



Variable Speed Drives Beam Pumping

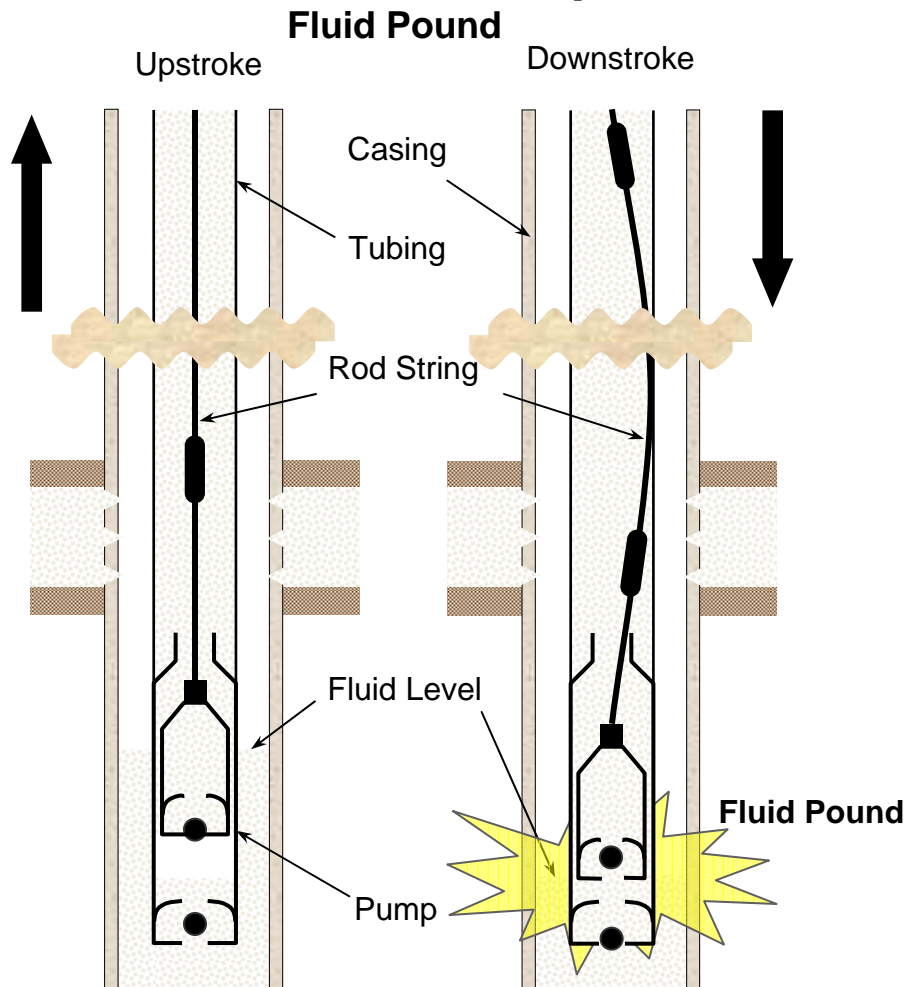
By: Andy Cordova

- VSD Variable Speed Drive
- VFD Variable Frequency Drive
- ASD Adjustable Speed Drive

Fluid Pound-Match Reservoir



Downhole Pump

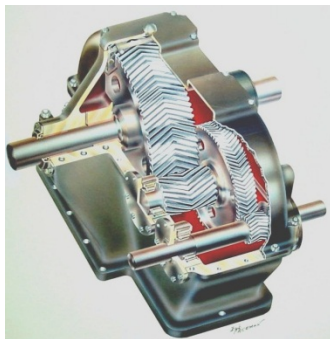


- Fluid Pound - as experienced in a pumping oil well, is caused by the pump not completely filling with fluid on the upstroke. As the downstroke begins, the entire fluid and rod string load moves down through a void until the plunger hits the fluid level in the pump barrel. The traveling valve opens, suddenly transferring the load to the tubing, causing a sharp decrease in load, which transmits a shock wave through the pumping system. It is this shock wave that damages the parts of the pumping system.

