The Magazine for ENERGY EFFICIENCY in Compressed Air Systems

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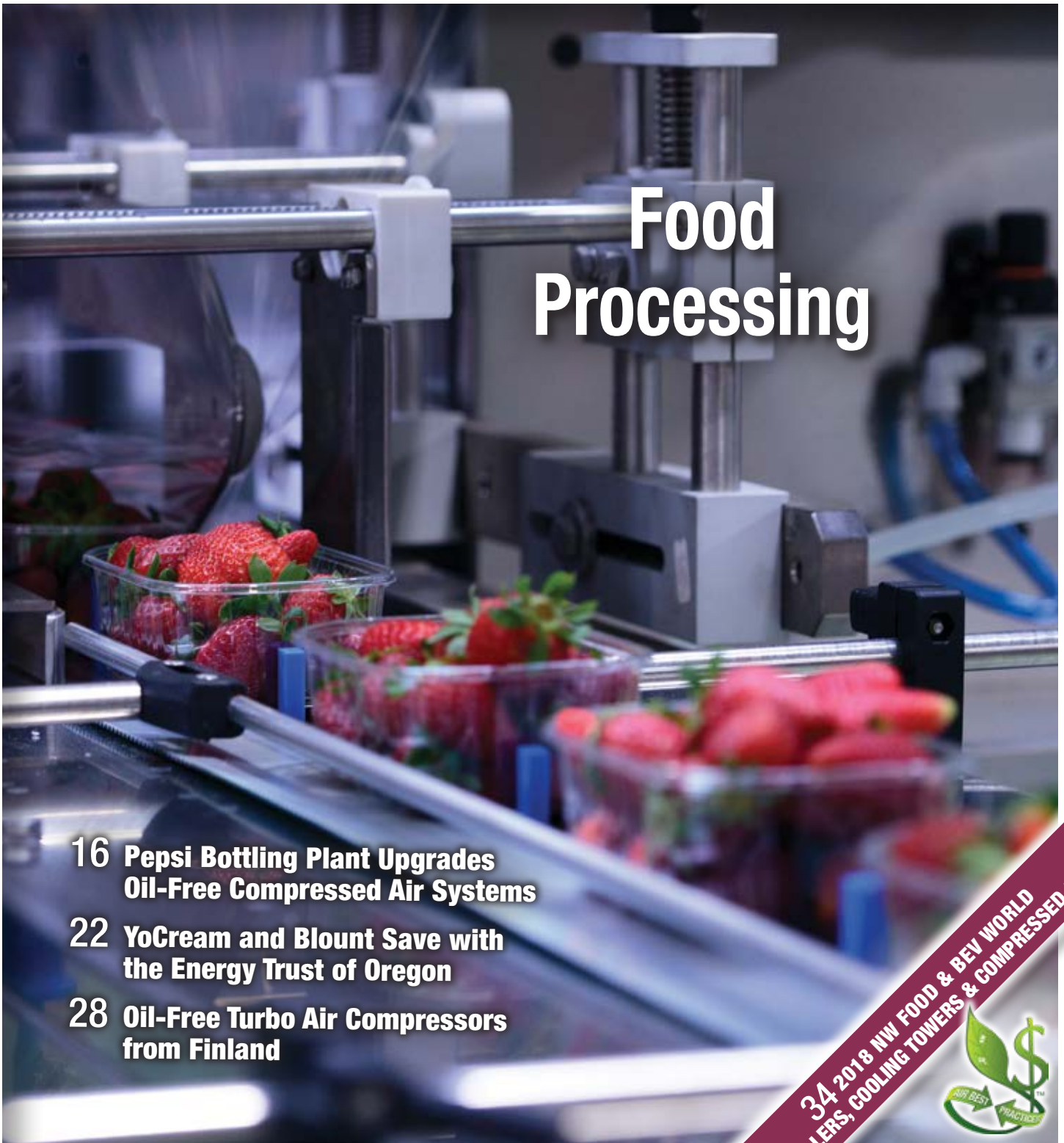
April 2018



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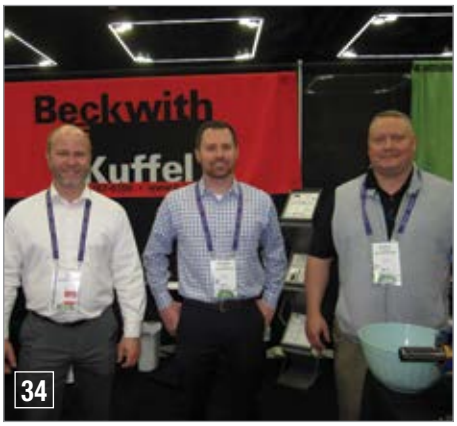

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This issue kicks off in a Pepsi bottling plant in Winnipeg, Manitoba. The story, provided by auditor Ron Marshall, details the energy-efficiency upgrades done to both their 100 psi (7 bar) and 600 psi (41 bar) systems. Each system had roughly 9 sub-projects including interestingly the retrofitted Sidel air recovery package on their bottle blowing systems. The biggest project was the replacement of the oversized 40 bar oil-free water-cooled reciprocating air compressor with an oil-free rotary screw air compressor and a booster.

The most economical way for a power company to increase it's generating capacity – is for it to incent energy conservation from it's customers. Since 2002, Energy Trust of Oregon (ETO) has saved and generated 728 average megawatts of electricity and 52 million annual therms of natural gas. During a recent trip to Oregon, I was able to speak with ETO. I hope you enjoy their success stories from recent projects done with sawchain manufacturer Blount International and with frozen dessert producer YoCream International.

