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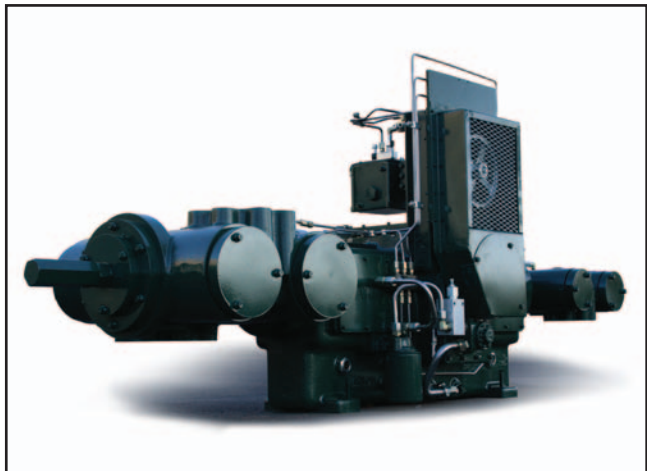
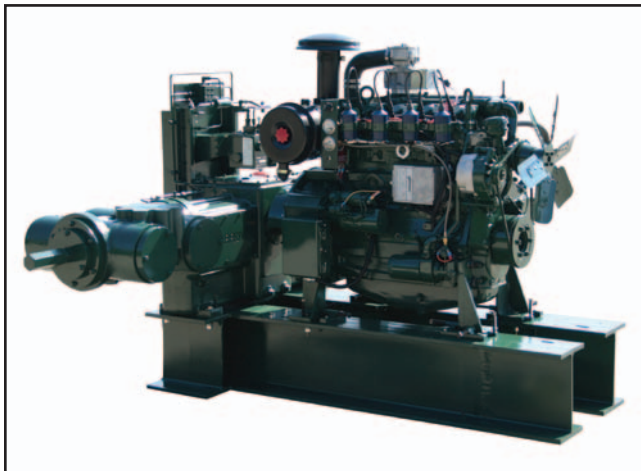
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■ (Left) Arrow engine and compressor “combo” coupled, aligned and mounted on a “T” skid, ready to mount in a package. (Right) Arrow Engine Company has introduced its new Arrow VRC2 horizontally opposed gas compressor.

ARROW ENGINE COMPANY TARGETS GROWTH THROUGH INNOVATION

*All-New Reciprocating Compressor Tops List of Developments as
Company Seeks Greater Prominence in Production Equipment Market*

By Phil Burnside

Established in 1955, Arrow Engine Company’s distinctive green and orange colors and “oil gusher” logo are familiar sights in the oilfield. Headquartered in Tulsa, Oklahoma, U.S.A., the company has diligently specialized in serving the parts and low-horsepower engine needs of gas and oil producers worldwide, and built a strong following in the process. Yet Arrow Engine has undertaken a significant change over the past several years.

Perhaps the most obvious sign of that change will become very visible at the 2008 Gas Compressor Association’s Conference in Galveston, Texas, U.S.A., in late February. It will be there that Arrow will officially announce its new VRC-2 reciprocating gas compressor. The VRC-2 marks a milestone in what Len Turner, Arrow’s president and CEO, indicated is “a natural development given the company’s long-held strategy of value-added service to the well-site operator. Arrow continues to stand by its commitment to be a supplier of quality equipment to the oil and gas production business.”

Joe Southern, Arrow’s sales and general manager for Gas Compression Products said, “On the gas compression side, Arrow now offers the engines, a compressor and engineered-to-order vessels and skids to meet the needs of many producers. Arrow also

has the capacity to build sub-skids, or what Arrow calls “engine-compressor combos” consisting of an engine and compressor coupled together as a compact unit and mounted on a base that packagers can install directly on their own skids. Main skids designed to adequately support compressor packages up to 200 hp [149 MW] are also available.”

