WHEN IT COMES TO stimulating horizontal wells, Western Canada’s service companies know there’s more than one way to skin a cat.

While there are companies that specialize in fracturing, there are also firms that have fine-tuned a tool or technology that facilitates fracturing. Where a technology is a game-changer, it can stimulate more fracturing.

One popular system, for example, uses various-sized balls to enable a well operator to sequentially fracture a horizontal well, one zone at a time. Under that system, though, the operator often has to decide whether or not to leave some hardware — usually, balls and ball seats — downhole, which could hamper later attempts to re-enter the well.

Other specialists take a different tack on the same well, perforating the cased hole, then running in coiled tubing to fracture. Still others would use sand-jetting, blasting their way through the casing and into the formation, carving a conduit for fracturing fluid and proppant to travel.

Increasingly, when fracturing is complete, more of today’s well operators have the option of re-entering or re-fracturing later, mainly because more companies are using techniques that leave the operator the full-bore diameter of the casing to work with.

That’s also the goal with the Burst Port System (BPS) rolled out last year by Trican Well Service Ltd. When Trican’s trucks pull off the lease after fracturing with BPS, the well operator can re-enter the well five days or five years later, with no hardware that needs to be milled or drilled out first.

“We’re not a packer company or tool company,” says Brian Lane, Trican’s business development representative. “But by patenting burst port technology, we’re trying to grow our fracturing market.”

With its distinctive burst port collars, the company’s method differs from packer-based systems in some key ways. For example, BPS uses no perforating guns, sand-jetting or dropped balls. Instead, the system employs a series of short, stubby collars.

“We’ve created casing collars that sit between joints of casing,” says Lane. “They have pre-drilled holes in the side, in which we’ve set burst discs set to burst at a pre-determined pressure.”

To be precise, each of the short collars has 10 to 15 outward-aimed ports, whose burst thresholds can be set in advance. Since the BPS system is designed for use with cemented casing, the burst ports need only build enough pressure to puncture the cement surrounding the casing and the formation, but not the casing itself.

When the casing is run downhole to the horizontal leg, the burst port collars are already threaded into it, with each collar spaced at intervals along the casing string. The number of collars matches the number of stages to be fractured. The liner is cemented into place with the collars an integral part of the casing string.

Next, Trican runs its selective fracturing or “cup-to-cup” tool into the well on coiled tubing. With expandable rubber cups at each end, the tool runs inside the casing, highlighting another difference from the external packer-style model, which seals around the casing’s outer surface.

Once downhole, the cup-to-cup tool is positioned at the deepest burst port collar. As the well pressures up, the rubber cups expand, sealing against the inner surface of the casing, isolating the zone for fracturing.

The pressure in the sealed zone rises and the burst ports break outward, puncturing the outer layer of cement and penetrating the formation.

“We get proper isolation, because we know the fracs are being placed in the exact spots where we set the collars,” says Lane. “It’s a simple method for horizontal stimulation, because there’s nothing moving, no sliding sleeves.”

While Trican could run its BPS collars in tandem with external packers in an openhole scenario, that setup would be less cost-effective, mainly due to the high cost of external packers.
packers, Lane says. By far, the more common scenario for BPS is where the casing is cemented. A few Alberta producers, including Westfire Energy Ltd., have tried out the Burst Port System. According to Jason Schoenfeld, Westfire operations manager, the junior producer has used BPS on 11 horizontal wells in the last nine months, fracturing 15 to 20 zones per well, on average. Well depth averaged about 700 metres, true vertical depth, while the horizontal legs ranged between 600 and 890 metres long.

“We feel the number one advantage … is [that BPS] reduces your perforating cost and leaves you with a full-drift casing liner at the end of the day, without having to go through any drilling of ports, balls or the sorts of things you see with packer-style systems,” says Schoenfeld. Having the full-bore casing diameter to work with also helps, he adds.

“If ever we need to go back in and clean the well once it’s on production, to get sand out, we can go in with jointed tubing, as opposed to coiled tubing. There’s enough room in there to circulate fluid and solids because we don’t have any other jewelry in the way.”

Initially, Schoenfeld had concerns that the burst ports might not be as effective as perforating guns in penetrating the formation.

“I was concerned about it initially, but we’ve gotten past that, I guess. When you perforate something, it’s possible you could induce further stresses in the reservoir, potentially making it more difficult to initiate a frac. But we have not seen any decrease in our ability to frac intervals, between perforating and [using] the burst port collar.”

Trican uses one of two casing configurations when it runs BPS. Crews run either one string of 114.3 millimetre (4.5 inch) casing from surface to total depth, or alternatively, a string of 177.8 mm (seven inch) intermediate casing from surface to 90 degrees, with a 114.3 mm liner hung in the horizontal section.

The BPS system can currently only handle casing of 114.3 mm diameter. Plans are afoot to expand its capability to handle slightly larger, 139.7 mm (5.5 inch) collars.

While Lane sees no reason why Trican couldn’t fracture 18 or 20 stages of a horizontal well, he acknowledges the company has so far achieved a maximum of 15 stages, done in about 11 hours. The company’s record is fracturing 15 zones in nine hours, although if rig-up is counted, the total time was about 20 hours, Lane says.

• James Mahony

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PRESSURE POINTS
Trican’s distinctive burst port collars do away with perforating guns, sand-jetting and drop balls common to other systems.