 marking the strongest year for greenfield deepwater sanctions on record, a pattern now firmly taking root across the APAC region. Here, operators are prioritizing "fast-to-market" strategies, where subsea tiebacks lead the way, favoured for their compelling economics and shorter development cycles.

For shipowners, this evolution translates into a clear, phased opportunity. The immediate demand will centre on subsea assets. Over the longer term, this wave of projects will generate sustained demand for vessels supporting the ensuing drilling campaigns and long-term production phases. Crucially, this is not just a story of more vessels but instead the focus is on the shift toward more capable ones. The move into deeper, more remote waters will amplify demand for higher specification units that are engineered to operate reliably in harsher sea conditions.

Regional Divergence and Fleet Discipline

While the broader shift toward deepwater sets the stage, the real-world impacts are playing out differently across Asia Pacific. In the region's largest market, Malaysia, vessel demand is softening, influenced by escalated tensions between Petronas and Petros. This is reflected in Petronas latest outlook, which suggests broadly flat rig and OSV activity year-over-year versus 2025, with potential exploration upside reserved for the 2028 window.

Specifically, Petronas's guidance for jack-up rigs in 2026 has softened to nine units, down from 11 previously projected a year ago and below the 10 rigs used in 2025. This signals a clear directive for owners: budget cautiously, focus on multi-market coverage and be ready to pivot toward other regional market if domestic demand slows.

Beyond emerging growth markets like Indonesia and Vietnam, India cemented its role as a crucial regional stabilizer in 2025, absorbing Southeast Asian tonnage during periods of localized softness to provide a vital outlet for surplus capacity. Vessel moves from Southeast Asia to the Indian Ocean region increased by 73% year-on-year, with PSVs showing the largest proportional increase in response to their sharper demand contraction in Southeast Asia. Together, these markets provide a crucial balancing mechanism for regional vessel supply, mitigating the impact of demand fluctuations in any single country.

Shifting focus to the other side of the equation, the vessel supply outlook points toward a tightening market as we approach the decade's end. The newbuild orderbook, which saw a brief resurgence in 2024, slowed sharply last year as cautious capital retreated amid weaker market sentiment. Demonstrating remarkable discipline, traditional OSV owners have largely avoided speculative ordering. Consequently, net fleet growth will be negligible if positive at all. Factoring in retirements, the effective fleet count is poised for a decline, with only the first wave of 2023–24 orders delivering by year-end and into early 2027.

Compounding this tight supply are local content and cabotage rules in the region, which remain defining structural factors. In practice, contracting is governed by a complex web of local registration, certification categories, and in-country support requirements. These rules can severely narrow the pool of commercially deployable vessels, creating a bottleneck that supports higher dayrates for compliant tonnage even when regional fleet totals appear ample on paper. Consequently, the effective supply is always less than the theoretical supply, leading to tighter conditions and rate support for eligible vessels during concurrent project peaks.

This dynamic creates a precarious long-term balance. The industry's fleet is still largely defined by the last major building boom from 2011-2015. With these assets now aging and some needing replacement, the current low orderbook – a product of post-boom discipline – fails to match that need. While an ideal market would see vessels retired at the same rate new ones are built, the absence of a new construction wave now risks a severe bottleneck later this decade, underpinning a firmer market for shipowners who have the right vessels in the right places.

In summary, 2026 and 2027 are best viewed as a strategic interlude – a time for the industry to recalibrate on the cusp of its next upcycle in the Asian Pacific region. This period of strategic investment and recalibration will pave the way for a recovery that is further amplified by national energy security priorities, unfolding against a backdrop of rising global energy demand and improved market fundamentals.

CASPIAN SEA JACKUP MARKET: LOCKED-IN SUPPLY SHAPES UTILIZATION AND DAYRATES

In one of the smallest offshore drilling regions globally, a limited and locked-in fleet combined with campaign-driven demand continues to shape utilisation and dayrate dynamics. The Caspian Sea jackup market is among the smallest offshore drilling markets worldwide, yet it consistently exhibits some of the sharpest utilisation and dayrate swings. With no external supply response and a small, closed fleet, the market remains structurally tight and highly sensitive to timing.

By Sofia Forestieri, Senior Analyst at Esgian

Unlike larger jackup regions where scale provides greater flexibility, relatively minor changes in supply can have an outsized impact. The availability, reactivation, or retirement of a single rig can materially shift utilisation levels, dayrate negotiations, and contracting dynamics, often with limited visibility.

There are currently five jackups drilling in the region, operating across Turkmenistan, Azerbaijan, and Iran. Several of these units are contracted into 2026 and beyond, which is meaningful in a market of this size.

Despite this coverage, active supply remains constrained. Only two rigs, Satti and Prime Exerter, are currently available, while another unit is expected to roll off contract toward the end of Q1 2026. This leaves little spare capacity to absorb delays or unplanned work, reinforcing the importance of early contracting and campaign alignment. This tight supply environment also explains the high degree of regional rig mobility. Cross-border movements have become a defining feature of the market, reflecting both the absence of redundant capacity and the campaign-based nature of offshore programmes. While this mobility supports utilisation, it also introduces execution risk when projects are delayed, rescheduled, or reprioritised.

Dayrates are driven primarily by how many rigs are available at any given time, rather than broader global trends. Recent contracts have reportedly been fixed with dayrates above $120,000, levels that would be difficult to sustain in larger markets but can still be achievable in the Caspian under certain supply-demand conditions.

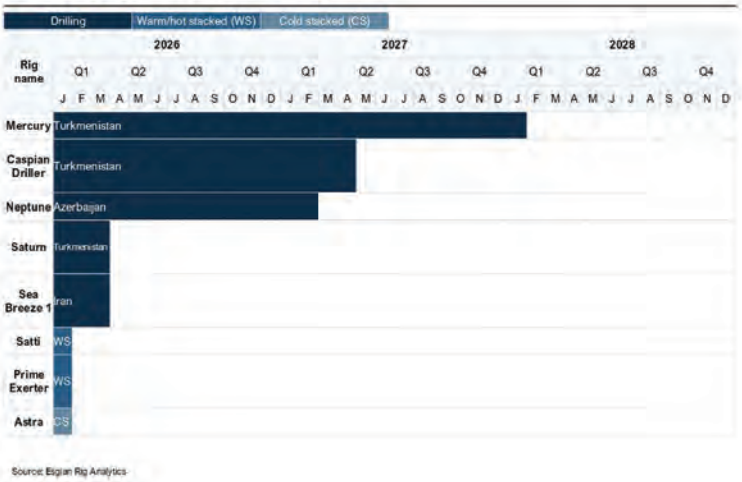
The small fleet size increases pricing volatility. When multiple contracts overlap, competition for a limited number of rigs can rapidly translate into stronger rates. On the other hand, gaps between projects can place downward pressure on pricing, even when longer-term demand remains intact. As a result, dayrates tend to move with individual projects rather than follow a stable long-term trend.

Although the Caspian jackup fleet is small, it reflects broader global trends in asset longevity. Many rigs operating in the region belong to design classes that continue to drill actively worldwide well beyond their original economic assumptions.

Globally, more than 120 jackups in the 400-449 ft IC design class remain active, with minimum working ages approaching 25 years. Comparable 350-374 ft IC and 375-399 ft IC design rigs show even longer operational lifespans, with several units continuing to drill beyond 40 years, and in some cases beyond 50. This suggests that jackups deployed in the Caspian are not constrained by near-term age limits. Instead, continued utilisation is more likely to be

Current jackup demand in the Caspian

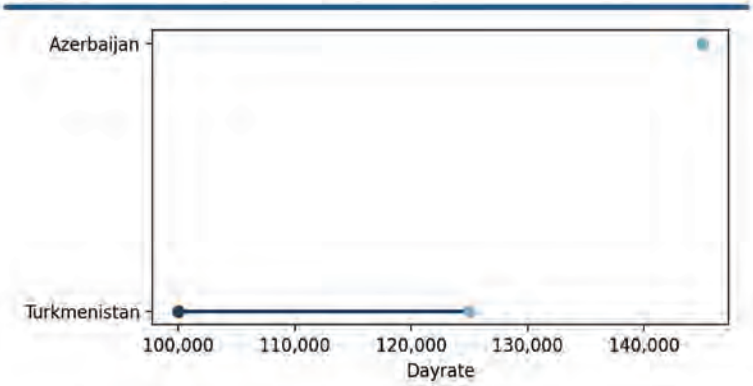
Five out of eight rigs currently drilling across the region



Source: Esgian Rig Analytics

Estimated dayrates for recent contracts

Value in USD



Expected operating life of jackups in the Caspian

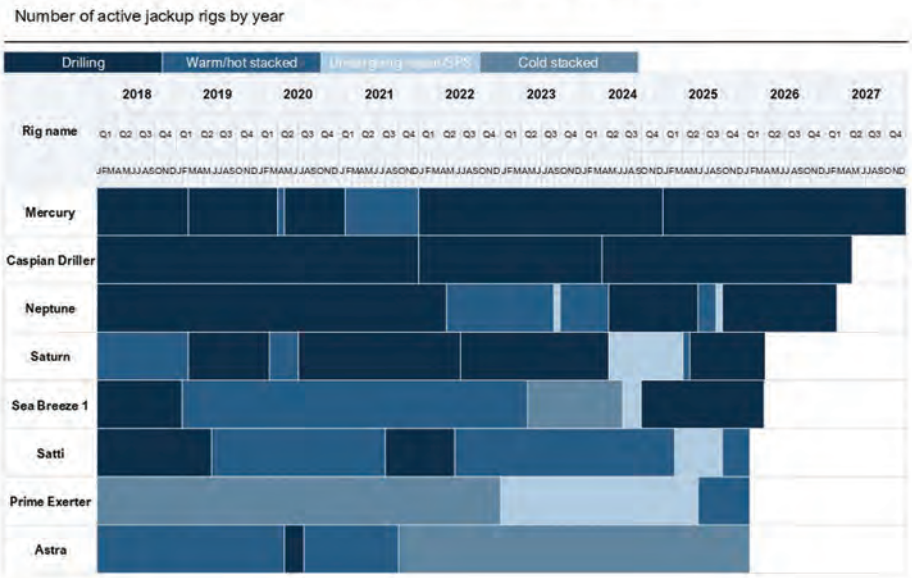
Example of active jackups, similar designs as the Caspian fleet

Rig name	Design Category	Age [yrs]	Year in SVC	Status	Region
Valaris 249	400-449ft IC	24	2002	Drilling	Central America/Caribbean
Valaris 250	400-449ft IC	22.5	2003	Undergoing repair/SPS	Middle East
Al Hail	400-449ft IC	20.4	2005	Drilling	Middle East
HAI YANG SHI YOU 941	400-449ft IC	20	2006	Drilling	Far East
Valaris 107	400-449ft IC	20	2006	Drilling	Oceania
ArabDrill 30	400-449ft IC	19.7	2006	Drilling	Middle East
Al-Khor	400-449ft IC	19.1	2006	Drilling	Middle East
DA ZHOU	400-449ft IC	19.1	2007	Drilling	Far East
PV Drilling I	400-449ft IC	19	2007	Drilling	Southeast Asia
Valaris 108	400-449ft IC	18.8	2007	Drilling	Middle East
Admarine 689	400-449ft IC	18.6	2007	Drilling	Middle East
PV Drilling VIII	400-449ft IC	18.6	2007	Drilling	Southeast Asia
Admarine 337	400-449ft IC	18.4	2007	Drilling	Middle East
Al-Zubarah	400-449ft IC	18	2008	Drilling	Middle East
Shelf Drilling Perseverance	400-449ft IC	18	2008	Drilling	Southeast Asia
Admarine 507	400-449ft IC	17.7	2008	Drilling	Middle East
Discovery I	400-449ft IC	17.4	2008	Drilling	India/Subcontinent
Admarine 694	400-449ft IC	17.3	2008	Drilling	Middle East
Virtue I	400-449ft IC	17.1	2008	Drilling	India/Subcontinent
PV Drilling II	400-449ft IC	17	2009	Drilling	Southeast Asia
PV Drilling III	400-449ft IC	17	2009	Drilling	Southeast Asia
Admarine 88	350-374ft IC	51.3	1974	Drilling	Middle East
TSeven Enya	375-399ft IC	42.2	1983	Drilling	Southeast Asia
Valaris 76	350-374ft IC	26.3	1999	Drilling	Middle East
COSLPower	350-374ft IC	20	2006	Drilling	Middle East
Admarine 693	375-399ft IC	19.8	2006	Drilling	Middle East
Admarine 688	375-399ft IC	19.7	2006	Drilling	Middle East
Courageous	375-399ft IC	18.7	2007	Drilling	Mexico
Admarine 687	375-399ft IC	18.5	2007	Drilling	Middle East
HAI YANG SHI YOU CHAO REN	375-399ft IC	18.5	2007	Drilling	Far East
Shelf Drilling Enterprise	375-399ft IC	18.5	2007	Drilling	Southeast Asia
Defender	350-374ft IC	18.2	2007	Drilling	Mexico
Shelf Drilling Tenacious	375-399ft IC	18.1	2007	Drilling	West Africa

Source: Esgian Rig Analytics

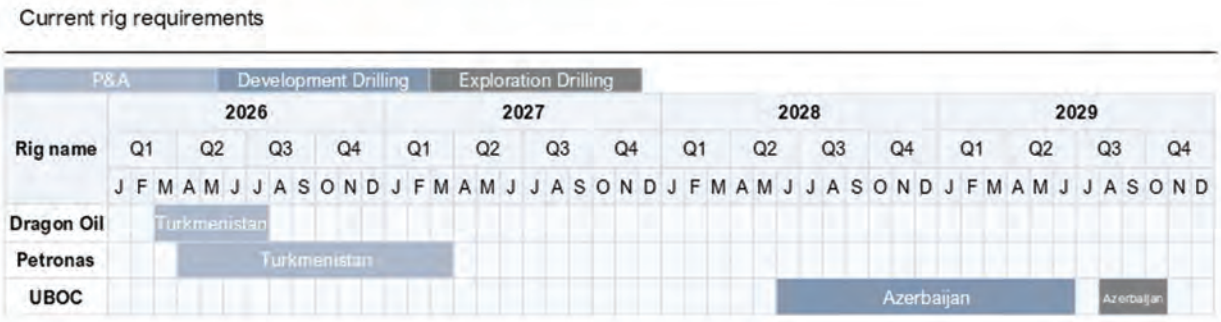
All charts © Esgian

Active jackups in the Caspian since 2018



Source: Esgian Rig Analytics

Potential work in the region



Source: Esgian Rig Analytics

dictated by regulatory compliance, maintenance standards, and access to regional work rather than design life alone. Recent rig upgrades and the reactivation of Prime Exerter following a prolonged idle period reinforce this view.

Earlier drilling in the Russian sector, led by Lukoil, gave way to renewed activity in Azerbaijan in 2021, before shifting toward Turkmenistan in more recent years. Today, demand is concentrated among a small group of operators, including Dragon Oil, UBOC, bp, and Petronas, reinforcing the market's sensitivity to changes in capital allocation and project sequencing.

Caspian Jackup Market to Remain Stable and Structurally Tight

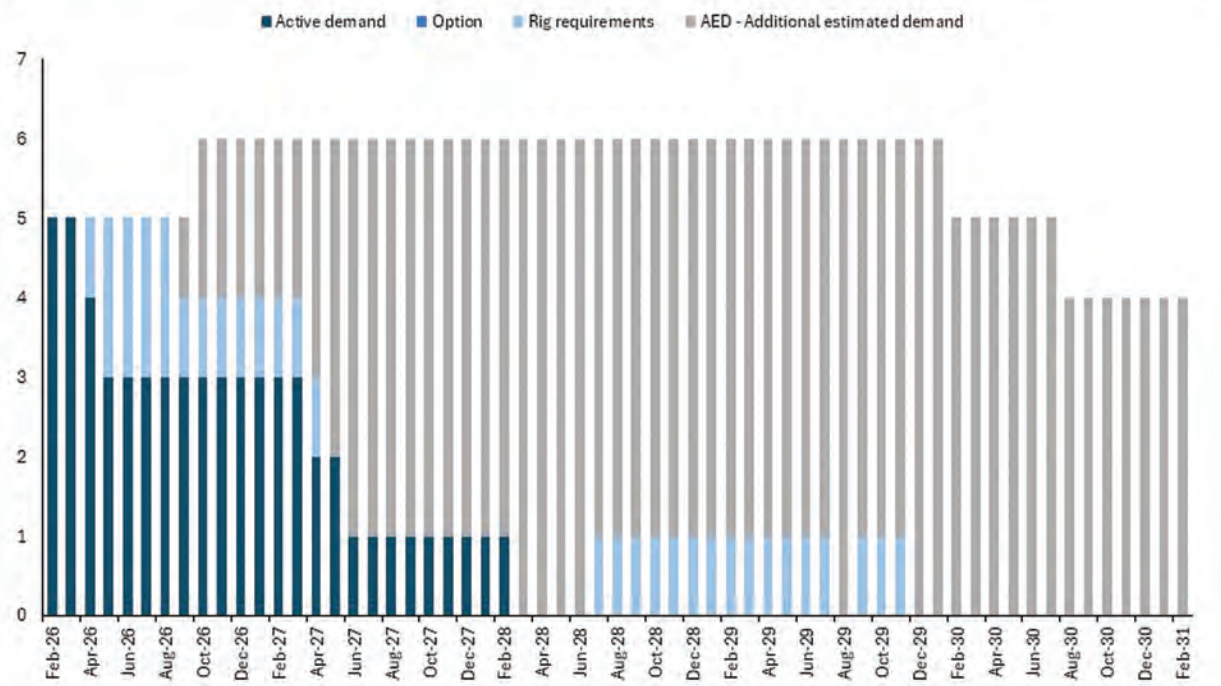
Looking ahead, jackup demand in the Caspian is expected to remain broadly stable at around five to six rigs over the next five years. While this does not point to structural growth, it implies continued high utilisation given the limited size of the regional fleet. Turkmenistan is expected to remain the primary source of demand, supported by ongoing offshore development activity.

Overall, the Caspian jackup market remains structurally tight and highly sensitive to timing. Limited fleet size magnifies both opportunity and risk: overlapping campaigns can shift dayrate negotiations toward contractors, while delays or cancellations can quickly affect utilisation.

In this environment, early planning and flexibility remain critical for operators, while rig owners continue to benefit from disciplined positioning and sustained regional access.

Five-year jackup demand forecast

Y-axis: rig count

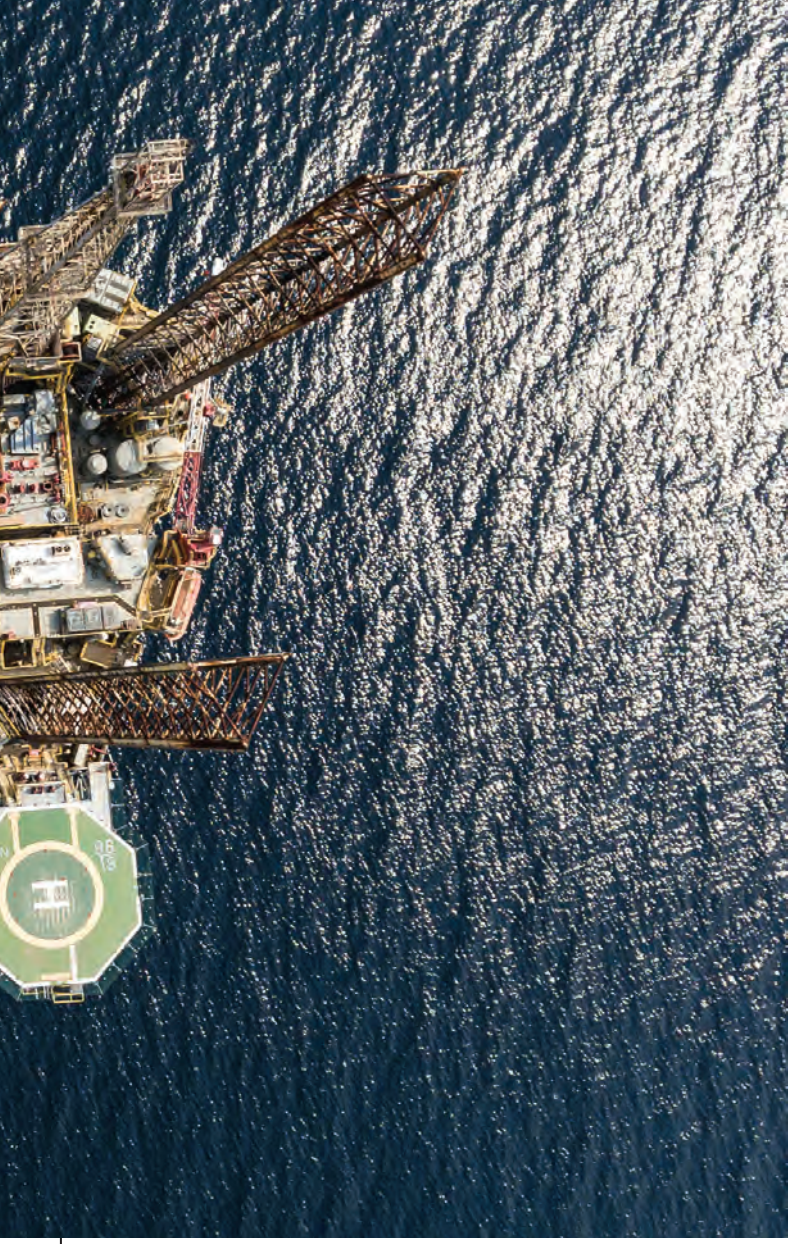


ASIA PACIFIC UPSTREAM 2026:

OFFSHORE PROJECTS RAMP UP AS FRONTIER DRILLING RETURNS

Asia Pacific's upstream sector heads into 2026 with a combination of near-term project delivery and high-impact frontier drilling. A wave of large offshore gas schemes is moving towards FID or first production, just as a new set of wildcats tests unproven deepwater plays. Together, they will shape regional energy security and LNG feedgas availability into the 2030s.

