

Left Helix PCP Manages Sand to Enable 13% Drawdown Increase for Casabe Consortium

Reverse-geometry PCP design eliminates sand flush interventions and extends uptime in two wells, adding USD 380,000 in oil value, Colombia

CHALLENGE

Improve uptime in wells with high sand production, eliminating deferred production and intervention costs.

SOLUTION

Deploy Left Helix* reverse-geometry progressing cavity pumps (PCPs).

RESULTS

- Restored economic production to a well that had been shut in for nearly 1 year because of its high sand production.
- Eliminated sand flushing interventions that had caused deferred production of oil valued at USD 380,000.
- Increased production by 13% in both wells because eliminating the sand accumulation enabled drawdown increases.
- More than tripled average PCP run life in the shut-in well and doubled it in another well.



Sand production damages pumps and raises opex

Casabe Consortium uses PCPs to produce wells for Ecopetrol in the Casabe field of Colombia. In some wells, conventional PCP technology is efficient and effective to lift the produced fluids. However, in others, extreme sand production—as high as 5% solids—results in plugging of the PCP intake, which leads to frequent interventions, deferred production, and high opex as the wells are shut in until such time that sand can be removed.

To reduce costs and improve oil recovery, Casabe Consortium evaluated robust sand control systems but determined they were uneconomical for the Casabe wells. Instead, engineers asked for a system that would produce the high-solids fluid more reliably.

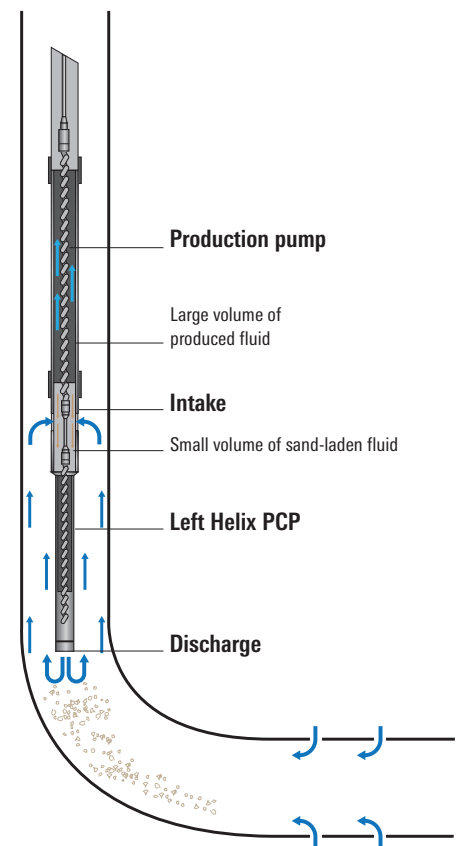
Reverse-geometry pump pushes sand away

Schlumberger recommended the Left Helix PCP. The main cause of sand plugging is accumulation of sand at the PCP intake. The Left Helix pump design incorporates two changes to a conventional PCP design to reduce future plugging risks. First, the conventional PCP bottom tag is replaced by a top tag, which increases the area to flow at the intake. In addition, a second rotor is added to the rotor string to pump a small fraction of the total rate downward (reverse geometry) and prevent sand accumulation at the pump intake.

Both wells restored to economic production without sand problems

To verify the technology, Casabe Consortium installed Left Helix PCPs in two pilot wells; installations proceeded normally and incurred no NPT.

In the first well, the Left Helix pump eliminated interventions and deferred production related to sand flushing, enabling incremental production valued at USD 50,000 at USD 50 per bbl. In addition, the improved sand management enabled increased drawdown, improving oil production by 13%. Finally, the new pump doubled the PCP run life from an average of 363 days to 732 days, further reducing interventions and production deferral.



The Left Helix pump design incorporates a bottom rotor to pump a small percentage of fluid downward, which prevents sand accumulation at the intake. The design also replaces the conventional bottom tag with a top tag to reduce plugging risks.

CASE STUDY: Left Helix PCP manages sand to enable 13% drawdown increase for Casabe Consortium, Colombia

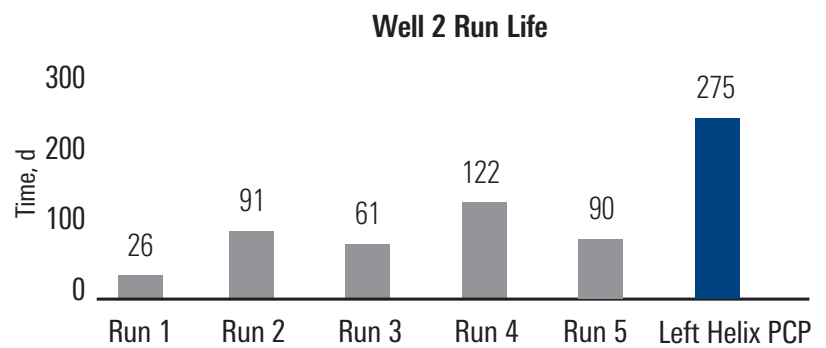
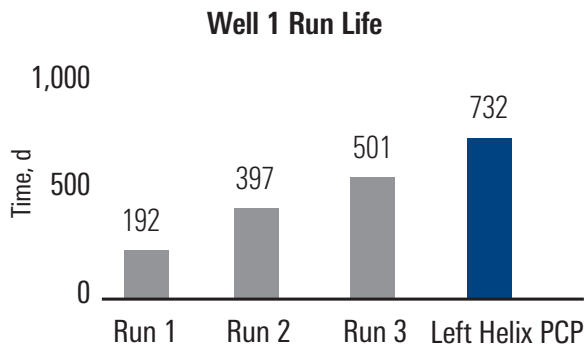
Conditions in the second well were considerably more challenging, resulting in more downtime for sand flushing as well as an average run life of just 78 days with conventional PCPs. In fact, the well had been shut in for nearly a year because Casabe Consortium could not justify its economics. As with the initial well, the improved sand handling eliminated flushing interventions and deferred production, enabling incremental production valued at USD 331,000. Drawdown was also increased by 13%, and the Left Helix pump more than tripled the conventional PCP run life to 275 days, further reducing deferred production.

The improvements in run life increased well production and reduced intervention frequency and associated costs. The success prompted Casabe Consortium to install the technology in 12 additional wells.

Average Performance for 3 Years Before Left Helix PCP Installation

	Well 1	Well 2
Average sand flushing interventions per year	3	3
Average sand flushing downtime per year, d	19	141
Average net oil production, bbl/d	52.5	47
Average deferred oil production volume, bbl/yr	998	6,627
Value of deferred oil production, USD/yr [†]	49,875	331,350

[†]Based on oil price of USD 50 per bbl



Average run life in Well 1 more than doubled after Schlumberger installed a Left Helix PCP to reduce plugging from sand production. The Left Helix pump restored production and more than tripled the average PCP run life in Well 2, which had been shut in for nearly 1 year because of the economics of repeatedly replacing conventional PCPs plugged by the more extreme sand production.

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