Back to Oregon we go with my Show Report of Northwest Food & Beverage World. This is the marquee event for Food Northwest (recently renamed from Northwest Food Processors Association). I hope you enjoy my brief profile of the exhibiting firms specializing in compressed air, vacuum, cooling tower, and chiller systems in our great Pacific Northwest region.

Those innovative engineers in Finland are at it again. I hope you enjoy my interview with Tamturbo management about their new high speed, active magnetic bearing, 80 to 500 hp, oil-free turbo air compressors designed for 85-130 psi (6-9 bar) plant air.

Speaking of opportunities to learn how to improve systems, you may have heard, we are launching the inaugural 2018 Best Practices Expo & Conference, September 17-19, 2018 at the Chicago O'Hare Crowne Plaza. Please consider putting this event on your calendar and registering for the event!

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INDUSTRY NEWS

Atlas Machine & Supply, Inc. Appointed Sullair Distributor

Sullair, an industry leader in innovative compressed air solutions since 1965, is pleased to announce Atlas Machine & Supply, Inc. has been appointed an authorized distributor for Sullair Commercial and Industrial Products in the greater Louisville / Central Ohio valley area. As an authorized distributor, Atlas will provide full customer sales and support for Sullair equipment, parts, service and warranty.

"Sullair is very excited to have a distributor offering such a highly trained and experienced compressor team to serve customers in Indiana, Kentucky, Ohio and Tennessee," according to Brian Tylisz, Vice President Commercial and Industrial Sales. "The end-to-end capabilities Atlas Machine & Supply brings to the market are truly exceptional. Their expert sales and service capabilities will be a tremendous asset in ensuring customers receive the compressed air solutions best suiting their application."

Atlas Machine & Supply will carry the full line of Sullair oil flooded compressors from 5 to 600 hp, plus the complete line of oil free and centrifugal compressors up to 30,000 hp. Atlas will also sell, install and support the full Sullair air treatment and aftermarket line, including compressed air dryers/filters/drains, industrial vacuum systems, flow controllers and Sullair Genuine Parts.

"Our partnership with Sullair is a perfect fit for our company," says Richie Gimmel, President of Atlas Machine & Supply. "We were drawn to their commitment to excellence and desire to grow in our market. They also share our culture of a long-term outlook and a desire to constantly find ways to improve the value of their products. We're excited to represent such a highly respected and nationally recognized leader of industrial air solutions."

Atlas Machine & Supply is headquartered in Louisville, Kentucky; and has branch offices in Indianapolis and Evansville, Indiana; and Cincinnati and Columbus, Ohio. The Atlas Machine & Supply territory will cover the southern halves of Indiana and Ohio, Northern Tennessee, and the state of Kentucky. For more information about Atlas Machine & Supply visit atlasmachine.com.

About Sullair

Since 1965, Sullair has developed and manufactured air compressors with proven reliability and wear-free durability. Sullair is globally recognized as a leading manufacturer of air compressors for use in manufacturing, oil and gas operations, food processing, construction and more. The Sullair compressor line includes oil flooded as well as oil free compressors, including rotary screw, scroll, and centrifugal options. Sullair also offers a complete line of construction air tools, compressed air treatment equipment and vacuum systems. Customers around the world keep their compressors running optimally with a full line of aftermarket parts, fluids and services. Sullair has manufacturing capabilities in Michigan City, Indiana; and Shenzhen and Suzhou, China; as well as a JV (IHI-Sullair) based in Suzhou. For more information, visit www.sullair.com. Sullair is A Hitachi Group Company.

The Hitachi Group is a global leader in the Social Innovation Business with over 300,000 employees worldwide. Through collaborative creation, Hitachi is providing solutions to customers in a broad range of sectors, including Power / Energy, Industry / Distribution / Water, Urban Development, and Finance / Government & Public / Healthcare. For more information, visit www.hitachi.com.

Atlas Copco Celebrates Opening of Lowenstein Offices

Atlas Copco, a leading provider of sustainable productivity solutions, is celebrating the grand opening of their new offices at the Lowenstein Building, a revitalized four-story building in the heart of Rock Hill's (South Carolina) University Center at Knowledge Park.

Robert Eshelman, Atlas Copco Compressors LLC'S president and general manager, giving a speech during the opening ceremony.

"We couldn't have found a more inviting and supportive community for our new offices in Rock Hill," said Robert Eshelman, Atlas Copco Compressors LLC's president and general manager. "Since we expanded here 20 years ago, we've continued to invest in the greater Charlotte community. The area offers top talent and gives us the resources we need to continue innovating, which is a pivotal part of our commitment to global manufacturing excellence."

Close to 150 employees from Atlas Copco Compressors, Chicago Pneumatic Compressors and Pneumatech Compressors will be relocating to the new 25,000 square foot office space on the fourth floor of the Lowenstein Building. The office features an open floor plan designed to foster collaboration among employees, spark innovation and take advantage of the office's natural light from the long wall of windows and high ceilings.

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INDUSTRY NEWS

Atlas Copco is one of the first major businesses to move into the University Center at Knowledge Park, which will soon include retail, restaurant, office and residential space. University Center will connect historic downtown Rock Hill with Winthrop University, giving Atlas Copco the chance to build relationships with individuals looking to enter the manufacturing and engineering industry.

