

TRICAN POLYBORE

BACKGROUND

For over 20 years pipelines have been lined with polyethylene. Trican Polybore turns the process vertical—same fluids, gas contact issues, and deposits as in pipeline applications. When compared to steel, plastics exhibit improved friction characteristics as well as increased thermal insulating qualities. They also, however, have reduced mechanical properties which limit their applications.

The Polybore process was founded in the USA, but has recently been adopted in Canada. Although installations have predominately been completed in Saskatchewan, recent developments in the approval process through the AEUB are creating a growing interest in Alberta. Installations are available in 114.3mm, 139.7mm and 177.8mm casing size applications.



Roller Reduction Unit (RRU) – Progressively reduces the plastic liner OD through a series of precision sized roller banks.

Polybore

Plastic tubulars have been used in oil and gas operations for many years as a means of preventing wellbore corrosion, typically by lining and installing individual joints of tubing or casing in the wellbore. Polybore is a technique which allows for the in-situ installation of full-length liners composed of high density polyethylene (HDPE) and other plastic materials. Polybore can be installed to protect against internal corrosion, reduce wellbore friction in injection wells and provide casing repair to extend wellbore life in injection and producing wells. It also acts as a velocity string providing reduced friction and improved thermal insulation to gas producing wells while reducing, and in some cases, eliminating liquid loading in the wellbore.

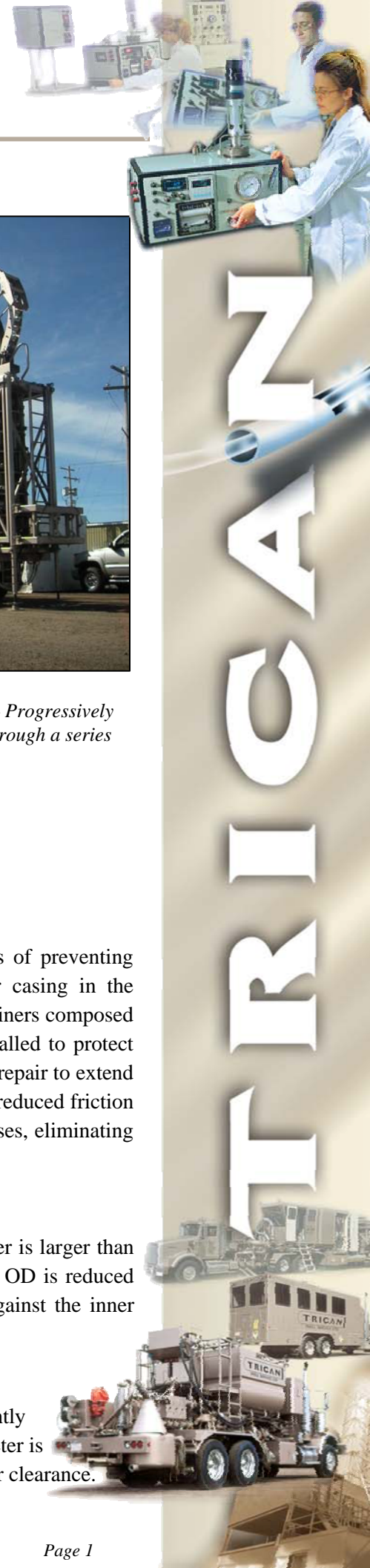
Polybore can be installed using two different methods:

Tight Fit Liner (TFL):

In this application, the liner's initial outer diameter is larger than the inner diameter of the host tubular. The liner OD is reduced prior to installation and left to recover tightly against the inner wall of the tubular.

Loose/ Neutral Fit Liner (NFL):

In this method, a liner with an outer diameter slightly smaller than that of the host tubular's inner diameter is installed with the intent of having minimal annular clearance.





