Deep Water & Harsh Environment Seminar

- Agenda
- Company profiles

10 November 2016 | St. Johns, Canada

In cooperation with:

- Innovation Norway
- Norwegian Embassy
  Ottawa
Seminar agenda

Thursday 10 November 2016 | Delta Hotel, Salon A, St. John's, Canada

Chairpersons:

Håkon Skretting, Regional Director, INTSOK
Dave Keating, Oil & Gas Advisor – Canada, INTSOK

08:00 Registration & refreshments

08:45 Welcome
Chairpersons

08:55 Opening remarks
Ingvil Smines Tybring-Gjedde, Deputy Minister, Norwegian Ministry of Petroleum and Energy

09:15 Opening remarks
Hon. Siobhan Coady, Minister, Department of Natural Resources - Government of Newfoundland and Labrador (TBC)

09:30 Quantifying the cost of asset integrity – Is there a better way
Perry Hillier, Regional Manager (Canada) Asset Integrity Management Services, Aker Solutions

09:50 Design solutions for deep water harsh weather regions
Bill Fanning, President Kvaerner Canada Ltd. & Country Manager, Kvaerner

10:10 Benefit of 4G LTE in harsh offshore environments – superior connectivity to every rig, every vessel and every device
Matthew May, Sales Director, Tampnet

10:30 Refreshments and Exhibition
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<td>11:10</td>
<td>Satellite based monitoring for maritime operations</td>
<td>Jan Petter Pedersen, Senior Vice President - Strategy and Relations, KSAT - Kongsberg Satellite Services</td>
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<td>11:30</td>
<td>Human safety in cold/harsh environment</td>
<td>Trond Spande, VP Offshore &amp; Marine Solutions, Safe Yards</td>
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<td>11:50</td>
<td>Close of morning session</td>
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<td>12:00</td>
<td>Lunch – with participation from HRH Crown Prince Haakon and HRH Crown Princess Mette-Marit</td>
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<td>All participants to be seated by 11:55</td>
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<td>Winterization of drilling systems and equipment in harsh environmental conditions</td>
<td>Won Ho Lee, Principal Engineer – US, DNV GL</td>
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<td>13:50</td>
<td>Design of winterization systems according to customer needs</td>
<td>Knut Espen Solberg, Principal Specialist Winterization, GMC Maritime</td>
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<td>14:10</td>
<td>ROPS: An alternative to the industry standard</td>
<td>Seraj Helu, Aftermarket Manager, Sub Sea Services</td>
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<td>Air Gap on semi-submersible MODUs under DNVGL Class – current &amp; future design practice</td>
<td>Kristen Lydhus Amundrød, Principal Engineer, Wood Group</td>
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<td>Innovative SURF design methods adopted on recent Norwegian projects</td>
<td>Per R. Nystrøm, Technical Director, IKM Ocean Design</td>
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<td>15:30</td>
<td>Unique technology for 3D integrity monitoring of subsea pipes</td>
<td>Caleb Roquemore, Sales Manager - ClampOn Inc., ClampOn</td>
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<td>16:10</td>
<td><strong>Controlled mud level managed pressure drilling system for use in deep water</strong>&lt;br&gt;John H. Cohen, Technology Manager, Enhanced Drilling</td>
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<td>16:30</td>
<td><strong>Rigless interventions utilising straddle solutions for lower and upper completions</strong>&lt;br&gt;Ed Van Sickle, VP of Business Development - Interwell Americas, Interwell</td>
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<td>16:50</td>
<td><strong>Engineering approach from seabed to ocean surface</strong>&lt;br&gt;Nils Ånund Smeland, Head of Section, Multiconsult</td>
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<td><strong>Concluding remarks</strong>&lt;br&gt;Chairpersons</td>
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<td>17:45</td>
<td>Bus transportation to The Rooms for reception</td>
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<td>18:00</td>
<td>Reception and Networking&lt;br&gt;<strong>Hosted by Her Excellency Anne Kari Hansen Ovind, Ambassador Extraordinary and Plenipotentiary, The Royal Norwegian Embassy in Ottawa</strong>&lt;br&gt;<strong>Finger food buffet and drinks will be served</strong></td>
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<td>20:00</td>
<td>Close of programme</td>
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* Exhibitors
Presentation title:
Advanced modelling shows small impacts on Norwegian cod from oil and gas activities

