

Research key to fracking future

Companies innovating to reduce costs

Dan Healing, Calgary (Canada) Herald, 7-17-10

When technical specialist Lewis Facca sets up his laptop in front of the projection screen at the Trican Well Service research centre, he can watch ideas developed one floor below face real world tests.

"This is kinda neat," says Facca, tapping keys and pointing to the screen in the second-floor boardroom in southeast Calgary. A question pops up from a colleague sitting in the producer client's office downtown and Facca taps in an answer.

In a graph to the left, real-time information begins flowing from a well being fracture-stimulated by a Trican crew using the company's 12-month-old Burst Port System in a sunny field somewhere in east central Alberta.

"It's very awesome," said Facca. "You can be at home, sitting anywhere, and watching your frac."

He points to the graph, which tracks pressure in the well. "We're hoping this little red line doesn't get too high because that's going to be an indication you're on zone and the formation is actually taking fluid."

The line rises on a computer-generated graph, then turns down. "That's happening. That's good news," grins Facca.

A few minutes later, the lines on the graph turn down sharply to the bottom of the graph and stop.

"Did we establish breakdown there?" asks Chuck Vozniak, Trican manager of technical services.

"We did," says a disappointed Facca. "We've been having issues with the CO2 pump today."

The good news is that the frac, the second in that particular shallow horizontal well, was working. The bad news is that a piece of faulty equipment on the surface had interrupted the process.

The phrase "horizontal multi-fractured well" has become an established part of the energy lexicon as producers seeking to develop resource plays in oil and gas rush to prove up their lands.

What is less visible are the technological resources being employed to come up with better, faster, cheaper, more effective ways to coax precious petrochemicals from their tight sand and shale hideaways.

Fracturing, in a nutshell, involves breaking up an underground rock formation by injecting high-pressure liquids through holes in the well pipe, thus allowing the oil and gas to flow and be collected.

A successful frac requires delivering the right liquid to the exact spot that needs to be fractured at the right time, creating the optimum level of pressure, keeping the fracture open by forcing sand or other "propants" into it and then getting everything out of the way so the largest amount of oil and gas can flow back into the well.

Every step is tested for practicality and cost. In Trican's lab, a series of specialized machines -- resembling pressure cookers -- worth hundreds of thousands of dollars recreate downhole pressure and temperature to test how its products will react, sometimes employing actual rock samples brought up from the depths.

Chad Friess, a services sector analyst with UBS, said producers and frac providers, also called pressure pumpers, work together to find specific solutions for their particular resource plays.

"With the fracs getting so much bigger and more expensive and getting more and more technical, the bigger guys that have those R and D shops have a bit of an advantage in that they can compete in those deeper plays where the smaller guys are a little more challenged."

Setting up a new fracturing crew capable of stimulating a deep well can cost a company \$60 million in capital, he said.

"The big differentiator when it comes to service companies is scale and the ability to run efficiently," Friess said. "It's still a logistics business, pressure pumping. It's all about keeping your crews active and using your resources as efficiently as possible."

In the Horn River Basin, for example, developing enough fracking pressure to counteract the weight of thousands of metres of rock requires as many as 16 pumper trucks, parked in rows on the well site. Friess said companies such as Encana are crying out for more powerful equipment in a more compact format.

An acknowledged fracking leader is privately held Packers Plus of Calgary, whose Stack-Frac set of solutions is employed around the world through a partnership with giant U.S. well stimulation firm Schlumberger.

Chief executive Dan Themig says the pressure to come up with innovations doesn't stop. In fact, his company has tripled its engineering staff to nearly 40 over the past three years to support three technology centres -- one in Edmonton and two in Houston.

New ideas include technologies that might allow 60 to 80 fracture stimulations in wells that extend horizontally for kilometres underground. Other producers are testing and improving on multilateral fractured wells.

Themig said a critical step in starting the company and continuing its growth is convincing the industry to try new things, while heading off ideas it doesn't think will pay off (such as cemented horizontal liners, a pet peeve).

"Almost 70 to 80 per cent of what the industry thought -- and what I thought -- when we started out in 2001 with our first system has proven to not really be accurate," he said.

"Now we've done like 35,000 frac jobs with our systems, over 4,000 wells, empirical evidence has been much different than all the theories."

Both Packers Plus and Trican have test wells to try out their new gear and chemicals.

Back in the lab at Trican, chemist Darren Maley demonstrates how adding a thickening powder and a few drops of proprietary chemical to water, followed by a beaker of artificially produced ceramic sand particles and a few

swirls in a blender, creates a thick, flubberlike green propant that hopefully will go where it needs to when pumped into the fracture.

Vozniak, a geologist by training, says the research part of the game has changed dramatically since he came on board in the Trican sales department 11 years ago.

About five years ago, the company moved its research department to Calgary from Red Deer and it has grown to 18,000 square feet of space and about three dozen staff, including a couple of people with doctorates.

"We don't do research because it's a neat idea. There has to be a practical, commercial side to it," Vozniak said.

"We see what the dollars invested in it would be and is there really a market for a new fracturing fluid or a new technique, whatever it might be."

Over the past three years, Trican has developed more than 60 new cementing and stimulation products and 18 coiled tubing products, tools and processes, maintained 14 Canadian patent applications and authored 25 technical papers.