

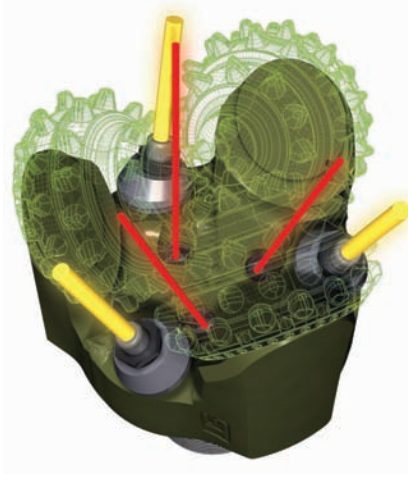
Dennis Denney, JPT Senior Technology Editor

### Six-Nozzle-Hydraulics System—

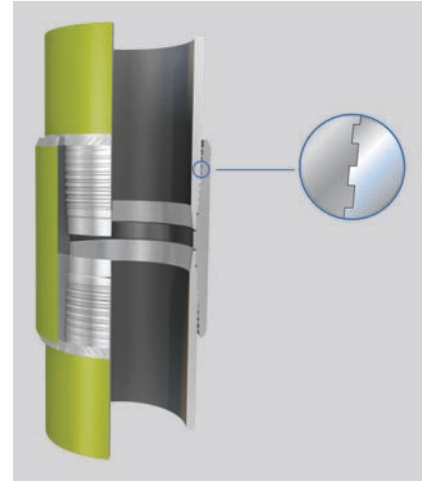
Smith Bits introduced its Shamal Typhoon roller-cone drill bits developed for challenges of Middle East drilling applications in which the large, upper-hole sections are relatively soft formations. These bits have new cutting structures, hydraulics system, insert geometries, and carbide materials. The six-nozzle-hydraulics system consists of three vectored/extended outer nozzles and three dome-jet inner nozzles. The main hydraulics system contains a vectored-tube extension that directs fluid flow to the leading edge of the cones for gauge-row cleaning without contributing to cone-shell erosion (Fig. 1). The dome jets are pointed at middle and inner cutting rows but are far enough from the cone to avoid steel erosion and lost inserts, as is common with the traditional center jet. The combined effect of these six oriented flow patterns creates significant improvements in the path and velocity of the drilling fluid. The system provides an optimized solution for bit- and/or bottomhole-balling environments or any combination of the two. Ultimately, the six-nozzle system optimizes the displacement of cuttings off-bottom and up the drill-string, resulting in maximum penetration rates.

For additional information, visit [www.smithbits.com](http://www.smithbits.com).

**Dovetail Casing Threads—**Tenaris provides its TenarisHydril Wedge Thread having high tension and bending strengths that are achieved with a dovetail thread machined on both upset and nonupset pipe. The interlocking dovetail creates a reverse angle on both the load flank and the stab flank (Fig. 2). The reversed-angle load flank permits the connection to carry large tension loads by resisting radial disengagement (i.e., jump-out) of partial-depth threads, while the reversed-angle stab flank prevents thread pre-engagement (i.e., jump-in) giving the connection its 100%-rated compression strength. The dovetail thread also produces radial-stress com-



**Fig. 1—Smith Bits' Shamal Typhoon bits incorporate three vectored/extended nozzles (yellow path) and three dome-jet inner nozzles (red path) for effective bit cleaning.**



