

TECHNOLOGY APPLICATIONS

Dennis Denney, *JPT* Senior Technology Editor

Multipoint Monitoring

Weatherford has introduced its LxDa-ta fiber-optic thermal-monitoring system to address challenges of extracting heavy oil. In-situ thermal processes with ultrahigh temperatures and highly corrosive environments require reliable monitoring solutions. Specialized techniques are needed when dealing with difficult conditions such as the bitumen reserves in Alberta. Thermal monitoring along the entire heated wellbore is required to enhance efficiencies and reduce environmental effects of these operations. The monitoring system uses a proprietary optical-sensor-array technology that addresses challenges of these complex reservoirs and offers a full representation of the wellbore with high data quality and extended service life. The design provides flexibility in placing sensors to achieve real-time data management of the well, pad, and field levels. Thermal monitoring over time allows a step change in visualization simulation and in modeling tools to augment steam-assisted gravity drainage or any in-situ operation, leading to significant improvement in production efficiencies and economics while providing an additional check of environmental factors. The fiber-optic sensors (Fig. 1) can be used in multiple applications and in conjunction with other components of the company's WellScan reservoir-monitor-

ing products, including specific-location temperature, pressure, seismic, acoustic, and multiphase flow.

► For additional information, email robert.caporuscio@ca.weatherford.com.

Multisleeve Fracturing System

i-TEC has developed and field proved its i-FRAC CEM system (Fig. 2), a multistage fracturing system for cemented-long-string and -liner applications. The system is ball-drop activated, and multiple sleeves can be installed as clusters in each stage to maximize reservoir contact. A single ball shifts open all sleeves in a stage, and then pressure is applied to break the cement sheet and initiate fractures. Each sleeve has ports sized for optimized fracture initiation. Up to 22 stages can be installed per well, and each stage can contain from 1 to 20 sleeves. Installation of the system is performed in a single trip, and the system is cemented in as a normal long string or liner. A special wiper dart was designed to pass through all ball seats and wipe the casing and sleeves clean of cement before the dart is bumped into the float collar and the cement is given time to set. The fracturing treatment is carried out in a continuous pumping operation, as for an openhole sliding-sleeve system. No wireline, cranes, or coiled-tubing units are required on location. The frac balls are designed to be produced back to surface

after the treatment, and the ball seats are millable for future full-bore applications.

► For additional information, email mail@i-tec.no.

Monitoring Technology

Omega Well Monitoring, part of Reservoir Group, has launched its latest Leakator (Fig. 3). The tool is optimized to locate leaks and monitor downhole flow. It was developed in response to the increasing requirements to improve efficiency and reduce operating costs by monitoring well integrity. The tool's run-it-yourself capability means an existing on-site crew can operate the tool without the need for further staff. It has no moving parts, so only the O-rings and detachable batteries need to be replaced during servicing. Because it uses small AA batteries, operators do not need to comply with dangerous-goods legislation during transportation. The modular memory instrument uses multiple sensor arrays, with synchronized data from the sensors merged and plotted against depth to highlight local variations in the well. These data provide an indication of leaks. Optional sensor modules enable additional data to be monitored, including differential temperature, flow, and flow direction. The sensors are distributed physically and have a balanced output, allowing extreme sensitivity to very small local anomalies of temperature and flow.

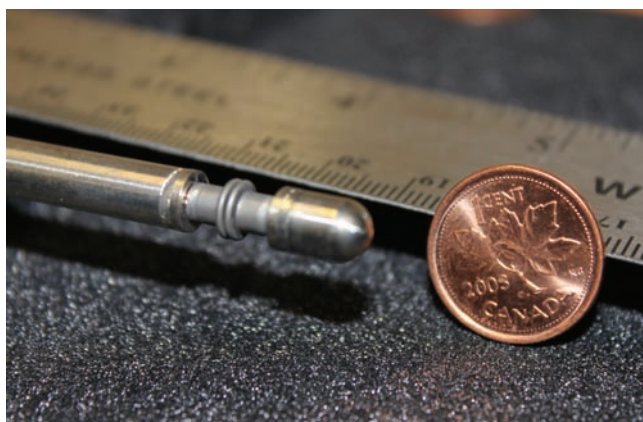


Fig. 1—Slimline ultrahigh-temperature pressure gauge.

