SPE/IADC 105851

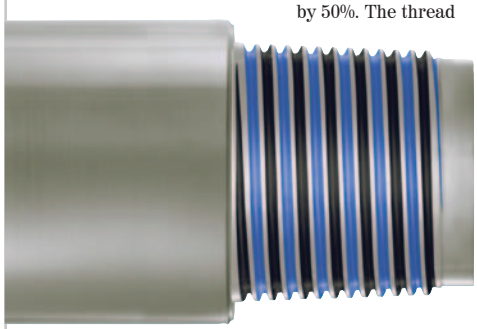
Dope-Free Tubular Connections, Through Research and Development to Field Trial and Implementation: A North Sea Case History. H.B. Andersen, M.P. Hummer and R.C. Engell, Maersk Oil; L. Verdillon and A. Pardé, V&M Tubes.

This paper describes work involved in developing dope-free tubular connections DTCs from research and development through field trails and finally to implementing DTCs as standard for all casing, liners and tubing where DTCs are available.

SPE/IADC 105866

Drill Faster, Deeper and Further with Ultra-High Torque, Third-Generation Double-Shoulder Connections. R.B. Chandler, A. Muradov and M.J. Jellison, Grant Prideco; M.E. Gonzalez and J. Wu, Chevron.

A third-generation, ultra-high torque connection has been developed. This paper will present the results of a 2 ½-year effort to design, test, manufacture and field-trial a family of connections engineered to meet the specific needs of each drill pipe size. Extensive laboratory tests and results from two field trial programs are presented. The thread form is a double start thread that reduces the number of revolutions to assemble the connection by 50%. The thread form also provides a unique dual thread root radius that offers a step-change improvement in fatigue resistance.



SPE/IADC 105866: An ultra-high torque connection uses a double start thread that reduces the number of revolutions to assemble the connection by 50%.

SPE/IADC 105067

Tubing Buckling Analysis with Expansion Joints. R.F. Mitchell, Halliburton.

A new type of tubing completion used in the North Sea is a fixed packer with an expansion joint several joints upstream of the packer. The expansion joint installation may be either pinned closed, or sheared and spaced out after packer installation. The joint may or may not have a stop to prevent jump-out. If the joint is pinned close, a shear rating needs to be specified for the shear pins. Additional information necessary for expansion joint analysis includes the joint stroke length, joint seal bore diameter, and installation space out, if sheared. There are distinct differences in the analysis of expansion joints compared with conventional packer installations.

This paper details the tubing movement and stress calculations for both pinned and sheared expansion joints. The pinned joint is designed to fail at a specified tubing load. After pin shear, the tubing has free movement until either the joint closes, jumps out, or is restrained by a stop. The sheared joint movement calculation is distinct from conventional tubing movement calculations because there are two piston loads. Both the tubing below and above the joint may buckle. Bending due to buckling may cause binding and friction loads in the expansion joint.

Several example cases are presented that give insight into the potential benefits and problems of expansion joints in comparison with conventional tubing completions.

SPE/IADC 104471

Casing Collapse Strenth Reduction Under Lateral Loads from Yielding Shales in the Daqing Oilfield. C. Ai and W. Zhao, Daqing Petroleum Inst.; B. Guo, U of Louisiana at Lafayette.

Casing failure has been found in nearly 20% of production wells in the Daqing Oilfield after 45 years of oil production. Plastic failure of casing strings has been recognized in the zones of yielding shales overlaying reservoir pay zones in the field. This type of casing failure is one of the most costly problems in the field. No research has been done to study the resistance of casing string against the lateral loads from the yielding shales. This paper fills the gap.

Assuming a lateral load uniformly distributed along a casing section from a shale zone clamped between an upper and a lower sandstone zone, a mechanistic model was developed in this study. Results of the model indicate that the resistance of casing string to the lateral loads drops sharply in the early stage of development of radial deformation. The resistance of casing string to the lateral loads is not sensitive to the length of the deformed casing section. The remaining strength of casing string also depends on properties of the casing string.