Abstract
Fisheries and petroleum resource development are concomitant in some of the world’s most productive continental shelf seas. Much of our understanding of the impacts of oil spills to fisheries and the general health of ecosystems has been acquired from a few major events. It remains a significant challenge to link data on effects of oil on individual organisms, mainly gathered through laboratory experiments, to impacts on the population as a whole. The advanced software tool, SYMBIOSES, was developed in Norway by an international consortium of scientists to improve assessments of environmental impacts linked to oil spill scenarios. The development was supported financially by Norwegian Research Council and a number of industry partners. The tool allows for impacts on cod larval survival to be traced through the population to observe the effect of oil spills on the overall fish stock. We will present simulation results for oil spill scenarios for a single location on the northern Norwegian continental shelf. These examples demonstrate the utility of predictive ecological models to explore and inform on a key impact factor of oil spills which, in turn, lends valuable support to science informed decision-making and stakeholder communication.

Key learning outcomes
1. For all SYMBIOSES oil spill scenarios, the biomass of cod never fell below a sustainable limit. The diverse age distribution of the cod population provides a buffer against losses from major oil spills
2. Moderate action by fisheries managers can mitigate both the ecological effects on the cod population and the economic effects on the fisheries

Core SYMBIOSES Development Team:
J. Carroll, Akvaplan-niva; F. Vikebø, Institute of Marine Research; D. Howell, Institute of Marine Research; O. J. Broch, SINTEF; R. Nepstad, SINTEF; S. Augustine, Akvaplan-niva; G. M. Skeie, Akvaplan-niva; R. Bast, UiT-The Arctic University of Norway
Aker Solutions

Speaker
Perry Hillier, Regional Manager (Canada) Asset Integrity Management Services
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Presentation title:
Quantifying the Cost of Asset Integrity – Is there a better way

Abstract
Asset Integrity solutions today primarily focus on dated Risk Based Inspection (RBI) methodologies and in-service inspections utilising conventional non-destructive testing techniques that in some cases require plant shutdowns to assess the condition of the facility (pipe, vessels, structures, etc). This approach can be costly, introduce significant HSE risk and cause equipment damage through the tear down and assembly resulting in infantile failures. Whilst this approach does give a level of control, recent advances in technology provide a means to gain more insight into equipment integrity and a greater level of confidence in reliability. In today’s operating environment, it is imperative that industry take advantage of these technological developments and new ideas to implement alternative solutions to reduce cost, as well as improve safety and operational efficiency.

This presentation will discuss new, yet proven, engineering philosophies and Advanced NDE technologies that can significantly reduce the cost to operate whilst ensuring a high level of asset integrity. The presentation will highlight how Aker Solutions Integrity Engineering and Advanced Inspection groups work together using proven industry best practices and Advanced NDE Technologies to create value for our clients. We will go through various case studies summarising the approaches that were used, the Advanced NDE Technologies that were utilised and the direct and indirect cost savings that were achieved.

Today’s advanced NDE Technologies are more than just data collection. They combine a range of activities from the initial planning, identifying and understanding failure mechanisms, determining the probability of detection to detailed data analysis. The information that is gathered provides a means for the Subject Matter Experts to diagnose issues and develop strategies to mitigate findings. From the planning stages to the final assessment, advanced NDE provides a means to manage equipment in a safe and cost effective way. This presentation will highlight some of the Advanced NDE Technologies that are being utilised within Aker Solutions and how they provide solutions to our clients that are more efficient and cost effective.