By JY Chew, Head of APAC Upstream Research at Welligence Energy Analytics



After years of investment, flagship oil and gas projects are now approaching start-up, while others vie for FID as governments prioritise domestic oil and gas and LNG supply. In parallel, operators are lining up potential basin-opening wells that could reset the region's resource base.

Indonesia is at the forefront, repositioning offshore gas as a backbone for national energy security rather than purely for export. Mubadala Energy is fast-tracking the 2024 Tangkulo discovery on the South Andaman Block, with FID targeted by mid-2026 and first gas by late-2028. Domestic offtake deals are progressing, aligning the project with Indonesia's drive to cut LNG imports and shore up local supply. The FID target at the Mako gas field on the Duyung Block is also 2026, with gas deliveries to the domestic market in late-2027.

Malaysia is following a similar path, with PETRONAS and ENEOS Xplora advancing the BIGST (Bujang, Inas, Guling, Sepat and Tujoh) cluster offshore Terengganu to deliver first gas to Kerteh by 2029. The project will reinforce Peninsular Malaysia's supply base and support industrial demand as legacy fields decline.

Vietnam's near-term offshore activity is more oil-weighted but still supports the domestic balance. Murphy Oil, with PVEP and SK Earthon, is targeting first oil from the shallow-water Lac Da Vang field (Block 15-1/05) by Q4 2026, using a new CPP and leased FSO. The 100 MMbbl field is expected to peak at 30,000–40,000 boe/d, helping offset Vietnam's liquids decline and could re-energise exploration in the Cuu Long Basin.

Increasing APAC's LNG Supply and Export Optionality

At the same time, project economics still hinge on long-term LNG offtake. New offshore gas developments are being configured to sustain or expand LNG exports.

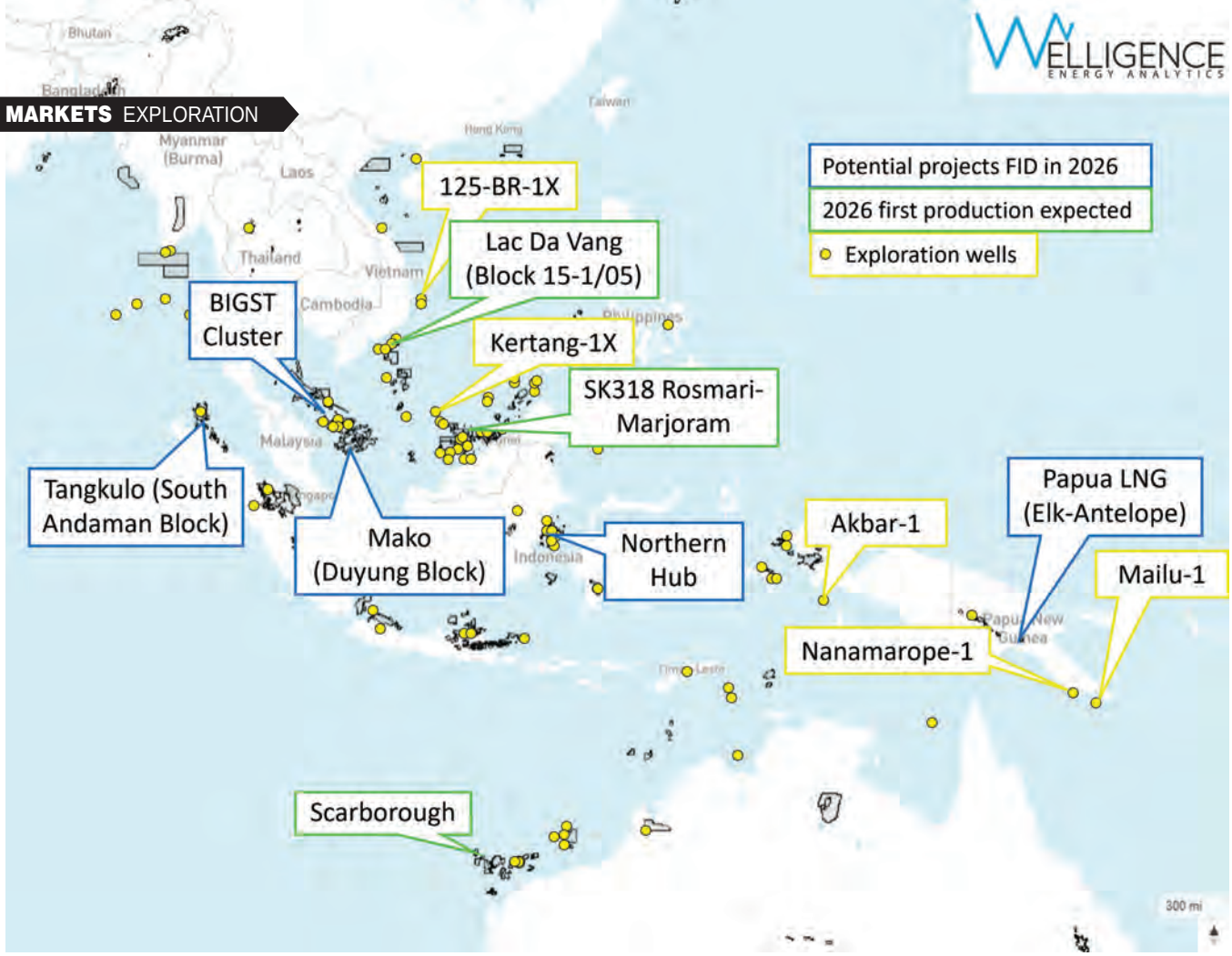
In Indonesia, Eni is developing a large-scale Northern Hub development offshore East Kalimantan, anchored by the deepwater Geng North discovery in the North Ganal PSC and the Gehem field in the Rapak PSC, with a combined resource size of 6.6 Tcf of gas and 400 MMbbl of condensate. A new floating production facility with up to 2 Bcf/d of processing capacity is envisaged, feeding the onshore Santan terminal and supplying both Bontang LNG and domestic gas users.

Offshore Sarawak, Shell and PETRONAS are progressing the c.800 MMcf/d SK318 Rosmari–Marjoram sour-gas project, involving an unmanned wellhead platform, subsea producers and a 207 km pipeline to a new onshore sour-gas plant at Bintulu. The high-CO_2, H_2S-rich reservoir adds execution complexity and could push first production into early-2027, but the volumes are important for sustaining the Bintulu complex's LNG output.

Papua New Guinea's Papua LNG is the next major greenfield LNG project in Asia Pacific. Operated by TotalEnergies with ExxonMobil, Santos and ENEOS Xplora, it targets a 5.6 MMtpa development, producing from the Elk-Antelope fields (6-7 Tcf of gas). FID is targeted this year, with US$3 billion of EPC contracts or more planned, positioning the project as a key Asian LNG supply source.

Offshore Western Australia, Woodside continues to progress its Scarborough gas project. The deepwater field will be developed via a FPU and a 430 km pipeline to shore, providing feedgas to an expanded Pluto LNG complex. At plateau, Scarborough is expected to produce about 8 MMtpa of LNG, with first production targeted for H2 2026.

Across these schemes, the balance between domestic sales and export volumes will be critical. How this trade-



off is managed in Indonesia, Malaysia, Papua New Guinea and Australia will influence LNG contract structures and pricing for years to come.

Deepwater Frontiers: Basin-Opening Wells to Watch

Alongside the near-term projects, exploration momentum is growing, with several deepwater and play-opening wells scheduled for 2026 and beyond. Success at any one of these would have basin-scale implications, materially expanding the region's long-term resource base.

In Papua New Guinea, TotalEnergies and PETRONAS are preparing to drill the giant Mailu prospect in PPL 576 in the Coral Sea at c.2,000 m water depth. A discovery would improve the geological understanding of the broader area, opening a new play and de-risking adjacent clastic prospects. Also nearby in PPL 579, Larus Energy's Nanamarope-1 will test a different play concept but is contingent on securing a partner given the estimated US$100 million cost.

In Malaysia's Block 2A, in the prolific North Luconia Basin, the Kertang-1X well will target Oligocene and Miocene formations in a very large four-way structural closure spanning more than 200 km² in 1,000 m of water. With c.5.2 Tcf of unrisked 2U prospective gas resources, a commercial discovery could underpin a wider deepwater exploration drilling campaign and a new LNG-scale development via the MLNG complex.

Vietnam's planned 125-BR-1X well in Block 125 in the frontier Phu Khanh Basin is another standout opportunity, with unrisked mean prospective resources exceeding 13 bnbbl of oil across identified leads. Pharos Energy has secured a PSC extension to late-2027, but drilling will depend on rig availability and partner alignment.

In Indonesia, the Akbar-1 well in the Bobara Block off West Papua will be the first test of a frontier ultra-deepwater basin, operated by PETRONAS with Pertamina and TotalEnergies. A discovery would open a new play and support domestic production targets.

As 2026 unfolds, the region's upstream narrative will be shaped by both sides of this story: a tangible wave of offshore oil and gas projects shoring up domestic supply and LNG exports, and several frontier wells, each potentially redefining longer-term opportunities.

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FLOATER BACKLOG SHOWING SIGNS OF STRENGTHENING WITH SOUTH AMERICA AT FOREFRONT

After a softer 2025, floater backlog is strengthening for 2026 and beyond, driven by early contracting, strong South American demand, and a growing pipeline of 2027+ programs.

By Cinnamon Edralin, Americas Research Director, Westwood Energy

By the close of 2025, total floating rig backlog days had fallen 25% compared with 2024. This was in large part due to few contract awards coming out of Brazil, the world's biggest user of floating rigs. As of the end of January 2026 however, the number of rig days already booked for this year is up 4% from the 2025 total.

The three rig managers with the biggest increases in contracted days for 2026 versus last year are Turkiye state-owned TPAO, China state-owned China Oilfield Services (COSL) and Well-Safe Solutions, which is based in the UK and primarily competes in the well intervention and workover segments. Each of these three companies already has over 400 more days firmed up for 2026 than they did for 2025.

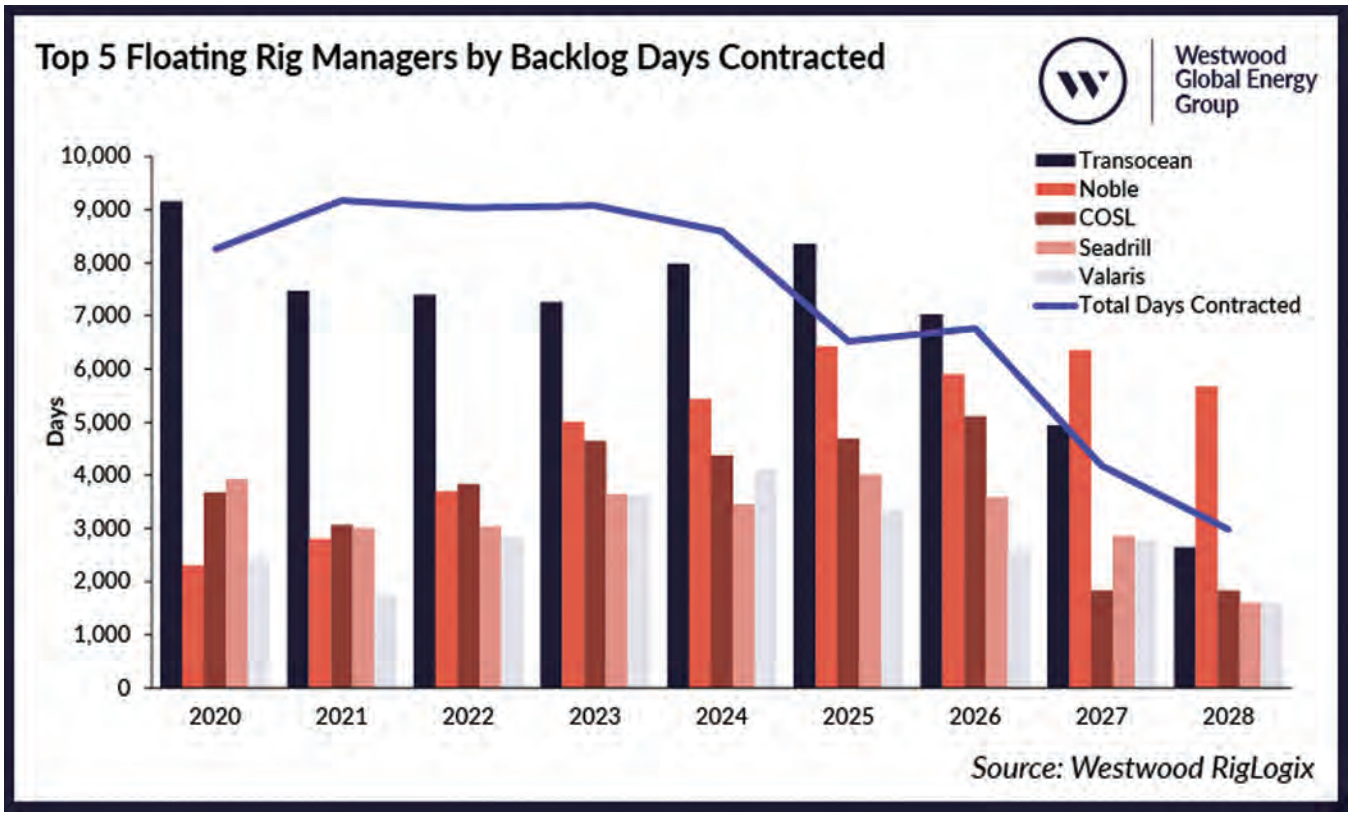
Looking at 2026 backlog by rig manager, Transocean, Noble Corporation, Seadrill and Valaris are the five companies with the most backlog for 2026. Despite a changing marketed fleet size and competitor landscape over the years, Transocean has held the top spot for over two decades. The company currently has a marketed fleet of 23 managed floaters.

However, at present, Noble has the most backlog days booked for 2027 and 2028. Following the September 2024 close of Noble's acquisition of Diamond Offshore, the company currently has a managed marketed floater fleet of 24 rigs. Notably, Noble has over 400 more days booked in 2027 than for 2026. Valaris, with a marketed floater fleet of 12 units, is in a similar position to Noble, with over 200 more days booked for 2027 than for this year.

South America Leads 2026 Contracted Days

Despite seeing fewer floater awards than anticipated from Brazil in 2025, numerous long-term contracts already in place means Brazil continues to drive the South America region to remain at the top in terms of days contracted by region for 2026 at 33%. Approximately 77% of South American floater days contracted for this year are for drillships, leaving 23% of the days going to semisubs.

While South America has nearly 14,000 days contracted this year, it is a far cry from the second busiest floater region of the North Sea, which has around 7,400 days booked. This represents about 17% of global days contracted for 2026. Unlike South America, which is heavily skewed towards drillships, the North Sea floater days are all for semisubs. For this region, the work is more heavily weighted towards Norway, which accounts for 75% of contracted days, versus 25% for the UK.



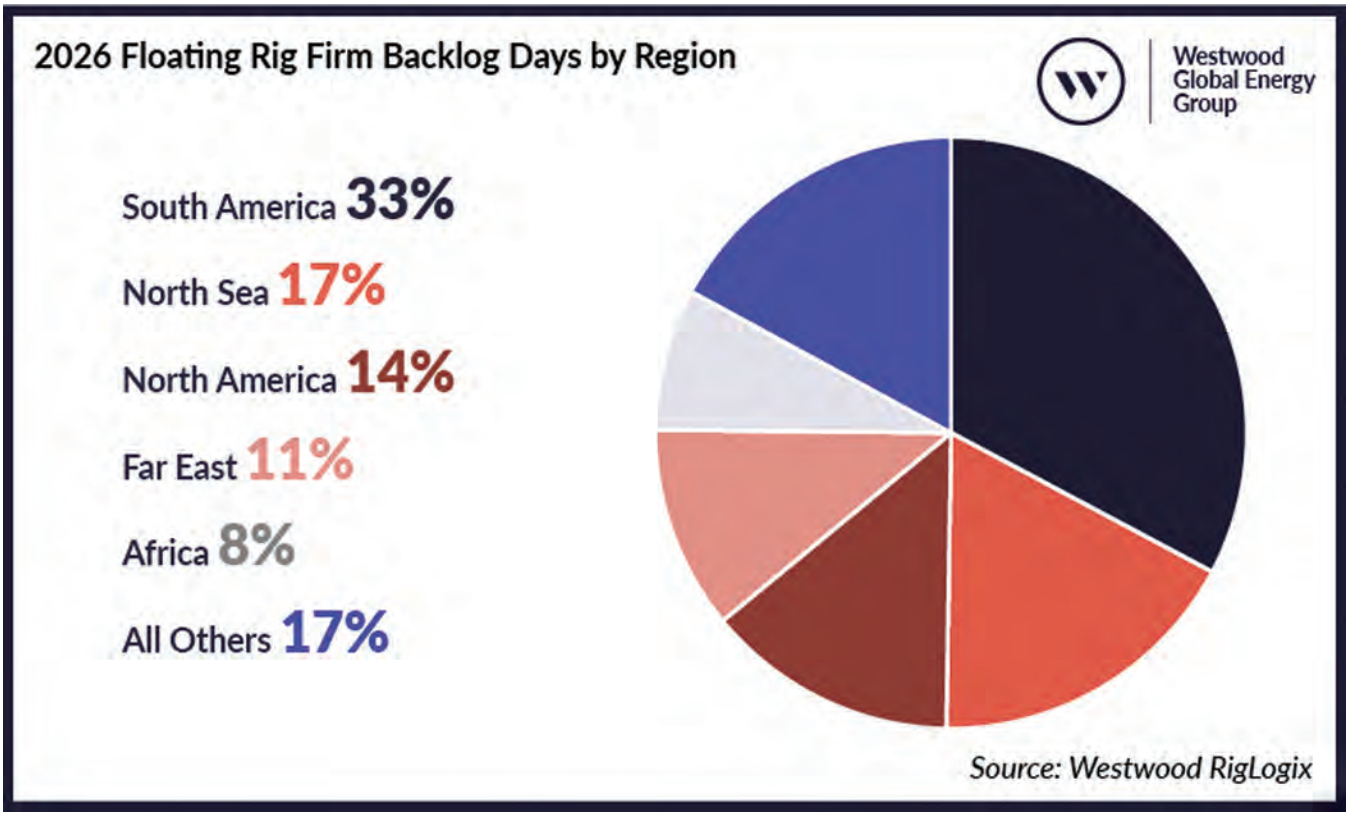
Focus for 2025 Contracting Was Securing 2026

Examining the contract fixtures from 2025, operators were primarily focused on securing slots starting in 2026 and beyond, rather than for 2025, despite a weakness in floater demand that began creeping into the market during 2024. This softness in demand resulted in lower contracted utilization rates for the 2025 marketed fleet, coming in at 78% for drillships and 71% for semisubs. Westwood uses the term 'contracted utilization rate' for rigs currently under contract. The committed utilization rate, which adds rigs with future firm commitments, was much higher than the contracted rate at 91% for drillships and 84% for semisubs due to all the upcoming assignments that are already firm.

Last year, only 17% of the days awarded, whether new contracts or exercised options, were for jobs starting in 2025, leaving 83% booked for future years. For comparison, from the 2024 awards, 28% were for the current year, and in 2023, 27% of awarded days were for the current year.

Opportunities for 2026 Start Now Limited

With a limited number of pending floater programs expected to be finalized for commencement this year, the upside potential to contracted days for 2026 is tight. Westwood's RigLogix is currently tracking over 13,700 unawarded days across 30 programs with target commencement dates this year. This is limited to only rig requirements at the direct negotiation, pre-tender, or tender phase, as these programs are generally the closest to being finalized. However, it is also worth noting that RigLogix is also tracking additional campaigns that, while less certain, may still be finalized.