SPE/IADC 105842

A New Drillstring Fatigue Supervision System. O. Vincké and D. Averbuch, Inst. Français du Pétrole; S. Tollet, Cybernetix; B. Lefevre, Vam Drilling; D. Dupuis, Pride International.

With the development of complex, extended-reach and deep wells, drillstring elements are subject to several kind of cyclic stresses. Induced fatigue accumulation over time may generate drill pipe failure while drilling. This requires a follow-up of the fatigue of each element of the drillstring by tracking the mechanical and dynamic history of each drillstring element over its life. The team developed a way to acquire necessary data, model and memorise the fatigue of each element.

Technical Session 16: Casing While Drilling

SPE/IADC 105773

Two Salt-Dome Wells Sucessfully Drilled with Casing While Drilling Technology. D. Veltri, Yuma; T. Warren and R. Tessari, TESCO.

While formations around salt domes provide good hydrocarbon traps, the high tectonic stresses and complex geology make drilling especially difficult. Yuma and its partners have drilled about a half-dozen conventional wells in the Chachaloula field in South Louisiana. Each proved difficult to drill. Two new salt dome wells in this field were successfully drilled with Casing while Drilling (CwD). A small footprint rig was used. Both wells successfully reached the target depth, and both utilized rotary steerable directional technology for directional control. The paper will describe the operations and compare it to previous wells.

SPE/IADC 105413

Cementing Considerations for Casing-While-Drilling Operations: Case History. R.D. Strickler, ConocoPhillips; P. Solano, Halliburton.

Casing while Drilling (CwD) is an emerging technology. It conflicts with conventional cementing practices such as the use of centralizers attached to the casing to provide a good pipe stand-off. In CwD operations, centralizers are required to be robust enough to drill the entire open hole section without losing their stand-off ability.

This paper describes the methodology developed to successfully cement surface, intermediate and production casings in more than 100 wells in South Texas where CwD was used.

SPE/IADC 105403

Drilling With Liner On Horizontal Oil Wells. M. Terrazas, M. Estrada, V.M. López and A. Jardines, Pemex; E. Diaz, Hydril; M. Fisher, Weatherford.

This paper describes lessons learned and results obtained while applying a rotary drilling with liner system in operations offshore the Mexican coasts of the Gulf of Mexico. Problems such as lost circulation, stuck pipe, cave-ins of holes and bad casing cementing jobs were experienced. The application of the system allowed PEMEX to drill down to the objective depth with high angle, cement the liner and drill out the following interval horizontally, steering in the reservoir. The results of the technique are presented utilizing a liner of 9 5/8 in. and a bit of 12 ¼ in.

SPE/IADC 105595

PDC Casing Drilling Improves HS&E, Cuts Drilling Costs, West Africa. K. Hartsema, Shell; E. Aliko, J. Campos, L. Clark, F. Delgado, P. Folling and J. Wingate, Hughes Christensen.

Conventional drilling was used by the operator in Gabon to drill wells until 2004. Then a cost-cutting initiative with casing drilling was initiated. It was recommended that a PDC drillable casing bit that was designed to be screwed onto the bottom of the casing be used. Two sizes have been run successfully to date. The paper will describe the PDC casing drilling system, its performance in Gabon, the positive economic impact and HSE benefits.

SPE/IADC 105457

Combination of Drilling with Casing and Stage Tool Cementing: A Unique Approach to Mitigating Downhole Conditions. R. Robinson, SandRidge Energy; S. Rosenberg, B. Lirette and A.C. Odell, Weatherford.

This paper demonstrates the combination of rotary drilling with casing and stage tool cementing to drill and cement surface casing in place, providing a solution to the operator's hole stability and cementing issues in surface intervals in the Piceance Basin of northwestern Colorado.

SPE/IADC 105678

Applying Risk Analysis to Casing While Drilling. B. Houtchens, J. Foster and R. Tessari, TESCO.

