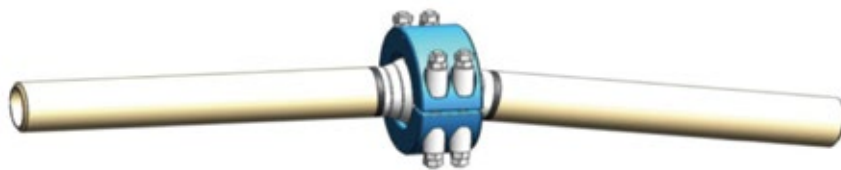


A New Angle of Approach



The SeAlign angled pipe connector.

Small Norwegian company Subsea Design has taken an interesting angle on pipeline installation projects.

The firm has developed the SeAlign self-aligning connection system which is able to connect misaligned pipes and flanges. The patented connector has been developed to connect rigid pipes at an angle for both subsea and topside applications.

Hans Fjeldall, sales manager for the company, told *SEN*, “The advantage of this connector is that it can connect at an angle. Plus or minus 3 degrees is our standard angle but we can tailor-make it for larger angles, but obviously the larger the angle the bigger the connector.

“We have recently won the first major contract for this system on **Johan Sverdrup** (*SEN*, 33/2) where we will supply 72 connections for the subsea field comprising 8-in., 12-in., 14-in., and 18-in. size connectors.” Delivery of the diver-installed connector systems will begin this year and run through until 2018.

Sea Design earlier delivered nine connectors for the **Tordis** (32/20) Field for Statoil but without the angling function.

Statoil has been involved with the SeAlign concept for the past five years and provided financing through its Loop programme. Innovation Norway also provided funding for the project.

Fjeldall added, “Originally the idea of developing this system came up when some of us had experience during various projects of large set spools of 100 m or

200 m in length and the difficulty of installing them with very, very tight tolerances.

“This system reduces the bending loads into the pipeline systems, into the foundations and the hub terminations, which is one of the big risk scenarios especially when

using a duplex type of material. The big advantage of having such a flexible connection is that it is self-adjusting into finding the angle itself, as long as it is within the tolerance of plus or minus 3 degrees. Then when it is connected, we torque it up and it remains static.”

Technical manager Bjorn Pettersen added, “Normally when you make a pipe connection on the seabed it comes in at an angle so you need a mechanism to align it and then close the connector as they do today.

“The advantage with this one is that if you come in at 1 degree you close it and it remains there, so you don’t need to bend the pipe into the right position. Every time you bend the pipe you add loads and stresses into the system. If you come in at 3 degrees it remains at 3 degrees. It is never corrected. You don’t need to put extra work on it to correct it.”

Cost savings using the technology could be “huge” according to Sea Design, which is also in the process of developing an ROV-installable SeAlign connection.

Pettersen said, “The potential for cost savings is huge. If you have a field where you are using vessels for installation you are able to reduce the time for installation by getting a flexible end connection instead of a rigid connection, then we are talking about huge numbers. Not only cost saving by reduction of the spool itself by 30 or 40% but the infrastructure around it.


“The spool is shorter and the time offshore becomes shorter. The biggest saving is on vessel time offshore.”



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DEVELOPMENT

Halliburton Signs up on Maria

Wintershall in Norway has awarded a four-year service contract to Halliburton to support its exploration and development campaigns in Norway, including the upcoming **Maria** (32/21) project.

The contract is effective immediately and will be used for drilling-associated services on Wintershall's Maria development in the Norwegian Sea.

The agreement, which contains incentives for efficient well deliveries, can also be used for other Wintershall activities.

"At an uncertain time for the industry, this contract provides a timely boost for the supplier market while laying the groundwork for efficient construction of our operated development and exploration wells over the rest of the decade," said Bernd Schrimpf, Managing Director of Wintershall Norge.

Wintershall and Halliburton will immediately begin collaborating on detailed engineering work prior to the start of drilling for the Maria development in the first half of 2017.

Early next year, Halliburton will provide services supporting the drilling of six development wells on Maria's subsea templates located at a depth of around 300 m on the Halten Terrace in the Norwegian Sea.

Two subsea templates for Wintershall's Maria Field have arrived in Kristiansund on the heavy load carrier *Meri*.

Maria is being developed with the two subsea templates tied back to several host installations in the area.

The Maria reservoir will be linked via a subsea tieback to the *Kristin*, *Heidrun* and *Åsgard B* production platforms. The Maria well stream will go to the Kristin platform for processing while supply of water for injection into the reservoir will come from the Heidrun platform and lift gas will be provided from Åsgard B via the *Tyrhans D* field subsea template.

Processed oil will be shipped to the Åsgard Field for storage and offloading to shuttle tankers. Gas will be exported via the Åsgard Transport System to Kårstø.

Wood Gets Busy Off Norway



The Oseberg Ost platform off Norway

Wood Group has been picked by Statoil to deliver subsea field concept engineering for the **Snorre expansion project** (33/2) offshore Norway.

The project will focus on cost efficient enhanced recovery from the Snorre reservoir, with tieback to the existing **Snorre A** tension leg platform and gas import from **Gullfaks A**.

There are also options for front end engineering design (FEED), detailed design and fabrication on

this contract award.

The deal is one of four subsea contracts Wood Group has landed with Statoil on the Norwegian Continental Shelf (NCS).

On the **Oseberg** (33/2) field development Wood Group Kenny has been awarded detailed design for two pipelines with corresponding spools and an umbilical, which will form part of the tieback from the future unmanned well-head (UWP) platform to the Oseberg field centre.

Wood Group Kenny also provided FEED support on the **Utgard** field development to support engineering on the pipeline system that will tieback the planned subsea template to the **Sleipner T** platform and performed lifetime extension studies to the pipeline system in the Gullfaks field.

