New technology and business models are needed to meet the economic challenges of declining production from the North Sea oil province. Bed space limitations imposed by platform at Oseberg East dictate a manning solution that significantly reduces POB. Previous models have especially focused on the drilling contractor and production manning levels on the platform. This study will extend the operational efficiency to the drilling services by utilizing an integrated services model. The new principle employed is manning by tasks instead of manning by services. This has given a substantial reduction in headcount while maintaining quality of execution.

SPE/IADC 105438

The Next Major Step in Total Hands-Free Pipe Handling — No Derrickman in the Derrick Racking and Unracking Pipe. D. Richard, Iron Derrickman.

The paper identifies challenges that were overcome to realize hands-free tripping, racking and un-racking of drill pipe and collars in medium and large land-based drilling rigs through the development of a new technology racking board pipe handling system.

A comparison to offshore racking board pipe handling systems highlights the technical and economic difficulties experienced in applying the land-based systems successfully with frequent moves, weight/size restrictions and reliability concerns. Field-gathered tripping and connection test times in comparison with a human Derrickman working the racking board are put forward. The paper looks at how conventional robotic motion control technology has resulted in reliable "Nintendo-style" control operation with smooth solid control of moving pipe.

SPE/IADC 105612

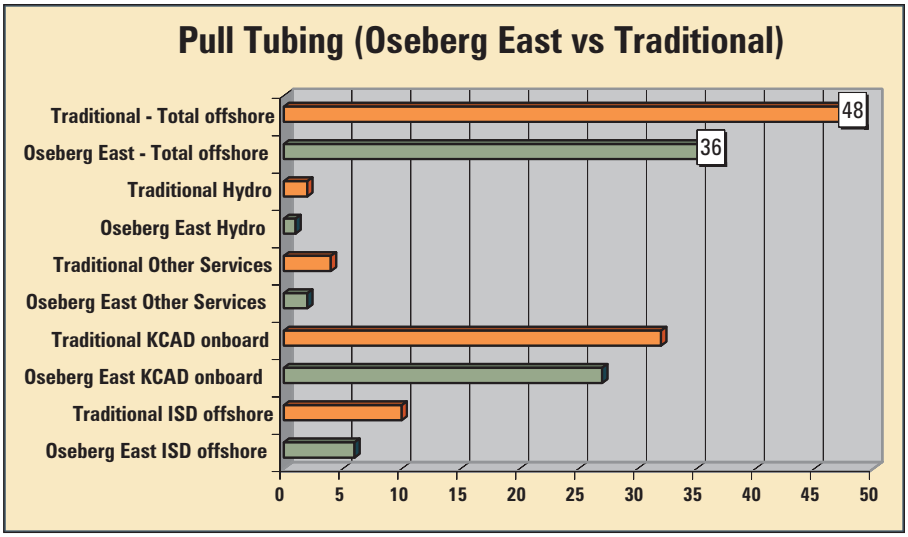
Hydraulic Blowout Control Requirements for Big-Bore and HPHT Developments: Validation with Field Experience. P. Oudeman, Shell.

Although blowouts are now rare, their consequences are often of such a magnitude that for each development a contingency plan should be available aimed at limiting the damage and regaining control over the outflow of the well rapidly. This plan should consider all possible blowout scenarios and the corresponding response. When capping is not an option, downhole injection of kill fluids through an existing conduit or relief well(s), the hydraulic or "dynamic" kill, is the best alternative. To plan for such an operation prior to spudding the development wells, a number of parameters needs to be known, such as the required number and dimensions of relief wells, kill fluids and kill rates, pump capacity, etc. For HPHT and big-bore developments, these requirements depend on a limited number of factors, such as the pressure regime of the blowing formation and flow resistance of the blowing well. This allows formulation of guidelines for hydraulic blowout control for (un)conventional developments, even when the exact circumstances of a blowout are not known, as is the case in contingency planning. A comparison with selected field cases of blowouts demonstrates that the formulated guidelines match the experience with actually killing these blowouts in terms of the number of wells, pump rates, and kill fluids, etc., that were eventually required.

