

# Texas A&M, 2009

BITS AND PIECES

did not come away from this year's event with any single consensus theme, but I will offer a few observations.

The keynote speech by Claudio Santiago, President & CEO of GE Oil & Gas, returned to a familiar exploration and production theme of finding new sources of supply. Santiago characterized today's climate as one in which economic volatility and hydrocarbon demand has delayed or eliminated proposed projects, resulting in increased spare capacity.

He offered that the world oil consumption of 80 million barrels per day, growing at 1.1% per year to 90 MMBL/D by 2018, coupled with the continued decline of existing capacity, will require an incremental 54 MMBL/D in 10 years. This is equivalent to 5.5x Saudi Arabia.

He also offered that the world would add 230 GW per year between 2008 and 2018 in both new and replacement capacity. The challenges include:

- A greater reliance on sour crude and acid gas
- Seabed activity
- Obtaining lighter products from heavier crude
- CO<sub>2</sub> emissions
- Monetizing stranded resources

Innovation and technology are key enablers and that leveraging knowledge and experience in "sister" industries, along with collaboration across industry, government and academia were ways to reduce the risk of new technology introduction.

Technologies on display included integrally geared CO<sub>2</sub> Compressors. Atlas Copco announced its 8-stage integrally geared CO<sub>2</sub> compressor in the show issue of *Turbomachinery International* (p. 16, Sept./Oct. 2009). The unit is intercooled between stages up to stage 5. Intercooling beyond stage 5 is case-specific because of concerns over hydrate formation over 40 bar.

Cameron announced the Turbo-Gas 2040 for CO<sub>2</sub>, among other gases. The unit is rated at 800 hp unit and 3,000 scfm with pressures to 610 psig (42 barg). This rating is well short of flow and pressure for commercial-scale application in the emerging Carbon Capture and Sequestration (CCS) market, and looks to be a simple derivative of its bottle-blowing offering.

Although not obvious, Mitsubishi Heavy Industries also seemed to place more emphasis on their integrally geared configuration. Mitsubishi provides CCS technologies and turnkey power plants that virtually preclude third-party inclusion.

There has been a good bit of interest in high-speed drivers. This seems to be driven

by interest in both electric drive pipeline compressors and seabed compression.

Electric drive pipeline units benefit from first cost and permitting advantages in non-attainment zones, while the use of high-speed direct drives and magnetic bearings in seabed applications is intended to prolong maintenance intervals and reduce the size of these executions.

All of the suppliers were in attendance at the conference and during the show. Direct Drive Systems announced that it had been acquired by FMC Technologies, Inc. — a supplier of systems and services for the oil and gas industry — for \$120 million. FMC's interest in seabed solutions is well-known.

Both Dresser-Rand and Elliott were displaying designs with high flow coefficients. Elliott displayed its 88M first stage with a 55.5 inch first stage running at 3,700 rpm. The catalogue advertises the inlet capacity of this unit at 154,000 icfm. Based on these values, the flow coefficient is 0.17, and the NASA specific speed is 1.02. Since the first stage of these inline designs sets the casing diameter, a high flow coefficient stage offers significant potential for cost reduction. You may recall that last year, Siemens offered an overhung first stage on an inline configuration to reduce the casing size of its high-capacity designs (p. 56, Nov./Dec. 2009).

Dresser-Rand exhibited its 50 PDI pipeline booster at 571 mm (22.5 inches) that had an advertised flow coefficient of 0.211. At the published 10,000 rpm, the unit would handle 34,300 icfm at a NASA specific speed of 1.30. This unit falls into the mixed-flow regime and allows for a significant size and cost reduction. The claimed efficiency is 86%. As a point of information, the 50 PDI would have to be approximately 26.3 inches to match this performance with a flow coefficient of 0.17.

Hangzhou Steam Turbine was exhibiting for the first time. Although not of any particular technical interest, this is the first time a Chinese steam turbine manufacturer was exhibiting directly. Welcome to Texas. ■

## Author

Peter Baldwin is an industry consultant ([www.base-e.net](http://www.base-e.net)) and former executive of Ingersoll-Rand Company's Northern Research and Engineering Corp. (NREC) subsidiary. Reach him at [pete\\_baldwin@base-e.net](mailto:pete_baldwin@base-e.net).

