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### Focus on Reducing Cost of Ownership Drives the Development of the 4th Generation Drill Pipe Connection Design

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#### Abstract

The past three decades saw the introduction of several generations of double-shouldered drill pipe connections with performance as a primary development focus. The record extended-reach drilling (ERD) wells could not have been drilled and completed without these technological advancements, which brought more torque, enhanced hydraulics, and greater reliability to satisfy drillers' needs. The improved performances of these technologies were so enabling that the associated repair costs were deemed acceptable.

When these same connections started to be used on land rigs to deliver wells in a factory drilling fashion, where cost control is of higher importance, the cost of maintaining these premium connections started to become more of an issue. Therefore, it became obvious that a different approach was required to meet the combined need for both performance, as well as a lower total cost of ownership post-acquisition.

A comprehensive two-year research and development (R&D) program was carried out to evaluate various design options. After a three-month field trial, the connection was released and has been used in the field since the second quarter of 2017.

The 4th generation double rotary-shouldered connection design provides benefits in addition to the previously seen improvements in torque, hydraulics, and streamlined profile. Specifically, the design optimizes the connection stresses, has broader tolerances for field damage, reduces the material loss on repairs, and provides greater connection ruggedness, all increasing field life and reducing operating cost.

The 4th generation double-shouldered connection was used in various onshore and offshore fields, accumulated a high number of drilling hours and has been inspected multiple times.

This paper demonstrates the performances of this new rotary-shouldered connection, its ruggedness and suitability for use on various kinds of rigs, and confirms the lower repair rates and reduced operational cost of ownership. As rental strings are rotated from rig to rig, they are prime candidates for evaluating these factors. Data compares the field damage and repair frequency of this new connection with earlier generation connection designs.

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