

Case Study

Packers Plus dissolvable plug maintains isolation for successful completion during challenging stimulation program

CANADA, MONTNEY
LIGHTNINGBOLT 2

Packers Plus is committed to continuous innovation of completion technology to find incremental time and cost-efficiencies for well stimulation operations. Specific to cemented plug-and-perf wells, the LightningBOLT™ 2 Dissolvable Plug (LB2) was designed to provide maximum isolation performance during stimulation, while maintaining the reduced time required to run in hole and reduce or eliminate millout time of the LightningBOLT Dissolvable Plug. An operator with a four-well pad in the Montney trialed two LB2 plugs in each of two wells. Run-in times were maximized for all four plugs and, after successful pressure tests, the plugs held and maintained stage isolation during stimulation operations.



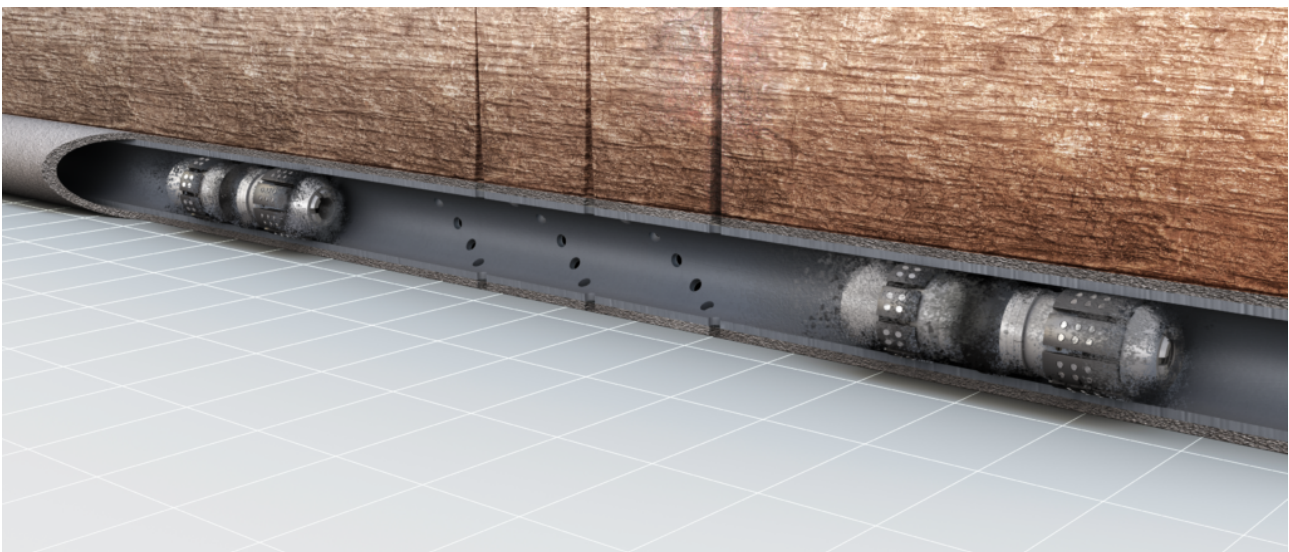
Challenge

Adoption of dissolvable materials has significantly reduced operating time and millout costs when completing plug-and-perf wells. While introducing dissolvable frac plugs into a completion program has helped operators lower well costs, there have also been occasions of zone isolation performance issues. The Montney operator had experienced frac plugs skidding in the wellbore during stimulation and required a dissolvable plug that could effectively provide stage isolation by both holding pressure against the casing and

providing internal ball-on-seat isolation throughout the stimulation program.

Solution

The Packers Plus LB2 dissolvable plug combines proprietary material for optimal dissolution time with a dual slip design that maximizes isolation performance during stimulation operations. Innovations built into the single slip LightningBOLT Dissolvable Plug are also included in the LB2, such as a short length for ease of running in hole and a combination of proprietary materials for optimal dissolution time. Dissolvable components include the slips, packer element and the ball, which can either be run in with the plug or pumped down onto the seat during stimulation operations.



Results

The operator working in the British Columbia side of the Montney formation trialed four LB2 dissolvable plugs in two wells on a four-well pad. The plugs were run on wireline with the ball in place and rates were maximized at 150 m/min (492 ft/min) for all four plugs. After a positive indication of plug setting was observed at surface, successful pressure tests were performed up to 46 MPa (6,672 psi) for 2 minutes to ensure isolation. As a result, no issues were observed during stimulation operations, which reached 53 MPa (7,687 psi).

Post-stimulation, the plugs were left in the well for a short time (77 hours and 67 hours) and as a result, coiled tubing milling operations were performed. After 77 hours in Well A, one LB2 plug had fully dissolved and the other plug was milled out in 2 minutes. After 67 hours in Well B, the two LB2 plugs required 13 and 15 minutes to mill out, respectively.

Packers Plus is a leading supplier of multi-stage completion systems, providing field-proven

and cost-effective methods for completing horizontal wells with superior production results in numerous formations worldwide. For more information on the company's portfolio of products, visit packersplus.com.

	Well A		Well B	
Measured depth	4,915 m (16,125 ft)		4,972 m (16,312 ft)	
True vertical depth	2,020 m (6,627 ft)		1,975 m (6,480 ft)	
Bottom hole pressure	25 MPa (3,626 psi)		23 MPa (3,335 psi)	
Bottom hole temperature	70°C (158°F)		68°C (154°F)	
Salinity of frac water	40,000 - 60,000 ppm		40,000 - 60,000 ppm	
	LB2 Plug 1	LB2 Plug 2	LB2 Plug 3	LB2 Plug 4
Ball in place	Yes	Yes	Yes	Yes
Run-in rate	150 m/min (492 ft/min)	150 m/min (492 ft/min)	150 m/min (492 ft/min)	150 m/min (492 ft/min)
Frac pressure MPa (psi)	53 – 49 MPa (7,687 – 7,108 psi)	43 – 47 MPa (6,237 – 6,817 psi)	52 – 47 MPa (7,542 – 6,817 psi)	53 – 51 MPa (7,687 – 7,397 psi)
Frac rate m ³ /min (bbl/min)	14 m ³ /min (88 bbl/min)	14 m ³ /min (88 bbl/min)	14 m ³ /min (88 bbl/min)	14 m ³ /min (88 bbl/min)
Total time in well	77 hours	77 hours	67 hours	67 hours
Millout time	0	2 minutes	13 minutes	15 minutes