Tight Fit Liner (TFL)



Loose/Neutral Fit Liner (NFL)



APPLICATIONS

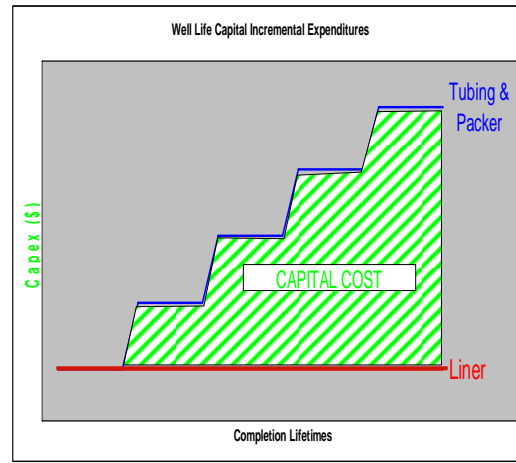
Tubingless Injection

Conventional water injection or disposal completions use tubing and packer completions that provide an annulus filled with inhibited water, isolated from the injection / disposal stream by a tubing and packer. The Polybore process replaces the tubing and packer completion with a tight fit corrosion-resistant plastic liner, providing both increased flow areas and smoother surfaces. The result is an effective tubingless injection completion.

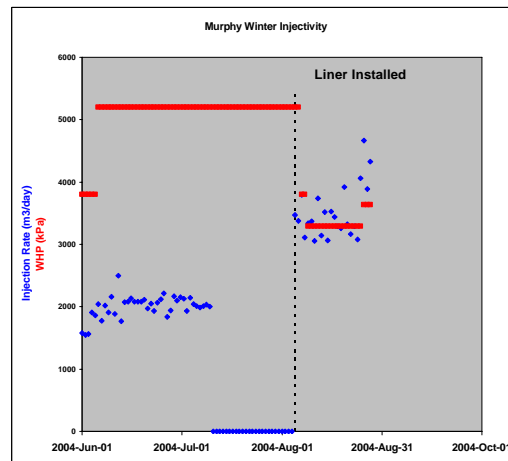
In some cases, tubing and packer completions are regularly replaced because of exposure to highly corrosive fluids and/or environments. With the corrosion resistant properties of HDPE a Polybore liner installation will last for the life of the well. The capital expenditures plot to the right shows the conceptual capital savings that could be expected. The tubingless injection system will see an up-front capital cost for the installation, while the tubing and packer completion may require several change outs over the life of the well.

Once installed the Polybore system continues to provide advantages and savings over the traditional tubing and packers completions. Injectivity data from an injector located at 46-25W3 is shown to the right. The well has 177.8mm casing and was injecting down 88.9mm tubing, displacing ~ 2000m³/day at 5200 kPa.

The plot shows that after the installation of the Polybore liner, the well head pressure was reduced to 3300kpa while the rate of injection was increased to ~ 3500 m³/day. By increasing the flow area by 340% and providing a smoother contact surface for the injected fluid, the friction pressure is substantially decreased. This drops wellhead pressure and, in turn, minimizes wellsite power consumption. In this particular case, the operator was able to save ~\$3000/month.

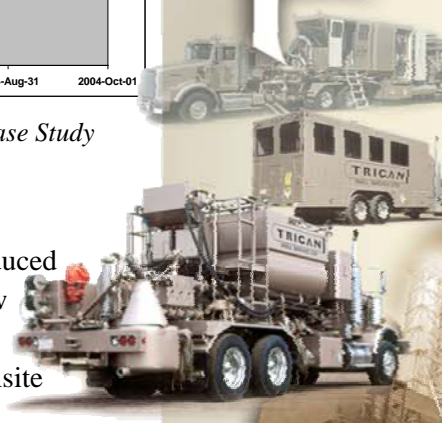


Conceptualization of the capital savings expected from a tubingless injection system.