About Atlas Copco

Atlas Copco is a world-leading provider of sustainable productivity solutions. The Group serves customers with innovative compressors, vacuum solutions and air treatment systems, construction and mining equipment, power tools and assembly systems. Atlas Copco develops products and services focused on productivity, energy efficiency, safety and ergonomics. The company was founded in 1873, is based in Stockholm, Sweden, and has a global reach spanning more than 180 countries. In 2016, Atlas Copco had revenues of BSEK 101 (BEUR 11) and about 45,000 employees.

About Atlas Copco Compressors LLC

Atlas Copco Compressors LLC is part of the Compressor Technique Business Area, and its headquarters are located in Rock Hill, S.C. The company manufactures, markets, and services oil-free and oil-injected stationary air compressors, air treatment equipment, and air management systems, including local manufacturing of select products. The Atlas Copco Group, which celebrated its 140th anniversary in 2013, is among the Top 100 sustainable companies in the world and a member of the Dow Jones World Sustainability Index. Atlas Copco has also been recognized by Forbes, Thomson-Reuters and Newsweek, among others, for its commitment to innovation and sustainability. Atlas Copco Compressors has major sales, manufacturing, production, and distribution facilities located in California, Illinois, Massachusetts, North Carolina, South Carolina, and Texas. www.atlascopco.us

Dearing Compressor & Pump Acquires Kruman Equipment

Dearing Compressor & Pump Co., the second oldest Gardner Denver industrial air compressor distributor, recently completed its first ever acquisition, merging with the oldest Gardner Denver distributor, Pittsburgh-based Kruman Equipment. The acquisition allows Dearing to effectively double their industrial air compressor business, while providing counterbalance to the dynamic energy market.

CEO and President, Rick Dearing, announced the newly merged operations will retain the Kruman name, and Kruman employees will continue in their same roles and operate as a division of Dearing, with shared services and resources maximizing efficiency and productivity. In addition to ensuring a smooth transition for employees, vendors and customers, Dearing will invest resources in developing Kruman as a division of their existing operations. The acquisition creates a concentration of resources to increase profitability, and the potential for additional job opportunities at all levels of the organization.

As VP Becky Wall explains, "The cultures of both Dearing and Kruman reflect common values of family owned and operated, multigenerational businesses — making the blending of the two a natural fit and bringing together the best assets of both companies. With over 150 combined years of industry experience, both Dearing and Kruman have spent decades delivering a deep working knowledge of the products, parts and processes that ultimately have allowed them

to offer their customers the most precise and effective application of systems and components."

The acquisition positions Dearing for growth through territory expansion in a demanding marketplace by extending their overall footprint. The value of the Kruman brand will be a complement to Dearing's industry-leading strengths in service, technology and packaging operations. The combined resources will allow them to better serve new and existing customers across a seamless map of territories from northern Ohio, down through southern Pennsylvania and into West Virginia and Maryland.

COO, Albin Dearing, describes Dearing's investment in Kruman as "a bold next step, and part of a comprehensive vision plan that includes continued expansion, increased revenue, ongoing implementation of technology, a balance between our industrial and energy operations, consistency of standardized processes, and contributions to community --- all while maintaining the integrity of our family values and a responsibility to create continued opportunities for our employees."

About Gardner Denver

Gardner Denver is a global manufacturer of compressors, pumps, blowers and other engineered solutions for various industrial applications. They specialize in highly engineered compressed air and vacuum solutions used across a range of industries, including pumps and consumable products used in oil and gas production, as well as air treatment systems, genuine replacement parts, and fluid transfer equipment for the chemicals, green technology and food and beverage industries. www.gardnerdenver.com/en/brands-overview.

About Kruman Equipment

Established in 1936, Kruman Equipment Company in Pittsburgh, PA is a full-service distributor for energy-efficient and reliable lubricated and oil-free rotary screw and reciprocating air compressors, refrigerated and regenerative desiccant air dryers, air filtration, regulation and lubrication products, aluminum piping systems, oil/water separators, electric drain valves, and nitrogen generators. Trained engineers and service technicians provide sales, repairs, training, installation and system design for all sizes and types of compressed air applications. Kruman is a 3rd generation family-owned business with a reputation for its standards in customer

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support and service across territories including Pennsylvania, West Virginia and Maryland. www.kruman.com.

About Dearing Compressor & Pump Co.

Dearing is a family business operating in Youngstown, OH as the industry leader in industrial compressor distribution and packaging. For over 70 years, Dearing has based their reputation on service, reliability, integrity and innovation, and responsibly serves industrial and energy customers with dependable equipment and systems for compressed air, gas, process gas and hydraulic applications. The manufacturers they represent provide the absolute best equipment and support available in the marketplace today. Dearing continually matches these quality products with engineering, design expertise, installation experience and quality service to keep customers' equipment running properly for years.

Albin P. Dearing III, who sold and serviced Gardner Denver industrial air compressors, formed Dearing and Co. in 1945. It is the second oldest remaining distributor for Gardner Denver in the U.S.A. The company's introduction to the oil and gas business came in 1960 by working on Gardner Denver oil rig compressors. This later led to an expansion into the natural gas compressor market within Ohio. Today, Dearing's air and gas compressors serve automotive, aluminum, plastic, chemical, food, high-tech, lumber, rubber, steel and mining, as well as oil and gas industries. www.dearingcomp.com.

Ohio Transmission Corporation Acquires Compressed Air Systems

Ohio Transmission Corporation (OTC), an industrial equipment service provider and distributor headquartered in Columbus, Ohio, announces the acquisition of Compressed Air Systems, LLC.

