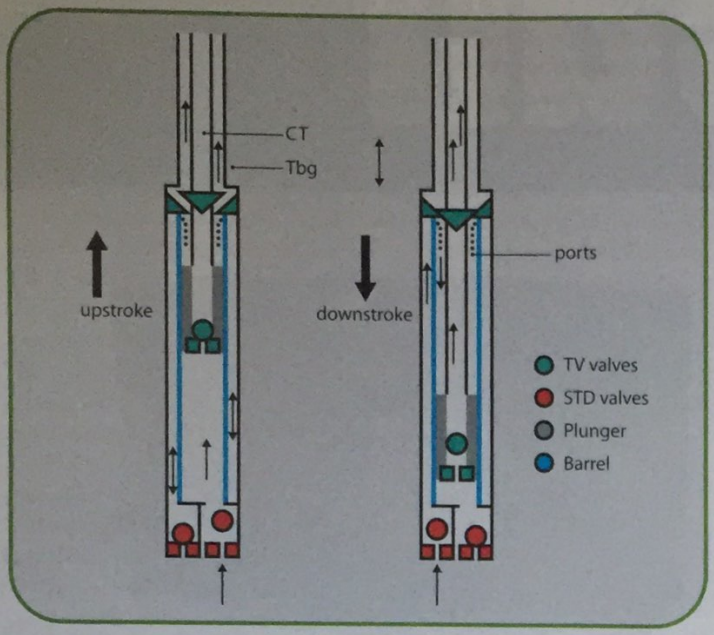
pumped for ACTION

Using Coiled Tubing As Sucker Rod May Improve Economics Of Secondary Recovery Wells



An inventor in Texas has developed an oil production system he says can use coiled tubing as a hollow sucker rod to improve the economics of secondary recovery wells.

Designed to work with a beam pump, or pump jack, the dual displacement pump (U.S. patent no. 6,585,049 B2) would produce oil and water on both the upstroke and the downstroke, says the inventor, Humberto "Bert" Leniek, a longtime petroleum engineer.

The coiled tubing would double as a sucker rod string — moving the plunger up and down — and a production string through which oil and water would flow.

On the pump's upstroke, fluid would be produced through the annular space between the coiled tubing and the production tubing (similar to how oil is produced with sucker rods). But on the downstroke, fluids would be lifted to surface through the coiled tubing.

Leniek believes the principal market will be wells that are on secondary production, because of the large volume of water that has to be lifted to produce oil.

This usually means going to a more expensive alternative to the beam pump, such as a submersible pump or a progressive cavity pump. Leniek's dual displacement pump, which costs roughly $10,000 (U.S.), is designed to allow producers to continue using beam pumping units instead of going to more expensive alternatives.

Since many of these wells have a water cut in the 95% range, it obviously makes sense to use the most economical production system available. Leniek believes his system can increase total fluid production by up to 80% per day while still using a pump jack.

Producing more fluid per cycle would allow smaller-diameter plungers to be used, decreasing the weight of the rod string. This in turn would reduce wear. It could also allow the operator to reduce the capacity of the pumping unit. "If you got a smaller plunger, you can use a smaller pumping unit," says Leniek.

His pump consists of two concentric tubes. The existing prototype, in which the outer diameter of the outer barrel is 4.25 inches, fits seven-inch casing. Leniek says he has also designed, but hasn't yet built, a version with a 3.75-inch OD outer barrel.

He believes his system will work in wells as deep as 4,000-5,000 feet. The pump is not suitable for natural gas handling because one of the stages is prone to gas locking.

In its only field test to date, the prototype fell far short of expectations. In a ChevronTexaco Corporation field in west Texas, the pump was tested on an oil well from Feb. 18 to April 22. It was hoped the product would fill a gap between a regular rod pump and the more expensive alternatives, says Bob Trickett, an artificial lift representative with the oil company.

If it had lived up to its promise, the system would have produced 1,000 bbls of fluids a day. But its best performance was at least 400 bbls a day below that rate.

The pump also had to be pulled six times because of various problems, racking up about $25,000 (U.S.) in rig costs, Trickett says. "I did not have a good experience with it." He says the same well is now producing about 855 bbls of fluids a day — 35 bbls of oil and 820 bbls of water — using a submersible pump.

"But regardless of the poor performance when it came to volume," counters Leniek, "the pump, particularly at low SPM (strokes per minute) rates, proved that it can pump both ways — on the downstroke and the upstroke."

Leniek readily acknowledges the test run was fraught with problems. For starters, the well used sucker rods, not coiled tubing. "This pump has been designed to run with coiled tubing," he says. "I'm sure we might be able to make it succeed with sucker rods too, (but) the original conception was the pump was to be used with coiled tubing."

He believes the sucker rods (which were fibreglass because of the well's high hydrogen sulphide content) were stretching and buckling during the test. Consequently, the stroke length downhole would be less than that at surface.

"The well was not the right candidate," says Leniek, who believes any test is better than no test and is still grateful to ChevronTexaco for testing the technology.

It was an old well, so components such as the production string were probably in less than ideal condition. Also, he says the test was funded from the oil company's field budget rather than as a research and development project. In a commercial setting, with production targets looming in the background, there is obviously less room for experimenting and developing a product.

Leniek, who has devoted himself since 1994 to developing artificial lifts with coiled tubing, is looking for a producer willing to test his pump with coiled tubing rather than sucker rods — and to fund the testing as well as improvements to the product. ntm — **Pat Roche**

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