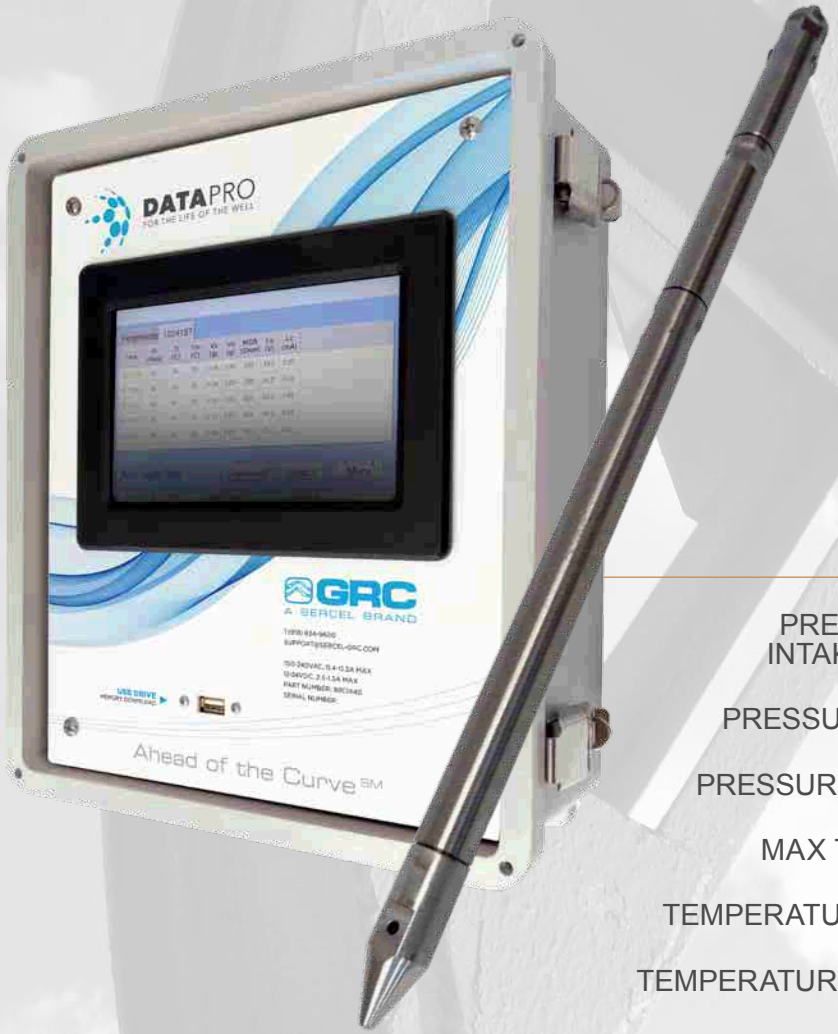
DOWNHOLE MONITORING SYSTEM:

SUCKER ROD PUMP OPTIMIZATION

SRP

GAS LIFT

PCP



KEY BENEFITS

- Increase production by maintaining the lowest possible fluid level over pump
- Avoid premature pump-off due to inaccurate algorithms
- Improve control over motor speed by monitoring real time bottom hole data
- Enable automated decision making using measurements, not assumptions or calculations
- Verify pump configuration's actual performance and efficiency
- Reduce lifting cost and extend life of pump

SYSTEM SPECIFICATIONS

PRESSURE RANGE INTAKE/DISCHARGE	**0-16 KPSI**
PRESSURE ACCURACY	**±.01% FS typ.**
PRESSURE RESOLUTION	**±.01 PSI typ.**
MAX TEMPERATURE	**165°C / 330°F**
TEMPERATURE ACCURACY	**±1.0°C**
TEMPERATURE RESOLUTION	**±.01°C**
VIBRATION	**0-18G**
VIBRATION ACCURACY	**±1%**
VIBRATION RESOLUTION	**0.055G**
SAMPLE RATE	**1/10TH SEC.**
TYPICAL DATA CAPACITY	**2 YEARS, SAMPLING EVERY 30 SEC.**
CONTROLLER INTEGRATION	**MODBUS 485, 232, ANALOG & DIGITAL**
INSTALLATION	**ABOVE OR BELOW PUMP**

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PROBLEMS

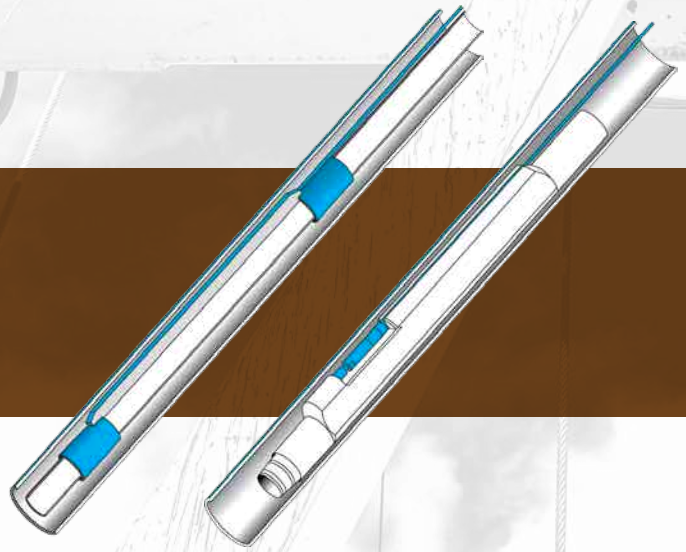
FACED IN CONVENTIONAL AND UN-CONVENTIONAL RESERVOIRS

- Premature pump-off due to gas locking
- Premature pump failure due to frequent control adjustments
- Power inefficiencies from frequent startup events
- Energy loss from undiagnosed downhole leakage

SOLUTION

PUMP INTAKE PSI + VSD OPTIMIZATION = CRUISE CONTROL

- ✓ Load assumptions are replaced by accurate wellbore pressure data
- ✓ PID control logic based on gauge data can modulate pump speed smoothly, avoiding multiple stop/start events
- ✓ High startup current draw is reduced as false pump-off and start-up events decrease
- ✓ Pressure and temperature data can identify tubing leakage not represented on dyno card



RESULTS

IMPROVING ECONOMICS BY EMPOWERING OPTIMIZATION

↑ RUNTIME ↑ PRODUCTION ↓ COSTS

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