Pre and Post Liner Injectivity – Case Study Well

POLYBORE



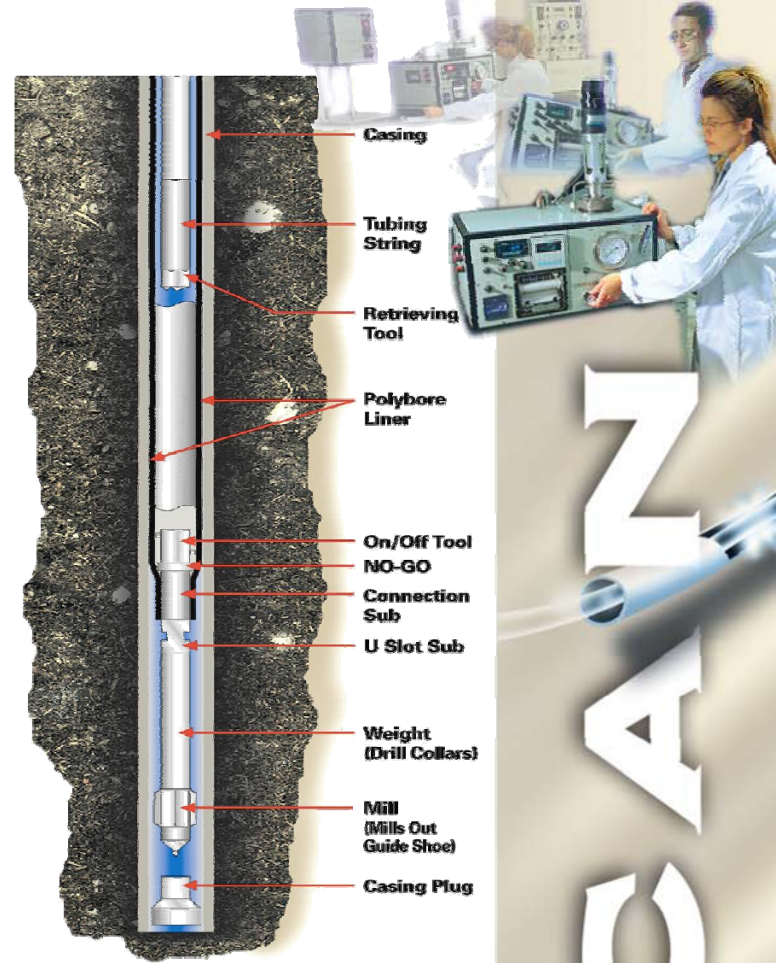
Casing Repair

Plastic liners are well suited to casing repair applications under the right circumstances. As of January 2005, casing repair operations have been conducted on four wells, including one producing oil well and three injection/disposal wells.

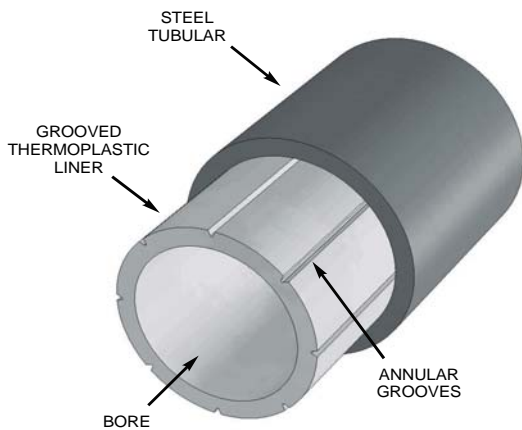
Field Case Study – Casing Repair

The injection / disposal wells located in 2-1W2M experienced casing corrosion just above the packer such that the wellbore failed its annual mechanical integrity test. The leaks were considered “pinhole” in nature without pressure buildup.

The tubing and packer were pulled and the wellbore was prepared as per routine procedures (i.e. scraper, swab, gauge). Although the procedures and equipment exist for the liner to be run as discreet patch (i.e. not to surface), the operator opted to run the liner full length due to a low incremental liner material cost. After running the liner, the well was returned to a tubing and packer completion, with mechanical integrity restored.



LINER INSTALLATION

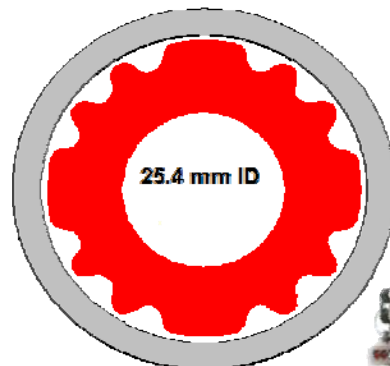


CO₂ Linings

Plastic linings can be used in wellbores in high CO₂ environments. For injection systems they can offer the benefit of reduced friction as well as corrosion protection. Since liners, however, are subject to collapse from gas permeation, grooved liners are recommended to provide a path for venting permeated gas and avoiding pressure buildup behind the liner.

Thermal Velocity Liners (TVL)

Plastic tubulars are commonly used for velocity strings in shallow low pressure gas fields as a method of reducing wellbore friction and optimizing production and liquid un-loading. Running the TVL as a neutral fit liner landed on a downhole nipple provides lateral support for the liner and avoids the creep issue experienced with free hanging plastic liners. The thermal insulating properties of the plastic also helps to maintain gas temperatures to further minimize condensation and liquid drop-out.



Example TVL Design and Configuration – 60.3 mm Tubing