DOWNHOLE ROD PUMP REDUCES WORKOVER FREQUENCY ANDASSOCIATED OPEX COSTS IN AUSTIN CHALK WELLS

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CHALLENGE

In the Aqua Dulce Field in Jim Wells County, an operator was producing large amounts of sand in mature Austin Chalk vertical wells. Sand and solids were so severe in one well in the field that a workover was required every 90 days on average to trip out of the hole and replace the pump. These workovers and failed pumps significantly increased the well's operating costs while causing a substantial loss in deferred production.

Whether dealing with formation fines from perforated intervals or proppant flowback from hydraulically fractured zones, efficiently producing from reservoirs with high sand content is a challenge common to multiple forms of artificial lift. Specific to reciprocating rod lift applications, sand and solids entering the barrel/plunger interface is a primary contributor to pump failures. In conventional designs engineered to move fluid through tight space tolerances, causing plugging and accelerated abrasive wear of the barrel, plunger, and other internal parts.

SOLUTION

To extend pump run times and improve bottom-line performance on the failure-prone Chalk well, the operator turned to Harbison-Fisher's patented Sand-Pro+™ pump.

Sand-Pro+ is designed to eliminate premature sand-related wear and pump sticking/plugging using a unique dual-plunger configuration to separate sand from the pressure-sealing leading edge of the barrel/plunger interface. The upper-stage wiper plunger is not subjected to pressures that would force sand into it, allowing it to effectively keep solids particles from settling on the leading edge of the pressure-sealing lower-stage plunger. Sand-Pro+ also incorporates an electroformed -coated mesh filtration screen to prevent sand particles from intruding into the nesting space between the plunger and barrel, enhancing lubrication and fluid flow.

RESULTS

A Sand-Pro+ pump with a 20-foot barrel and five-foot plunger section was run to a depth of 5,000 feet in the well in August 2020. The 20-125-RHBC-20-5-.02-zero cage (2 ⅜ -in. tubing, 1 ¼ -in. bore, heavy wall barrel pump) has operated continuously for more than 1,300 consecutive days–and counting–without requiring an intervention, extending by a factor of 10 times the well's average mean run time between failures using standard rod pumps.

The pump's prolonged service run has allowed the operator to avoid frequent workovers and production deferrals while maintaining the well's daily production rate of total fluid.

According to the operator, by eliminating the need to activate a workover unit to pull the pump at 90-day intervals, Sand-Pro+ has prevented the costs and potential risk exposures of 15 workovers since the pump's August 2020 install date.

Assuming a typical eight hours of rig time to roundtrip the rods and replace the pump, one workover would cost about $3,600 at prevailing South Texas workover unit rates of $450/hour. As of May 2023, the Sand-Pro+ pump had saved the operator nearly $54,000 in direct workover rig expense alone. With three days typically required to restart the well after a pump failure and assuming a 50% oil cut in daily production, the operator has captured another $27,000 to date in gross oil sales revenues by avoiding the deferred production associated with 15 workover events (given a 2024 YTD annualized average WTI price of nearly $70/bbl).

Factor in the capital cost of replacement equipment, and the workover savings potential compound significantly, along with the positive HSE and ESG impacts of mitigating personnel risk exposures by eliminating the emissions profiles associated with 15 workovers and pump replacements. Moreover, with the pump still performing strong, the economic and operational value continues to accumulate the longer it remains in continuous service.

These kinds of real-world results in the Aqua Dulce Field are driving the increasing adoption of Sand-Pro+ across the South Texas Austin Chalk and Eagle Ford trends as operators seek to maximize the performance metrics of rod-pumped wells in particulate laden environments.