Many companies are moving to explicit risk models where risk and its economic impact are quantified. Risk is composed of 2 components: the probability of an event occurring, and the economic consequences if it occurs. Applying a risk model to new technology is difficult because there is no experience base. This is particularly true when the technology has operational components that go against normal practices.

Such is true with Casing while Drilling. This paper will show the results of more than 280 wells and over 2 million ft of hole drilled with casing over the last 8 years. Comparisons will be made to conventional drilling methods in several of the areas where the technology has been applied.

SPE/IADC 105395

Casing Drilling Step Improvement: PDC Successfully Drills Out Casing Bit and Finishes Hole Section at Lowest Cost. I. Johnstone, A. Chomley, G. Cernev, M. Hoq, G. Atherton, S.S. Cornel and M. Jacobs, Hughes Christensen.

In Cooper Basin, onshore Australia, the need to reduce drilling costs is pushing casing while drilling technology forward. The operator was having difficulties drilling formations with weak matrix strengths, loss circulation zones and tight pore pressure/fracture gradient windows. A casing bit manufactured from a specialized steel alloy was recommended that allows technicians to braze PDC cutters directly to the one piece bit, ensuring the cutting structure is capable of efficiently drilling new formation and reaming existing hole while drilling casing in place. A new style drillout PDC was used to drill through the casing bit and continue drilling formation without tripping for a new bit. The authors will make cost comparisons with offset wells drilled with conventional drilling systems and focus on lessons learned.

SPE/IADC 105432

Connection Qualification for Casing Drilling Application. Q. Lu and D. Hannahs, Grant Prideco; J. Wu, Chevron.

As no commonly accepted industry standard exists in qualifying connections for casing drilling applications, a big question for the industry is how to determine reasonable and practical methods to measure connection performance for casing drilling applications. By applying ISO 13679 (regular casing connection test specification) worst case tolerance strategy, this paper presents test results on connections tested under the dynamic loading conditions. This paper illustrates the benefits, savings and limitations achieved with this testing program. Performance parameters of casing drilling connections can be accurately defined by testing with worse case sealability and fatigue life tolerance.

Technical Session 17: Completions

SPE/IADC 105556

Qualifying a New Expandable Reservoir Completion System. P.C. Wood and D. Duhrkopf, BP; A. Green, Weatherford.

In 2003 BP and Weatherford formed a collaboration to develop a new Expandable Reservoir Completion (ERC) system that would be run and expanded in a single trip to ensure efficient installation. From 2004 to 2007, 7 installations were completed to test the functionality of the completion equipment and associated expansion tools. This paper will describe the development of the ERC system and review some of the most significant lessons learned.

SPE/IADC 105542

Lessons Learned on Sand-Control Failure and Subsequent Workover at Magnolia Deepwater Development. G. Colwart, R.C. Burton, L.F. Eaton and R.M. Hodge, ConocoPhillips; K. Blake, Schlumberger.

In the Magnolia field, premium screens with alternate path tubes in conjunction with cased hole frac packs were used to complete the wells. The third well, A1ST1BP1, was completed using the same techniques as were successfully used on the first two wells. Completion failed during initial unloading. The well was worked over, and the tubing with 8 control lines and premium sand control screen with alternate path tubes were fished from the tight

SPE/IADC 105854: A metal-to-metal sealing technology uses expanding metal to form a high-integrity pressure seal.

clearances in the well. The retrieved screens had collapsed around the perforated base pipe. The well was re-perforated, new screens run and a second frac pack pumped. When laying down the washpipe after the second frac pack, erosion marks indicated an apprarent second screen failure. Collapse testing revealed the screen lost sand control at less than 1,000 psi. The collapse rating stated by the manufacturer was greater than 7,000 psi. The erosion tests demonstrated that inflow from supercharged reservoirs into the wellbore could erode hole(s) in the premium screen. Revised procedures were used in 6 subsequent frac packs without any additional failures and zero to negative completion skins.

This paper will discuss the failure modes of the 2 frac pack/premium screen sand failures, workover planning and execution, procedural revisions developed to successfully frac pack the subsequent Magnolia reservoirs.

