



## Pioneer deploys TenarisHydril Wedge 441™ slim bore connection in Permian wells

The collaboration between Tenaris and Pioneer has resulted in a cost-efficient connection solution for slim wells in shale operations.

### Summary

Pioneer Natural Resources wanted to replace a premium semi-flush connection for slim wellbores in a shale field with a more cost-effective solution that still met performance criteria. The four-string well design called for a connection that would allow them to run a 5.5-inch OD production casing inside a 7.625-inch liner in a 40-well drilling campaign in the Permian Basin. In addition to meeting tight clearances, the connection had to deliver high-tensile and torque capabilities.

Tenaris worked with Pioneer to develop and field trial an efficient and cost-effective connection – the TenarisHydril Wedge 441™ – that could be applicable in as many as 75% of the 350-400 wells Pioneer drills each year. The trials demonstrated the TenarisHydril Wedge 441™ could meet the running speeds and performance criteria required by the customer but at a cost more sustainable in the industrial drilling context of a shale play. As of September 2019, all of Pioneer's wells with the four-string well design relied on the TenarisHydril Wedge 441™ connection. In less than one year, more than 170 strings and 70,000 joints have already been run.

### Challenges

#### Well design with very tight clearance

The well plan called for a four-string design with a 7.625-inch OD intermediate liner and a 5.5-inch OD production casing. The production casing had to run inside the liner and the 6.750-inch open hole, which is a common well design for the Permian. The resulting clearance would be very tight for a full-sized threaded and coupled connection, yet an integral connection would not provide the cost savings desired. A slim design threaded and coupled connection was determined to provide the best economical solution.

#### High performance

The connection had to withstand rotation in a slimbore, and high torque capabilities were vital. It was also imperative that the slim coupling design still deliver the necessary tensile properties to ensure a reliable connection without deratings of the properties.

### PROJECT PROFILE

#### Operator

Pioneer Natural Resources

#### Products highlighted

TenarisHydril Wedge 441™

#### Location

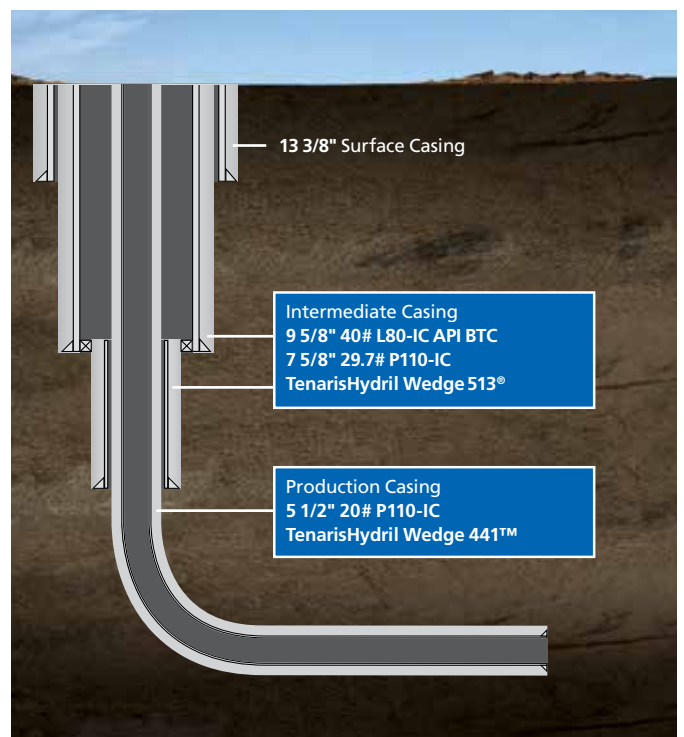
Permian, Midland Basin

#### Services provided

- Technical consulting services
- Field services

#### Well Type

Horizontal



## Cost effectiveness

In the shale environment, the industrial drilling approach is common. This means cost-effectiveness of products is a key factor in the well's economics, but safety and reliability factors remain paramount. While an existing connection exceeded operational requirements for the field's success, it did not meet the financial requirements, especially with the plan for large-scale deployment.

## Solutions

### Design inputs

Based on the customer's most demanding well design, Tenaris offered consultancy to develop a new connection design. Tenaris modeled and analyzed the loads with proprietary software, along with torque, drag, fatigue and cementing analyses and used the results to engineer a new product.

The new design features an OD of 5.852-inch to achieve the specified equivalent circulating density (ECD) along with the required operating torque of 25,000 ft-lbs, and tension and compression ratings higher than 80%.

Tenaris carried out a full validation program that started with theory and analysis, moved to the digital world, progressed to the lab and full-scale testing, and culminated in a rig demonstration at Tenaris Rig Direct® Academy for pioneer representatives to confirm connection robustness and runnability. That demonstration also familiarized the customer with Tenaris' Field Service Specialists, who provide ongoing support to operations at the rig site.

### Cost-effective product

The designed slim line threaded and coupled connection met customer technical requirements while significantly reducing costs. The savings come from using a connection that is not over-specified. In addition, the TenarisHydril Wedge 441™ is interchangeable with the TenarisHydril Wedge 461™ commonly used in shales. In applications where full pipe body tensile efficiency is needed above the liner section, TenarisHydril Wedge 461™ can be substituted to Wedge 441™ with no need of a crossover or modification to hanger assemblies.

## Results

### Trial runs and full deployment

Three runs in trial wells were performed using TenarisHydril Wedge 441™ for the whole production casing string. All three trial runs



▲ Rig demonstration at Tenaris Rig Direct® Academy in Mexico.

were successful, and Tenaris Field Services specialists were onsite during each of the runs. The trials went smoothly, running a total of 1089 joints over the three wells with improved speed and running performance compared to previous experiences.

Pioneer was satisfied with the trial results, and deployed the TenarisHydril Wedge 441™ for the full production string in all of the rest of the wells in that field that followed the four-string design.

### Performance and savings

By running more than 170 strings and 70,000 joints, Pioneer has built an extensive track record for the TenarisHydril Wedge 441™, and the connection is now fully integrated in their operations.

Product performance has been excellent: the high operating torque of 25,000 ft-lbs maintained in the slim coupling design complied with the demanding requirements of the wells. Pioneer has been happy with the demonstrated robustness and reliability of the connection and had very low rejection (0.08%) and break-out (0.14%) rates on the rig.

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For contact information, please visit our site:  
[www.tenaris.com](http://www.tenaris.com)