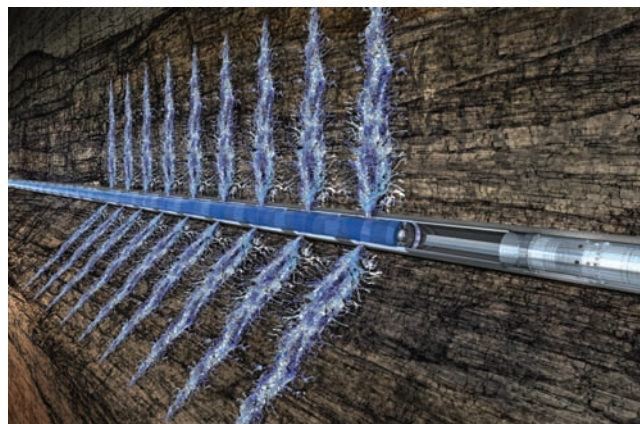
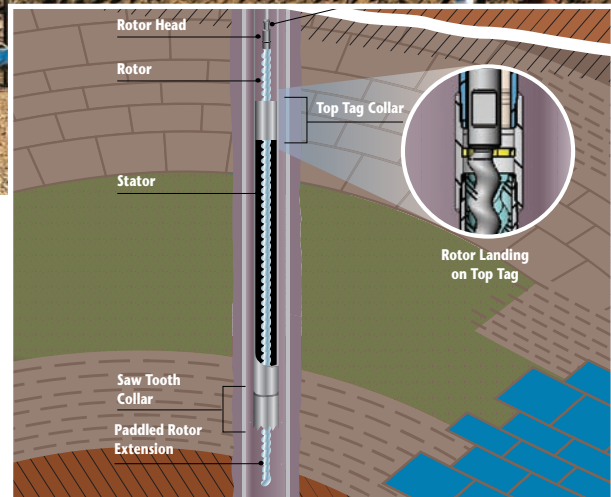


Fig. 2—The i-TEC i-FRAC CEM system.

GET YOUR PUMP RUNNING IN TIP-TOP SHAPE



Top Tag Installation

IMPROVE PUMP RUN LIFE

KUDU's patented Top Tag™ system is the first engineered Progressing Cavity Pump Top Tag that enables you to locate the rotor inside the stator without using a tag bar. It permits a paddled rotor to directly agitate the fluid within the casing rather than being limited to the fluid entering the tag bar.

KUDU's Top Tag increases pump run life, improves wellbore agitation, eliminates downhole restrictions, decreases the number of burnt pumps, reduces interventions, continuously clears the pump intake and much more. Visit kudupump.com to find out how Top Tag will revolutionize your PCP application.

With over 20 patents using Progressing Cavity Pumps in the artificial lift field, KUDU continually strives to reinvent the status quo. With locations around the world, we're just around the corner, offering the best service standard in the industry.



TECHNOLOGY APPLICATIONS



Fig. 3—Omega’s Leakator sensor.

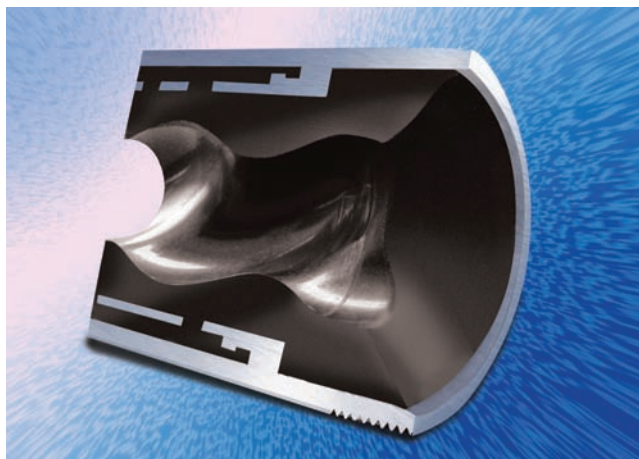


Fig. 4—The Moyno HTD350 stator elastomer is mechanically secured to the stator tube.

