CASE STUDY

Sand Diverter More Than Doubles Rod Pump Run Time in Sandy Wells for Permian Operator

Plunger adapter directs sand and solids away from the pump barrel to reduce failures caused by severe abrasion, Permian Basin

CHALLENGE

Improve run time and reduce failures for downhole rod pumps in wells with high sand or solids content.

SOLUTION

Add a Sand Diverter plunger assembly to direct sand away from the pump barrel.

RESULTS

- Increased average rod pump run time by 108%.
- Reduced average failure frequency by 44%.

Sand and solids abrade downhole pumps

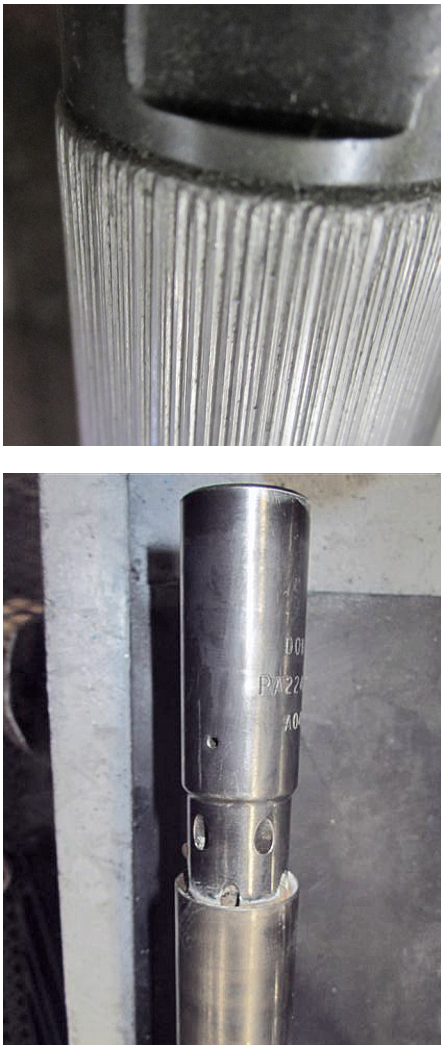
The Permian Basin in west Texas consists of several different formations and many different fields. Most have a wide range of downhole conditions even within the same field. One of these varying conditions is the amount of sand and other solids that must be properly managed to optimize production and minimize downtime. Large volumes of sand and solid material within a well can lead to damaging conditions for the downhole pump.

Each downhole rod pump is designed with a specific clearance in relation to fluid viscosity and stroke speed, among other factors, to maximize production and pump efficiency. When the barrel and plunger is severely abraded, clearance increases beyond the optimal range. The increased clearance results in increased fluid slippage, reduced pump efficiency and, in the worst case, a stuck plunger.

A leading operator in the Permian Basin was experiencing severe abrasion cutting in 15 wells across several fields and asked for a way to improve pump run time.

Sand Diverter keeps solids away

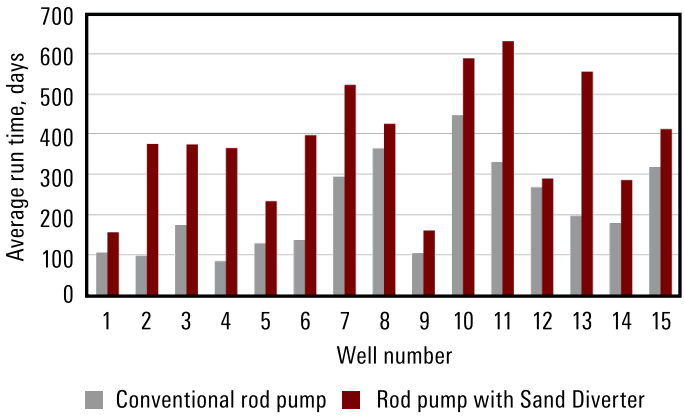
Don-Nan recommended adding a Sand Diverter to minimize the abrasion effects. A Sand Diverter is a modified plunger adapter that directs sand and solids away from the pump barrel. Compared with the conventional design for plunger adapters, the Sand Diverter has an increased outside diameter, providing a much closer fit, and a beveled leading edge with upwardly angled discharge ports. This combination of design features prevents sand and solid material from collecting between the barrel and plunger during operation or while the system is idle.



A plunger with a standard plunger adapter (top) shows extreme abrasion after only 100 days in operation, making it unacceptable for redeployment. A plunger fitted with a Sand Diverter plunger adapter (bottom) shows no signs of plunger abrasion damage after 226 days in operation and can be redeployed.

Pump lifetime increases and failures drop

Sand Diverters were installed in 15 sand-challenged wells with conventional downhole rod pump run life ranging from 84 to 364 days. The technology mitigated the effects of sand production on the downhole pumps, increasing run time in every well with an average improvement of 171 days (108%). The most improved well more than tripled its run time (335%). In addition, the average failure frequency decreased by 1.1 failures per year (-44%).



Severe abrasion limited pump run time for the Permian Basin wells, but the Sand Diverter improved pump run time by an overall average of 108%.