Wood Group has also won a new five year contract with BP-operated projects, valued at \$500 million, to deliver services to eight facilities, offshore Azerbaijan. Effective immediately, Wood Group PSN (WGPSN) will provide engineering, procurement and construction management services (EPCM) under the contract, which has the option for two further two year extensions.

Deepwater Projects Sink

Analyst Douglas-Westwood (DW) says the low oil price has, unsurprisingly, severely impacted investment in deepwater projects, with forecast deepwater expenditure put at \$137 billion between 2016 and 2020.

This represents a 35% decline compared to DW's previous edition of the deepwater forecast issued March 2015.

Subsea production equipment, SURF (subsea umbilicals, risers and flowlines), pipelines and trunk lines will

represent 34% of total expenditure combined, while floating production units will account for 28% of spend over the forecast period.

DW said, "The prolonged low oil price has impacted the deepwater market, with operators considering alternative development options and delaying the sanctioning of new projects, whilst trying to protect returns on their existing investments in the sector.

"However, projects already under construction are unlikely to be affected. The largest proportion (38%) of the total spend will be attributed to drilling and completion."

Expenditure will predominantly be driven by Africa and the Americas, which will account for a combined 87% of total deepwater capex.

Though all regions will be adversely affected by low oil prices, projects that were sanctioned before the oil price downturn will help sustain activity levels in these regions, and in addition DW expects to see the development of East African gas basins towards the end of the forecast period.

Record levels of backlog established over the 2011-2014 period have somewhat insulated subsea hardware manufacturers from the oil price downturn.

However, DW expects a further decline in subsea hardware installations in 2017 and 2018 with backlog falling rapidly and new orders trickling in at very low levels.

DW said, "We expect that the subsea OEMs will feel the full impact of the downturn in 2016/2017 and will face strong competition for the lower volume of projects. In total, it is forecast that the number of deepwater wells to be drilled over the next five years will decline by 3% compared to the preceding five-year period.

"From a supply-chain perspective, this point in the cycle is an opportunity to bring through new approaches and technology for deepwater developments to improve efficiency and lower cost. In the long run, we remain of the view that deepwater will be a cost competitive source of world-class hydrocarbon reserves."

DEVELOPMENT BRIEFS

McDermott International has completed the deepwater subsea tieback from the **Otis (32/20)** well to the **Delta House (32/20)** floating production system in the U.S. Gulf of Mexico.

McDermott's *Lay Vessel North Ocean 105 (LV 105)* completed the work for LLOG in Mississippi Canyon 79 in water depths ranging from 1,178 m to 1,348 m. The scope of work consisted of project management, engineering and installation of 21,350 m of insulated rigid flowline and insulated steel catenary riser as well as a control umbilical, pipeline end manifold jumper and associated flying leads. The flowline and riser were fabricated at McDermott's new spoolbase and marine facility in Gulfport, Miss. McDermott is lining up for reel lay work on Anadarko's **Caesar Tonga Phase II (31/16)** this year. Caesar Tonga is linked back to Anadarko's **Constitution** spar via the first ever lazy-wave steel catenary riser. McDermott also has been awarded three separate projects by a major national oil company for the integrated engineering, procurement, construction and installation (EPCI) services in multiple fields in the Arabian Gulf. In addition to this, there also has been an award of an additional scope on an existing contract, also being executed in the Arabian Gulf. These projects combined are a substantial brownfield award for McDermott and have a total scope that includes the EPCI for jackets and topsides, subsea pipelines and subsea cables.

Work on the projects is expected to be executed through fourth-quarter 2017.



Proserv will supply a subsea control system for use on Callater.

Subsea 7 has been awarded an engineering, procurement, installation (EPI) and commissioning contract worth up to \$150 million by Apache North Sea as part of the **Callater (32/17)** Field development. The work scope covers the project management, EPI and construction of a 4-km, 45-in. pipeline bundle system consisting of production lines, and power and supply services. It also includes the installation of a 13-km electro-control umbilical, associated structures, field testing and precommissioning works. Project management and engineering work will start

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immediately from Subsea 7's offices in Aberdeen, with offshore activities planned for first-quarter 2017. Meanwhile, Proserv will supply a subsea control system and associated topside and subsea interface equipment for use on the new Callater wells located south of the Beryl Alpha platform. The latest award comes after Proserv successfully completed work for Apache on the **Bacchus** and **Aviat** extension wells for the provision of subsea control modules and services in the Forties Field. The design, manufacture and supply of the workscope will be carried out by Proserv's team of subsea experts in Great Yarmouth, U.K.

Repsol has been given the nod by Norway's Petroleum Safety Authority to remove the *Petrojarl Varg* FPSO unit and subsea structures from the **Varg (32/10)** Field off Norway. The field was developed using the *Varg A* wellhead platform, subsea structures and the *Petrojarl Varg*. The ship-shaped, turret moored FPSO unit has been in production on the field since 1998. Repsol is the operator of the field following its 2015 buy-out of Talisman, which had been the operator since 2005. The Teekay shipping company has been responsible for running the two facilities on the field on behalf of the operator. Repsol plans to cease production from the field in June 2016. *Petrojarl Varg* will leave the field in August 2016, while removal of the subsea structures will start later in the third quarter. The *Varg A* wellhead facility will remain in place while plugging and removal of the wells takes place. The removal is a change of direction by Repsol after Talisman only last year exercised an option to extend the contract for the *Petrojarl Varg* for three years until the end of June 2019.

Petrofac has been awarded a Duty Holder contract from BP to support the late life management of the **Miller (31/13)** platform, located in the Central North Sea. The Miller Field last produced in July 2007. Since then BP has undertaken well abandonment and topsides cleanup on the asset and anticipates that the topsides will be removed during 2017 or 2018.