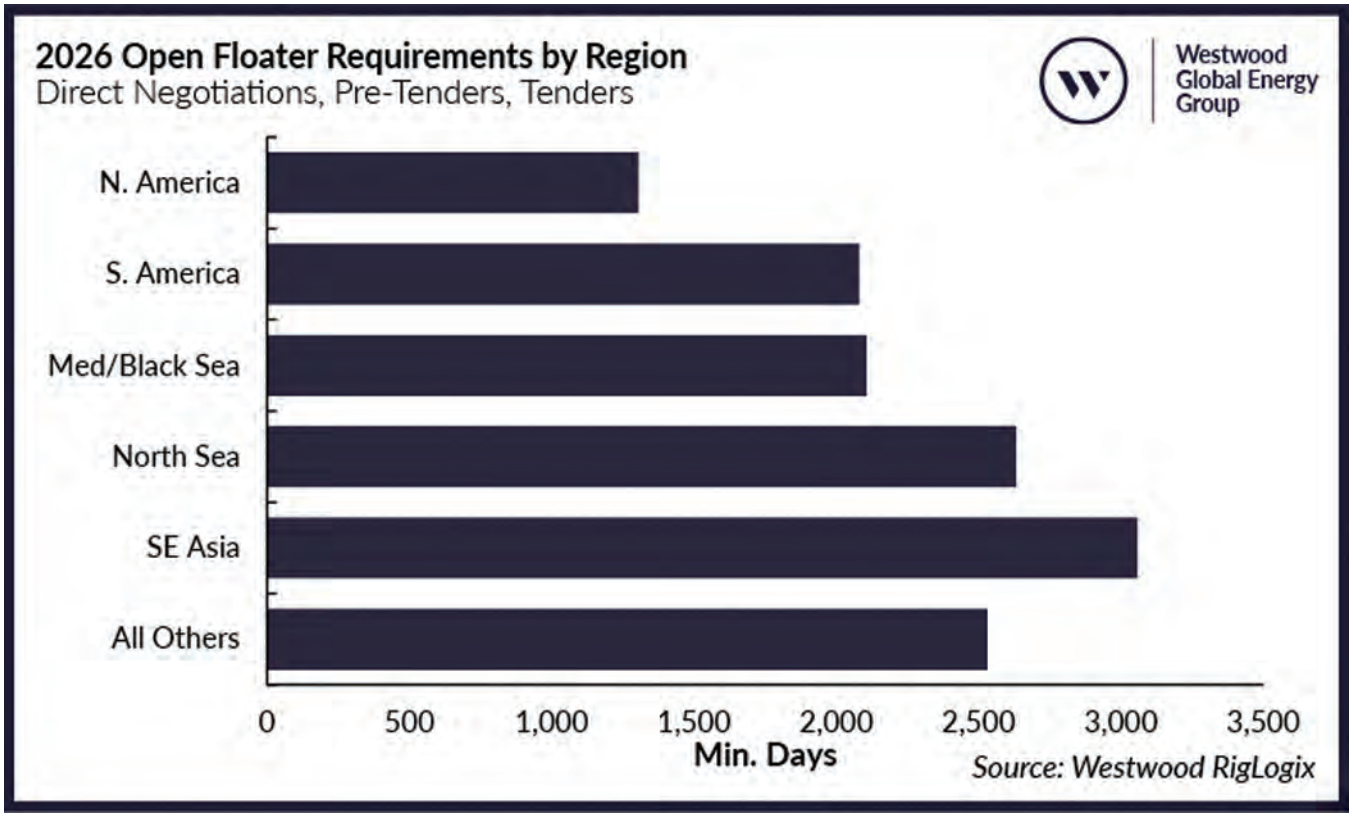
Besides these opportunities, Westwood also expects multiple blend-and-extend arrangements to be finalized this year for floating rigs working for Petrobras off Brazil. These awards will add to backlog and are not included in open requirements.

Furthermore, the available white space on many floating rigs this year could see some competitive, and possibly below-market, dayrate offers meant to entice operators to move forward sooner with certain plans that had not previously been on the schedule for this year. When there are gaps between rig campaigns, this can be an opportune time for operators with pending plug-and-abandonment (P&A) obligations to go ahead and lessen their P&A backlog.

Most of the floater opportunities targeting a 2026 start are for Southeast Asia, which has about 3,000 days available. Within this region, the countries with the most potential work are Indonesia and Malaysia.

Signs of Strong Demand For 2027 and Beyond

While the market is showing limited signs of new work coming to the market to start this year, 2027 is already shaping up to be a busy year for floating rigs. With nearly 11 months to go, 2027 already has over 8,300 days booked, which equates to around 62% of current 2026 backlog. Additionally, RigLogix records over 12,600 days from open requirements at the direct negotiation, pre-tender, or tender status with target start dates in 2027. Given the combination of secured demand and open demand for next year, the market may see some projects pushed into 2028, more as a factor of market tightness than a desire to delay.



PROJECT CERTAINTY, NOT POLITICS, SHOULD SHAPE AMERICA'S OFFSHORE FUTURE

America's offshore energy future does not hinge on ideology. It hinges on certainty. From oil and natural gas to offshore wind, carbon capture, subsea minerals, and emerging ocean technologies, offshore energy projects are among the most complex and capital-intensive investments in the U.S. economy. They require years of planning, billions of dollars in upfront capital, and a stable regulatory environment that allows projects to move from concept to construction to operation. When that certainty breaks down, investment stalls, workers are left in limbo, and America's competitive edge erodes.

By Erik Milito, President, National Ocean Industries Association (NOIA)

That challenge is quantifiable. According to McKinsey & Company, an estimated $1.1 to $1.5 trillion in infrastructure investment is currently in the federal permitting process. More than 650 projects are listed on the Federal Permitting Dashboard awaiting approval, and long-duration projects routinely spend four to five years navigating the system. For offshore energy projects operating on multi-decade timelines, that uncertainty carries real economic and strategic consequences.

These realities were front and center at the Senate Environment and Public Works Committee's January 28 hearing on permitting reform, where lawmakers from both parties acknowledged a fundamental problem: the current federal permitting system too often fails to deliver timely, durable decisions for major energy and infrastructure projects. While differences remain over policy and process, there was clear bipartisan agreement that predictability and finality are essential if the United States expects to build at scale.

The House of Representatives has already taken action. In December, it passed the Standardizing Permitting and Expediting Economic Development (SPEED) Act, a comprehensive update to the National Environmental Policy Act designed to bring structure, transparency, and accountability to federal permitting. The bill does not weaken environmental protections. Instead, it establishes clear timelines, improves interagency coordination, and reduces duplicative reviews that delay projects without improving environmental outcomes.

The SPEED Act is part of a broader effort in Congress to restore confidence in the permitting system. Additional bipartisan and bicameral proposals, including the recently introduced Fighting for Reliable Energy and Ending Doubt for Open Markets (FREEDOM) Act, reflect growing recognition that regulatory delay has become a policy outcome in itself. The FREEDOM Act focuses on enforceable permitting deadlines, protections for fully permitted projects, expedited judicial review, and mechanisms to reduce investment risk caused by agency inaction.

At the same time, recent actions by the executive branch demonstrate that permitting modernization is not limited to Capitol Hill. In January, the National Oceanic and Atmospheric Administration finalized revisions to its regulations under the Deep Seabed Hard Mineral Resources Act, creating a consolidated application process for seabed mineral exploration licenses and commercial recovery permits. This streamlined approach allows qualified applicants to pursue exploration and development through a single, coordinated review, reducing unnecessary delay while maintaining environmental oversight.

Together, these efforts underscore a shared understanding: certainty is essential to sustaining long-term investment.

This is not a partisan argument. It is an economic and strategic one.

Global Competitiveness and the Cost of Uncertainty

Offshore energy projects operate on 20- to 30-year timelines. Companies commit capital long before the first vessel mobilizes or structure is installed. Those decisions depend on predictable access to federal leases, coordinated agency reviews, and the assurance that once permits are secured, projects can move forward. When permitting becomes open-ended or reversible, capital migrates elsewhere.

Competing offshore regions, from Brazil to Guyana to the North Sea, actively market regulatory stability as a competitive advantage. The United States should not be signaling the opposite.

The consequences are tangible. Offshore energy supports hundreds of thousands of high-paying jobs across the country, sustains ports and shipyards, and anchors a sophisticated domestic supply chain that includes manufacturers, vessel operators, technology developers, and service providers. These jobs and investments depend on steady project pipelines, not stop-and-start policy cycles.

Project certainty also underpins innovation. Offshore energy continues to advance through improvements in subsea systems, digital monitoring, autonomous operations, and emissions-reduction technologies. These innovations are deployed, tested, and refined through active projects. Delays and uncertainty slow that progress and weaken America's leadership in offshore technology.

That is where legislative efforts like the SPEED Act, alongside complementary proposals such as the FREEDOM Act, play an important role. Together, they reflect a growing consensus that permitting should deliver timely decisions, clear outcomes, and finality at the end of the process. Early stakeholder engagement, transparency, and accountability benefit regulators, communities, workers, and developers alike.

For offshore energy, the stakes are especially high. America's oceans are a strategic asset, capable of supporting domestic energy and mineral production, strengthening supply chains, reducing reliance on imports, and supporting allies abroad. Offshore oil and gas, offshore wind, ocean mineral exploration, and other emerging ocean technologies are not competing interests; they are interconnected components of a broader offshore energy ecosystem.

As the Senate considers its path forward, permitting reform cannot become another casualty of political friction. Lawmakers have a real opportunity to deliver a durable framework that restores confidence in America's ability to build.

If America wants to shape its offshore energy future, certainty must come first.

A new design from SBM Offshore of a floating production storage and offloading (FPSO) unit focused on the production of blue ammonia has earned approval in principle from ABS.

Image courtesy SBM

FPSOs & MARITIME'S ENERGY TRANSITION

By Philip Lewis, Research Director, Intelatus Global Partners

Last year, the **International Energy Agency** (IEA) forecast that, under current national policies, shipping's global emissions will rise from ~847 million tonnes of CO2 in 2024 to ~1,060 million tonnes of CO2 by 2050. This is far from the IMO's target net zero GHG on a full lifecycle well-to-wake basis by/around 2050.

The IEA's report was published in the context of a changing relationship within the energy trilemma, where energy affordability and security are prioritized over the energy transition. In shipping terms, the framework to deliver net zero adopted (without the USA and objections from some Member States) within the IMOs Marine Environment Protection Committee (MEPC) were not adopted in October's IMO meeting as a result of, among others, significant pressure from the USA and Saudi Arabia. The adoption discussion has been delayed for one year until October 2026.

While a significant setback to the net zero framework, energy transition in shipping continues and the search for low and zero emission fuels maintains momentum. Increasing interest in FPSOs to be part of the low and zero emission supply solution has increased.

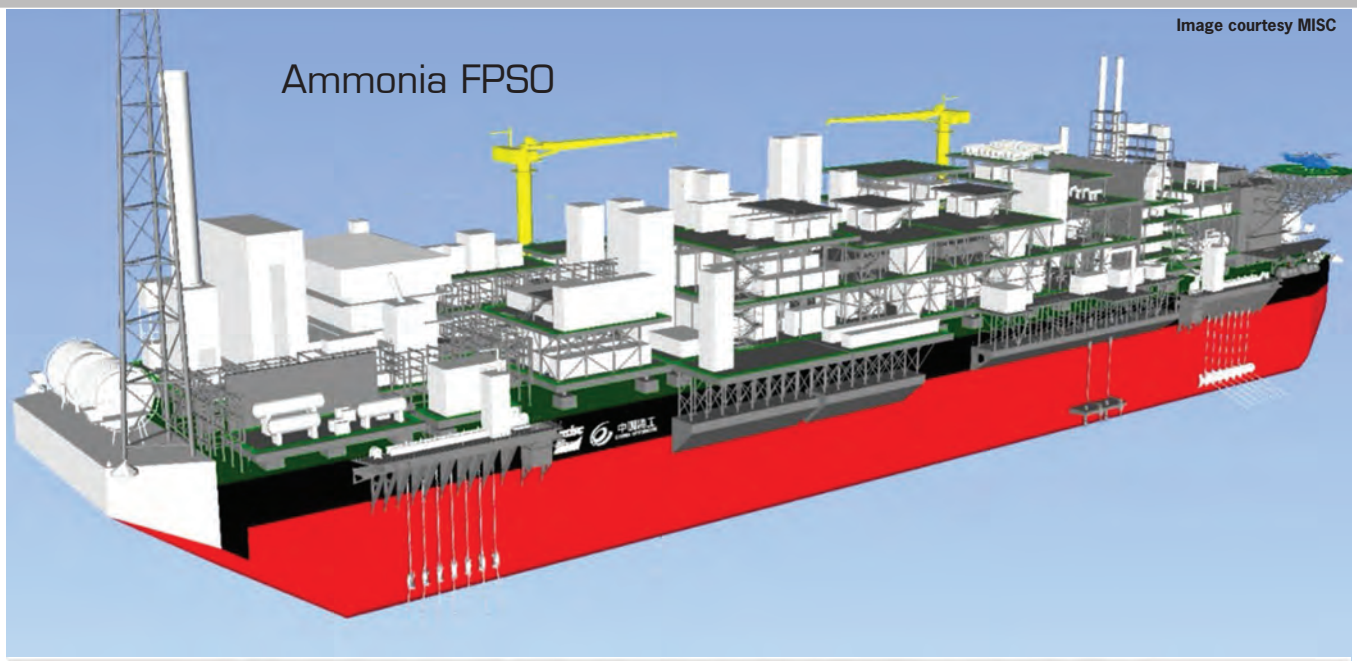
IS THERE DEMAND FOR LOW- AND ZERO-EMISSION FUELS?

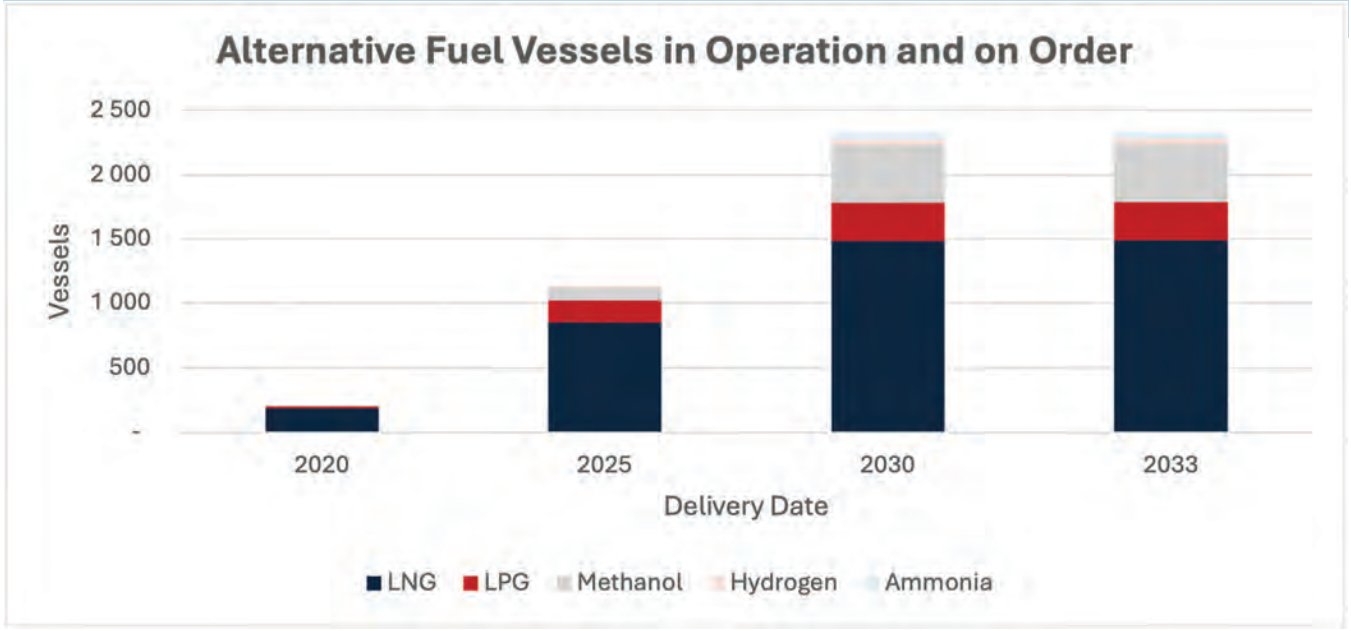
Demand for cost-competitive low and zero emission fuels is growing in the maritime sector.

According to **DNV Veracity**, ~2,330 alternative fuel vessels are in operation or on order. Close to 65% of the vessels can run on LNG, ~19% methanol, ~13% LPG and ~2% each for hydrogen and ammonia. Most of the alternative fuel vessels feature dual fuel engines that continue to run on conventional carbon-based marine fuels. Cost competitive low and zero carbon supply is needed.

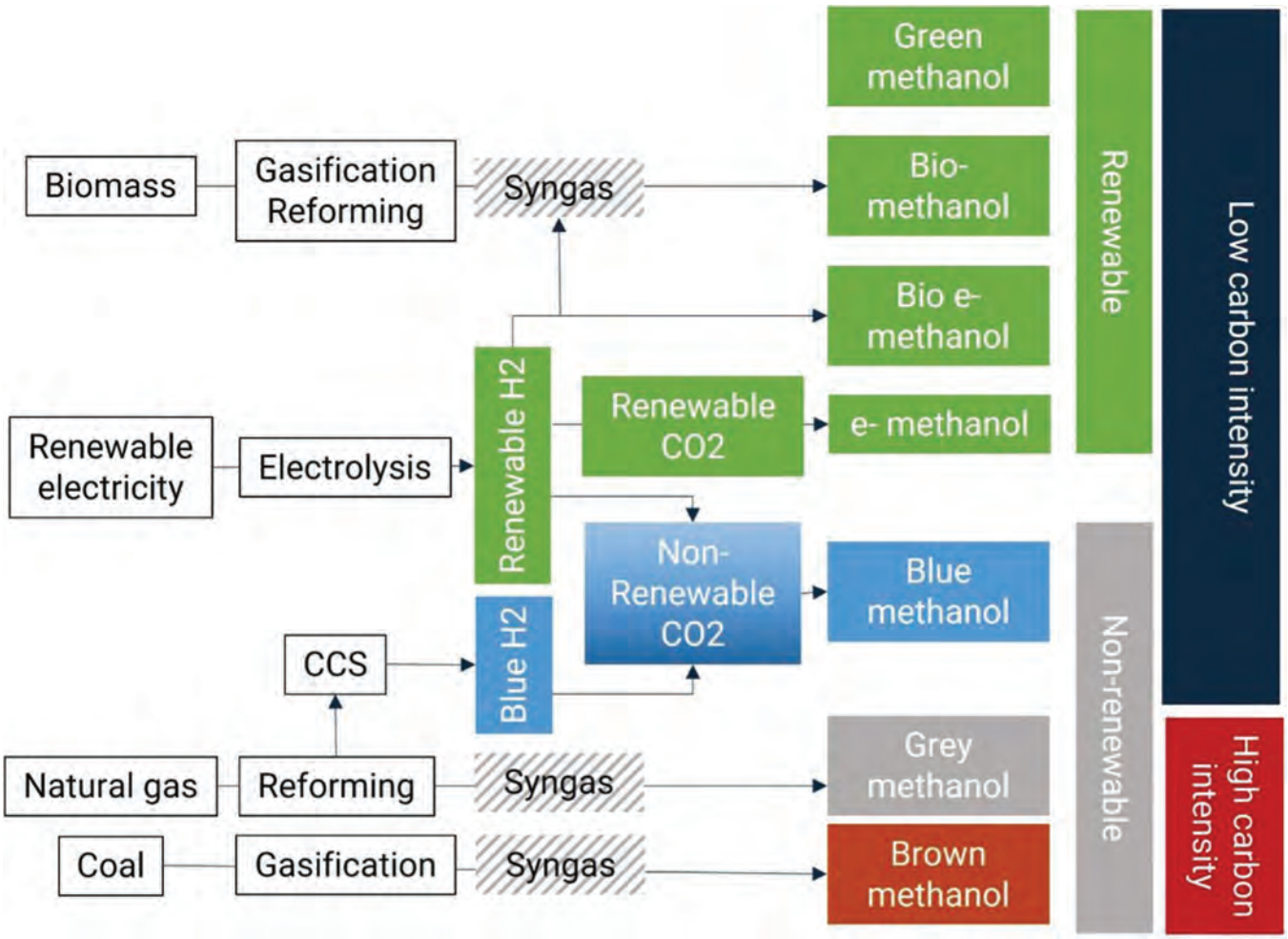
THE COLOR OF FUEL

Using methanol as an example, there are many pathways to produce methanol, from non-renewable to renewable sources, resulting in low- to high- carbon intensity fuel. For low and zero emission fuels, we look to blue, green and pink (from nuclear power) methanol, ammonia and hydrogen. Blue fuels generally require natural gas to produce the hydrogen, that is the base of alternative methanol and ammonia. In the context of low and zero well-to-wake maritime fuels, the question of certification is still being





Source: Intelatus Global Partners interpretation of data from DNV Veracity



Source: Intelatus Global Partners

addressed, and the certification of commercial scale alternative bunker supply is a complex question to address.

WHERE DO FPSOS ENTER THE DISCUSSION?

