



A tough connection for a record-breaking well

Torque strength and drag resistance of TenarisHydril Wedge 521™ connection proved instrumental in setting an extended reach drilling record in Southern Argentina.

Summary

Total Austral made oil & gas exploration and production history by developing a series of demanding extended reach wells in Tierra del Fuego. Drilling initially from an onshore rig and then deviating the well to reach the Ara and Kaus offshore reservoirs, the French operator was able to progressively extend both the measured depth and the horizontal displacement of its wells to a total length of 36.693 ft.

Challenges

Slim-hole architecture

Cullen Norte No. 1, the last and most ambitious of the extended reach wells drilled by Total, had a target depth of over 11km. Compared to the longest well the company had completed in the area, it meant an additional 2,500m of hole would have to

PROJECT PROFILE

Operator / Location

Total Austral / Tierra del Fuego, Argentina

Well

Cullen Norte No. 1 (gas reservoir)

Well type

extended reach well (drilled onshore to an offshore target)

Horizontal displacement / Measured depth

10,585 m (34.728 ft.) / 11,184 m (36.693 ft.)

Products provided

TenarisHydril Wedge 521™ connections for 7" and 5" liners



▲ Integral semi-flush connections suitable for horizontal liners and extended reach strings were selected for this operation.

be drilled. Such huge step-out led Total to modify the well design that it had been applying so far, and adopt instead a more efficient, slim-hole architecture.

One of the most challenging aspects of extended reach drilling is that, as the horizontal displacement of the well increases while its true vertical depth varies only marginally, there is a point where tubular products cannot continue to use the technique known as “partial flotation” (By running strings with their bottom sections empty, this technique allows casing to be pushed through slanted sections with less resistance).

Twist and bend

Beyond the point where partial flotation becomes impossible (given the extreme axial friction and drag that slanted strings are subjected to), there is only one way to run tubular products: by rotating them. Even then, careful consideration must be given to the weight of the casing to be rotated and the OD of its connections. If any of these two parameters exceed a certain level, problems associated with torque, stuck pipe and circulation loss are likely to surface.

Solution

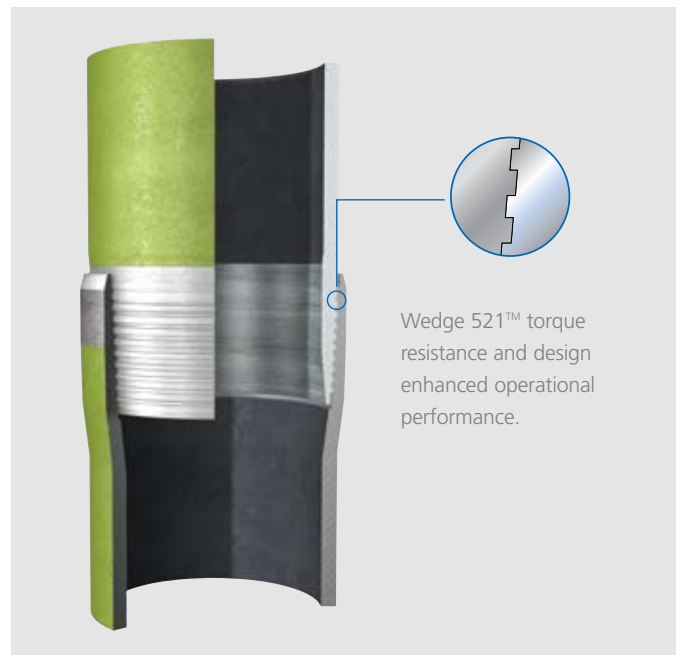
For the Cullen Norte No. 1, calculations had indicated that the point at which strings would have to start being rotated into place would be immediately after the 9 5/8" casing shoe (positioned at the bottom of a 5,000m-long string with an inclination of 81 degrees).

Thin and yet robust

Both the 4,000 m-long 7" liner (run in an 88 degrees slant hole to just above the pay zone) and the 5" completion liner were fitted with integral Semi flush Wedge 521™ connections.

By simultaneously engaging the opposing flanks of the dovetail wedge thread, these premium connections ensure very high torque resistance while keeping slim.

A key advantage of this connection is that it is designed to endure severe wearing of the OD (which is inevitable after being dragged for several kilometers) and still perform flawlessly. Furthermore, the fact that the connection is very easy to run was important for not losing time in the rig while the hole was still open.



Results

After 142 days of drilling and completion work, having run horizontally for over 10.5km, the Cullen Norte No. 1 officially became the then world's longest extended reach well.

The operator found that the TenarisHydril Wedge Series 500™ connections successfully tackled the extremely demanding operating conditions. The unparalleled torque capacity helped avoid any potential over-torque problems during the rotation of the liners.

Having bending and rotation at the same time results in an extra compression requirement for the connections, something difficult to comply with for integral connections. However, TenarisHydril Wedge 521™ has a compression rating of more than 80% – an exceptionally high value for integral connections.

Free flow

Additionally, the streamlined profile of the connection was critical in eliminating any potential “coupling-face hang-up” problems – an undesired effect frequently present in slim-hole architectures whereby residual cuttings pile up at the bottom of the slanted hole – without sacrificing neither performance nor bending capacity.



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