Simmons Edeco, which supplies wellhead and valve maintenance and onshore drilling services, has landed a multimillion-pound contract from a major North Sea oil and gas operator. Simmons Edeco will continue to provide wellhead and valve maintenance services for all of the operator's assets in the North Sea, where it has been working on behalf of the company since 2003.

Bibby Offshore will provide first gas and construction support to an unnamed client on its assets in the Southern North Sea. The contract, due to be executed between third-quarter and fourth-quarter 2016, will see Bibby Offshore's construction support vessel *Olympic Ares* and its diving support vessel *Bibby Polaris* perform subsea engineering work 150 km off the coast of Lincolnshire. The work scope consists of precommissioning and commissioning support and carrying out a range of construc-

tion services including valve operations, spool installation, umbilical pull in and lay, trenching and stabilisation through installation of concrete mattresses. The contract is Bibby Offshore's second construction project with the client, following a previous successful campaign in 2015.



Saipem has landed a bumper contract for Shah Deniz Stage 2.

Saipem and its consortium partners Bos Shelf and Star Gulf have been awarded a \$1.5 billion contract for work on the **Shah Deniz Stage 2 (33/1)** project offshore Azerbaijan. The scope of work covers the transport and installation of subsea production systems and subsea structures, laying of fiber-optic cables and production umbilicals, laying of 90 km of pipelines, and the activation, crewing and operations management of the newbuild subsea construction vessel *Khankendi*. Stefano Cao, Saipem CEO, said, "This award further strengthens Saipem's key role in the construction of the Southern Gas Corridor where the company has a total of four contracts in the upstream segment and in gas transportation infrastructure both onshore and offshore."

More than 140 km of pipeline manufactured at Tata Steel's recently enhanced double submerged arc welded (DSAW) mill has achieved an industry first by becoming the deepest to be laid in the Mexican section of the Gulf of Mexico (GoM). The company was awarded a contract to supply 457-mm outer diameter by 28.6-mm WT API 5L PSL2 X65MO line pipe from its large diameter 42-in. DSAW mill in Hartlepool, U.K., for the development. The project marked the first time that a pipeline had been laid at water depths greater than 914 m in the Mexican section of the GoM. The mill has been the focus of significant recent investment to enhance technology and processes and increase power efficiency. More than 125 improvements were completed in 2015 to strengthen its overall operational and performance capability.

FLOATERS

TEN Project 90% Complete



Mooring operations have been completed for the FPSO *Prof. John Atta Mills*.

Tullow Oil's offshore Ghana **TEN** (*SEN, 33/1*) project is on course to produce first oil between July and August this year. The project is now more than 90% complete, with a number of significant milestones being reached in the first quarter.

The FPSO *Prof. John Atta Mills* sailed from Singapore on Jan. 23 and arrived in Ghanaian waters on March 2. The FPSO mooring operations are complete, the vessel is now being connected to the subsea infrastructure via

the risers and umbilicals, and the commissioning of the systems is underway.

Six of the eleven predrilled wells are now completed, with the seventh completion underway. Tullow said, "The overall subsea installation campaign, comprising about 35,000 mt of equipment, also has reached over 90% completion. Given the mid-year startup and ramp-up in the second half, Tullow estimates that TEN average annualised production in 2016 will be around 23 Mbbbl/d."

Meanwhile, Tullow said a technical investigation of the **Jubilee** (*32/23*) Field's FPSO turret bearing has confirmed that it is no longer able to rotate as originally designed leading to new operating procedures being implemented.

These include the vessel being put on "heading control," which requires the use of tugs to minimise vessel rotation and revised offtake procedures, including the use of a dynamically positioned shuttle tanker and a storage tanker.

Tullow said a project team has been established to review the root cause of the problem and determine the optimum design of the permanent solution of the Jubilee turret issue. A decision on the solution is expected in the next few months.

Premier Cuts Catcher Costs to \$1.35 Billion

Premier Oil said it has reduced gross capex on its U.K. North Sea **Catcher** (*32/21*) project to about \$1.35 billion, a reduction of 15% from the time of original sanction.

Premier said it had been able to cut costs by negotiating reductions on contracts as well as the rephrasing of some

contractor payments and work scopes.


The project is scheduled to deliver first oil in second-half 2017.

Premier said, "The 2016 subsea installation campaign is progressing well. The four remaining drilling templates

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Oil flows from Solan are expected to reach 25 Mbbl/d.

are now in place while installation of the flowline bundles, towheads and mid-water arches is in progress. The dynamic risers and umbilicals are on track for delivery in June.”

Premier is targeting completion of subsea work in 2016 ahead of schedule. Meanwhile, the buoy is transiting to Northeast Scotland and, together with the mooring system, is on track for installation this summer. Drilling on the first Catcher template has been completed, and all four wells have met or exceeded predrill expectations.

FLOATER BRIEFS

Talks between Ophir Energy and Schlumberger to partner up on the **Fortuna** (32/24) floating LNG project in Equatorial Guinea have collapsed. Ophir said it had been unable to complete the deal for its Fortuna project on the terms agreed in January, when it signed a preliminary contract with the world’s largest oilfield services provider. Nick Cooper, CEO of Ophir, said, “The Fortuna project work streams are progressing towards FID [final investment decision]. We have been reviewing a number of options and our discussions continue with other quality counterparties that can offer an attractive source of funding. In addition, the reduction in the capex to first gas has lowered the project breakeven oil price to approximately \$40 per barrel. We continue to work closely with Golar, the prospective offtakers and the other potential partners and remain confident that we will take the FID in 2016.”

Sevan Marine has been tasked by a U.S. oil major to continue the paid floating LNG (FLNG) feasibility study announced in third-quarter 2015 for the use of Sevan Marine’s cylindrical hull for a specific FLNG development. It has been awarded a follow-up study focused on the marine aspects of Sevan Marine’s unique cylindrical design. The study is expected to generate about 9,000 hours of paid engineering work through 2016.

