NFPA 99 Medical Air Dewpoint BSA LifeStructures

April 2007

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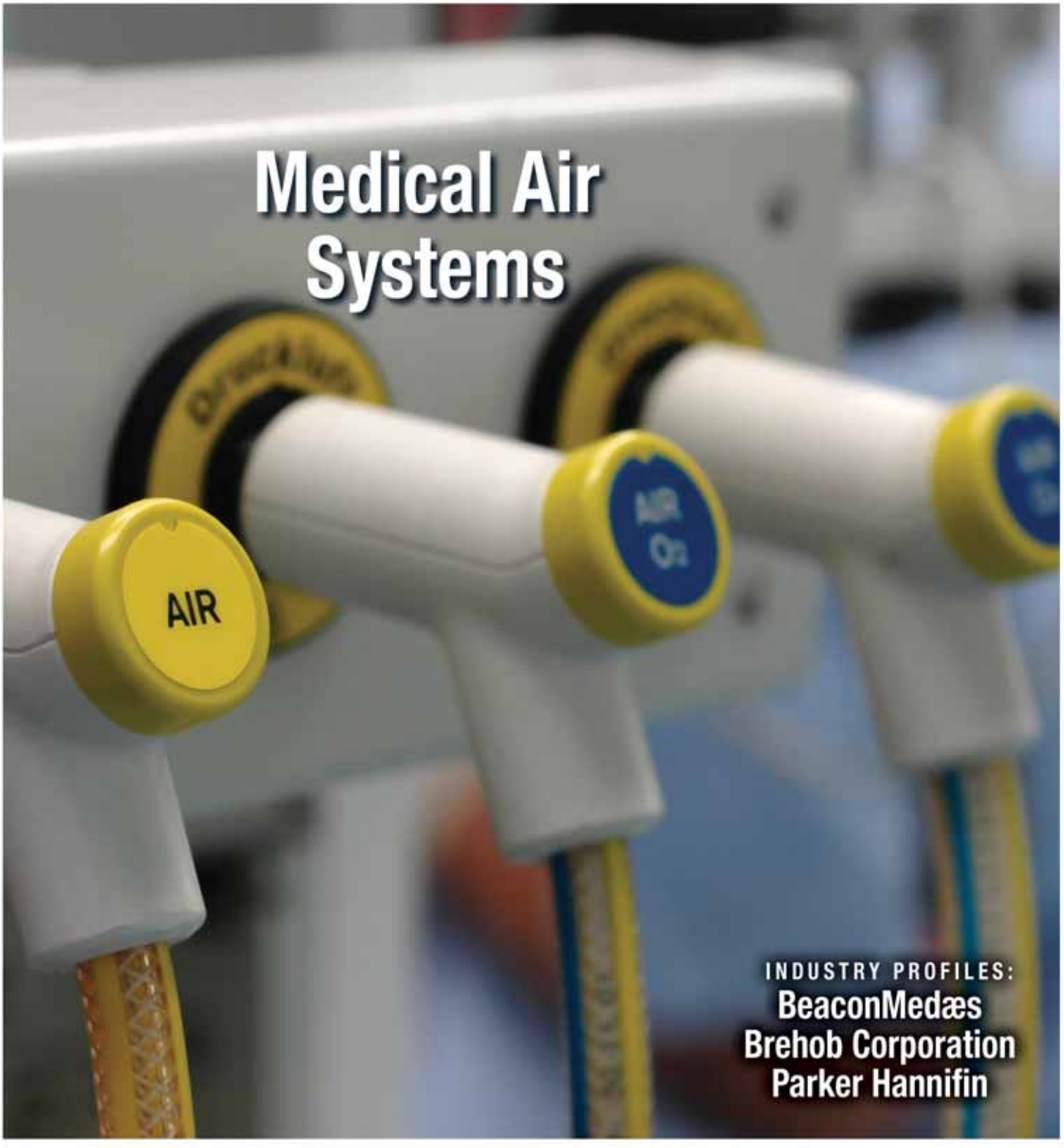

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FROM THE EDITOR

Leadership in Medical Air Systems

In every edition we publish of Compressed Air Best Practices Magazine, I interview professionals who work with compressed air systems for a living. The conversations are truly enlightening to me and it is great to see so much expertise being offered to users of compressed air systems. Most of our editions have an "Industry Focus" that enables readers to see that compressed air systems are unique in their proper application to specific industries. This edition examines Medical Air Systems for healthcare facilities and we speak with manufacturers, distributors and engineering firms involved with these systems.

Equipment manufacturers, such as **BeaconMedæs** and **Parker Hannifins' domnick hunter** and **Zander** divisions, truly take a leadership role in helping the healthcare industry continuously improve their Medical Air Systems. They are active in the NFPA and European Standards committees where codes are continuously updated to take advantage of new knowledge and technology. In preparing these articles, I was absolutely amazed at the evolution of Medical Air Systems over the past fifteen years. We are pleased to bring you articles from both of these companies and appreciate the leadership they demonstrate in the healthcare industry.

Engineering firms and specialized compressor distributors, such as **BSA LifeStructures** and **Brehob Corporation**, are proficient in implementing the new technologies and processes recommended by the NFPA 99 Standard. This edition offers some insights into the complexity of installing a "code-compliant" system in a hospital. **Mr. Robert Beierle, P.E.**, of **BSA LifeStructures** gives us an interesting account, for example, of how complex it can be to identify the proper location for compressor intake piping on a hospital rooftop.

Finally, this edition includes an article that reviews the dewpoint requirements of the current NFPA 99 Healthcare Standard. We review some of the drying technologies available and the current trends related to air dryers in hospitals today.

We again thank all the members of the compressed air industry for their continued support of the educational objectives of this magazine and for their continued leadership in continuing to perfect Medical Air Systems.

ROD SMITH

COMPRESSED AIR BEST PRACTICES MAGAZINE

www.airbestpractices.com

Advertising & Editorial: Rod Smith
rod@airbestpractices.com
Tel: 251-680-9154

Subscriptions & Administration: Patricia Smith
patricia@airbestpractices.com
Tel: 251-510-2598

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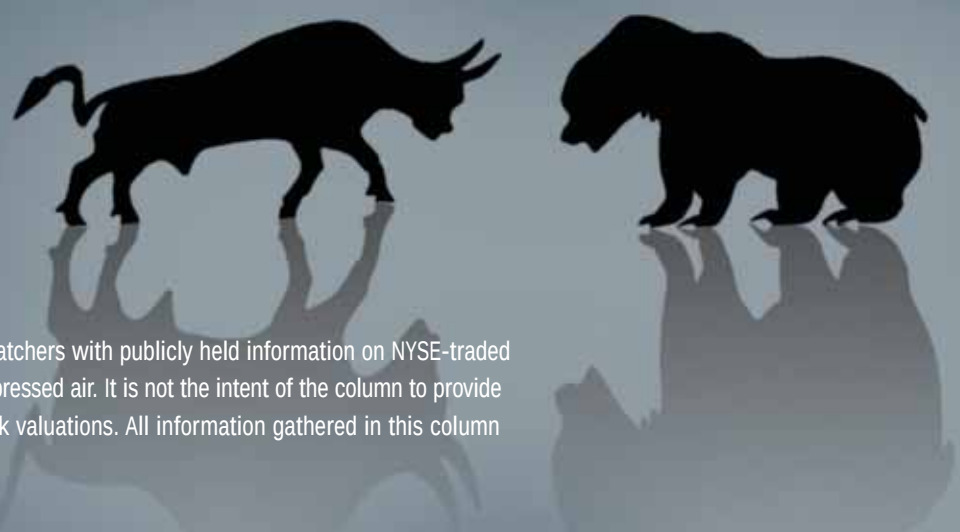
Wall Street Watch

BY COMPRESSED AIR BEST PRACTICES



The intent of this column is to provide industry watchers with publicly held information on NYSE-traded companies, involved with the sub-industry of compressed air. It is not the intent of the column to provide any opinions or recommendations related to stock valuations. All information gathered in this column was during the trading day of March 9, 2007.

The Atlas Copco Group (Stockholm, Sweden) released full year 2006 results. Orders received by the Atlas Copco Group in 2006 increased 23%, to MSEK 55 239. Volume for comparable units increased 18% while revenues increased 20%, to MSEK 50 512, corresponding to 15% volume growth. The Group's operating profit increased 33% to MSEK 9 203, corresponding to a margin of 18.2% . Profit before tax amounted to MSEK 8 695, up 27%, which corresponds to a margin of 17.2%. Profit from continuing operations was MSEK 6 260. Profit for the period, including discontinued operations, totaled MSEK 15 373, or SEK 24.48 per share. Operating cash flow before acquisitions, divestments and dividends totaled MSEK 2 106, including discontinued operations.

Order volumes for stationary industrial compressors continued to improve supported by favorable demand and the consistent strengthening of presence and penetration in new and existing market segments. The aftermarket business for industrial compressors continued to grow at a steady and high pace. Compressed air treatment products like filters and dryers also recorded very high growth. Geographically, all regions, without exceptions, were strong. The growth rate was particularly good in Eastern Europe, North and South America and in Africa/ Middle East.

Atlas Copco has signed an agreement to acquire the business of GreenField, based in Switzerland. The company is engaged in high pressure gas applications, mainly compressed natural gas (CNG) for natural gas vehicles. The turnover of GreenField is approximately MSEK 270 (MEUR 30) and it has around 200 employees.

GreenField designs, manufactures and markets a range of CNG compressors aimed at the natural gas vehicles market. The company has a long history in high pressure gas compression systems, a solid application knowledge and a well-known brand. GreenField's headquarters are located in Pratteln, near Basel, Switzerland. The acquisition includes the business of the companies in the United States, Germany, Argentina, Brazil, Colombia, Venezuela, Canada and Australia. GreenField will be part of the Oil-free Air division in the Compressor Technique business area. GreenField will continue to be a standalone brand.

"The acquisition of GreenField is part of our strategy to become a player in the rapidly growing market of compressed natural gas for vehicles," says Ronnie Leten, Business Area President, Atlas Copco Compressor Technique. "The acquisition, which is in line with Atlas Copco's policy to invest in environment-friendly solutions, gives us an entry into new regions. In combination with Atlas Copco, GreenField will have the means to serve its customers more efficiently."

Atlas Copco Italia S.p.A. has received conditional approval from the anti-trust authorities to acquire the Industrial Division of the **ABAC Group S.p.A.**. It had a turnover in 2006 of approximately BSEK 1.7 (MEUR 190) and some 650 employees. The estimated operating profit margin in 2006 was around 10%. The acquisition is scheduled to close on April 2.

The ABAC Group, headquartered in Turin, Italy, is a major manufacturer of piston compressors for the industrial market via the ABAC, BALMA and AGRE brands. It has a solid presence in the screw compressor market via the ALUP, ABAC and BALMA brands. The group has successfully established a presence in the distribution of compressors for small and medium sized industries and the automotive aftermarket.

For Germany, the conditions consist of divestment of the German sales and service organization of ALUP GmbH. If the acquirer does not have a production site of compressors in Germany, Atlas Copco is also required to divest the production site of ALUP GmbH in Köngen. The acquirer will have the right to use the ALUP brand in the German market exclusively for 5 years.

For Austria, the conditions consist of the divestment of the AGRE brand name for screw compressors. ABAC will become part of Atlas Copco Compressor Technique's Industrial Air division. The Consumer Division of the ABAC Group, led by the company Nu Air Compressors and Tools, will remain under the control of the current group.

SPX Corporation (NYSE:SPW) announced that it has entered into a definitive agreement to sell its Contech business unit to Marathon Automotive Group, LLC, a company formed by Marathon Asset Management, LLC, for approximately $146 million in cash. Contech, based in Portage, Michigan, has annual revenues of approximately $300 million.

Chris Kearney, President and CEO of SPX Corporation said, "Contech is a high quality supplier to the automotive industry with a strong management team and we wish them every success in the future. This transaction, however, is a natural progression for SPX. Today, SPX is focused on a strategy of growing businesses that provide solutions for customers in the areas of flow technology, test and measurement, and thermal equipment and services. Given this focus, Contech no longer fits into our long-term strategy."

Ingersoll-Rand Company Limited (NYSE:IR), announced that it has agreed to sell its Road Development business unit to AB Volvo for cash proceeds of approximately $1.3 billion. The Road Development business unit manufactures and sells asphalt paving equipment, compaction equipment, milling machines and construction-related material handling equipment. In 2006, Road Development generated net revenues of approximately $850 million, which included inter-company revenues of approximately $150 million. The sale includes manufacturing facilities in Letterkenny and Shippensburg, Pennsylvania; Hameln, Germany; Wuxi, China; and Bangalore, India; as well as 20 distribution and service facilities in the United States. The business includes approximately 2,000 people worldwide.