Key learning outcomes
Advantages of combining engineering best practices and new inspection technologies to implement alternative solutions to reduce cost, as well as improve safety and operational efficiency.
**ClampOn**

**Speaker**
Caleb Roquemore, Sales Manager - ClampOn Inc.
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**Mobile:** +1 903 922 1683

**Presentation title:**
Unique technology for 3D integrity monitoring of subsea pipes

**Abstract**
Corrosion and erosion on subsea installations is a big challenge for oil and gas operators and can carry significant cost and risk. Better monitoring of seabed installations will lower maintenance costs, provide greater control and reduce risk to installation integrity.

For topside installations, there are several methods of inspection and monitoring available, but subsea, the challenge has been to find technology that works and provides real value. The growing number of aging subsea installations increases the need for good retrofit solutions.

Research and development of guided-wave methods for asset monitoring and screening has been ongoing for several years and over this time ClampOn has developed a non-invasive instrument which can be used on new subsea installations or retrofitted by ROV to existing installations.

While developing this guided wave based system, ClampOn's research team has worked in parallel to develop and implement more technology in the system which will provide high-resolution 3D data for the area being monitored.

Tomography is already used elsewhere, such as in medical applications, but has never before been used as part of a fixed subsea system to monitor wall thickness loss in pipelines.

This paper provides background information about ClampOn's development of its subsea corrosion-erosion monitoring system, an explanation of the measuring principles used, and explains how combining several technologies and principles allows us to accurately monitor changes in wall thickness loss in subsea installations and fulfil operators' need for continuous condition monitoring of subsea pipes.

**Key learning outcomes**
ClampOn has developed a system that not only provides direct measurement of and important information about ongoing corrosion and erosion, but also offers highly accurate high-resolution 3D imaging of subsea pipes securing pipeline integrity.
Abstract

Oil and gas offshore exploration drilling and production facilities in cold climate and Arctic environmental conditions need various design considerations and operational preparation for intended operations. Offshore winterization of drilling systems and equipment is considered to be one of the essential aspects for ensuring that a facility is capable of and suitably prepared for operations in cold climates. When a drilling rig is in the operational mode at cold temperature for the intended operating, the drilling systems and equipment essential for safety and commercial operation must remain functioning, and have to be adequately protected to minimize risk of hazards against icing, freezing, dropped objects and material properties. System by system review for a semi-submersible mobile offshore drilling unit (MODU) that is intended to operate in cold climate conditions is carried out with focus on system and equipment functionality and criticality affecting safety and operability of the facility. The results of the system by system review propose possible measures to reduce identified risks to an acceptable level from safety, environment, technical and regulatory perspectives. The objective of the paper is to identify winterization needs, design considerations and proper safeguards for drilling systems and equipment, considered to be important to safety of the facility, personnel and environment.

Key learning outcomes

Winterization issues on drilling systems and equipment are generally satisfactorily addressed, but some systems/equipment should be improved to mitigate the identified hazards through safe design or operational measures or operational limitations. With the knowledge obtained from a system by system winterization application, the current offshore winterization standard should be further developed to provide operators and designers with specific winterization design and operational issues and acceptable solutions.
Enhanced Drilling *

Speaker
John H. Cohen, Technology Manager
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Mobile: +1 832 202 3241

Presentation title:
Controlled mud level managed pressure drilling system for use in deep water