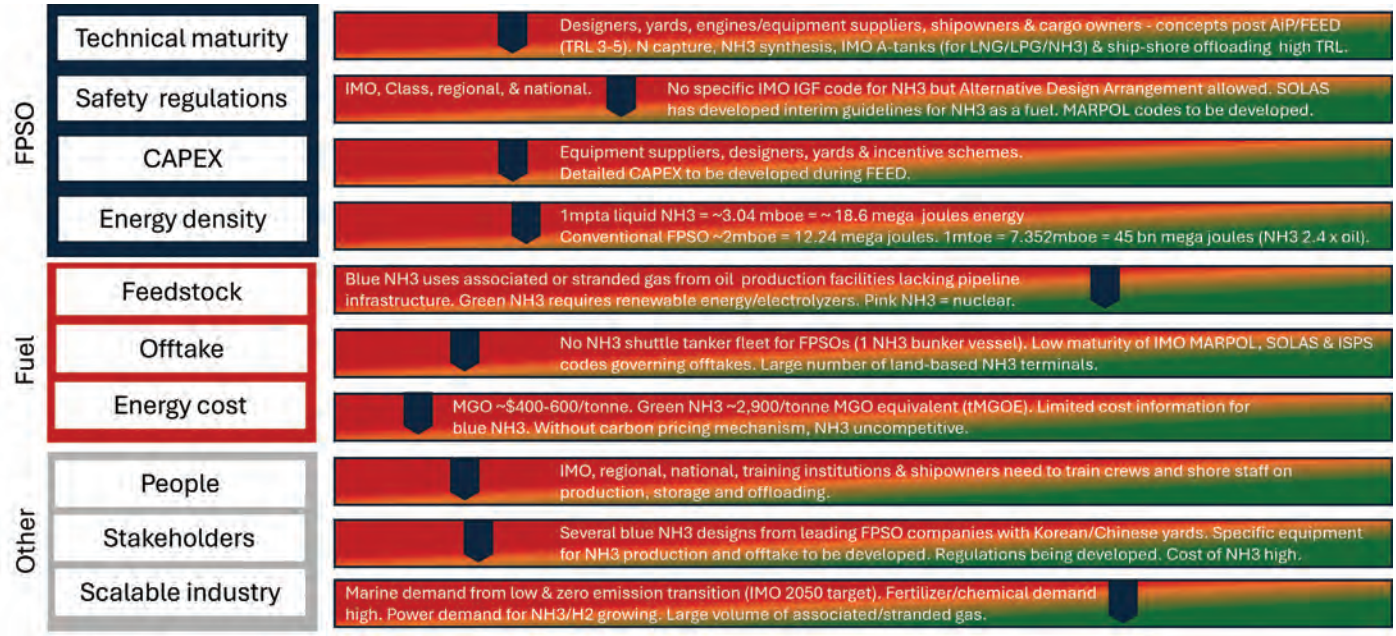
The FLNG segment has been growing as operators seek to meet growing LNG demand from commercial natural gas discoveries.

But there is increasing interest in monetizing associated natural gas to existing offshore oil production infrastructure, that was routinely flared, used to power gas turbines for production platforms and/or injected into wells, or stranded gas by location, lack of pipelines and economics. Many FPSO operators are looking at ammonia FPSOs ahead of methanol FPSOs.

Blue ammonia FPSOs appear to be favored as they help monetize associated and stranded natural gas. In a blue ammonia FPSO, carbon capture technology is used to sequester carbon dioxide from the gas stream and reinject CO2 into the reservoir, reducing the carbon footprint of oil production. Hydrogen from the natural gas stream and direct air capture nitrogen are compressed and then synthesized in Haber-Bosch process units before being refrigerated for storage and offloading to liquid ammonia tankers. Companies securing Class Approval in Principles (AiPs) for blue ammonia FPSOs over the last year or so have multiplied, including:

- **Aragon (Seatrium investment):** FPSO Bluebell secured an ABS AiP for a blue ammonia FPSO.
- **MISC:** Working with China Offshore Engineering & Technology Company, MISC secured an AiP from AIS to monetize unutilized gas from nearby offshore facilities with 1 mtpa ammonia FPSO, featuring a new build hull. KBR is the ammonia technology licensor. Produced ammonia is stored in onboard LNT A-box refrigerated tanks at -33oc at atmospheric pressure
- **MODEC:** Working with Mitsubishi Shipbuilding and Toyo, MODEC has secured an AiP from ABS to monetize associated gas & FPSO gas turbine exhaust
- **Samsung Heavy Industries:** ABS AiP for Ammonia Blue 1.2mpta FPSO.

Eni and its partners have launched the hull of the Coral North floating liquefied natural gas (FLNG) vessel, marking a key milestone in the development of Mozambique's offshore gas resources. Coral North will be the second floating LNG facility deployed in the Rovuma Basin offshore Cabo Delgado in northern Mozambique and will produce gas from the northern part of the Coral reservoir.



Source: Intelatus Global Partners

- **SBM Offshore:** AiP from ABS to monetize associated gas.

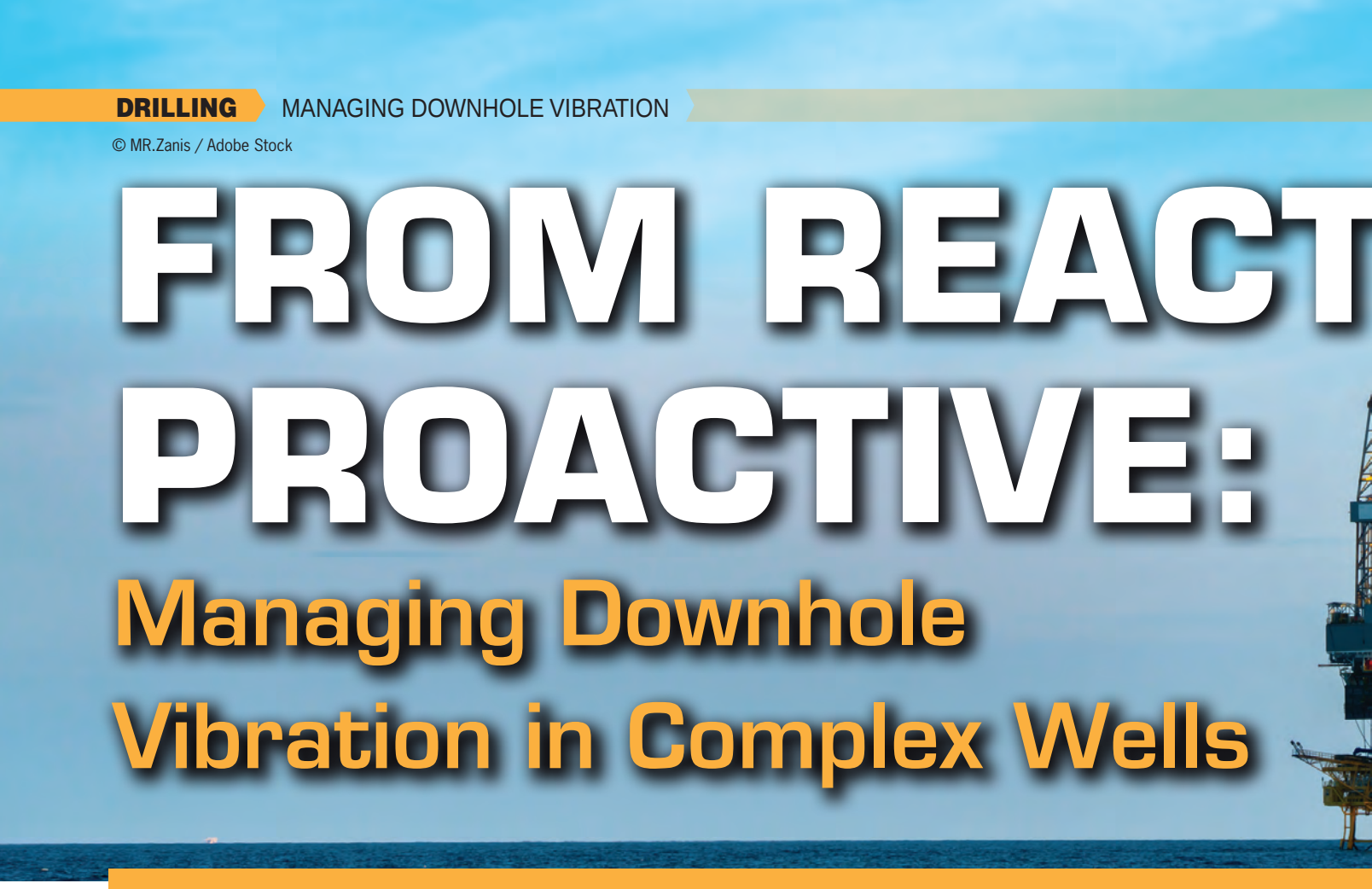
In addition to blue ammonia FPSOs, several companies are looking at green ammonia FPSOs, where generally offshore onshore wind power is supplied to the FPSO which desalinates and splits hydrogen from seawater through electrolysis units to be compressed and synthesized with nitrogen to produce ammonia. Companies developing green ammonia concepts include:

- **Aragon (Seatrium investment):** Developing the Amalia green ammonia FPSO.
- **BW Offshore:** SwitchH2, BW Offshore and McDermott have secured a DNV AiP of green ammonia FPSO powered by offshore wind and using a converted VLCC.
- **Samsung Heavy Industries:** working on a green ammonia FPSO with LR.
- **Wison New Energies:** Working with H2 Carrier for a 500MW green ammonia FPSO using onshore wind power.
- **Yinson:** 165ktpa P2A FPSO producing green ammonia using offshore wind

HOW CLOSE ARE WE TO AMMONIA FPSO DEPLOYMENT?

Given the current state of development and the barriers to FPSO adoption, it is unlikely that an ammonia FPSO will be deployed until the middle of the next decade. The factors impacting ammonia FPSO adoption are addressed in the following chart.

Deployment of ammonia FPSOs in the next decade can support the development of ammonia fueled vessels that are zero emissions on a tank-to-wake basis for blue ammonia (low-carbon on a well-to-wake basis) and well-to-wake for green ammonia.



FROM REACT PROACTIVE:

Managing Downhole Vibration in Complex Wells

As offshore wells grow deeper, hotter and mechanically more complex, drilling systems are operating closer to their structural limits than ever before. In this environment, torque, drag and vibration are no longer secondary technical considerations - they are central to performance, reliability and well economics. Recognizing the increasing operational and economic impact of downhole vibration, ***Neo Oiltools*** *was founded in Luxembourg in October 2014 to develop a dedicated torque management solution.*

By Amir Garanovic, Managing Editor at Offshore Engineer

Neo Oiltools' downhole torque management tool, Neotork, manages torque generated by the drill bit while mitigating all four types of vibrations that can be encountered, protecting critical downhole equipment. According to the company, the tool's simple, unique design automatically controls downhole torque. When torque exceeds a preset limit, the tool contracts to reduce the bit depth of cut. The excess torque stored in the system is slowly released as the drilling structure drills off.

In an interview for Offshore Engineer, Guy Feasey, Global Business & Operations Advisor at Neo Oiltools, said that addressing torque at source is becoming increasingly important as well designs push operational boundaries.

"Offshore operators increasingly face a critical challenge. Downhole vibration, once an acceptable byproduct of drilling, is now a focus of drilling optimization experts searching for any root cause impacting drilling performance, project economics, and equipment reliability," said Feasey.

According to Feasey, the shift is driven by the evolution

© Neo Oiltools

of well architecture. Extended-reach wells, high-pressure/high-temperature developments and aggressive directional trajectories are placing bottomhole assemblies (BHAs) under greater mechanical and thermal stress.

"These conditions have repercussions, creating a complex interplay of tri-axial vibrations created at the interface between the rock and bit, that coalesce into nodes of damaging dysfunction that lead to excessive tool wear, erratic rates of penetration (ROP), and unplanned trips, which undermine efficiency and inflate well costs," he added.

As laterals extend and geometries tighten, torque, drag and friction intensify. In mature offshore basins, where reservoirs are compartmentalized and wellbores closely spaced, drilling often requires sharper build-and-turn sections and narrower operating windows.

"Working within these geometries in exacting downhole environments increases the range of vibration-triggering events that impact the drilling schedule," Feasey pointed out.

FROM SURFACE ADJUSTMENTS TO DOWNHOLE CONTROL

Historically, vibration mitigation relied on adjusting surface drilling parameters such as weight-on-bit (WOB) and RPM. But with operators facing strict cost and scheduling constraints, reactive adjustments offer limited protection against nonproductive time.

"Identifying the cause of the vibration in real time allows drillers to proactively adjust operations so drilling can progress and wear on equipment can be reduced," said Feasey.

Today, Feasey explains, tools placed within the BHA are being used to suppress, dampen, isolate or alter vibration energy before it escalates. This allows drillers to apply more aggressive designs and drilling practices without increasing vibration magnitude to a level that compromises reliability.

The economic stakes, as Feasey claims, are considerable.

"Deepwater drill ships are commanding day rates around USD $500,000. For a well with a base drilling schedule of 80 rig-days, that equates to roughly USD $40 million in rig cost alone," he said.

If vibration-related issues extend a program by just five days, incremental rig cost could reach USD $2.5 million. When services, consumables, additional runs and logistics are factored in, total additional well cost can easily double. Across multi-well campaigns, the financial impact becomes material.

© Neo Oiltools

CASE STUDY: BAY OF THAILAND

A recent multi-well drilling program in the Bay of Thailand, which involved the use of Neo Oiltool's Neorork, demonstrated what proactive vibration management can deliver. The region's stacked, faulted sands and frequent changes in formation strength and temperature have historically led to erratic ROP and premature BHA wear.

The operator deployed Neotork's cable-based vibration control system across four wells and benchmarked performance against offset wells drilled without it. Each well was drilled with a single BHA and required no mid-run tool-related trips. Vibration amplitudes dropped from more than five g to less than two g. With instability suppressed, drilling energy translated more efficiently into penetration, increasing average ROP by about 39%.

"Mitigating vibration at the source enables BHAs to operate consistently closer to their design limits. Greater WOB and RPM become feasible without pushing mechanical or thermal boundaries. Torque response smooths out, directional control improves, cutter engagement becomes more uniform, and tool electronics wear slows," said Feasey.

The outcome extended beyond faster drilling. Directional control improved, tool life was extended, and operational risk was reduced.

MECHANICAL STABILITY AS A STRATEGIC ADVANTAGE

As offshore operators navigate increasingly extreme environments and geological complexities, Feasey believes mechanical stability will increasingly define what is achievable.

"The results achieved in the Bay of Thailand demonstrate that vibration is not an unavoidable hazard but a manageable engineering challenge," Feasey emphasized.

For operators, drilling managers and contractors alike, early adoption of vibration control strategies may deliver significant gains in wellbore performance, equipment longevity and operational predictability.

In a market where every additional rig day carries substantial cost, drilling in mechanically stable conditions may prove one of the most reliable ways to protect both performance and well economics.

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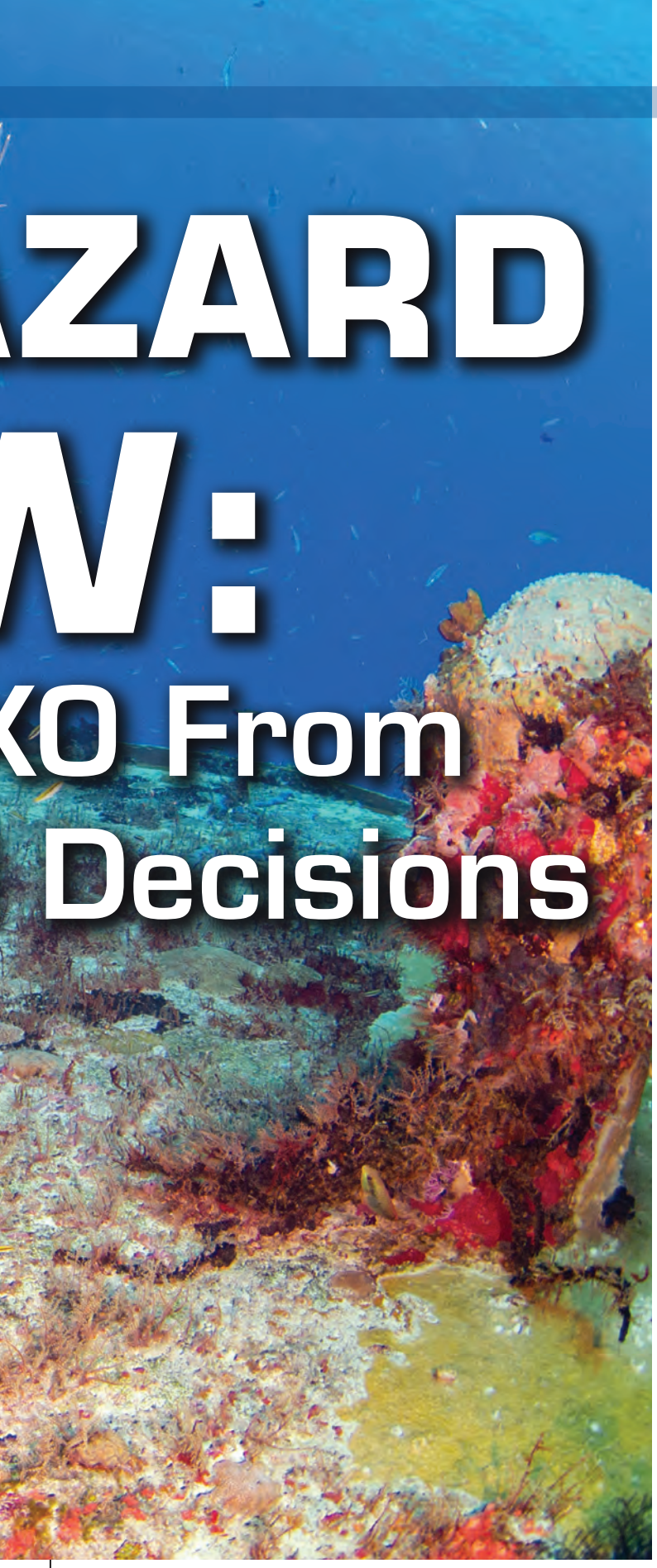
HIDDEN HA BELOV

Turning Subsea UX "Red Dots" Into Real

Offshore work is hard enough when the only variables are weather, water depth and equipment availability. But in many parts of the world — particularly in European waters—there's another hazard that doesn't show up on the surface: unexploded ordnance (UXO) and other explosive remnants of war (ERW) sitting on, or buried just beneath, the seabed. Matt Grove – EMEA Regional Segment Manager – Offshore and Becky Bodger – EMEA Customer Solutions Team Lead & Geophysicist, Seequent, discussed the UXO problem and solution recently with Maritime Matters: The MarineLink Podcast.

By Greg Trauthwein

AZARD W: XO From Decisions



UXO is a legacy problem from conflicts past, but it's a very current problem for developers and contractors trying to build the infrastructure the modern economy demands — offshore wind farms, export cables, interconnectors, port deepening projects, dredging campaigns, pipelines, nearshore utilities and more. Nobody wants to find a bomb on the seabed. Even more, nobody can afford to miss one.

That "needle in a haystack" reality — combined with the operational complexity and cost of working underwater — is exactly where Seequent positions itself. "Think of Seequent being the subsurface specialist," said Matt Grove, EMEA Regional Segment Manager – Offshore at Seequent. "We're looking underneath the seabed to try and find what's there… ultimately trying to de-risk that subsurface, whether that's geophysics or geotechnical data… specifically UXO."

Grove and Becky Bodger, EMEA Customer Solutions Team Lead & Geophysicist, joined Maritime Matters to put shape around the size of the threat — and the practical workflows that help teams find, identify and mitigate subsea UXO without turning offshore projects into open-ended investigations.

WHAT IS UXO?

"UXO" is widely used in the industry, but it's worth being explicit, Bodger said. UXO is unexploded ordnance: munitions, bombs or other explosive items that were deployed during conflict and did not detonate. Closely related terms include ERW (explosive remnants of war). In practice, she noted, the scope can also include fragments and other left-behind items. The highest-risk class is the one nobody wants to discover the hard way: munitions that remain intact enough to detonate.

The ocean adds its own twist. In addition to "active combat" items that ended up offshore, there are also deliberate dump sites created after wars — munitions pushed into the sea to get them out of circulation. Add decades of fishing activity, and the picture gets more complicated: fishermen historically were paid to take munitions offshore; others pulled up dangerous items unintentionally while trawling.

The result is a problem that isn't going away — and one that, in many areas, collides directly with new build activity. "We're building into places offshore where they dumped all these munitions after the wars," Grove said. "It's a challenge that keeps presenting itself."

Image courtesy Seequent

"MILLIONS OF TARGETS"

While offshore UXO is often discussed through a European lens — Baltic Sea and North Sea wind farm activity, dense marine construction corridors, decades of legacy conflict — Bodger stressed the global scale.

"There's millions of items… across the globe," she said, pointing to heavily affected regions where conflict left persistent contamination. She cited Laos as a top-impacted country, and also referenced emerging unknowns in Ukraine. She added that the marine environment is heavily affected in World War-era waters, noting estimates that the Baltic and North Sea alone hold roughly 1.9 million tons of unexploded ordnance.

Beyond detonation risk, Grove emphasized another long-term hazard: degradation. "These things are 80, 90 years old, they degrade. We don't really know what's inside them."

In other words: the risk profile isn't only operational safety; it's also environmental and reputational risk, and potentially long-tail consequences that are far harder to remediate later.

