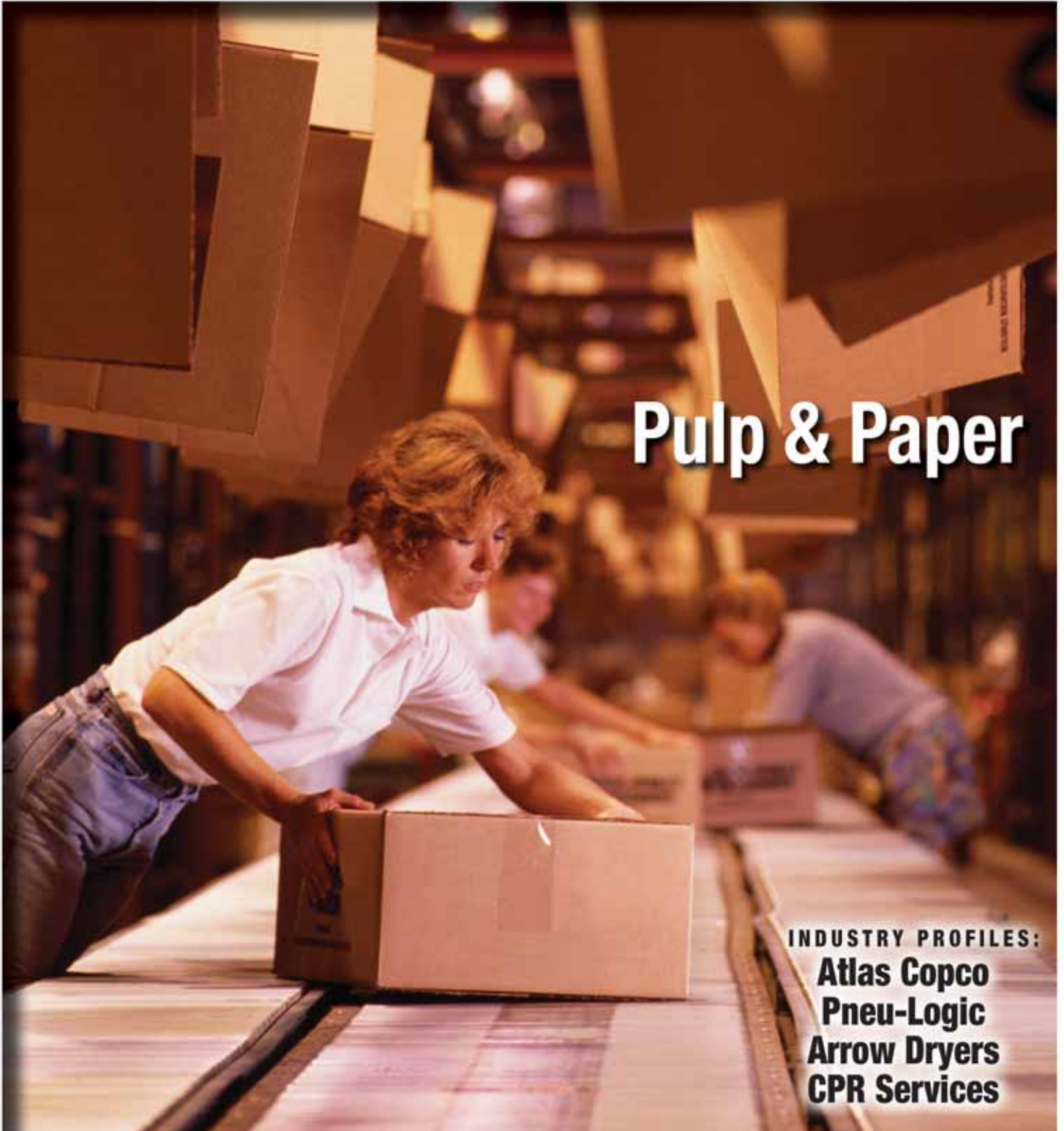


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## FROM THE EDITOR

*Saving Water in Challenging Ambients*

The last two editions, of Compressed Air Best Practices Magazine, have dealt with two industries, which must manage aggressive ambient conditions; cement and pulp & paper. The challenge presented by dusty and hot ambient air, to compressed air systems, is significant. The compressed air industry has

responded to these two editions with some wonderful examples of how to meet these high ambient challenges — and save significant amounts of water.

Most paper & pulp plants operate under the impression that they must use water-cooled air compressors, due to the amount of paper dust in the ambient air. This month's edition shows how a paper mill and a corrugated container plant were able to use air-cooled air compressors and thereby save hundreds of thousands of gallons of water. The air-cooled air compressors, combined with investments in air ducting, have allowed these facilities to no longer use water in their compressor room.

Our industry is also involved with renewable energy. Motivair Corporation writes of an enormous paper mill, which installed a closed-loop cooler to take advantage of the existing water in their on-site pond. CompAir discusses the growing opportunities in methane biogas and how high pressure compressors can make this form of renewable energy commercially viable.

Improving the bottom line of the corporation, while taking environmentally-friendly actions, is illustrated in these articles. Plant engineers and plant managers often must take risks, to break old paradigms and beliefs (like the water-cooled vs air-cooled paradigm). When they do, they reward their companies with profits and the world with a better environment.

My hat is off to the plant engineers and plant managers bold enough to take these steps.

ROD SMITH

## COMPRESSED AIR BEST PRACTICES MAGAZINE

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# LETTER TO THE EDITOR

## CLASS ZERO

Regarding the article titled "Compressed Air Systems for ISO 8573-1, Class-Zero, Oil-Free Air" in the October 2006 edition of your magazine, I would like to give your readers some additional information, and perhaps clarify some of the statements made in the article.

The authors state that a modern lubricated compressor, without any filters, has an output of 3 ppm of oil in the air supply.

Today's modern coalescing filters are designed to remove liquid oil aerosols from compressed air, and typically have oil removal efficiencies of 99.97% or higher. If we apply a single filter with an efficiency of 99.97% to the example above, where there are 3 ppm of residual oil in the compressed air supply, then the oil content downstream of the filter will be reduced to 0.0009 ppm, or 0.9 parts per billion. If a second coalescing filter is installed in series with the first filter, then the residual oil content is below the level of detectability, at a theoretical 0.27 parts per trillion. This is many orders of magnitude cleaner than the cleanliness level stated in the article of 0.01 ppm using two filters.

Later in the article, the authors mention that the purity class for oil in compressed air, as defined by the 1991 version of ISO 8573-1 did not include oil vapors, when in fact the standard did include vapors as well as aerosols and liquid oil droplets. Section 5.4.1 of

the 1991 standard does state that oil vapor content can be disregarded when the air is used for non-critical applications, but it must be measured and reported according to section 6.3. The authors are correct in saying that the 2001 revision of ISO 8573-1 also groups all three types (liquids, aerosols, and vapors) into the classification for total oil content.

Finally, the statement that atmospheric oil that is drawn in at the compressor intake "is almost completely washed away by the condensate in the intercooler and aftercooler, resulting in pure oil-free air for your process" could lead users of oil-free compressors to disregard the effects of ambient air contaminant ingestion. In many cases oil-free compressors are used in food preparation applications, or when compressing air for contact with food, beverage, or pharmaceutical packaging. Contaminants, especially vapors that are drawn into the compressor intake are almost always detectable at the outlet of the compressor, and users of any type of air compressor should be aware of the potential for serious consequences due to poor air inlet quality.

DAN RYAN  
ENGINEERING MANAGER — FILTRATION  
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# ATLAS COPCO: BRANDS WHICH ARE

Compressed Air Best Practices interviewed the following executives of Atlas Copco:

Ronnie Leten, President, Atlas Copco Compressor Technique Business Area

Paul Hense, President, Atlas Copco Compressors LLC (USA)

Herman Matthyssen, Vice President of Multi-Branding, Atlas Copco Compressor Technique

“We only buy companies we know we can grow.”

RONNIE LETEN, PRESIDENT,  
ATLAS COPCO COMPRESSOR TECHNIQUE

Compressed Air Best Practices: Good morning! What does “First in Mind, First in Choice” mean?

Good morning. This phrase represents the vision for all the compressed air product brands within the Atlas Copco Compressor Technique Business Area. The vision for all brands is to delight their particular customers with a strong value proposition, which makes the brand “First in Mind, First in Choice”.

How do you segment customers by brand?

Each brand has a long history of delighting specific customer segments. We work hard at clearly defining and understanding the customers served by each particular brand. These are the “ideal customers” of each brand. We spend countless hours working to deepen our understanding of who our customers are and what their needs are. We segment customers into three groups:

1. **Premium** — productivity and innovation
2. **Value** — cost effective
3. **Price**

Next to that, we also have a market & geography-specific segmentation of course.

Can you give an example of a “premium” brand?

*Atlas Copco*

Absolutely. The Atlas Copco brand name represents our premium product and service offering to compressed air users. Over one-third (⅓) of the global market is looking for the highest quality and technology they can find to support their requirements for compressed air. These users understand the importance of reliably receiving the highest quality compressed air at the most efficient energy cost. The Atlas Copco brand is sold world-wide to support this demand.

# "FIRST IN MIND, FIRST IN CHOICE"

## COMPANY PROFILE

What is an example of a "Value/Cost Effective" brand?

There is another large segment of the market which will sacrifice some premium features and designs, on their air compressor, in order to reduce the capital requirements of the project. They require a high quality product which produces reliable compressed air and which is energy efficient. Examples of brands we own, addressing this customer segment, are Worthington Creyssensac, Grassair and Chicago Pneumatic here in the U.S.

Does Atlas Copco have a "Price" brand?

No. We believe that a pure "Price" brand does not offer a solution for our customers. It also does not fit with our company's philosophy of commitment to quality. Customers only focusing on price, focus on purchasing "disposable" products. They do not place any value on technology, product features, system reliability, optimum logistics or professional aftermarket services. Furthermore they tend to switch brands easily, which makes it impossible to be "First in Choice"



*Ronnie Leten, President, Atlas Copco Compressor Technique*

Ronnie Leten is the President of Atlas Copco's Compressor Technique business area. Mr. Leten joined Atlas Copco in 1985 and has held various operations and manufacturing positions within Compressor Technique. Prior to his current position, he was President of the Industrial Air and Airtec divisions.

Compressor Technique, headquartered in Belgium, is Atlas Copco's largest business area. It consists of five divisions in the following product areas: industrial compressors, compressed air treatment products, portable compressors and generators, gas and process compressors, as well as specialty rental.

# ATLAS COPCO

## Company Profile



**Worthington  
Creyssensac**



Can you give an example of what is meant by “Market or Geography-Specific” Brand segmentation ?

Mauguiere in France is a good example and goes back to the origins of our multi-branding strategy in the late 1970’s. Mauguiere Compressor had a long history in the professional and construction aftermarket in France and had a large installed base. The company, however, was losing market share when we bought it in 1976. We reinvigorated the brand and it now commands a strong market share in the French professional and industrial market. Mauguiere is a brand whose objective it is to delight small and medium-size customers in the French market.



*Herman Matthyssen, Vice President of Multi-Branding, Atlas Copco Compressor Technique*

Worthington Creyssensac is another example. We acquired Worthington Creyssensac, in 1993, as a company with a solid presence and installed base in southern Europe, but which was losing market share. We knew we could grow the Worthington Creyssensac brand in Europe if we injected new product development and improved the sales & service network. Today, Worthington Creyssensac has grown significantly and is also sold in the U.K. and in Northern Europe. We consider Worthington Creyssensac to be a “European-market” brand. As it takes many years and a lot of investment to introduce a new brand to a new geography, we prefer to use both organic growth and make prudent acquisitions, wherever the opportunity is available.