Applications – Why Use a VSD

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- Match pumping displacement to reservoir
- Reduce rod loads
- Reduce rod stress
- Reduce rod float
- Increase production
- Decrease maintenance costs
- Decrease electrical costs

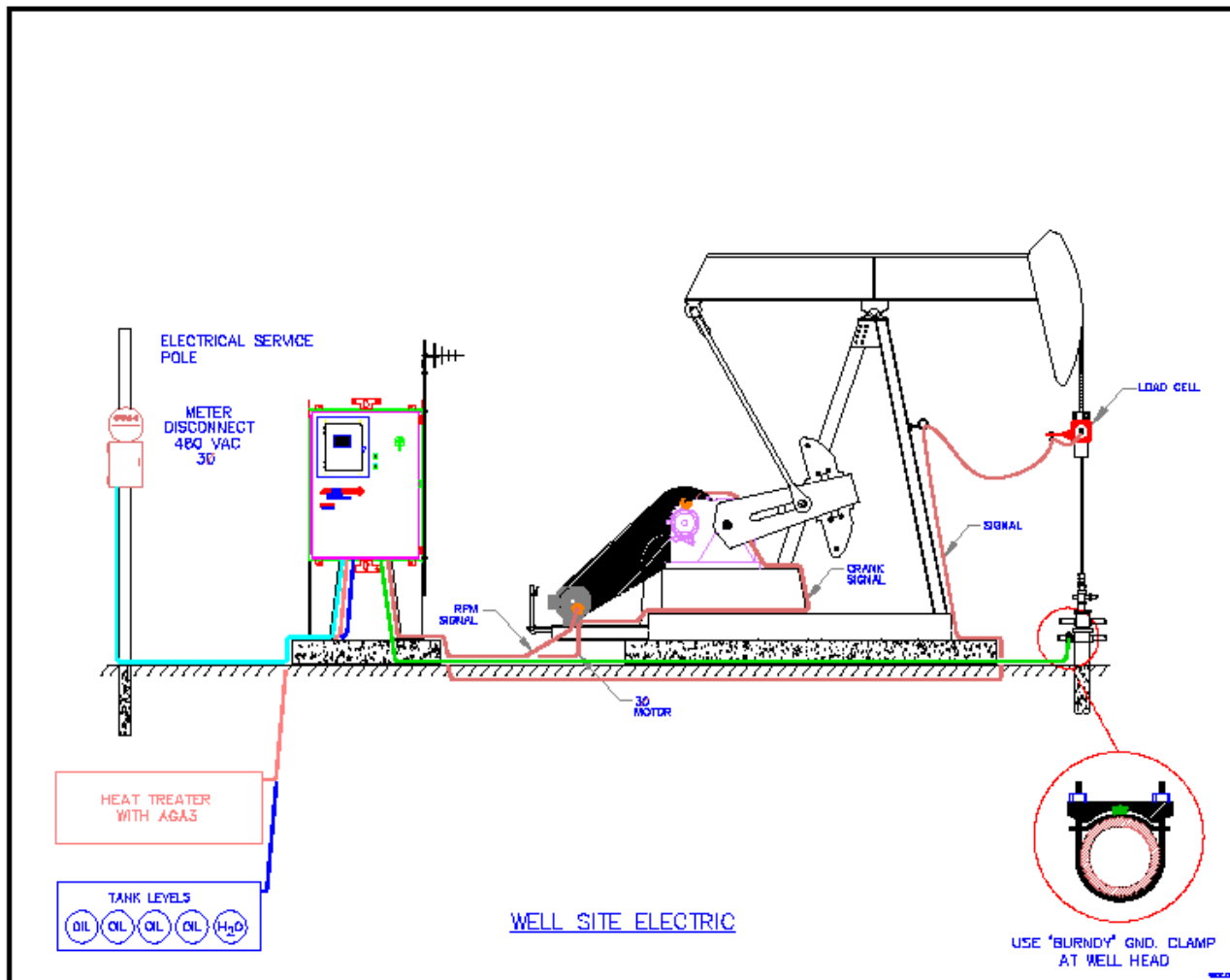


NOTE: Verify Pumping Unit has correct wipers

- Heavy crude & rod fall problems
- Steam flood with erratic inflow
- Large volume producers where if shut down takes days to return to oil production
- Low BHP where shutting down will cause back pressure on inflow
- Sanding/pump sticking problems
- Reduce costs for sheave changes