SPE/IADC 105854

Recent Metal-to-Metal Sealing Technology for Zonal Isolation Applications Demonstrates Potential for Use in Hostile HPHT Environments. G. Garfield and G. Mackenzie, Baker Oil Tools.

Metal-to-metal sealing technology is a high-expansion seal that uses expanding metal to form a high-integrity pressure seal. Recent applications of the seal and the latest lab testing have suggested the prospective of the technology for products in the HPHT arena. The technology could make well suspensions and intervention possible in hostile HPHT wells that were previously deemed inoperable by the complete removal of elastomers from the design. Case studies in terms of design, testing, and implementation will recognize the alignment to the increased demands of HPHT applications.

SPE/IADC 105736

Overcoming the Loss of a Primary Barrier in an HPHT Well — Investigation and Solution. A. Humphreys, Total; R. Ross, Baker Oil Tools.

In 2005, a completed HPHT well suffered the loss of a primary barrier resulting in a hydrocarbon leak from the production column into the production annulus. Following a complex well kill operation, a full-scale reproduction of the downhole failure was carried out in a test facility at absolute BHT (200c), BHP (19,000 psi). This programme concluded that the properties of Aflas at high temperature and pressure, when allied with very limited deformation or wear of the casing (less than 1 mm) could lead to a slow deterioration and ultimate failure to contain differential pressure. The manufacturer then undertook a programme to develop packer systems capable of accommodating casing irregularity in this severe HPHT environment. A packer system was developed and successfully tested in casing with significant wear patterns at 15K psi differential and 230ºC. This redesigned packer has subsequently been deployed in an HPHT well.

SPE/IADC 105715

Drilling and Completing Intelligent Multilateral MRC Wells in Haradh Inc-3. F. Al-Bani and A. Shah Baim, Saudi Aramco; S. Jacob, WellDynamics.

The Haradh Inc 3 development has added significant volumes to Saudi Aramco's daily production capacity. The development has 73 wells, including 32 producers — 28 of them are intelligent multilateral MRC wells. The multilateral systems improve the reservoir contact while reducing the drawdown on the reservoir. The intelligent completion system allows the inflow from each lateral to be controlled from the surface. The combination of the multilateral and intelligent completion system is expected to enhance field recovery by preventing/delaying water coning and improving sweep efficiency. Haradh Inc 3 may be considered as an industry milestone where the field development is focused on the "Smart Multilateral Systems." The paper will discuss equipment selection, well placement and drilling/completion practices of the intelligent wells .

SPE/IADC 105443

Are Swelling Elastomer Technology, Pre-perforated Liner and Intelligent Well Technology Suitable Alternatives to Conventional Completion Architecture? G.P. Hertfelder and K. Koerner, Plains E&P; A. Wilkins, Easywell; L. Izquierdo, Schlumberger.

An independent operator offshore California integrated swelling elastomer technology and pre-perforated liners with triple zone intelligent well completions for an extended-reach drilling campaign in the Rocky Point field. Three deployments have been successfully installed in this field, and each has provided successful zonal isolation without conventional cementing and perforating methods. This paper focuses on the operator's innovative use of advanced completion technologies to lower developmental cost and optimize production rates. Also discussed is the safety provided by the intelligent well completion systems. Three field deployments using swelling elastomer, pre perforated liner and intelligent completion technologies will be discussed along with the initial design, installation objectives, safety attributes, field installation, and performance results.

SPE/IADC 105489

World's First Annular Safety Valve for Dual Concentric Water Injection. K.A. Pearce and H.G. Skorve, Hibernia Management and Development; M. Grini, ExxonMobil.

The Hibernia Gravity Based Structure (GBS) platform has 64 slots for well construction, and only a limited number of well slots remain. Since production began in 1997, it has become apparent that more than 64 wells will be required to adequately develop the resources. To optimize the use of remaining slots, a solution was developed to drill a well through the upper Ben Nevis Avalon (BNA) reservoir and into the Hibernia reservoir. This well is the first Hibernia dual water injection well. To