MARCH 9, 2007 PRICE PERFORMANCE	SYMBOL	LAST PRICE	PRICE CHANGE YTD	1 MONTH	6 MONTHS	12 MONTHS	52-WEEK HIGH	52-WEEK LOW	BETA
Parker-Hannifin	PH	$84.09	7.9%	-1.4%	10.7%	5.1%	$88.19	$69.70	1.19
Ingersoll Rand	IR	$42.90	10.3%	0.2%	12.5%	4.5%	$49.00	$34.95	1.40
Gardner Denver	GDI	$33.15	-11.3%	-8.1%	-9.4%	11.3%	$40.73	$29.37	0.90
United Technologies	UTX	$64.65	3.3%	-5.1%	1.9%	11.6%	$69.49	$56.58	0.71
Donaldson	DCI	$35.69	2.7%	0.6%	-7.1%	8.9%	$38.97	$30.16	0.88
Enpro Industries	NPO	$37.71	12.8%	10.7%	16.2%	16.6%	$40.70	$29.28	1.91
SPX Corp.	SPW	$69.39	13.0%	-1.7%	32.0%	35.6%	$72.18	$50.47	1.08
Industrials Sector				-2.4%	10.3%	8.2%			
Ind. Machinery Sub-Ind			-1.8%	11.8%	8.8%				

WALL STREET WATCH

"The Road Development business has been a strong contributor to Ingersoll Rand's success for several decades and remains an industry leader with dedicated and talented employees," said **Herbert L. Henkel**, chairman, president and chief executive officer. "However, the business' markets and products do not fit within our transformed portfolio of diversified industrial businesses. I am confident that Road Development will benefit by joining a company sharing similar competencies and offering complementary products and services. We are pleased to have entered into this agreement with Volvo, which represents a strong strategic buyer for the business. The sale of the Road Development business reflects our strategy to transition away from capital-intense, heavy-machinery businesses and improves the company's efforts to consistently achieve aggressive financial objectives over the long term."

Ingersoll-Rand Company Limited announced that it has completed the acquisition of the remaining 40.2-percent interest in Russia-based Instrum Rand JSC. Established in 1992, Instrum Rand was one of the first closed stock joint ventures in Russia.

Based in Pavlovo (Nizhny Novgorod region), Instrum Rand manufactures pneumatic tool components for export as well as a line of tools for sale in the local market. The company also distributes and services tools imported from other Ingersoll Rand facilities. Instrum Rand is ISO 9001:2000 and ISO 14001 certified and is the only factory in Russia to hold a VDA (Verband der Automobilindustrie) 6.1 certification, a quality standard related to automobile sector suppliers. Instrum Rand will operate as part of Ingersoll Rand's Industrial Technologies Sector.

"Our acquisition of Instrum Rand builds on our strategy to operate world-class manufacturing facilities that produce high-quality, cost-competitive products in emerging markets for local and international customers," said Herbert L. Henkel. "Russia and Eastern Europe represent major growth opportunities for the enterprise. The addition of the manufacturing, engineering and distribution capabilities of Instrum Rand will allow us to accelerate our growth initiatives in these markets, improve our connectivity to local customers and develop product and service solutions that meet their specific requirements."

MARCH 9, 2007 COMPANY PERFORMANCE	SYMBOL	5-YR REVENUE GROWTH	1-YR EPS GROWTH	5-YR EPS GROWTH	RETURN ON EQUITY	1-YR PROFIT MARGIN
Parker-Hannifin	PH	9.4%	47.6%	12.3%	19.4%	7.7%
Ingersoll Rand	IR	6.0%	28.9%	43.6%	19.1%	8.0%
Gardner Denver	GDI	31.8%	57.8%	28.9%	17.6%	8.5%
United Technologies	UTX	11.4%	18.6%	14.1%	21.8%	7.3%
Donaldson	DCI	8.3%	13.8%	13.4%	26.1%	6.7%
Enpro Industries	NPO	8.1%	N/A	N/A	-33.7%	-70.9%
SPX Corp.	SPW	2.3%	28.9%	7.3%	10.5%	5.6%

Parker Hannifin Corporation (NYSE: PH), reported an increase of 3 percent in total orders for the month of February compared to the same month a year ago. Parker reported the following orders by operating segment:

- Orders in the Industrial North America segment decreased 2 percent versus February a year ago.
- Orders in the Industrial International segment increased 9 percent versus February a year ago.
- Orders in the Aerospace segment increased 4 percent on a rolling 12- month average basis.
- Orders in the Climate and Industrial Controls segment increased 3 percent versus February a year ago.

Parker Hannifin Corporation reported that a patented starting gate design that uses Parker technology is winning recognition throughout the world of BMX bicycle racing, including the 2008 Olympics in Beijing. The ProStuff® straight eight starting gate has been selected as the official start gate for Olympic BMX contests. The 2008 Olympics will be the first ever held in China and mark the debut of BMX bicycle racing as an Olympic event. Parker distributor, **Barker Rockford, Inc.**, integrated Parker automation components to develop the patented system.

"Using Parker automation technology, we set out to find a new application in an untapped market niche," said **Pierce Barker, III**, principal of the Rockford, Illinois distributorship and president of ProStuff LLC. "Today, we're confident that the design features and performance of our starting gate are unique and allow them to outperform any other in the world. This equipment is in use at racing facilities in 24 countries on every continent except Antarctica — and that includes many Olympic training facilities." With Parker's support and cooperation, Barker has been instrumental in establishing a worldwide standard based on ProStuff designs.

The ProStuff starting gate systems are built using Parker components including a pneumatic ram, FRLs, exhaust valves, a custom accumulator constructed using Parker's rigid aluminum IPS profiled shapes, hoses and connectors and industrial grade shock absorbers. Barker also developed proprietary electronic controls and safety hinge devices for use with the gates. Gate doors and ramps on single gate systems for individual training are framed by Parker's Industrial Profile Systems — extruded aluminum sections designed to support automated equipment in factories. Several world champions attribute their success, in part, to training with the ProStuff ProGate.

"Our design addresses the concerns of riders and race operators for consistent performance, safety, durability and low noise operation," said Barker. Consistent performance and safety go hand-in-hand in a race where riders anticipate the start signal and actually begin moving milliseconds before the gate falls. In many BMX races, early anticipation results in riders going "over the top" — stuck on the upraised edge of the start gate — or worse, falling under the gate as it drops to start the race. At the 2005 BMX World Championship in Paris, 40 percent of the race starts had riders going over the top using a competitive system. In the 2006 event, in Sao Paulo, Brazil, using ProStuff starting gates, only two riders in 3,970 starts got ahead of the gate drop. The automated start cycle of ProStuff gates, from "ready" to "drop" positions varies by 10 milliseconds or less. Other systems typically vary 60 to 120 milliseconds — enough time to throw off top world class competitors.

"Besides the improved safety, we had no breakdowns or malfunctions in all 3,970 drops of the gate at the Sao Paulo Worlds," Barker noted. "In many contests where heavier steel gates are used, the repair welder is on the starting line nearly as often as the riders to fix gates and ramps that literally beat themselves to pieces." Several elements, from basic design geometry to light weight materials and an adjustable "cushion" stop for the cylinder rod combine to make this high performance reliability possible.

The last ⅝ inches of rod travel on the Parker air cylinder, or ram, can be cushioned by exhaust air compressed in the cylinder rod end by Parker cushion valves. The rod extends rapidly, using pressurized air from its attached accumulator, to push the gate forward on each race start. Unlike self-destructing "bang-into-the-ground" systems, ProStuff gates can be modulated with software and a single adjustment screw on the side of the air ram to provide a pneumatic cushion that stops the free-fall of the gate. The cushion kicks in as the industrial grade Parker shock absorbers contact the gate at the end of its travel.

(Continued on page 43)

The Importance of Dewpoint when Specifying COMPRESSED AIR SYSTEMS for Medical Air

BY DR. CHRIS J. DUFFELL AND MARK J. WHITE, DOMNICK HUNTER LTD, UK.

Desiccant Air Dryers Typically Produce Dewpoints to -40 °F or -94 °F

Introduction

The most abundant contaminant in any compressed air system is water. This can be in either liquid or vapour form. Atmospheric air is already very wet, and becomes saturated when compressed. This water vapour will condense when the temperature drops, after the compressor, and will damage air receivers, pipework and equipment. For this reason coalescing filters and then dryers are used to remove the bulk of this water.

Often thought of only as an oil removal filter, coalescing filters are probably the most important purification equipment in a compressed air system. Designed to remove aerosols (droplets) of oil and water, they also have the additional benefit of removing solid particulate to very low levels (as small as 0.01micron in size). Note: adsorption and refrigeration dryers are designed to remove water vapour and not water in a liquid form; they require the use of coalescing filters to work efficiently.

Even with bulk liquid removed, moist, saturated air continues to cause damage and corrosion in the compressed air distribution system. Untreated compressed air is 100% saturated with water vapour and any temperature drop within the system will cause this to condense into liquid water, leading to system damage and equipment failure.

The most common mechanisms of water vapour removal are adsorption (desiccant) and refrigeration. Desiccant dryers remove the water vapour by adsorbing the water molecules onto the surface of small beads that have an exceptionally large surface area. As a result, very low outlet water levels can be achieved measured as pressure dewpoint. Typical pressure dewpoints are -40 °C or -70 °C (-40 °F or -94 °F), which means for water vapour to condense into a liquid, the air temperature would have to drop below -40 °C or -70 °C (-40 °F or -94 °F), respectively.

THE IMPORTANCE OF DEWPOINT WHEN SPECIFYING COMPRESSED AIR SYSTEMS FOR MEDICAL AIR

> "A pressure dewpoint of better than -26 °C (-15 °F), will inhibit the growth of micro-organisms."

Refrigeration dryers cool the air to allow the vapour to condense, and the bulk liquid is then drained away. They are ideal for producing general purpose compressed air and can provide water vapour removal with pressure dewpoints of around +3 °C, (+37 °F). Refrigeration dryers are not suitable for installations where piping is installed in ambient temperatures below the dryer dewpoint as the remaining water vapour will condense.

Two key areas of concern that are affected by the dewpoint of the air supplied, are the growth of micro-organisms, and the performance/life of granular filter media and catalysts. These specific subjects are addressed in the following sections.

Micro-Organism Growth

Warm, moist air provides an ideal environment for the growth of micro-organisms. Bacteria and viruses are also brought into the compressed air system through the compressor intake. Ambient air can typically contain up to 3,850 micro-organisms per cubic metre[1]. If only a few organisms were to enter a clean environment, sterile process or distribution system, enormous damage could be caused that not only diminishes system integrity, but may cause serious physiological detriment. A pressure dewpoint of better than -26 °C (-15 °F), will inhibit the growth of micro-organisms within the compressed air system; however, a refrigeration dryer cannot achieve these low water vapour levels, so a desiccant dryer must be used for breathing and medical air applications.

Sterile Air Filters

Activated Carbon Filter Performance

Oil vapour is simply oil in a gaseous form and will pass through a coalescing filter just as easily as the compressed air itself. Therefore, oil vapour removal filters must be employed as these provide a large bed of activated carbon adsorbent for the effective removal of oil vapours to provide ultimate protection against oil contamination. However, these granular media are "poisoned" by water vapour as adsorption sites are preferentially occupied and oil vapour removal is hindered. As a result, the performance and service life of activated carbon filters is greatly reduced by the presence of high levels of water vapour.

Catalyst Performance

In medical and breathing air catalysts are often used to remove traces of any harmful gases such as carbon monoxide and NOx. These catalysts work by temporarily adsorbing the toxic gas onto their surface and allowing time for the oxygen in the air to combine with them forming harmless by-products. For example:

$$2CO + O2 \rightarrow 2CO2$$

Although an asphyxiant at higher concentrations, carbon dioxide is not toxic and is preferable to carbon monoxide.

Tests performed at domnick hunter have shown that the performance of these catalysts is greatly affected by the presence of water vapour. A new catalyst element that has been vacuum packed can remove an inlet challenge of 65 ppm carbon monoxide in air down to the European Pharmacopoeia[2] limit of 5ppm for breathing air. However, a catalyst unit was left exposed to the atmosphere to allow saturation with water vapour and then tested in the same way. The "aged" cartridge could only catalyse 15ppm carbon monoxide as an inlet challenge before reaching the 5ppm limit on the outlet.

Other tests showed that using air with a dewpoint of -40 °C (-40 °F) did gradually improve the performance of the catalyst, as the water vapour was slowly desorbed over time.

Conclusions and Discussion

This paper has highlighted the need for dewpoints better than -26 °C (-15 °F), to avoid growth of micro-organisms, and better than -40 °C (-40 °F) for increased granular filter performance and life within compressed air systems for medical air.

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2. Medicinal Air, European Pharmacopoeia, Fourth Edition, 2002.

For more information, please contact Mr. Tony Hergert, Market Development Manager, domnick hunter, Division of Parker Hannifin Corporation, tel: 704-972-1800, email: tony.hergert@parker.com

BSA LIFESTRUCTURES

Compressed Air Best Practices interviewed Robert G. Beierle, P.E., Senior Associate of BSA LifeStructures.

Robert Beierle, P.E., BSA LifeStructures

Good afternoon. Please describe BSA LifeStructures and what businesses it is in.

Good afternoon. BSA LifeStructures is a full-service architectural and engineering firm specializing in healthcare, higher education and technology facilities. We employ close to 260 associates and are established in 2 locations; Indianapolis and Chicago. We were founded more than 30 years ago. Our strongest focus is on hospitals and university facilities.

What kind of hospitals do you work with?

We work with every kind of healthcare facility you can imagine. We design brand new hospitals from scratch and we also design additions to existing hospitals. We have recently, for example, done a lot of additions to hospitals that have acquired the capability to do MRI and CAT Scan work. We also do many renovations in hospitals that need to upgrade their installations and bring them up to code. This often includes medical gas systems.