Compressed Air Systems, LLC, a Louisiana company headquartered in Lafayette, LA, is a leading provider of compressed air products and services to various industries in south Louisiana — from offshore drilling and production to marine, chemical plants, refineries and industrial applications. The company, with other locations in Baton Rouge, LA, and New Orleans, is a Quincy Compressor Master Distributor.

"Louisiana is a vibrant industrial market and provides a great opportunity to expand Ohio Transmission Corporation's geographic reach in the compressed air business," said Phil Derrow, president and CEO of Ohio Transmission Corporation. "Our customers rely on us as a supplier-partner with the resources to help them improve their processes and solve problems. Compressed Air Systems' mission, to always offer its customers the best products on the market and the best service in the industry, falls right in line with our way of serving customers."

The owners of Compressed Air Systems, Gerry Lasseigne, Sr., and his wife, Marianne, will stay with the company during the transition to Ohio Transmission Corp. The company will continue to operate under the same name, but as a division of Air Technologies®, a compressed air system equipment and service provider part of the OTC family of companies. Air Technologies® pioneered the fourth-utility concept of compressed air, and is the largest independent compressor distributor in North America.

With this acquisition, Ohio Transmission Corporation now has 34 locations throughout the South and the Midwest and Northeast regions, along with 14 service shops. The addition of Compressed Air Systems' 20 associates brings Ohio Transmission Corporation's existing workforce to more than 900 employees.

"We're excited to be working with Gerry and Marianne Lasseigne and the Compressed Air Systems team through this transition," said Kurt Lang, president of Air Technologies®. "This acquisition is an excellent strategic move for Air Technologies®. We have great respect for Compressed Air Systems and the Quincy product line, and we're looking forward to creating sustained success with this team moving forward in these three trading areas in Louisiana. Our goals are to continue to serve our associates and customers at a high level, and to earn the customer preference in all compressed air business channels in these markets."

As a division of Air Technologies®, Compressed Air Systems, LLC, will have access to Air Technologies® unique compressed air utility service group offerings, as well as OTC's vast product and service offerings and support resources. The acquisition provides significant growth opportunities for the associates of Compressed Air Systems, LLC, and will provide customers with a more comprehensive set of technical solutions, according to Lasseigne.

"This acquisition is a perfect fit for our company because of the core values that OTC and Air Technologies® embrace," Lasseigne said. "They take care of their employees and are very family oriented. That's how we are, and I wanted to keep that going. The change also benefits our customers, too, because OTC and Air Technologies® are so advanced in technology. Now, we'll be able to offer our customers more in the way of product, and we'll be able to give them even better service, which is something that we've built this company on."

About Ohio Transmission Corporation

Established in 1963, Ohio Transmission Corporation is one of the largest industrial distributors and service providers in the United States. Its divisions include OTP Industrial Solutions, a provider of expert solutions for industrial motion control, factory automation, fluid power, pumping systems, spray finishing, and power

transmission, and Air Technologies®, a compressed air system equipment and service provider and the largest distributor of Atlas Copco compressed air equipment in North America. Ohio Transmission Corporation maintains locations throughout the South and the Midwest and Northeast regions. Ohio Transmission Corporation's 900 associates share its founding vision of delivering excellent value through work with integrity. For more information, please visit www.otpnet.com and www.aircompressors.com.

About Air Technologies®

Air Technologies®, a division of Ohio Transmission Corporation, is a team of compressed air experts and one of the world's largest independent air compressor distributors and service provider as well as North America's largest Atlas Copco distributor. Air Technologies® supports a full line of innovative Atlas Copco products and provides expert installation services on everything from air compressors, compressed air dryers and filtration systems to industrial vacuum and blower systems, oil and water separators, receiver tanks, and mineral and synthetic lubricants. In addition, the company offers compressed air piping, nitrogen generation, cooling systems and air compressor rentals. Air Technologies® aftermarket support services include a wireless service center, an expert parts team and customer service agreements. The company's unique Utility Services Group allows businesses to purchase commercial compressed air like a utility, manage and control air compressor systems, and lower overall compressed air costs. For more information, visit www.aircompressors.com.

About Compressed Air Systems, LLC

Compressed Air Systems, LLC, founded in 2009 in Louisiana by Gerry and Marianne Lasseigne, has established itself as the leader in south Louisiana as a provider of compressed air service and products.

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Lasseigne built the company on his 40-plus years in the air compressor business. With offices in three locations — Lafayette, La., New Orleans and Baton Rouge, La. — the company provides air compressor equipment and services to companies in various categories — from offshore drilling and production to marine, chemical plants, refineries and industrial applications. For more information, visit www.compressedairsystemsllc.com.

Free Expert Advice on Optimizing Air Tool Installations from Chicago Pneumatic

Optimizing overall equipment effectiveness (OEE) is key to maintaining productivity, ensuring workplace safety and delivering the best return on investment. For air tool users in industrial and vehicle servicing applications, a correctly installed and maintained air supply system is a major contributing factor to OEE. However, this can be easily overlooked or misunderstood.

"When it comes to air pressure, higher isn't always better!" says Annabelle Bray, Chicago Pneumatic's global product marketing manager – accessories. "Actually, it is more important to maintain the right pressure and keep pressure drops to a minimum if you want to ensure high productivity and energy savings."

To help users get the most out of their compressed air system, Annabelle and four other Chicago Pneumatic experts have pooled their knowledge to produce *Is Your Air Tool Installation Right?* This is a new, free-to-download Expert Guide containing clear and helpful information to enable users to achieve optimum performance and reliability.

