

Modern Frac Fleets Deliver Wells Faster And Consume Less Fuel

By Colter Cookson

“Waste not, want not” has become the hydraulic fracturing industry’s motto. Modern fleets do everything possible to minimize fuel consumption, simplify surface equipment and automate routine tasks. In the process, they are discovering ways to increase horsepower density and complete wells with fewer people. These innovations cut operating costs while reducing safety risks, community impacts and emissions.

Many of the companies behind these improvements say they have benefited from vertical integration. In-house manufacturing has helped them blunt the impacts of global supply chain disruptions. Even so, those disruptions have reinforced broader trends that limit how quickly new pressure pumping fleets can come on line.

“The demand for pressure pumping services exceeds supply,” assesses Matt Wilks, PF Holdings’ executive chairman. “In the past, the demand may have led service companies to build too many fleets, but I don’t believe that will happen today because operators, service companies and investors have become more disciplined. Investors used to be more aggressive about giving capital to companies with contracts. Today, they look more closely at how new capacity will affect the macro environment and deploy capital only when it makes sense.”

The spreads that are built tend to be electric or dual-fuel fleets. “The goal is to displace diesel with natural gas,” Wilks explains. “The delivered cost for diesel runs around \$5.50 a gallon, and an all-diesel fleet consumes 7 million-10 million gallons a year, which puts annual fuel costs between \$3.85 million and \$5.00 million. A single Mcf of gas can displace about eight gallons of diesel, so electric or dual-fuel fleets can deliver incredible savings.

“The economic incentive for dual-fuel and electric fleets is strong enough that, eventually, we do not think we will see many all-diesel fleets,” Wilks predicts. “Diesel fleets will handle single well pads and some recompletions, but completing multiwell pads will be done by some form of fuel-efficient fleet, whether it’s an electric fleet that runs entirely on natural gas or a dual-fuel fleet with high substitution rates.”

Wilks points out that on Nov. 1, ProFrac Services acquired U.S. Well Serv-

ices, one of the pioneers of electric frac fleets with more than 110 patents covering related technology. “Before the acquisition, we secured licenses through U.S. Well Services so we could build our own electric fleets,” he mentions. “The combined company has eight electric fleets, and we expect to have 12 early in 2023 as more roll off the line.”

The company’s horsepower also will include at least 13 Tier IV dual-fuel fleets by the first quarter of 2023, Wilks indicates. He says ProFrac builds both its electric and dual-fuel fleets internally to control costs and manage its supply chains. “Vertical integration helps us build electric fleets at a lower cost. The capital expense for the fleet itself is lower than it would be for a conventional diesel fleet,” he says.

“If we combined the costs for the fleet with the turbine that provides the electricity, the cost would be slightly higher,” Wilks allows. “However, we treat the fleets and turbines as separate busi-

nesses. The fleets compete with other pressure pumping equipment, while the turbines compete with diesel-based engines and are available on a rental basis through longer-term contracts.”

Given the fuel cost savings provided by natural gas turbines, Wilks deems the investment worthwhile. He mentions that displacing diesel has the side effect of improving air quality. “We are handling the E in ESG largely by following a maxim that is intrinsic to capitalism: Don’t waste what you don’t need,” he says. “In other words, we try to work as efficiently as possible.”

Enabling Efficiency

Fleets are becoming more efficient by reducing how long engines spend idling, Wilks says. He expresses pride in EKV Power Drives, a PF Holdings subsidiary that has developed a system to automatically shut down engines if they idle too long. EKV estimates that the system reduces engine idle time 80%,



Through vertical integration, including manufacturing pressure pumping fleets internally, ProFrac Services is navigating tough supply chains. The company says most future fleets will run partly or entirely on natural gas to reduce fuel costs and emissions.



RESOURCE SCIENCE

halving diesel deliveries and shrinking emissions.

The idle management system uses electric starters rather than hydraulic start and wet kits typical on frac sites, a change Wilks says greatly reduces the site footprint. “To accommodate hydraulic kits, a fleet with 50,000 horsepower would usually need 34-36 Class 8 tractors, or one for every pump. With the idle management system’s electric starters, we can reduce the trucks associated with each fleet to 10-12,” he details.

In cold temperatures, the idle management system periodically brings engines on line to keep fluids and catalysts warm so the equipment can turn on when needed, Wilks notes.

ProFrac has adopted big-bore frac manifolds, Wilks continues. “These manifolds allow us to equalize pressure from each pump,” Wilks says. “On a conventional manifold, we would have to equalize the line pressure across quadrants to prevent aggressive vibrations that could cause equipment failures.

“The big bore manifold allows more

flexibility,” he contrasts. “Instead of treating the whole system as a single unit and balancing pressures as the number one priority, we can look at individual drive trains and optimize other factors, such as fuel consumption and equipment wear and tear. This extends engine, transmission and power end life, improves natural gas substitution rates on dual-fuel fleets and simplifies maintenance schedules.”

Ensuring Supply

Wilks stresses that even the best equipment needs to be supported by robust supply chains. “At PF Holdings, we focus on making sure we control the entire supply chain to protect ourselves from common procurement issues that can reduce our utilization rate or our ability to provide customers reliable service at an attractive price,” he says.

As part of that effort, the company is expanding its network of frac sand mines, Wilks relates. In December, PF Holdings acquired the Eagle Ford mining operations of Monarch Silica LLC, and a subsidiary signed a definitive agreement to acquire

Performance Proppants, the Haynesville Shale’s largest in-basin proppant provider.

Wilks says ProFrac tries to anticipate potential supply chain problems before they affect service. “If anything gives us pause or concern, we will dig deeper and build the appropriate inventories,” he relates. “We want to keep everything as tight and lean as possible, and we track our cycle times very closely. However, we will invest in inventory to keep any tightness from impacting our operations. No one is happy when \$40 million worth of equipment has to shut down because we are waiting on a \$10 part.”

Wilks mentions that ProFrac has prepared for shortages by building inventories of packing and polymers. He adds that in 2021, the company’s manufacturing division moved its forgings from Europe to the United States. “We did not anticipate that Europe would shut down much of its manufacturing to conserve fuel for the winter, but we saw inflationary pressures and wanted to shorten lead times,” he says. “After moving forgings stateside, we have shorter lead times than ever.” □