Is the acquisition of Pneumatech a “Market & Geography Specific” brand acquisition?

Yes. Pneumatech represents a strong brand of compressed air treatment products in North America and in China. We are sure we will continue to grow the Pneumatech brand in these markets. The prime focus of Pneumatech is to provide the markets in the USA and Asia with state-of-the-art air treatment products. The Pneumatech manufacturing facility in Wisconsin also provides us with a U.S. manufacturing center for desiccant air dryers and products requiring local certifications, which can supply all brands, active in the defined territory.

“Atlas Copco is recognized, throughout our organization, as our Foundation Brand.”

HERMAN MATTHYSSEN

The “dignity of the brands” is ensured by providing the customers with new products on a regular basis, which are differentiated to meet their different value requirements. Our product companies make this possible. We infuse the brands we acquire with new products on a regular basis and we invest in their ability to market the product and create brand awareness. The result has been the growth of every specific brand, as their ability to optimally meet the differentiated customer requirements has been improved.

**Please elaborate on product differentiation**

We mentioned we work very hard to clearly understand and segment our customers. This means we must provide them with different products to meet their needs. We consider compressor elements, for example, to be a core technology within Atlas Copco Compressor Technique. Our manufacturing centers are capable of designing and manufacturing two to three differentiated compressor elements of the same size, to meet the different customer needs of our brands. All aspects of our products, from compressor elements, coolers, integrated air treatment, and intake valves — are differentiated between the brands to delight the customer segment being served.

**Where does the recent Beacon Medaes acquisition fit in?**

Acquisitions we make must fall within our ability to serve a specific geography or customer segment in a market. The Beacon Medaes acquisition greatly increases our ability to serve the hospital market. Beacon Medaes is a “competence center” and in this case we have acquired knowledge of a market segment. Beacon Medaes will operate as a separate business unit worldwide.

**What is your manufacturing strategy behind the brands?**

Manufacturing centers are brand neutral and have to support the branding strategy.

What really counts is that we are capable of optimizing synergies amongst brands, and that we create value for our customers, our company and other stakeholders. This strategy is very successful. The Ceccato compressor factory in Italy — now called the Product Company Brendola, for example, manufactures five times what it did before they were acquired in the 1990’s.

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## ATLAS COPCO

### Company Profile

#### Multi-branding appears to be pretty complex!

Herman and I (Ronnie Leten) have had countless discussions on how to manage brands. We also admit to having made some mistakes along the way. It is not a simple task. We are today able to say that the strategy has been very successful for our customers, employees, and shareholders. Multi-branding has allowed us to serve more customers by providing them with a differentiated value proposition, both with products and services. By doing so, we are able to establish a long-term business relationship with more customers. This has translated itself into profitable organic growth for both existing and acquired brands.

“The dignity of the brands is ensured with differentiation.”

PAUL HENSE

#### What does the future look like in North America?

We will continue to execute our multi-branding strategy. We want to continue being “First in Mind, First in Choice” for the premium segment of the market with the Atlas Copco brand, and with the Multi-brands for all other segments. Our decisions will continue to reinforce our strategy to also be a market leader in the “value/cost effective” market segment in North America.

Thank you ATLAS COPCO for sharing your insights.

For more information please contact:

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# SAVING *Water* IN A PAPER MILL

*Compressed Air Best Practices interviewed the following employees of Compressor & Pump Repair Services (CPR) Inc.*

*Martha Kinate, General Manager*

*Jodie Blumreich, Operations Manager*

*Jim Kinate, President*



## Compressed Air Best Practices: How did you help a paper mill reduce water consumption?

Like many of its kind in Wisconsin, this paper mill is located on a river and employs over 4,000 people. The mill has been on the EPA's Department of Natural Resources watch-list for water consumption for many years. The operations people are always looking for ways to reduce water consumption and increase efficiency. We were asked to visit the facility and propose ways to address three issues:

1. Water-cooled air compressors were consuming 547.5 million gallons of water per year
2. Yearly maintenance and rebuild costs for the air compressors was \$550,000
3. Moisture was present in the compressed air lines during cold winter days
4. Improve the efficiency of the system



*Kaeser Air-Cooled Rotary Screw Compressor at Paper Mill*

# SAVING WATER IN A PAPER MILL

## PAPER MILL BEST PRACTICE ACTIONS

1. Replace the water-cooled piston compressors with air-cooled rotary screw compressors specifically designed for high ambient conditions
2. Install ducting to bring fresh ambient air into the air compressors and to duct heat upwards and out of the compressor room
3. Install blower purge desiccant dryers and stainless steel pipe which assures the facility with -40 °F dew points and dry air throughout the facility
4. Install two 15,000 gallon horizontal receiver tanks. The first tank is a “wet tank” at the compressor outlet. We separate a tremendous amount of moisture in this tank and improve the efficiency of the desiccant dryers. The second tank is installed at the dryer outlet and maintains optimal air pressure
5. Install a flow controller which supplies 82 psig pressure to the plant
6. Quarterly-interval maintenance contract with 24/7 on-call capabilities to manage high paper-dust ambient conditions

## BEST PRACTICE RESULTS

1. Water savings of 1.5 million gallons per day and 547.5 million gallons per year
2. Maintenance cost reduction of \$470,000 per year
3. Clean, dry air throughout the mill and no instrumentation problems

### What did your analysis of their system find?

The mill was using eighteen water-cooled piston air compressors. They averaged forty years of age and sizes ranging from 150 to 200 horsepower. These old workhorses required yearly rebuilds and scheduled maintenance with costs totaling \$550,000. They also generated a tremendous amount of heat. When the heat being generated was combined with a hot summer day, ambient conditions in the compressor room could reach 120 °F. The water requirement to keep these compressors cooled was 1.5 million gallons per day. The operations management was under the impression that they had to use water-cooled air compressors due to the high ambient temperature conditions.

The mill was drying the air with refrigerated air dryers. The dryers had been sized for 100 °F ambient conditions and were completely overloaded. The result was elevated dew points and moisture presence in the downstream air lines. This caused problems, in particular, with instrumentation located around the mill.

The other important factor the analysis discovered was that their plant air pressure requirement was 75–80 psig. They were, however, delivering compressed air at 100 psig.

### Aren't water-cooled compressors the only option for 120 °F ambient conditions?

Many pulp and paper mills have the misperception that they have to use water-cooled machines due to their high ambient conditions. This is false and an area of opportunity for them. We reviewed the following recommendations with them (see sidebar on left).

### How have the results turned out?

Very well. The facility is so pleased with the results that we have used them as a reference for other paper & pulp mills. This process has since been replicated with Kaeser compressors at two other facilities.



### When was CPR started?

Compressor & Pump Repair Services was established in DePere, Wisconsin in 1984 as a service company for industrial pumps and air compressors. In 1986 we expanded into mechanical contracting and specialized in industrial air piping and municipal sewage treatment. The sales division sold mostly pumps to the industrial and municipal markets. In 1988, the sales department expanded to include industrial air compressors.

KAESER compressors was chosen as our main compressor line and we have since placed over 2000 units in our territory. We are the sole distributor for KAESER in Wisconsin, Minnesota, North Dakota and Michigan's Upper Peninsula.

### How does CPR cover so much geography?

We have regional sales people in the field and have a large group of dealers. Dealers cover specific markets. Our regional sales people support their efforts, particularly with larger installations. The strength of dealers is with the smaller installations in their area.

### How does inside sales support outside sales?

Inside sales generates leads for outside sales people. This makes our outside people much more efficient with their time. Our inside sales and marketing people execute the following functions:

1. Call potential customers to set up appointments. We now get referrals from over 2000 installed air compressors.
2. Multiple direct mail efforts go out every year. Follow-up phone calls are made to generate sales appointments.
3. Follow-up mailings to our customer base. We want to make sure they are satisfied customers and keep our pulse on new opportunities.
4. E-mailers are sent to customers or prospective customers. We find an increasing percentage of people prefer an email to other forms of contact.



*Air-cooled Compressors Provided Water Savings of 1.5 million gallons per day*



*Jim Kinate, Martha Kinate, and Jodie Blumreich of CPR Inc.*

## SAVING WATER IN A PAPER MILL

How does your sales force help your company be so efficient?

We have supported the sales force with technology from day one. Each outside person carries phones which take photos and can receive emails direct from our computer network. They also have laptops. They use the technology to increase their and our over-all efficiency.

1. If a customer emails a sales person — he can see it on his phone and handle it right away. If he needs to forward it to inside sales or accounting — it's done right away. Accounting can then respond to the customer right away. Faster response time for customers is the result.
2. Sales and service people are required to generate service work. They use their cameras on their phones to photograph name plate data on air compressors. They then email the photo to technical service so that the appropriate parts can be identified and the customer can be sent a service proposal. The photos have eliminated countless back and forth phone calls with the customer needed to figure out what parts are needed. The result again has been increased efficiencies for our customers and our company.
3. Installation photos are taken in advance by the sales people. When our installers arrive at a site, they arrive prepared to deal with every situation because they have seen photos of the installation beforehand. There are no delays or extra trips which again make the whole process more efficient for our customers and ourselves.



CPR Headquarters —  
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### How does CPR use technology in assessing your customer's compressed air needs?

Compressor Pump & Repair (CPR) specializes in evaluating systems. We utilize Kaeser's excellent Air Demand Analysis process in many applications. An analysis will often involve:

- Trending the system by installing kW meters and flow meters
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*Thank you CPR for your insights.*

---

“Selling quality products is of utmost importance to our growth and success”

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CPR Service Trucks

# PAPER MILL IN CANADA IMPROVES QUALITY AND COMPRESSOR COOLING

BY GRAHAM WHITMORE

This article reviews two major processes in paper mills: compressed air quality and air compressor cooling. The central air compressor room was expanded and relocated at the largest privately owned paper mill in Canada. The compressor space was required by a plant expansion, which would occupy the original compressor space for increased production.



*Motivair Large-Capacity Cycling Refrigerated Dryer*

The existing, open draft cooling towers for the centrifugal air compressors were aging, and required a major capital expense for relocation, repair & re-piping. An additional centrifugal air compressor was installed and a central 12,000 scfm refrigeration dryer was added to supply the entire plant with dry, oil-free air. The dryer was required to be a redundant, cycling dryer so that the mill could operate round the clock, while minimizing power consumption and the risk of downtime.

During the compressor & dryer pre-installation discussions, it became apparent that a better compressor cooling solution was possible, and within the constraints of the original project time frame. The mill pond water never exceeded 72 °F in the summer, but was not considered clean enough for the air compressors. The project proposed using the mill pond water with a plate & frame cooling system to supply clean water in a closed loop to the air compressors. This avoided the expense of tower refurbishing & relocation, while also eliminating the evaporation losses & make-up, along with the associated water treatment and maintenance. A strategic decision was made by the mill to change direction, and proceed with the new proposed closed-loop cooling system in parallel with the new compressor & dryer installation.