Technical Session 12: Rig Technology

SPE/IADC 105892

Recovery of a Damaged Jackup Following Hurricane Rita. R.W.P. Stonor, M.J.R. Hoyle, Noble Denton Consultants; J.N. Brekke and C. Keaton, GlobalSantaFe.



SPE/IADC 105065: Previous models have focused on the drilling contractor and production manning levels on the platform at Oseberg East. A new study extends the operational efficiency to the drilling services by utilizing an integrated services model.

The paper describes the analyses and procedures used to recover a jackup hit by Hurricane Rita. It was tilted out of level and suffered leg damage. Initial recovery attempts resulted in further leg damage, at which stage it was decided to apply temporary leg strengthening and undertake a more detailed evaluation and analysis of the best method to recover the unit. The seabed geotechnical conditions were found to be providing restraint, which helped to support the tilted configuration. However, they also had the effect of resisting rotation of the spudcan when hull levelling was attempted. This resulted in additional leg damage. This analysis identified the need for a hold-back force during the recovery procedure.

The methods described can be used for the safe recovery of a range of jackup designs that have been subjected to extreme loading events and suffered leg damage.

SPE/IADC 105644

Application of Purpose-Built Rig Technology Results in Step Change in Drilling Time, Cost and Opportunities. E.S. Kolstad, New Tech Engineering; L.D. Steinke and L.S. Brady, Williams Production; S.P. Marchand, Helmerich & Payne IDC.

In a mature field development project challenged by difficult topography, how can a dramatic change in rig design increase drilling performance safely, efficiently, and in an environmentally conscious manner while also improving well costs? The paper will document the specification, design, and implementation of purpose-built rigs to accelerate the drilling of more than 4,000 wells in a safe, efficient, and cost effective manner. To date, the rigs have drilled an average of 26% faster than the conventional rig benchmark.

SPE/IADC 105798

Deepwater Drillship Operations and Upgrade. O. De Bonnafos, Pride Foramer; G.H. Zijderveld, GustoMSC.

Since 1999, two drillships, Pride Africa and Pride Angola, have been operating in Angolan offshore waters. From their initial startup, both vessels have been deployed in a deepwater field development role and operated under long-term contracts. This paper describes the operational experience since the startup of both vessels within their field development role; the successes and the shortcomings resulting in lessons learned which formed the base of a project plan to further enhance the operability of the vessels. In 2004-05 both vessels underwent maintenance and upgrades to reflect additional requirements requested by the operator as well as upgrades planned by the drilling contractor.

The paper will address: lessons learned with respect to the originally installed systems on both units and improvements made; the development of a project plan indicating key elements for upgrade; the preparation and execution of the docking of both vessels, specifically with respect to timing, logistics and the docking itself; the actual execution of the docking with the lessons learned; the subsequent operational and maintenance experience as a result of the upgrade process on the vessels.

SPE-IADC 104602

UniTong Combined Tong for Drilling Operations. H.R. Halse, V-Tech.

This paper will describe the design, use and results of a field trial for the UniTong, which enables the running of drill pipe, tubing and casing from 2 $^{7}/_{8}$-in. to 13 $^{3}/_{8}$-in. and is completely remotely operated. This was an important factor for Smedvig in their evaluation of the field test, which was completed with no personnel on the drillfloor. This tong is able to be parked on the well centre, and drilling, tripping and casing operations can be performed through the UniTong. Safety implications and projected operational time/cost savings over a theoretical well will be discussed as indicated by the Smedvig actual field trial.

SPE/IADC 105883

Improvements in Operations Using a High-Efficiency Jackup. G. Hart and A. Ramsing, Maersk Contractors.

The paper presents operational experiences gained in using a high-efficiency ultra-large jackup offshore Norway for ConocoPhillips at the Ekofisk field. The rig features a new concept in cantilever skidding called x y. It is also rigged with a quardruble derrick with dual standbuilding capability and space for casing racking. The dual pipe handling, offline activity features have saved as much as 25-30% on earlier offset wells drilled with more conventional units.

SPE/IADC 105822: Casing installation technology using a new-generation top drive casing running system permits changes in conventional well construction methods.

SPE/IADC 105822

Improved Well Construction Enabled by Next-Generation Top Drive Casing Running and Drilling Tools. E. Abrahamsen and D. Reid, Weatherford.