A surface readout capability is also possible. With the modular assembly, operators can customize the setup to fit the specific requirements of individual jobs as determined by well conditions. The tool’s 25-mm diameter enables access to all zones.

► For additional information, visit www.omegawell.com.

DST Well Testing

Expro Group’s enhanced drillstem-test (DST) capability provides technology and special-data services, including tubing-conveyed perforating, data acquisition, surface readout by use of cableless telemetry, fluids sampling and analysis, compact well-testing solutions, and enhanced flow measurement. Following the drilling and casing of a well, a DST is used in conjunction with the company’s downhole data system that uses advanced wireless-telemetry technology to transmit high-quality bottom-hole-pressure and -temperature data to surface in real time by electromagnetic through-tubing/casing communication. Also, the company’s tubing-conveyed sampling provides a high-quality alternative to traditional DST-type full-flow samplers. The company’s meters offer continuous wellhead surveillance with its nonintrusive clamp-on sonar-based metering technology (ActiveSONAR and PassiveSONAR). Flowmeter analysis includes multiphase-flow-interpretation

techniques. The meters can be installed without production shutdown and are an extremely safe way to monitor well flow. The DST Slip Joint is a telescopic joint run in the tool string, allowing 5 ft of free travel that allows for tubing movement caused by temperature changes. The tool is pressure and volume balanced internally and is splined, enabling torque to be transferred below the tool.

► For additional information, visit www.exprogroupp.com.

Multistage-Stimulation Technology

Baker Hughes’ FracPoint multistage-completion system uses openhole packers to isolate multiple stages and uses ball-activated sleeves to divert the fracture treatment. The system’s EX-C sleeves extend the capability of ball-activated systems, enabling more contact with the reservoir while maintaining fracturing efficiency. The mechanical support in the ball seats allows 1/16-in.-increment ball sizes and ball seats. When the ball makes initial contact with the ball seat, pressure is applied to shear a set of shear screws, which releases a collapsible ring under the ball and increases the amount of surface-contact area between the ball and the seat to provide support to achieve fracturing pressures. A significant addition to the system is the IN-Tallic disintegrating frac balls that are made of a new nano-

material. The material has the compressive strength of steel, but is lighter than aluminum. The balls were developed to disintegrate in most common wellbore and fracturing fluids, so no special fluid mixture is required, enabling operators to remove the frac balls from the well without having to mill them out.

► For additional information, visit www.bakerhughes.com/fracpoint.

High-Temperature Sealed Stator

R&M Energy Systems’ Moyno HTD350 downhole pump is designed for high-temperature applications that previously prevented operators from using downhole progressing-cavity pumps (PCPs). This downhole pump uses an elastomeric stator that is mechanically secured to the stator tube for greater temperature and chemical resistance (Fig. 4). This patented design uses no bonding agent between the elastomer and the stator tube. The downhole pump has the capability of handling downhole temperatures up to 350°F and is compatible with steam-injection applications without removing the stator from the well. Models are available for 95 BFPD/(100-rev/min) up to 6,000-ft lift, 275 BFPD/(100-rev/min) up to 5,400-ft lift, and 500 BFPD/(100-rev/min) up to 4,000-ft lift. **JPT**

► For additional information, email fmg.marketing@robn.com.



**we are the people
of Baker Hughes.
and our software
adds confidence to
your reservoir decisions.**

Bob Rundle, Director—Reservoir Software Technology

Let's be clear. Making multimillion dollar decisions involving your reservoir development plan or its drilling and completion programs is tough. And it's even tougher if you don't have complete confidence in your understanding of the reservoir. That's why we've recently added a full suite of industry-leading reservoir software to our capabilities. To give you all the tools you need for clear, confident decisions.

Based on the talents and experience of the best minds in the business, Baker Hughes reservoir software gives you abilities to model the reservoir, access it safely and efficiently, and design a stimulation treatment that maximizes your recovery.

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