## *Large Capacity Dryer*

The large capacity refrigerated dryer (12,000 scfm) was designed to satisfy the specific mill requirements for reliability, redundancy & energy efficiency. The shell & tube heat exchangers & integrated separator were designed for a maximum pressure drop of only 2.0 PSI at 12,000 SCFM. The maximum operating air compressor shaft BHP was around 2,500. Therefore a design pressure drop of 2.0 PSI was intended to reduce the air compressor power required by 50 kW/h compared to a traditional air dryer 5.0 PSI pressure drop.

# COMPRESSED AIR

The refrigeration was supplied by four semi-hermetic compressors with cylinder unloading, installed in four completely independent parallel refrigeration circuits. This design allows any circuit to be off-line for service or repair, while the others remain in full operation. Separate power disconnects for each compressor and glycol pump enable the operator to perform any maintenance safely, while the plant dry air supply is uninterrupted.

The dryer is a cycling design, which requires the refrigeration compressors to cool a circulating mass of glycol solution, which in turn cools the air in a separate heat exchanger. 2 separate glycol pumps, with auto change & alarm insure a continuous glycol flow. The refrigeration compressors sequentially unload, and cycle off, based on the applied compressed air load at any time. They automatically absorb only the minimum power required to meet the load. The PLC controller automatically rotates the compressor & pump sequence, and prevents short-cycling. The resulting dew point is a constant 33–39 °F regardless of load changes.

The airborne condensate is separated from the air stream in a 2-stage ultra-high efficiency stainless steel separator which guarantees >99.9% separation efficiency from zero to 100% load. This is especially important in large capacity dryers, which can experience very low airflow between shifts, or in off-peak periods, weekends, etc.

The accumulated condensate is discharged via 3 x parallel pneumatically-powered drain valves. Any valve can be isolated and removed while the others remain in operation.

Since start-up in 2003, the dryer has never been inoperative, and has improved productivity at the mill through improved compressed air quality.



*Compressor Cooling System*

# PAPER MILL IN CANADA IMPROVES COMPRESSED AIR QUALITY AND COMPRESSOR COOLING

## Compressor Cooling System

The mill's air compressor cooling system was designed to cool the existing centrifugal air compressors and the new Motivair water-cooled 12,000 SCFM refrigeration air dryer, plus planned compressor growth for the next several years. The design heat load was established at 18,300,000 Btu/h, cooling 1,475 GPM from 110 °F to 85 °F, using 2,439 GPM of mill pond water at 72 °F, and leaving at 87 °F.

Motivair designed and built a single skid-mounted package, which consisted of a stainless steel plate & frame heat exchanger, duplex 75 HP circulation pumps with VFD, for the closed loop circuit, filtration of the mill pond water, and all associated 8" process control valves and piping in 316 stainless steel. The entire package measured 20 feet x 10 feet wide x 9 feet high and weighed approximately 20,000 Lbs. The cooling skid was easily installed inside the building, and the space occupied was a fraction of that required for the original outdoor cooling towers & pumps. The closed loop water temperature was comparable (85 °F) to an optimized evaporative cooling tower, but without the evaporation losses and water treatment required by a tower, in a smaller footprint, and at a competitive cost. The construction (all 316 stainless steel) was compatible with the typical airborne pollutants found in a paper mill.

The combined equipment cost of the Motivair 12,000 SCFM refrigeration dryer and the new closed loop cooling system was approximately US\$350,000, plus installation. The entire cost will be recovered through increased productivity, by eliminating unscheduled downtime, and reduced system maintenance.

For more information please contact Mr. Graham Whitmore, Motivair Corporation,  
email: [gwhitmore@motivaircorp.com](mailto:gwhitmore@motivaircorp.com), tel: 716-689-0222, [www.motivaircorp.com](http://www.motivaircorp.com)

“The project proposed using the mill pond water with a plate & frame cooling system to supply clean water in a closed loop to the air compressors.”

## Compressed Air Best Practices

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2	230	10-24	170
3	210	25-49	150
4	195	50+	135

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tel: 251-510-2598

# VARIABLE SPEED DRIVE AIR COMPRESSOR TRIGGERS ENERGY REBATE AT CONTAINER PLANT

BY SCOTT A. WILLIAMS

You've likely witnessed this scene at a birthday or holiday celebration: A gift is unwrapped, a much-anticipated toy is revealed, and a child plays happily — with the cardboard box in which the toy was packaged.

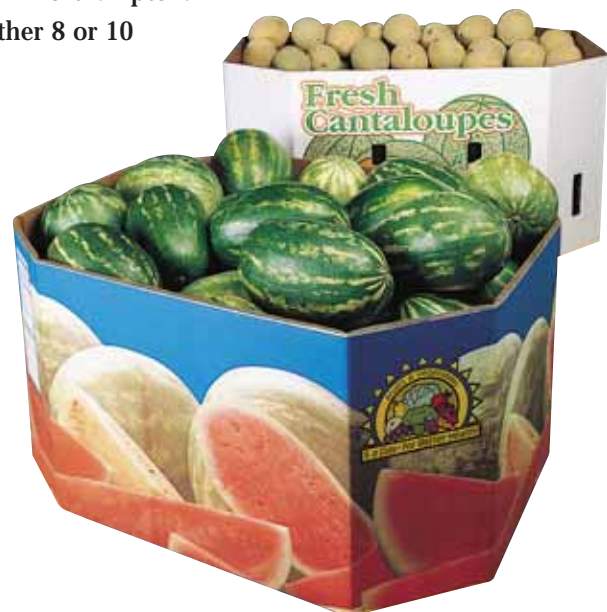


Beyond its treasured role as a playhouse or fort, corrugated cardboard is the ideal material for packaging. It's easy to understand why. Corrugated is both functional and versatile in applications ranging from specialized industrial shipping containers to high-end consumer goods packages. In fact, corrugated is the most widely used packaging material.

## *Packaging Corporation of America (PCA)*

Packaging Corporation of America (PCA) focuses squarely on corrugated packaging at its 66 manufacturing and converting facilities. At PCA's plant in Northampton, Massachusetts, between 3,200 and 4,000 tons of corrugated packaging are shipped each month to customers from Maine to New Jersey who package products ranging from food products to sporting goods to stuffed animals.

The manufacture of corrugated products goes on non-stop at PCA Northampton. "The fabricating line, where corrugated boxes are made from blanks, runs 24 hours a day," according to Tom Dougherty, Production Manager at PCA Northampton. "The corrugators, where blanks are made, run two shifts of either 8 or 10 hours a day, depending on demand."



## VARIABLE SPEED DRIVE AIR COMPRESSOR TRIGGERS ENERGY

“Without compressed air, we’d basically shut down.”

One resource that is crucial to the plant’s ongoing operation is a reliable supply of compressed air. Maintenance Supervisor Peter Cincotta explains.

“We have pneumatic motors that open and close machines. Air powers the diaphragm pumps that move wastewater and starch from the corrugators. Reverse-air cleaning filters remove starch on air bags. There are air-driven motors that mix ink in the printing process, and our printing plates and rolls are loaded using air. We have hundreds of feet of conveyors that are driven by electric motors, but the bladder bags that raise and lower the zone carriages are pneumatic. So is the braking system. The strapping operation at the end of the line has a dual platen system to raise and lower the strap around the track, adjust the tension and seal it. That’s pneumatic, too. Without compressed air, we’d basically shut down.”



In 2004, a combination of air starvation problems and rising energy costs convinced Dougherty and his team that it was time to upgrade the plant’s air compressor system. Working with Gerry Carney, Sales Representative at Atlas Copco’s New England Compressor Center, a new system was configured.

*Variable Speed Drive Compressor Triggers Energy Incentive Rebate*

Carney describes the installation. “The system uses two Atlas Copco compressors. The lead unit is a 75 hp GA55C-125AFF with built-in dryer. The trim unit is a 75 hp GA55VSD AFF with built-in dryer and Variable Speed Drive. The installation involved completing the plant’s air piping to form a closed loop system. We also installed a 1,550 gallon vertical storage tank equipped with a demand controller to regulate air pressure in the header line. We store compressed air at 120 psi, and a regulating valve downstream of the tank releases air to the plant at 85 psi. With the larger storage tank, demand controller, and completed piping line, the air starvation problem was eliminated.”





## REBATE AT CONTAINER PLANT

Dougherty explains that the system's energy-saving design qualified for an Energy Incentive Rebate from Massachusetts Electric Company. "That rebate lowered the cost of the project and shortened the pay-back period."

One key to qualifying for a rebate was the Atlas Copco Variable Speed Drive compressor, which automatically varies the production of compressed air to precisely match the demand. The storage tank provided another rebate opportunity since it is equipped with a regulator valve. (PCA Northampton also participated in a lighting rebate program to further cut its energy costs.)

"With the new compressors in operation, our power costs went down significantly," says Dougherty. "Comparing 2005 to 2004, we saved 16,000 kW per month, just from the compressor upgrade. That dropped the total electrical consumption in our plant by 4.3% to 384,000 kW per month. Here's another way to look at it: we produced more in 2005 but we used less electricity because of the new compressors."

### *Reduce Water Use by 3,500 Gallons per Day*

In addition to energy cost savings, the new compressors enabled PCA Northampton to cut the cost of buying and disposing of water. "Two of our old compressors were water cooled," Cincotta explains. "Getting rid of the water cooled units saved 3,500 gallons of water per day. That's over 100,000 gallons of water per month! Of course we had to pay for all that water, and then it went right down the drain increasing our monthly sewage charge. We worked on some ways to utilize the warmed water, but output temperatures weren't consistent enough to make it worth the effort. The air-cooled air compressor units eliminate these water expenses completely."

Packaging Corporation of America (PCA) produces a wide variety of corrugated packaging products, including conventional shipping containers used to protect and transport manufactured goods, and multi-color boxes and displays with strong visual appeal that help to merchandise packaged products in retail locations.

PCA Northampton, which also provides in-house services including packaging design, graphics, printing, gluing, and die cutting, is one of 66 PCA operations across America.



## VARIABLE SPEED DRIVE AIR COMPRESSOR TRIGGERS ENERGY REBATE AT CONTAINER PLANT

Of course heat remains a byproduct of air compression (no one can change the laws of physics), so the new compressors are situated to take advantage of latent heat output during cold weather. “We put the compressors right beside a door where we receive roll stock each day,” says Cincotta. “During the 20 minutes the truck takes to unload, cold air seeps in around the dock seal. The heat from the compressor helps keep that area a bit warmer when unloading.” When the heat is not needed, such as in warm weather, an overhead exhaust fan blows it outside.

With the air compressors in service for more than a year, Dougherty is pleased with their performance, reliability and efficiency. “We haven’t had any issues related to an outage of air,” he explains. “They run really great and use less energy. What more can you say?”

*For more information please contact:*

*For US Customers:*

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*info@atlascopco.compressors-usa.com*

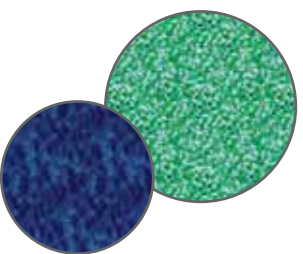
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# Membrane Dryers

## AT PAPER & PULP FACILITIES

BY COMPRESSED AIR BEST PRACTICES

Paper and pulp mills often have moisture in the compressed air. It causes the instrumentation operating the machinery, to malfunction and creates product defects. Plant engineers do not have simple solutions at hand, and like with most situations must weigh several alternatives. What most plant engineers will examine is how to solve the moisture problem, at the source, in the compressor room. This normally involves major capital expenditures in the form of replacement refrigerated or desiccant air dryers. Another alternative is to solve the moisture problem, at the point-of-use, with membrane air dryers.

