

Down Hole Tool Tale from WA

Perth Australia is not somewhere that the drilling industry traditionally looks to for developing oilfield service tools. Inflatable Packers International Pty Ltd (IPI) from the Perth suburb of Osborne Park has bucked that trend for the past 20 years. This is a story of how one of IPI's numerous tools originated, and how it has since evolved into one of their most successful products, being used worldwide in oil & gas, mining and other downhole applications. It is a classic tale of how a good product that meets the needs of users sells itself by word of mouth in the industry and continuous improvement to increase capability.

Clem Rowe established IPI in 1999 to build inflatable packer tools for the global market, focused mainly on custom products for the nuclear waste and geotechnical industries. In 2002, he received a call from a division of a large Indian company seeking to find a lower-cost tool to test the permeability of coal seams compared to the Canadian Drill Stem Test (DST) equipment that others were using. The resulting straddle packer system, named ST-86, was a third the cost of the Canadian tools and the original tool is still in use today. The tool was eventually made in three sizes to suit a wide range of boreholes and was used by several Indian clients. The tools then went on to be used in other countries, notably Indonesia, for coal seam permeability testing.



ST114 – Miinifrac testing in Kalimantan using coiled tubing (Picture courtesy of PT Gas Fields Testing)

and shut-in settings. Permeability testing is vital to evaluate the potential of extracting methane gas in coal by dewatering the coal seam. Indian regulation required that IFO tests be conducted as part of CSG exploration and development.

In the Surat Basin of Queensland operators preferred to use Drill Stem Testing (“DST”), a technique in which fluid is produced from the formation, rather than injected into it as with the IFO. This is accomplished by lowering the fluid level in the drill pipe relative to formation pressure creating an underbalanced condition. The Canadian tool was excellent for that type of test, but Ewan McDonald, who had recently established Pro-Test Pty Ltd, saw potential in a more cost-effective tool from IPI. To enable the rods to be underbalanced, a fourth valve position was developed, and the tool was subsequently often run on coiled tubing – a more cost-effective type of rig for well testing than a work over rig - which the Canadian tool was not suited for. Meanwhile testing in the Galilee Basin, further north in QLD, was in harder coal and the preferred permeability test for

The tool was specifically designed to conduct Injection Falloff testing (IFO) – where the coal seam section of the well is isolated by a pair of inflatable packers, water is injected at pressure and then, with the area still isolated, retrievable memory gauges measured the fall in pressure as the injection pressure dissipated. The basics of the tool was a pair of inflatable packers (a “straddle”) which is run below a 3-stage valve that is actuated by axial movement of the drill pipe or tubing it is run in on. Once the packers are inflated and anchored against the formation, the tool can be shifted between inflate/delate, injection



STX60 – CSG Permeability Testing in Queensland (Picture courtesy of Klohn Crippen inc)

that is the Diagnostic Fracture Inducing Test (“DFIT”), also known as Mini-Frac, which is basically a high-pressure version of the IFO Test. It turns out that the more expensive Canadian tool was not very suitable for this. Both these advantages helped Pro-Test to become the top well testing company in QLD from that era.



ST86 – CSG Permeability Testing in Queensland (Picture courtesy of Pro-Test Pty Ltd)



ST114 – Injection Fall Off Testing for a US Government sponsored CO₂ Sequestration Project in Illinois USA

DFIT and Mini-Frac are oilfield terms and the tool (by now known at the “ST series”) was being used in wider applications. One was for an American government funded project for Carbon Storage and Sequestration in Illinois. If you are going to store away carbon by injecting it into the subsurface, it is critical to characterise the injectability of the target formation.

This work was mounted from IPI’s base in Red Lodge Montana (an old coal mining town in the lee of the Beartooth Mountains) and not long after this there was a requirement for Mini-Frac testing in the Athabasca oil sands in northern Alberta. The client was a “super major” and the tool has now done multiple work there, the running of which was amicably taken over by a Canadian rock stress testing company. They then took the tool on jobs in Turkey and China for several other applications including salt formation testing for oil storage. During this time an assistant professor from the Beijing Institute of Geomechanics (part of the Chinese Geographical Survey) saw the tool at work, resulting in the Chinese Government now using the 10,000psi version of the tool for shale oil and geothermal testing across China.

Over time the tool has had several modifications and new features developed to enable it to work deeper and in wells with low fluid levels. It has had plenty of use for testing well casing and the effectiveness of abandonment plugging in offshore oil wells. More recently it has been used on the Snowy Hydro 2.0 project, taking over from other equipment that was not getting test results. With an increased prospect of more Carbon Sequestration and Capture projects in Australia, we expect to see more use in its home market.

It's "little brother" – the 60mm version – is now probably the most versatile version of all IPI's products, running as a mining wireline permeability testing tool for major hard-rock mineral mining projects as well as for coal, rock stress testing, and as a treatment tool in the largest of Middle East oilfields.

Configured for mining wireline operations and termed the STX-60 the tool is capable of much more than single packer Lugeon tests if a project requires such as multiple straddle tests in one run or the more advanced Injection Fall Off test. It operates "through the bit" in HQ format using standard 60mm elements or with 70mm elements on the same chassis for PQ wells. For NQ wells it can run as a BHA (Bottom Hole Assembly) and with higher rated elements for rock stress testing beyond what standard drill rods are usually rated for.



ST114 Minifrac testing in Northern Alberta (Picture courtesy of BitCan inc)



ST60 used for acid frac stimulation (Picture courtesy of National Petroleum Services (NPS), a NESR company)

This is a classic example of how IPI has developed technology for one sector of the drilling and exploration industries and applied it in others. Several IPI products for mining and geothermal application now operate at elevated temperatures by using synthetic oilfield materials, while low pressure, mineral coring rig BOPs were inspired by the more expensive, higher pressure oilfield versions. These are becoming increasingly essential for safe exploration drilling and utilize IPI's inward inflating packer designs.

All designed and manufactured in Perth, Western Australia