Co-contributor Joel Draelants, Chicago Pneumatic's global business development manager – industrial, explains, "Choosing the right tool for the job is only the first step in optimizing efficiency. A good air installation is essential for your tool to work properly, and for achieving global productivity of your working stations. Our new Guide is designed to present factual information and advice about the correct design, installation and maintenance of air systems in a way that our customers will find accessible."

Packed with helpful diagrams and tips, *Is Your Air Tool Installation Right?* features a self-diagnostic in three easy steps to help air tool users check if their existing air tool accessories selection is correct, and to make sure tools are working as expected. For ease of use, this checklist can be downloaded as a separate item from a link within the main Guide.

The Guide is arranged to educate and inform the reader. Taking each element of an air installation in turn, it provides an introduction to the basic principles of how a compressed air system works, a guide

to buying the right compressor and a clear explanation of what accessories are either essential or desirable within an air installation. Detailed consideration is given to each system component and how it should be applied and maintained for optimum efficiency.

Throughout, Chicago Pneumatic experts offer their handy hints to help users ensure their air system will deliver clean, regulated and lubricated air consistently and at the right pressure. Reflecting the company's philosophy that safe working is integral to achieving optimum productivity, the Guide also has a section dedicated to their top 10 recommendations for avoiding damage to people or equipment when using compressed air.

Claim Your Free Poster

The first 100 people to download the new Expert Guide will be eligible to receive a free A1 wall poster illustrating a typical air system layout and the components involved. The poster also includes a graphical reminder to regularly check filters and lubrication. Printed in full color and totally pictorial in design, the Air System poster can be used as a universal training aid or displayed as a handy reminder.

To download your free copy of *Is Your Air Tool Installation Right?* and register for your chance to win the free poster, use this link: campaigns.cp.com/is-your-air-tool-installation-right

This is the third title in the Expert Corner Technical Guide series from Chicago Pneumatic. Previous topics include *What Gives Power to Your Impact Wrench?* and *Five Benefits of Pneumatic Grinders* and are available here: www.cp.com/en/tools/expert-corner

For more information about Chicago Pneumatic's innovative solutions for the industrial and vehicle service markets, got to www.cp.com or visit us on LinkedIn www.linkedin.com/company/chicago-pneumatic/ or Twitter twitter.com/CP_PowerTools.

INDUSTRY NEWS

Edgetech Instruments Assists Ambri

Edgetech Instruments provides Ambri, a manufacturer of innovative liquid metal batteries located in Marlborough MA, with the PPM1 Trace Moisture Analyzer from their facility in neighboring Hudson, MA. The PPM1 sensor utilizes a proprietary P_2O_5 (phosphorous pentoxide) technology to provide accurate, long term trace moisture measurement at low Parts Per Million by Volume (PPMv) moisture levels. The PPM1 is used to monitor various inert blanketing gases during the manufacturing of Ambri's liquid metal batteries, as even small amounts of moisture can have an adverse effect on the results and performance.

Ambri Inc. is developing an electricity storage solution changing the way electric grids are operated worldwide. Ambri will enable the more widespread use of renewable generation like wind and solar, reduce power prices and increase system reliability. Ambri's technology, the liquid metal battery, was invented in the lab of Dr. Donald Sadoway, a professor at the Massachusetts Institute of Technology. At MIT, the Liquid Metal Battery Project built upon Professor Sadoway's 40 years of experience working with extreme electrochemical processes, ranging from aluminum smelting, to molten oxide electrolysis for extracting oxygen from lunar regolith, to lithium polymer batteries.

Ambri's Manufacturing and Process Engineering Senior Manager, Brian Liebl, states, "Edgetech Instruments' local support, along with their economical and reliable product offering have helped us achieve a higher level of quality in our manufacturing processes."

For More Information about Ambri Inc. and their liquid metal batteries, please visit www.ambri.com

About Edgetech Instruments Inc.

Edgetech Instruments Inc. designs and manufacturers accurate and reliable absolute humidity hygrometers, relative humidity transmitters, humidity probes, moisture and dew/frost point analyzers, relative humidity calibrators, dew/frost point generators and oxygen measurement instrumentation. Edgetech Instruments products are manufactured, calibrated and serviced to the highest industry standards in a modern, ISO/IEC 17025:2005 accredited, ISO 9001:2008 registered facility located in Hudson, Massachusetts. All certifications and calibrations are traceable to NIST. For more information, please visit www.edgetechinstruments.com.

The PPM1 sensor utilizes a proprietary P_2O_5 technology to provide accurate, long term trace moisture measurement at low PPMv moisture levels.

Sparks Dynamics Closes $2 Million in Series A Investment Round

Sparks Dynamics, a leader in data acquisition, analytics, and optimization of industrial compressed air and chilled water systems, recently secured $2 million in Series A funding. The Series A funding was led by a large angel investor with extensive corporate C-suite experience in large publicly traded companies within the industrial equipment sector.

Founded by Mac Mottley and George Privalov, Sparks Dynamics offers industrial facilities a powerful and flexible platform to deploy, collect and analyze real-time compressed air and chilled water system data with unprecedented ease. "With this new round of funding we will bring even more ambitious innovations to market while expanding our team, strengthening our vision to connect and optimize the most inefficient systems in the typical industrial utility environment."

"We are excited and proud to gain support from senior executive investors that realize our solutions are part of the next industrial revolution and will become a standard in the specification of new industrial site generated utilities," said Mac Mottley CEO of Sparks Dynamics.