### A Common Scenario

Most pulp and paper mills use refrigerated dryers which are undersized. They were sized for maximum ambient temperatures of 100 °F while, in reality, many paper mills see ambient temperatures of 120 °F, on a regular basis. The difference between these temperatures is tremendous in heat load and moisture content. To compensate, a refrigerated dryer needs 30% more capacity to maintain dew point (which it doesn't have).

INLET AIR TEMP @ 100 PSIG	REFRIGERATED DRYER CORRECTION FACTOR
100 °F	1.0
110 °F	0.82
120 °F	0.70

The result can be a significant amount of moisture leaving the air compressor room and traveling downstream, through (sometimes miles) of iron pipe — which begins to rust. A combination of water moisture, liquid and rust-flakes will arrive at a point-of-use application for compressed air.

### A Simple Solution

Membrane dryers offer the convenience of being very small and can be installed in-line, near the application in question. Compressed air enters the head the membrane dryer and comes into contact with membrane fibers. The fibers are able to separate the water vapor from the oxygen molecules. Differential in pressure moves the water vapor to where a side stream of process air (sweep air) can remove the water vapor to ambient. It should be noted that some membrane dryers will also sweep out the nitrogen with the water vapor — making the compressed air un-breathable. The compressed air (now clean, dry, enriched oxygen) now exits the outlet port for use.

Membrane dryers will offer a dew point range between +50 °F and down to -40 °F, depending upon the inlet air conditions. If a membrane dryer is hit with higher temperatures, then dew point will suffer and vice versa. The point-of-use application can simply size for worst-case scenarios and thereby ensure an uninterrupted supply of clean, dry air.

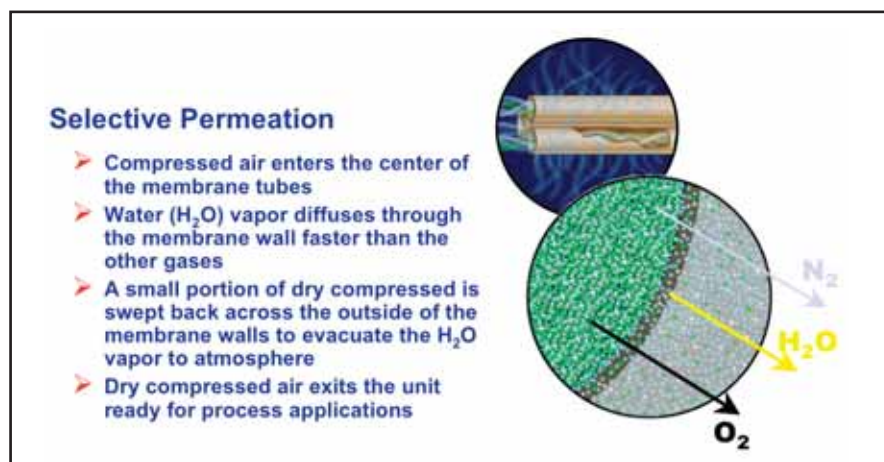


Image Courtesy of SPX Dehydration & Filtration

## MEMBRANE DRYERS AT PAPER & PULP FACILITIES

### Pre-filters Are Required

Membrane dryers cannot remove liquid water — and there will be plenty coming downstream. They also cannot filter solids — and there will be plenty of rust flakes arriving as well. If liquid water hits the membrane fibers, they will be ruined. No warranty will cover a membrane dryer against a slug of liquid. The costs to dry the fibers are also more than the cost to buy a new dryer.

Two pre-filters, therefore, are always recommended with a membrane dryer. The first should be a 1 micron particulate filter and the second an oil coalescer. To facilitate timely maintenance, most suppliers offer automatic alarms which can notify maintenance when a filter element change-out is necessary. Most are measuring differential pressure across the element and sending a signal from there.

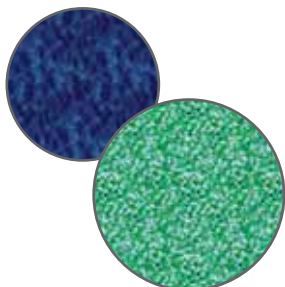
### Managing Purge

The sweep air, which is used to carry the water vapor out of the membrane dryer, can and should be managed. Left unchecked, this open port is capable of purging 20–30% of the compressed air flowing through it. Different manufacturers offer different solutions to reducing this purge flow. Most solutions involve purchasing optional check valves or other valve configurations designed to manage purge air losses. The compressed air savings are worth the investment.

### Fast & Easy

Sometimes the capital isn't available to replace all the dryers in the compressor room. Often the application in question cannot wait another six months for clean, dry compressed air. Membrane dryers offer a solution, within one week at very reasonable costs, to a troublesome point-of-use problem with moisture in compressed air.

For more information, please contact  
Compressed Air Best Practices  
at [rod@airbestpractices.com](mailto:rod@airbestpractices.com)



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# Alternative Energy: METHANE BIOGAS

BY PAUL GREEN

## High Pressure Air Compressors Open Door for Methane Biogas

The production of methane biogas continues to gain momentum as an alternative energy source and as a way to reduce greenhouse emissions. Dairy and cattle farms in the U.S. are considering the business opportunities that methane presents them. Traditionally seen as a fuel source capable of generating on-site electricity, high-pressure compressors are now making methane biogas a product which can be produced, stored, and shipped to Compressed Natural Gas (CNG) markets such as vehicles and industry.

## What is Methane Biogas?

Methane Biogas is produced by the controlled decomposition of livestock waste products. The anaerobic digestion process involves the breakdown of organic wastes, by bacteria, in the absence of oxygen. The acid-forming bacteria create a Methane Biogas composed of methane, carbon dioxide, and traces of hydrogen sulfide, ammonia, and water vapor. Methane Biogas has an energy content of 600 BTU/ft<sup>3</sup>.

METHANE BIOGAS*	COMPOSITION BY VOLUME
Methane	60%
Carbon Dioxide	35%
Hydrogen Sulfide	1.67%
Ammonia	1.67%
Water Vapor	1.67%

VARIOUS FUELS*	ENERGY CONTENT
Methane Biogas	600 BTU/ft <sup>3</sup>
Natural Gas	1,000 BTU/ft <sup>3</sup>
Propane	92,000 BTU/gallon
Butane	104,000 BTU/gallon
Gasoline (regular)	120,000 BTU/gallon
Diesel fuel	138,000 BTU/gallon



## Where does Methane Biogas come from?

The livestock wastes targeted are dairy cows, beef-feeder cows, and market hogs. The primary opportunities lie, however, with cattle farms and dairies. The average dairy cow will produce 30.2 cubic feet of biogas per day. This will translate into 18,000 BTU's of net energy per day. The greatest areas of cattle and dairy farms are found in the Midwest and in California.

A leader in environmental protection and concern, California has particularly good reasons for using bio-methane. The state is home to more than 1.7 million dairy cows, with a technically feasible potential for producing about 18 billion cubic feet of methane a year — equivalent to over 150 million gallons of gasoline.



Dairy Farm in Wisconsin Producing High Pressure Methane Biogas

## ALTERNATIVE ENERGY: METHANE BIOGAS



Paul Green, High Pressure Compressor Engineer, CompAir

### High Pressure Compression of Methane Biogas Opens New Markets

Methane Biogas has been used directly for cooking, lighting, space heating, water heating, grain drying, gas-fired refrigeration and air conditioning. It has also been transformed into electricity through the use of internal combustion, engine-driven generators. On-site use has been the first application due to the challenges presented by storing and moving Methane Biogas. Methane Biogas at ambient pressure is simply too bulky to put in storage cylinders and transport in a cost-effective manner.

Compressing Methane Biogas to higher pressures makes the gas easy to “bottle” and transport to customers. A compressor company, CompAir, installed a high-pressure compressor system, in early 2006, at a dairy farm in Wisconsin. The manure from 1600 head of dairy cows is being converted into Methane Biogas and is then compressed up to 3000 psig for placement into transportable storage cylinders. The dairy has already found local customers in local industry and local CNG vehicle re-fill depots.

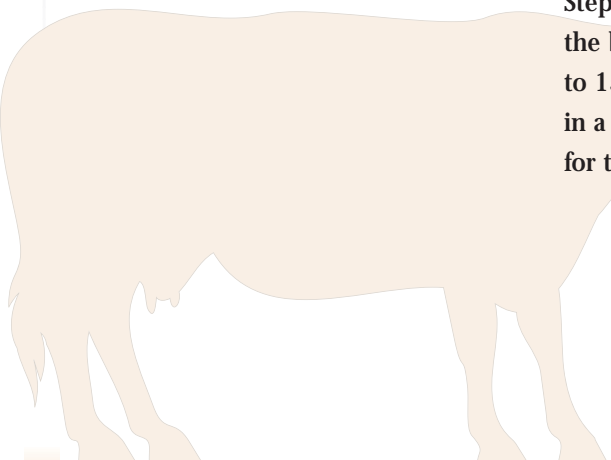
A specialist in high pressure air compressors, Mr. Paul Green of CompAir, notes “The break-even point is 1500 head of cattle. We are seeing cooperative efforts of 3–4 farms, of 500 head of cattle, making this work as well”.

### Methane Biogas at High Pressure\*

PRESSURE (PSI)	DENSITY (BTU/FT <sup>3</sup> )	ENERGY CONTENT (BTU/FT <sup>3</sup> )
14.7 (atmosphere)	0.0690	616
100	0.470	4,196
1000	5.34	47,686
3000	17.39	155,241
4000	21.34	190,744
5000	24.46	218,561

### A 5-Step Production Process

There are five steps in the production of Methane Biogas. The first step, of course, begins with the producer (the cow) who produces a product, Step 2 (manure). Step 3 is in a digester, which excludes oxygen and creates an environment where the bacteria can create Methane Biogas. Methane Biogas is then compressed up to 150 psig and purified in a dryer (Step 4). Finally, the gas is then compressed in a high-pressure air compressor/booster (Step 5) and stored in cylinders ready for transportation or for filling Natural Gas Vehicles (NGV's).





Step 1: The Producer



Step 2: The Product



Step 3: Digester at Dairy Farm



Step 4: Gas Cleaning

The high-pressure compressor designs are reciprocating-type compressors which come in air and water-cooled packages. Pressure capabilities go as high as 6000 psig and flows can range from 8–1,000 scfm. Package features will typically include:

- Compact modular design for small footprint with maximum flexibility
- Well balanced compressor design which requires no special foundations
- Individual compression stage separation uses high-efficiency separators that reduce moisture carryover between stages, thereby increasing component life
- Gas-recovery system means no loss of gas to the atmosphere
- Complete set of safety trips, indicators and PLC controller
- Packaged as ready-to-run modules

For more information contact Mr. Paul Green at CompAir USA: Tel: 937-498-2500, email: [paul.green@compair.com](mailto:paul.green@compair.com) or visit [www.compairusa.com](http://www.compairusa.com)

\*Source: Methane Fuel Gas from Livestock Wastes — A Summary, James C. Barker, Professor and Extension Specialist, Biological and Agricultural Engineering, North Carolina State University, Publication Number: EBAE 071-80



Step 5: CompAir Gazpack High Pressure Compressor

## COMPANY PROFILE

# PNEU-LOGIC

*Compressed Air Best Practices interviewed Mr. Bill McNamara (President) and Mr. Bryan Anderson (Director of North American Sales) of Pneu-Logic Corporation, based in Portland, Oregon.*

**Compressed Air Best Practices:** Good morning! How was Pneu-Logic formed as a company?

Good morning. Since 1999, a group of compressed air industry engineering professionals had been working on some innovative technologies designed to significantly reduce energy consumption and costs for industrial compressed air systems. Pneu-Logic was officially formed, in January of 2005, to commercialize these technologies worldwide. We received initial financial backing from some public organizations dedicated to industrial energy efficiency, and additional private investments continue developing Pneu-Logic's technology.