How does BSA LifeStructures get involved with compressed air systems in hospitals — what is your role in the process?

We design medical air systems for hospitals. We have worked for years with compressed air systems and are very familiar with the NFPA guidelines. Our role in the process depends upon the project. When doing an addition to a hospital, we will evaluate the existing compressed air system to see if more capacity is needed. Some hospitals call us to come in and see if their medical gas system is up to code (the current NFPA code). The compressed air system is an important part of this survey. We will visit the hospital and do a survey. Some of these projects result in a complete system replacement and some result in the addition of some specific components, like CO Monitors or Dew Point Monitors.

How do you decide how much air is needed?

BSA LifeStructures does engineering work for hospitals to create a medical gas system that suits their needs. Our engineering and architectural teams will meet with each of the different types of occupancies in the hospital to determine their needs with medical gases. How many beds do they have? How many respirators? How many incubators? A key question is, what is the “simultaneous use factor” that they want to use in that area of the hospital? We recently, for example, worked with a 75-bed neonatal intensive care unit. They asked us to size their occupancy area for 100% simultaneous usage. This meant that they wanted to be able to support all 75 beds, at the same time, if necessary. We will then calculate the compressed air demand, in scfm, per bed and multiply it times the usage factor.

We offer the nurses and doctors advice on the usage rates we typically see in their areas, but it is ultimately their decision. We will also speak with the engineering and facility management, at the hospital, to hear their experience with the different occupancy areas. At the end of these meetings and discussions regarding medical gas usage, we will be able to create a demand curve for compressed air. We can then proceed with preparing drawings and specifications for equipment and pipelines.

In a hospital, because there are so many types of areas, the simultaneous use factor gives us a demand curve. As an example, the 75-bed NICU could have a capacity of 75 infants, so we sized for 100% simultaneous use factor. We spend a lot of time in the design phase speaking with nursing staff, doctors involved in the unit, and with engineering/facility services to get input on the use factor of this area of the hospital. This is what our engineering and architectural teams do in many meetings.

Which areas in a hospital see a lot of compressed air use?

The biggest area is in the neonatal intensive care units. Infants are in incubators and are completely reliant upon the supply of breathing air. The pediatrics areas, particularly in winter, also require the use of many respirators to assist children with the flu or with asthma. A number of hospitals are also putting in contamination wash-down areas to cleanse people who have become exposed to a hazardous contaminant. They need an area where they can hose these patients down while protecting themselves with a hood, body-suit and a respirator.

What kinds of air compressors does BSA LifeStructures recommend to hospitals?

We started, years ago, with the Nash oil-free air compressors and have been using, over the past few years, oil-less reciprocating air compressors.

We've just been introduced to the new oil-free rotary-tooth air compressors and think it will be our next step. The NFPA 99 Code approved rotary compressors as an oil-free technology, recently, and we like the reduced maintenance this technology offers. The only moving parts are the lubricated bearings and they can run a lot longer with only doing the recommended oil change on the gear box. This is less maintenance than with the oil-less reciprocating compressors, where the manufacturers recommend a "tear-down" every 20,000 hours to check the pistons, rings and bearings. We have a lot of hospitals whose maintenance departments have been reduced. Some surgery centers don't have their own maintenance and have to outsource it. All of our customers are looking for ways to reduce maintenance requirements.

We also recommend scroll compressors for smaller applications. They are compact and are easy to offer in duplex and multiplex configurations.

The sizes of the packages vary from job to job. We run from very small projects to very large. The neonatal intensive care unit I referred to earlier required six (6), twenty (20) horse-power air compressors.

BSA LIFESTRUCTURES

Medical compressed air systems are often used in intensive care units.
Dan Francis, Mardan Photography

What kinds of air dryers does BSA LifeStructures recommend to hospitals? Why?

Technology has also evolved with compressed air dryers. We will size a compressed air dryer, which can handle the combined installed capacity of the air compressors. This ensures the hospital of air treatment under peak usage conditions. We used to recommend refrigerated air dryers, but we now recommend desiccant air dryers. All of the compressor packagers have moved in the direction of duplex desiccant air dryers for the primary and standby drying systems. NFPA 99 changed the dewpoint requirement to 32 ºF and the industry has moved in this direction. If a hospital has serious budgeting issues, we sometimes recommend a refrigerated dryer as the standby drying system behind a desiccant air dryer.

What operating pressures are common in hospitals?

Operating pressure is normally at 55 psig delivered to the hospital. We allow for a five-pound (5 psig) pressure drop through the piping and deliver air at 50 psig to the outlets. The air compressors are normally delivering compressed air at 100 psig to the compressed air dryers. After the dryers, a set of duplex regulators bring the air pressure down to 55 psig.

Why is the air compressed at 100 psig for a 50 psig application?

That is a good question. The answer lies with the capabilities of the oil-free air compressor technologies that we have available to meet the NFPA Code. I'm sure energy savings could be achieved if we compressed the air at a lower pressure.

What can the compressed air industry do to help hospitals?

The industry is doing a good job of coming out with new technologies — like this new rotary tooth compressor. We are seeing advancements in designs, which offer benefits to the hospitals that are real — like reduced maintenance. The scroll compressors were introduced to hospitals, only a few years ago, and they have also provided reduced maintenance benefits. The air drying systems have also evolved from refrigerated to desiccant air dryers. CO and dewpoint monitoring is seeing better compliance every year. The industry has done a good job of increasing awareness of this issue. Hospitals now go to the equipment vendors and have gone ahead and upgraded their systems on their own by having these monitors installed.

What are the main issues facing hospitals with compressed air systems?

Older facilities are wearing out their equipment and need to replace it. They are always fighting fund allocation issues to get it done. It gets put off and put off until it has to be done. These situations can be hard to deal with. You have to replace all the air compressors — but you can't turn off the supply of compressed air to the hospital, while you do it! Sometimes the hospital can create more room in the compressor room by removing other equipment. We can then bring in the new equipment while the old equipment is still running. Sometimes we have to bring in a rental air compressor to supply the hospital while we do the project to remove the old and bring in the new equipment.

Another major issue we face is how to source clean ambient air for the air compressor intakes. The air compressors are usually located in the basement and we have to run pipe two to three stories up to the roof to access clean ambient air. On the roof we compete with the boiler stacks, which are discharging flu gases, with air handling intakes, and with helipads! We also have to take into consideration wind currents and what the wind brings with it. We are currently working on a system that is four blocks away from the smokestacks of an industrial facility. We have engaged a firm, whose expertise is with wind currents, to take all of these factors into consideration and to advise us on where to locate all of these things on the roof of the hospital. As you can see, it isn't so easy to access clean ambient air.

Thank you BSA LifeStructures for your insights.

For more information, please contact
Mr. Robert Beierle, BSA LifeStructures,
email: rbeierle@bsalifestructures.com,
tel: 317-819-7878, www.bsalifestructures.com

NFPA 99

MEDICAL AIR DEWPOINT REQUIREMENTS

By Compressed Air Best Practices

The NFPA 99 (National Fire Protection Agency) Standard for Healthcare Facilities (2005 Edition) is the current Code by which Healthcare facilities in the U.S. design their compressed air systems. The NFPA 99 Standard covers many requirements for medical gases, with compressed air being just a component of the Standard. To understand the complete scope of the Standard, including information on air compressor requirements, it can be purchased at http://www.nfpa.org/catalog.

Healthcare facilities have two separate compressed air systems that fall under the Code of NFPA 99. They are the Medical Air and Instrumentation Air Systems. They are two completely independent systems that are not allowed, by Code, to be connected. Both systems have specific dewpoint and air quality requirements. Both systems are monitored by specific local and master alarm systems. This article discussed the Medical Air System and drying technologies used to meet the Standard.

Medical Air Systems

There are two types of Medical Air Systems. The definitions of Level 1 and Level 2 Systems, below, are from the NFPA 99 Code:

> Level 1 Medical Piped Gas and Vacuum Systems. Systems serving occupancies where interruption of the piped medical gas and vacuum system would place patients in imminent danger of morbidity or mortality
>
> Level 2 Medical Piped Gas and Vacuum Systems. Systems serving occupancies where interruption of the piped medical gas and vacuum system would place patients at manageable risk of morbidity or mortality

Medical air is produced, by medical air compressors, at 100 psig air pressure. This air is introduced into medical air dryers and filters at this pressure. The air is then pressure regulated down to 55 psig and distributed to occupancy areas for Level 1 or 2 applications. A pressure drop, in the piping distribution, is accounted for and the end use pressure is 50 psig.

NFPA 99 MEDICAL AIR DEWPOINT REQUIREMENTS

Medical Air Dewpoint

Both Level 1 and Level 2 Medical Air have the same dewpoint specification. The NFPA 99 Standard states:

"The medical air dryer shall be designed to provide air at a maximum dewpoint that is below the frost point (0 ºC (32 ºF)) at any level of demand."

The phrase "at any level of demand" is important. The NFPA 99 Standard goes on to state that dryers must be sized to deliver the specified dewpoint at peak calculated demand. Peak calculated demand, therefore, represents the full load conditions for which a dryer must be sized. This enables dewpoint quality to be maintained even when a crisis hits a hospital and all air consuming devices are in use.

> "When dewpoint alarms became mandatory, in the NFPA 99 Standard, many hospitals began experiencing daily alarms."

The reality in hospitals is that actual demand is typically only 33% of peak calculated demand. The estimate of 33% is unofficial, yet is agreed upon by many industry experts. This means that the air dryer, which must provide dewpoint at "any level of demand," must be able to provide a dewpoint of 32 ºF at 33% load.

Medical Air Dewpoint Alarms

Medical air quality monitoring requirements are very specific in the NFPA 99 Standard. They are outlined as follows:

> Medical Air Quality Monitoring. Medical air quality shall be monitored downstream of the medical air regulators and upstream of the piping system as follows:
>
> 1 Dew point shall be monitored and shall activate a local alarm and all master alarms when the dew point at system pressure exceeds +4 °C (+39 °F).
>
> 2 Carbon monoxide shall be monitored and shall activate a local alarm when the CO level exceeds 10 ppm.
>
> 3 Dew point and carbon monoxide monitors shall activate the individual monitor's signal at all master alarm panelsif the monitor loses power.

Medical air dewpoint, therefore, is monitored at both the dryer's control panel (at 100 psig pressure) and downstream after the pressure regulators (at 50–55 psig pressure). Any presence of moisture, in the pipelines, will trigger the downstream alarms. There are different types of dryers used to eliminate the presence of moisture, refrigerated, membrane and desiccant-type dryers. All are capable of complying with the NFPA 99 Standard while facing different challenges to do so.

Refrigerated Air Dryers

Refrigerated-type compressed air dryers can provide pressure dewpoints that comply with the NFPA 99 specification of 32 ºF (0 ºC). They will first supply a pressure dewpoint of 38 ºF (3 ºC) at 100 psig pressure. Hankison refrigerated air dryers, a brand owned by SPX Corporation, have long been used for medical air. "When air with a 38 ºF (at 100 psig) pressure dewpoint is regulated down, the pressure dewpoint becomes 25.9 ºF at 55 psig and 24.1 ºF at 50 psig," says **Timothy J. Fox**, Manager, Research and Development, **SPX Dehydration & Process Filtration.**

Refrigerated air dryers operate on the principle of using a refrigeration circuit to cool compressed air, in a heat exchanger, and provoke the condensation of moisture in the air. The condensed moisture is then separated, from the compressed air stream, by a moisture separator inside of the dryer. The compressed air now leaves the refrigerated air dryer at the design dewpoint of 38 ºF (3 ºC) at 100 psig pressure.

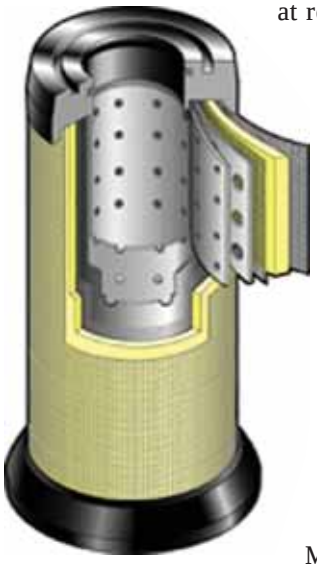
Moisture Separators in Refrigerated Air Dryers

The moisture separator, obviously, plays a critical role in the dryers' ability to dry the air. A common problem, with some refrigerated air dryer designs, is that the moisture separator only performs, to a high degree of effectiveness (90–99+% moisture removal), when experiencing a full, 100% load. Moisture separators, in refrigerated air dryers, have varying designs and degrees of effectiveness — particularly under the partial load conditions of 33% commonly experienced in hospitals. This is why the NFPA 99 Standard specifically says "the dryer will provide the specified dewpoint at any level of demand." There are many types of moisture separators used inside of refrigerated air dryers. A few are listed below:

1. Mechanical Centrifugal Separator
   a. Velocity versus non-velocity sensitive design
2. Integrated/Heat Exchanger Separator
3. Combination Filter/Separator

The traditional Centrifugal Separator can have a problem with a lack of air velocity at loads of 33%. These "velocity-sensitive" separators use centrifugal action to throw moisture droplets out of the air stream. Under partial load conditions like 33% of load, there is insufficient air velocity to force the moisture droplets out of the air stream. The moisture droplets simply are re-entrained into the air stream and continue downstream of the dryer.