Founded in 2014, Sparks Dynamics is working with corporate energy and sustainability managers at several Fortune 500 companies to identify facilities and implement saving hundreds of thousands of dollars related to energy expense and avoided downtime.

About Sparks Dynamics

Sparks Dynamics provides Industrial Internet of Things (IIOT) intelligent solutions to our manufacturing customers enhancing business profitability through smart systems continuously monitoring energy, security, and equipment status. This continuous verification allows for increased efficiencies, reliability and business continuity. Our state of the art cloud based Remote Monitoring Analytics System Technology for Efficiency and Reliability (ReMASTER) product provides an intelligent monitoring solution with big data analytics and specially developed artificial intelligence ensuring operating parameters remain within the performance envelope. Sparks Dynamics provides energy audits, system integration, equipment sourcing and project management to optimize the industrial customer's site generated utility systems. For more information please visit www.sparksdynamics.com.

PEPSI BOTTLING PLANT UPGRADES Oil-Free Compressed Air Systems

By Ron Marshall, Marshall Compressed Air Consulting

The Pepsi bottling plant in Winnipeg, Manitoba has upgraded both their main 100 psi compressed air system and their 600 psi PET bottling system in two separate projects. The system improvements have saved the company both maintenance and electrical operating costs, and even reduced some winter heating demand.

Background

The first project started, a number of years ago, when the 100 psi compressed air system needed replacing due to the advanced age of the air compressors. The previous units were 100 hp fixed speed units operating in a combination of modulation and load unload mode. The system used standard compressed air filters and non-cycling air dryers. During normal operation, the plant pressure ranged from a high of 107 psi to as low as 78 psi due to pressure differentials in the system. The plant had already implemented some improvements to their system in eliminating compressed air drying on their filling lines, and by turning off the main compressors on weekends (a small reciprocating compressor was used). Plant personnel were interested in renewing the compressed air system to make it more efficient, and had heard of the power utility incentives offered, so they requested some energy analysis.

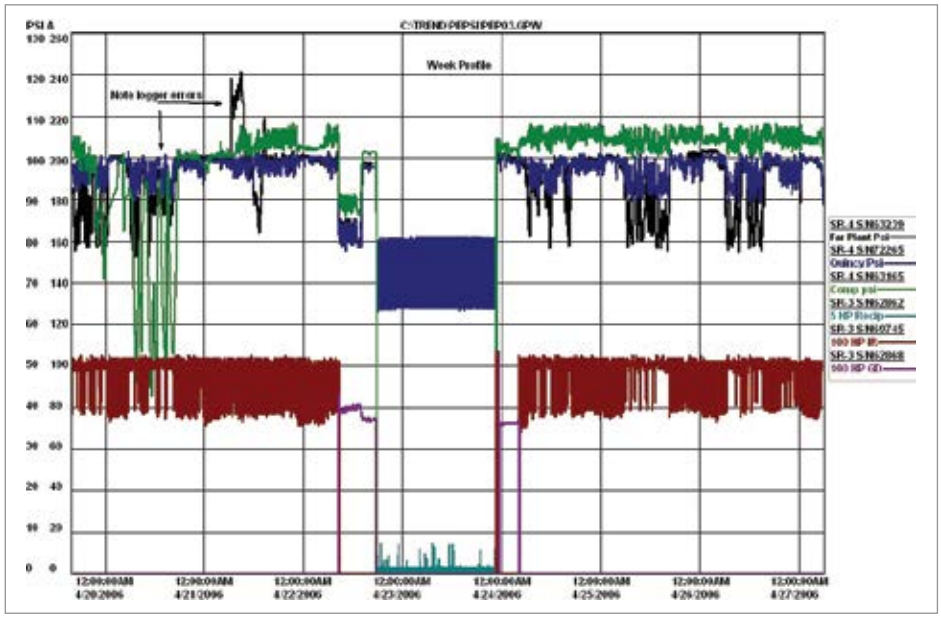

Figure 1: The as found system was found to be operating inefficiently, note how the air compressor amps fall from 70 to almost nothing when the reciprocating compressor runs.

Initial Assessment

Data loggers were placed on the 100 psi system, which showed the compressed air system was running inefficiently due to the type of air compressor control and the lack of enough storage receiver capacity. The system also had some significant pressure differentials across the piping, air dryer, and filtration system. Leakage was estimated at 27 percent of the average flow and the timer style condensate drains were contributing to wasted flow. Estimated energy consumption was pegged at 746,000 kWh per year, about 11 percent of the total facility electrical costs. The utility predicted that if a VSD compressor was installed, along with other improvements, an operating cost saving of 35 percent could be gained.

Figure 2: The 600 hp 600 psi PET air compressor consumed significant power.

PEPSI BOTTLING PLANT UPGRADES OIL-FREE COMPRESSED AIR SYSTEMS

Figure 3: A heat recovery ventilation system saves natural gas costs in winter.

Further to this, some preliminary assessment of the 600 psi PET bottle blowing system was done. This system used a 600 hp multi-stage water-cooled reciprocating compressor to supply the system that produced plastic beverage bottles, first passing the air through a refrigerated air dryer. This system was identified as an item that contributed significantly to the plant energy costs, mainly through peak demand charges. No work was done initially, but further testing a few years later found that this system, and an associated evaporative cooling system consumed 1,425,000 kWh and contributed to a peak facility electrical demand of 425 kVa.