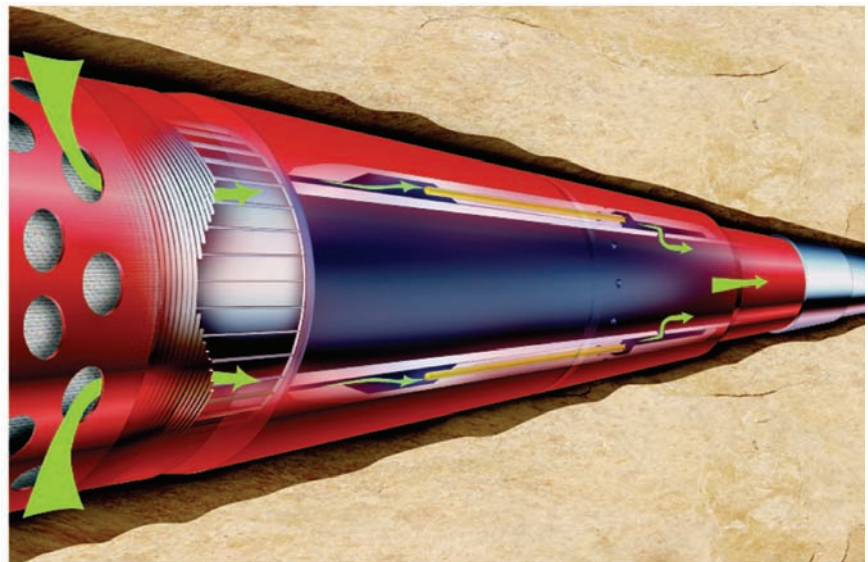
**Fig. 2—Exceptional torque strength is developed through the simultaneous engagement of opposing flanks of the TenarisHydril Wedge Thread dovetail thread.**

ponents that support the coupling in resisting high-compression-induced hoop stress. These interlocking dovetail threads provide resistance to the simultaneous tension and compression created by bending. Also, exceptional torque strength is developed through the simultaneous engagement of opposing flanks of the dovetail thread. The thread flanks provide a positive torque

stop, which virtually eliminates pin-end inside-diameter restrictions caused by overtorque.

For additional information, email [usa@tenaris.com](mailto:usa@tenaris.com).

**Sand Control—**Halliburton's Equi-Flow inflow-control devices (ICDs) can improve completion performance and efficiency by balancing inflow



**Fig. 3—Halliburton's EquiFlow ICD balances inflow over the completed interval.**

# DynaPump



# Dinosaur

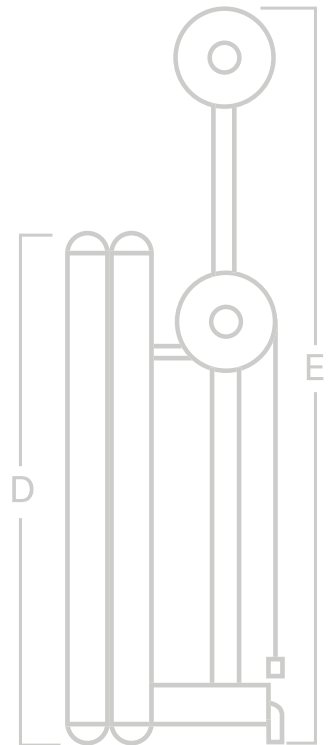
## Evolve or become extinct

**DynaPump** offers significant advantages over other forms of artificial lift. For starters, a DynaPump unit generally costs up to 36% less than a comparably equipped new conventional unit and offers a longer stroke length than is available from competitors. The evolutionary advantages don't stop there. DynaPump features include:

- Adjustable automatic flow control
- Light, portable, and easier to install
- Lower unit, transportation, and installation costs
- Low installed power. Lower power consumption

DynaPump's lower upfront investment, advanced features and longer stroke — for optimized plunger movement downhole — translates to increased production rates, lower lifting cost per barrel, leading to a faster return on investment, **rendering conventional pumping units extinct.**

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**Fig. 4—An Expro Megaflow separator prepared for use in Kazakhstan.**

throughout the length of a completion. Differences in influx from the reservoir can result in premature water/gas breakthrough, leaving valuable reserves in the ground. The ICD can help increase oil productivity and recovery by reducing water and gas production associated with heel/toe effects, water/gas breakthrough, permeability differences, and high oil viscosity. The ICD has no control lines and is installed as a part of the completion string combined with a sand screen in unconsolidated-sand reservoirs. Simulation software is used to obtain optimum configuration. The ICD consists of an annular chamber on a standard oilfield tubular (**Fig. 3**). If screen is required, the reservoir fluid is produced from the formation, through the sand screen, and then into the flow chamber. The flow continues through a set of tubes, which creates a pressure drop, and then into the pipe through a set of ports. Tube length and diameter are designed to provide the correct pressure drop for optimum completion efficiency.

