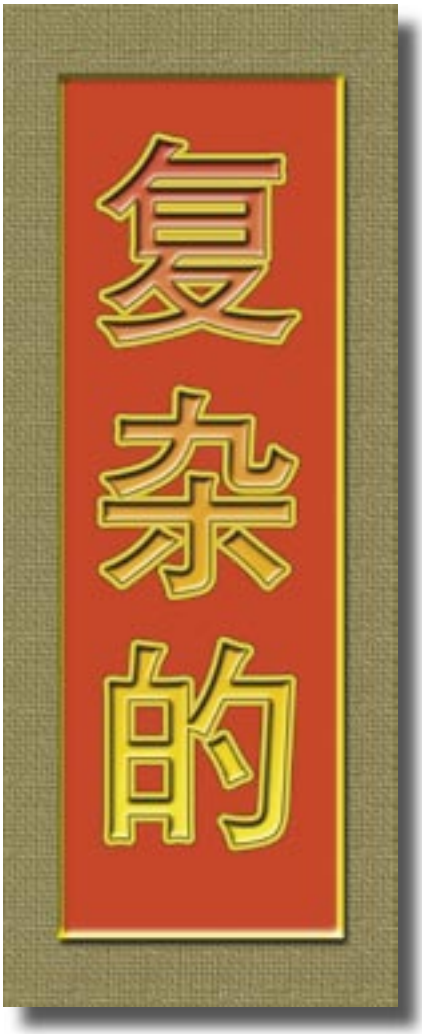
Canada Tech

... precision monitoring for the world's oil and gas industry

A Case Study using SubWorks™
A Permanent "Real Time" Reservoir Monitoring System



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What is SubWorks™?

SubWorks™ is an advanced permanent real time reservoir monitoring system that measures down-hole pressure and temperature. Comprised of modular components, it is engineered to match any reservoir monitoring application or budget. It uses sensors primarily mounted on the production tubing string and connected to surface via a cable with digital telemetry technology. At surface the system supplies power to the downhole sensors and receives accurate real time data.

Advantages of the SubWorks™ Monitoring System

- Accurate real time data to improve production, diagnose problems, control reservoir performance and make critical operational decisions
- Engineered for long term performance and reliability
- Low power consumption with high resolution and accuracy
- Superior digital telemetry and data quality

Applications:

- Critical or observation well monitoring
- Reservoir evaluation – real time, (flowing test, build-up test)
- Interference testing – real time
- Fluid level monitoring
- Variable frequency drive / variable speed drive data source for optimizing lifting pump off control (ESP, PCP)
- Pump performance monitoring and protection
- Reservoir model fine-tuning
- More accurate reserve estimates
- Remote well monitoring/SCADA—reduce operations and maintenance costs
- Lifting/hydrate chemical injection regulation and optimization
- Pressure measurement below valves or packers

SubWorks™ is considered the best tool in the reservoir engineer's arsenal to dynamically manage hydrocarbon resources!

Case Study

Offshore rig in Bohai Bay, China

The Challenge

An offshore drilling operation in Bohai Bay, Northern China required installation of a SubWorks™ monitoring system.

What the Company Wanted

A monitoring system that was robust enough to provide continuous reservoir pressure and temperature data to optimize ESP usage and associated well production, to limit sand production, to properly size pumps for the life of the wells and for long term reservoir management.

The Problem

There were 12 separate platforms (60-100 ft. WD) with 16°- 87° deviated wells with artificial lift (ESP) equipment and many multi-lateral horizontal completions. The wells had an average deviation of 60°. During installation it was difficult running the production tubing inside the deviated wells as most completion strings hung up above the final depth targets. There was concern whether the SubWorks™ system would remain operational during such an aggressive installation that included severe shock loading on the completion string and repeated abrasion of the tubing and cables on the deviated section of the well bore.

Damaged encapsulated tubewire

Welded Carrier with secured Continuous Monitoring Tool and Cablehead attached to tubewire.

The SubWorks™Solution

A complex installation ensued using the following SubWorks™ components:

- Continuous Monitoring Tool (Piezo-resistive sensor, acquisition electronics)
- Machined Carrier (internally/externally ported) and Packer Feed-through
- Cablehead with redundant metal-metal seals and Tubing Encapsulated Conductor (TEC) with protective polymer encapsulation
- CSA-US Approved Wellhead Feed-through and modular DINLine Surface Data Management System (Modbus)
- Rackmount multi SRO Modbus (20 well Data Integration System)

The Installation

1. SubWorks™ components were integrated with 3 1/2" production tubing and electrical submersible pumps

and associated power cables.

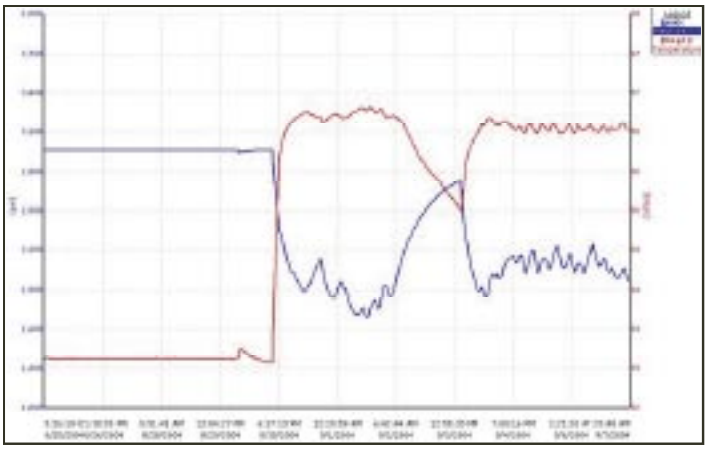
2. Gauges were set near the sand face (6,000 ft. - 13,000 ft.) and the electric pumps a sizeable distance away, some 2,000 - 3,000' shallower.
3. The tubing deployed SubWorks™ components were typically installed in 9 5/8" casing using a 7" liner hung off to deploy the sand screens across the open hole or perforated interval.
4. Aggressive cycling of the completion string (reciprocation of pipe up and down) was implemented in order to run the production tubing in to total depth on a great many of the wells.

Installation of encapsulated tubewire.

The Result

Even with the use of aggressive contingency installation methods 57 of the initial 60 wells have fully functional SubWorks™ systems. Even in the most severe shock loading situation SubWorks™ components were retrieved, tested, determined undamaged, and re-installed in the same well. These wells produce 200–1,500 bblpd and are communicating real time reservoir and pump intake pressure and temperature data with the SubWorks™ monitoring system installed. The advanced engineered electronics, the redundant metal to metal seals, efficient mechanical connections combined with expert installation techniques, proved durable enough to achieve 95% success during these extremely challenging installation.

Rackmount multi SRO Modbus with 10 wells integrated.



Real Time pressure and temperature data using Canada Tech's software.

> "SubWorks™ is the most forgiving permanent system I have ever worked with which afforded very satisfying results"
>
> ~Operator, Shanghai Off-shore Drilling Operation

For more information on how the SubWorks™ Monitoring System can work for you contact us at:

1-866.815.3421 or

1-403.232.1400.

Disclaimer

Canada Tech advocates reasonable caution handling downhole electronic instrumentation. Canada Tech does not advocate a completion process with high shock loading, the reciprocation and/or the rotation of pipe. Positive anecdotal experiences noted above, although indicative of the strength and reliability of the Canada Tech Permanent Monitoring System, are not a guarantee of similar results should the electronic instrumentation be handled aggressively or installed and operated improperly.