**Can you describe the mission of Pneu-Logic?**

Certainly. Our patented and innovative technology provides the most advanced energy saving management and control systems for industrial compressed air systems available today in the world. Simply stated, the cost of electrical energy required to generate compressed air is a very large and under managed percentage of most company's total industrial electrical energy costs (an average of 15%), and a cost that continues to increase every year. Providing companies with substantial energy cost savings, reducing energy consumption, and providing a much more stable and reliable supply of compressed air is what Pneu-Logic can do right now for virtually any industrial company in the world.

To give you a sense of scale for potential savings involved, we just returned from a gold mine in South Africa where we are proposing a Pneu-Logic solution for their installed capacity of 101,000 compressed air horsepower. We will be saving them, at a minimum, 10% of their total compressed air energy costs, resulting in a electrical energy cost savings of \$1 to \$1.2 million per year.





### How do you work with customers?

Long-term partnerships are how we do business with both our end user customers and with our Pneu-Logic Authorized Resellers worldwide. We work together in close partnership with companies who are committed to saving energy and costs — which is what we are all about. We provide strong technical, engineering and customer support, and focus on getting the best results possible for each customer's unique installation.

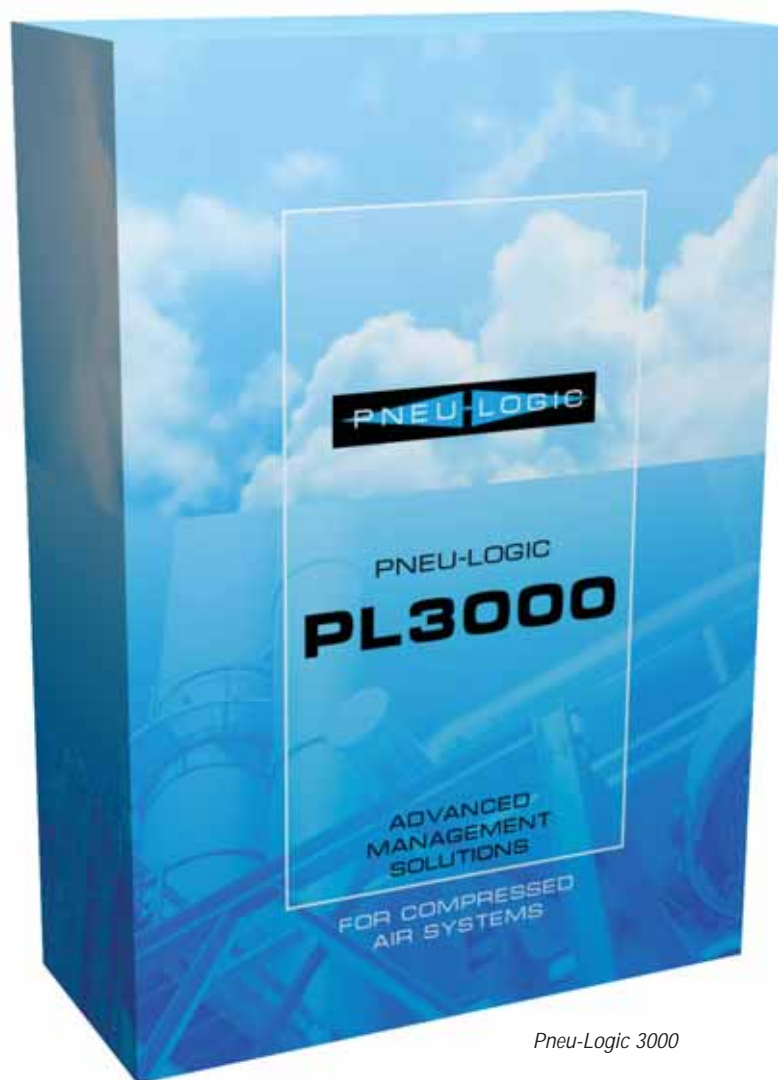
Most existing compressed air systems don't have a holistic or system-wide view of measuring and managing operating conditions in across all devices at the same point in time. Existing controllers tend to be discrete in their focus, often monitoring one compressor at a time. In the real world, compressed air systems are complex with many variables that need to be observed in 'real time' and controlled. Working together as partners with our customers, we look at the entire system and implement a true demand-based compressed air management solution, supplying only what and when the demand requires.

### Can you describe your flagship product — the Pneu-Logic 3000?

Sure. The Pneu-Logic 3000 is a computer and sensor network-based industrial control and management system for compressed air. The essential principle of Pneu-Logic's technology is to measure and manage air flow in the system, along with air pressure changes, in order to determine what the true demand of the system really is. The PL3000 is then capable of precisely controlling and managing any combination, of any type or manufacture, of air compressors that are available throughout the customer's system. This results in the appropriate amount of compressed air being supplied, with very little variation, in the most energy-efficient manner possible with the existing equipment.



*Mining Customer of Pneu-Logic*



*Pneu-Logic 3000*

## PNEU-LOGIC

**A lot of compressor sequencers focus just on air pressure, right?**

That is correct, and that is where our patented technologies and processes come into play. We measure air pressure AND air flow. We place air flow meters, which use high-quality elements, in critical points within the compressed air distribution network. We concentrate on critical source and consumption areas as points for measurement of both demand and supply managed system response.

There are two things to watch out for if a facility is only measuring plant air pressure:

1. The measurement of pressure in a compressed air system does not always speak accurately to the real supply of air flow needed for the work being performed
2. Pressure based management systems almost always lead to over-pressurization as a form of "safety factor", in order to compensate for insufficient air flow to meet production demand — which consumes more energy than is necessary.

For many years industry has been trained to think and talk in terms of air pressure. While it is not wrong to think about pressure, it simply is whole picture — nor is it the most important aspect of compressed air in relationship to work. The real measure of the actual work performed by any compressed air system is the air flow itself, within the required pressure range. For example, if you have "enough" static air pressure, this does not at all guarantee you will have enough air flow capacity to perform the required work. Only the flow or air itself performs the necessary transfer of energy to the consuming device. It is also a fact that increased air pressure also increases leakage rates due to increased stresses at joints and every coupling and connection point. These stress related issues only get worse when there are significant fluctuations caused by inadequate or nonexistent compressed air management systems.

**How does information from the sensors reach the PL3000?**

Every customer infrastructure is unique, and so we adapt the Pneu-Logic installation to meet their specific needs. For example, in some factories we connect to an existing Local Area Network (LAN). In others, we use direct data-signal wires. Others larger installations have used radio or networks. The PL3000 was designed as a network computer system from its inception, and so it can work with virtually any connectivity requirements at any customer facility.



US Naval Shipyard Customer of Pneu-Logic

## SUBSCRIBE NOW!

COMPRESSED AIR  
BEST PRACTICES

### COMING EDITIONS!

IDEAL GIFT FOR EMPLOYEES

### IDEAL FOR:

INDUSTRY:

Plant Engineers, Plant Managers & Maintenance Managers

MANUFACTURERS:

Management, Sales, Marketing & Engineering

COMPRESSOR DISTRIBUTORS:

Every Branch Location

Rates: 12-month Subscription

Number of Subscriptions	1-10	11-19	20-49	50+
U.S.	\$55.00	\$50.00	\$45.00	\$40.00
Canada	\$65.00	\$60.00	\$55.00	\$50.00
International	\$95.00	\$90.00	\$85.00	\$80.00

### 3 WAYS TO SUBSCRIBE\*

- 1.) Call Patricia Smith at 251-510-2598 and use your VISA/Mastercard.
- 2.) Email us at [patricia@airbestpractices.com](mailto:patricia@airbestpractices.com) and mail your check.
- 3.) Mail your information and check to: Compressed Air Best Practices  
161 Clubhouse Circle  
Fairhope, AL 36532

Checks should be made out to "Smith Onandia Communications, LLC"  
Questions, call Patricia Smith: 251-510-2598.

\*Information required:

First Name: \_\_\_\_\_

Last Name: \_\_\_\_\_

Company Name: \_\_\_\_\_

Street: \_\_\_\_\_

City: \_\_\_\_\_

State (Province): \_\_\_\_\_ Zip Code: \_\_\_\_\_

Country: \_\_\_\_\_

Phone: \_\_\_\_\_

email: \_\_\_\_\_

You describe industrial process latency as a big cost savings opportunity — can you elaborate?

Actually, the potential for productivity increases, reduced process related ‘spoilage’, and improved quality resulting from the use of Pneu-Logic’s fair flow based management system can often exceed the total energy savings. Aside from reducing over-all plant pressure requirements, we place a strong focus on eliminating industrial process latency in a facility. Process latency is caused whenever a manufacturing process is supplied with unstable (substantially fluctuating) air flow and pressure. Unstable working conditions make it very difficult for a machine or operator, for example, to increase the output of the machine. Unstable air flow and pressure will also increase maintenance and wear costs, increase spoilage rates, and reduce over-all machine life-cycles. By providing stable compressed air flow and pressure to critical processes, we have seen measured productivity improvements of 1.5% occur in some major manufacturing facilities.

What kind of metrics and reports can be generated?

Many compressor sequencers or on-board compressor PLC’s do not provide much in the way of analytics or reports. Pneu-Logic’s technology provides standard and customizable business-metrics and reports which will permit the energy costs, related to compressed air, to be managed and reduced. For too many years now, manufacturing facilities have not had the ability to directly measure and manage their compressed air system. This is substantial opportunity available now to most factories. Many of our customers feel that the reporting capabilities of the PL3000 is an essential feature.

How is your company structured?

We work directly with end users in North America and worldwide through our Authorized Reseller network, or directly. We also have a strong inside support team which helps distributors, and offer strong technical support capabilities to our customers. We are currently building an international network of Resellers who share our commitment to energy-savings and long-term partnerships.

*Thank you Pneu-Logic for your insights.*

For more information please contact  
Mr. Bryan Anderson, Pneu-Logic Corp.,  
tel: 503-718-0127,  
email: bryan.anderson@pneu-logic-corp.com

“Eliminating process latency has realized productivity improvements of 1.5% with our customers”

BILL MCNAMARA, PRESIDENT,  
PNEU-LOGIC CORPORATION



Pneu-Logic Personnel Bryan Anderson (Director of North American Sales) and Dusty Smith (Manager of Professional Services)

# ARROW DRYERS BY McINTIRE

BY JIM DONOHUE

As most people in the compressed air and gas industry are aware, Arrow Pneumatics sold their dryer division to McIntire Company of Bristol, Connecticut in December of 2005. Given the current climate in the industry, this was not a surprise. However, the biggest question on most people's minds has been "Who is McIntire?"

