

THREE New Technologies

Contribute to Clients' "Green" Efforts

***Editor's Note:** We recently spoke with Dresser-Rand's H. Allan Kidd, director, Emerging Technologies and Engineering Services, worldwide, to gain insight into several of the new technologies in which the company has recently invested. Kidd's responsibilities focus on understanding and gaining access to emerging technologies that support growth initiatives and help differentiate Dresser-Rand's products and services from the competition. He maintains a leading role in Integrated Compression System (ICS) product development, CO₂ compression, and technical coordination with D-R's recent investment in Ramgen Power Systems and its associated technologies. In addition, Kidd leads the D-R Blue Sky team and its funnel process that enables employees to bring any new technology or emerging market ideas to the team for evaluation.*



H. Allan Kidd

DRESSER-RAND IS INVOLVED IN a broad range of current and developing technologies that are contributing to "green" efforts across our industry. During the past 18 months, the company has invested in three particularly important technologies, each consistent with its business strategies of enhancing core capa-

bilities; focusing on the environment; adding new products, services and technologies; and providing access to new markets.

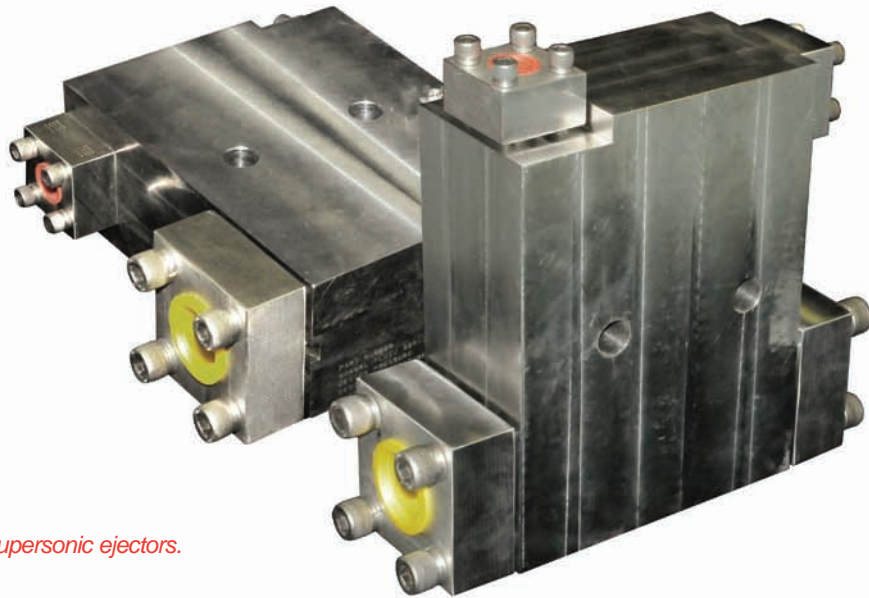
Using a "funnel" process, Dresser-Rand's "Blue Sky" team engages, evaluates and acts on creative new initiatives, ideas and solutions that help the company identify new market opportunities, and apply existing or new technologies and services to developing markets. (The "funnel" process provides management's input on each proposed R&D project to ensure consistency and alignment with the company's strategic business direction.) For example, CO₂ emissions from coal-fired power plants are cited as a key contributor to global warming, while sequestration of these emissions in deep saline reservoirs is an important environmental initiative. Dresser-Rand is actively pursuing technologies and is involved in some current projects to efficiently capture and inject CO₂ in support of this initiative.

SUPERSONIC EJECTORS REDUCE HYDROCARBON EMISSIONS

Late last year, Dresser-Rand introduced a new technology that employs tandem supersonic ejectors. Reclaiming gases ordinarily vented into the atmosphere, the ejectors offer exceptional environmental benefits while enabling facilities to operate more efficiently.

The two-stage ejector system captures leaking gas from a dry-gas seal at low pressure and recompresses it to a pressure equivalent to the fuel gas pressure. Reclaimed gases are injected into gas turbine fuel systems or compressor inlets, reducing hydrocarbon emissions to the atmosphere.

Continued on page 14



Supersonic ejectors.

“The recovery and recycling process captures all greenhouse gas emissions during normal operation, and recovers 100 percent of natural gas vented from the primary gas seal,” Kidd explained.

A typical dry-gas seal is a non-contact end face seal comprising two rings. The first is known as the mating ring; it has grooves etched into the seal face and rotates with the shaft. The second ring has a smooth face and only moves along the axis of the shaft. Using this pair together provides the sealing effect (a typical dry gas seal system is composed of two pairs of these rings, thus providing a two-stage sealing effect).

A significant advantage of the supersonic ejectors is that they have no moving parts; therefore, they offer practically maintenance-free operation when compared to mechanical compressors and vacuum pumps.