Abstract
Harsh environments and deep-water present many new challenges when drilling a well. Many of these challenges are addressed or mitigated when using a managed pressure drilling (MPD) system. This paper discusses a revolutionary MPD system that uses a Controlled Mud Level (CML) to manage wellbore pressures. A CML operation uses a subsea pump module mounted on the riser approximately 1000 ft below the surface to extract the drilling fluid from the riser and pump it to the surface through a separate flow line. Controlling the pump allows the mud level in the riser to be adjusted up or down based on current drilling conditions. This in turn changes the well bore pressure profile, optimising the use of the drilling window. The presentation goes through a brief introduction to CML MPD; also covered are the main equipment components used in the system, integration into a rig, and operation of the system. The paper concludes with case study information from several different operations that have successfully used the system to overcome drilling problems, including narrow drilling windows, lost circulation, depleted formations, and uncertain pore/fracture pressure gradients. Also included in the case study material is operational planning for deployment of the CML MBD system on a vessel for use in the harsh environment of the Barents Sea. The system also enhances influx detection allowing early action that minimises the impact of influx and the time required to circulate it from the well.

Key learning outcomes
- Advantages of MPD in drilling operations
- Planned operations for Barents Sea
- Case studies of previous wells
GMC Maritime

Speaker
Knut Espen Solberg, Principal Specialist Winterization

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Presentation title:
Design of winterization systems according to customer needs

Abstract
GMC Maritime is a Norwegian industrial company, established in 1973. From our headquarter in Stavanger, Norway, we provide multidiscipline services and product solutions to the global marine and offshore industries. Winterization solutions has been part of the company’s focus areas for the last 5 years, and extensive knowledge, products and experience has been gathered during these years.

GMC is designing and implementing winterization systems and has been involved in the winterization and preparations for cold climate operation for the semi-submersible West Alpha and the Leiv Eiriksson, in addition to the drillship Noble Globetrotter. These large projects have involved topics ranging from training and wind chill analysis to custom technical design of the systems, including component testing at our test facilities for regulatory compliance.

These projects have in common that they have been addressing preparing the rigs/vessels for cold climate operation. However, large differences in customer needs have been experienced due to differences in area of operation, regulatory regimes, company cultures, available time and resources.

The ability to identify and define the customer needs in each individual case is essential for successful design and implementation of systems and procedures for cold climate marine operation. This presentation addresses both the common denominators and the uniqueness of individual projects in addition to the lessons learned.

Key learning outcomes
It is essential with a good dialog between the customer and the supplier to identify and define the needs of the individual project, including regulatory requirements and operator requirements. This demands a multidisciplinary approach involving different parts of the organisation from both the customer and supplier.
IKM Ocean Design

Speaker
Per R. Nystrøm, Technical Director
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Mobile: +47 917 444 22 7

Presentation title:
Innovative SURF design methods adopted on recent Norwegian projects

Abstract
IKM Ocean Design has been involved in many of the most recent offshore field development projects being developed by Statoil and its partners on the Norwegian Continental Shelf. These projects include the large Johan Sverdrup development in the North Sea, Aasta Hansteen and Trestakk in the Norwegian Sea and Johan Castberg in the Barent Sea. Due to the change in the oil price, there has been a significant focus in the mentioned projects to investigate new solutions and challenge old industry truths in the process of reducing cost and thus making the projects economically viable.

The paper will discuss some of these innovative methods investigated and introduced for the design and installation of subsea pipelines and structures on the above projects including:

- Optimised protection design from dropped objects, considering new analyses methods and laboratory tests performed on fallings objects such as drill pipe and containers
- The use of the Residual Curvature Method for reel-lay and S-lay installation method in order to:
  > Minimise seabed intervention/rock dumping for thermal buckling and expansion reasons.
  > To allow for direct tie-in of flowlines without the use of tie-in spools
  > To reduce pipeline spans lengths and heights in uneven seabed
- The use of detailed integrated FE models to more accurately simulate trawl gear pullover on free spanning pipelines in order to reduce the requirement for expensive span corrections.
- New numerical methods to more accurately calculate the potential for a pipeline to rotate due to residual strains which could have negative effects for pipeline inline structures to be installed and how to counteract such tendencies.

