

Unlocking onshore hydrocarbons

Recent advances in directional drilling technology have resulted in enhanced production not just offshore, but onshore as well, enabling economic exploitation of unconventional reserves. Helge Tveit, Partner, Energy Ventures, reports.

For decades, the drilling of vertical wells appeared to be the most effective approach to exploiting oil and gas reserves. However, experts soon realised that vertical wells alone were not enough to tap the full potential of reservoirs. As a result, directional drilling techniques were developed to facilitate access to areas of reservoirs that were previously considered unreachable. When first introduced, operators typically employed directional drilling as a 'last resort' in difficult well situations, predominantly offshore. However, the resulting consistently-improved reservoir access and production, especially with extended-reach and horizontal drilling, led to a rapid uptick in the deployment of directional drilling techniques (specifically horizontal drilling), particularly in offshore environments.

The main challenge found with directional drilling techniques within offshore wells is the inherent difficulty of directional drilling control. Deepwater formations provide complex environments in which navigating in the sliding mode with steerable motors becomes difficult. As a result, operators recognised that a tool providing greater manoeuvrability and less technical risk was essential. Rotary steerable systems (RSS) were the answer to the sliding problem and, as these tools were developed and deployed in complex offshore drill sites, the benefits were quickly realised.

Onshore application

As companies began harnessing the benefits of horizontal drilling offshore, the shale gas boom swept the industry. Having learned much about horizontal drilling offshore, E&P companies were able to justify expenses, mitigate risk and develop technologies that enabled them to quickly mobilise and apply

these lessons to their onshore drilling environments, with the hope of capturing part of the extremely lucrative shale gas market.

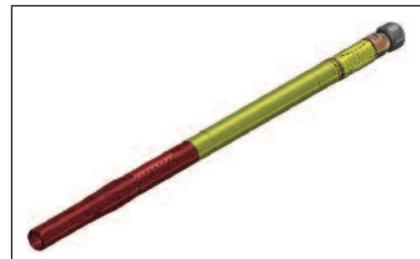
Today, horizontal drilling accounts for the majority of onshore wells being drilled. For example, a recent Baker Hughes rig count report showed that directional drilling techniques are being used on more than 65% of the world's onshore drilling rigs.

Most rigs onshore are still using the conventional directional drilling technique of a drilling motor with an adjustable bent-housing. However, as the length of horizontal sections increases, the challenges with directional control in sliding-mode resurface. When one adds the need for staying within narrow target zones, appropriate well cleaning and faster drilling to reduce cost, the lessons learned offshore need to be applied onshore.

The RSS advantage

Rotary steerable systems currently inundate the offshore directional drilling market due to the technology's established benefits over conventional directional drilling techniques. However, this is currently not the case for a large portion of land-based drilling due to design and cost barriers. In a bid to tackle this issue, companies such as 2TD Drilling, an Energy Ventures portfolio company in Norway, have drawn from experiences offshore to develop an RSS tool specifically for onshore drilling. This tool will deliver cost effective, high-end performance enabling significant improvements in land-based horizontal drilling in unconventional reservoirs.

While new technology adoption is still an ever-present industry hurdle, the cost of failure onshore is dramatically lower when compared to offshore. As a result, operators tend to be less risk averse,



2TD's electro-mechanical rotary steerable tool
Source: 2TD

making the adoption and introduction of game-changing technologies more commonplace. Recognising this opportunity but realising that a challenge still exists, 2TD has designed an electro-mechanical rotary steerable drilling tool with a 'keep it simple' philosophy in mind.

Two of the must-haves that operators evaluate when considering switching to an RSS tool are tool reliability and bore-hole quality. Unlike traditional RSS tools that are complex, 2TD's design requires no external moving parts, thereby minimising the chances of technical failure. The tool's near-bit stabiliser also allows users to target the desired zone more closely, ensuring the quality of the well being drilled.

For operators, cost is the name of the game in any drilling scenario. The new tool is remote controlled, stand-alone and powered by its own turbine generator. This eliminates the need for extensive crew oversight, allowing companies to cut crew costs while also increasing production. The tool is also short in length, significantly reducing maintenance costs while allowing for more directional control. Thus, when MWD (measurement while drilling) data identifies a more efficient drill path in a different location, direction can easily be changed to provide greater accuracy and enhance drilling efficiency.

A lasting impact

Oil and gas companies everywhere are pursuing a highly successful strategy of drilling fewer but longer horizontal wells to achieve maximised production at lower overall cost. Yet experience shows that this can only be achieved with advanced directional drilling equipment. While new horizontal drilling techniques have made a name for themselves offshore by demonstrating an immediate reduction in operational cost, advances in new technology remain key to fuelling this growth onshore.

Drawing from lessons learned offshore, innovative tools such as rotary steerable systems, that are both reliable and economically viable, stand to have lasting impacts onshore. ●