Dresser-Rand signed a technology license agreement with TransCanada Corporation in January 2008 to manufacture, use and market the supersonic ejectors, incorporating technology developed with NOVA Research and Technology Corporation.

Following successful field testing of a prototype in 2007 and 2008, TransCanada installed the prototype system on a 24 MW gas turbine unit in one of its compressor stations in Alberta, Canada, which yielded impressive results. The system has saved more than 99 kW of energy equivalence and reduced 1,600 metric tons of CO₂-E greenhouse gases per year. The final design, which resulted from the collaboration of Dresser-Rand and TransCanada technologists, is currently undergoing field evaluation in another compressor station in Alberta. Dresser-Rand’s product launch strategy is to

offer this energy-efficient device first in mid-stream applications, followed by upstream and downstream applications. The supersonic ejectors are available as new equipment options and product upgrades for centrifugal compressors that compress hydrocarbon gases.

“With growing concern for the environment, this system presents an excellent way to reduce carbon emissions, while increasing energy efficiency in a variety of applications,” Kidd said. “This provides a cost-effective solution for carbon footprint reduction in gas transmission operations, and the system pays for itself in a short period.”

SUPERSONIC AIRCRAFT TECHNOLOGY FOR GROUND-BASED AIR AND GAS COMPRESSORS

Dresser-Rand recently invested in Ramgen Power Systems, LLC, and is supporting that company’s ongoing development work in game-changing compressor technology that applies proven supersonic aircraft technology to ground-based air and gas compressors. The companies are working together to develop this unique technology that uses supersonic shock wave compression to address the global challenge of reducing CO₂ emissions. The end goal is a compression system that is industry-leading in terms of cost and performance, especially in high molecular weight gas services such as CO₂ compression. Higher efficiency means lower energy costs and lower emissions.

While Ramgen compressor technology is applicable in other high molecular weight services (*e.g.*, refrigeration and wet gas), the invest-

ment was made primarily to help Dresser-Rand meet the demands of the CO₂ compression market as it applies to carbon capture and sequestration (CCS). The technology is projected to significantly reduce the capital costs of CO₂ compression (one of the most expensive aspects of this process), while offering a potential operating cost savings. Dresser-Rand believes that this emerging market, and the growing market for enhanced oil recovery, represents an annual multi-billion dollar market potential for Ramgen's CO₂ compressor.

Compared to current compressor technologies, supersonic compression technology holds four distinct advantages:

- It can achieve competitive compression efficiencies with good turn-down.
- It is capable of producing very high, single-stage compression ratios.
- Its simplicity and size make it cost effective to manufacture.
- It offers an opportunity for significant recovery of the waste heat of compression into the CSS process or power plant itself, thus improving overall plant efficiency.

"Ramgen has successfully demonstrated the proof-of-concept of its Rampressor supersonic compressor in a 12-month testing program. These test results, combined with Ramgen's analytical and performance prediction tools, confirm expectations and validate the preliminary performance and operational claims of Rampressor technology," Kidd said.

Dresser-Rand expects to fund Ramgen for continued development and demonstration of this

technology, and may eventually exercise an option to purchase the assets of Ramgen.

NEW SEAL TECHNOLOGY LOWERS ENERGY CONSUMPTION, REDUCES OPERATING COSTS

Last spring, Dresser-Rand signed an agreement with CMG Tech, LLC to license technology for producing low-leakage pressure-activated leaf seals, or PALS. This technology involves PALS that relax during machine startup and shutdown cycles, providing increased clearance between rotating and stationary components. During normal operation, PALS reduce the clearance, which also reduces the leakage.

"The benefit," Kidd says, "is that compressors equipped with PALS require less power to complete the same amount of work. In fact, preliminary calculations suggest that PALS installed in a 10,000 horsepower-driven compressor could generate energy cost savings of approximately \$120,000 each year."

"Furthermore, these seals can substantially reduce internal leakage and improve overall efficiency for rotating equipment," Kidd emphasizes. "And by reducing leakage within a machine, operating costs are reduced because overall energy consumption is less."

"In addition, process throughput will increase, with no increase in power consumed. This innovation will help our clients extract more oil and gas from their reservoirs in a given period and consume less energy while doing so, maximizing their investment and our global energy resources."

Dresser-Rand will obtain exclusive rights to manufacture, use and market PALS for centrifugal compressors, steam turbines (under 60 MW), and other Dresser-Rand rotating equipment, as appropriate. PALS technology for equipment upgrades is being considered for centrifugal compressor users, and Dresser-Rand is working to make the technology available to steam turbine users in the near future.

FUTURE CONSIDERATIONS

Other new technologies are being evaluated and projects are underway for compressed air energy storage (CAES) [see page 20], marine renewable (wave) energy technology [see page 16], and waste heat recovery solutions...to name a few. Dresser-Rand continues to look for opportunities to collaborate with like-minded, innovative companies to converge and integrate technologies that will bring the greatest value to its clients. ■