Key learning outcomes
How to potentially reduce protection requirements for pipelines, subsea structures and spools due to loads such as dropped objects and trawl gear interaction. How to minimize seabed intervention requirements due to trawl gear loads and other external loads in free spanning and thermal buckling sections.
Interwell *

Speaker
Ed Van Sickle, VP of Business Development - Interwell Americas
Email: edsi@interwell.com
Mobile: +1 713 724 7530

Presentation title:
Rigless interventions utilising straddle solutions for lower and upper completions

Abstract
Both Upper and Lower Completions often require some form of well intervention at some point in the life of the well. The intervention may require the retrieval and repair of tubing, Surface Controlled, Sub-Surface Safety Valves (SCSSV), and other downhole production equipment. Some wells may require the conversion to Gas Lift in order to enhance or optimise production, or perhaps a modification to an existing downhole Gas Lift System. These interventions often require the use of a rig in order to remove and replace the tubing, or worst case, require a major workover. This operation is extremely costly, and time consuming, and could result in temporary or long term loss of production. Straddle technology is available to overcome these challenges for well intervention. This straddle technology can be conveyed and successfully installed thru-tubing and Rigless.

Thru-Tubing Straddles have been developed to solve multiple completion, downhole hardware and production technical issues. Significant savings in rig time expense and many other time-sensitive costs are possible. Thru-tubing Straddles, conveyed via E-line or Slickline, will enable the Operator to retrieve and re-install production tubing to change out production seals, SCSSV’s, failed Gas Lift Mandrels or Gas Lift Valves. The well can be brought back on line, and production can continue, in a timely manner, without waiting for a drilling or workover rig to become available.

Key learning outcomes
• Wells can be successfully retrofit with Thru-Tubing Gas Lift Systems, without retrieving the tubing.
• Rigless, Thru-tubing Straddles can be utilised to install an Insert Downhole Safety Valve without retrieving the tubing.
• Multiple Thru-tubing Straddle design options can enable Rigless production tubing repairs and production enhancement.
KSAT, Kongsberg Satellite Services

Speaker
Jan Petter Pedersen, Senior Vice President - Strategy and Relations

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Mobile: +47 90581626

Presentation title:
Satellite based monitoring for maritime operations

Abstract
Earth observation data from satellites can provide valuable information in the different stages of operations in remote and cold climates.
Synthetic Aperture Radar (SAR) Satellites are ideally suited for environmental monitoring, ice monitoring and large-scale maritime situational awareness in the arctic due to their orbital characteristics and ability to see through darkness and clouds.

KSAT (Kongsberg Satellite Services) offers ground station services to satellite owners around the globe, in addition to services based on earth observation data from a variety of satellites. Having access to updated information is crucial when operating in cold climates. KSATs uniquely located ground network at high latitude ensures extensive coverage, best available update frequency and rapid delivery of data.

Key learning outcomes
Updated information from satellites can be a valuable asset in decision making in for operations in arctic and cold climate, whether monitoring for oil-spills, vessels or ice.
Kvaerner

Speaker
Bill Fanning, President Kvaerner Canada Ltd. & Country Manager
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Mobile: +1 709 770 7725

Presentation title:
Design solutions for deep water harsh weather regions

Abstract
The areas offshore Newfoundland and Labrador hold great potential for the oil and gas industry in the years to come.
The environmental conditions on the Grand Banks are among the roughest in the world, with large waves as well as drifting ice and icebergs.
Moving into deeper waters further away from shore introduces new challenges and a requirement for new and innovative solutions to ensure safe operations with high regularity and production uptime.
The new locations are far from shore, the visibility may be low and platform access may be restricted by weather and ice conditions. Kvaerner has a long and proven track record for delivering fixed and floating offshore platforms including, concrete substructures for use in the offshore industry in some of the harshest areas in the world. The combined experience and knowledge from design of both bottom founded and floating platforms for rough weather conditions around the world, is the basis for the more recent development work done by Kvaerner to design solutions for the future developments in deeper waters in the Barents Sea and offshore Newfoundland and Labrador.