Some heat exchangers, inside of refrigerated air dryers, have a compartment that acts as a bulk separator of liquids. Effective at full loads, some of these separators have been known to see reduced performance efficiency, at reduced loads.



Hankison Grade 9 Filter/Separator (Image Courtesy of SPX Dehydration & Process Filtration)

There are some designs, of mechanical separators, which do create enough turbulence to provide effective separation in low-flow conditions. These "non-velocity sensitive" designs were created with low-flow conditions in mind. Different compartments and chambers are added to the centrifugal action, to ensure the separation of the moisture droplets. Some manufacturers, like domnick hunter — a division of Parker Hannifin, will even offer an end user a third-party certification of effectiveness at low-flow conditions. "End users are glad to receive third-party validation from Lloyd's Register, that the domnick hunter moisture separators perform at low load conditions," says **Tony Hergert**, Market Development Manager at **domnick hunter**.

NFPA 99 MEDICAL AIR DEWPOINT REQUIREMENTS

SweepSaver™ Membrane Air Dryer (Image Courtesy of SPX Dehydration & Process Filtration)

Another effective design is the "filter/separator." This is a separator design that flows the air through a two-stage filter element. The air flows through the element from the inside to the outside. The first stage is made up of perforated stainless steel and blocks the larger droplets of moisture. The second stage is made up of coalescing filter media and this is where the finer droplets are coalesced. This second stage is 99% effective at low-flow conditions, such as those seen in hospitals.

Membrane Air Dryers

New technical advancements with membrane air dryers are causing industry experts to re-examine this technology. Membrane air dryers can deliver customized dewpoints to meet the NFPA 99 Standard, ranging from -20 ºF to +32 ºF. They also come in very small, "filter-like" housings, which make for easy installations. Historically, the negative factor about membrane air dryers has been that they used a lot of purge air to sweep the moisture out of the air stream. Recently, SPX Hankison introduced a new SweepSaver™ membrane air dryer product line, which reduces purge air requirements. The product uses a demand signal to open and close an integrated two-way valve to control the sweep air. This new purge control capability, combined with its inherent simplicity and compactness, makes membrane dryers a possible technology for the future.

Desiccant Air Dryers

Another type of compressed air dryer, the desiccant-type dryer, has become the dryer technology of choice in healthcare facilities. Over the past fifteen years, the desiccant air dryer has replaced the refrigerated air dryer. A NFPA 99 Committee Member, **Mark Allen** of **BeaconMedaes**, estimates that, "Medical air systems use desiccant air dryers 90% of the time." The primary reason for this change was the installation of many refrigerated dryer designs, over the years, which do not have moisture separators which are effective at 33% load conditions. When dewpoint alarms became mandatory in the NFPA 99 Standard, many hospitals began experiencing daily alarms. In most cases the alarms would activate overnight when there was very little demand for compressed air. During the day with higher levels of demand, the alarms would work well.

Desiccant air dryer designs are more expensive than refrigerated air dryer designs — but they are not negatively affected by low-flow conditions. Compressed air passes through a bed of adsorbent material (normally activated alumina), which removes the moisture from the compressed air stream. Industrial desiccant air dryers are normally sized to produce dewpoints capable of -40 ºF and -100 ºF pressure dewpoints. The traditional design is a twin-tower design with two pressure vessels holding the adsorbent material. This design is very effective in providing the required dewpoint at all flow rates.

Some newer designs, of desiccant air dryers, have gained popularity in the healthcare industry. Some designs continue using the twin tower design but have been designed to provide a 14 ºF (-10 ºC) pressure dewpoint. An example of this is the BeaconMedaes Lifeline Dryer. Designing a twin tower desiccant air dryer to meet the NFPA 99 Standard for dewpoint has reduced the size of the towers and therefore the cost of the unit. These dryers also integrate dewpoint controls and alarms required by NFPA into the dryer package to further reduce system costs.

Another popular design is the "modular-type" desiccant air dryer. Designed to provide dewpoints of -4 ºF, these "modular" desiccant air dryers are very compact and easy to get through doorways and into elevators. This is often a significant issue for healthcare facilities who often have their compressed air equipment in areas with difficult access.

Modular-type Desiccant Air Dryer
(Image Courtesy of domnick hunter)

Medical Air Dewpoint Summary

Level 1 and Level 2 Medical Air Systems are required by the NFPA 99 Standard to provide a 32 ºF pressure dewpoint at supply pressure. Medical air is produced and dried at 100 psig pressure and then regulated down to 55 psig for distribution in the pipelines. Both local and master dewpoint alarms, per NFPA 99, will activate when pressure dewpoint exceeds 39 ºF. Refrigerated and desiccant air dryers are both technologies capable of achieving the pressure dewpoint requirement at the supply pressure of 50–55 psig. The low-flow characteristics of hospitals, normally 33% load, makes it a challenging application for many refrigerated dryer designs due to issues with the moisture separators. As a result, the healthcare market has moved towards desiccant air dryers and is considering new technical advancements with membrane air dryers. These technologies are providing more reliable dewpoint performance at partial loads with new designs that reduce cost and size issues experienced in the past.

To acquire the NFPA 99 Standard, please visit: http://www.nfpa.org/catalog.

For more information on this article, please contact Rod Smith at tel. 251-680-9154, or email at rod@airbestpractices.com.

Expertise Quantify Visualize

The EQV Marketing Plan for COMPRESSOR DISTRIBUTORS

BY ROD SMITH

A company whose business is focused on selling and servicing air compressors, has not historically needed to invest many dollars in marketing to have a successful company. This situation may have changed, as changes with customers and with the competitive landscape have impacted the compressor market. Customers have reduced the maintenance and engineering departments and it is increasingly difficult to arrange meetings and depend solely upon a good sales force. Multinational corporations have consolidated the compressor industry and have the deep pockets and international structures to market to customers through a variety of strategies. With small marketing budgets, little supplier support and little marketing experience, many independently owned compressor distribution companies are faced with a marketing challenge to protect market share and grow it. An **EQV Marketing Plan** can address this challenge in three stages:

Stage 1: Identify Your Market **Expertise**

Stage 2: **Quantify** This Market in Terms of Potential Customers

Stage 3: Create a Marketing Strategy that Employees Can **Visualize**

Fewer Customers with Less Time

When I began my career with compressed air equipment, I was told "you better learn this equipment inside and out because we have customers who will know more than you if you don't." My tutor painted a picture for me of a maintenance manager at a factory, whose full-time job it was to know how to keep the compressed air system in perfect working order. The maintenance manager, however, didn't last long in his job. In the great "leaning out" years of the 1980s and 1990s, maintenance staffs were greatly reduced. It also became hard to get time to meet with them. Then came the "off-shoring" of U.S. industry, which we saw in 2001–2004. Unless you live in the Southeastern part of the U.S., *most compressor distributorships have fewer customers to sell to and fewer people at those remaining companies to contact*. This results in more intense competition for the time and attention of customers.

Compressor distributorships sell to an almost infinite number of customer types. "General industry" is the answer I normally receive when I ask people who they sell air compressors to. Gaining a quantified understanding of what specific industries, by SIC Code, are buying products is very difficult and rare to find at a distributorship. *This is a significant marketing disadvantage*.

Today's maintenance and engineering departments, at U.S. factories, are skeleton crews compared to years past. They get the job done by outsourcing and being efficient vendor managers. Compressed air systems are no longer maintained in-house. This change has been great for the service business of compressor distributorships. Strong relationships exist between the customer and the service department of the compressor distributor. The customer depends upon the service provider to keep his system up and running, without which he cannot manufacture product. Because of this strong service relationship, *it is very difficult to convince customers to change compressor suppliers.*

The compressor sales engineer, however, does not have a strong relationship with the normal customer. When one compares that relationship with the one enjoyed by a sales engineer for pumps or pneumatic products, it isn't even close due to the nature of the business. Pumps and pneumatic products are sold every month, to the same customer, so these sales engineers visit every week. A compressor sales engineer may only find demand for air compressors once every five years at a specific customer. Time to visit is dedicated accordingly. *The relatively weak sales relationships with air compressor customers can present an area of opportunity for marketing.*

Expertise Quantify Visualize

The customer today treats compressed air primarily as a utility. It is a power source and he has become increasingly aware of the costs required to run it. The compressed air industry has done a good job (although there is still a lot of work to do) on educating the customer on ways to optimize compressed air systems. Most customers, however, are naturally interested in their industry, the products *they manufacture and the "Lean Manufacturing" processes and equipment required to produce their products.*

Customers have also seen their industries consolidate. Major corporations have snapped up independently owned factories or have purchased the smaller corporations with 3–5 factories. *There are fewer decision makers today on purchasing air compressors, and many wield multi-factory influences.* A career of rising popularity is that of an "Energy Engineer" at a corporation. The person's responsibility is to purchase capital equipment for the plants, which will reduce the overall energy consumption of the corporations' factories. This is a great strategy for corporate America to reduce energy costs. It's often not so great for a locally operated compressor distributorship. A local compressor distributor often finds that the decision to buy an air compressor was made "out-of-state" or out of their territory.

Competition

A compressor distributorship faces more intense competition than ever before, particularly from the multinational air compressor corporations who open up "factory stores" in their territories. The "factory stores" are supported by tremendous name brand recognition, powerful marketing budgets managed by marketing professionals at corporate and strong new product development programs.

Some corporations who manufacture air compressor, invest significant marketing dollars in national and regional marketing and with promotional activities. There is a well-rounded marketing mix with active magazine advertising and trade show. Because they invest in "factory stores" there is also a significant investment in customer databases.

Some manufacturers do deploy active, Oracle-based, direct marketing databases from which all customers (and potential customers) are tracked on a national basis. Tailored marketing plans for specific industries are executed with customized product packages and promotional programs. *As customers consolidate, this marketing approach by industry is increasingly effective.*

Typical Compressor Distributor Marketing Plans

There are some high-powered marketing programs at compressor distributorships. I know some firms with customized Goldmine databases and successful marketing programs. Most independently owned compressor distributorships, however, are at a significant marketing disadvantage. The distributorship is excellent at selling and servicing high quality products. The company has not invested in marketing and its vendors focus their marketing dollars on product development and product support materials. The responsibility to promote and market the product is left exclusively up to the local distributor by these vendors.

Distributorships who have historically not needed to deploy resources into marketing plans, are left in a difficult situation. Marketing has typically consisted of a newsletter to existing customers, talking about the capabilities of the company. Open houses and training sessions have also been a mainstay over the years. Booths at regional trade shows are also common but of dwindling popularity with the customers who have less time to visit shows. This traditional marketing approach by the vendor and its distributor, has been steadily losing ground to the long-term marketing plans of some corporations, who target specific industries with products and promotional activities.

EQV Marketing (Expertise, Quantification & Visualization)

The best marketing programs I have seen, by compressor distributors, involve focusing in on a specific industry. The compressor company has gained an **expertise** in the customers' industry that translates itself into value for the customer. I have seen this repeated in industries as varied as bakeries, NASCAR racing and commercial printing. Many have worked with their vendors to turn this expertise into a national opportunity for both. The distributorships have **quantified** the industry they are targeting and have very specific approaches to capturing a tremendous market share of this niche. The company can also **visualize** the market opportunity. They can see their market in a database or on a map. It becomes their goal to convert the non-customers and they create a marketing plan to do so.

Stage 1: Identify Your Market Expertise

Stage 2: Quantify This Market in Terms of Potential Customers

Stage 3: Create a Marketing Strategy that Employees Can Visualize

THE EQV MARKETING PLAN FOR COMPRESSOR DISTRIBUTORS

EQV Marketing — Stage 1: Expertise

The first step is to determine what market expertise is in your company. The key here is "market expertise" and not "product expertise." *Market expertise is where you can differentiate your firm from the market.* Most of your competitors are experts in the products, just like you are. Remember, **customers are interested in their industry — not the compressed air industry**. Take some time to discover your market expertise. Ask all your sales engineers and service technicians in writing. Ask them to reply in like form. If they say "food processing" ask them to be more specific. Is it "meat packaging" and if so what knowledge/expertise do they have to offer meat packagers? After you have your responses, this could provide the background for some interesting meetings with these employees to dig a little deeper.

Look at the products your company sells. Do you sell climate control packages, hospital packages or any other specific products, which go to an obvious market niche? What is your level of expertise with these products and niches versus the competition? Do you have an advantage with your products or a disadvantage? What could your expertise in this niche become (versus the competition) with some effort?

Finally, examine your territory and geography for dominant markets. Most geographies have industries for which they are known. You may or may not be active in these markets. For multi-state compressor distributorships, a strength in one territory might not be transferring itself over into another territory. Perhaps this is an area of opportunity.

At the end of this Stage, you should be getting an idea of some specific markets where your firm adds exceptional value **due to your knowledge of their business**.

EQV Marketing — Stage 2: Quantification

It's of no use (from a business standpoint) to develop an expertise in something that will not pay for the light bill. Quantification, or putting a dollar value, on markets is at the heart of marketing. Real marketing plans begin and end with numbers. Many people think that marketing types are the creative types. Wrong — those are the advertising people executing a marketing strategy. Marketing is about credible numbers.

