Rotoliptic

CYCLIC STEAM STIMULATION

TECHNICAL BULLETIN

ANY VISCOSITY **ANY TEMPERATURE** **ANY PHASE**

www.rotoliptic.com

To learn more about our pumps and how our technology can help, speak to one of our Application Engineers today.

expert@rotoliptic.com

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The performance of Rotoliptic's novel patented positive displacement pump is not impacted by the varying downhole conditions, including in Cyclic Steam Stimulation (CSS) wells. The Rotoliptic pump also enables the ability to steam through the stator rather than the casing.

CYCLIC STEAM STIMULATION (CSS)

Cyclic Steam Stimulation (CSS), is an enhanced oil recovery technique commonly used in heavy oil reservoirs. In this method, steam is injected into a well to heat the heavy oil, reducing its viscosity and making it easier to extract. The process occurs in three phases: injection, soaking, and production. During the injection phase, steam is pumped into the reservoir to heat the oil. The well is then shut in for a soaking period, allowing the heat to penetrate and reduce the oil's viscosity. Finally, in the production phase, the now-mobilized oil is pumped out of the well. CSS is particularly effective in reservoirs where the oil is too thick or viscous to be recovered through conventional methods.

ROTOLIPTIC PUMP CONFIGURATION

The page below shows the typical surface drive setup for CSS operations. Figure A illustrates the run positions. A typical Rotoliptic pump setup utilizes a surface drive system and can be easily configured to use a conventional Progressive Cavity (PC) pump system in a plug-and-play manner. This setup requires no specialized equipment and can be readily deployed using standard oilfield equipment such as continuous rod/tubing or coupled sucker rod and tubing. One of the key attributes of Rotoliptic technology is its ability to allow steam injection directly through the stator, eliminating the need for heavy workover rigs and preserving the integrity of the casing. This feature significantly reduces operational costs and downtime.

STEAM INJECTION PROCESS

To complete the steam injection process, any light-weight pulling unit or crane can be employed to lift the polished rod (Figure A). The polished rod is then clamped in place, suspending the rotor above the stator and allowing steam to pass down the tubing and through the stator into the formation (Figure B). After the steam injection, the clamps holding the polished rod are removed, and using any light workover rig and/or crane, the rotor is lowered back into the stator to resume the production cycle (Figure C).

ROTOLIPTIC BENEFITS

Rotoliptic's ability to retain efficient pump performance throughout the entire production cycle range of temperature and viscosities, along with the multiphase flow capability, makes Rotoliptic the preferred lifting solution for challenging well environments and typical conditions in CSS operations.

ANY VISCOSITY

The unique Rotoliptic pump principles allow for an all-metal Progressing Cavity (PC) pump configuration with a much tighter clearance at the seal lines than a typical PC pump while maintaining a lower operating friction torque and having tighter clearance results in higher volumetric efficiency with low viscosity fluids, commonly encountered at each end of the CSS production cycle.

Rotoliptic pumps can handle a wide range of viscosities, experiencing even higher volumetric efficiency as fluid viscosity increases. Regardless of the fluid viscosity at the pump inlet, Rotoliptic will pump it, making it an excellent choice for the varying viscosities associated with lifting CSS operations.

ANY TEMPERATURE

With a maximum operating temperature rating of 350°C (660°F), the temperature fluctuations associated with steam cycles have no impact on Rotoliptic pump performance.

ANY PHASE

Rotoliptic can also transport multiphase fluids where free gas/vapor is present at the pump inlet. This ensures consistent downhole pump performance and eliminates adverse effects due to free gas/vapor interference by moving the gas up through the pump and into the tubing, preventing gas locking.

The Rotoliptic pump is the most efficient all-metal artificial lift system for unconventional oil production, designed to excel across all thermal recovery methods

