

Challenges ahead

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The risks associated with placing complex open hole completions across the reservoir are becoming greater. Mark Presslie of Deep Casing Tools explains why.

Over the past two decades, many of the oil and gas industry reservoir production challenges have been successfully overcome by the evolution of horizontal drilling and completions techniques.

Completion technologies, in line with the ability to drill longer horizontal wells, have also evolved, introducing varying levels of complexity. Initially, completions for longer horizontal applications were predominantly stand-alone slotted or screen completions. The level of sophistication of completions however has continuously increased to meet both the drainage strategy of the operator and the expected life-of-well reliability. With increased focus on cased-hole functionality, sand control, production monitoring systems, and inflow performance management tools, running completions now presents a new challenge.

Increased complexity has led to components of greater diameter, most evident with swellable elastomer packers, and more delicate components that are not ideal to take undue torque and stress.

Only by placing such completions exactly on depth is the true value of the completion realised. So the challenge facing the industry is to place a very long, large diameter, complex completion system in exactly the right place, without damage to the system or the formation.

Historically, to meet the challenge of providing better borehole quality and stability, mud systems were developed to provide borehole support. Significant work has been undertaken to understand the geomechanical issues around borehole support, subsequently allowing higher mud weights to be used to support sand -shale sequences.



Combining best practices to circulate and condition the hole prior to the placement of the completion, has in the past been successful. However, moving forward, the challenges are becoming more acute.

Higher mud weight to support the borehole has limits. As both the mud weight and ECD are increased, so does the risk of inducing losses. To counter this, the circulation rate to clean the open hole can be decreased, but again with the counter effect of occasionally leaving cuttings behind. Additionally as the fracture gradient is approached the effects of swab and surge are magnified. Not just when tripping the drilling assembly but also when running the completion. Even with an open-ended assembly, the localized effect of stick-slip in horizontal wells can destabilise the borehole.

At the other end of the scale, depleted reservoirs or reservoirs with lower pore pressure limit the impact of advances in mud technology. This is important, for example, when attempting to drain the numerous sand shale sequences within the flanks of a mature reservoir.

Under-reaming has also been used to overcome placement issues, case in point being the placement of larger OD completion into the wellbore, the rationale being the larger the borehole, the greater the ability to place the completion. This technique however has the knock-on effect of decreasing the velocity in the open hole, and increasing the chance of depositing cuttings. Not to mention the negative effect this has on the performance of completion equipment such as zonal isolation packers and expandable completions.

As the completions do not lend themselves to rotation, engineers may be limited to circulating a path through cuttings beds, again potentially with much lower circulating rates due to ECD restrictions.

To combat these issues, Deep Casing Tools has developed an enabling tool that is designed specifically to aid the placement of completions and liners into horizontal wellbores.

The Turborunner™ tool is a fluid powered reamer system, that has the ability to wash and ream a given borehole section, re-establish the borehole condition, and allow the safe passage of the completion without rotation.

The tool design considers specific issues such as operating pressure, reactive torque, and vibration. The relationship between the operating pressure and the torque is well understood and can be controlled. Low start up, circulating and stall pressures ensure the tool is compatible with pressure activated completion components.

The rationale behind this tool is not to drill but to ream the completion without rotation to TD. The high speed reamer shoe action is designed to redistribute cuttings beds, remove ledges or dilated shales, reducing cuttings management issues as far as possible. This provides a welcome level of risk management, but should not draw attention away from good borehole stability and clean-up practices. However, it does offer significant operational advantages around completion placement strategies.

Success in placing the more sophisticated and expensive completions has the most significant impact on the productivity and value of a well project. Placement off depth may lead to an ineffective drainage strategy, loss of accessible recoverable reserves as well as the significant down time and expense of replacing damaged components.

The Turborunner™ tool is one of several tools in the Deep Casing Tools portfolio designed to minimize placement risk. For more information refer to our website; www.deepcasingtools.com or contact Mark Presslie directly.