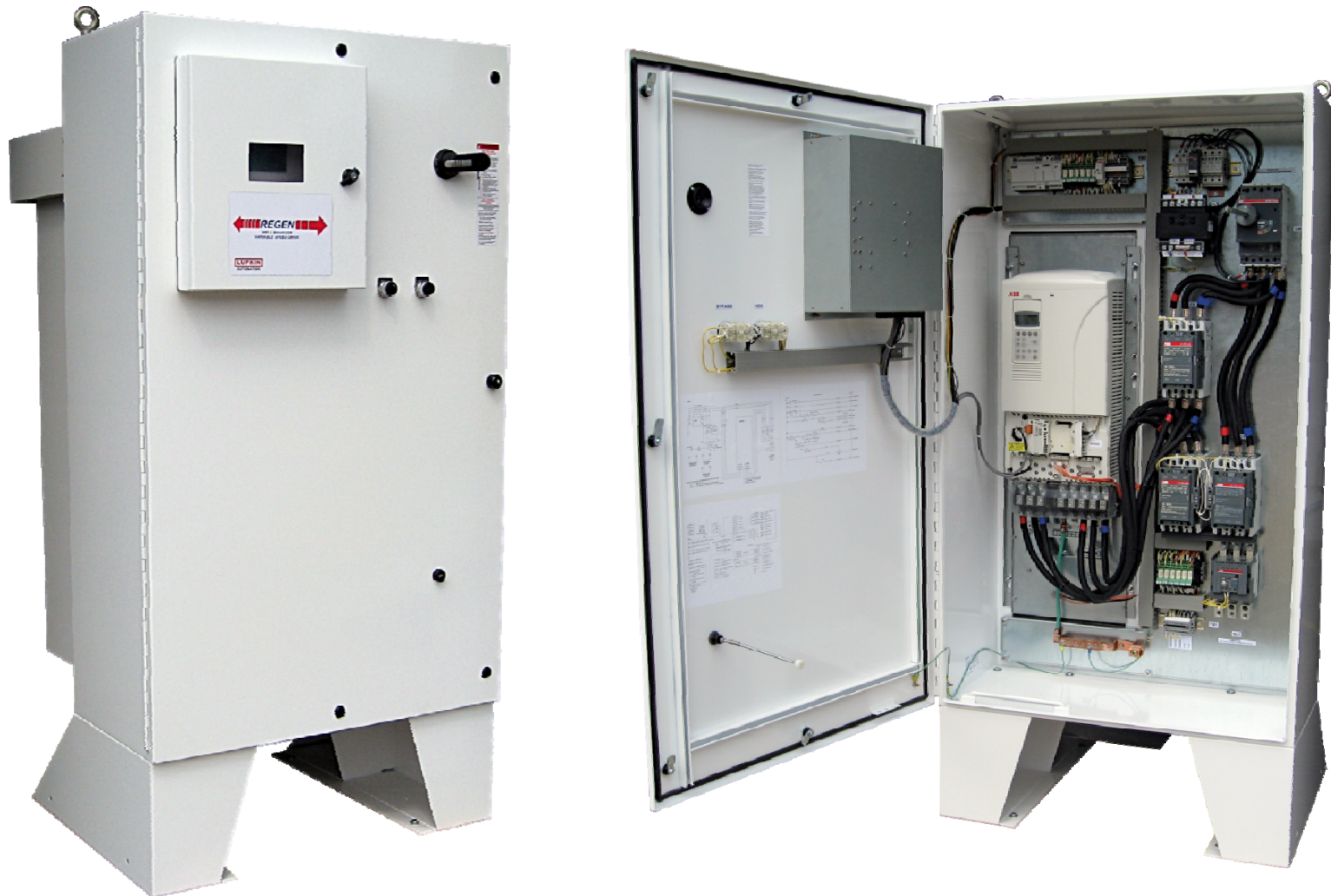
Typical Installation

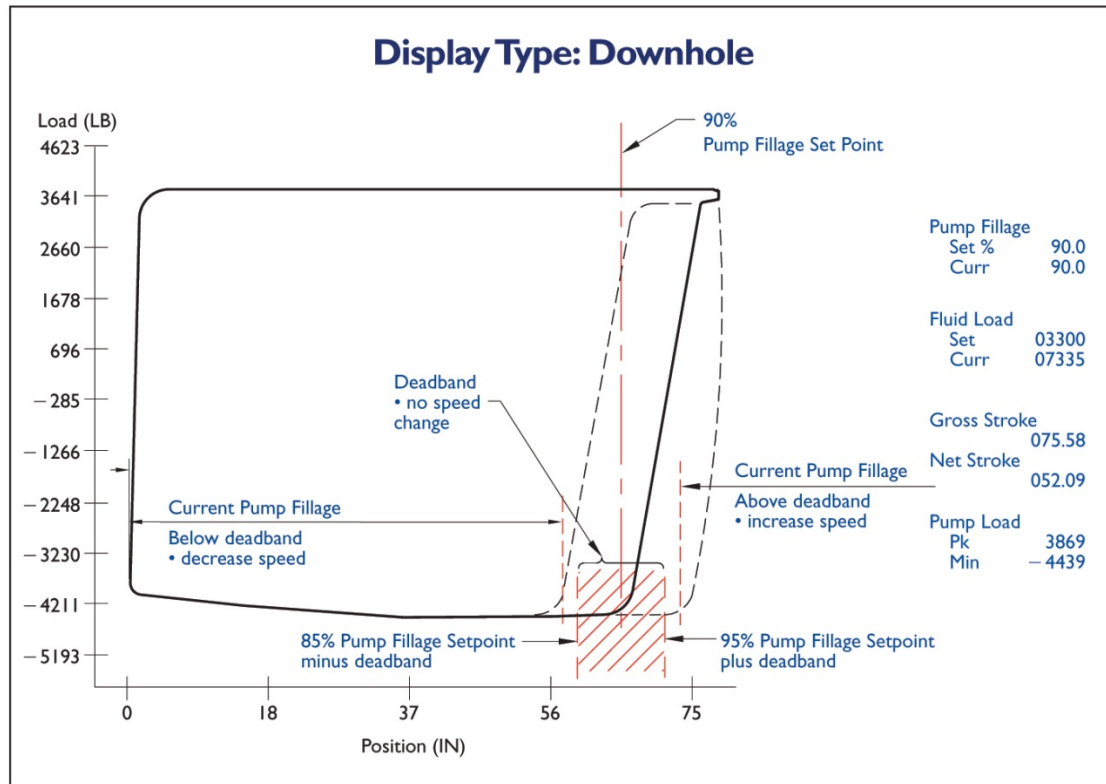
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VSD Enclosure