Knowing the numbers takes work and a commitment by your company. Research is required. We suggest you begin by analyzing who is buying from you today. *In my experience, few companies have a quantified answer for this question.* Re-deploy some resources to take a look at your company's sales, in 2006, by SIC Code. Visit www.osha.gov for the SIC Code listings. Start with the larger categories so you don't go crazy:

1. Split 2006 equipment sales by Division Codes A–J and Major Groups 1–99
    a. Break Division D (Manufacturing) down further into the three-digit Industry Groups
2. Split 2006 service sales by Division Codes A–J and Major Groups 1–99

Please remember to not go crazy with SIC Code classifications. You might quit before you finish. Just get the general idea of where your business is in this first stage.

The split from service revenue may be interesting as well. Service is normally the main profit center. Can you find a company expertise that differentiates your firm and will result in strong service revenues? Do you see areas that should be stronger — given the market you live and work in?

When the analysis is complete, compare the numbers to the "Expertise" evaluation you did before. Does your market expertise show up in the numbers? It could be that this expertise represents an untapped potential for future growth for your company.

To complete Quantification, an understanding of your market's SIC Code split would be very valuable. How many factories/customers are there in your market? What is the relative value of the equipment they would buy? How does the market mix match up with your company's sales split? Now it is time to act on the information.

EQV Marketing — Stage 3: Visualization

Most compressor distributors do not, and will not, have a staff of three marketing analysts led by a Marketing Manager. Marketing will be done by general managers, sales managers and inside customer support personnel with some marketing experience and/or education. Visualization is about getting the company energized about contributing to this new marketing program.

In Stage 3, you have identified your Expertise in up to six markets and have Quantified their relative value. You now select 2–4 Markets to focus on. Your Marketing Plan will focus on:

1. Building a Customer AND Non-Customer Database of these Markets
2. Methods of Communicating Your Expertise to These Markets
3. Positioning Your Company to Convert Non-Customers to Customers the Next Time They Buy an Air Compressor

Build a Visual Database Sales People Can Use

The sales force and a strong inside person with database management skills will be the keys to building a market database. The sales force is the best source for quality names of customers. Make it easy for them (and incentivize them) to provide the Company with the names of non-customers and customers within this area of Market Expertise. I recommend using Microsoft Excel spreadsheets, which are easy to use. Then use Microsoft MapPoint so that the sales force can visualize, on a map, the customers and non-customers. This also makes it easier to "stop by" en route to a sales call.

Create a Visual Market-Tailored Communications Plan

Once all your "meat-packagers" (both customers and non-customers) have been identified, it is time to let them know of your market expertise. The goal is to enter this community of "meat-packagers" as one of them. Each communication plan will be different but some options are:

1. Ask one or two of your "meat-packager" customers to give a presentation about a current topic in meat packaging. Invite the market to attend this ½ day seminar at a hotel or at your business
2. Ask a prominent supplier of meat-packaging equipment to come give a seminar on the latest technologies to your target market
3. Begin sending a quarterly newsletter (electronic or hard-copy) with a focus on your expertise in meat packaging.
    a. If you have three markets — rotate the monthly newsletter so that your market hears from you once a quarter

Positioning Your Company as a Value-Adder

The idea here is to talk less about air compressors and speak the language of the customers. This is what we have tried to do at *Compressed Air Best Practices Magazine*. The Industry Focus, in each edition, makes the information relevant to customers. Soon you will be invited to "their" industry association events and chapter meetings. You are now becoming part of their world and will improve your understanding of what is important to them. The next time one of these meat packagers needs to buy an air compressor, your company will be on their mind as a "value-adder."

This article assumes your firm is a top-tier air compressor distributor. We assume that, given the opportunity, your firm can provide the customer with superior compressed air system consulting and with superior products and service support.

As mentioned in our Customer Profile, customers buy air compressors infrequently. We reviewed why the strong service relationship makes it hard to convince a customer to change suppliers. Often you don't even find out about the new air compressor projects of your non-customers. When you do, how often is your quote simply something the Purchasing Manager must have to show due diligence?

Summary

The whole idea here is to proactively prepare your non-customers to view your firm as a value-adder before they need to buy an air compressor. They may switch their service business to you first! With small marketing budgets, little supplier support and little marketing experience, many independently owned compressor distribution companies are faced with a marketing challenge to protect market share and grow it. An **EQV Marketing Plan** can address this challenge and enable your firm to differentiate itself in the highly competitive air compressor market.

For more information on this article or on EQV Marketing Plans, contact Rod Smith at email: rod@airbestpractices.com or tel: 251-680-9154.

Rod Smith is the former Vice President of Sales & Marketing for Hankison, PPC, & Deltech (divisions of SPX Dehydration & Process Filtration) and for Quincy Compressor (a division of EnPro Industries). Rod is currently the Publisher of Compressed Air Best Practices Magazine.

> "The best marketing programs I have seen, by compressor distributors, involve focusing in on a specific industry."

Expertise Quantify Visualize

BEACONMEDÆS
COMPANY PROFILE

Compressed Air Best Practices interviews Mark Allen (Director of Marketing) of BeaconMedæs.

James J. Tapkas, President, BeaconMedæs

Good morning! How long has BeaconMedæs been in the medical business?

Our roots are the deepest in the entire medical gas industry. Our heritage includes such famous, familiar names as Ohio, Ohmeda Medical Engineering, Medishield, Medaes, Fluid Energy, NASH, Beacon and Puritan Bennett. In our portfolio are the very best known medical gas products: Lifeline® medical air and vacuum, Lifeline® medical air dryers, Diamond outlets, Medipoint alarms, Gem 10 outlets, Diamond Care outlets, Series B outlets, MEGA alarms, MedPlus medical air and vacuum, Reliisys medical air, Total Alert alarms, Envirom medical trunking and headwalls and Gemini outlets.

Our roots go back to the 1940s, when the medical air industry began. We have had many ownership changes, so for space we'll skip to the recent past. In 2003, Hill Rom determined that it was no longer in their strategic interest to be in the medical gas equipment business, and Beacon Medical and Medæs were enabled to join into one company, whose name BeaconMedæs, was chosen specifically to recall this heritage and to build on that strength.

Beacon Holdings Corp, the parent company of BeaconMedæs and Medaes Ltd., was purchased in 2006 by Atlas Copco U.S.A. Holdings. As a result of the acquisition, BeaconMedæs will become the global competence center for medical solutions within Atlas Copco. This new arrangement brings additional product development expertise, powerful global brand recognition and the extensive international sales and service distribution network of Atlas Copco to further fuel the global growth of BeaconMedæs.

Medical gas is our only business and we aim to remain the world's most often specified brand.

BEACONMEDÆS®

A company within the Atlas Copco Group

How is the business structured? What is relative importance of compressed air versus vacuum and pipeline equipment?

We are the market leader in medical gas systems. It's important to emphasize that our customers look to us to provide complete systems — not just air compressors or vacuum pumps or outlets. We do have product managers and engineers with technology specialties, but BeaconMedæs makes a concerted effort to keep all employees focused on providing optimal systems.

Our average project consists of roughly 50% pipeline products and 50% source equipment. Medical air typically makes up about 60% of the source equipment portion of the project. While interesting to us as manufacturers, this division is not particularly relevant to the user; however, because all the elements inter-relate to deliver what the user needs, which is of course medical gas and vacuum at the patient bedside.

What is the international presence of BeaconMedæs?

BeaconMedæs has always had a presence in Latin America and in the Middle East. Our new ability to access the worldwide presence of Atlas Copco will make a huge impact on our international business. Atlas Copco brings us 182 customer centers all over the world. Ultimately, we will be promoting our products through all of these customer centers.

How has Medical Air evolved in hospitals?

In the U.S. as an example, the NFPA has taken the view that if your compressor draws in good clean ambient air, the air stays clean through the compressor, is then dried and filtered, when you deliver it to the patient it will be entirely satisfactory. After all, when you went into the hospital that's what you were breathing and when you leave you will breathe it again! Implicit in this approach is making the effort to get intake air from the cleanest source available, which should be tested if there is any question about the purity. It can be a challenge to source good ambient air when your compressor room is in the basement, but the standard mandates that pipes are run as needed to source that clean air.

Under the NFPA Standard, Level 1 Medical Air details this approach. Many other countries have independently reached similar conclusions. Some of these countries include Canada, Switzerland, Finland, Norway, Sweden and Australia. It is simple logic. Start clean and stay clean. The natural basis for this philosophy is that all hospital air compressors must use either oil-free or oil-less technologies.

The BeaconMedæs Scroll Medical Air Package

Many other countries, however, continue to employ a different and older method. They establish a specification and let the user decide how to get there. For this reason, such systems, if not carefully implemented, may be dangerous for the patients. They may take intake air from more or less contaminated areas and usually use lubricated compressors to compress the air. To meet the defined specification for purity, they must load up the system with purification equipment to take out all the contaminants, many of which were introduced in the compression process. If the purification gear is not well maintained or fails, the air delivered to the patient may be contaminated.

BEACONMEDÆS

Company Profile

How have medical air compressors evolved?

Years ago in the U.S., any type of air compressor was allowed for medical air. Very early on, there were several cases where oil was discharged into the pipelines, and some hospitals ended up paying big sums to wash out the pipelines. Oil is a dangerous contaminant, particularly as a main use of medical air is to blend it with oxygen. Many of us on the Committee have had experience with lubricated compressors and the result of using them in medical applications. The NFPA 99 Standards Committee as a result is terrified of oil in medical gas pipelines!

I have been a member of the Standards Committee since 1989. Our next revision will be coming out in 2009.

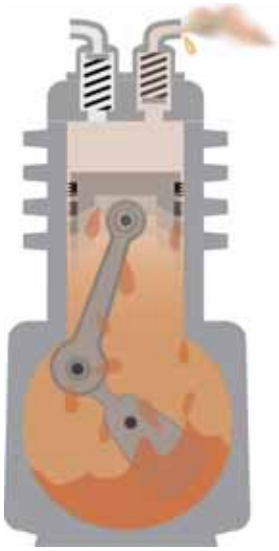
After the oil-lubricated phase, the industry used oil-free compressors, like the Corken and Joy reciprocating machines, with vented distance pieces. BeaconMedæs came out with oil-less reciprocating machines in 1989 and the oil-free scroll compressor in 1999, and now about 60% of our volume is with that technology. Hospitals choose oil-free scrolls because they are very quiet, have low vibration and are very compact. A reciprocating compressor, for example, is at least 10 dba higher than a scroll compressor. Real estate is expensive, in a hospital, and compact packages are valued.

The latest development came in 2005 when the NFPA Standards Committee specifically allowed rotary tooth and screw compressors as an oil-free technology. As a result, we expect the larger packages, above 15 horsepower, to move in the direction of oil-free rotary compressors. We see scrolls continuing to be the preference, due to their compactness, on 15 horsepower and under packages.

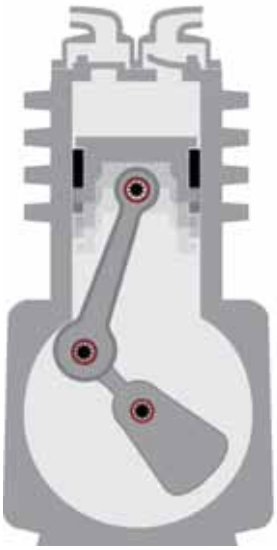
How have air drying systems evolved in hospitals?

There are two dimensions to this question. The first dimension is the issue of where we came from. The old standard said "make sure the air is dry." There was no dewpoint specification or any required dewpoint monitoring. As a result, everyone used the lower-cost technology — the refrigerated air dryer. In the U.S. in 1985, about 90% of hospitals had refrigerated air dryers. Industry insiders knew of problems with water in the pipelines but had no feel for how bad the problem was.

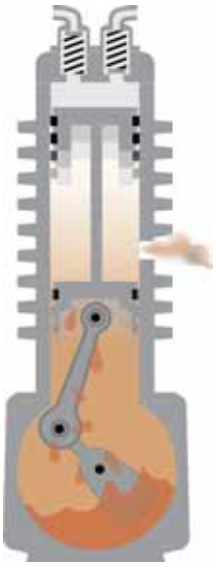
In 1993, as a result of these persistent questions, I was involved with the introduction of a new requirement into the NFPA 99 Standard, which said that dewpoint should be monitored. It also specified an alarm set point and a design dew point for the system — 38 ºF (3 ºC). This dew-point, 38 ºF (3 ºC), was based on what refrigerated air dryers claim to be capable of delivering. Although NFPA 99 is not retroactive, hospitals began installing dewpoint monitors and the results were incredible. BeaconMedæs received huge volumes of phone calls from hospitals



Oil-lubricated air compressors discharge oil into the air stream in liquid and vapor form.



"Oil-free" air compressors have no free oil, and thus effectively eliminate any possibility of oil reaching the air end.



"Oil-less" air compressors control the oil and prevent it from reaching the air end. An important element is the venting of the space between crankcase and air end seals.

concerned and infuriated over the fact that the dewpoint alarms kept going off. The presence of moisture in the air lines was now open for all to see. What made matters worse was that after a service person visited the site and found everything in good working order, the alarms would go off again the very next day! As a result, we found many hospital installations where they had literally unplugged the dewpoint monitors because it was driving them crazy.

Why were the dewpoint alarms going off?

The problem was in the sizing and in the design of the separators, of many (not all) refrigerated air dryers. First, sizing in hospitals is done for peak-calculated demand. Peak-calculated demand represents a worst-case scenario, for instance, where a disaster has occurred and all air outlets are being used in all areas of a hospital. This sizing practice is unfortunately even more necessary today than before as hospitals must have contingency plans for biochemical attacks on the civilian population.