THE OFFSHORE PROBLEM: TOO MANY "RED DOTS"

On land, UXO workflows benefit from relatively straightforward positioning and access. Underwater, those assumptions break down quickly.

"For me, the biggest challenge is… lack of GPS," Bodger said. "You can't connect to satellites underwater. We need to know where your sensors are … and that doesn't exist in the marine world comparing to what we do on land."

And then there's the economics.

Offshore investigations are expensive, and the cost curves can be brutal: survey, process, interpret … then send down EOD experts and divers to investigate target lists. "The cost is not comparable to the investigation step offshore," Bodger said. "With our software and our solutions, we're reducing that final list … less investigation, more surveying… means they spend less money later."

Grove described the practical reality that survey teams and project owners face after a magnetometer campaign: target maps filled with anomalies — thousands of "red dots." Magnetometry detects changes in Earth's magnetic field caused by ferrous content in the subsurface. That means the system can light up for UXO — but also for plenty of harmless debris. "It could be a shopping trolley, it could be a reel of cable… you get a lot of data coming through," Grove said.

The downstream problem is decision-making. If a project owner receives a deliverable with a target list of thousands of anomalies, every anomaly becomes a potential UXO, and therefore a potential schedule and cost hit. "They have to make a decision based on what they're being delivered," Grove said. "If there's thousands… that's potentially thousands of potential UXOs, which have to be whittled down."

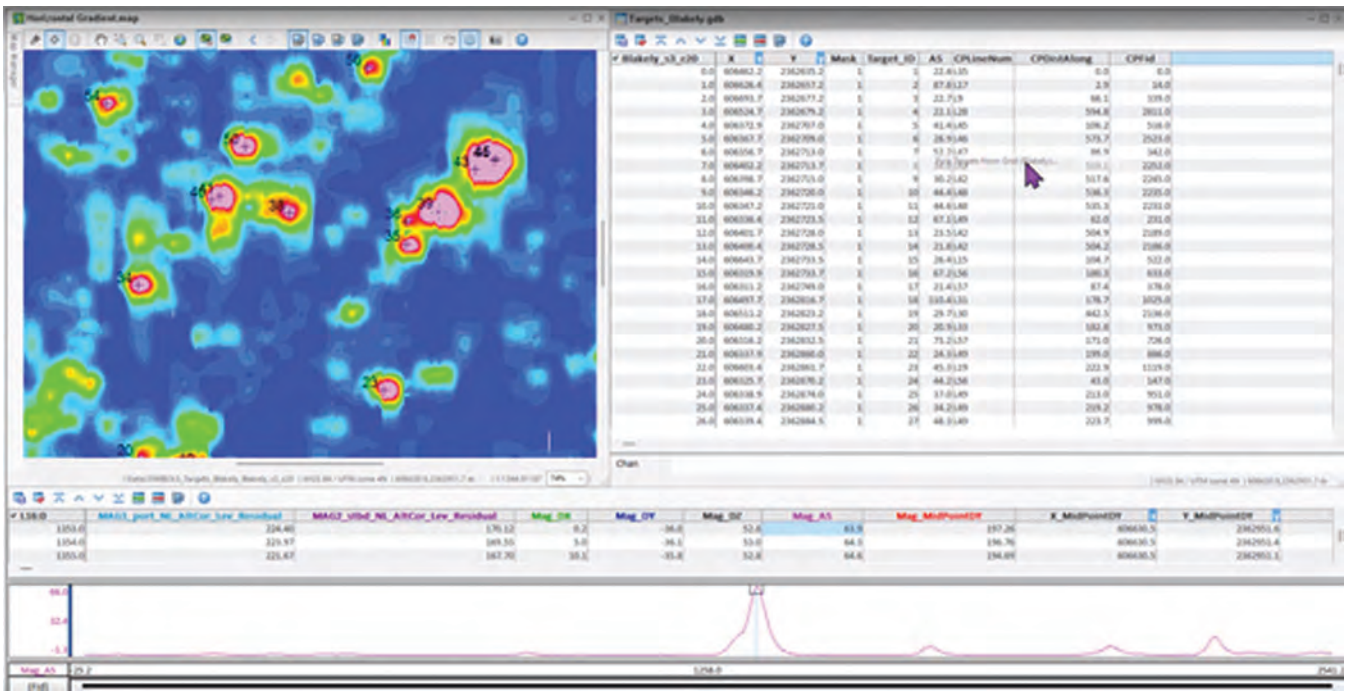


Image courtesy Seequent

REDUCE UNCERTAINTY

The trick isn't just "more data," rather it's data that is fit for purpose, processed reliably, integrated with other sources, and used to reduce uncertainty — especially uncertainty caused by false positives and false negatives.

"One of the biggest challenges for our customers is the false positives, false negatives," Grove said, describing the uncertainty created by clutter on the seabed. In magnetometry, the physics can be non-unique: small and shallow can resemble big and deep, and vice versa. That's why integration matters.

Seequent's answer in the marine UXO space is its UXO Marine module within Oasis montaj—built as part of a modular, end-to-end geophysics workflow. Bodger described it as covering planning through QA/QC, map/report generation, and target list creation from processed magnetic data.

Key capabilities in that workflow include automated target picking: users can set parameters based on what the "smallest detectable object" is for a given survey design and mission requirement, and pick everything above a minimum threshold. The module also offers modeling tools that can provide depth estimates — critical information when you're trying to decide what requires investigation, what can be discounted, and where to shift infrastructure if needed.

But Bodger was clear: in marine UXO, magnetometry is necessary but often not sufficient. That's why Seequent focuses heavily on integrating and visualizing multiple data types in one place. "You need side scan sonar, multi-beam, sub bottom profile," she said. While Oasis montaj may not process every format, the ability to bring in and visualize supporting datasets — and view seismic SEG-Y, for example — helps teams build a clearer picture of what's on the surface versus what's buried.

Grove put it plainly: if magnetometry shows an anomaly, but multibeam or side scan provides context, you can start to answer the first-order question: is it on top of the seabed, or under it? The outcome isn't academic — those determinations can change where a turbine foundation sits, how a cable route is adjusted, or where risk mitigation is prioritized.

BEYOND UXO

One of the more pragmatic points in the discussion: UXO isn't a standalone "checkbox." It's often the first hard gate in a sequence of subsea decisions.

Bodger noted that Seequent's portfolio extends beyond UXO Marine into products like Leapfrog for geological modeling, where targets and hazards can be integrated into a broader ground model — including clays, silts and interpreted seabed structures. Grove referenced recent work around cable routing and thermal response, where understanding sediments and their behavior directly influences design and operational performance.

In short, UXO findings don't live in a vacuum. They inform the geotechnical interpretation, and they ultimately influence engineering decisions — foundation placement, cable burial strategy, route selection, and other infrastructure choices.

ELIMINATING SILOS

Offshore projects are multi-year, multi-party undertakings. Owners, contractors, regulators, and a wide range of specialist teams touch the data. Bodger argued that one of the industry's biggest challenges is still organizational: silos between teams, disciplines and deliverables.

Seequent's push here is connected workflows — particularly with cloud-based project management via its platform, Central. The proposition is straightforward: upload Oasis montaj projects from the vessel, allow shore-based stakeholders to view results, reduce the number of people who need to be offshore, and accelerate sign-off and demobilization decisions.

"The quicker we can make that available, the quicker we can get sign-off," Bodger said, emphasizing the real costs of waiting until the end of a campaign for final deliverables.

Within the UXO workflow itself, Grove described how different layers of the project chain — from data acquisition teams to consultants to client representatives — can interact with the same datasets and tools, using standardized imports/exports or shared access through Central.

And in a very practical bonus for owners: the same geophysical datasets can be reused across compliance and planning requirements. Bodger noted that archaeology surveys are often required to confirm there are no shipwrecks or seabed items of cultural importance. Rather than running redundant surveys, teams can reprocess existing datasets with different objectives and signatures in mind — geological features, paleo-channels, archaeology targets — using the same software environment.

TAKING THE FIRST STEP

When asked what a developer should do first if they're starting a project in UXO-prone waters, both Grove and Bodger converged on planning discipline.

Start with documentation and repositories. Do a desktop study to understand what types of munitions are likely present. Then design the survey around the smallest target you must detect — because that decision drives everything else: line spacing, sensor height, number of magnetometers, and whether the campaign should focus on total field, gradients, or other collection approaches.

"The lowest detectable item…is really important," Bodger said. "Your very first step in designing the survey is so important."

Grove added a reality check that every software company eventually has to state out loud: even the best processing and modeling can be undermined by poor data coverage. Dense, high-quality datasets don't just improve results — they can be the difference between confident decisions and expensive uncertainty.

THE BOTTOM LINE

Subsea UXO is not a theoretical hazard, and it's not limited to one region or one industry segment. It's a global legacy problem showing up in the busiest corridors of offshore development — often in the exact places where projects can least afford delays.

The good news is that the industry is steadily moving from "spot it and react" to "characterize it and decide" — using better workflows, better data integration, and tools that shrink target lists and reduce the need for costly investigations.

Or as the conversation kept returning to, again and again: it's all about the data — good data, integrated data, and the ability to turn "red dots" into real decisions.

2026 EDITORIAL CALENDAR

OE OFFSHORE ENGINEER

JANUARY / FEBRUARY

Ad close February 6

- Floating Production Systems
- Digital Transformation: Downhole Data
- Offshore Wind: CTVs, SOVs, WTIVs
- Going Green: Carbon Capture & Storage
- Subsea: Workclass ROVs

EVENT PARTNERS

- **HYPACK EVENT** – New Orleans, LA
- **Subsea Expo 2026** – Aberdeen, Scotland
- **IPF 2026** – New York, NY
- **Oceanology International** – London, UK
- **IADC/SPE Intl Drilling Conf & Exhibition** – Galveston, TX

MARCH / APRIL

Ad close April 3

- Deepwater Exploration & Production
- Energy Ports
- Production: Topsides, Platforms, Hulls
- Abandonment & Decommissioning
- Going Green: Electrification

EVENT PARTNERS

- **Port of the Future 2026** – Houston, TX, USA
- **OTC 2026** – Houston, TX, USA
- **Wind Europe 2026** – Madrid, Spain

MAY / JUNE

Ad close June 5

- Digital Transformation: AI
- Floating Power
- Subsea: Subsea Tieback Projects
- Seismic & Geotechnical Surveys
- Safety Systems

EVENT PARTNERS

- **Japan Energy Summit & Exhibition** – Tokyo Big Sight
- **Underwater Technology Conference** – Bergen, Norway

JULY / AUGUST

Ad close August 7

- Robotics
- Digital Transformation: Cyber Security
- Offshore Wind: WTIVs
- Transport & Installation
- Heavy Lifters: Deck Machinery & Cranes

EVENT PARTNERS

- **Gastech** – Bangkok, Thailand

SEPTEMBER / OCTOBER

Ad close October 2

- Digital Transformation
- New Frontiers: Latin America
- Going Green: Water Systems
- Subsea: Electrification
- Power Generation

EVENT PARTNERS

- **ADIPEC 2026** – Abu Dhabi, UAE

NOVEMBER / DECEMBER

Ad close December 4

- Decarbonization
- Project of the Year
- Going Green: Outfitting the Green Rig
- Marginal Fields: Projects and Technologies
- Subsea: Vehicles – AUVs, ROVs, UUVs

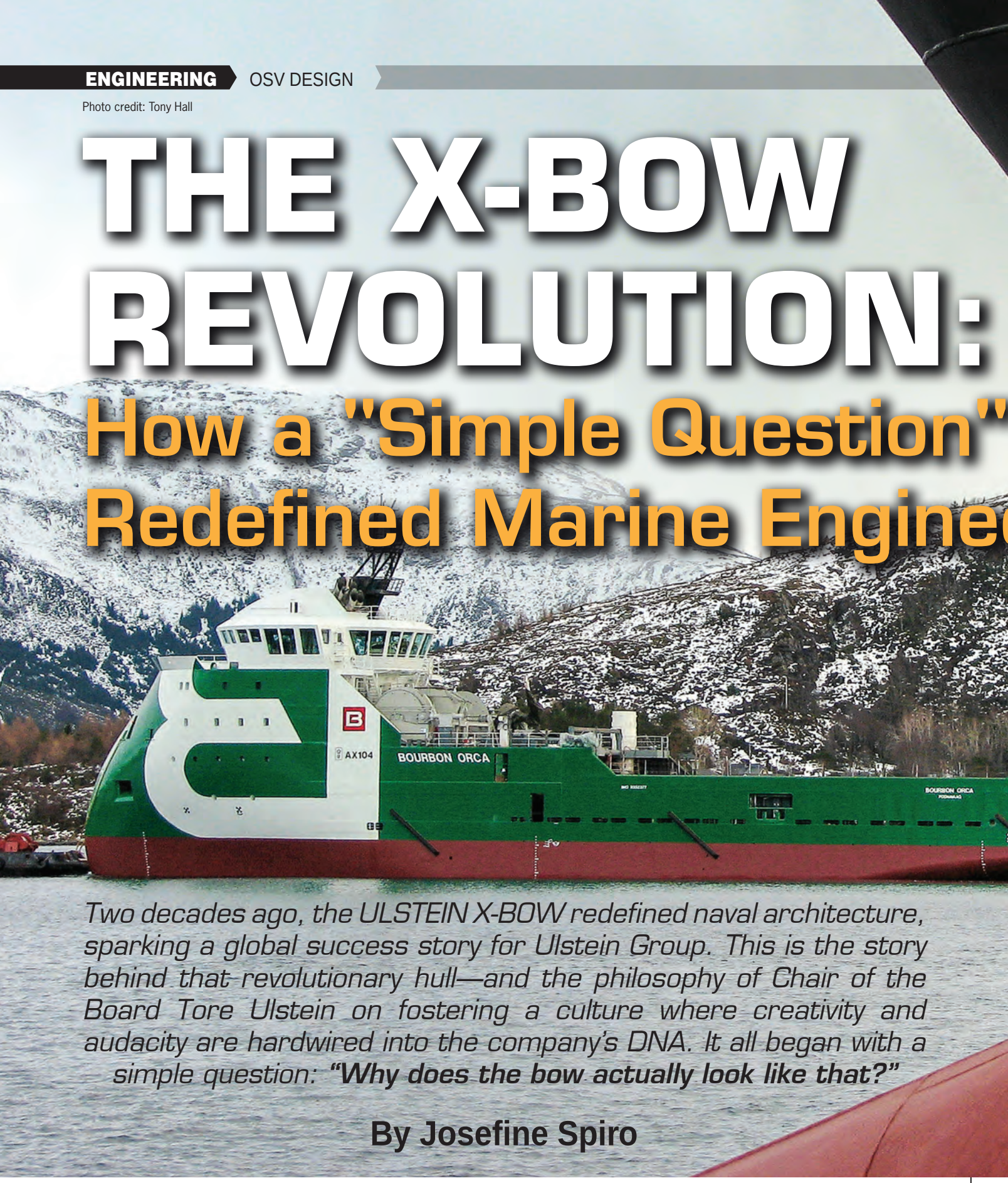
EVENT PARTNERS

- **Underwater Intervention 2026** – New Orleans, LA

Photo credit: Tony Hall

THE X-BOW REVOLUTION:

How a "Simple Question" Redefined Marine Engine



Two decades ago, the ULSTEIN X-BOW redefined naval architecture, sparking a global success story for Ulstein Group. This is the story behind that revolutionary hull—and the philosophy of Chair of the Board Tore Ulstein on fostering a culture where creativity and audacity are hardwired into the company's DNA. It all began with a simple question: ***"Why does the bow actually look like that?"***

By Josefine Spiro

"None of us could give a proper answer," admitted Tore Ulstein.

The Chair and co-owner of Ulstein Group smiled at the memory of that 2003 workshop—the catalyst for a new era. This turning point came five years after his family had sold their original design business, known for the UT designs (short for Ulstein Trading). Following the 1999 sale, Tore's father, Idar Ulstein, announced the group would build its in-house design capabilities from scratch. Tore—an engineer with a Ph.D. in marine hydrodynamics—was tasked with leading the new team. In 2002, this unit became the subsidiary Ulstein Design AS.

"Our strategy was clear from day one: we had to differentiate," Ulstein explained. "If we had tried to compete with the established UT designs by simply matching them, we would have always been playing catch-up. Instead, in 1999, we chose to lead through innovation. We wanted customers to choose us because we brought something entirely new to the table."

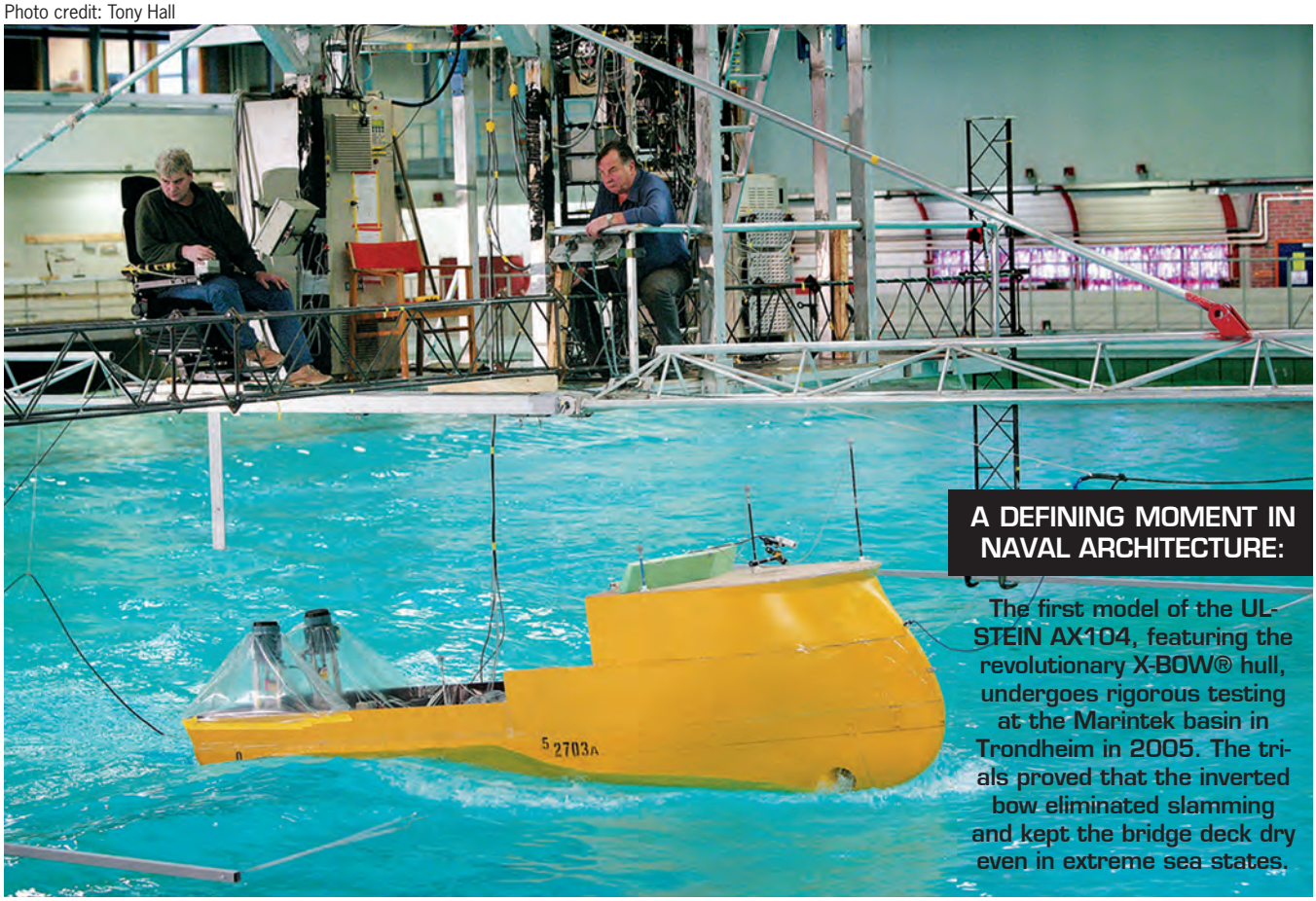
To realize this vision, Ulstein initiated a workshop in 2003 with the Oslo-based agency Abry Design. Choosing a team with no maritime background was a deliberate move. Their "outsider" perspective prompted the question; "Why does the bow look like that?"—along with a series of other seemingly "dumb" inquiries that challenged the status quo.

"What they did know a lot about, however, was the design process itself," said Ulstein. Through these interdisciplinary sessions, the designers were challenged to look beyond the industry's traditional horizon. Following the workshops, Tore Ulstein was shown a sketch by the then 33 year old hull designer Øyvind Gjerde Kamsvåg that he found particularly intriguing. The concept was brought into the dialogue between the two teams, where it piqued their collective curiosity and challenged a century of naval tradition.

THE VISUAL EVOLUTION OF A BREAKTHROUGH:

The Bourbon Orca, the first vessel to feature the X-BOW® design, alongside a traditional hull profile. Launched in 2006, the vessel immediately piqued industry curiosity by defying a century of naval tradition.