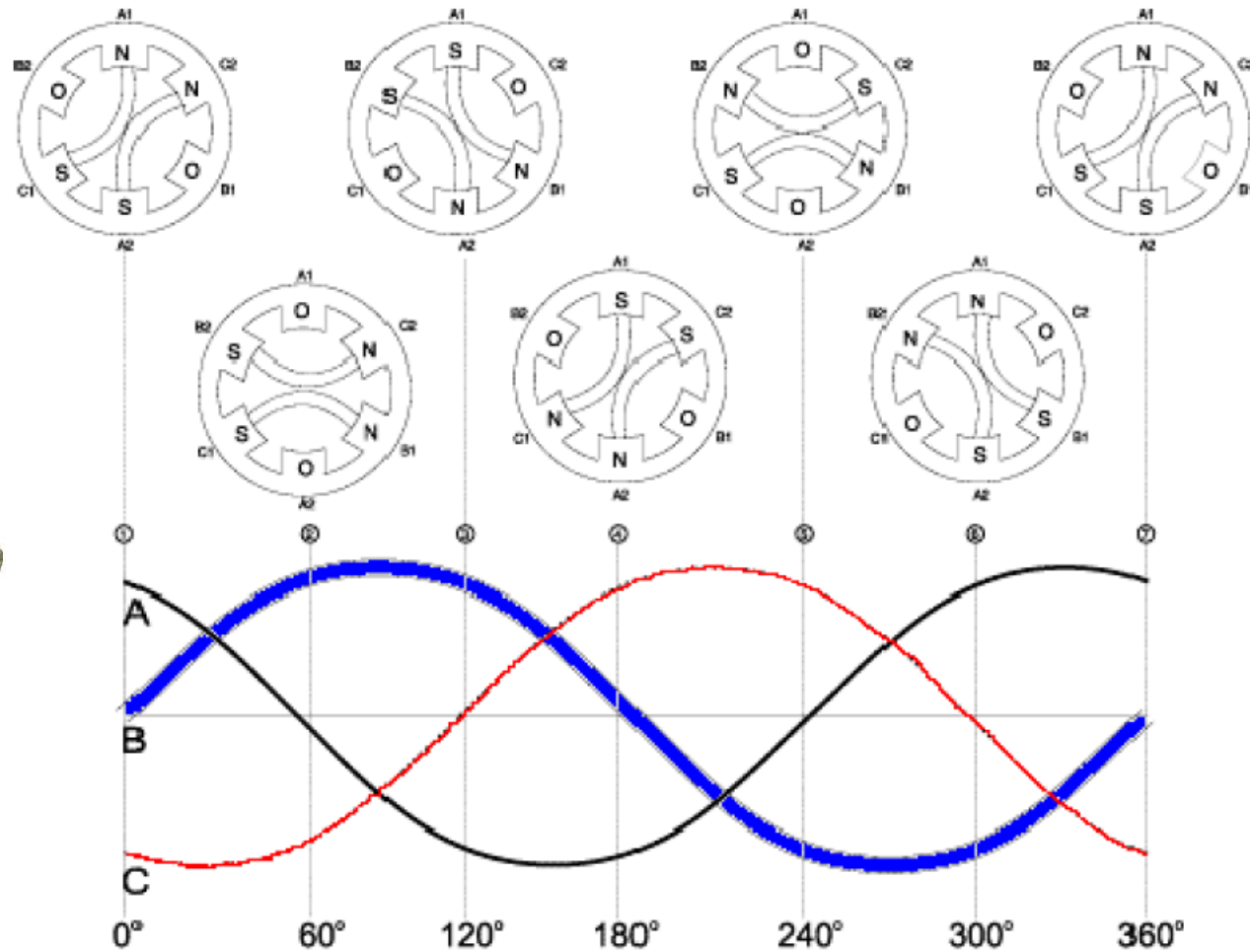
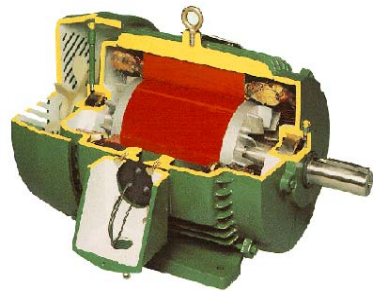
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Change Speed-Pump Fillage