McIntire Company was founded in Parsippany, New Jersey in 1925. They started in business by making refrigeration filter dryers and soon expanded their line to include cartridge filters, small regenerative dryers, humidity indicators and other pneumatic drying equipment and accessories. Business boomed throughout the 40s and 50s but it wasn't until the mid 1960s when McIntire detoured from industrial products.



Refrigerated Dryers 5-2000 CFM



McIntire's new home was built in 1999 and is dedicated to the manufacture of compressed air dryers.

Also located in Parsippany New Jersey was AT&T's research and development arm, Bell Labs. This division created many of the household communication items that we now take for granted. However, in 1963, AT&T had a new need for a machine that could pressurize underground telecommunication cables to prevent moisture from entering and destroying the cable. Given their stellar reputation, the first call was to McIntire.

McIntire soon introduced a new product line of compressor/dryer packages that were used by the Bell Companies to pressurize both underground and arial cables. Over the following years, McIntire focused on product improvements and innovations and has been the benchmark for other dryer manufacturers who have tried to compete in this marketplace. However, it wasn't until 2001 that the world would come to know the greatness of McIntire products.

Beginning in the early 1990s, McIntire began an aggressive campaign to grow their business within the telecommunications industry by acquisition. By 1999, McIntire had acquired three companies, ADK Pressure Equipment, a competitive manufacturer of telecommunication air dryers; Dahl, a manufacturer of specialized fittings, manifolds and accessories for cable pressurization and Western Progress, Inc. a manufacturer of confined space entry equipment. Also, due to the changing needs of their customer base McIntire began working with customers to produce customized air pressurization products and packages.

One such product allowed our nation rise from the ruins of a New York City landmark. Prior to the events of 9/11, McIntire built a mobile compressed air system for the phone company in Manhattan. The intention of this system was to provide compressed air to telephone central office switching stations in the event of a power outage or brownout. Manhattan is home to some of the largest such switching stations in the country, but the largest switching station in the world is less than a block from what we would come to know as ground zero.



McIntire's original product portfolio

## ARROW DRYERS BY McINTIRE



*McIntire's state of the art production facility.*



As the dust from the collapse settled, phone company employees began trying to save what they could. Their first move was to start up the McIntire mobile compressed air system. They had no idea what the challenges would be in coming days, but more importantly they hardly knew where to start. There was extensive damage done to the most critical parts of the central office, parts of the building were completely flooded due to a nearby broken water main and the building was nearly condemned. Workers stormed through the night, sleeping wherever they could, some working shifts in excess of 24 hours. With debris still smoldering feet away, they worked feverishly to regain communications to lower Manhattan.

Less than one week after 9/11, America woke to news of Wall Street being open for business, and life getting back to "normal" in lower Manhattan. This was due in no small part to the men and women who worked through the night to restore communications, however, when it came time to splice new phone lines, they found that the cables that had been submerged in contaminated water for almost a week were surprisingly usable, due to the constant air pressure being fed to them by the McIntire mobile compressed air system.

As the economy struggled in the years after 9/11, so did the telecommunications industry. Most of the major Regional Bell Operating Companies had begun planning to replace their copper based communication networks with fiber optics, which do not require pressurization. As McIntire began to realize the growth potential within the telecommunications industry was dwindling, they began to look to other markets in which to expand. The first look was at wireless communications. In early 2005, McIntire introduced an air dryer system specifically designed for use with wireless communications.

In late 2005, McIntire announced the acquisition of the air dryer division of Arrow Pneumatics. This was their first step in returning to the industrial dryer market and their first year in the business was met with many challenges and great success. In early 2006, McIntire moved production of the F-Series, High Performance and Heavy Duty Series from Broadview, Illinois to Connecticut. The heatless, heated and blower purge regenerative dryers followed very soon after.

The future of the Arrow Dryers product line is a promising one. McIntire's vision for 2007 is one of quality and availability at a competitive price. McIntire is also dedicated to promoting this product line through advertising, attendance at key trade shows and unparalleled support of our field sales reps. Also In 2007, McIntire is making electronic timer drains standard on refrigerated dryers under 100 CFM, and energy efficient, zero-loss drains on dryers over 125 CFM. Additionally, development of an energy efficient cycling dryer is currently underway, with plans to release it to the market early in the year. McIntire is planning to continually improve their marketing materials and web presence while still continuing to improve service and delivery to offer an excellent overall value to their customers. McIntire also fully supports several strategically placed remote warehouses, including one in southern California, the Pacific Northwest, Arizona, Texas, Florida and Ontario, Canada.

*For more information on McIntire and the Arrow Dryers product line, please feel free to contact Jim Donohue, Sales and Marketing Manager, toll free at 877-640-8300 or e-mail [jdonohue@mcintireco.com](mailto:jdonohue@mcintireco.com). Visit us online at [www.airtreatmentproducts.com](http://www.airtreatmentproducts.com).*



*Heatless, Heated and Blower Purge Regenerative Dryers up to 12,000 CFM*

“McIntire’s vision for 2007 is one of quality and availability at a competitive price.”

## ROCKWELL AUTOMATION SOLUTION CUTS ENERGY CONSUMPTION

BY COMPRESSED AIR BEST PRACTICES

## Rockwell Automation

“Money wasting breakdowns are now prevented with the expansive energy calculations.”

The Indian tractor manufacturer sought a drive systems solution along with new monitoring systems and an energy fix that would pay for itself in a short amount of time. Through energy reduction, the upgrade paid for itself within 13 months.

### *Background*

New Holland roots go back to its namesake, the small U.S. town of New Holland, Pennsylvania. The New Holland Machine Company opened its doors in 1895 as a one-man machine repair shop and went on to carve its niche in the 20th century as an innovator of agricultural equipment that is made and sold around the world and has standardized on Rockwell Automation products.

New Holland Tractors has one of its wholly owned subsidiaries in India and is a leader in the local market and a major player on the global stage. When the facility, located in Greater Noida, near New Delhi, opened its doors in 1998, it specified the inclusion of Allen-Bradley control systems. Today, the plant produces 1,000 units a month and serves 10% of the Indian tractor market with annual sales of US\$100 million.

### *Challenge*

Energy waste in the compressor line throughout the Indian plant was having a negative effect on profit margins. The company sought to improve energy waste by introducing control and monitoring systems that would minimize energy losses and reduce mechanical and electrical breakdowns in the compressor unit.

In the compressor line, excessive energy waste and pressure variation affected several different departments in the plant, including the paint shop, assembly line, utility area, engineering and machine shop. Increases and decreases in air pressure required constant management because requirements varied from department to department. Great quantities of energy were wasted because the motor would run at full speed when the compressor switched between load and no load conditions.

To reduce costs and improve its competitive position, New Holland India decided to decrease power consumption and improve energy system monitoring of such things as voltage, current, power factor, load and harmonics. The challenge was to achieve this with a small investment that delivered a quick payback.

### *Solution*

New Holland India sought answers from the local System Integrator M/S Elcon System Pvt. Ltd., which partnered with Rockwell Automation for a solution.

Working together, the Elcon/Rockwell Automation team proposed a plan that helped New Holland with the decision making process. The team gave the manufacturer a demonstration and a 10-day trial period. The company quickly assessed long term savings and chose Elcon/Rockwell Automation over its competitors.



# BY 35% AT NEW HOLLAND TRACTOR INDIA

The solution included the installation of a pressure transmitter at the input point of the pressure line and an Allen-Bradley 125 HP Variable Frequency Drive (VFD) to vary the motor speed automatically. The features allowed the motors to run at low speed when more pressure was required and immediately saved energy and improved the power factor to unity.

With the AC variable speed drive, New Holland could automatically adjust pressure during various operating conditions without losing operational efficiency. A solution that offered maximum savings in energy costs.

Monitoring process details for critical parameters as the power factor, harmonics and demand load, was achieved with the installation of power monitors connected to a network running a specialized power software RSPower32. One monitor was placed in each of the plant's seven key departments and included six - PM3000 and 1 - PM2. Energy calculations were now achieved automatically along with easy monitoring of such things as tripping, voltage dipping and power failure.

### Results

The Rockwell Automation/Elcon solution helped New Holland India reduce energy consumption by 35% and the system now operates automatically with no manual intervention.

Without losing efficiency of its operation, New Holland achieves their savings due to their new ability to automatically vary their pressure amounts. The savings means the company will have paid for its investment within 13 months, a key objective from the start of the project.

The company also reports they are now getting automated regular reports for each department and are able to track various trends and data, which have increased efficiency. Money wasting breakdowns are now prevented with the expansive energy calculations. Moreover, the company is now able to measure and correlate power consumption with production output.

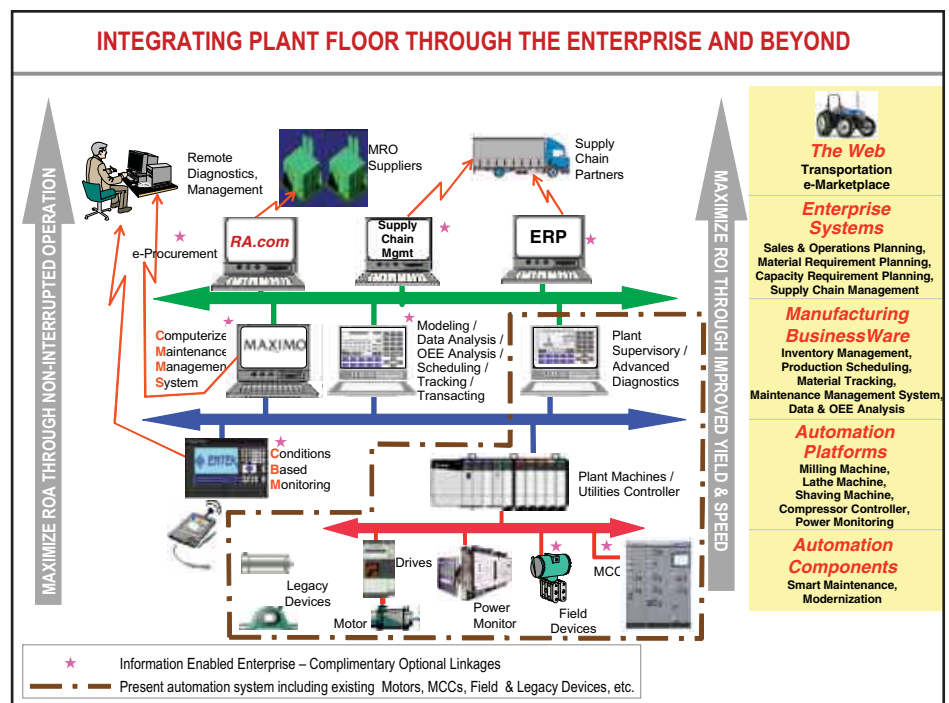
New Holland India assistant manager and plant engineer Pawan Uppal said he is extremely happy with the results.

"The realization of savings by controlling our compressors has been a remarkable achievement," he said, adding that the "support system was key in the operational success."

New Holland India plans to involve Rockwell Automation in future energy saving undertakings and PLC/SLC based automation projects.

The architecture on the following page depicts Rockwell Automation's concept of an Information Enabled Enterprise. The area outlined with a brown dash line represents the present automation level under discussion in this document. The remaining portion illustrates a host of solutions that Rockwell Automation can provide today to integrate the plant floor to the enterprise and beyond.