Photo credit: Tony Hall



A DEFINING MOMENT IN NAVAL ARCHITECTURE:

The first model of the ULSTEIN AX104, featuring the revolutionary X-BOW® hull, undergoes rigorous testing at the Marintek basin in Trondheim in 2005. The trials proved that the inverted bow eliminated slamming and kept the bridge deck dry even in extreme sea states.

SURPRISE IN THE TANK

By 2005, the X-BOW® concept was ready for its first trial in the model tank at Marintek (now SINTEF Ocean) in Trondheim. At the time, scepticism from industry experts was palpable.

“The researchers had never seen anything like it,” recalled Tonje Øyehaug Ruud, Ulstein Group’s Head of Communications. “

The researchers in Trondheim took precautions before starting the machinery. "They mounted a Styrofoam plough on top of the model and wrapped the measuring equipment in plastic," Ruud remembered. “At the time, they had little faith in the concept.”

When the tests were completed, however, the warnings proved baseless. While researchers had expected high waves to climb the hull and impact the bridge deck, the model remained stable and buoyant. The slender bow allowed the hull to move gently through the waves without slamming, and the water was displaced along the side instead of being thrown upward and outward. In the end, there was not a single drop of water on the protected equipment.

FROM INVENTION TO INNOVATION

"An invention only becomes an innovation when it succeeds commercially," Ulstein emphasized. "The X-BOW didn't spring from a finished problem definition, but from pure curiosity and a willingness to take detours. And then, you need a customer who dares."

That customer was Bourbon Offshore Norway. "They were brave," Ulstein added. "They challenged us based on some sketches they had seen in our customer magazine. Their primary motivation was the desire to differentiate themselves."

In 2006, the first X-BOW vessel, Bourbon Orca, was launched from the shipyard in Ulsteinvik, Norway. What skeptics feared would be a technical failure became a prize-winning triumph. The design went on to earn "Ship of the Year" honors in both Norway and abroad in 2006, as well as the prestigious "Engineering Feat of the Year" award.

While the awards provided confidence, the true validation came from those working at sea. The ship’s steward reported back enthusiastically: "I no longer have to call the bridge to ask them to slow down when I'm making dinner; the pots stay on the stove!"

Another striking proof of the hull's superiority surfaced

Photos on this page: Josefine Spiro/JoDa Media

LEADING THROUGH INNOVATION:

Tore Ulstein outlines the three non-negotiable criteria for maintaining a creative edge: competence (knowing something), drive (wanting something), and permission (being allowed).

Chair of the Board **Tore Ulstein** and Head of Communications **Tonje Øyehaug Ruud** discuss the collaborative culture that fostered the X-BOW® revolution.

on YouTube in 2007. A mobile phone video, filmed from the bridge of a supply ship in the rough North Sea, captures the contrast: As a traditional vessel hammers against the waves—crashing into the water, forced to slow down significantly—the Bourbon Orca appears in the frame. It glides through the swells without the characteristic slamming, effortlessly passing the conventional ship.

RESILIENCE & PIVOT

Since 1999, Ulstein Design & Solutions has delivered 169 designs. This portfolio includes 122 vessels featuring the original X-BOW, a number that rises to 132 when including its successors, the X-STERN and TWIN X-STERN.

But the journey was not always smooth. When the oil crisis hit in 2015, the maritime landscape was devastated; many large, publicly listed companies went bankrupt or were forcibly merged with more financially stable players.

Ulstein reflected on the choice they faced as a family-owned company when the market suddenly vanished. "We could have closed down, right? We could have said we're done. But instead, we chose to invest in finding new markets."

This strategic pivot involved a staggering 1.2 billion NOK—a commitment that included several years of losses as the company pushed into new markets. While a massive sum, it eventually led to the successful export of Ulstein designs into new segments, ranging from offshore wind and cable-laying vessels to expedition cruise ships and yachts.

"Having leadership and owners who provide the room and security to experiment and 'play' a little' is crucial," Ulstein added. "Such a turnaround would be almost impossible in an organization governed by short-term corporate thinking and quarterly results."

By 2024, the strategy bore fruit as Ulstein Group returned to profitability.

THE ART OF STIMULATING CREATIVITY

How does Ulstein maintain this creative edge? The chairman points to three non-negotiable criteria: you must know something (competence), you must want something (drive), and you must be allowed (permission).

“You need the competence and the inner drive, but the deciding factor is having owners who give you the space to experiment,” he explained. He describes this as a balance between Yin and Yang—structure for productivity, but

Photo credit: Josefine Spiro/JoDa Media

Tore Ulstein highlights the group's commitment to sustainable technology, such as hybrid propulsion systems, which evolved from the same innovation-led strategy established in 1999.

protection for "creative chaos."

An example of this playfulness is the ULSTEIN THOR, a visionary concept for a thorium-powered floating power station unveiled at the Seatrade Cruise Global convention in Miami in 2022. Designed as a mobile charging hub for electric fleets in sensitive regions like Antarctica, it eliminates the need for individual ships to return to port for fuel, dramatically reducing the industry's environmental footprint.

"We knew the technology wasn't ready, but we chose to go public to bring the industry along on the journey and strengthen our brand as an innovator," Ulstein said.

DIGITAL HORIZONS

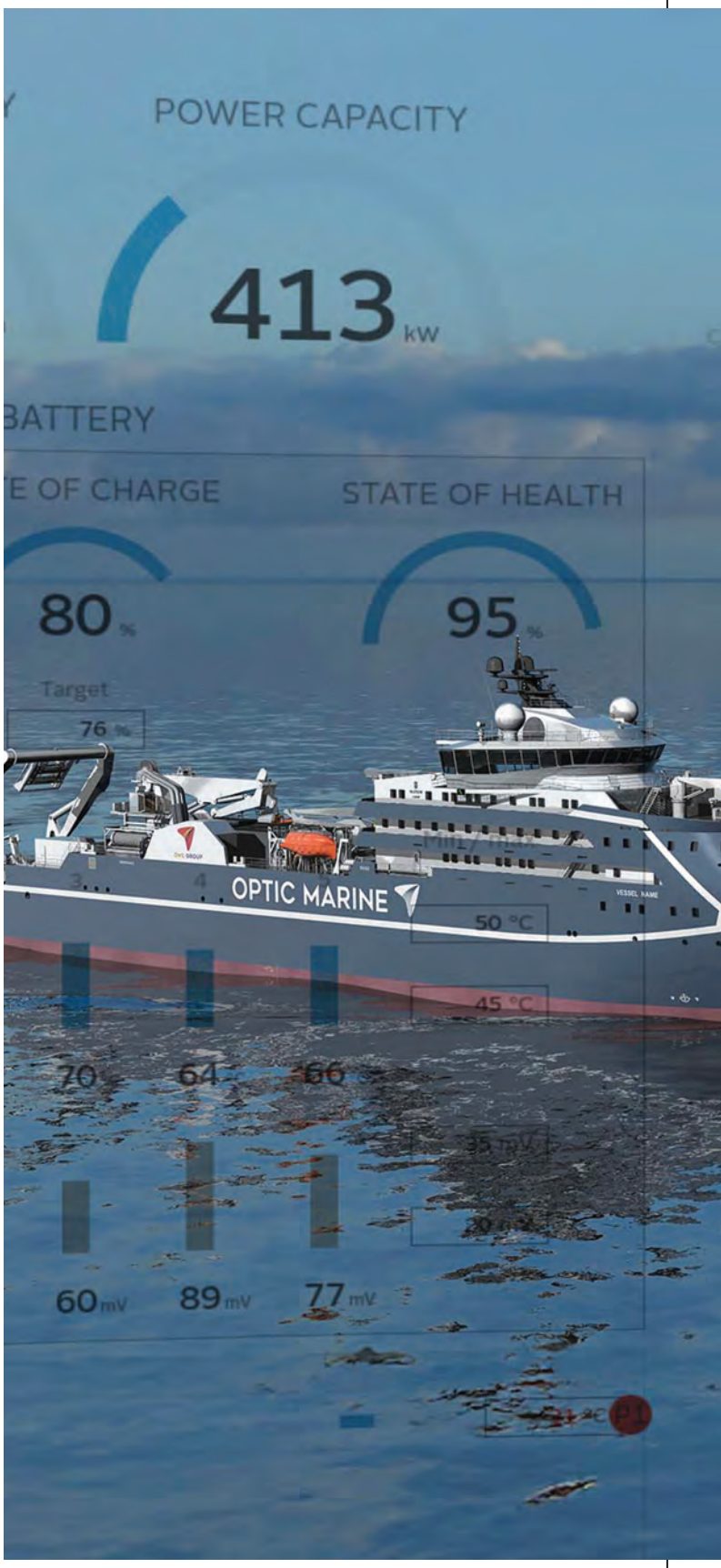
The innovative spirit that began with the Bourbon Orca continues to open doors in new markets. Ulstein recently signed a contract with Malaysia's OMS Group for the building of two next-generation cable-laying vessels for 2028. These SX252 designs incorporate the X-BOW® to ensure more comfortable motion for both the crew and the delicate cable equipment, alongside a reduction in fuel consumption. Furthermore, the enclosed cable hangar protects sensitive fiber-optics from the elements and significantly improves the working conditions for those on board.

But when asked about the next "big nut to crack," Ulstein looks beyond hull shapes.

"The next frontier is digitalization and Artificial Intelligence (AI)," he said.

By harvesting fleet data through proprietary systems, Ulstein aims to support real-time decisions to reduce emissions and enhance safety.

For Tore Ulstein, the mindset remains exactly as it was in 2003: the courage to challenge the established. "If we only tried to be as good as the others, we would always be a step behind," he concluded. "We must have the desire to challenge the status quo."



DIGITAL HORIZONS:

The Bourbon Orca, the first vessel to feature the X-BOW® design, alongside a traditional hull profile. Launched in 2006, the vessel immediately piqued industry curiosity by defying a century of naval tradition.

Photo credit: Ulstein Group ASA

ACUA Ocean's medium-sized uncrewed support vessel, which just received funding from the UK Government.

The Shift Towards Remote Operations

Within the subsea industry, underwater vehicles are a critical solution for longer projects at deeper depths, mirroring market trends that dictate a shift towards deep and ultra deep work. ROVs act as safe, efficient, and cost-effective alternatives to human divers in dangerous environments, eliminating risks in deep and high-pressure waters. They can dive beyond the reach of humans, often staying below the water for longer periods of time.

By Celia Konowe

As such, they can complete work faster and collect a variety of data depending on assembly of cameras, sonar, and sensors.

In the offshore industry, this signals the growing role of remotely operated vehicles (ROVs) and other underwater vehicles, as well as the need for more ROV support vessels (RSVs), which are designed to launch, operate, maintain, and sometimes recover ROVs for a variety of offshore underwater tasks, including diving support, infrastructure maintenance and inspection, and surveys.

Offshore Contracts

In recent months, OceanPact, DOF Group, and AKOFS Offshore have all signed contracts with Petrobas to expand RSV services. OceanPact has signed four contracts, totaling $614 million for the chartering of RSVs Parcel do Bandolim, Parcel das Timbebas, Parcel das Paredes and Parcel dos Reis over the course of four years. The vessels will contribute to the inspection of subsea structures, preventive and corrective maintenance, installation and removal of subsea equipment, and other activities, across Petrobras' offshore units. OceanPact will operate both the vessels and their ROVs, which can operate at depths of up to 3,000 meters.

DOF Group has also secured a four-year contract, estimated at $150 million and set to start January 2027, with Petrobas for RSV Skandi Commander. The vessel is a MT 6009 design and joined the fleet in 2007 as a platform supply vessel. She has since been refitted to feature construction support capabilities and will be equipped with both an ROV and an Autonomous Underwater Vehicle (AUV).

AKOFS Offshore's contract with Petrobas is for AKOFS Santos, which will operate as a multi-purpose support vessel, covering both marine and ROV services, to be operated in partnership with Bramante and IKM Subsea, respectively. The contract is set for four years and to start in January 27, following the expiry of the current contract and preparations for the next. AKOFS Santos is

RSV Skandi Commander in the background, with an AUV in the foreground

121 meters, of an STX OSCV 03L design and built by STX Europe at Aukra in 2009. It is designed to perform operations in up to 3,000 meters and is capable of installation, testing and maintenance of subsea modules, rapid module deployment, ROV launch, and subsea construction and maintenance work.

Project MROS

In the UK, Project MROS consortium, led by ACUA Ocean, has secured government support to develop a 43-meter uncrewed offshore support vessel, taking the industry one step further into autonomous solutions. The consortium, including Houlder, Ad Hoc Marine Designs, Trident Marine and the University of Southampton, received funding in 2025 through the UK Department for Transport's Clean Maritime Demonstration Competition.

The vessel will feature hybrid-electric propulsion and can operate autonomously, remotely, or with a small crew onboard. Designers are currently assessing methanol fuel for efficiency and emissions reduction, alongside hydrogen, ammonia, and diesel options.

Building on ACUA's 14-meter pioneer-class Unscrewed Surface Vessel (USV), the new platform will incorporate a Small Waterplane Area Twin Hull (SWATH) design to reduce motions in high sea states. It will also offer DP1 station keeping, a 2,500-nautical-mile range, endurance of more than 20 days and sprint speeds above 20 knots. It is designed for roles across offshore logistics, surveillance, subsea inspection, intervention and offshore commissioning and decommissioning. Payload capacity will reach 80 tons, including space for ISO-standard containers and a moonpool configured for twin launch and recovery systems for ROVs and Unmanned Underwater Vehicles (UUVs).

In the meantime, partners are progressing with resistance and seakeeping tank tests and will announce system-integration partners in the coming months.

RSVs fill a unique role in the offshore industry, often times completing a variety of tasks while operating ROVs and other underwater vehicles. As companies across offshore energy, oil and gas, and defense shift more towards deep water environment and look for speed, efficiency, and reliability in their projects, RSVs may represent the next horizon.

AKOFS Santos

ACUA Ocean's uncrewed support vessel

BRIGHT PROSPECT:

Blue Lasers for the Deep Sea

All images © Laserline

From cutting and drilling to paint stripping and removing maritime fouling, underwater tasks in the maritime environment are as numerous as the grains of sand on the beach. Some of these applications are carried out at depths of several thousand meters. A new laser system based on blue diode lasers now promises a contact-free, low-maintenance, and cost-efficient solution for a wide range of underwater operations.

By Dr. Simon Britten, Senior Technology Manager at Laserline

Whether in the maintenance of offshore platforms, the decommissioning of old oil rigs, or the inspection of underwater structures, the demands for precision, efficiency, and environmental compatibility in subsea operations continue to increase. At the same time, conventional methods quickly reach their limits here. Common pressure-based processing methods, such as high-pressure water jets used to remove algae growth, lose their effectiveness with increasing depth due to the high counterpressure of the water. Additionally, many of these systems require intensive maintenance and are prone to wear. Mechanical tools such as circular saws, in turn, generate recoil forces upon contact with components, which destabilize remotely operated underwater vehicles (ROVs) and often cause them to drift away.

Consequently, the industry shows great interest in contact- and force-free, low-wear, low-maintenance alternatives – possibilities that laser technology in particular can offer. Initial attempts, however, were not very successful. Early efforts to use conventional infrared (IR) lasers to cut structures during oil platform decommissioning proved only partially practical. The primary reason: infrared radiation (wavelength 1000 nm) is completely absorbed by water within just a few centimeters, resulting in significant energy loss. For subsea applications, IR laser cutting can therefore only be performed using an air nozzle or an air-filled chamber – a complex and cost-intensive process that also prevents use at greater depths.

Image above: Underwater processing with blue diode laser – Perforation / Penetration through 8 mm steel plate.

Blue Lasers as Key Technology

A newly developed underwater laser system based on blue diode lasers from Laserline now promises a solution to this challenge. Unlike IR radiation, the blue light emitted by these lasers, with a wavelength of around 445 nanometers, is barely absorbed by water. The lasers thus offer excellent transmission, with the effect that (almost) the entire laser power is available – even when distances of up to one meter or more have to be bridged during processing. Combined with laser powers of up to 6 kilowatts, this physical advantage opens up numerous new possibilities for force- and contact-free material processing directly underwater – without an air chamber or other complex infrastructure.

Laserline diode laser systems also offer maximum precision: for example, the laser spot size can be adjusted with micrometer accuracy, and the power can be precisely controlled within milliseconds. This ability to quickly adjust the power makes the system particularly suitable for complex tasks at great depths.

Efficient, Flexible, Economical

The combination of high efficiency and precise controllability makes the new laser system both technologically and economically highly attractive. Contact-free processing underwater significantly reduces wear on tools and components, lowers energy requirements, and minimizes the release of potentially harmful particles or substances. Contact-free processing underwater significantly reduces wear on tools and components, lowers energy consumption, and minimizes the release of potentially harmful particles or substances. In terms of environmental protection and resource conservation, the diode-laser-based process clearly outperforms conventional mechanical or chemical methods—which often cause environmental damage and material degradation. This is especially relevant for removing marine fouling, which until now has often been treated with such methods, posing risks to both the environment and the components.

The system also offers new logistical advantages. While conventional heat treatment processes in the deep sea often require the use of large, specialized ships with daily costs in the five to six-figure range, the diode laser system can also be operated from smaller supply ships thanks to its simpler system architecture. This not only reduces maintenance and operating costs and significantly shortens travel times, but also significantly increases system availability and the responsiveness of operational teams. Especially for short-notice maintenance tasks or emergency repairs, companies gain a notable operational advantage.

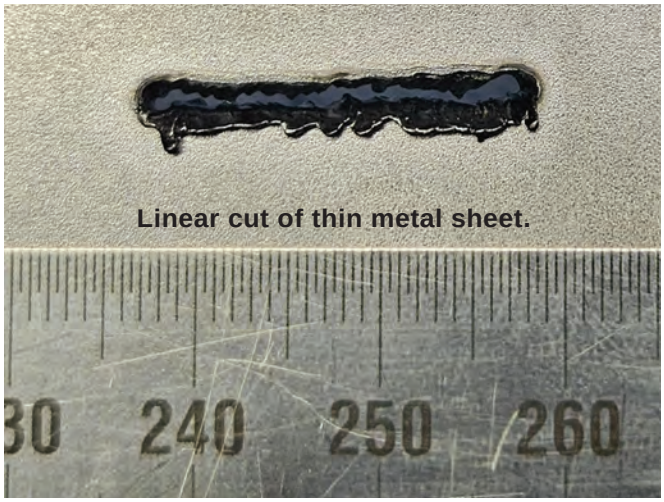
From Cutting Processes to Algae Removal

The range of possible applications is diverse: cutting sheet metal and pipes during the decommissioning of oil rigs, removing coatings, paint, and marine fouling, inspecting and maintaining valves and load-bearing structures on pipelines or offshore platforms. The latter in particular are often completely overgrown with algae after a few years of service. Here, an ROV equipped with a laser and a camera can remove the growth and restore clear visibility to critical components in a single dive – a decisive advantage for maintenance companies and underwater integrators. Robot-assisted systems for pipeline inspections can also be equipped with a diode laser as a useful add-on.

System Technology

Depending on the application, different integration approaches for diode lasers have been developed. One option is to mount the laser system onto a Workhorse ROV, remotely operated from a supply vessel via a traditional umbilical cable. The laser system, with an output power of up to 6 kW, is specially enclosed to permanently protect it against water, pressure, and dirt. The consistently low water temperatures between four and seven degrees Celsius that prevail in the deep sea make the integrated laser cooling system especially efficient.

Depending on the scenario, the laser systems can be customized to meet customer-specific requirements. The underwater vehicles can be equipped with laser scanners or fixed optics as well as diode lasers in different power classes, depending on the specific application. However, development in this area is far from complete: modular single components, for example, are expected to enable even more compact system designs – ultimately also reducing ROVs size. Further optimizations are anticipated: laser power and energy efficiency will continue to increase, and image recognition systems have the potential to be combined with AI in the future for the automatic identification of fouling or corrosion spots.



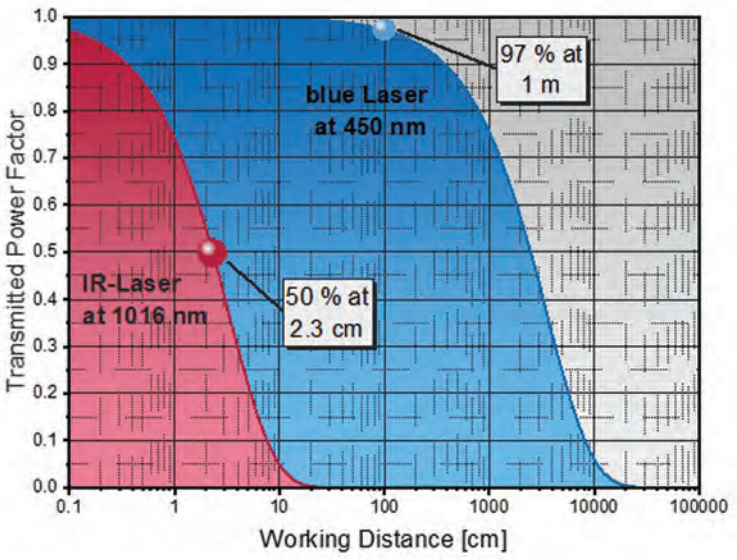
Case Study: Cleaning Ship Hulls with Blue Lasers

The outstanding transmission properties of blue wavelengths in water can also be leveraged to combat biofouling on ship hulls. In the research project "FoulLas," funded by the project agency Jülich using resources from the German Federal Ministry for Economic Affairs and Climate Action (BMWK), the project partners Fraunhofer Institute for Manufacturing Technology and Applied Materials Research IFAM, Laserline GmbH, and Laser Zentrum Hannover e.V. (LZH) demonstrated for the first time that targeted underwater laser irradiation can lethally damage marine fouling such as algae, mussels, and barnacles without harming the protective coatings beneath. After treatment, the dead fouling naturally detaches during the vessel's next voyage due to the shear water forces. The method is a promising alternative to mechanical processes, which often cause damage to coatings and release living organisms.