Yinka Folarin Petroleum Co. has pumped first oil from the **Aje** (32/22) Field in OML 113 offshore Nigeria. Subsea installation activities had been underway at Aje since January, and were completed in early March ready

Drilling on the **Burgman** template is expected to commence shortly, following the completion of drilling at the **Laverda/Slough** exploration prospects.

Delivery of the FPSO hull to Singapore is expected by July and progress in manufacturing of the topside units has been good, Premier said.

Following integration and commissioning, the sail-away date of the FPSO unit from Singapore for a 2017 field startup remains on track.

Meanwhile, first oil from the **Solan P1** production well in the U.K. North Sea Solan Field was achieved on April 12. The well achieved rates of 8 Mbbl/d of oil on natural flow before rising to 14 Mbbl/d following the successful commissioning of the downhole pump.

As planned, production was subsequently shut down to complete the additional works required for second oil: the tie-in of the second water injector was completed with final commissioning of the water injection system underway, while the electric submersible pump completion for P2 is being installed with tie-in of the well planned for early June.

Resumption of production is scheduled shortly after, with the Solan Field expected to reach production rates of 20 Mbbl/d to 25 Mbbl/d in the third quarter when both pairs of producer-injector wells will be onstream.

for the hookup of the *Front Puffin* FPSO unit, which arrived in Nigeria on March 16. Oil produced from the Aje Field will be stored on the *Front Puffin*, which has production capacity of 40 Mbbl/d and storage capacity of 750 Mbbl. Aje is situated in water depths ranging from 100 m to 1,000 m about 24 km from the coast.

Malaysia’s national oil company Petronas has marked another construction milestone for its second floating LNG facility *PFLNG2*, with the official launch of the hull at Samsung Heavy Industries (SHI) shipyard in Geoje Island, South Korea. The 393-m long hull was floated out from the Green Dock 3 to anchor at the quayside of the SHI shipyard signifying the near completion of the hull construction, which commenced in June 2015.

Offshore pre-lay of the 77-km chain and cable mooring system for the Inpex-operated **Ichthys** (32/23) LNG project has been completed in the Browse Basin off the coast of Western Australia. As part of the mooring system, 49 chains were laid on the seabed in water depths of up to 250 m and anchored to foundation piles—5.5 m in diameter and 63 m long. The mooring system will secure two offshore facilities—the central processing facility and FPSO facility—at the Ichthys Field seabed for at least 40 years of continuous operation. Supplying more than 40,000 tonnes of large-scale anchor chains for the project represented nearly 18 months of worldwide chain production. Each chain link weighs more than 700 kg, Inpex explained.

OTC 2016 CONFERENCE REPORT

Chevron Looks to Leicester City for Inspiration

The recent shock of English football—Leicester City winning the English Premier League despite 5,000-to-1 odds stacked against it—shows how far focus can take a team.

Chevron Corp. is arguably at the top of its league in the Gulf of Mexico, where it is the largest leaseholder and produces 140 Mbbl/d.

Yet the company sees gaps between where it is and the goal line and cannot help but fret.

“Bluntly, we’re finding it too often where we don’t have the necessary competencies, the technical competency, to do the engineering that we need to do to complete these projects,” said Mick Kraly, Chevron’s general manager of facilities engineering, at an OTC luncheon.

Large projects have become immensely complex, with engineering, inspections, fabrication, construction, precommissioning and startup demonstrating a “lack of depth in the competencies we really need.”

But Kraly sees parallels to Leicester City as the model for thriving.

As Chevron and other deepwater operators push farther and deeper into the water to reach areas of optimal return, an unbalanced stack of concerns have built up like paperwork on an untidy desk.

Suppliers, engineering and safety concerns only grow as new technology—while ultimately valuable—can lead to optimism that may blind operators to risk.

“A lot of our projects now are bigger, larger and harder to reach,” Kraly said, with more complicated supply changes making Chevron “rethink things.”

While Chevron’s brownfield projects have single-well breakevens typically in the \$20 to \$40 Brent range, greenfield developments have been more difficult, Joe Geagea, Chevron’s executive vice president of technology, projects and services said in a May 1 conference call.

“Obviously we need scale in the resource, but we also need to rethink about how we bring our development,” Geagea said.

Chevron is considering optimizing development concepts. “This is another place where we actually need our suppliers,” he said. “We need to work closely with them to continue to drive the cost down.”

Kraly said the complexity of projects is increasingly a hurdle, one that has it bringing aspects of engineering back inside the company; working closely with suppliers toward standardisation and even reworking the basic metallurgy it uses.

Chevron measures its ability to successfully manage a project using the International Project Agreement standards of schedule, cost and production attainment—reaching Chevron’s prediction of first year production.

Among selected projects, Kraly said cost and schedule problems, which often are intertwined, disrupted many projects.

“At the very end, only 8% [of projects] meet cost, schedule and production attainment. From an industry perspective is probably why we’re here today,” he said. Adjustments are essential, Kraly said. “If we don’t change, obviously in this low price environment many projects are not going to be viable,” he said.

Kraly, sounding somewhat like a coach, said Chevron and other deepwater drillers have to come together, innovate and return to basics.

“We have to do what Leicester City has done, go back to basics, back to what you do fundamentally to be really ultimately successful,” he said.

—Contributed by Darren Barbee, Hart Energy

More Tools for Subsea Toolbox



Statoil took a giant step forward on the Åsgard project.

Making the possible of the impossible is the beauty of being the first. But why stop at just one when two are possible?

With its successful installation of two subsea gas compression systems at the Gullfaks and Åsgard fields, Statoil took two giant steps closer to realising its vision of a seafloor-based subsea factory.

