CDI ENERGY PRODUCTS

CASE STUDY – JANUARY 2022

CDI's new Tuff Breed®WSP Extreme® Gold Pressure Ring and SandDog® Header Ring Achieve 435-Hour Run for Pressure Pumping Operation

CDI ENERGY PRODUCTS®
A Michelin Group Company

PROBLEM IDENTIFIED

Application: Natural Gas Pressure Pumping Operation located in the Haynesville Shale Basin

Issue: Service Provider's existing well service packing was not meeting the required needs for the long run times and multiple frac stages necessary for the Pressure Pumping operation and environmental conditions

Solution: CDI's Tuff Breed® WSP Extreme® Gold packing along with the SandDog® header ring enabled the service company to complete the entire pressure pumping job without maintenance or downtime interruption

MARKET INSIGHTS

According to the U.S. Energy Department, 95% of all wells drilled today are completed utilizing high-pressure pumping technology which accounts for two-thirds of total marketed U.S. natural gas production, and almost one half of U.S. crude oil production. The energy industry continues to evolve by harnessing new technological advancements to support a three-pronged strategy of cost mitigation, operational efficiency, and production safety. Onshore production best reflects this three-pronged strategy, with pressure pumping standing out as the most cost-effective means of producing oil and natural gas. However, the process relies heavily on pumping large amounts of water and abrasive slurries into the geological formations in order to allow the flow of hydrocarbons. New technological advances have mitigated production costs, but the process of unlocking hydrocarbons trapped in low-permeability source rock is very demanding on equipment, especially the pressure pump's critical fluid end.

THE CHALLENGE

To obtain hydrocarbons from these hard-to-reach sources, high-pressure reciprocating pumps located on the wellsite pump the proppant and water at pressures as high as 15,000 psi into the formation to "fracture" the hydrocarbon-loaded rock and allow oil and gas to be brought to the surface for processing.

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This extreme operation requires robust pumping equipment and internal components, like well service packing, to minimize downtime on the well site and to ensure the environment is protected from leakage and spills. One of the leading Service Providers in the Haynesville Shale contacted CDI regarding premature failure of the existing well service packing in their pressure pumping operations. The Service Provider was also experiencing related packing bore washouts, unplanned downtime, and increased packing and maintenance costs. The competitors' packing products were not providing an acceptable level of performance which resulted in excessive cost overruns. CDI was asked to provide a solution to the well service packing problem and leveraged its technical knowledge of unconventional operations and custom-engineered performance products to find a reliable alternative.

TECHNICAL SOLUTION

The first step was to analyze the active production equipment, to review the current run times, and to assess the fracturing stage requirements to determine a means to increase efficiency and maintain dependability. CDI's field team visited the multi-well site location, working with the Service Provider's Maintenance staff to understand the big picture for current equipment needs and future production objectives. After an internal review of the field data with CDI's engineering and material science groups, the CDI team worked with the Service Provider to assess the options and evaluate the potential efficiency-boosting and cost-saving deliverables. At the conclusion of the assessment, CDI recommended its Tuff Breed® WSP Extreme® Gold well service packing, coupled with its industry leading SandDog® header ring.

RESULTS

Once CDI and the Service Provider's technical teams were aligned on the possible solutions, the Service Provider approved a test on an active pressure pumping operation in the Haynesville Shale Basin. The test had strict conditions and success parameters, requiring optimal performance from CDI's well service packing under the following conditions:

- 3.5-hour frac stages
- 11,500 PSI conditions
- Low-conductivity 100 mesh proppant suitable for slick water applications
- Total proppant pumped 56,763,000 pounds

About Tuff Breed®

CDI pioneered the Tuff Breed® line specifically for high-pressure pumping, cementing, acidizing and well servicing needs. For years now, Tuff Breed® frac valves, well service packing components, and packing sets have been used in pressure pumping and drilling operations across the globe and have been tested under some of the toughest conditions with superior results.

The SandDog® Header Ring features a patented design to minimize proppant migration to the stuffing box bore, made from proprietary compounds to maximize seal life.

The new WSP Extreme® Series was developed to meet the level of quality and reliability companies have come to expect from Tuff Breed®, with pressure rings optimized for specific production environments.

You can learn more about the new WSP Extreme® Series featuring our Bronze, Silver, Gold and Platinum pressure rings by visiting:

www.TUFFBREED.com

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Pairing the WSP Extreme® Gold pressure rings with the SandDog® header ring resulted in superior proppant exclusion that extended both the performance life of the packing and the fluid end.

CDI's WSP Extreme® Gold and SandDog® combination completed the entire run, while maintaining high-level equipment performance without maintenance issues. The total testing time included 435 hours in active operation, and the performance exceeded the Service Provider's considerable demands. The Service Provider was eager to report the success and shared that there was still usable life in the removed packing.

Considering its three-pronged strategy of cost mitigation, operational efficiency, and production safety, the Service Provider was able to achieve measurable results from CDI's well service packing products.

- WSP Extreme® Gold and SandDog® ran for 124 stages (over 435 hours) resulting in a 35% increase in run time against the competitor's packing product.
- As a consequence of the improved well service packing reliability, the Service provider reported an overall increase in operational performance due to less maintenance-related downtime.
- Annualized direct packing costs were reduced by over $400k and maintenance and downtime costs for packing-related issues were significantly reduced.
- As a result of the new well service products, the Total Cost of Ownership (TCO) for the Service Provider was significantly reduced.

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Operational performance enhancements mean more than just bottom-line growth. Improvement in the field can translate to increased hydrocarbon production, with less risk to the health and safety of field employees, along with mitigated impact on the environment.

FURTHER INFORMATION

CDI is focused on forging strategic partnerships with its customers. With strategic partnerships with OEMs and Service Providers, CDI's team can continue to develop products and materials that help companies mitigate costs, drive operational efficiency, and ensure production safety across the multiple industries it serves. To learn how CDI Energy Products can improve performance in your operations, please visit: **cdiproducts.com**.

BETTER SCIENCE. BETTER SERVICE. BETTER SOLUTIONS.

- **In pursuit of Better Science, CDI developed a revolutionary header ring design that forms an exclusion barrier once installed eliminating the ability of the proppant to cause premature failure.**
- **In pursuit of Better Service, CDI's field team, material scientists, and engineers collaborated to determine a viable solution, within a quite rapid timeline.**
- **In pursuit of Better Solutions, CDI conducted field testing for well service packing integrity through multiple 3.5-hour frac stages, under 11,500 PSI conditions, utilizing low conductivity 100 mesh proppant suitable for slick water applications.**