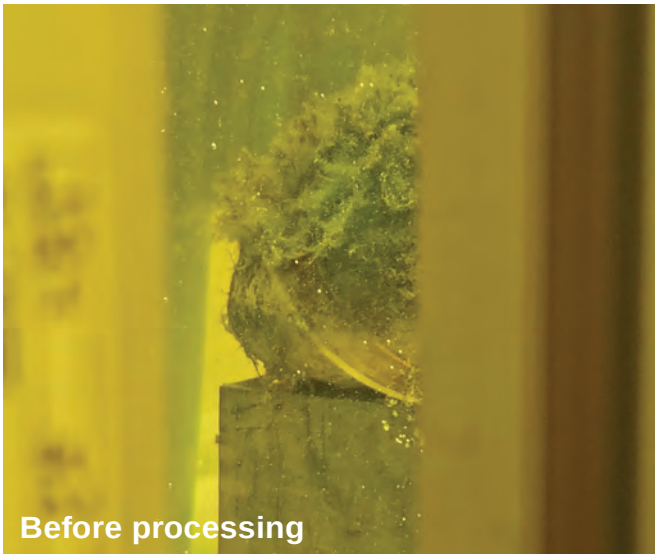
A follow-up project called "FoulLas2" is now transferring these laboratory results into practice: a semi-autonomous, magnetically adhering underwater crawler equipped with integrated laser optics will systematically sweep the ship's hull and irradiate the fouling directly.

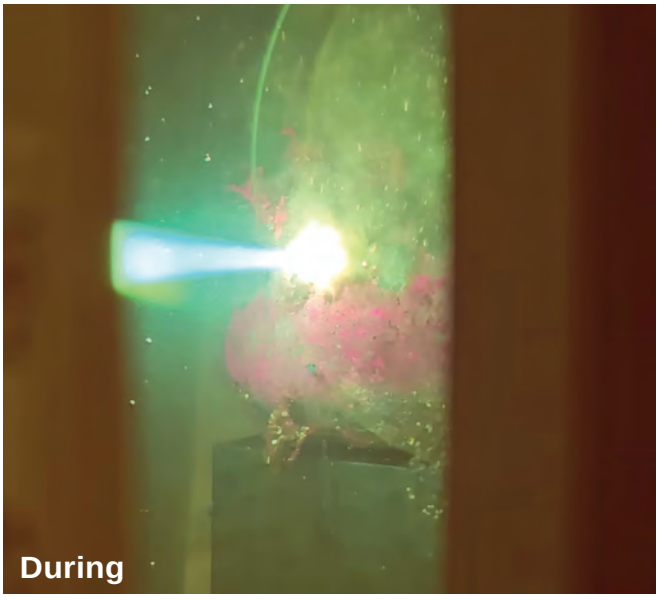
Conclusion: Setting New Standards in Underwater Technology

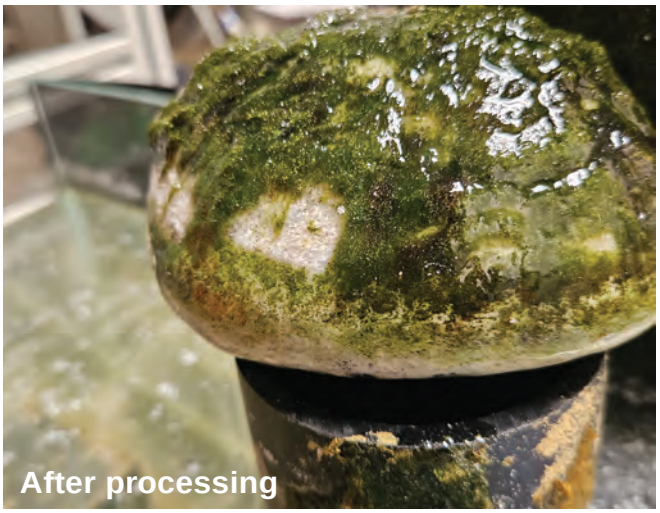
Overall, the blue diode laser marks a technological milestone for the maritime industry. It combines efficiency, precision, and environmental friendliness in a compact system and opens new possibilities for underwater processing. Whether for the maintenance of offshore platforms, the inspection of pipelines, or the removal of marine fouling, the laser provides a powerful and sustainable solution for numerous application scenarios. For service, maintenance, and supply companies in the subsea sector, the system opens new technological horizons and may replace many established methods of underwater processing in the medium to long term.

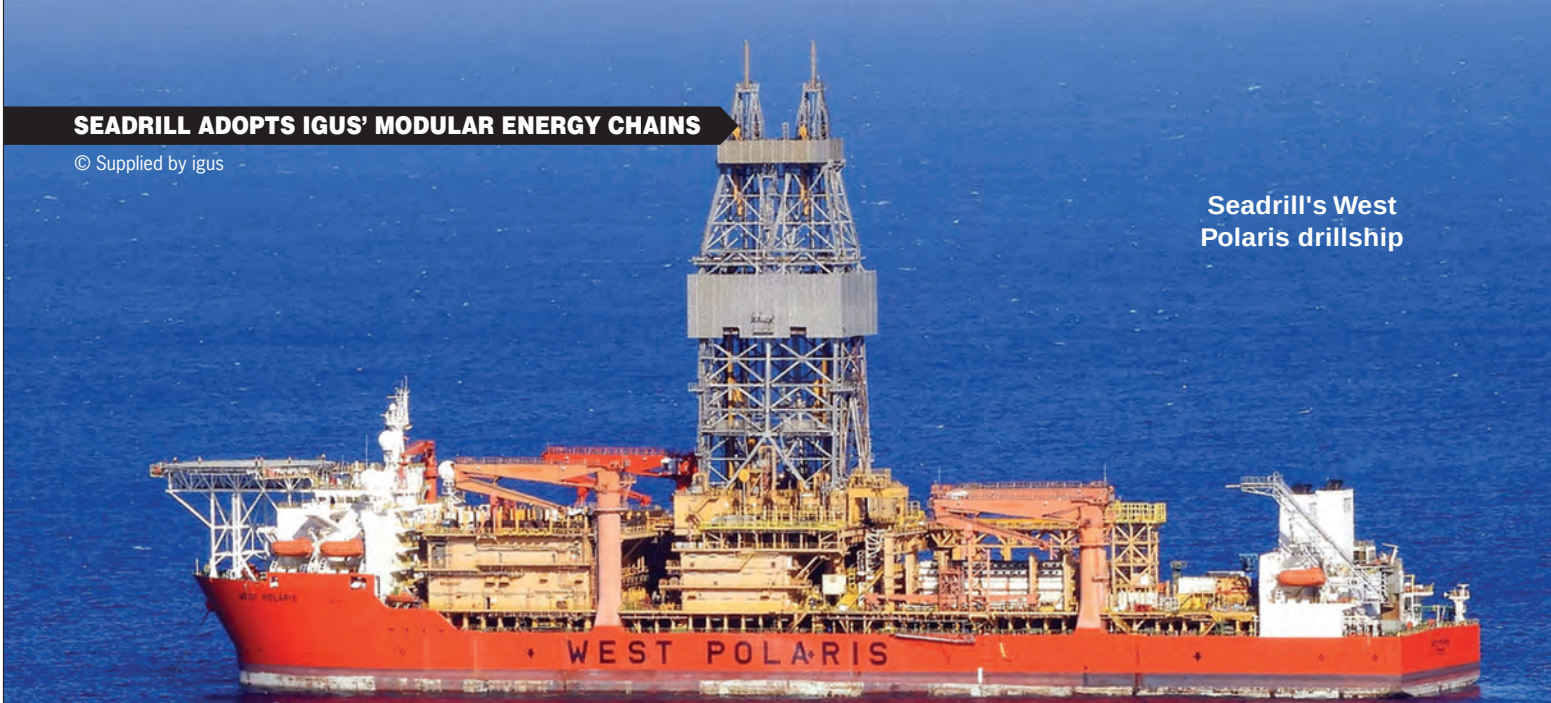


Underwater processing – Removal of algae growth on stone with blue diode laser.









Seadrill's West Polaris drillship

SEADRILL ADOPTS IGUS' MODULAR ENERGY CHAINS TO CUT OFFSHORE DOWNTIME AND COSTS

A modular cable management system, designed by German-based supplier igus, has been implemented by offshore driller Seadrill to reduce downtime, cut maintenance costs and improve operational reliability on its drillships by replacing traditional service loops with a more durable and flexible alternative.

By Cameron Dreyer, Oil & Gas Industry Manager, igus

On offshore oil rigs, keeping equipment running smoothly and avoiding interruptions is essential, though hardly easy. The environment is unforgiving, prone to extreme weather, vibration and other harsh conditions that can damage components and quickly spiral into costly downtime, increased maintenance efforts and safety hazards.

These are the outcomes Seadrill, a major player in the field, wanted to avoid, according to igus, a manufacturer of high-performance polymer products and energy supply systems, which was engaged by Seadrill to provide a solution.

Seadrill was experiencing issues with the service loops on its top drive system. The loops, which guide cables and hoses in hanging applications, were prone to issues like snagging and strain-related damage, which would lead to costly replacements of entire assemblies.

By switching to the igus e-loop technology, a modular energy chain system, Seadrill saw significant improvements, including less downtime, easier maintenance and a reduction in operational costs, according to a case study released by igus.

Offshore Challenges for Traditional Service Loops

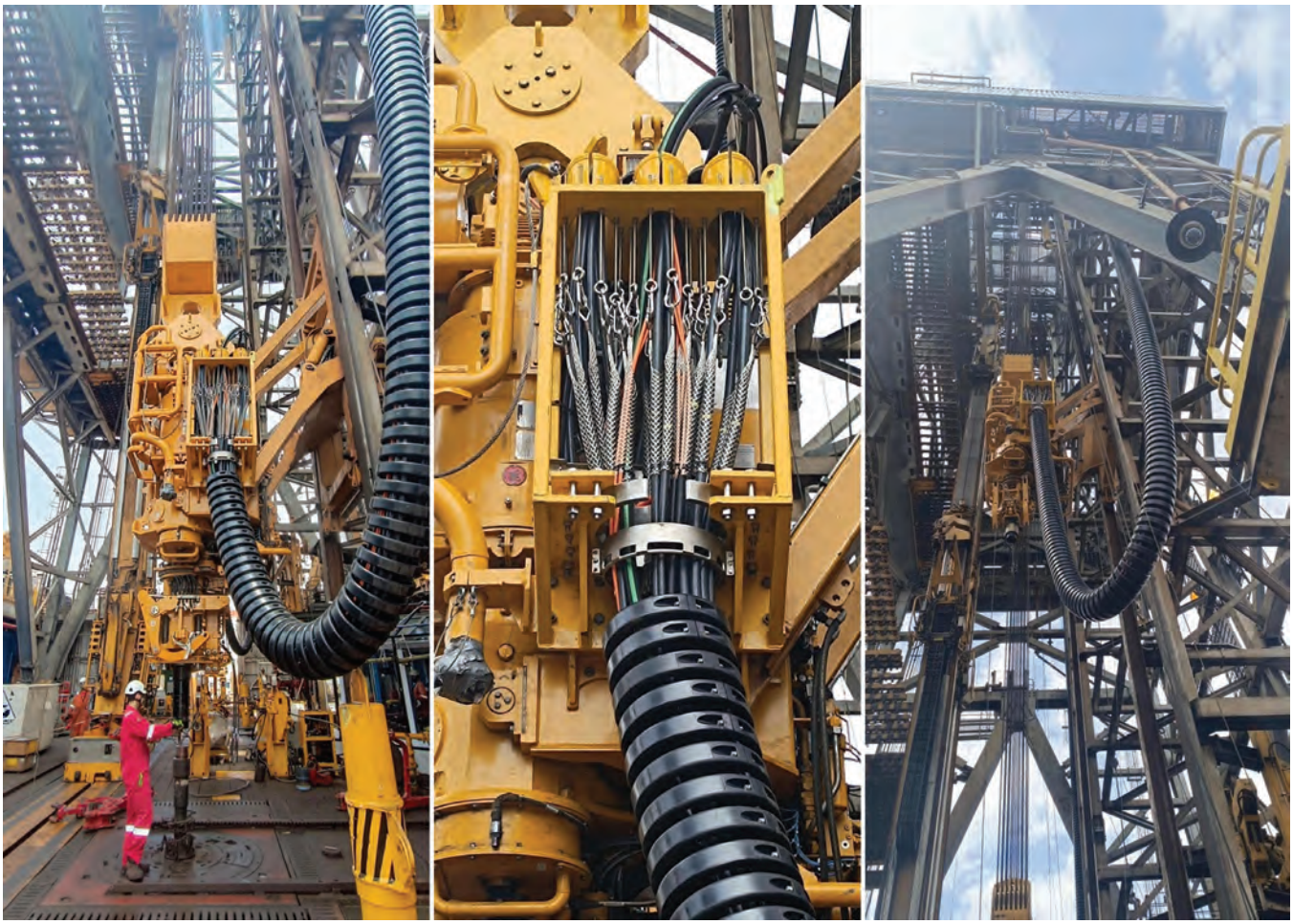
Seadrill operates in one of the most challenging environments, where equipment is constantly exposed to harsh conditions, including vibration, impacts and extreme weather. Traditional service loops used in top drive systems often face issues like swinging cables, high strain and limited durability.

In addition, the design of service loops creates a vulnerability. These assemblies, which consist of cables and hoses bundled within a large outer hose, are secured by potting with epoxy at both ends. When individual cables fail or when the service loop catches on equipment, the entire service loop assembly must therefore be replaced, driving costly downtime and maintenance efforts.

Seeking to address the limitations of traditional service loops, the igus e-loop combines the flexibility of a polymer energy chain with the strength of a high-performance composite rope.

Fifteen times stronger than steel, this rope lies at the core of the e-loop design. It absorbs the tensile forces exerted on the cables, relieving them from strain and extending their

© igus



The igus e-loop replaced traditional service loops being installed on Seadrill's West Polaris drillship

service life. The rope is also made of a synthetic plastic fiber, creating a shatter-proof, weather-resistant, flexible and corrosion-free solution.

The e-loop also incorporates chain links made from high-performance plastic and are designed to be replaceable, even during operation.

The feature ensures the system can be easily maintained and adapted to changing requirements without the need for a complete overhaul, according to the company.

In addition, durable polyurethane (PU) foam bumpers on the outside of the e-loop system absorb impacts and further protects the system from damage caused by swinging or bumping into equipment on site. Like the other components in the system, these bumpers are replaceable, ensuring any damage can be rectified without significant downtime.

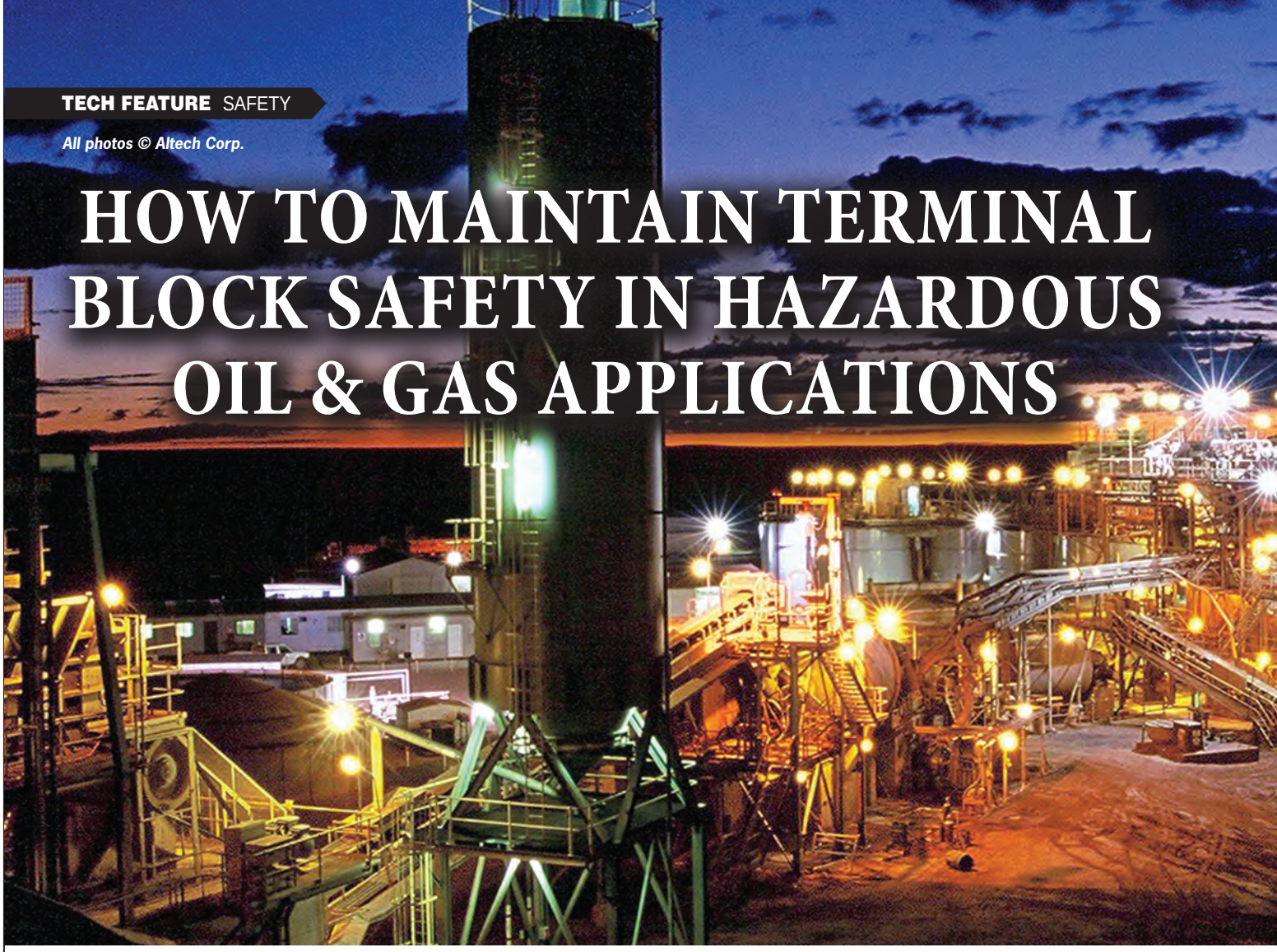
Implementation on Seadrill's West Polaris Drillship

From system design to onsite installation, igus provided Seadrill with support throughout the implementation process on its West Polaris ship and delivered the e-loop as a ready-to-install solution, reducing installation time. Consisting of igus chainflex flexible cables, the system combined multiple power, signal and hydraulic loops into a single loop design that not only reduced the overall footprint, but also extended the system's durability.

Compared to standard industrial cables used in traditional service loops, chainflex cables are designed for continuous flexing and harsh environments, offering resistance to abrasion, oil, chemicals and temperature extremes. With less cable failures and maintenance, Seadrill has seen substantial cost savings, igus claims.

"igus e-loop technology has played a critical role in enhancing the operational reliability and efficiency of Seadrill's offshore operations. The system's modular design, ease of maintenance and proven performance have addressed the challenges posed by traditional service loops, resulting in significant cost savings and reduced downtime," igus said.

Following the installation of the system on the West Polaris drillship, Seadrill opted to implement the same solution on its second drillship, West Capella.



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HOW TO MAINTAIN TERMINAL BLOCK SAFETY IN HAZARDOUS OIL & GAS APPLICATIONS

Exploring why compliance with NEC, CEC, ATEX and IECEx codes is crucial for terminal block technologies in explosive atmospheres in the oil and gas industry.