The trials and tribulations of the projects that started out as a rough sketch on the back of a napkin in 1985 to fully functional operating compression systems in 2015 were the focus of an OTC technical panel “World’s First Subsea Compression.”

The panel, led by Svein Hellesmark, 7 Seas Oil & Gas Group LLC, and Herbjorn Haslum, Statoil ASA, included seven presentations that covered all aspects of the projects that were given by the companies involved.

Torstein Vinterstø, project director for Statoil, lead the panel with a detailed project overview. According to Vinterstø, the considerable distances in scale and boosting requirements are what dictated the two very different technical approaches to the challenging fields.

For example, the Gullfaks wet gas compression sys-

tem is projected to increase recovery from the Gullfaks South Brent reservoir by 22 MMboe using two 5-MW WGC4000 wet gas compressors connected to the existing subsea templates and pipelines about 15 km from the **Gullfaks C** platform.

For the Åsgard subsea compression system, two 11.5-MW centrifugal compressors will help provide the projected 306 MMboe in increased recovery from the Mikkel and Midgard fields, he said. The compressor system is connected to existing subsea templates and pipelines 40 km from the **Åsgard B** platform.

In his presentation, Vinterstø noted that while each field was a separate project with its own business case, management of the project was conducted by a central

team to ensure transfer of lessons learned and best practices between the fields.

Statoil worked with OneSubsea and other key suppliers to qualify the helico-axial multiphase technology used in the wet gas compression system.

The operator worked with Aker Solutions and key suppliers to qualify the technology utilised within the Åsgard centrifugal compression system.

Startup of the Åsgard systems occurred in September 2015, with the Gullfaks compressors going online in October 2015. Both systems have experienced little to no downtime since startup.

—Contributed by Jennifer Presley, Hart Energy

Mindset Needs Changing, Looney says

Imagine the oil and gas world as an assembly line, churning out cubes of oil and natural gas. Assembly lines are efficient. Changes mean swapping out one part—not the entire system. Industrial and aviation companies typically cut costs annually.

But on the hydrocarbon conveyor belt, cost efficiency doesn't seem to follow any logical pattern.

"In oil and gas, specifically the upstream, costs as we know tend to follow oil price and in general have trended upward over time," said Bernard Looney, BP's CEO for upstream, May 2, at OTC. "We need to change this."

The U.S. shale revolution, Looney said, is part of the way forward—a fundamentally different mindset that the industry should adopt.

"This combination of innovation and continuous improvement is the driving force for the future," he said.

"It's how we will improve through the productivity of our oil sector and put costs on a downward curve."

For instance, BP's Mad Dog Phase 2 project in the Gulf of Mexico went through about \$10 billion in cost trims, Looney said.

"This was a \$20 billion project, and we've brought it down to under \$10 billion with expected returns improved despite a lower oil price," he said.

However, the real value might be in opening up the company to using more technology and collaboration.

In 2015, the company teamed with Maersk to train rig teams in an immersive simulator in advance of an Egyptian project.

"It has helped our rig teams in Egypt complete six of the best wells ever in the Nile River Basin," he said.

—Contributed by Darren Barbee, Hart Energy

EXPLORATION

Kosmos Touts New Senegal Find

Kosmos Energy's **Teranga-1** exploration well offshore Senegal has hit significant gas pay.

Located in the Cayar Offshore Profond Block in nearly 1,800 m of water, the Teranga-1 well was drilled to a total depth of 4,485 m. The well encountered 31 m of net gas pay in good quality reservoir in the Lower Cenomanian objective.

Kosmos said well results confirm that a prolific inboard gas fairway extends about 200 km from the **Marsouin-1** well in Mauritania through the Greater Tortue area on the maritime boundary to the Teranga-1 well in Senegal. Kosmos has now drilled five consecutive successful exploration and appraisal wells in this fairway with a 100% success rate.

The company has discovered a gross mean resource of about 0.7 Tcm and estimates the fairway might hold more than 1.4 Tcm of resource potential.

Andrew G. Inglis, chairman and CEO, said, "Our continuing exploration success demonstrates we have opened a supermajor scale basin offshore Mauritania and Senegal with world-class resource potential. Given the scale and quality of the gas resource discovered along the inboard trend, our focus is to move this resource through to development. Our forward exploration plan is to mature the two independent tests with oil potential in northern Mauritania and in the outboard of Mauritania and Senegal for drilling in 2017."

Kosmos holds a 60% interest in the Teranga-1 well, along with Timis Corp. (30%), and the Société des Pétroles du Sénégal (Petrosen), which has 10%.

Since 2014, Kosmos has held rights to conduct exploration in the St. Louis Offshore Profond and Cayar Offshore Profond license areas under production sharing contracts with the Government of Senegal.

EXPLORATION NOTES

TGS is expanding its multiclient library offshore Eastern Canada with plans to acquire more than 36,000 km of 2-D seismic data, in partnership with PGS, using two vessels during the 2016 acquisition season. The *Sanco Spirit* and *Atlantic Explorer* will acquire seismic and gravity data in the Labrador Sea, Newfoundland Orphan-Flemish Pass basins and Grand Banks areas.

SeaBird Exploration has agreed to supply the *Osprey Explorer* source vessel for an upcoming survey in North-west Europe during this coming summer season. The project is due to commence during the second quarter and will run for about two months.

Sterling Energy has withdrawn from the **Ambilobe** Block offshore Madagascar. Sterling has held an interest in the block since 2004 and recently completed a fully carried 1,175 sq km discretionary 3-D survey in 2015. Sterling said, "Given the challenging commercial landscape, we have made the disciplined decision to exit, focusing on shorter cycle revenue generating assets."

Cluff Natural Resources is acquiring Verus Petroleum's stakes in three oil and gas licences in the U.K. Central North Sea and the Moray Firth. It will buy a 5% nonoperated interest in the U.K. Continental Shelf licenses P1944, in Block 14/20e, and P2156, in blocks 15/11 and 16f.