For additional information, e-mail [screens@halliburton.com](mailto:screens@halliburton.com).

**Well-Test Separator**—The Expro Megaflow separator for testing high-

capacity gas wells eliminates the need to flare, thus lessening the effect of operations on the environment. It was designed to satisfy the requirements for high-capacity gas, oil, and water separation while remaining easily transportable for use both onshore and offshore. The design combines both horizontal- and vertical-separation technologies. The separator can be dismantled into five skids to minimize the overall weight and size during mobilization/demobilization (**Fig. 4**). The separator has two separation stages. In the first stage, free liquid is spun out of the gas by centrifugal force and is collected at the bottom of the liquid-chamber sump. In the second stage, the small amount of liquid still entrained in the gas is removed by an increased centrifugal force and then is collected by a cycling circuit. The separator was designed for use in high-pressure/high-temperature gas/condensate tests to resolve the poor separation efficiency typically experienced with conventional horizontal separators in this application. The separator is capable of handling sour service and has a working-pressure rating of 2,160 psi at temperatures from  $-50$  to  $350^{\circ}\text{F}$ . The maximum gas rate is 175 MMscf/D,

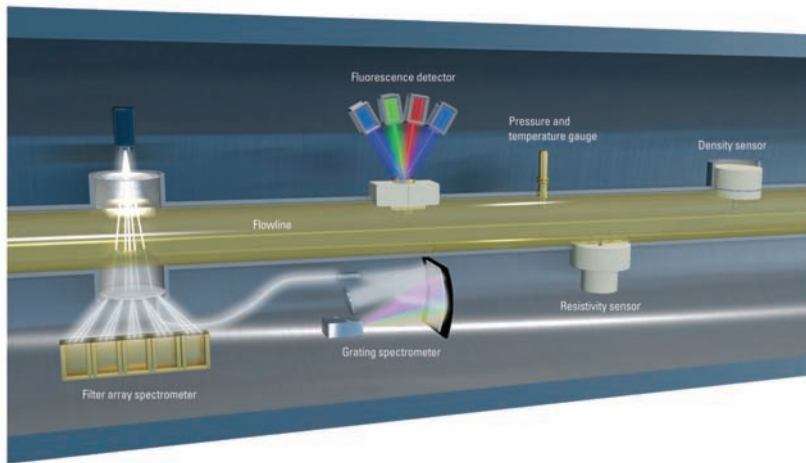
maximum oil rate is 25,000 B/D, and maximum water rate is 6,290 B/D.

For additional information, visit [www.exprogroup.com](http://www.exprogroup.com).

**Multilateral System**—Weatherford recently installed its OneTrip StarBurst multilateral system (**Fig. 5**) in the Norwegian North Sea for StatoilHydro. This Technology Advancement of Multilaterals forum (TAML) Level-4 multilateral system was installed in a single trip despite heaving seas. This system saves two pipe trips vs. the standard system. The junction was installed at 13,300 ft; the casing exit was milled in  $9\frac{5}{8}$  in. 53.5 lbm/ft, 13% Super Chrome 110 pipe; and the rathole was milled in Garn-4 hard impermeable sandstone with quartz stringers. This was the first time the system was used to mill through such a challenging casing material with a very hard formation on the outside. Milling the 19.7 ft window and 19.7 ft of rathole required only  $5\frac{1}{2}$  hours. This single-trip multilateral system creates a cemented junction with full liner access to the lateral bore. The whipstock remains in the wellbore to eliminate recovery risks. The lug-and-rail technology protects the whipstock pressure plate during cut-out and