Motor-VSD Controlled



- **Company A**
 - **20 high-failure wells**
 - 52 failures in 12 months before install (2.60 FF)
 - \$1.2 mm repair cost (\$24 m/failure)
 - **In operation 10 months**
 - 12 failures to date (annualized FF of 0.68, 74% redux)
 - 5% production increase 6 mos. After

- **Company B**
 - **15 high-failure/low BHP/fiber glass rod wells**
 - 38 failures in 12 months before install (2.53 FF)
 - \$873 m failure cost (\$23 m/failure)
 - **In operation 8 months**
 - 6 failures to date (annualized FF of 0.60, 76% redux)
 - 8% production increase 2 mos. after

Long Stroke Unit RPC to VSD



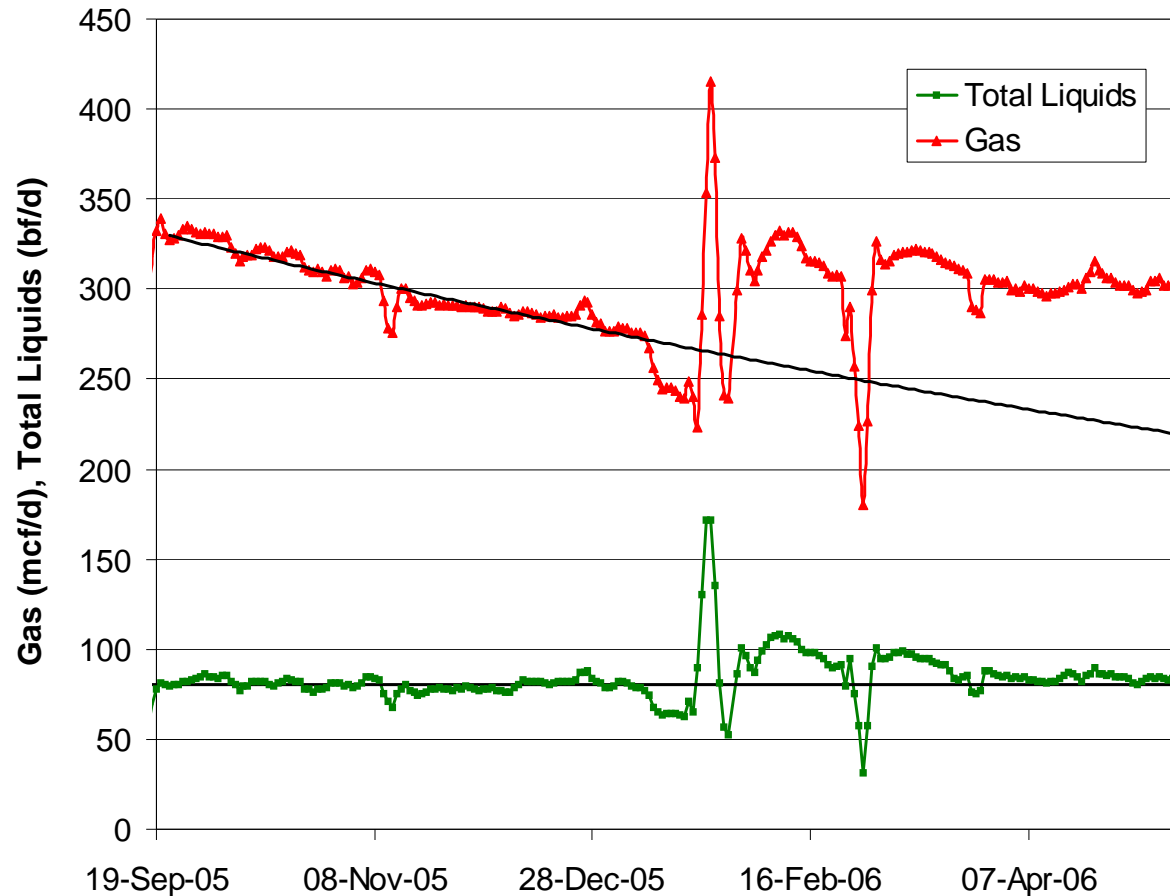
Summary

	Peak Load	Min Load	Net SPM	Pump Stroke	Rod Loading	Gearbox	Production
RPC	16156	2870	3.89	285"	93%	53.4%	693 BPD
VSD RPC	15698	2725	4	280.7"	90.2%	49.2%	670 BPD
VSD RPC Optimized	14447	3378	4.01	285.1"	78.5%	43.4%	716 BPD