Cluff also has been granted two exclusive options to increase its equity in P1944 and P2156 to 25% and to acquire an additional 25% interest in license P2082, which contains the **Skerryvore** exploration prospect. Cluff CEO Algy Cluff said, "The acquisition of these high-quality assets, which come with a highly regarded operator in Parkmead, attractive geology, near-term drilling opportunities and nearby infrastructure, provide the ideal cornerstone for building a significant new U.K. oil and gas company focused on the North Sea. "We believe the lower cost drilling environment in the North Sea, which we expect to prevail for the foreseeable future, provides us with an excellent opportunity to build and advance a substantial portfolio of exploration and appraisal assets."

VESSEL BRIEFS

Ulstein has unveiled its compact LX109 design, a high-capacity cable lay vessel, which has a new, patent pending, cable arch system. In combination with an open top vessel design, it results in an unprecedented total of 12,500 mt of power cable that can be laid as one single piece. The Ulstein Cable Arch connecting the forward and aft turntables allows the vessel to load and lay one continuous cable of up to 12,500 mt. This capacity was made possible by positioning the turntables into the hull instead of their conventional location on deck, improving the vessel's stability.

Reach Subsea said it has agreed a comprehensive restructuring of its charter agreements, which will enable it to move forward with market based charter-in rates. Solstad Offshore and Østensjø Rederi will as part of the restructuring become new shareholders of Reach Subsea. Reach said that although the details of the agreement are confidential between the parties, the deal would enable it to "handle a prolonged period of weak market conditions."

TECHNOLOGY

MDL Launches m-pipe Deployment System



The m-IDP deployment system.

Maritime Developments (MDL) has delivered a new flexible pipe deployment and retrieval system for Magma Global. MDL said the system is set to significantly reduce the costs and risks of light well intervention for the offshore oil industry.

The m-IDP (Integrated Deployment Package) was unveiled at the company's assembly and testing facility in Peterhead, at a client open day co-hosted with Magma.

The m-IDP is a compact, multifunction system designed specifically for installation, retrieval and storage of 3-in. 15ksi m-pipe—the lightweight pipe manufactured by Magma Global.

The flexible m-IDP design allows m-pipe to be installed over the moonpool or side or over the stern of the vessel as required.

The complete package is due to travel to the Gulf of Mexico, with the first deployment expected by year-end 2016.

CEO of MDL Derek Smith said, "This integrated system, coupled with the unique capabilities of the m-pipe, is set to become an invaluable solution for operators with

multiple well intervention projects, regardless of their geographical location.”

Steve Hatton, technical director at Magma Global added, “We wanted a system to allow us to deploy our m-pipe to any current or future subsea well depth up to 10,000 ft [3,048 m], and enable maximum pressure and high flow rate pumping.”

He said the m-pipe’s durability and ability to withstand HP/HT and highly corrosive intervention fluids allows the whole system to be reused on multiple intervention projects.

“As the whole system can pump intervention fluids rapidly, and at high pressures, detailed calculations show this combination offers potential savings of 30% in comparison to traditional offshore light well intervention operations like coiled tube systems,” he continued.

“Driven by our client’s demand for competitive systems, this means it has to be light, compact and take up minimum deck space, and I think our combined efforts have achieved that within the m-IDP design, which will be launched into the market on a highly competitive day-rate rental basis.”

Subsea Power Production Boost

Aker Solutions and ABB have teamed up to pool their strengths in subsea, power and automation technologies.

The cooperation is designed to integrate Aker Solutions’ pioneering subsea capabilities and ABB’s subsea power and automation system expertise.

Initial focus areas will include developing better subsea compression systems at lower costs and in less time.

It will enhance how production equipment on the seafloor is powered and controlled by applications onshore or on platforms, lowering costs and enabling economically viable production at fields far offshore from existing infrastructure.

“Power and automation are crucial to improving the effectiveness of compression, boosting and other solutions

for increasing oil and gas recovery from subsea fields,” said Peter Terwiesch, president of ABB’s process automation division. “This collaboration is part of our Next Level Strategy to engage in value-adding partnerships and will bring together the expertise and technology needed to help better serve customers and strengthen our subsea power and automation solutions.”

The cooperation is an outcome of several years of joint work that includes landmark developments such as the 2015 delivery of the world’s first subsea compression system for the Statoil-operated **Asgard (33/1)** Field offshore Norway.

The collaboration will target opportunities globally. It will be headquartered in Oslo, Norway.

BUSINESS

FMC Hit by Fall in Major Projects

FMC technologies said first quarter revenue from its Subsea Technologies division was \$864 million, down 25% from the prior-year quarter.

Subsea Technologies operating profit decreased 35% from the prior-year quarter to \$109.5 million, as cuts in major projects began to bite.

John Grempe, Chairman and CEO of FMC Technologies said, “While operators’ reduced capital spending continues to delay large deepwater projects, we believe that our subsea service orders will remain fairly resilient in 2016.”

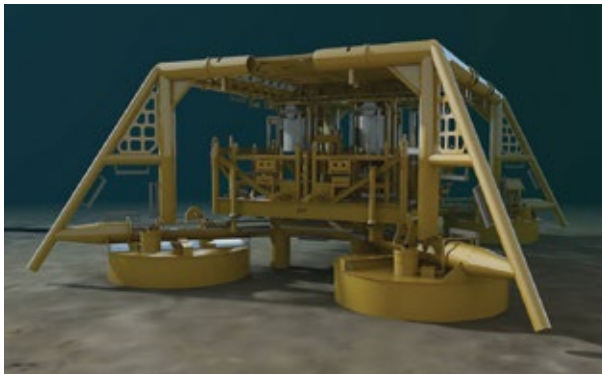
Grempe said in a conference call that while FMC is confident improved returns will lead to future deepwater development, the subsea outlook in the near term is being impacted by aggressive cut backs in spending for major projects.