For more information please visit [www.rockwellautomation.com](http://www.rockwellautomation.com)



# INDUSTRY NEWS

Press Releases

## HITACHI INTRODUCES VORTEX BLOWER TECHNOLOGY TO NORTH AMERICA

TARRYTOWN, NY, November 13, 2006 — Hitachi America, Ltd., Industrial Systems Division, today announced introduction of Vortex Blower Technologies into North America. Hitachi's 37 years of Vortex Blower experience and nearly 100 years of compressed air experience are the foundation for these innovative products.

Features of both the E-series High Capacity and G-series High Pressure Vortex Blower line include but are not limited to:

- Flexible application for both air discharge and suction.
- Sound levels as low 49 dB(A)
- UL Listing
- Completely oil-less design
- Patented three dimension impeller to provide high discharge pressures
- Usage with Hitachi inverters for optimum energy efficiency

Hitachi's Vortex Blower products are part of the Air Technology Group, which is to be based in Charlotte, NC. The facility will be 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](http://www.hitachi.us) or contact [airtechinfo@hal.hitachi.com](mailto:airtechinfo@hal.hitachi.com).

Hitachi America, Ltd., Industrial Systems Division, supplies a broad range of industrial products and services. The division supplies sophisticated industrial equipment, components and services for application in pharmaceutical plants, food & beverage processing, steel making, mass transit systems, chemical plants, and other manufacturing facilities.

Hitachi America, Ltd., a subsidiary of Hitachi, Ltd., markets and manufactures a broad range of electronics, computer systems and products, and consumer electronics, and provides industrial equipment and services throughout North America. For more information, visit <http://www.hitachi.us>.

Hitachi, Ltd., (NYSE: HIT/TSE: 6501), headquartered in Tokyo, Japan, is a leading global electronics company with approximately 356,000 employees worldwide. Fiscal 2005 (ended March 31, 2006) consolidated sales totaled 9,464 billion yen (\$80.9 billion). The company offers a wide range of systems, products and services in market sectors including information systems, electronic devices, power and industrial systems, consumer products, materials and financial services. For more information on Hitachi, please visit the company's website at <http://www.hitachi.com>.



# HITACHI

## NEW CATALOG FEATURES SERIES QR1 PNEUMATIC PUSH-IN FITTINGS

With the QR1 series, Rexroth provides a comprehensive inch and metric (ISO-G) program for its pneumatic components. In addition to the Mini and Standard programs, the complete fitting program also includes various function fittings.

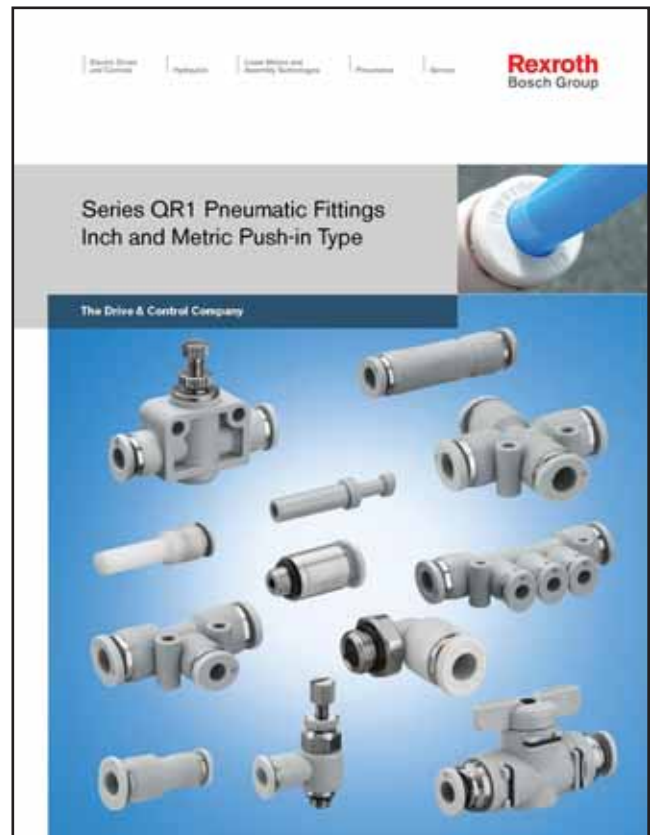
Rexroth catalog SC-400.10 features 128 pages of technical and ordering information and a features overview section on Series QR1 pneumatic push-in fittings. Series QR1 (Quick Release) fittings are equipped with a user-friendly oval plastic release ring that enables fast connection and release of compressed air tubing, making them easier to use than standard push-in fittings.

The Mini design has been created for plastic tubing ODs of  $\frac{1}{8}$ " to  $\frac{1}{4}$ " and 3–6 mm. This variety of fittings is completely new at Rexroth and rounds out the product spectrum specifically for the small handling sector. The Standard design fittings can be used for tubing ODs of  $\frac{3}{32}$ " to  $\frac{1}{2}$ " and 4–16 mm. Products such as check, ball and flow control valves are also included in the range of function fittings.

Bosch Rexroth AG, part of the Bosch Group, achieved sales of approximately \$5.7 billion (4.6 billion Euro) in 2005 with over 28,200 employees. Under the brand name of Rexroth the company offers all drive and control technologies, from mechanics, hydraulics and pneumatics to electronics and associated service. Over 500,000 customers worldwide utilize Rexroth's unique technological know-how to implement their innovative and future-oriented systems and machine concepts. The global player, represented in over 80 countries, is an extensive supplier of components and systems for industrial and factory automation and mobile applications. For more information visit [www.boschrexroth-us.com](http://www.boschrexroth-us.com).

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**Rexroth**  
Bosch Group

## INDUSTRY NEWS

Press Releases

## PARKER HANNIFIN INTRODUCES NEW P5T2 SERIES SHORT-STROKE THRUSTER

Wadsworth, Ohio, December 6, 2006 — The Actuator Division of Parker Hannifin Corporation (NYSE:PH) introduces the new P5T2 Short-Stroke Thruster. The P5T2 Series features short-stroke, heavy-duty performance in a smaller footprint than conventional thrusters that use external cylinders.

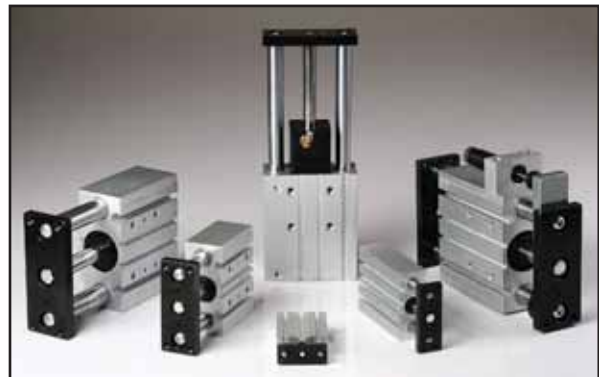
Parker's innovative design of the P5T2 addresses requirements in the packaging, conveyor and assembly markets where available space is limited and loads are typically substantial. The P5T2 Series is ideal for handling frequent stops on conveyor equipment, tamping and pressing on packaging machinery, as well as the unloading/loading and clamping processes on assembly machinery.

The P5T2 Series is available in 12, 16, 20, 25, 32, 40, 50, 63, 80, and 100mm bore sizes with strokes up to 200mm. Maximum operating pressure is 1MPa (10 bar/145 psi). Primary features of the series include standard through-hole mounting on all sizes and available rear mounting — when special ordered — on all sizes, ensuring drop-in capabilities for a variety of installations. Top porting is standard, but rear and side porting are available on all sizes as well. A true rod-lock mechanism, which stops the unit in current position upon loss of air pressure, is available on 32mm through 100mm bore sizes.

Construction of the P5T2 thruster features an aluminum body and end caps; steel tool plate, support rods, and rod bolts; and a stainless steel piston rod. Standard nitrile seals operate at temperatures between -18 to 74 °C, 0 to 165 °E. Fluorocarbon seals are available for high-temperature applications and have an operating range of -18 to 121 °C, 0 to 250 °E.

A PTFE impregnated composite bushing is standard on all P5T2 models and provides high load carrying capabilities with excellent resistance to shock loading. Optional linear ball bearings provide precision operation with very low friction and wear.

*For more information about the new Parker P5T2 Series, contact Parker Hannifin Corporation, Actuator Division. Phone 330-336-3511 and ask for Catalog AU03-1838/US or visit us online at [www.parker.com/actuator/sys](http://www.parker.com/actuator/sys).*



  
anything possible

## AGGREKO OPENS NEW FACILITY IN MIAMI

MIAMI — (BUSINESS WIRE) — Dec. 5, 2006 — Aggreko, LLC (“Aggreko”), the world leader in rental power and temperature control solutions, announced today that, through the acquisition of GE Energy Rentals (Aggreko has just acquired substantially all the GE-ER activities, other than those relating to large gas turbines), it has opened a new facility to provide rental power generation, temperature control and oil-free compressed air solutions to industrial and commercial operations in South Florida.

“For the past several years, we have been serving the Miami market through our facilities in North Florida,” said Tim Ainslie, Area Sales Manager. “With Aggreko’s global acquisition of GE Energy Rentals, we have acquired their Miami location and will now have the ability to serve this market directly with an expanded fleet, including generators, oil-free air compressors, chillers, air conditioners and ancillary equipment. In addition, our strong sales and service team will be supported by our nationwide network of over 50 locations and our staff of experienced professionals.”

For over 20 years, Aggreko has been providing rental power and temperature control solutions throughout North America to the entertainment industry, including sport events such as the PGA Tour, the Olympic Games and Super Bowls; and to industries such as shipping and associated port services, construction, facilities management and manufacturing.

Aggreko’s new Miami facility, located at 2100 NW 82nd Ave, is ideally situated to serve industry and commercial interests throughout South Florida. It is approximately five miles from the Miami International Airport and adjacent to the Port of Miami.

**CONTACT:**

*Aggreko, LLC  
Rod Jay, 281-985-8200  
Marketing Manager*

*Amy Stine, 281-985-8200  
Communications Specialist  
Amy.stine@aggreko.com*

The logo for Aggreko, featuring the word "aggreko" in a lowercase, bold, orange sans-serif font.

## INDUSTRY NEWS

Press Releases

### REDUCED NOISE LEVELS!

*One-to-one direct drive for maximum efficiency and reliability*

Kaeser Compressors Inc. announces the latest additions to our direct drive rotary screw compressor line — the new FSD series compressors in 350–450 hp models. Available in flows from 1250–2003 cfm and pressures to 217 psig, FSD compressors are designed for efficiency, reliability, and minimal maintenance.

These state-of-the-art units feature our optimized Sigma Profile airend, patent-pending Sigma Control system and the latest one-to-one direct drive technology. The FSD units are true direct drive compressors with an oversized airend connected directly to the motor via a maintenance free coupling for maximum efficiency.

Units are now available in either air-cooled or water-cooled models. Kaeser's unique cooling air flow design includes a powerful radial fan that significantly reduces noise levels and provides superior cooling. All models are fitted with a re-designed, high-efficiency separator system for extremely low oil-carry over. And for applications with varying demand, the FSD is also available with variable speed drive.

For more information, please call 800-777-7873 or visit us at [www.kaeser.com](http://www.kaeser.com).



**KAESER**  
COMPRESSORS

*Built for a lifetime.™*

## NEW AIR SERVICES FROM FESTO

### *Air Consumption Analysis*

Using too much or not enough compressed air?

Let Festo help you find the answer. . .