In reality, however, normal medical air demand is normally only one-third of peak-calculated demand. This means that the average air dryer is operating at one-third of its designed capacity. What we discovered was that at one-third load, the average refrigerated air dryer cannot maintain the 38 ºF (3 ºC) pressure dewpoint. The reason was (and is today) that most of the mechanical separators used in the dryers to separate out the condensed water are not capable of effective separation at the low loads. There is not enough air velocity for the centrifugal action of the separator to function. Moisture, therefore, would simply get re-entrained into the air stream and would flow downstream of the dryer, triggering the alarm. A surgery center, for example, which operates 10–12 hours per day, might see no problems while they are working and placing a good deal of demand on the compressed air system. Overnight, the compressed air system then has a reduced level of demand and the moisture separators don't work at the partial load. Moisture is re-entrained into the system and when people show up for work the next day, the dewpoint alarm has gone off.

Why didn't hospitals just use desiccant air dryers?

In the early 1990s, industrial desiccant air dryers had several characteristics that hospital engineers perceived as negatives. The first challenge was price. The cost was twice that of a refrigerated air dryer. The second challenge was purge air. Hospital engineers didn't like purge air primarily because it would force the air compressors to turn on — even when there was little or no demand from the hospital. The third challenge was a perception of higher maintenance — particularly with the valves on a desiccant air dryer. Many industrial desiccant air dryers recommended yearly valve "rebuilds" as part of standard maintenance procedures. For these reasons, the hospital industry was against desiccant dryers and "lived with" the issues they had with refrigerated air dryers.

Our company, BeaconMedæs, had a lot of experience with desiccant air dryers and we decided to address these challenges by designing a desiccant air dryer, specifically for hospitals.

How did you address the challenges?

We set about solving these challenges one by one. Cost was a major issue. The classic industrial desiccant air dryer is designed to deliver a -40 ºF (-40 ºC) dewpoint at CAGI sizing conditions (100 psig, 100 ºF ambient, 100 ºF inlet). We don't need (in fact don't want) too low a dew point. We only need a dewpoint low enough that no liquid will form. Some moisture in the air is actually good for breathing use. So we designed a dryer that can deliver a -12 ºF dewpoint at CAGI conditions. The result was that we were able to reduce the size of the desiccant towers versus the industrial designs. This reduced the cost of the machine and therefore the customer price.

Industrial designs sold purge controls as an expensive "adder" to the standard controller. The "adder" was 50% of the value of a dryer in some cases. Without purge controllers, the purge air drove people crazy because it caused the air compressors to turn on when no air was being used. Our solution was to integrate the dewpoint monitor, required by Code, with the desiccant air dryer and use it for purge control. BeaconMedæs was the first to do this. This again reduced cost and eliminated the concerns created by purge air.

The challenge presented by frequent valve maintenance was solved by utilizing the toughest valve we could find. We found a valve designed for locomotive braking systems. Locomotive brake systems, of course, expose this multi-port, ceramic valve to the dirtiest and most extreme conditions. The valve is designed for 10 million cycles and we placed a 10-year unconditional warranty on it. We call it the 441 Valve and although it is a very expensive component, the elimination of maintenance concerns make it well worth it.

How has the BMed air dryer been accepted?

We introduced this air dryer design in 1992 and it has become the standard for medical dryers. The market now knows that a medical dryer is very different in design from an industrial air dryer. Today, the U.S. hospital market is 90% desiccant air dryers and 10% refrigerated air dryers. This change has occurred over the past 10–15 years.

BEACONMEDÆS

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So what is the NFPA 99 dewpoint requirement today?

In 2002, the NFPA 99 Code changed again and now specified a 32 ºF dewpoint. The text actually says "a dewpoint below frost point" which is, in essence, 32 ºF. This eliminates any possibility for water vapor to condense in the pipelines.

Can refrigerated air dryers also meet the current NFPA 99 Specification?

There are a few designs that can and many that cannot. We have already discussed the issues with partial loads, separator designs and moisture re-entrainment in refrigerated air dryers. This eliminates many refrigerated air dryer designs. The other factor is pressure. Most medical air systems operate at 50 psig air pressure. A properly designed refrigerated air dryer can provide a dewpoint at 50 psig of -1 ºF. A refrigerated air dryer, therefore, can comply with the 32 ºF NFPA 99 dewpoint requirement — if properly designed for one-third load working conditions.

Does BeaconMedæs get involved with breathing air?

We are not directly involved with the OSHA and CAG Standards Committees, which drive their breathing air specifications. We do, however, get involved with breathing air applications through the NFPA.

> "Today, the U.S. hospital market is 90% desiccant air dryers."

The 2002 Edition of NFPA 99 says you can use Level 1 Medical Air for an Occupational Purpose. Occupational air includes the supply of air to Supplied Air Respirators. Prior to 2002, a separate "breathing air" port could only be used for respirators. Now, Medical air can be used. The only difference is that the Medical air must be tested and documentation of the testing most be done on a regular basis. The local OSHA inspector has the documentation requirements for this.

This goes back to the NFPA philosophy of sourcing clean air. If you take average ambient air and take it to a lab, the chances are extremely good that it will meet OSHA requirements.

Using Level 1 Medical Air for breathing air is now more commonplace. The demand for breathing air is increasing. Respiratory isolation is on the rise due to increases in tuberculosis. Hospitals must be prepared to work in an environment with contaminated patients who present biochemical or biological hazards to the nurses and doctors. Emergency Rooms need an air supply with hoods, suits and respirators. Medical Air Systems have had required CO Monitors since 1999. Now the key to be OSHA Grade D compliant is to practice the quarterly testing and documentation. Using Medical Air for Breathing Air eliminates the need for a separate air system in the hospital.

Thank you BeaconMedæs for your insights.

For more information, please contact Mark Allen, BeaconMedæs, email: mark.allen@beaconmedaes.com, tel: 704-588-0854, www.beaconmedaes.com

PARKER HANNIFIN CORPORATION

Compressed Air Best Practices interviewed Doug Blakeman (VP Sales & Marketing, Filtration Group) and Russ Strobach (VP Marketing & Business Development, Automation Group) of Parker Hannifin Corporation.

Good morning! How is Parker Hannifin structured?

Good morning. Parker Hannifin is a $9+ billion revenue corporation, which is divided into eight major Product Groups. The Product Groups are: Filtration, Automation, Aerospace, Instrumentation, Hydraulics, Climate and Industrial Controls, Seals and Fluid Connectors. We operate over 290 manufacturing plants and employ over 57,000 employees globally.

How are the Parker Filtration and Automation Product Groups organized?

At Parker Filtration, our filtration business has five major product platforms; hydraulic and lube oil filters, diesel engine fuel filtration, process filtration, gas generation and compressed air treatment.

Our Automation business delivers solutions on the demand and machine side of industrial processes. Our actuators, valves, logic processing, fittings and airline accessories make industrial processes possible. Our air preparation products are private labeled for the Filtration Group.

What is the Vision for Parker in compressed air treatment?

Parker is a global market leader in compressed air treatment. We have made many acquisitions within this product platform to make it one of the fastest growing parts of the filtration business. Each acquisition has provided new geographic or technological strengths.

We started with the Finite acquisition in 1985, which gave us our start in this business. Parker Finite has a deep technical competence in the engineering, design and manufacturing of compressed air filter elements and filter media. We did well to begin our presence in the compressed air treatment market by acquiring a company so strong on the engineering and knowledge side of the business. Parker Finite has a tremendous installed base of compressed air filters in North America.

Parker Finite Compressed Air Filters

Parker Automation Filter-Regulator-Lubricator

PARKER HANNIFIN CORPORATION

Company Profile

Parker Balston Nitrogen Generator

Then came the Balston acquisition in 2000. Balston strengthened our global compressed air and gas treatment capability with a strong presence in Europe, particularly the U.K. It also added nitrogen and hydrogen gas generator products to our product portfolio. Our filtration business is very strong in the food and beverage industry and we understood the growth opportunities for nitrogen generators. Parker Balston has done a great job of educating industry on the benefits of generating nitrogen, rather than buying nitrogen cylinders.

Please describe the domnick hunter acquisition.

The acquisition of domnick hunter in 2005 made Parker a global player on the compressed air dryer side of the business. Domnick Hunter, based in the U.K., is not only a major supplier of compressed air filters, but one of the largest compressed air dryer companies in the world. While global, the strength is in Europe. Domnick hunter, before we acquired them, had acquired Zander in Germany, which provided them with a strong market share in desiccant air dryers. They also acquired Hiross, an Italian manufacturer of refrigerated air dryers, who was one of the largest in the world at the time. Parker is now, through the domnick hunter acquisition, the market leader in Europe's compressed air treatment market.

Parker domnick hunter Compressed Air Filters

Parker domnick hunter Refrigerated Air Dryers

Parker Zander Desiccant Air Dryer

The recent Airtek acquisition signals what new strategy in North America?

The Airtek acquisition is simply another step in our strategy to be a global leader in the compressed air treatment market. Airtek provides Parker with a strong manufacturing operation in North America of compressed air dryers. This facility can supply Parker North American customers with both refrigerated and desiccant air dryers. To be a major player in the U.S. dryer market, we needed to have a manufacturing facility here.

What is the manufacturing strategy to support so many brands?

Our long-term strategy is to align our platforms geographically with manufacturing facilities. The closer our manufacturing facility is to the customer the better. Parker is a Lean Manufacturer and we systematically eliminate all forms of waste. In this way, Parker customers only pay for what they want — and nothing more. Acquisitions provide many opportunities to find synergies. The Airtek acquisition, for example, will allow us to consolidate our Xebec manufacturing facility into the Airtek facility. We will continue to support Xebec's strong business in Canada from the Airtek facility.

Parker Filtration now provides manufacturing support in Europe, North America and Asia. In Europe, we manufacture filters in our facility in the U.K. We manufacture desiccant air dryers in our facility in Germany, and we manufacture refrigerated air dryers in our facility in Italy. In North America, Parker Filtration manufactures filters in our facility in Michigan and we manufacture dryers out of our facility near Buffalo, New York.

How does Parker manage so many brands?

Parker is the lead brand internationally. Our core philosophy is to transfer the equity of acquired brands to the Parker master brand. This process is different for every acquisition and may take anywhere from 90 days to several years. We manage acquired brands very carefully so as not to lose market share or disrupt distribution channels.

Parker Finite Filter Manufacturing Facility in Michigan

Parker domnick hunter in the U.K.

Parker Zander Manufacturing Facility in Germany

PARKER HANNIFIN CORPORATION

Company Profile

Parker Hiross Manufacturing Facility in Italy

When we acquire a brand with significant equity, like domnick hunter, we often choose a co-branding strategy that introduces the Parker name to the customers of the acquired brand. An example of this is Parker Balston. The Balston brand has significant equity in niche markets like gas generation. It has made good business sense to stay with the co-branding strategy of Parker Balston.

How do you manage product differentiation between brands?

Any acquisition is done for a strategic reason. We simplify the business as much as possible. Instead of having three designs for commodity-type products — like gauges or automatic drains — we have one. This eliminates manufacturing complexity. We do take products from one sales channel and open them up to other channels. Over the long haul, more customers can derive benefits from these products.

Parker Airtek Dryer Manufacturing Facility in New York State

With larger capital equipment, like dryers, the business follows customer specifications. This is where we need the local manufacturing advantages. On products that are of a standard (out of the catalog) nature, we do look for opportunities to simplify manufacturing requirements. This simplification process results in lean product designs that can be produced in a lean manufacturing process. The benefits are multiple and include improved customer service through lead-time reduction, improved quality and increased manufacturing economies. We look for designs with IP (Intellectual Property) advantages that we can standardize on for all the brands. To drive this process, we have two to three meetings per year with our marketing and engineering teams.

Any more acquisitions coming?

We are always on the lookout for opportunities that make sense. I can tell you that we do not plan on expanding into manufacturing air compressors! We get that question quite often. Our focus, in compressed air systems, is to provide all the air treatment products from the intake to the air compressor to all the applications downstream of the compressor room.

This is where Parker Filtration and Automation work together, correct?

Parker's Automation and Filtration businesses have many opportunities to work together. We can help industry on the service side to control energy costs. We have been working together over the past year on providing air audits, air leak and air quality testing services to our customers.

We can cover the whole plant for our customers. We can also re-engineer the end-use machines, using pneumatics, to reduce their air consumption. As the manufacturer of the pneumatic products consuming the air, our customers benefit from our expertise as to what will work and how much air is required.

Where is the compressed air treatment market headed?

There has been a lot of consolidation over the past ten years, and there is probably still some industry consolidation yet to be done. Air compressor manufacturers are also involved today in manufacturing compressed air treatment products. We will not get involved with manufacturing air compressors and plan to continue providing these OEMs with an alternative to investing in manufacturing these products. We will continue to work the OEM, distribution and end-user markets.

Asia is probably the highest growth area for compressed air treatment. We are now manufacturing dryers and filters in Korea, China and Malaysia. This is where we see our highest growth rates. We are also experiencing good growth rates in Latin America and have a joint venture operation in Brazil to support this region.

Thank you Parker for your insights.