**Fig. 5—Mill, whipstock and packer, and perforating gun (left to right) of the Weatherford OneTrip StarBurst multilateral system.**



**Fig. 6—Schlumberger's InSitu Fluid Analyzer tool integrates multiple InSitu Family reservoir-fluid measurements and sensors.**

directs the mill into the casing wall accurately. After milling the window and drilling the lateral, a conventional lateral liner assembly is run into the lateral and then cemented and anchored back to the main bore above the window. Overlapping concentric strings, combined with the cement, ensure a TAML Level-4 junction with maximum support and formation isolation. The liner and whipstock pressure plate are then perforated using a low-side-oriented technique which reopens the main bore. The pressure rating is 5,000 psi from below the packer and 3,500 psi from above the packer at 275°F. A high-pressure/high-temperature (5,000 psi at 302°F) model is available.

For additional information, visit [www.weatherford.com](http://www.weatherford.com).

**Downhole-Fluid Composition In Real-Time**—Schlumberger's InSitu Family of complementary downhole-fluid measurements provides compositional results at near-laboratory quality and accuracy. In addition to the recently introduced InSitu Density reservoir-fluid-density measurement, the new measurement components include InSitu Composition (hydrocarbon-fluid composition), InSitu GOR (reservoir-fluid gas/oil ratio), InSitu CO<sub>2</sub> (reservoir-fluid CO<sub>2</sub> content), InSitu Color (reservoir-fluid color), InSitu Fluorescence (reservoir-fluid fluorescence), and InSitu pH (reservoir-fluid pH). These measurements are made with the InSitu Fluid Analyzer system

(Fig. 6), facilitated by the Quicksilver Probe that produces ultralow- or no-contamination fluid samples in a fraction of the time required by conventional probes. Data are presented with the InSitu Pro real-time-monitoring and interpretation software. Making quantitative flowline measurements in the tool provides laboratory-quality data in real time under downhole conditions. Measurements include a 20-channel filter-array spectrometer, a 16-channel grating spectrometer (the primary laboratory instrument), and a fluorescence and gas detector. The system also makes measurements of flowline pressure, temperature, resistivity, and fluid density. Besides improving reservoir characterization, operators can use the measurements to identify compartments and to quantify compositional grading. The measurements enhance simulation-model accuracy for performance predictability and for equation-of-state modeling. These measurements enable decisions from completion through production and flow assurance in oil and gas wells.

For additional information, visit [www.slb.com/insitu](http://www.slb.com/insitu).

**Personnel Transfer**—Reflex Marine has introduced its TORO personnel-transfer capsule (Fig. 7) to enhance the safe use of crane transfer. The capsule can carry up to four passengers, protecting them from side impact and heavy landings. Shock absorption is provided by foam seat cushions and headrests,



**Fig. 7—Reflex Marine's TORO personnel-transfer capsule.**

and the ethylene-vinyl-acetate foam feet are designed to absorb hard-landing impact. In case of water immersion, the capsule is buoyant and self-righting. The ergonomic seat design allows it to be used without seatbelts (subject to company policy and local legislative requirements), and the arrangement of the seating will permit fast loading and unloading of personnel. The capsule also can be used to transfer injured personnel, including by stretcher.

For additional information, visit [www.torotransfer.com](http://www.torotransfer.com).

**Multidisciplinary Processing**—Paradigm has introduced its Higher Order Workflow, a system that uses the company's geophysics, geology, petrophysics, and engineering solutions set to develop asset knowledge under tight project time lines. The knowledge-building process accesses an integrated-software-solution portfolio covering many E&P domains for subsurface analysis including seismic processing and imaging, interpretation and modeling, reservoir and subsurface evaluation, reservoir engineering, well planning, and drilling engineering. The system addresses subsurface challenges by exposing supporting data to a continuum of data operations and transformations while ensuring data integrity by use of common interpretation and modeling canvases. The system concurrently engages multiple

(Contd. on page 83)

education information for nonpetroleum engineers and the creation of the SPE R&D Technical Section.

