



■ A diaphragm compressor package completed by Gas & Air Systems Inc. (GAS) in January 2003. The package incorporates a Burton Corblin Model D123LC6.3 metal diaphragm compressor. It is used to compress high purity nitrogen gas to a pressure of 900 psi (61.2 bar) with zero contamination of the gas.

## GAS & AIR SYSTEMS ADDS BURTON CORBLIN ASSETS AND INVENTORY

Enters Agreement to Distribute Burton Corblin Products  
Throughout North America

By Gay Walley

Bethlehem, Pennsylvania, U.S.A., is an old steel mill town that, like most steel towns, spent a little time as a ghost town once the steel business fell. But Bethlehem made a brave comeback and today boasts a new compressor package manufacturing company to its census.

Gas & Air Systems Inc. (a Weldship Group company) is comprised of two compressor manufacturer lines. On January 1, 2003, Gas & Air Systems Inc. acquired the inventory and assets of Burton Corblin Inc. and entered into an agreement to distribute Burton Corblin products throughout North America.

Gas & Air Systems already had an existing arrangement with Gardner Denver/Bellis and Morcom to market their nonlubricated industrial gas compressors, as well as high-pressure breathing air and industrial gas compressors in standard packages.

All Gas & Air Systems products are designed to service the industrial, specialty and process gas compressor market. The combining of these offerings into one group, which still only requires a small working staff of about 12 people, has resulted not only in a wider product line, but synergies and efficiencies in the service and sales area.

Steve St. Martin, who has been with Burton Corblin 21 years, explains the advantages of the merger, "Weldships' core business is high-pressure gas transportation, ground storage and cryogenic equipment for the industrial and specialty gas market. Burton Corblin has long held a leadership position among the major producers of those gases. We always had the products, but since we were small, we couldn't focus on some of the segments we wanted to. Now, Gas & Air Systems can better focus on being full service

suppliers to our traditional customers. We were also fortunate to retain quite a few of the Burton Corblin staff, who bring a wealth of experience, and add significantly to Gas & Air System's capabilities."

The addition of Burton Corblin brings some new technology to Gas & Air Systems. Burton Corblin invented the metal diaphragm compressor, an ideal technology for difficult gas compression duties. As a manufacturer in oil-free piston compressor technology, and a member of the API 618 task force, Burton Corblin also manufactures nonlubricated process piston compressors. And, they innovated the Periflow rotary regenerative centrifugal compressor which the company said is fast becoming standard.

Burton Corblin's diaphragm compressor is known for its zero emissions. The Burton Corblin triple diaphragm construction completely isolates

the gas from the reciprocating and lubricating parts thus ensuring contamination-free compression. "The triple metal diaphragm gives the customer the ability to sense a failure in any one of the diaphragms, explained St. Martin. "If there is a failure in a diaphragm, the gas remains isolated from the hydraulic space and any leakage is confined in a closed system for safe disposal."

The crankcase of the compressor is essentially a hydraulic pump. The piston moves in the cylinder and pulses the hydraulic fluid in the head producing an oscillating movement of the diaphragm group. This diaphragm group consists of three diaphragms clamped and sealed at the periphery between the gas plate and oil plate. The oil plate has the role of distributing the hydraulic fluid uniformly under the diaphragm and the gas



■ A process gas compressor package completed by GAS in June 2003. The package incorporates a Burton Corblin Model P123HG140/100csh process gas compressor. It is used to compress hydrogen-rich gas mixtures in a GTL process. The balance opposed, nonlubricated process gas compressor is built and packaged to API 618 guidelines in accordance with GAS and customer specifications.

plate contains the suction and discharge check valves. These two plates are specially contoured on their internal faces and their assembly forms the compression chamber.

Their profile is carefully designed so as to minimize the stresses in the diaphragm. A piston pump, called the compensating pump, works via an eccentric mounted on the crankshaft. At each stroke of the piston a surplus of hydraulic fluid is injected into the oil chamber to compensate for any leakage past the piston and to assure the diaphragm makes full contact with the gas plate. Thus the clearance volume is reduced to a minimum.

The excess hydraulic fluid introduced by the compensating pump escapes via an adjustable relief valve called the pressure limiter and returns to the sump.

The Burton Corblin diaphragm compressors can be built in a wide range of materials to suit any process gas. The diaphragm compressors have pressure ratings ranging from 10 to 3000 bar and offer a large number of combinations allowing an optimum selection for a given duty.

Currently, Gas & Air Systems is completing two diaphragm compressor packages for major chemical companies, one to act as an ethylene process gas compressor, and the other to be a nitrogen gas compressor.

Another compressor unique to Burton Corblin is the

Periflow compressor. It is a relatively new design which addresses a small niche of centrifugal compressors. An interesting point regarding the Periflow compressor is that it cannot surge.

The rotary Periflow compressors are compact centrifugals which achieve multi-stage pressure rise using a single impeller. With a technology of their own, they have performance characteristics situated between those of positive displacement blowers and centrifugal compressors. The aerodynamic concept is based on the rotation of a profiled wheel in an annular channel.