For more information, please visit www.parker.com or contact:
Parker Filtration; Doug Blakeman, tel: 216-896-2099, email: dblakeman@parker.com
Parker Automation; Russ Strobach, tel: 216-896-3171, email: rstrobach@parker.com

Parker Automation Guided Pneumatic Cylinder

Brehob Air Compressor Division Headquarters in Indianapolis

BREHOB CORPORATION

Compressed Air Best Practices interviewed John Masterson (Division Manager), Al Bunker (Operations Manager) and Greg Owen (Sales Manager) of the Brehob Corporation Air Compressor Division.

Good morning! How is Brehob Corporation structured?

Good morning. Brehob was founded here in Indianapolis in 1953. Today, we employ more than 180 people and have branch locations in Cincinnati, Columbus, Detroit, Louisville, Elkhart and Fort Wayne, Indiana. Our headquarters remains in Indianapolis in our ISO 9001 Certified facilities. We have two locations here, one block apart, which comprise 65,000 square feet, when added together. The Corporation has three distinct operating divisions: Air Compressors, Electric and Crane & Hoist.

Brehob Electric and Crane & Hoist Division Headquarters in Indianapolis

Please describe the Air Compressor Division at Brehob.

The Air Compressor Division employs 75 people. We have thirty-five service technicians and sixteen sales people. The balance is made up of managers, application engineers, and customer service people. All of the branch locations, mentioned above, are heavily engaged with selling and servicing air compressors.

What is the strategy of the Brehob Air Compressor Division?

Brehob, since 2001, has experienced a period of tremendous geographic expansion. Prior to this, the Division operated in Indiana and southern Ohio. These markets were shrinking at the time. Manufacturing was going overseas to China and also down to Mexico. The Tier 1 and 2 automotive industries were suffering and either downsizing or closing. While Brehob enjoyed a strong market share, our customer base was shrinking. We partnered with our strategic vendors and entered Northwest Indiana, Detroit and Columbus, Ohio. This more than tripled our potential market opportunity and helped fuel a phase of strong growth for Brehob.

This expansion required a strong strategic and financial commitment by Brehob Corporation. The ownership of the Corporation and the combined performance of all three Divisions made the expansion phase possible. Today, the Corporation is benefiting from those investments by having an expanded sales and service base. Market diversification is good for Brehob. We benefited, for example, from having a branch operation near the Elkhart, Indiana market. This area, which is where most RVs and trailers are built, has boomed over the past few years due to the effects of Hurricane Katrina. The need for emergency FEMA housing went through the roof and most of the units were built in Elkhart. Brehob was there to support the manufacturing expansion.

Brehob
Electric · Air Compressor · Crane & Hoist

BREHOB CORPORATION

Company Profile

Brehob has a rental fleet, right?

Brehob was a pioneer with the rental of air compressors and dryers. We continue to manage a rental fleet of over 200 pieces of equipment. We offer a broad range of products ranging from oil-flooded screws, diesel, vacuum systems and compressed air dryers.

Brehob has worked extensively with hospitals, correct?

Yes. Brehob began with strong ties in the Indianapolis healthcare market by providing strong technical service-repair support to the Quincy oil-less reciprocating compressors installed in the region. We built strong relationships with the maintenance departments at the hospitals. We have specific service technicians for the hospital market, who know the NFPA codes and how to work with hospitals. We do the calibration and selling of dewpoint monitors and CO monitors so the hospitals can verify that they comply with NFPA guidelines.

Steel Forging Facility in Michigan with Brehob/Quincy Rotary Screw Compressors

We offer a full range of air compressors and dryers to the hospitals. The technologies range from oil-less reciprocating, oil-less scroll and oil-less rotary screw air compressors. The air dryers are both refrigerated and desiccant. Brehob also works with hospitals to supply wall outlets and alarm monitoring systems.

What trends do you see with air compressors for hospitals?

The most popular compressors are the scroll-type, multi-staged units. They will bank nine compressors, for example, on one skid and use one controller to run them all. They can run one compressor, during low demand periods, or all nine units simultaneously during peak demand periods. This is a space-saving and energy-saving solution for the tremendous load variations all hospitals experience. In larger installations, oil-free rotary compressors have been accepted by the NFPA and are a growing trend.

> "Due to the diversity of our customer base, we work with a wide range of compressed air products."

What trends do you see with vacuum?

Vacuum systems have gone towards hook and claw systems. Busch and Rietschle are two major suppliers. Rotary screw vacuum systems remain very common in the marketplace as well. A primary application is WAGD Gas Systems (Waste Anaestesia Gas Disposal). This WAG Gas comes off the tanks and we install a dedicated vacuum line to remove the gas. This has been a good application with a lot of activity.

What trends do you see with air treatment in hospitals?

We are busy with dewpoint monitors and CO monitors. We install and calibrate them. Hospitals have gotten very good, over the past ten years, with documenting and monitoring air quality performance. One result has been that most hospitals are going to dryers that can deliver a -40 ºF dew point. Most installations now specify desiccant air dryers.

Have you observed any developments with breathing air systems?

We haven't observed any big changes in the hospitals where compliance with OSHA Grade D Regulations continues to be strong. We have seen, however, some changes in the industrial market. Fabrication shops, where welding is being done, are receiving pressure from their liability insurance providers to improve the breathing air systems for the welders. We have spoken to customers whose insurance underwriters would not issue liability insurance unless they could provide proof that all of the welders were using the appropriate helmets, hoods and supplied-air breathing respirators.

BREHOB CORPORATION

Company Profile

If you had to choose one, what is the primary strength of Brehob?

That's a hard question. The answer is probably that we are well-rounded in our ability to serve a multitude of different markets. We supply commercial buildings with climate control compressors and know how to serve their needs. We also work well with institutions like universities, laboratories and hospitals. Our people are knowledgeable on the different codes (like NFPA 99 for hospitals) that these institutions must comply with. We also have the skill sets to work with large air systems used by automotive facilities and other industrial facilities like the power plants and refineries along the Ohio River.

What kinds of compressed air equipment do you work with?

Due to the diversity of our customer base, we work with a wide range of compressed air products. We offer fractional horsepower climate control compressors, rotary screw compressors for standard industrial applications, oil-less reciprocating and oil-free scroll compressors for hospital applications, oil-free rotary screw compressors for food packaging systems, vacuum systems, air treatment products and centrifugal compressors for power plants. Our service department is capable of working with all these technologies and can also work on the large double-acting reciprocating compressors.

Where is the compressed air industry headed?

Our industry has been moving, for some time now, towards consultative-type selling. Industry is better informed, than ever, on their compressed air systems and wants to learn more about monitoring and managing it. Manufacturers are beginning to integrate information on their compressed air system into their information management systems. This is allowing them to recognize opportunities for energy savings and productivity increases. All of these trends are bringing benefits to the end user.

Another trend is that end users are more reliant than ever on outsourced service and maintenance of their compressed air systems. Most medium and large companies outsource all the service work they can for air compressors. The maintenance staffs have been reduced and they now must manage outside vendors to keep the plant running. This has been a positive development for Brehob, as we continually invest in our capabilities to provide top-notch technical-repair services.

What challenges does Brehob face?

We see the primary challenge (long-term) being our industry's ability to develop service technicians. Fewer young people today are interested in mastering a trade and getting their hands dirty. Everyone wants to go into computers! There is a growing demand from our customers for service work. The average age of our service technicians is 45 years old. As we look long-term, being able to build a staff to meet this demand is a challenge.

How can vendors and distributors work closer together?

The main thing a distributor wants from the manufacturer is for them to produce a quality product and stand behind it. The second is that the manufacturer continues to build products that fit our customers' needs. Good communication, between us, is critical and something we at Brehob place a high priority on.

Thank you Brehob for your insights.

For more information, please contact John Masterson, Brehob Corporation, email: jmasterson@brehob.com, tel: 317-231-8090, www.brehob.com

WALL STREET WATCH

(Continued from page 11)

"How much cushioning is required will vary with the terrain of the start line," said Barker, "so our software ensures sufficient air volume and pressure are applied to suit the conditions." Before ProStuff, start gates hit the ground hard enough to be felt in the stands. The noise, over 100 decibels, was comparable to a shotgun blast. BMX racing organizations find the quiet operation of the system is actually helping recruit young riders to the sport.

"Parker offers more motion and control systems worldwide than anybody else," said **Roger Sherrard**, President of Automation at Parker. "More than 12,000 Parker distributor locations provide an unequaled global market channel, and like Barker Rockford, partner with customers to identify needs and create productive, profitable motion and control applications. We look forward to watching, along with the rest of the world, the result of this collaborative approach in action at the athletic competitions in Beijing."

MARCH 9, 2007 VALUATION RATIOS	SYMBOL	PRICE/EARNINGS RATIO	PRICE/EARNINGS GROWTH RATIO	PRICE/BOOK RATIO	PRICE/SALES RATIO	DIVIDEND YIELD
Parker-Hannifin	PH	12.86	1.02	2.22	0.95	1.3%
Ingersoll Rand	IR	13.48	1.05	2.91	1.15	1.7%
Gardner Denver	GDI	13.29	0.90	2.04	0.99	NA
United Technologies	UTX	17.40	1.29	3.72	1.25	1.7%
Donaldson	DCI	21.35	1.48	5.13	1.52	1.0%
Enpro Industries	NPO	N/A	1.51	1.96	0.81	NA
SPX Corp.	SPW	24.41	1.59	1.92	0.82	1.5%

United Technologies Corp. (NYSE:UTX) outlined expectations for 2007 this afternoon at its annual investor conference in New York. In addition to reviews of each of UTC's operating segments, the company reaffirmed its earlier outlook for 2007 earnings per share in the range of $4.05 to $4.20, and for cash flow from operations less capital expenditures exceeding net income. Revenues for the year are expected to increase to more than $51 billion, including organic growth of 6 percent.

During the first quarter, the Company expects to recognize a charge for the previously disclosed European Commission fine assessed against Otis Elevator. UTC also expects one-time benefits in the quarter that, combined with a previously established reserve for the matter, will reduce the net impact of the fine to approximately 7 cents per share.

Gardner Denver, Inc. (NYSE:GDI) reported record revenues and earnings for the full year 2006 with the following highlights; Full Year 2006 Results Compared to Full Year 2005:

- Revenues increase 37 percent
- Net income increases 99 percent
- Diluted earnings per share increase 82 percent
- Total debt decreases more than $161 million from December 31, 2005

WALL STREET WATCH

BY COMPRESSED AIR BEST PRACTICES

Gardner Denver announced that revenues and net income for the year ended December 31, 2006 were $1.7 billion and $132.9 million, respectively, the Company's highest level ever. Diluted earnings per share ("DEPS") for the twelve months of 2006 were $2.49, 82 percent higher than the comparable period of 2005. Total debt was reduced by $161.5 million during 2006, driven by cash generated from operating activities of approximately $167 million and the rationalization of cash balances at a number of the Company's non-U.S. locations.

Ross J. Centanni, Chairman, President and CEO commented,"During 2006, we used cash flow from operating activities and cash remitted from certain of our non-U.S. locations to repay debt, reducing debt to total capital to 32.3 percent. As a result of the Company's reduced debt level and the progress made to date integrating previously completed acquisitions, we believe we are well positioned to begin proactively seeking strategic acquisitions."

Mr. Centanni continued, "Demand during the fourth quarter was strong across nearly all end market segments and geographic regions, with the exception of some expected slowing in orders for blowers used on Class 8 trucks in North America. However, this slowdown was more than offset by increased orders for industrial products in Europe and Asia and for environmental applications in the U.S. My outlook remains positive for the first half of 2007 and cautiously optimistic for the second half of the year. I expect continued growth from Europe and Asia and from environmental applications in the U.S., tempered somewhat by a slowing rate of growth in North America for general industrial applications. Orders for drilling and well stimulation pumps remained strong in the fourth quarter of 2006 and our production capacity for some of these products is already booked through the end of 2007.

"At present, manufacturing capacity utilization rates in the U.S., as published by the Federal Reserve Board, remain above 80%, which has historically indicated a good demand environment for industrial equipment such as compressors and blowers. However, we expect the industrial production rate of growth to slow in the U.S. throughout 2007," said Mr. Centanni. "We continue to see growing industrial demand in Europe and on-going strength in Asia. As a result of these growth expectations and increasing demand anticipated in the U.S. for environmental applications, we believe that the industrial portion of our business will continue to grow in 2007, although at a slower rate than realized in 2006.

"We continue to have good visibility of the demand for our oil and natural gas well drilling and servicing products. Based on input from our customers, we anticipate demand for well servicing pumps to grow in 2007, compared to 2006, and we have invested in key machine tools in order to increase our production capacities accordingly. At this point, we are uncertain about the level of drilling pump demand in the second half of 2007, but have the flexibility to reduce the levels of previously outsourced production if demand were to decline," said Mr. Centanni.

INDUSTRY NEWS

Press Releases

SULLAIR EARNS PRESTIGIOUS OSHA AWARD

SULLAIR®
Always air. Always there.

Sullair Corporation announced that its facilities in Michigan City, Indiana have earned "Star" status in the Occupational Safety & Health Administration's Voluntary Protection Program (VPP). Established in 1982, the VPP Program recognizes businesses and worksites that exhibit excellence in occupational safety and health and are committed to effective employee protection that exceeds the requirements of the OSHA standards.

Sullair is the first Hamilton Sundstrand Industrial site to achieve "Star" status and, according to OSHA representatives who conducted the review, Sullair is one of only 32 sites in the State of Indiana to achieve this honor.

