Gas Well Dewatering Successes with Harbison-Fischer Variable Slippage Pump®

VSP® Sucker Rod Pump

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SPRING 2004 GAS WELL DELIQUIFICATION WORKSHOP

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Artificial Lift R&D Council (ALRDC)
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Southwestern Petroleum Short Course (SWPSC)
Texas Tech University, Dept. of Petroleum Engineering (TTU)
WHY USE A SUCKER ROD PUMP TO LIFT LIQUID OFF A GAS WELL?

- ESTABLISHED TECHNOLOGY
- EXISTING FIELD SUPPORT NETWORK
- LONG-LASTING SURFACE EQUIPMENT
- MANY YEARS OF EVOLVED TECHNOLOGY
- RECENT BREAKTHROUGH TECHNOLOGY FOR GAS-LADEN FLUIDS (VSP® PUMP)
TRADITIONAL SUCKER ROD PUMP DESIGN:

- TRAVELING VALVE MUST DEVELOP HIGH PRESSURE IN THE COMPRESSION CHAMBER ON THE DOWNSTROKE TO PRODUCE FLUID (Leads to gas locking)
Traditional Sucker Rod Pump
TRADITIONAL SUCKER ROD PUMP COMPRESSION CHAMBER WITH GAS LOCKING CONDITIONS

BOOM!

Fluid
VSP® SUCKER ROD PUMP
FOR GAS

Stroke Length

Tapered Barrel

High Pressure

Low Pressure

PRESSURE EQUALIZES AROUND PLUNGER/TRAVELING VALVE AT TOP OF STROKE

Patent
#6,273,690

SPRING 2004 GAS WELL DE LIQUIFICATION WORKSHOP
VSP® SUCKER ROD PUMP FOR GAS

Patent #6,273,690

PRESSURE EQUALIZES AROUND PLUNGER/TRAVELING VALVE AT TOP OF STROKE

High Pressure

Low Pressure

Stroke Length

Tapered Barrel
DYNO CARD FOR VSP PUMP

VSP PLUNGER SHOWS TO BE SPACED ABOUT 40% INTO THE UPPER VSP TAPERED BARREL SECTION. IT COULD BE SPACED LOWER FOR A HIGHER PRODUCTION RATE WHILE STILL AVOIDING GAS LOCK.
100 Successful Installations:

PROBLEMS SOLVED AND ADVANTAGES GAINED

- Data from wells located in: Canada, West Texas, Oklahoma, New Mexico, North Dakota, and Kansas.
- ELIMINATED GAS LOCKING
- ELIMINATED FLUID POUND AND GAS POUND
- ELIMINATED TAGGING THE PUMP
- REDUCED SUCKER ROD WEAR & BREAKS
- REDUCED TUBING WEAR AND LEAKS
- INCREASED RUN TIMES
- INCREASED GAS PRODUCTION IN SOME WELLS
RUN TIME FOR 100 VSP® PUMPS

FIGURE 1

VARIABLE SLIPAGE PUMP (VSP) DAYS RUNNING SINCE INSTALLATION

AVERAGE 305 DAYS AS OF 12/30/03

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FIGURE 3

GAS PRODUCTION

MCF PER DAY

10,000.0
1,000.0
100.0
10.0
1.0

WELL NUMBER

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AVERAGE 79 MCF/DAY
FIGURE 2

PRODUCTION PER DAY (LIQUID)

BARRELS PER DAY

1,000.0

100.0

10.0

1.0

56 BPD AVERAGE

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WELL NUMBER
AVERAGE 5,348 FEET
GAS LIQUID RATIO FOR 100 VSP® PUMPS

FIGURE 5

GAS / LIQUID RATIO

AVE. GAS/LIQUID RATIO 1,216 SCF/BBL

GAS / LIQUID RATIO (GLR)

WELL NUMBER

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PUMPS PREVIOUSLY TAGGING

FIGURE 6

PUMPS IN WELLS THAT WERE SET TO "TAG"
BEFORE VSP PUMP INSTALLATION
ELIMINATED TAGGING FOR GAS LOCKING

74 WELLS
PREVIOUS TAGGING
CAUSED TUBING WEAR, SUCKER ROD
BREAKS AND PUMP WEAR OR BREAKAGE

26 WELLS
NOT REPORTED AS TAGGING,
ONLY GAS LOCKING

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DELIQUIFICATION WORKSHOP
Q: Questions from the audience?

Pressure equalizes around plunger/traveling valve at top of stroke.

VSP® sucker rod pump for gas

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