Rotoliptic

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CYCLIC STEAM STIMULATION

TECHNICAL BULLETIN

FIGURE A

LIFT DRIVE STRING FROM RUN POSITION

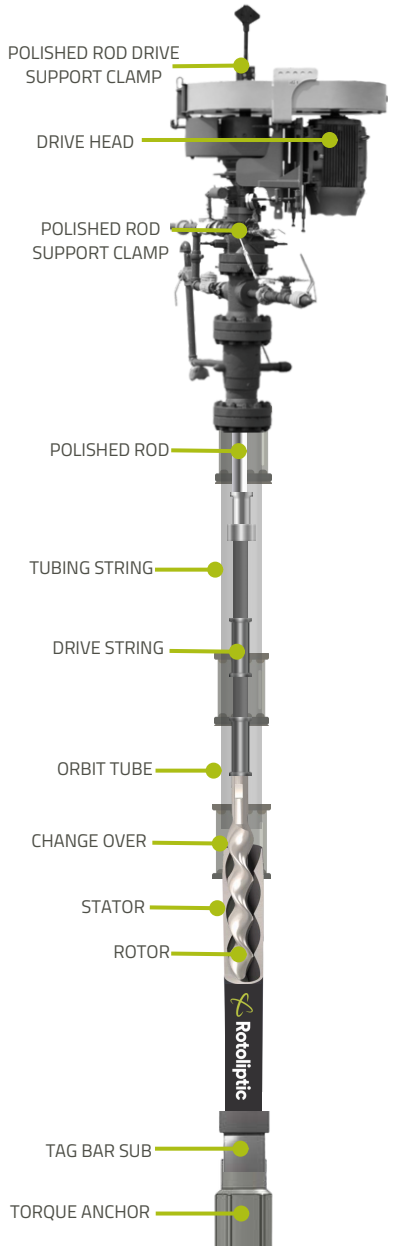


FIGURE B

ADD ADDITIONAL CLAMP TO HOLD POLISHED ROD IN PLACE DURING INJECTION PROCESS

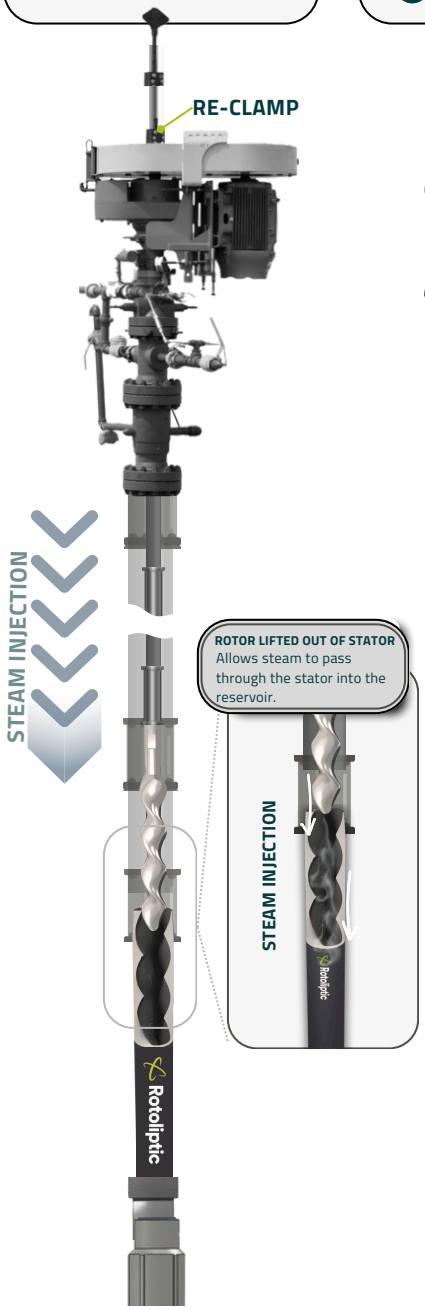
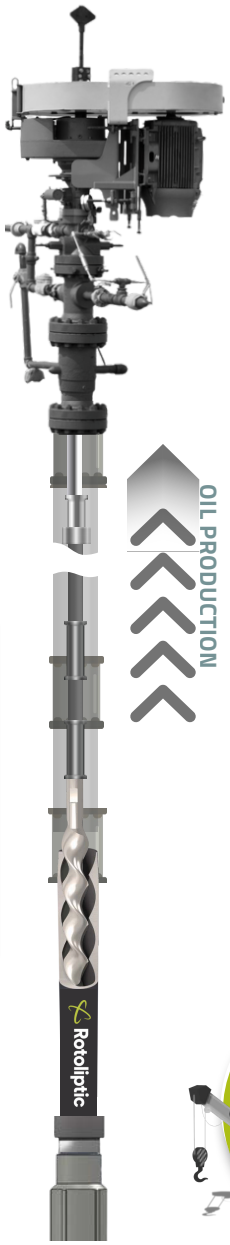


FIGURE C

REPLACE POLISHED ROD BACK TO RUN POSTION



BENEFITS

- Suitable for deviated wellbores
- Ideal for areas with limited rig access and availability
- Reduces workover intervention time and costs
- Allows for fluid circulation by flushing through the pump

FEATURES

- Use any lightweight pulling unit to lift the rotor and drive string, allowing for steam injection through the tubing
- Rotoliptic pump pre-assembled with Tag Bar Sub, Torque Anchor, Orbit Tube and Change Over prior to running in hole

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