



Unlocking the Black Sea's deepwater potential

The prospects of finding major untapped reserves of oil and gas deep under the Black Sea are driving exploration projects in the region. Developing these resources however, will call for sophisticated designs and advanced tubular technologies.

Summary

The search for energy self-sufficiency

With the exception of Russia, all other littoral countries of the Black Sea have traditionally been dependent on energy imports. This reality could soon change. Turkey has estimated that the Black Sea holds recoverable reserves of ten billion barrels of crude oil and two trillion cubic meters of natural gas.

As part of exploration plans to confirm the Black Sea's reserves, an ultra-deepwater well (one of the first in the region) was recently drilled off the coast of Turkey. The well design specified a challenging, extreme lean profile, whose successful execution depended on the combination of strong, integral premium connections with high-collapse steel grades. For these challenging conditions, the operator turned to Tenaris.

Challenges

An ultra-deepwater exploration

A drilling campaign has been launched off the Turkish coast. All of the wells share similarly complex designs, with the wellheads set at just over 2000 m BRT (below the rotary table) and a target depth in excess of 3000 m BML (below the mudline) – for a total depth of over 5000 m BRT.

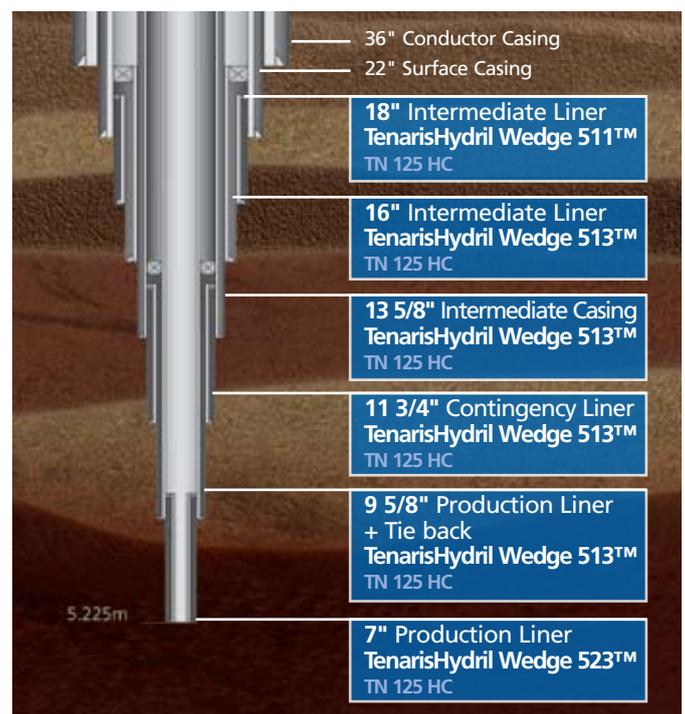
Extreme lean profile

Due to the ultra-deep nature of this particular project – as well as the need to reach the pay zone with a productive diameter – the operator had specified an “extreme lean profile” design.

Lean profiles feature reduced clearances between the walls of the open hole and the outer diameter of the casing string. In ultra-deepwater environments, the lean profile approach makes it possible to reach the target depth with a productive diameter, a task very difficult to attain with threaded and coupled strings. Additionally, it allows for contingency strings, a highly valued alternative for such demanding exploration wells. In practice, this meant that each of the casing sections would be drilled with a diameter only slightly

PROJECT PROFILE

Location Black Sea (Turkish area)	Products highlighted <ul style="list-style-type: none"> • 18" Intermediate Liner with TenarisHydril Wedge 511™ connections • 16", 13 5/8" and 9 5/8" casing with TenarisHydril Wedge 513™ connections • 7" liner with TenarisHydril Wedge 523™ connections
Field Offshore (ultra-deepwater)	
Purpose Exploration	<ul style="list-style-type: none"> • High Collapse grade TN 125 HC • Accessories
Technical services provided Running assistance	



larger than that of the pipes used to case the well. With such tight clearances, casing joints risk becoming stuck in the formation.

It was evident that the use of API steel grades would not be a good option given the unexpected pressure and loading conditions at such depths.

Solution

End-to-end technical assistance

Tenaris was involved in every step of the project's casing program, from providing technical consulting support during the well design phase, to supplying specialized OCTG and accessories, to providing running assistance onboard the offshore rig with the most critical casing running jobs.

Streamlined coupling approach

To address the issue of extremely narrow clearances throughout the well, integral flush connections were used for the 18", 16", 13 5/8" and 9 5/8" casing sections, while the 7" liner was fitted with integral semi-flush connections. The operator chose the Wedge Series 500™ line of premium connections (Wedge 511™, Wedge 513™ and Wedge 523™) based on the individual characteristics and requirements of each section.

At the heart of these products' ability to meet the most demanding lean profiles while simultaneously delivering unparalleled mechanical strength is the unique thread design that all Wedge Series 500™ connections share. Based on a dovetailed-wedge thread form, it creates the largest possible contact surface area at make-up, which results in superior compression efficiency and several times the torque strength of most competing technologies.

High-collapse steel grade

Another key technical aspect for the successful execution of the extreme lean profile design was the special, high-collapse steel grade developed by Tenaris. The TN 125 HC proprietary grade was used to manufacture the 16" through 7" casing joints run in the well. The enhanced collapse resistance that this material allowed was particularly important, given the exploratory nature of the project and the envisioned downhole conditions.

Results & future outlook

Flawless Wedge™

Being able to combine an integral flush/semi-flush profile, robust Wedge™ thread form and a high-collapse steel grade all in one product line of premium connections afforded the operator the ability to reliably design an ultra-deepwater well with extremely tight clearances.



▲ Wedge™ connections and High Collapse grades offer significant benefits for deepwater applications.

For a flush and a semi-flush integral connection, Wedge Series 500™ products offer distinctively high compression and tension efficiencies. This allowed the customer the possibility to push and rotate casing strings as necessary.

All five casing strings were successfully run to their individual TD. Total depth reached was 5225 m BRT. There were no rejections and no breakouts, and the well was completed on time.

Offshore tubular services

Having a Tenaris field services specialist to assist the operator and casing running crew onboard the offshore platform ensured that tubular components were made up according to the company's recommendations for optimal performance.

Only the beginning

Should this and future exploration campaigns confirm the vast energy resources that are believed to exist beneath the Black Sea, this emerging oil & gas province might one day match the production rates currently seen in established major markets such as Russia, the Caspian Sea or the North Sea.

The challenging conditions posed by ultra-deepwater offshore rigs require the support of sophisticated tubular products and services, which in many cases make the difference between failure and success.



For contact information, please visit our site:
www.tenaris.com