The R&D Advisory Committee recognizes that the big challenges facing the industry will require the best and brightest minds to conquer. For this reason, encouraging more people to enter our industry and encouraging interest in R&D challenges in basic sciences outside the industry are included in the committee's goals. Among the proposals being considered by the committee are working with the SPE Energy Information Committee to expand information on the high-tech R&D aspects of the industry on [energy4me.org](http://energy4me.org), SPE's energy education website for students and teachers, and establishing a program to send speakers from our industry to university science departments to talk about our R&D challenges.

The R&D Technical Section provides a community for users and providers of R&D. The community is predominantly virtual, operating through online community software, but also meets annually at the SPE Annual Technical Conference and Exhibition. Among its goals are to encourage the development of a cooperative framework for R&D, encourage communication among members of the R&D community in various disciplines, and identify major issues on which to focus interaction and discussion.

I encourage you to participate in the upcoming SPE R&D Conference during 3–4 March in Lisbon. **JPT**

In 2002, an R&D Task Force recommended to the SPE Board of Directors that an R&D Advisory Committee "identify, encourage, facilitate, and help global R&D activities that will provide needed technology for future use of petroleum engineers." The mission of this committee is "to encourage and facilitate global R&D activities by establishing (1) an ongoing dialog between industry, government, and academia that will match industry needs with research efforts; (2) a cooperative framework for development of technology and a competent workforce for the future E&P industry; and (3) R&D efforts that satisfy the needs of industry, governments, and academia in meeting their goals for success." In 2006, the committee became permanent and reports to the Board Committee on Education and Professional Activities.

Committee members are Chairperson Vikram Rao, Kate Baker, Chris Buckingham, Ken Brown, Paul Ching, Turgay Ertekin, Richard Felder, Dan Georgi, Arnis Judzis, Med Kamal, Mike Sheppard, Pacelli Zitha, and David Zornes.

## TECHNOLOGY APPLICATIONS (Contd. from page 23)



**Fig 8—Fern Communications' FRX-1 ATEX radio repeater.**

E&P disciplines across domain processes. It connects solutions through data-rich models and advanced geosciences technology, and it covers survey and repository boundaries for all domains across distributed-data models and third-party data. E&P teams can improve reservoir-property models through continuous correlation, calibration, and correction, refining and expanding the asset-knowledge base.

For additional information, email [info@pdgm.com](mailto:info@pdgm.com).

**Bending Radio Signals**—Fern Communications announced that its FRX-1 ATEX Portable Radio Repeater provided uninterrupted radio communications for Qserv crews while onboard the *Seawell*, a riserless-well-intervention vessel used to carry out wireline, coiled-tubing, and pumping operations in the North Sea. The radio repeater was positioned on the *Seawell* between two points where no radio communication had been possible because

of the ship's construction (**Fig. 8**). Following a 3-week testing period on the *Seawell*, Qserv reported that the two units greatly enhanced the quality and consistency of radio communications. Standard radio systems are extremely vulnerable to "black spots" such as solid structures that make up the platform and that block radio signals. The radio repeater effectively bends the radio signal around a solid structure so that it reaches its target destination. The system is approved for use by the European Union in hazardous Zones 1 and 2 and gas group 11C, and is temperature rated to T6. The portable system operates on marine frequencies, VHF, and UHF and is fully compatible with existing radio-communications systems currently in use offshore. The system's high-capacity lithium-ion battery can operate for more than 18 hours before it must be charged. **JPT**

For additional information, email [sales@ferncom.com](mailto:sales@ferncom.com).