



**Fig. 3—Expro’s Active SONAR clamp-on sonar-metering technology.**



**Fig. 4—Cross-section samples of CJS Coiled Tubing Supply’s FLATpak umbilicals.**



**Fig. 5—Emerson Process Management’s Micro Motion ELITE Coriolis meter.**

sonar-meter technology. These meters are designed to address flow rates in heavy-schedule piping. The new meter uses pulsed-array-sonar technology. The nonintrusive, clamp-on design (Fig. 3) enables deploying the meters on new or existing installations and inherently lowers both the technical risks and operating costs associated with flow measurement. The meters can measure primary gas-flow rate over a wide range of wet-gas mixtures. Sonar-flow measurement uses sonar-array-processing technology to measure volumetric-flow rates inside pipes by determining the speed at which naturally occurring coherent flow structures move past an array of sensors clamped onto the outside of the pipe. Specifically, sonar-flow-measurement technology leverages beam-forming techniques, originally developed in underwater acoustics to determine the location of sound sources underwater. Sonar-flow measurement is applicable to single- and two-phase flows. Installation does not require production shutdown. Because the meter is completely external, there is no pressure drop or permanent pressure loss. Measurement is independent of process pressure and pipe schedule.

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

**Flat Coiled Tubing**—CJS Coiled Tubing Supply has combined two technologies for wellbore-cleanout services. The company’s FLATpak vertical umbilical (Fig. 4) enables unloading liquid from low-pressure low-rate gas wells completed without a tubing string. Deployed by a conventional coiled-tubing unit, the cleanout service uses a high-efficiency jet pump coupled with a two-line umbilical. With no moving parts, the jet pump can handle wellbore fines and solids. Equipped with a high-energy jetting nozzle, the jet-pump system is able to jet through various wellbore blockages. By use of an accurate method of determining inflow volume, this technology ensures that there is no pressure surging during cleanout and that fluid from one zone is not pushed into another zone. This vertical umbilical uses multiple coiled-tubing strings that are encapsulated in a plastic jacket to create one uniform, rectangular-shaped matrix. Used as a production conduit, the vertical

umbilical integrates hydraulic-control capability for subsurface hydraulic artificial-lift pumps. The umbilical can be deployed with traditional coil units.

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

**Low-Flow-Rate Meters**—Emerson Process Management has designed its Micro Motion ELITE Coriolis meter for low-flow-rate high-precision applications (**Fig. 5**). The new meters are for monitoring and controlling chemical-additive-injection rates for treatment and flow-assurance programs. These meters deliver  $\pm 0.05\%$  liquid-flow accuracy,  $\pm 0.35\%$  gas-flow accuracy, and  $\pm 0.0005 \text{ g/cm}^3$  liquid-density accuracy for injection rates of 2 to 330 kg/h. The new meters provide measurement stability and robustness with Coriolis sensor tubes rated to 6,000 psi for high-pressure applications, with full secondary containment. The meter has no moving parts, minimizing maintenance costs. There are no requirements for flow conditioning or straight pipe runs, enabling simple installation.

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

**Interactive Quality Assurance**—Knight Oil Tools has introduced its equipment-inspection program, KIP, an interactive quality-assurance system. The touch-screen computer system (**Fig. 6**) enables technicians and inspectors to retrieve technical data, review reference material, and record inspection results from the shop floor. The system walks inspectors through each step of the inspection process. Then, the system records critical data and prompts the technicians and inspectors to enter information and approve components. If there is a question regarding the correct part or tool to use, the system provides the answer in text and video formats directly to the workstation on the shop floor. An interactive schematic ensures that inspectors mark damages on the proper component. All components must be inspected (and results recorded) before an inspection can be finalized. Training videos are available on screen for quick visual reference. Additional technical reference materials—from manufacturers and from Knight—are available as needed. Drillstem inspections and measure-



**Fig. 6—Knight Oil Tools' KIP equipment-inspection-program display.**



**Fig. 7—ITT's C'treat ROUSTABOUT reverse-osmosis system.**

ment data are tracked, and inspectors are alerted to excessive wear and minimum acceptance criteria. Inspections cannot be closed until both tubular and rental inspections are completed.

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

**Desalination System**—ITT has introduced its C'treat ROUSTABOUT off-the-shelf reverse-osmosis water-desalination system (**Fig. 7**). The system generates between 4,000 and 20,000 gal/D of potable water from seawater and

requires little attention from the off-shore crew. The custom-engineered water systems have three stages of pretreatment to extend membrane life. The system is expandable to manage capacity to meet variable demand. The lightweight steel-cage construction, with integral lifting eyes, encloses the system components to protect them from a variety of dangers. The system uses a nine-piston axial-piston pump to minimize vibration and pulsation. **JPT**

For additional information, email [roustabout@ctreat.com](mailto:roustabout@ctreat.com).