The Periflow is a dynamic type compressor with the process flow taking place at the circumference (or Periphery) of an impeller. The impeller is machined in one piece featuring either straight or curved blades located equidistantly around the external diameter on one or both sides of the wheel. The blades move with the rotation of the impeller in a ring-shaped channel and force the fluid to move spirally. This spiraling, corkscrew flow pattern is the result of the combination of two flow components. One is tangential and follows the impeller while the other is circulatory, located in a plane perpendicular to the impeller. The tangential component contributes mainly to the flow whereas the circulatory component contributes to increase the pressure. This helical movement forces the



■ Oil-free reciprocating compressor package delivered by GAS in 2000, incorporating a Belliss & Morcom 3-stage model W1100. Application: Nitrogen boosting from a cryogenic plant to 500 psig (34 bar) for slag treatment at a steel mill.

fluid to pass through the blades several times. The distance traveled by the fluid inside the machine is considerable and the Periflow behaves like a multistage centrifugal compressor with partial admission. The pressure gradient is more or less constant throughout the channel.

The swirling helical flow imparted to the gas in the course of a single revolution results in the compression of the fluid comparable to that produced by several centrifugal stages. It provides high-pressure rise at low rotation speed.

In addition, the Periflow compressor comes with dry gas seals in various configurations. Dry gas seals are the most popular; the design will accept John Crane or Flowserve dry gas seals.

With an inlet flow up to approximately 3750 acfm (6000 m<sup>3</sup>/hr), the machines are built with corrosion-resistant materials of construction. Low noise and vibration eliminates the need for acoustic enclosures or expensive foundations, even though to date the machines have been designed and built with absorbed power up to approximately 1300 hp (1000 kW).

The Periflow compressor is particularly suited for process gas applications such as boosting and recycling of hydrocarbon gases and hydrogen rich gas mixtures; gas boosting in industrial processes; and gas phase reactor process gas recycling.

Also offered by Gas & Air Systems are GD/Belliss & Morcom industrial and proc-



■ One of three process oxygen compressor packages completed by GAS in 2003. The package incorporates a Belliss & Morcom Model V-130 compressor and is used to raise the pressure of oxygen produced in a VPSA or cryogenic oxygen generator.



■ A 20 year old Williams & James compressor overhauled and upgraded by GAS in April, 2003. Application: Breathing Air, Discharge Pressure: 3000 psig (204.12 bar).

ess gas piston compressors. These come in a wide range of crankcase and cylinder sizes and configurations to meet process and specification requirements. These nonlubricated gas compressors are built with a double distance piece and packing arrangement which prevent the gas from coming into contact with lubricants or other contaminants. Special construction and package features have been developed for handling Oxygen Gas.

The mean piston speed of any of the frames is less than 800 fpm, V and W configura-

tions allow multiple staging on a single, compact frame, which provides flexibility in compression staging without using stopped or tandem cylinders.

For fixed installations and heavy-duty continuous service applications, these compressors cover power ratings up to 1743 hp (1300 kW) at pressures of up to 3626 psi (250 bar).

There are high-pressure industrial gas and breathing air compressors and dryers. These compressors have a balanced design which ensures smooth, virtually vibration-free operation and allows simple bolt-

down installation without special foundations. Also available are GD/BM horizontally-opposed compressors, which provide suitability for heavy-duty applications and are recommended for air and most inert gases. Their full rod reversal ensures good oil lubrication to the bearings.

The Gas & Air Systems products run from reciprocating pistons up to 6000 psi and 1750 hp (400 bar and 1300 kW); metallic diaphragm compressors up to 43,000 psi and 200 hp (3000 bar and 150 kW) and rotary Periflow compressors up to 3200 psi and 1300 hp (220 bar and 1000 kW).

Gas & Air Systems recently completed a pair of oxygen product compressor packages for Linde BOC Process Plants LLC, a major manufacturer of oxygen generating systems. These packages, incorporating Bellis and Morcom compressors, will be installed in a water treatment plant in Dallas, Texas, U.S.A. The oxygen machines are smaller than those traditionally used on large, air separation plants, but are highly specialized and custom-

engineered, from their materials of construction, gas velocity and cleanliness standards. The entire package is surrounded by an engineered protective barrier.

"In a quite different market," St. Martin said, "we have an order due on the floor very shortly for a major engineering company. We are building a hydrogen/hydrocarbon compressor for a petroleum syn-fuels project. This is a Burton Corblin compressor, built and packaged to the customer's specifications and the API 618 standard that is in line with the process gas markets we serve. We are in the midst of completing GD/Belliss & Morcom high-pressure breathing air compressor packages for two major specialty and industrial gas distributors. We have also recently supplied a GD/Belliss & Morcom high-pressure helium compressor to one of the same distributors and we have one on order for one of the major national industrial gas producers."