Key learning outcomes
- innovation through innovating proven design solutions for deep water harsh weather regions;
- broader industry collaboration is necessary to lowering the entry cost for future development of deep water regions;
Multiconsult

Speaker
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Presentation title:
Engineering approach from seabed to ocean surface

Abstract
In general, all engineering structures that are to be located in regions with deep waters and harsh environments, face some common challenges; such as challenging seabed anchoring and loads from waves and/or ice on the surface. The current industry practice on how to deal with these challenges vary greatly from project to project and therefore represents an uncertainty in the project execution.

Through in-depth design knowledge of seabed anchoring structures (e.g. suction anchors or gravity anchors/foundations) combined with state of the art structural analyses methods, there are great opportunities to reduce project costs, design risk, execution risk and uncertainties throughout the entire project. By reducing size and weight on anchoring structures, particularly on subsea installations, the available weight for equipment can be increased without complicating the installation. For gravity based structures, proper design of the complex soil-structure interface may significantly improve constructability and lower the execution risk.

For floating and gravity based structures in harsh environments, loads from ice and waves are often governing in the design. In depth knowledge on assessment of these kind of loads, often have a significant impact on progress and risk, both during the design and execution phase. Experience and understanding of governing ice- and metocean parameters under severe conditions are crucial to evaluate concepts and perform detail design and execution.

Key learning outcomes
Selected highlights from a design perspective on:

- Where an early effort in the design- and engineering process may contribute to reduce project risk through detailing and execution phases.
- The value of settling and defining environmental boundaries based on proper understanding of governing parameters, in order to reduce project execution risk.
Safe Yards *

Speaker
Trond Spande, VP Offshore & Marine Solutions
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Mobile: +4797533333

Presentation title:
Human safety in cold/harsh environment

Abstract
As exploration and operations are moving further into cold and harsh environment, it raises challenges to maintain a safe working environment for the personnel as well as the integrity of operational equipment. Safe Arctic Technology/Safe Yards will develop more efficient and documented solutions for “winterization”, human factor and operational training for personnel. This both in accordance with the various class societies guide lines and notations as well as the upcoming Polar Code for vessels operating in polar waters. In the presentation we will present some of the challenges to obtain ice free escape routes and working areas, while keeping costs and energy consumptions as low as possible. We will address the importance of “human factor” both for safety and efficiency. We will address safety equipment as it is today and look at “gaps” towards low operation temperatures. We will here present research done together with the Royal Norwegian Coastguard, university of Stavanger, University of St Johns and the Norwegian costal authorities.

Key learning outcomes
Better understanding of the operational challenges regarding human factors and safety in cold climate.
Sub Sea Services

Speaker
Seraj Helu, Aftermarket Manager
Email: s.helu@subseaservices.no
Mobile: +47 464 40 568

Presentation title:
ROPS: An alternative to the industry standard

Abstract
The dynamics of drilling wells has changed since the early days of the industry. Operators are constantly pushing the bounds in order to explore areas, which require enhanced technologies and more HSSEQ focused operations. This calls for an industry response, which enables rig owners to adapt and perform in a larger array of operational, environmental and personnel safety challenges.

As a technology focused partner, Sub Sea Services has for the past 10 years, engaged in a research and development program intended to terminate the use of man riding in hose connection operations. This provides safety for crews onboard and enhances the uptime of the rigs in an operation, which was highly dependable of environment conditions and crew training.

The result of our R&D is a Remoted Operated Pull-in System installed onto the telescopic joint or dedicated termination joint, which allows connection and disconnection of moon pool hoses, via hydraulic fluid controlled by a console on deck.

Our units are deployed on semis and drill ships throughout the world, ensuring rig owners and operators a reduced hook up time to 1 hour, regardless of environment conditions.