He said, “Small orders for subsea equipment were light in the quarter but these orders are typically lumpy and never spread evenly throughout the year. We only expect to see a modest decline in small orders for the full year. These orders are typically tied to smaller projects but have lower capital cost and offer higher returns and accelerated cash payback.”

He said a number of the small projects would be in the Gulf of Mexico.

Grempe added, “Over the next 24 months, we see the potential for nearly 20 large projects to move forward. Some large projects are considered strategic and could be awarded this year. But there is a likelihood that even these projects could be pushed into 2017. And we still do not expect any projects in excess of \$500 million to be sanctioned before the end of the year.”

DNV GL Launches Subsea JIPs



DNV GL has launched a host of subsea JIPs.

DNV GL is leading seven new joint industry projects (JIP) in the North American region in 2016 to find solutions to safely reduce complexities and cost in the oil and gas industry.

The company said initiatives will support overall efficiency efforts in pipelines, wells and subsea, umbilicals, risers, and flowlines sectors.

Key focus areas for DNV GL in 2016 will be centred on solving challenges around standardisation, operations (opex services), safety, environment, regulations and performance.

“Our collaborative projects are pivotal in strengthening the industry throughout the Americas and helping it move forward and out of the difficulties we are currently facing,” said Peter Bjerager, executive vice president, Oil & Gas—DNV GL Region Americas. “As an independent third party, we are uniquely positioned to provide a neutral ground for collaboration.”

DNV GL is inviting industry players to take part in the following JIPs:

- Extended application of corrosion-resistant alloys;
- Guidance for qualifying materials in compliance with API 17TR8 HPHT design guidelines for subsea equipment;

- Increased consistency for sour service testing and assessment;
- Sour HP/HT fatigue testing for clad subsea components;
- Prediction of internal flow induced vibration of complex subsea pipework;
- Jumper vortex induced vibration (VIV) instrumentation and field measurements—expanding ongoing JIP; and
- Safe assessment of embedded flaws in sour pipelines.

According to a recent research report published by DNV GL, one-third of North American respondents are concerned that they do not have a strategy in place to maintain innovation in a declined market. However, 31% see greater involvement in JIPs as a priority over the next 12 months, while four in 10 want to increase collaboration with other industry players (40%).

The report also found that 60% of respondents agreed that operators will increasingly push to standardize their approach globally—up from 42% in 2015. Only 9% expect an increase in spending in R&D and innovation, a figure that has been cut by more than half in two years, from 20% in 2014.

“Like the global oil and gas industry, companies in North America are braced for an extended period of lower oil prices, which is leading to continued pressure on cost management. However, it is encouraging that there is still enthusiasm to work together and drive greater standardisation and reduce inefficiencies. The success of our collaborative approach has seen the introduction of new industry standards and practices, which help advance innovation and reduce complexity,” Bjerager said.

In total, 43 DNV GL-led JIPs have been initiated globally this year, in addition to the launch of a new Step Change innovation program to help customers leverage opportunities from digitalization.

BUSINESS BRIEFS

Statoil said its adjusted earnings came in at \$857 million in first-quarter 2016 compared to \$2.94 billion in the same period in 2015. The reduction was primarily a consequence of significantly lower liquids and gas prices, partially offset by good operational performance and reduced underlying operating costs, the company said. Statoil’s equity production was 2.054 Bboe/d in the first quarter.

Balmoral Offshore Engineering, the provider of deepwater buoyancy, insulation and elastomer products, is constructing a new elastomer product manufacturing facility, R&D laboratories and a hydrostatic test centre at its group headquarters in Aberdeen.

Since January 2016 a new building has been taking shape that covers the area of more than six tennis courts and rises to some 18 m in height. Balmoral also has been blasting through Aberdeen’s famed granite substrata to accommodate new underground pressure test vessels.

The Balmoral Subsea Test Centre offers a range of procedures including hydrostatic, mechanical and laboratory trials. The facility provides the industry with a fully comprehensive resource for buoyancy, insulation and polyurethane product testing, from concept through development and deployment. New and upgraded vessels and procedures are in place offering independent testing for all types of subsea equipment to depths of 10,000 m of seawater (32,808 ft of seawater) equivalent. All of Bal-

moral's vessels are underground, meaning that access is at ground level making handling much easier and safer.

Technip has signed a four-year extension of its five-year initial contract signed in January 2011 with Petrobras for its flexible pipes logistic base located in Vitória, Brazil. The scope covers storage, handling, inspection, testing, load-out (two simultaneous vessel load-out points), internal cleaning and maintenance of flexibles pipes. The base has a 300 mt handling capacity, storage capacity for 220 reels and serves as the main load-out point for all presalt flexible pipes.

TIW UK has signed a three-year contract extension with Total for supply and rental of liner hanger products and services for their upcoming drilling projects in the U.K. North Sea.



Norway's Coast Center Base has teamed up with Statoil.

Norway's **Coast Center Base (CCB)** has signed a nationwide frame agreement with Statoil for the maintenance of subsea equipment and tools. The frame agreement, which comes into effect immediately, includes demobilisation, storage maintenance and overhauling of subsea equipment that forms part of Statoil's underwater tools portfolio. CCB also has an option for additional maintenance work in connection with mobilisation and offshore operations. The maintenance work will be carried out at CCB and NorSea Group-owned bases along the entire Norwegian coast. The plan is to carry out most of the work at CCB (Ågøtnes) in Bergen and Vestbase in Kristiansund, but it also is expected that a considerable amount of work will be carried out at Vestbase in Florø, Helgelandbase in Sandnessjøen and Polarbase in Hammerfest. Meanwhile, Westcon has been awarded a maintenance contract for subsea tools and equipment at all Statoil base locations in Norway. Previously Westcon has manufactured advanced subsea equipment for Statoil for use on multiple subsea developments.