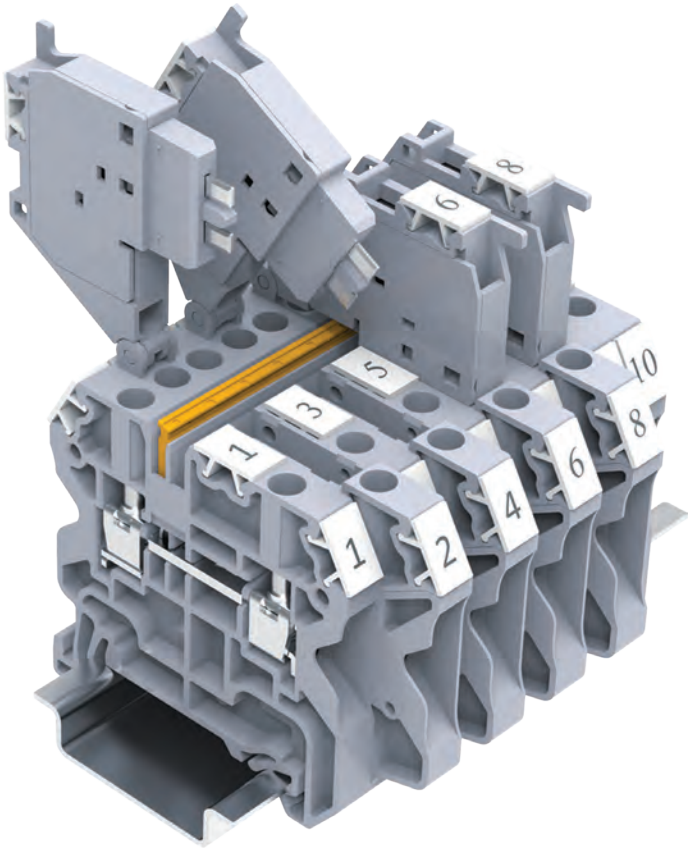
By Markus Kraess, Product Manager, Altech Corp.

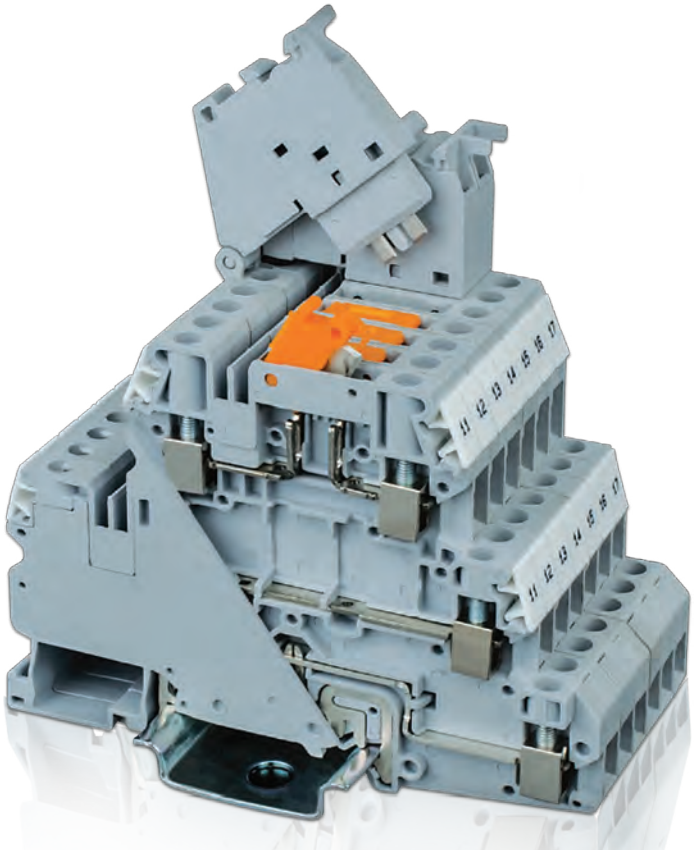
The oil and gas industry — with its continuous handling of flammable gases, vapors and mists — is inherently prone to explosion hazards, making safety in these environments non-negotiable. From offshore platforms to processing facilities, electrical installations in these areas demand more than standard components; they need equipment specially designed and certified to prevent ignition.

Navigating these hazardous areas necessitates strict adherence to NEC, CEC, ATEX and IECEx standards. These global and North American benchmarks provide a comprehensive framework for equipment operating in explosive atmospheres, ensuring every component and system is engineered, manufactured and rigorously tested to eliminate explosion risks.

Even seemingly simple electrical components like terminal blocks play a critical role in this safety ecosystem. Though often viewed as simple connecting devices, their compliance with NEC, CEC, ATEX and IECEx is paramount to maintaining the overall safety and integrity of electrical systems in oil and gas facilities with potentially explosive atmospheres.

Here's how advanced terminal block connection technologies that comply with these codes significantly enhance safety and reliability.





Understanding North American and Global Directives

The oil and gas industry continues to grow, with 2024 global oil demand averaging 103.75 million barrels per day, amplifying the need for safety-compliant automation systems. Terminal blocks serve as critical interconnection points where electrical energy transitions between circuits, and any failure at these junctions in explosive atmospheres could have severe consequences.

Addressing these challenges necessitates strict adherence to standards. In North America, the National Electrical Code (NEC) in the U.S. and Canadian Electrical Code (CEC) provide standards

for the installation and use of electrical equipment in potentially explosive environments. These codes include provisions for both ordinary and hazardous locations, with hazardous locations posing explosion risks due to the presence of flammable gases, vapors and dust.

Similarly, ATEX (2014/34/EU) in Europe and IECEx provide guidance for equipment and systems intended for use in potentially explosive atmospheres. Both consider not only electrical sources of ignition, but also the presence of potentially explosive concentrations of gas or vapor in the air. Their primary goal is to ensure that the components used in these environments are designed, manufactured and tested to prevent explosions and promote personnel and equipment safety. Specifically:

- **ATEX (Atmosphères Explosibles)** is a mandatory European Union directive that provides a legal framework for controlling explosive atmospheres. It outlines health and safety requirements for equipment and protective systems intended for use in these environments.
- **IECEx (International Electrotechnical Commission System for Certification to Standards Relating to Equipment for Use in Explosive Atmospheres)** is a global certification system that facilitates trade in equipment and services for use in hazardous areas. It aims to lower testing and certification costs for manufacturers and enhance end-user safety.
-

NEC and CEC: Scope and Protection Types

Despite their similarities, the four codes vary in scope and use different classification systems. NEC and CEC categorize locations based on the presence of hazardous materials during normal (Division I) or abnormal (Division II) conditions. They further divide locations into three classes based on the hazard type: Class I (gases and vapors); Class II (dusts); and Class III (fibers).

In addition to the Class/Division system (Article 501), NEC divides locations into zones (Article 505), which

more closely aligns with international standards. This system is based on the frequency and duration of the presence of explosive atmospheres. For example:

- **Zone 0** = continuous presence, such as inside process vessels or storage tanks.
- **Zone 1** = likely presence during normal operation — e.g., areas around pumps, compressors or loading/unloading stations.
- **Zone 2** = presence only under abnormal conditions — e.g., adjacent areas where releases are unlikely.

NEC and CEC also outline protection methods for equipment used in these hazardous locations — each one designed to prevent ignition in explosive atmospheres. Examples include:

- **Intrinsic Safety (Ex i):** Low-energy circuits limit the energy available for ignition.
- **Explosion-proof (XP):** Housing can contain explosions, preventing external ignition.
- **Pressurized Enclosure (Ex p):** Protective gas inside prevents explosive gas entry.
- **Flameproof Enclosure (Ex d):** Robust enclosure can withstand internal explosions.

ATEX and IECEx: Scope and Protection Types

ATEX and IECEx classify hazardous areas into zones based on the frequency and duration of the presence of an explosive atmosphere:

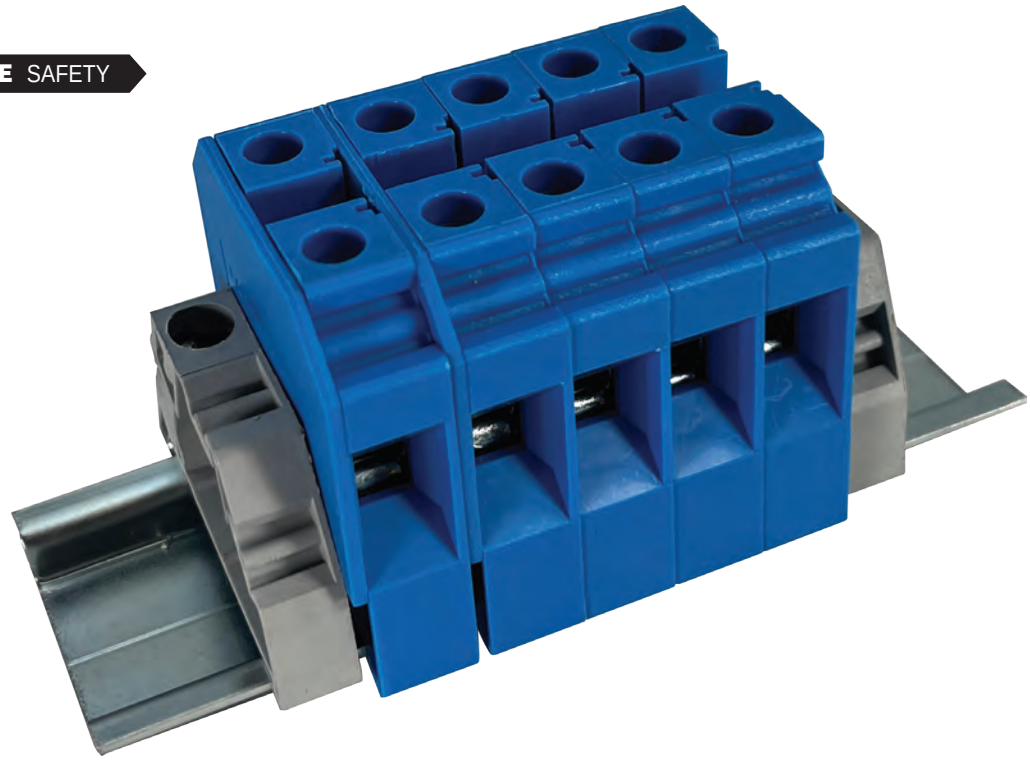
Gas / Dust Zone	Description
Zone 0 / Zone 20	Continuous presence of an explosive atmosphere.
Zone 1 / Zone 21	Likely occurrence under normal conditions.
Zone 2 / Zone 22	Unlikely occurrence under normal conditions.

To be used in specific zones, equipment must be certified with levels of protection depending on the risk. ATEX further divides equipment into groups based on their intended use — for example, Group I refers to underground mining equipment while Group II refers to surface industries — as well as categories based on the level of protection they offer:

- **Category 1:** Very high level of protection (for Zones 0 or 20).
- **Category 2:** High level of protection (for Zones 1 or 21).
- **Category 3:** Normal level of protection (for Zones 2 or 22).

The Importance of Terminal Block Compliance in Oil and Gas

Within any electrical installation in an oil and gas hazard-



ous area, each component — no matter how small — can become a potential source of ignition if not properly designed and certified according to NEC, CEC, ATEX and IECEx. One example is the terminal block, which serves as the connection point in electrical circuits. In an explosive atmosphere containing hydrocarbons, an uncertified or improperly installed terminal block could generate sparks, excessive heat or electrical arcs, leading to catastrophic ignition.

Explosion-proof terminal blocks have undergone the rigorous engineering and testing required for safe use in oil and gas facilities where potentially explosive environments are present. Their design and features demonstrate why compliance at the component level is non-negotiable.

Here are some examples of features and design specifications to look for in terminal blocks with the proper compliance, ensuring safety in your oil and gas installation:

Robust Design and Material Selection

Terminal blocks designed for use within ATEX/IECEx certified enclosures have a minimum IP54 rating. For environments with hydrocarbon mists or process dusts, they're integrated into enclosures providing the type of protection ("t") that complies with IEC/EN60079-31. A suitable insulation material is Polyamide 66, which features a Comparative Tracking Index (CTI) of 600 and belongs to Material Group I, indicating high resistance to tracking and electrical breakdown.

Terminal blocks in oil and gas applications must also withstand multiple environmental stressors, such as:

- **Corrosive Atmospheres:** Terminal blocks must undergo rigorous corrosion testing in condensation climates containing sulfur dioxide, where acidic compounds form and attack metal surfaces. The components must create gas-tight connections that protect contact points even under these extreme conditions.
- **Salt Spray:** Particularly critical for offshore platforms, terminal blocks must withstand exposure to fine spray of 5% sodium chloride solution at +35°C for extended periods to simulate marine and offshore atmospheric conditions.
- **Temperature Cycling:** Terminal blocks must maintain proper tight fit and function through dielectric testing after exposure to extreme temperature variations, with severity testing at +85°C for 168 hours (standard) for industrial-grade components.

Excellent Thermal Management

Excessive heat is one of the most common causes of ignition in oil and gas hazardous areas. Terminal blocks, especially when carrying rated currents, can generate heat, making it imperative to select components that are designed to manage this thermal load effectively.

Look for terminal blocks with a maximum service temperature of 110°C, though for some series, the maximum temperature may be 85°C. The highest temperature of the insulating material must not exceed these specified maximum values. In addition, these components can operate within an ambient temperature range of -60° to +66°C at the mounting position — critical for both offshore platforms exposed to harsh weather and desert facilities experiencing extreme heat.

Electrical and Mechanical Integrity

Terminal blocks must maintain proper electrical separation and secure connections. At Altech, we ensure that minimum creepage and clearance distances are maintained for respective voltage ratings between neighboring terminal blocks, as well as between the current bar and the DIN-Rail, preventing electrical breakdown and short circuits. For example, for a 630-V system, creepage distance is 12 millimeters (mm) and clearance distance is 10 mm. For a 400-V system, these values are 8 and 6 mm, respectively.

Compliance with explosion-proof directives also emphasizes proper care for stranded wire connections to prevent conductor damage during installation, leading to loose connections and potential arcing. To avoid short circuits between adjacent conductors, the insulation of each conductor must be maintained up to the metal of the terminal.

Requirements for Intrinsically Safe Circuits

An intrinsically safe ("i") design will limit a circuit's electrical and thermal energy, preventing ignition in an explosive atmosphere. If identified as part of an intrinsically safe circuit, terminal blocks should be marked with a light blue color.

Altech terminal blocks used in such circuits have been tested for compliance with intrinsic safety requirements, including clearance, creepage and solid insulation distances for circuits up to 60 V. A minimum separation distance of 50 mm between intrinsically safe and non-intrinsically safe circuits is required, achievable via partition plates or spacers. These terminal blocks must also meet the requirements for a T4 temperature class, ensuring that their surface temperature remains below the ignition temperature of most hydrocarbon gases commonly found in oil and gas operations.

Clear Marking and Certification

Safety and explosion-proof compliance is not just about design and performance; it's also about clear identification. Altech terminal blocks bear the required information, including the IECEx SIR certification number and Ex protection marking.

- For increased safety ("e"), markings such as Ex eb IIC Gb or Ex ec IIC Gc signify robust construction designed to prevent ignition sources in hazardous gas environments.
- For intrinsic safety ("i"), markings like Ex ib IIC Gb or Ex ic IIC Gc indicate the circuit's energy is restricted to levels incapable of causing ignition.

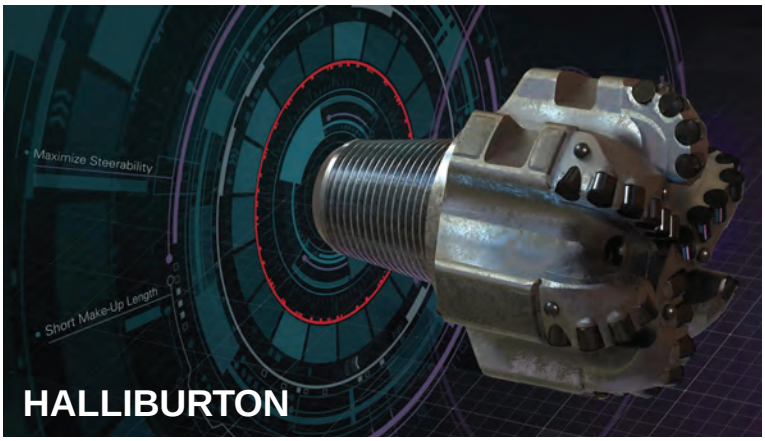
TERMINAL BLOCK APPLICATIONS IN OIL AND GAS

While crucial to hydrocarbon processing, the compliance framework provided by NEC, CEC, ATEX and IECEx applies universally to any industry — including chemical, pharmaceutical and mining — where flammable gases, vapors, mists or combustible dusts create explosion risks.

- ***Power Distribution and Control:*** *These systems help manage the flow of electricity to equipment used in exploration, extraction and processing operations. Terminal blocks ensure that power is distributed efficiently and safely, minimizing the risk of electrical failures that could lead to downtime or safety hazards.*
- ***Process Control and Automation:*** *Terminal blocks connect the sensors, transmitters and actuators that enable accurate data transmission and control. The role of terminal blocks in these systems is a testament to the industry's shift towards greater automation.*
- ***Integration in Control Panels:*** *Terminal blocks organize and manage all the electrical connections in control panels, providing an organized way to connect multiple wires and ensuring the control systems operate smoothly and effectively.*


MODUSPEC/MR GROUP


SAIPEM



HALLIBURTON

DNV Approves ModuSpec's BOP Monitoring System

DNV has granted approval in principle (AiP) for ModuSpec's Blowout Preventer (BOP) monitoring technology, validating its application for offshore drilling environments.

The system is designed to deliver real-time monitoring and diagnostics of BOP performance, enabling enhanced visibility into equipment condition and operational status. By continuously collecting and analyzing system data, the technology supports predictive maintenance strategies and early fault detection, reducing the risk of unplanned downtime during drilling operations.

DNV's assessment confirmed compliance with applicable offshore and safety standards, marking a step toward broader deployment of digitalized BOP condition monitoring systems. The approval reflects increasing industry focus on integrating data-driven monitoring solutions into critical well control equipment to enhance safety assurance and operational reliability.

Halliburton Unveils Shankless Matrix Drill Bit

Halliburton has introduced a new shankless matrix body drill bit engineered to improve drilling efficiency and reduce overall well construction time.

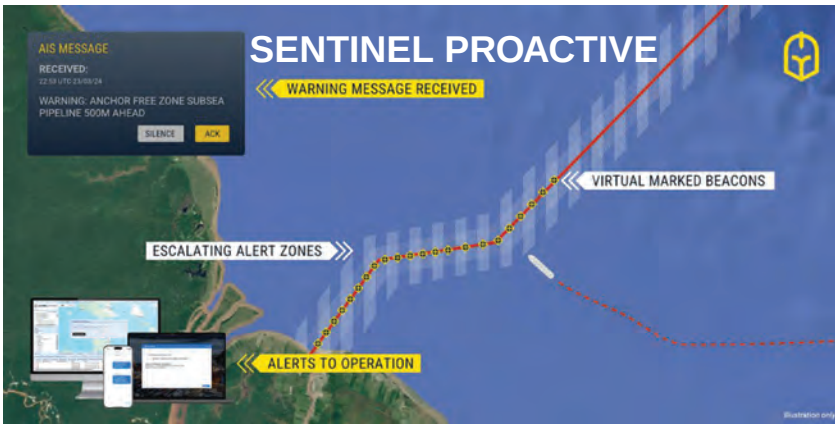
The shankless architecture removes the conventional steel shank interface, optimizing weight distribution and enhancing mechanical integrity between the bit body and drill string. The design supports improved durability in demanding formations while enabling higher rates of penetration.

Constructed with matrix body technology, the bit is intended for complex well trajectories and extended drilling intervals. The innovation targets performance gains through structural optimization and improved hydraulics, aligning with operator demands for faster drilling cycles and lower cost per foot.

Cydome Rolls Out Remote Cybersecurity Tool for Offshore Energy

Cydome has introduced a remote cybersecurity solution designed to protect offshore and remote energy infrastructure without requiring on-site hardware installation.

The platform provides continuous monitoring of onboard digital networks, detecting vulnerabilities and cyber threats across maritime and energy assets. Designed for



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rapid deployment, the system operates remotely, minimizing installation time and avoiding operational disruption.

The tool supports real-time risk assessment and proactive threat mitigation, addressing increasing digitalization across offshore platforms, wind farms and subsea infrastructure. The rollout reflects growing emphasis on cybersecurity resilience as energy systems integrate advanced automation and networked technologies.

ExxonMobil Selects Sentinel Pipeline Monitoring System

ExxonMobil has selected the Sentinel Proactive monitoring system to safeguard its gas pipeline infrastructure offshore Guyana.

The Sentinel system provides continuous surveillance and real-time visibility into pipeline integrity, offering early detection of potential threats and operational anomalies. The technology integrates monitoring sensors and analytical capabilities to enhance situational awareness and risk mitigation.

Designed to strengthen asset protection and environmental safety, the system supports proactive pipeline management by enabling faster response to potential incidents. Deployment of the solution highlights the role of advanced monitoring technologies in securing critical offshore energy infrastructure.

Saipem's Hydrone-R Drone Completes Autonomous Survey

Saipem's Hydrone-R underwater intervention drone has completed an autonomous subsea survey at the Njord field, demonstrating advanced robotic inspection capabilities.

Hydrone-R is engineered to perform inspection, maintenance and intervention tasks without continuous surface vessel support. The system integrates autonomous navigation, real-time data transmission and remote operational control to conduct subsea missions with reduced logistical footprint.

The Njord deployment validated the drone's ability to operate independently under offshore conditions, supporting the transition toward lower-emission inspection methods and digital subsea asset management. The technology forms part of Saipem's broader robotics portfolio aimed at enhancing operational efficiency and reducing environmental impact in offshore operations.