Upgrade Savings Calculations

For the 100 psi system the local power utility, Manitoba Hydro, was able to help calculate the savings that could be gained through various upgrade options. Each option came with a corresponding possible incentive grant, this was used by the plant maintenance manager to help decide on the type of air compressor to purchase and the energy efficiency options to buy. This was done based on the CAGI data sheet data of the compressors being considered, and estimated pressure and power reductions. Calculation was done on a spreadsheet, which was developed by Manitoba Hydro. The following energy efficiency measures were selected:

- A new 100 hp variable speed air compressor was purchased to eliminate the wasteful unloaded power consumption, the compressor target pressure was reduced to lower compressor power consumption
- A cycling air dryer was installed to reduce the refrigeration compressor consumption which is based on the flow of air through the dryer rather than running constantly as in a non-cycling dryer

- A 1060 gallon receiver was installed to stabilize fluctuations in plant pressure and reduce compressor cycling
- A flow control valve was installed to reduce the average plant pressure and wasteful artificial demand
- Mist eliminator filtration was installed to significantly reduce the contribution of filtering to system pressure drop
- Air compressor room piping was upgraded for lower pressure loss
- Airless condensate drains were installed to reduce wasted compressed air
- Compressed air leakage was repaired
- A ventilation system was installed that redirected the compressor heat into the plant during cold winter months

For the PET system some data logging of pressure, flow and power showed the existing air compressor was very much oversized for the load. After a few years, excessive repair costs convinced plant personnel to do something about the system. Because the compressor was so big, the compressor cooling system was also oversized, and consumed significant extra power due to the way the circulation pumps were controlled by throttling. The power utility and PepsiCo Corporate engineering also looked into the possibility of recovering high pressure compressed air from the bottle forming machine for use as low pressure air. The bottle blowing machine maker (Sidel Inc.) had a high-pressure compressed air recovery system retrofit for the existing bottle blower (more information on high pressure recovery in this article: https://www.airbestpractices.com/industries/plastics/sidel-and-krones-blow-molders-stretch-conservation-potential). Basically, some of the 500 to 600 psi air used to form a beverage bottle can be captured

Figure 4: VSD air compressor control increases system efficiency.

PEPSI BOTTLING PLANT UPGRADES OIL-FREE COMPRESSED AIR SYSTEMS

Figure 5: Installing a smaller oil-free rotary screw air compressor, with a heat-of-compression dryer, saved energy in the PET system.

at around 100 psi to be used in the internal pneumatic circuitry of the bottle-blowing machine and with the excess fed to the main 100 psi system to reduce the power for the low pressure compressor.

The improvement measures implemented on the PET system were:

- An air compressor system using a 125 psi 145 kW oil-free compressor feeding into a separate high pressure 105 kW booster compressor was selected, the reduced total kilowatts lowers energy and demand costs
- The new system uses a heat of compression desiccant air dryer to save dryer power, the dryer is internal to the compressor package, saving floor space

- A 1060 gallon high pressure storage receiver was installed to stabilize pressure and reduce compressor cycling
- The cooling system was redesigned using VSD control
- Airless high pressure condensate drains were used
- A high pressure recovery system was installed to supplement the 100 psi system from the bottle blower air

Savings Results

The power utility verified both projects at the end of the commissioning. Overall the combined savings were 806,000 kWh per year and estimated natural gas consumption of 9,700 m^3. The 100 psi system saved 35 percent in operating costs over the base case energy consumption, very close to the level predicted by the utility. The PET project saved 38 percent in electrical operating costs and significant annual repair costs. The PET project savings had such a significant impact on the facility demand charges that the reduction in demand was very obvious, something not all that common for energy projects. Figure 6 show the results, during months where year-over-year monthly energy was not reduced due to the level of production, the plant peak demand was still lower due to the smaller PET compressor size.

	KWH	DEMAND
JUL	-53,529	-87
JUN	-91,285	-188
MAY	-70,774	-217
APR	-94,050	-280
MAR	216	-217
FEB	-86,058	-172
JAN	-542	-100
DEC	-26,663	-144
NOV	-52,836	-176
Projected Annual	-634,028	-176

Figure 6: The new PET system greatly reduces demand and energy on the electrical bill.

Conclusion

This project shows the value of utility energy programs and the measuring of the compressed air baseline. In this case, the utility had excellent compressed air technical support and was able to perform some free compressed air assessments to analyze how the systems were working. The utility stayed with the project after the assessment and supported the PepsiCo plant Operation and Engineering in helping calculate the savings for various different compressor options and other energy measures. The utility then came to the table in offering significant energy incentives, in this case more than $159,000, to help pay for the additional costs to purchase extra energy saving equipment. The projects are generating savings of over $60,000 per year in energy costs alone. BP

For more information contact Ron Marshall, Marshall Compressed Air Consulting, tel: 204-806-2085, email: ronm@mts.net

To read more about ***Food Industries*** please visit, www.airbestpractices.com/industries/food

YoCream and Blount Save with THE ENERGY TRUST OF OREGON

By Compressed Air Best Practices® Magazine

Since 2002, Energy Trust of Oregon has saved and generated 728 average megawatts of electricity and 52 million annual therms of natural gas. This is enough energy to power Multnomah and Washington counties while heating Deschutes County homes. ETO has saved enough energy equal to the output of a power plant and reduced reliance on fossil fuels. In total, they have invested $1.5 billion to save customers more than $6.9 billion on their energy bills over time. They have also added $5.7 billion to the local economy, including $1.7 billion in wages, $312 million in small business income and employment equal to 4,700 full-time jobs lasting a decade. Carbon emissions have been cut by nearly 20 million tons, equal to removing 3.5 million cars from the roads for a year. Efficiency remains the least expensive energy resource Oregonians can buy. This affordable energy supply helps utilities avoid investment in new and more expensive energy resources. The following articles are just two examples of such success stories.