FMC Technologies has appointed **Douglas J. Pferdehirt** as president and CEO. Pferdehirt will succeed **John T. Grempe** who will continue to serve as chairman of the board

of directors while the company completes its transition to the new CEO. Pferdehirt joined FMC Technologies from Schlumberger in August 2012 as executive vice president and COO and was appointed president in May 2015.

Maersk Oil is cutting 40 jobs in Copenhagen, Aberdeen and Stavanger due to the low oil price. The company said that despite significant cost cuts in the past 18 months, the oil price in first-quarter 2016 continued to put pressure on earnings and led to a small loss in the quarter. Maersk Oil has about 4,000 employees. The company said the 40 jobs would be cut in its growth division as a result of lower exploration activity.

Some 171 jobs have been lost in Aberdeen and London following the collapse of oil and gas shipping company **Harkand Group** in the face of the crash in global oil prices. The administration involves 10 companies within the Harkand Group. Harkand provides inspection repair and maintenance services for offshore operations worldwide. The group, which is headquartered in London, currently employs about 400 staff. Deloitte said, "Unfortunately the group's European business (based in Hammersmith and Aberdeen) could not be saved, having ceased to trade prior to entering administration due to financial pressures. It will now be wound down by the joint administrators with the loss of 171 jobs. Thirty-nine staff will be retained for a short period to assist with the wind-down of the European business."

Statoil is selling its stake in a Norwegian North Sea field to Lundin Petroleum in return for a larger stake in the Swedish oil firm. Statoil will divest its 15% stake in the **Edvard Grieg (32/22) Field**, a 9% stake in the Edvard Grieg oil pipeline and a 6% stake in the Utsira High Gas pipeline. Statoil will also pay \$68 million in cash to Lundin. In return Statoil will up its stake in Lundin to 20.1% from 11.9%, the Norwegian company said. If the transaction goes through Statoil will be the second-largest shareholder in the Swedish firm after Lorito Holdings' 24.5% stake. The deal boosts Lundin's resources and cash flow at a time when the industry is readjusting to a plunge in crude prices, while Statoil gains more exposure to key parts of the Norwegian Continental Shelf such as the giant Johan Sverdrup Field.

Halliburton and **Baker Hughes** have terminated the merger agreement they entered into in November 2014. The \$28 billion tie-up would have brought together the world's No. 2 and No. 3 oil services companies. "While both companies expected the proposed merger to result in compelling benefits to shareholders, customers and other stakeholders, challenges in obtaining remaining regulatory approvals and general industry conditions that severely damaged deal economics led to the conclusion that termination is the best course of action," said Dave Lesar, chairman and CEO of Halliburton.

Maersk Training has signed a global framework agreement with Statoil to provide drilling simulation training for the next three years with an option to extend for additional two years. The aim of the training is to assist the drilling and well teams to detect issues earlier and be able to react to, or potentially recover from, critical events in the safest and most efficient way. Training will primarily take place in Stavanger, Norway, with Maersk Training facilities in Aberdeen, Houston, Rio de Janeiro and Dubai also set up to accommodate Statoil's needs.

New-start Subsea Engineering Technologies has been launched "to take on the challenges of an ever-changing industry with experience and innovation." The company will specialise in the design engineering of deep-water hydrocarbons projects. The company has been formed by president and co-founder **Cody Moffitt** alongside **Terren Roark**. Subsea Engineering Technologies management team includes well-known members of the industry including **Barbara Thompson** as the vice president of business development and marketing, **Doreen Chin** as vice president of systems and operability solutions, and **Neil Summer** as vice president of geotechnical services.

Technip has been awarded an engineering services contract by Australia's Woodside to provide multidisciplinary engineering services as part of an engineering panel. This contract covers all Woodside operated onshore, offshore and subsea producing assets. Under the agreement, Technip and subsidiary Genesis may provide a comprehensive suite of engineering services including concept select and feasibility studies; FEED; detailed engineering; produc-

tion engineering support; engineering assessment and review as well as Genesis' specialist technical services (e.g., flow assurance, technical safety).

The **Subsea Equipment Australian Reliability (SEAR) JIP** has sparked significant interest in the subsea industry, with more than 70 companies submitting an expression of interest (EOI) to date, Wood Group Kenny which leads the JIP said. The EOIs are currently being reviewed by the participating operators to decide which opportunities to pursue further.

The SEAR JIP's collaboration model is helping operators by systematically capturing subsea operational issues across numerous assets and equipment vendors to feedback to suppliers; co-ordinating efforts to resolve unanswered technical issues; and sharing information regarding new technologies and their application.

Worldwide job losses in the oil and gas industry have just topped 350,000, according to analysis by **Graves & Co.** transaction service. As of May 6, announcements of reductions in force reached 351,410 globally, and the impact of layoffs has been most severe in the oilfield service sector of the industry, with 152,015 layoffs, or more than 43% of the total worldwide, Graves said. Layoffs in the upstream E&P sector began slowly and for many months were much lower than the service, drilling and supply sectors. In recent months, job cuts in the E&P sector have surpassed those in the drilling contracting and supply sectors, reaching 80,265, or just under 23% of total layoffs, while drilling and supply now represent 15% and 14.5%, respectively, according to Graves.

CONTACT INFORMATION

JOHN SHEEHAN Editor
jsheehan@hartenergy.com
 (UK) +44 (0)1403 782198

MARK THOMAS Editor-In-Chief, E&P Franchise
mthomas@hartenergy.com

CONTRIBUTORS

Ian Forsyth (Aberdeen), Bruce Nichols (Houston), Mark Thomas (UK)

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