RESULTS:
Lowered Loading
Increased Production

Gas Increase with VSD

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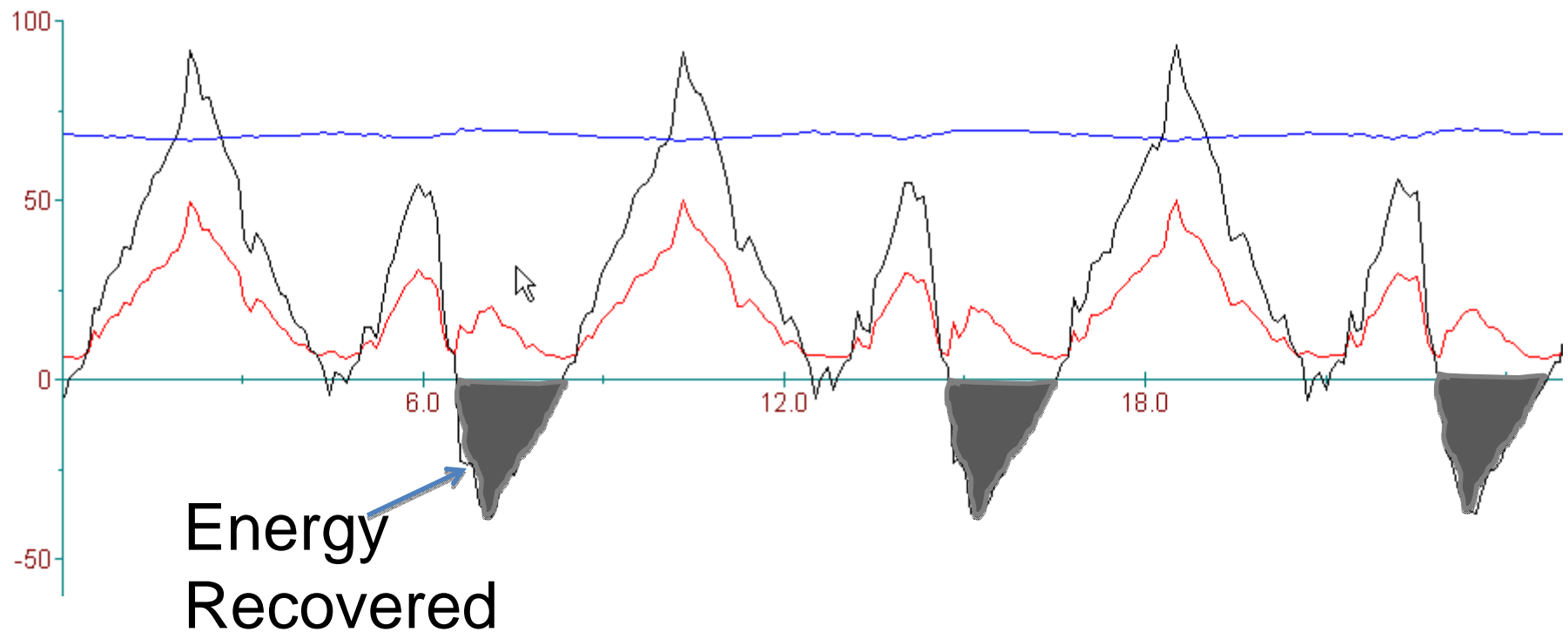
RESULTS:

Increased Revenue \$500/day

Payout less than 30 days

Actual 40HP AFE operation Line Side

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Questions