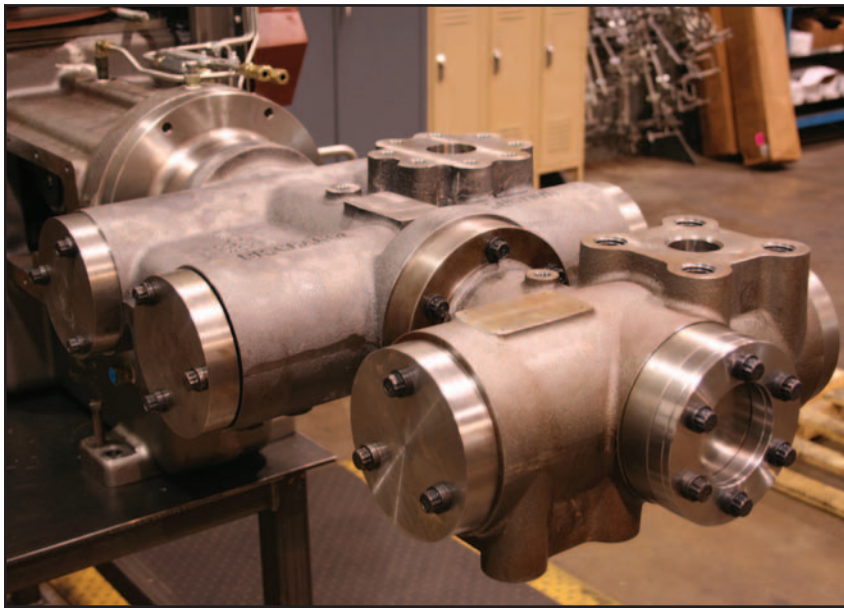
In addition, Arrow now owns and operates ASME code shops in Tulsa,

Oklahoma, U.S.A., and Shandong, China, that will build skids to order as well as ASME bottles, gas process equipment and vessels of various sizes to service the needs of the oil and gas production market. The company supports the artificial lift pump jack market with engines, clutches, auto start systems and parts for oilfield engines of all kinds.

“We don’t intend to become a packager,” Turner said, “but as we focused



■ Arrow Engine Co.’s headquarters and U.S. manufacturing facilities are centrally located in northeast Tulsa, Oklahoma.



■ A view of the VRC-2 compressor's 4 x 2.25 tandem cylinder.

more and more on additional well-site content, we realized that offering a matched engine and compressor, pressure vessel and skid is one of the best ways we can serve our compression customers' needs."

The new Arrow VRC-2 is a two-throw separable reciprocating gas compressor with a maximum rating of 125 hp (93 kW) at 1800 rpm. The compressor's horizontally opposed cylinders are balanced for smooth running and durability.

Unlike most other reciprocating compressors, the VRC-2 features horizontally opposed cylinders and a three-throw crankshaft configuration that eliminates opposing cylinder offset. Rods are balanced, and their design places the centerline of both pistons in the same horizontal and vertical planes, thus minimizing or even eliminating the source of horizontal couple.

"The VRC-2 is equipped with a pressurized lubrication system, highly efficient Hoerbiger valves, industry-proven accessories, innovative engineering design and close attention to quality," said Southern. He also pointed out that all Arrow compressor cylinders are 100% hydro tested before being released for assembly or shipping.

Southern foresees that most VRC-2 gas compressors will be assembled as standardized three-stage units, although the compressor can easily be packaged for single-, two- or three-stage applications with cylinder sizes from 2.5 in. (6.35 cm) to 8 in. (20.3 cm). Southern said that Arrow Engine will stock a complete selection of cylinders and spare parts to assure fast delivery and maximum flexibility.

"We are very excited to offer our customers a new alternative in the small gas compression marketplace. The VRC-2 is a perfect complement to the Arrow Engine product line of gas engines, chemical pumps, compressor skids and ASME-coded vessels," he stated.

