Economic Pumping Technology for Shallow Gas Well Deliquification

Mike Dickey  SMITH LIFT

David Smart-Priority Oil and Gas
Hydraulic Diaphragm Electric Submersible Pump-HDESP

- What is an HDESP?
- How does it work?
- How is it deployed?
- What kind of wells can I use it in?
- How does it handle sand and gas?
- How does it benefit me?
What is an HDESP?

- A down-hole positive displacement pump
- Twin acting diaphragm tubes
- Oil filled, 3 phase, 460V electric submersible motor
- Submersible cable which is sealed at the wellhead
- Surface controls monitor & protect the motor
- Stainless Construction, 3.75” OD, 100 pounds, 7 feet long
How Does It Work?
What Kind of Well Can It be Used In?

- Vertical or slightly deviated wells to 2500 feet
- 4 ½” casing or larger
- Production Rates less than 200 BPD
- Stripper oil wells, gas wells, CBM
How is the HDESP Deployed?

- The HDESP is suspended by the tubing string
- The tubing can be steel, fiberglass, or thermo-plastic
- A conventional work-over rig or spooling truck can be used
- The smaller tubing the better for handling solids
How is the HDESP Deployed

If setting below perforations, then a flow shroud may be needed

Flow by the motor shell is required for cooling
How Does It Handle Gas and Sand?

- There are no rotating parts exposed to well fluids
- Gas has little effect on the expansion and contraction of the diaphragms
- Small ID tubing provides increased fluid velocity to expel solids
How Does HDESP Handle Solids?

+/- 5% by volume

Pump used for clean up - 8 day run
Cleaned up pump and ran the same pump for 571 days
How Can It Benefit Me?

- Rod strings and therefore rod & tubing wear are eliminated

- Environmental & Safety Benefits
  - Low profile surface equipment
  - Leak free completion
  - Virtually silent
  - No moving parts
  - Over-head irrigation; no problem

- Built in pump off control for automatic operation
- Can be deployed without the use of a rig
- Low NPSH requirement-Maximize Drawdown
- High efficiency, low rate pumping – **lower electrical consumption!**
Where are HDESP’s Installed?
No Electric?

Powered by 3 phase/480v generator with feed from propane & casing gas
Case History from Priority Oil & Gas
Hogback #5
(Before HDESP)

- A Conventional 320 beam unit with worn bearings
- Average Production: 5 BOPD, 10 BWPD & 15 MCF/day
- Pump Set Depth = 2,100’ with 1.5” insert pump & 2-3/8 Tubing
Failure reason: solids, paraffin, and beam issues
Case History from Priority Oil & Gas
Hogback #55
(After HDESP)

• Installed HDESP on Nov 21, 2007 & 2,100’ pump depth

• No failure to date - continued cycling w/o problems

• Electrical costs cut in half

• Endorsed by New Mexico BLM
Questions???????
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