

Latest Frac Fleets Are Tougher, Faster

By Colter Cookson

A broad recovery in upstream investment continues to gain steam across the lower-48, and at the head of the convoy is a long line of pressure pumping trucks.

Driven by tight oil and shale gas plays, annual U.S. demand for hydraulic fracturing services, equipment and consumables has grown by double digits over the past two years, and is estimated to reach \$24.6 billion in 2018, according to Spears & Associates. No matter how one looks at it—including expenditures, fleet utilization statistics, announced new-build capacity additions or proppant consumption—the fracturing market has been the front-runner in the broader upturn in domestic field activity.

To meet the growing demand for their services, pressure pumpers are building new fleets and reactivating idle iron. In the process, they are finding ways to make their assets safer, more efficient and more reliable. Pump, engine and transmission manufacturers and creative startups are helping them improve reliability by taking proven designs and novel ideas to the next level.

Extending Pump Life

To shrink pumps' operating costs, Gardner Denver announces it has introduced longer-lasting packing. "Historically, customers needed to change packing every 200-250 hours of run time," says Chris Degginger, the company's director of engineering for new product development. "Our Redline™ packing delivers more than twice that life, reducing downtime associated with scheduled maintenance and improving margins."

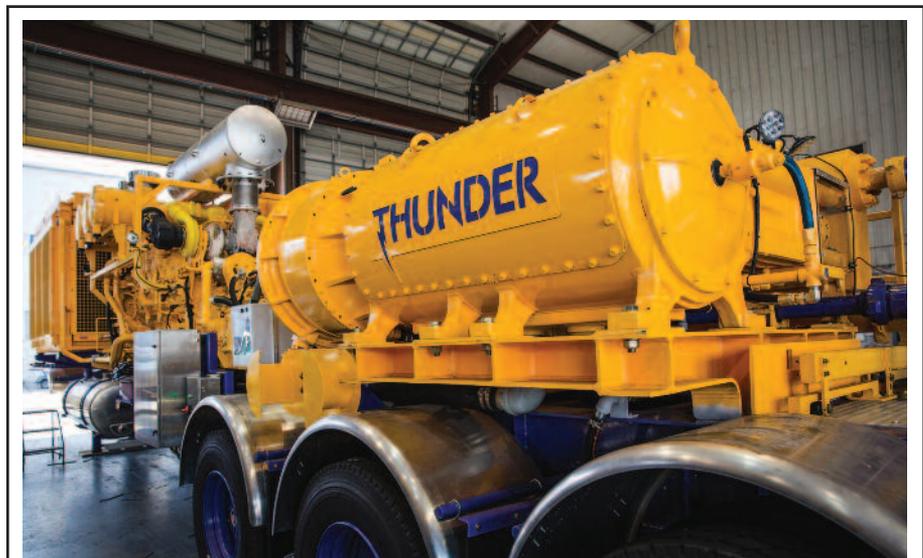
The packing has such a long life be-

cause it was developed based on extensive research into the causes of packing failure, Degginger relates. To delay failures, he says the designers applied the first principles in material chemistry and seal design to redesign the header ring and the pressure rings, and refined the material makeup to achieve exceptional resistance to abrasion, heat, friction and pressure.

With packing capable of withstanding 500-plus hours of run time, Degginger says many fleets will be able to move the packing maintenance interval from the field to the shop, aligning with other shop scheduled maintenance. "Replacing packing requires pulling out the plunger and exposing the heart of the pump to

contamination and reassembly errors. It is much better to do that in a clean shop than in the field, where dirt and sand tend to get into the grease between the threaded components and cause galling or other damage."

The longer maintenance intervals also reduce the risk of packing failing during operation, Degginger adds. "The more packing is run to failure, the higher the risk of fluid end damage that leads to washout, which forces the owner to replace the stuffing box, or if the stuffing box is not removable, the entire fluid end. Otherwise, the residual fluid end damage will continually degrade subsequent packing life, resulting in shorter and shorter



By moving from a traditional eight-inch stroke length to 11 inches, Gardner Denver's Thunder series hydraulic fracturing pumps enable fleets to extend consumable life and reduce maintenance costs by delivering the same horsepower, pressures and flow rates at slower speeds. Alternately, fleets can run the pumps at the same speed as their predecessors to increase flow rates.



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Degginger describes the packing as flexible, explaining that it can be used in the most popular pumps from a variety of manufacturers.

“We have spent the past year testing the packing throughout North America, including Texas, Oklahoma, Wyoming, North Dakota and Canada,” Degginger reports. “The packing delivered more than two times the life of the incumbent designs, pumping more than 100 million pounds of sand before failure and reducing maintenance 50 percent.”

Moving away from the packing, Degginger says Gardner Denver has raised the bar for fluid end performance with new fluid end designs for legacy 2,250 and 2,500 horsepower pumps. “We are applying proprietary geometries developed across our product portfolio to improve the life and serviceability of these legacy fluid ends, including valve-over-valve fluid ends and YWS fluid ends,” he details.

The NX™ line of valve-over-valve fluid ends lasts three and a half times as long as previous designs, while the modern YWS designs (Super YWS™) last twice as long as their predecessors, Degginger

reports. “Customers are validating these improvements with reports of fluid end life that exceeds their expectations in head-to-head field tests completed on the same wells,” he comments.

Degginger attributes the fluid ends’ durability to superior materials, stress-reducing geometries and optimized manufacturing processes. “We are implementing these geometries without any changes to the areas that interface with other components, so the pump operator still can use all existing internal and external components, including the valves, seats, packing, Falcon spring retainers and manifolds they were using with previous fluid ends,” he assures.

Long-Stroke Pump

The quintuplex and triplex models for the Thunder series pumps continue to perform well in the field, Degginger says. “Customers are reporting unprecedented operating efficiencies that result in significant savings,” he touts. “These savings come largely because the pump uses an 11-inch stroke rather than an eight-inch stroke.”

The longer stroke can have one of two benefits. “Fleets can run the pump slower, extending consumable life by 37

percent but maintaining the horsepower, pressure and flow rate they would get from an eight-inch pump. Alternately, they can run the pump at the same speed as the eight inch pump to increase their flow rate as much as 37 percent,” Degginger says.

By taking the latter approach, customers have cut the size of a frac spread by 30 percent, he reports. “Fewer pumps mean less work that needs to be done in the field, less nonproductive time, and improved safety, all of which contribute to a lower total cost of ownership,” he says.

Degginger adds that the pump can improve the life of other components. “By optimizing the crankshaft design, we minimized system vibrations up stream and down stream of the pump,” he explains. “Customers tell us they never have seen a pump run so smooth. In fact, in one West Texas field test, a triplex ran so much more smoothly than nearby quintuplexes—which are generally considered smoother—that the crew sent someone out to confirm it was running.”

The Thunder series pumps are durable enough that their maintenance intervals coincide with those for the engine and transmission, Degginger says. □