Everett Treat, Arrow's operations manager, has a long history with the company. He is intimately in tune with its customers and predicts that the VRC-2 engine compressor combo will appeal to many of them. "The real advantage to the packager with our approach is that, when the engine and compressor are purchased together, the packager has to deal with only one supplier if something



■ The new VR260 four-cylinder engine is equipped with an electronic governor.

goes wrong. Their potential service problems are reduced in both the logistics of procurement and repair of the unit because they're talking to the company responsible for both. One of the advantages we have at our size is that we all operate very close to one another, and we can effectively pool our expertise as necessary," he said.

"With many packages out in the field and running for over a year, we are very pleased with the longevity of these units," said Southern. "Arrow continues to work to establish a strong and dependable packaging system for its new compressor and engine-compressor combo."

Kavas Mistry, corporate director for VR Engines pointed out that, "We have rearranged our engine line. We will be bringing two new engines to market, one rated at the top end of



■ One of the initial packages with the VRC-2 driven by an Arrow VRG330 Cross Flow engine.



■ The VRG330 Cross Flow engine. A design advancement on the venerable 330.

our range, at about 150 hp [112 kW], and the other rated 50 hp [37 kW]. Now Arrow will be able to offer four engines ideally suited to driving field compression equipment in a range from 30 or 40 hp [22 or 30 kW] to a high of 150 hp [112 kW].” This same range of engines drives Marathon generators on Arrow’s line of gen-sets from 25 to 100 kWe.

As for engines and parts support, Kevin Boucher, Arrow Engine sales manager, said, “Like the VR330, the VR260 and VR380 are also true industrial engines. This means they were designed from the start to endure the harsh world of duty in the oil and gas industry. All engines carry a one-year warranty. Arrow supports its product in the field through factory-backed distributors and a trained staff of experts well versed in all aspects of the product.”

“Arrow Engine’s expansion, even within its own niche markets, sparked a need for other changes. Arrow has about doubled its workforce over the past few years. Additional staff is being set in place to provide support for field service operations,” said Boucher.

“Design features include forged steel, dynamically balanced and counterweighted crankshafts with hardened journals, individual cylinder heads, serrated, angle-cut, forged steel connect-

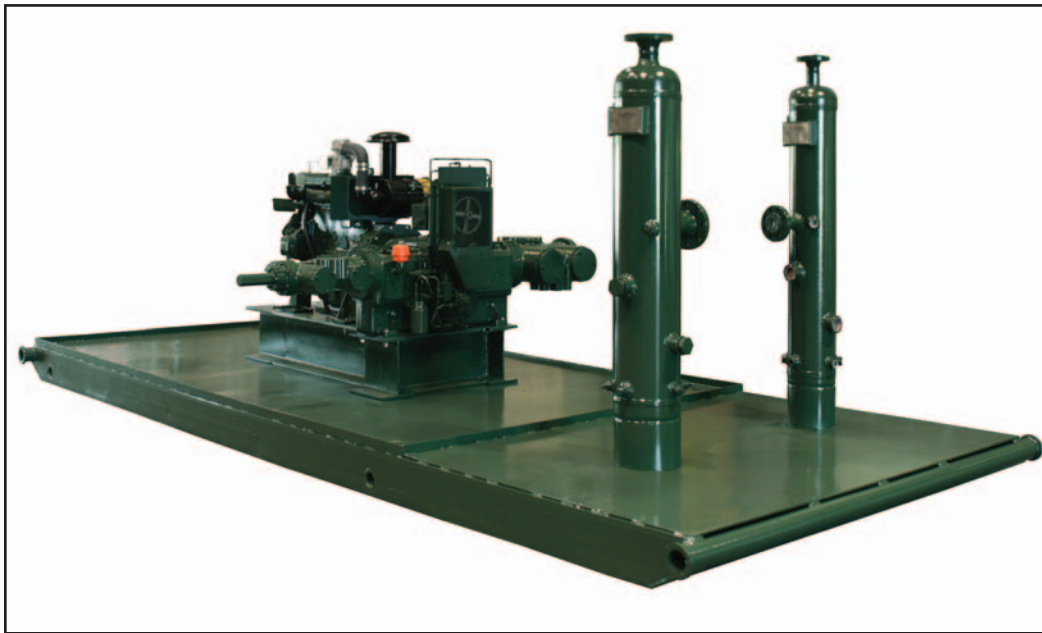
ing rods, replaceable precision main and rod bearings, replaceable cylinder liners, and a heavy-duty deep skirted crankcase,” explained Boucher. “Both engines share significant commonality in parts, which will make using the two engines especially attractive because the parts’ interchangeability makes it easier and more economical to maintain, service and provision. The wet sleeve and individual head design ensures field rebuild ability, which will benefit end users by minimizing downtime and excessive transportation costs when repairs are needed.”