In recognition of the Star status achievement, Sullair President, Henry F. Brooks congratulated "a great team on a great result." He said, "The award speaks to the commitment of each team member to the Environmental, Health and Safety journey." He further stated, "Now it is equally important to maintain the practices that will sustain this position for Sullair." Companies with Star Status in the Voluntary Protection Program have achieved injury and illness rates at or below the national average for their industry, and are reevaluated every three to five years.

Sullair is one of the world's leading compressor manufacturers, and is the only air compressor manufacturer to concentrate exclusively on rotary screw technology. Sullair is a company of Hamilton Sundstrand, which is a division of the United Technologies Corporation. Sullair has been an industry leader and innovator since 1965. With subsidiaries in France, China and Australia, Sullair is also a globally recognized manufacturer of compressed air containment removal equipment, vacuum systems and contractors' air tools.

CONTACT
Judi Seal
Marketing Specialist
Sullair Corporation
PH: 219-861-5089
FX: 219-874-1267
e-mail: judi.seal@sullair.com

EH&S CONTACT
Jeanie Downs
Environmental, Health and Safety Manager
Sullair Corporation
PH: 219-861-5066
FX: 219-874-1208
e-mail: jeanie.downs@sullair.com

INDUSTRY NEWS

Press Releases

HITACHI INTRODUCES OIL-FREE SCROLL AIR COMPRESSOR TECHNOLOGY TO NORTH AMERICA

HITACHI

Features of the SRL Oil-free product portfolio include but are not limited to:

- 100% oil-less design to conserve natural resources and eliminate environmental emissions (No lubricants and/or grease to manage).
- Patented Scroll Wrap with Alumite™ surface treatment and labyrinth seal that provide superior performance and reliability.
- Multi-stage cooling to provide stability of discharge air temperature.
- Microprocessor based Cycle Control Logic that automatically elongates the Load/Unload (On/Off) cycle to avoid excessive restarting frequency and promote extended package life.
- Integrated Air Receiver(s) as standard to promote proper air system design.
- Quiet Enclosure as standard, providing industry leading low sound levels.
- Incorporation of Hitachi motors and air-ends to convey highest efficiencies throughout the operating range.

Hitachi's SRL oil-free scroll air compressor products are part of the Air Technology Group, which is based in Charlotte, NC. The Charlotte facility is the center for all Air Technology Group business operations, warehousing and training for Distribution Partners and OEMs.

For more information, please visit www.hitachi.us or contact airtechinfo@hal.hitachi.com.

MINIATURE ROTARY ACTUATOR FEATURES HIGH-STRENGTH VERSATILITY, FLEXIBILITY

Parker
anything possible

The Actuator Division of Parker Hannifin Corporation introduces the new PRNA Series of miniature rotary actuators. The PNRA Series incorporates a unique rounded vane design, which provides lower vane seal bypass than typical vane rotary actuators. A full range of PRNA options includes single and double vane models, keyway timing for reference points, rear porting and a variety of switches and sensors. The actuator's vane seal is custom-molded to a machined shaft and vane construct to create a one-piece shaft/vane/seal assembly for greater durability, strength and reliability. Versatile enough for use with lube/non-lubed filtered air at pressures ranging from 30 to 150 psi (0.2 to 1.0 MPa), the PRNA Series' robust design package provides high performance precision at a competitive price.

Standard internal bumpers provide quiet operation for high-speed applications, while the stock rear output shaft is designed for easy accessibility and manual override in the event of air pressure loss. Engineered for applications in which space is at a premium, the PRNA Series of rotary actuators is perfect for turning, toggle clamping, indexing, positioning, oscillating and open/close/push/pull operations. PRNA offers standard rotations of 90°, 180° or 270°. Operating temperature range is from -5° to 80° C (-23° to 176° F). Filtration requirement for the PRNA Series is 40 micron filtered, dry air. Mechanical efficiencies for PRNA Series ranges from 80% to 95% depending on application. Sleek, compact body design maximizes ease in mounting, while heavy-duty assembly offers smooth, step-free operation in rugged service applications.

For more information regarding the PRNA Series of miniature rotary actuators, contact Parker Hannifin Corporation, Actuator Division. Phone 330-336-3511 or visit us online at www.parker.com/actuator.

ASCO® INTRODUCES CONDENSATE DRAIN VALVE ASSEMBLIES

ASCO, the world's leading manufacturer of solenoid valves, today introduced a comprehensive line of condensate drain valve assemblies. The assemblies are designed specifically for use in compressed air systems where drainage of moisture is critical.

"Clean, dry, reliable compressed air is essential in today's high-throughput manufacturing environments," said Nicholas Buccheri, vice president, marketing, ASCO. "ASCO's new condensate drain valve assemblies represent a significant improvement over ball valves. Our proven technology provides cycle after cycle of dependable performance, drives down maintenance costs and ensures minimal system downtime."

ASCO is offering two types of condensate drain valve assemblies to meet the requirements of virtually any compressor system application. Air-operated models incorporate a straight-through design with fewer components. This provides superior sealing and non-clog operation for lower cost and minimal maintenance. Solenoid-operated versions offer exceptional value, compact size and longer life in high-temperature, high-humidity applications.

"Built with ASCO's robust, high-quality electronics and renowned reliability, these condensate drain valve assemblies are ideal for compressed air systems used in manufacturing plants, automotive service stations and body shops and transportation service center applications," said Buccheri. "Smaller sizes can be installed in mobile compressed air systems where portability is essential."

Condensate drain valves are used to remove water that develops in compressed air systems from changes in air temperature during the compression cycle. The condensate accumulates in pneumatic system receiver tanks, dryers, separators and pre-filters. Failure to properly drain the condensate will result in air leakage, improper system operation and additional maintenance.

Most valve assemblies with standard timer range, elastomer and voltage are available for quick shipping as part of ASCO's 5-Day program.

For more information, contact ASCO at 800-972-ASCO, by e-mail at info-valve@asco.com or visit www.asco-valve.com

COMPLETE SYSTEM CONTROL!

Increase Efficiency and Pressure Stability

KAESER COMPRESSORS
Built for a lifetime.™

Announcing Sigma Air Manager Basic (SAM Basic) from Kaeser Compressors! SAM Basic offers the very latest technology for optimizing compressed air system performance in small to medium installations. This energy-saving master controller provides superior pressure band control — something standard sequencers cannot do!

SAM Basic balances service hours, tracks preventive maintenance requirements and prevents simultaneous motor starts. And it can be adapted to almost any system and manage up to four compressors or vacuum pumps — including multiple types and differing brands. SAM Basic also connects to dryers, filters and drains to monitor their operating or maintenance status.

To see just how much you could be save with this competitively priced master controller, please call 800-777-7873 or visit us at www.kaeser.com.

INDUSTRY NEWS

Press Releases

NEW HANKISON *SWEEP*SAVER™ SERIES MEMBRANE DRYERS

HANKISON
hankisonintl.com

Hankison continues to provide global leadership in the pursuit of pure, clean, dry compressed air with the introduction of *Sweep*Saver™ Series Membrane Dryers. The dryers feature digital purge control (DPC) to save energy and protect membrane fibers. The exclusive design can align purge flow with air demand for precise dew point control with zero waste. Guaranteed constant pressure differential protects the membrane bundle from damaging pressure surges.

Hankison membrane dryers can be sized to provide a full range of reliable dew point performance anywhere from +50 °F to -40 °F. *Sweep*Saver™ Series with DPC is ideally suited for medical/breathing air applications where compressors start and stop.

- ISO 8573-1 Air Quality to Class 1;2;1
- Flows up to 139.5 scfm
- Pressures to 200 psig
- Modular design frees up floor space
- Oil Free Air
- Medical/Breathing Air

For more information please visit www.hankisonintl.com.

VERSATILE SERIES CA44 PLUG-IN PNEUMATIC VALVES HAVE INTEGRATED AS-I CONNECTION

Rexroth
Bosch Group

Valve manifold system with integrated AS-i electronics

Series CA44 valves are two station valve manifolds for AS-i serial link (bus) applications, complying with AS-I specification V2.11 Rev. 1. Manifold choices include: with or without digital inputs and with or without auxiliary power. The valve stations can be 4-way, 2 position valves, or dual 3-way, 2 position valves, or a blanking plate. The plug-in valve design simultaneously makes both the electrical and pneumatic connections when plugging the valve into place — eliminating the need to disturb electrical wiring connections.

Extremely adaptable and efficient — CA44 is the intelligent solution for integrating pneumatic valves in systems with AS-I bus structures.

The CA44 valve flow is 0.2 Cv (200 l/min) with a pressure range of 29 to 116 psi. Voltage is 24VDC with a protection rating of IP67 (NEMA 6). Up to four valve functions and four electric inputs are possible with just one AS-i address. The manifold is easy to install with all pneumatic connections on one side, and a valve can be replaced without changing the address. Series CA44 valves feature a long service life of more than 100 million cycles.

For more information, visit www.boschrexroth-us.com or contact:
Eric Deist
Phone: (630) 654-0170, ext. 160
Fax: (630) 654-0302
edeist@market-sense.com

EQUIPMENT MARKET

Pre-Owned Machinery

BREHOB CORPORATION

PRE-OWNED EQUIPMENT

U10828 *Quincy QST40 hp rotary screw compressor; tank mounted, 460/3/60; air cooled; excellent condition* **$6,225.00**

U10827 *Gardner Denver rotary screw base mount compressor, air cooled, 230/3/60, 125 psi, 120 cfm* **$4,685.00**

U10605 *Quincy rotary vacuum; 460/3/30 rated 730 scfm @ 29.9 hg; air cooled; Unit is totally remanufactured and ready to go; excellent condition* **$12,600.00**

U9929 *Gardner Denver 150 hp rotary screw compressor, variable displacement; 460/3/60; air cooled 125 psi; Wye-Delta start; touch pad controller* **$16,630.00**

U10246 *Zeks 1600 cfm refrigerated air dryer, air cooled, noncycling, 460/3/60; 1999 unit; uses R-22* **$8,500.00**

U10835 *Hankison refrigerated air dryer 100 cfm, 115 volt, 2001 unit, excellent cond.* **$1,650.00**

U10836 *Quincy QSBair cooled 25 hp rotary screw 230/3/60; 125 psi; 2001 model year with only 9753 hours; with low sound enclosure; excellent unit* **$6,910.00**

For more information, contact Jim Frankenberger, tel: 1-800-323-8090 ext.135, email: jfrankenberger@brehob.com, www.brehob.com

JOB MARKET

Job Openings in the Compressed Air Industry

GRS · GRS FLUID HANDLING

NATIONAL MARKETING MANAGER — NORTHEAST/EAST U.S.

Sick of your boss? We can help! We are working on a search for a client, searching for a National Marketing Manager who can lead a staff to great things. This position will be responsible for total marketing of products, and be located in the Northeast/East U.S. For an experienced candidate, direct reports will come not just from sales, but from application and production.

Requirements:

- A technical background in marketing, with some experience in the marketing of pump/compressor products and systems
- A Bachelor's degree is required
- Experience working with customers, salesmen, C-level executives and engineers
- An excitement about work and a positive attitude that leads to success

For someone with good leadership experience and a history of success in the pump/vacuum/compressed air marketplace, this position offers a chance to be a leader. With direct reports, personnel responsibilities and a role that reports directly to the president, success in this role means visibility in the industry. If you are someone who can succeed in a position like this, please send an e-mail to Mike Lee at cabp@grsrecruiting.com.

For more information on these positions, any other positions we are working on or to learn more about GRS and GRS Fluid Handling's recruiting services, please send an e-mail to us at cabc@grsrecruiting.com.

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www.grsfluidhandling.com

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Manage all projects to ensure equipment and personnel meet the requirements of the application and ensure customer satisfaction.

For more information contact:
Keith Miller
Rental Manager
Quinn Power Systems
3500 Shepherd Street
City of Industry, CA 90601
Tel: 562-463-4776
Email: kmiller@quinnpower.com

ADVANCED SOLUTIONS FOR YOUR COMPRESSED AIR CHALLENGES

The BEKO range of reliable performance products includes all aspects of economical, safe and ecologically responsible compressed air use. With their unique and diverse capabilities, all of the product families meet the demands of tomorrow's advancements today, from individual components right up to those of complete large-scale systems.

Being that every system, no matter how large or small, is made up of individual components, only components that are designed to work with each other, and are suited to rigorous applications and conditions can fulfill their performance expectations in a reliable and environmentally friendly way.

BEKO does more than manufacture phenomenal products, we are a complete solutions provider. Ranging from analysis of the problem, to specification, installation support, maintenance resolutions and comprehensive customer service, the BEKO know-how for compressed air use is customer oriented with a global focus.

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Maintainance time is now 2-minutes or less

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236 Raceway Drive
Suite 1
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Kaeser SFC compressors offer a wider range of operation, from 20% partial load to 100% full load. Plus, our oversized *Sigma Profile*™ airend rotates at lower speeds for greater output while consuming less energy.

With near-unity power factory, built-in phase protection, and superior pressure control, our SFCs are built for a lifetime! And, since we offer them in the widest range of sizes – most with integral dryer options – we have just the right model for your needs. Of course, the best way to appreciate the superior engineering of Kaeser SFC compressors is to see them in operation, so call **800-777-7873** to find one near you.

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