This paper discusses casing installation methods using a new-generation top drive casing running system versus conventional and mechanized casing running methods. The enabling technology permits changes in conventional well construction methods through the ability to rotate casing strings at high speed, instantly circulate and reciprocate on demand, and even ream casing into the well. The paper highlights how this technology, when combined with drilling with casing tools and expertise, can significantly reduce well construction costs providing earlier production at less risk.

Applications include drilling with casing from rigs with top drives; casing installation in pre-drilled wells; risk mitigation for casing installation in extended-reach, deviated and troublesome wells; reducing flat spots in the well construction through improved hole cleaning with casing and other related problems.

Technical Session 13: Managed Pressure Drilling

SPE/IADC 105599

Demonstrating Managed Pressure Drilling with the ECD Reduction Tool. R.K. Bansal, D. Brunnert and R. Todd, Weatherford; P.A. Bern, R.V. Baker and C. Richard, BP.

The ECDRT was designed to counter increased fluid pressure in the annulus due to friction loss and cuttings loading. A prototype was recently tested in a BP onshore operation in southeast Oklahoma. The ECDRT was field-tested by drilling 8 ¾-in. hole with the tool at a depth of 4,500 ft. Wellbore pressure management was clearly demonstrated in the field trial. The ECDRT consistently reduced ECD by about 0.7 ppg at 4,500 ft. Drilling performance was not limited by the ECDRT. Fluid return and wellbore cleaning were normal throughout the drilling operation. The ECDRT processed all of the cuttings generated by the drilling at 100 ft/hr. Over 500 ft was successfully drilled before the team decided to pull the tool due to an issue that caused difficulties with the directional drilling system.

Post well analysis of the tool revealed that there are still a number of issues that must be addressed to secure the longevity and sustained performance of the tool, but overall results are encouraging.

SPE/IADC 105454

Kick Detection and Control in Oil-Based Mud: Real Well Test Results Using Micro Flux Control Equipment. H. Santos and E. Catak, Impact Solutions; J. Kinder, Secure Drilling; P. Sonnemann, Chevron.

Kick detection in oil- and synthetic-based fluids has been a major concern for the industry for decades. Due to solubility issues, kicks detection may be delayed, and resulting well control operations may be problematic. Use of a Micro Flux Control (MFC) method potentially offers a better way to address this problem.

To check the performance of the MFC method while using oil-based mud (OBM), tests were conducted at Louisiana State University using natural gas injected into test wells containing an 11 ppg 70/30 diesel/water OBM. Results were compared with previously good results obtained with water based fluids. The paper presents the results obtained during one week of live well testing. Also included will be details of the first field test of the MFC system on an actual well being drilled with OBM.

SPE/IADC 105490

Managed Pressure Drilling Reduces China Hard-Rock Drilling by Half. C. Shen and X. Niu, Sinopec; S. Nas and C. Holt, Weatherford.

This paper describes the experiences during 15 months of MPD operations in sandstone formations in remote southern China. A two-well project was commissioned in Puguang, the largest gas field in China, to determine if percussion air drilling technology could provide ROP benefits. Because the feasibility report determined that wellbore stability could be an issue, a certain amount of project risk was involved. In addition the main reservoir is sour, with sweet gas secondary zones above. Conventional 5,500 m wells were being drilled and completed in about 200 days. The first well was spud in March 2006, and immediate benefits were realized. In the main section, over 60 days were saved. Future wells are expected to eliminate an additional 40 days.

As the project progresses, MPD techniques will be employed in the secondary gas reservoir with the goal to improve ROP performance. Planning is currently underway, and results will be presented.

SPE/IADC 105583

Hydraulic Predictions for Polymer-Thickened Foam Flow in Horizontal and Directional Wells. Z. Chen, M. Duan, S.Z. Miska, M. Yu and R.M. Ahmed, U of Tulsa; J. Hallman, Weatherford.

Foam has proven effective and economical in underbalanced operations (UBO) and is gaining wider applications in many areas. However, knowledge of rheology and hydraulics of polymer-thickened foams is still limited. This paper summarizes the significant effects of polymer on foam rheology and hydraulics and presents a mathematical background