About a mile from Arrow’s 110,000 sq.ft. (10,200 m²) headquarters in northeast Tulsa, the company occupies a 30,000 sq.ft. (280 m²) building in which it has established its new compressor manufacturing shop, a compressor skidding shop and warehousing for compressor frames and cylinders.

At a third site located just blocks north of Arrow’s headquarters is another large building in which Arrow utilizes about 28,000 sq.ft. (2600 m²) as a fabrication shop and storage location for a large parts inventory intended for both manufacturing and customer support. Since obtaining that space, the company has added additional overhead lift capacity, and recently added an additional 20,000 sq.ft. (1860 m²) of



■ A VR260 power unit in final stages of assembly, this one with shielded ignition for Canada.



■ In addition to the small skids used to create Arrow Engine's new engine-compressor combos, the company can also design and manufacturer full-sized skids in its ASME code welding facilities in Tulsa or in Shandong, China.

storage, according to Treat.

"Arrow also recently opened an ASME code welding facility in Shandong, China," explained Treat. "The 280,000 sq.ft. (26,000 m²) facility will enable Arrow to grow its gas products business at a more rapid rate by tapping into a large pool of qualified code welders producing ASME code vessels and skids for Arrow. There are approximately 100 Yantai employees in Shandong, China, that will be a vital part of Arrow's growth strategy going forward. Based on Yantai's 30-plus years of experience, we are confident in their ability to provide high-quality products."

Turner explained, "We are a company that is committed to the very highest-quality products and a high level of customer satisfaction. Many of our competitors make a product, sell it, and then it's the customer's problem when something goes wrong. Our Customer Service Department is second to none. These are people who are experts, and who can help with all product needs. In addition, our compressors and engines have the best warranty in the business. We are that sure of the quality. These units are built oilfield tough."

Turner said that "Arrow is also at the forefront of the emissions issue, always working on conforming to the latest standards. Both single-cylinder engines and the complete line of multicylinder engines will be capable of meeting current and proposed emissions standards."

Arrow Engine Co. provides a wide variety of engine replacement parts and engine accessory products, as well as slow-speed engines, four- and six-

cylinder engines, generator sets and chemical injector pumps for the oil and gas industry and other industrial engine markets worldwide. In addition to Climax Single-Cylinder Engines, VR Multicylinder Engines and Arrow engine parts, the company's products include quality replacement parts for Ajax, Fairbanks, Caterpillar, Lufkin, White and Gemini engines, and a wide assortment of carburetor and clutch components, chemical injector pumps and parts, engine starters and engine automation.

Arrow is a part of the Energy Group formed by TriMas Corp., which is headquartered in Bloomfield Hills, Michigan, U.S.A., and consists of five business groups with projected 2006

revenues in excess of \$1.1 billion. TriMas has over 5000 employees at 80 facilities in 10 countries.

"Arrow is continually redefining its role in the oil and gas business," Turner said. "Our main growth driver over the next decade, however, has not changed. Our strategy is to be the preferred provider of quality well completion products for the various facets of the oil and gas business. We will continue to add products and product lines to our portfolio to provide additional well site content and services to our customers in the oil and gas industry." ■

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■ Arrow's fabrication shops can also manufacture vessels, such as these separators, to customer specification.