Key learning outcomes
- No man-riding operation to connect and disconnect the moon pool hoses is possible.
- Reduced hook up time to 1 hour, some units down to 35 minutes, allows rig owners and operators to standardise their expectations of time and safety in these operations.
- The development and use of high pressure equalised swivels in the moon pool hoses, allowing unimpeded 360 degrees rotation of the hoses at the full range of pressure, without any bearings or grease.
- The development and use of a different application of tungsten carbide overlays, in order to increase longevity and reliability of our equipment.
Tampnet *

**Speaker**
Matthew May, Sales Director

**Email:** matthew.may@tampnet.com

**Mobile:** +1 757 651 6663

**Presentation title:**
Benefit of 4G LTE in harsh offshore environments – superior connectivity to every rig, every vessel and every device

**Abstract**
Tampnet's vision is to become the global leader in providing high capacity, low latency and reliable connectivity to offshore installations, mobile rigs and vessels. Tampnet's mission is to add value to our customers through connecting offshore assets to robust and reliable terrestrial networks with high capacity and low latency. Our services shall enable our customers to improve on health, safety, quality, operational efficiency and crew welfare in their offshore operations.

Tampnet operates the largest offshore high capacity communication network in the world and serves more than 240 Oil and Gas (O&G) platforms, Floating Production Storage and Offloading units (FPSOs) and exploration rigs in the Gulf of Mexico (GoM) and the North Sea. In total, Tampnet has installed and operates a redundant subsea infrastructure network of 2,600 km fiber and approximately a huge number of offshore grade radio links.

Tampnet has successfully installed a 4G LTE network in the North Sea based on its leading Subsea Fiber Network – and is currently deploying a revolutionary high-speed communications 4G LTE network in the GoM - in order to deliver the latest technologies to the oil and gas industry in this region. Tampnet is continuously seeking new opportunities and areas for building similar and groundbreaking offshore communications networks – such as offshore Newfoundland.

**Key learning outcomes**
Demonstrate to the audience the opportunities made possible by new technologies and a state-of-the-art 4G LTE platform in the Offshore Environment:

1. Operations
2. Safety
3. Environmental monitoring and control
4. Crew Welfare
Wood Group *

Speaker
Kristen Lydhus Amundrød, Principal Engineer

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Mobile: +47 95 07 72 59

Presentation title:
Air Gap on semi-submersible MODUs under DNVGL Class – current & future design practice

Abstract
Recent incidents involving wave impact on the deck box and superstructures of semi-submersible MODUs in relatively common stormy sea states have recalled the attention of the industry to the air gap problem. There has been significant effort in reviewing and revising the regulatory regime governing the air gap of such units to ensure safe operation in the harsh environments frequently found in the North Atlantic and Artic oceans. An Offshore Technical Guideline (OTG-13) was published in draft edition by DNVGL in the summer of 2016 with guidelines for air gap calculations that presents several changes to what has been considered industry practice. This paper will, based on a generic semi-submersible MODU, investigate the differences between what has been considered industry practice and the new guidelines. Focus of the evaluation will be on calculation of the wave frequency contribution, namely on wave asymmetry factor and viscous damping influence on results. Two different locations shall be analysed - the North Sea and the Barents Sea – so that the impact of the new regulations on harsher environments can be assessed. A full air gap analysis based on what has been considered industry practice and the new OTG-13 practice will be performed and compared with the aim of assessing the short term impact to the industry.

Key learning outcomes
Suitability of drilling rigs in harsh environmental
Corrosion in the oil and gas industry is a major cost driver. For the North Sea production platforms 60% of all maintenance costs are related to corrosion, directly or indirectly. In the US Gas and Liquid Transmission Pipelines expends 7 billion US$/y alone on corrosion related issues. Monitoring integrity of offshore platforms, subsea systems and pipelines has become more important in evaluating field life extensions and future maintenance cost.

Investing in integrity management systems requires justification and the risk of various corrosion costs needs to be considered.

The objective of the workshop is present technology and experience on corrosion protection of offshore structures (not just structures but also pipelines, flow lines, risers and subsea systems).