Enhancing Drilling Efficiencies, Reducing Costs and Creating a Safer Environment

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The quality of drilling fluids, drilling waste volumes and issues around Health, Safety & the Environment (HSE) represent major cost and efficiency issues in today's drilling environment, particularly with the current low oil prices.

Drilling costs, for example, are predicted to come down by a third by 2016, according to industry analysts Wood Mackenzie. While reduction in rig and vessel rates are likely to account for a major portion of these savings, there is also an increased focus on solids control to support such cost efficiencies as well as improve drilling performance.

The Importance of Drilling Fluids & Traditional Technology Limitations

Drilling fluids - also known as muds - play a crucial role in North Sea and global drilling activity today. They cool and lubricate drill bits, carry drill cuttings to the surface, control pressure at the bottom of the well, and ensure that the formation retains the properties defined for that well.

Yet, despite their crucial role, for too often the solid control technologies that guarantee their effectiveness remain rooted in the past. Any effective drilling fluids strategy is dependent on the efficient separation of drilled solids from the drilling fluids and yet traditional technologies come with significant limitations.

Chief among these technologies is the shale shaker. The shaker is a vibrating sieve where a metal cloth screen vibrates, generating high G-forces, while the drilling fluids and other elements returning from the well flow on top of it.

Through the vibration and high G -forces, solids are filtered out for overboard discharge or for treatment on the rig or onshore and the cleaned mud is then re-incorporated into the active fluid system and reused to drill the well.

Yet, the high G-forces from shale shakers often break down the drilled solids into too finer particles, reducing the ability to remove them and increasing the solids content in the drilling fluids.

The result is a decline in drilling fluid efficiency. This can lead to a negative impact on penetration rates and Equivalent Circulating Density (ECD) and also generate wear and tear on both surface and downhole equipment.

Another drawback is that vibrating type shale shakers often result in high volumes of mud being lost with large amounts of drilling waste generated and less mud able to be reused within the system. With the cost of an average oil-based mud used on the Norwegian Continental Shelf around US$1,300 per cubic meter and the treatment and disposal of drilling waste conservatively estimated to cost US$1,580-1,750 per ton, any mud that isn't reused can have a highly negative cost implication. The same goes for the chemicals required to maintain the mud's properties.

Finally, from an HSE standpoint, shale shakers lead to a poor working environment with personnel exposure to high noise levels and vibrations as well as the emission of oil and other vapours.

An Alternative Solution – The MudCube®

It's against this backdrop that drilling contractors and operators today are looking for an alternative means of separating and treating drilling fluids on onshore and offshore facilities. One such alternative is the MudCube® from Norwegian-based company Cubility.

The MudCube is the industry's first compact solids control system that eliminates the traditional process of using high levels of vibration and shaking for separating fluids and solids.

With the MudCube, drilling fluids are vacuumed through a rotating filter belt using high airflow to separate the cuttings from the fluid more effectively. The cleaned drilling fluids are then returned to the active mud system and the drilled solids - carried forward on the filter belt - are discharged either directly overboard (if they meet environmental discharge regulations) or to a cuttings handling system.

The improved separation capabilities of the MudCube leads to better quality mud, fewer chemicals required to maintain the mud's properties (one operator and mud company recently reported the reduced use of premix chemicals as bringing savings of as much as $270,000), more mud recycled back to the mud tanks to be reused for drilling, and less waste.

As mud properties are field proven to be very stable throughout the entire well when using the MudCube, there are also corresponding low maintenance requirements to control drilling fluid properties with optimum parameters. For drilling rigs costing millions of dollars a day, the financial benefits of this are clear.

Effective solid control from the MudCube also results in improved drilling efficiencies with higher rates of penetration (ROP), reduced stuck pipe incidents, and wellbore stability.

Another benefit comes from the size of the MudCube and the fact that it can free up much-needed rig space and weight and improving the drilling rig's variable deck loads (VDL). It is estimated that a typical MudCube-system can save up to 25 tons on existing facilities and much more on new-builds.

Finally, the remote, automated operations of the MudCube and its' enclosed system with reduced vibration and noise levels and the elimination of oil vapour also brings considerable workplace benefits. At a time when HSE regulations are becoming increasingly stringent in the North Sea and elsewhere, this is a significant benefit.

Cubility's MudCube

Global Applications

Since its 2012 introduction to market, the MudCube has been adopted on offshore and onshore rigs in the North Sea, Far East, North and South America and the Middle East.

Applications include installation on the Maersk Gallant rig where the MudCube is addressing space utilization, HVAC and HSE issues; the Maersk Giant rig which led to improved working conditions and drilling efficiencies with less drilling fluid being lost and more returned to the mud tanks for reuse; the Maersk Resolve rig in Denmark; the Peregrino A platform operated by Statoil Brazil where the conventional solution was not controlling solids effectively when drilling in sand formations;; and the Scarabeo 5 platform in the Norwegian Continental Shelf.

Since installation, the Maersk Giant has embarked on an ambitious drilling program in the North Sea with the MudCubes used in the drilling of thirteen wells to date.

Cubility has also recently signed a multi-million dollar deal on the Johan Sverdrup field, one of the most important industrial projects in Norway over the next 50 years.

Located 155 kilometers west of Stavanger, Johan Sverdrup is one of the five biggest oil fields on the Norwegian Continental Shelf with expected resources of between 1.7 to 3 billion barrels of oil equivalent. Production start-up is scheduled for the end of end 2019 and will consist of four platforms on which the MudCubes will be based.

In this case, the MudCube will provide the operator Statoil with improved drilling efficiencies, lower mud consumption, reduced waste volumes and improved HSE. The partnership is also testament to the long-term partnership and collaboration Cubility has enjoyed with Statoil.

Cubility's MudCube

Improving Drilling Efficiencies

It's only through challenging traditional technologies and focusing on innovation that drilling efficiencies can be realised, costs contained and a safer environment generated in today's oil & gas sector. It's through tools, such as the MudCube, that operators can put in place effective solids control strategies that achieve these goals.