With the growing demands of end users to validate their air consumption figures, there is a major incentive to improve performance. What may hamper many is the lack of skills and appropriate technologies for accurate air consumption measurements.

The new Air Consumption Analysis Service from Festo gives machinery OEMs the ability to document air usage figures for new or existing equipment. The detailed analysis provided by Festo enables manufacturers to reduce compressed air costs and optimize distribution networks. From flow measurement on the machine level to the analysis and documentation of the values calculated, tailor-made solutions help the machine builder to calculate and document the vital characteristic values for the end user resulting in a more reliable and efficient compressed air supply system.

**Air Consumption Analysis includes:**

- Measurement of compressed air consumption and pressure
- Generation and documentation of defined values
- Complete support through your Festo technical consultant



**With the Air Consumption Analysis, you can expect:**

- Highest Precision — through the use of the most modern, regularly calibrated and tested measuring equipment and software
- Rapid Availability — through a comprehensive and worldwide service network
- High Levels of Competence — through continuously trained pneumatic specialists
- Reduced Costs — the purchase of expensive measuring and testing equipment is no longer necessary
- Customer-Specific Solutions — each service is tailored to the individual machine and includes specific suggestions for improvement.

For more details, please visit: [www.festo.com/us/airservices/FACA](http://www.festo.com/us/airservices/FACA)  
<<http://www.festo.com/us/airservices/FACA>>

*Festo is a leading global manufacturer of pneumatic and electromechanical systems, components and controls for industrial automation, with 56 national headquarters serving more than 180 countries. For more than 80 years, Festo has continuously elevated the state of manufacturing with innovations and optimized motion control solutions that deliver higher performance, more profitable automated manufacturing and processing equipment. Our dedication to the advancement of automation extends beyond technology to the education of current and future automation and robotics designers with simulation tools, teaching programs, and on-site services.*

# FESTO

## INDUSTRY NEWS

Press Releases

## NEW EASIDEW 2-WIRE DEWPOINT TRANSMITTER

Kahn Instruments, Wethersfield, CT, a leading manufacturer of advanced moisture-measurement instrumentation is proud to announce that we have upgraded our Easidew Dewpoint Transmitter. The new and improved Easidew 2-Wire Transmitter is a low cost, rugged dewpoint transmitter for continuous measurement in compressed air or process gas.

New and improved features include:

- The ability to be connected in a 2-wire, loop powered configuration, while maintaining complete backward compatibility with all existing 3-wire installations
- An output that is configurable in PPMv moisture content (0-100, 0-1000 and 0-3000 PPMv ranges)
- A new 10 micron HDPE sensor guard designed to show contamination for service ease
- Improved software and firmware to protect calibration from the most severe levels of EMI

The Easidew Transmitter has a dewpoint measurement range of -148 °F to +68 °F and an accuracy of  $\pm 3.6$  °F. The instrument also features a field adjustable 4-20 mA linear analog output, resettable failure modes for Over Range, Under Range and Sensor Fault conditions, and temperature compensation.

The Easidew Transmitter is economical to purchase, install and maintain. Volume manufacturing allows Kahn to keep the price low. Installation costs are minimal, because of the transmitter's ruggedness and simplicity. And ongoing operating costs are low, because the Easidew Transmitter is reliable and durable. Only periodic re-certification is required to maintain calibration accuracy. Kahn even offers an exchange program so a customer's process is never out of operation.

*For further information, contact:*

*Kahn Instruments, Inc.*

*885 Wells Road*

*Wethersfield, CT 06109*

*Phone: (860) 529-8643*

*Fax: (860) 529-1895*

*E-mail: [hygros@kahn.com](mailto:hygros@kahn.com)*

*Web: [www.kahn.com](http://www.kahn.com)*

*Contact: Robert T. Bailey, Product Manager*



**KAHN**  
KAHN INSTRUMENTS, INC.



## FLUID METRICS INTRODUCES COMPRESSOR OIL PURIFIERS

*Increase Fluid Life and Air Compressor Reliability with Acid Adsorption and Ultra-fine Filtration*



Atlanta, GA — Fluid Metrics, LLC introduces a revolutionary, proactive maintenance device designed specifically for oil-flooded rotary screw air compressors. The Fluid Metrics' Compressor Oil Purifier (COP), with ProACT Acid Control Technology, combines proprietary ion exchange acid adsorption with ultra fine particle filtration to remove the acids and catalytic solids known to accelerate oil degradation, wear, corrosion and fouling in rotary screw compressors. The system employs a patent-pending, K9 housing cartridge manufactured by Schroeder Industries.

Fluid Metrics recognized that specific fluid contaminants (acids and ultra-fine solids) were the root cause of most compressor repairs

and failures and, with the elimination of these pollutants, compressor users would realize dramatic extensions in the service life of expensive compressor fluids, separators, bearings, and shaft seals.

With this knowledge, Fluid Metrics turned to the recognized leaders in filtration and fluid conditioning, Schroeder Industries, and leading innovators in synthetic compressor lubricants and liquid separation, The Dow Chemical Company, for state-of-the-art technologies designed to target and remove these contaminants. The result of this collaboration is an innovative, cost-effective line of COP's that easily mount onto any rotary screw compressor to purify the oil, reduce maintenance and operation costs, and increase compressor reliability.

Unlike traditional and more costly "preventative" maintenance techniques that rely upon the regular replacement of expensive fluids and separators to rid compressors from contamination, the COP is a "proactive" maintenance device that selectively removes destructive, clearance-sized solids and corrosive acids before they can negatively impact fluid and component service life.

The heart of the COP's ProACT Acid Control Technology is its patent-pending cartridge design by Schroeder Industries. The COP cartridges utilize a dual core design that incorporates an outer core of high dirt holding capacity synthetic media to remove solids down to 3 microns absolute, followed by an inner core of proprietary ion exchange media specially developed by Dow Chemical to adsorb and neutralize acids that are produced and accumulated in synthetic compressor fluids.

This unique combination of separation technologies has produced dramatic results, extending compressor fluid life by three to five times, extending separator life by two to three times, and lowering

compressor energy consumption by as much as 3 percent. Performance of the COP is easily verified through routine oil analysis by monitoring fluid Total Acid Number (TAN), pH and ISO particle counts.

The COP installs easily in an auxiliary loop to the compressor's main oil circuit. Unlike standard full flow oil filters, where filtration performance is limited by pressure drop, the COP purifies a relatively small slip-stream of oil at low velocities and high surface areas, thereby maximizing contact time with both filtration and acid removal medias. Each COP comes complete with its own installation kit which includes a mounting bracket, high pressure supply and return hydraulic hoses, flow meter, sight flow indicator, automatic vent, sample and drain valves, and isolation valves that permit cartridge replacement without having to shut down the compressor.

The Fluid Metrics' COP can be used on any brand rotary screw air compressor and with all of today's most common compressor fluids, including Polyglycol/POE, PAO, Food Grade PAO's, Hydro-treated Petroleum, and Ester based fluids. The COP will benefit all compressors, whether they are operating in a normal environment and achieving full fluid life, or operating in a severe environment with drastically reduced fluid life. The COP is ideal for any industrial end-user of oil-lubricated rotary screw air compressors, including the pulp and paper, mining and steel, chemical processing, food and beverage, oil and gas, carpet and textile, and general manufacturing markets.

*About Fluid Metrics, LLC*

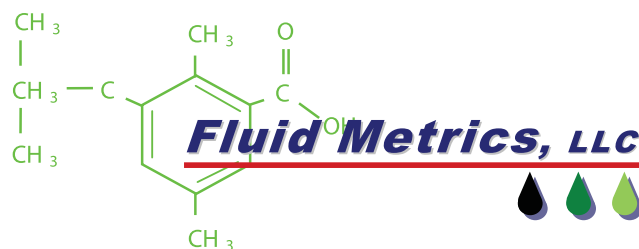
*Fluid Metrics, LLC is the leading provider of proactive maintenance acid control technologies to the compressor industry. Fluid Metrics is dedicated to creating value for its customers by designing and marketing engineered solutions that reduce user cost and improve equipment performance and reliability.*

*For further information about Fluid Metrics and its products, call 770-393-8636 or visit [www.fluidmetrics.com](http://www.fluidmetrics.com)*

*About Schroeder Industries*

*Schroeder Industries designs, manufactures and markets filtration products for the fluid power industry. Schroeder is a leader in filtration and fluid conditioning. Their expertise in filtration technology, superior filter and element manufacturing capabilities, dedication to customer service, and product support are the reasons Schroeder is considered "The Filter Company."*

*For further information about Schroeder Industries and its products, call 724-318-1100 or visit [www.schroederindustries.com](http://www.schroederindustries.com).*



# JOB MARKET

Job Openings in the Compressed Air Industry

## GRS · GRS FLUID HANDLING

### REGIONAL SALES MANAGER — CALIFORNIA

GRS Fluid Handling is working on a search for a client of ours — a strong compressor manufacturer, serving a variety of industries worldwide. They are a strong company with a track record of customer satisfaction. This position, as a Regional Sales Manager, will sell Industrial Air Compressors throughout a California territory.

**Requirements:**

- 2-5 years sales experience; \*\*\*Must have channel management experience
- Knowledge of California account base as well as surrounding areas
- Some applications experience, preferably dealing with compressed air systems
- A strong personality and attitude
- A college degree is strongly preferred for this position.

This is a highly visible position that offers a chance for advancement, great benefits, challenge and opportunities with a strong, stable company.

### SALES POSITION — NORTHERN FLORIDA

GRS Fluid Handling is working on a search for a leader in the compressor industry. Their presence in Florida makes them one of the strongest companies in compressed air, with strong product offerings and great service. This position, in sales, will be responsible for targeting potential OEM customers and introducing product to new markets.

**Requirements:**

- Knowledge of compressed air products and systems
- 3-7 years Outside Sales experience
- Strong sales presence, and the ability to make large scale sales
- Ambition to succeed and desire to bring solutions to industrial businesses
- Residence or relocation in Northern Florida

Along with being in a beautiful location, this position offers daily challenges and strong company support. It interacts with sales, marketing, and engineering, and offers the chance to progress in a company that rewards excellence.

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](mailto:cabc@grsrecruiting.com).



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[www.grsfluidhandling.com](http://www.grsfluidhandling.com)

## Compressed Air Best Practices

### JOB MARKET ADVERTISING RATES

#### MAGAZINE ADS

For smaller classified-type ads use the following rates per column inch:

1x per year: \$94.00\*  
per column inch

3x per year: \$90.00\*  
(i.e., this is a 10 col. inch, reversed ad)

12x per year: \$84.00\*  
\*reversed ads = 1.5x normal price

Add \$50.00 to post the job opening on [www.airbestpractices.com](http://www.airbestpractices.com) when you purchase an ad in the magazine

Contact Patricia Smith for 4 color full page, 1/2 page and 1/3 page ad rates

#### ONLINE ONLY ADS

Each job posting is up on the site for 60 days. Postings can be purchased in bulk quantities per the rates below. The customer has twelve months to put the postings on the site. After twelve months, any unused postings will be charged at the minimum quantity.

Small Qty.	Price Per Posting	Bulk Qty.	Price Per Posting
1	\$250	5-9	\$185
2	230	10-24	170
3	210	25-49	150
4	195	50+	135

[patricia@airbestpractices.com](mailto:patricia@airbestpractices.com),  
tel: 251-510-2598



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With near-unity power factor, 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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