"We learned which energy-efficiency projects were the most cost effective, and Energy Trust provided more than $130,000 in cash incentives, which made the difference in whether several of our projects penciled out."

— Jason Smith, Corporate Environmental Engineer, Blount International

Sawchain Manufacturer Hones Its Process with Energy Efficiency Upgrades at Blount International, Inc. Should Save More Than $200,000 Annually

In April 2009, Blount International, a global manufacturer of sawchains and equipment for the forestry, garden and construction industries, was searching for ways to cut costs. With a mounting recession and decreasing plant production, management personnel at Blount's Portland and Milwaukie facilities were exploring energy efficiency as an untapped opportunity for operational savings. It didn't take long before Blount's new-found energy management team discovered and took advantage of the Industrial Energy Improvement initiative offered by Energy Trust of Oregon.

Fast forward to late 2010. After participating in the 2010 Industrial Energy Improvement for 12 months and completing seven energy-efficiency projects, Blount expects to save an estimated $227,805 per year in electricity costs. Combine those savings with production levels that have increased significantly, and the bottom line at Blount couldn't look any sharper.

"The expertise that Energy Trust brought to the table through its Industrial Energy Improvement initiative really helped us to understand where to focus our efforts," said Jason Smith, corporate environmental engineer, Blount International. "We learned which energy-efficiency projects were the most cost effective, and Energy Trust provided more than $130,000 in cash incentives, which made the difference in whether several of our projects penciled out."

Industrial Energy Improvement is a year-long behavioral and process-related training initiative in which participants such as Blount work closely with Energy Trust technical service providers. As part of Industrial Energy Improvement, Blount's energy management team learned how to analyze their energy bills and came to understand exactly where and when they use energy on a cost per unit of output basis. Next, they engaged in no- to low-cost energy improvements, particularly related to operations and maintenance in Blount's compressed air system.

YOCREAM AND BLOUNT SAVE WITH THE ENERGY TRUST OF OREGON

PROJECT-AT-A-GLANCE

Equipment Installed

Compressed air operations and maintenance

- Tag and repair leaks
- Auto shut-off valves
- Sequencer optimization
- Motor sequencing
- Compressed air upgrades
- VFD air compressor
- Sequencing modifications
- Thermoelectric cooling in electrical cabinets

Chilled water system upgrades

- Increased chilled water supply temperature
- Optimized condenser water supply temperature

Lighting

- High-performance T8 lamps, electronic ballasts
- High-efficiency metal halide exterior lighting, electronic ballasts
- Lighting controls

Foodservice

- ENERGY STAR hot food holding cabinet

Estimated Annual Savings

- 3,254,359 kilowatt hours
- 1,237 tons of carbon dioxide

Financial Analysis

- $160,409 in Energy Trust incentives
- $227,805 estimated annual energy cost savings
- Applied for 35 percent Business Energy Tax Credit from the Oregon Department of Energy

Energy Trust arranged for engineers at Portland General Electric's Customer Technical Services to provide free energy studies, such as a compressed air study showing that Blount could save a considerable amount of energy and money simply by repairing leaks. The report also recommended installation of valves that automatically shut off the flow of compressed air when specific pieces of equipment were not in use.

Follow-up energy studies focused on capital improvements and operations and maintenance improvements. Blount achieved savings in the plant's chilled water system through controls improvements. Blount also purchased a new air compressor with a variable frequency drive that adjusts compressor output according to compressed air needs.

Now Blount boasts a well-established corporate-wide commitment to energy efficiency. The energy management team for the Portland and Milwaukie facilities has representatives from manufacturing, purchasing, engineering, management and facilities maintenance—every function that can impact plant energy use. The team has integrated energy management into ongoing decision making and is looking for the next level of "low-hanging fruit" in terms of energy-saving projects.

Because Portland is headquarters for Blount International, the energy-efficiency efforts at its Oregon facilities are now leading the way for Blount's facilities across the globe. Blount's three U.S. facilities have joined The ENERGY STAR® Challenge for Industry, which is a nationwide challenge to improve the energy efficiency of U.S. industrial sites by 10 percent within five years.

"Companywide, we now have a monthly energy conference call with all of our sites participating," said Smith. "We're taking the information and strategies that we learned from Industrial Energy Improvement and pushing it out to our other plants. You could say that Energy Trust efforts haven't just helped our Oregon facilities, but are helping all of them."

Frozen Yogurt Producer Trims Energy Use. Energy-Efficiency Improvements Bring YoCream International $204,461 in Cash Incentives

With 110 tasty flavors of frozen desserts and beverages, YoCream International, Inc. is all about production quality. Now the 35-year-old company is applying that same high-quality approach to saving energy in its Portland-area manufacturing plant.

Since 2006, YoCream has meticulously worked to trim its operating costs and improve its environmental impact.

When increased demand for its products required YoCream to install a higher capacity freezer, the company looked to Energy Trust of Oregon to help select the most energy-efficient equipment available. Energy Trust performed a detailed engineering analysis, at no charge, that recommended a 10,600-square-foot freezer with variable frequency drives (VFDs) on compressors, condensers and evaporators. Fast-closing doors keep cold from escaping, and heat recovered from compressors provides underfloor heating. YoCream can conveniently maintain the freezer's temperature from a computer at the office or remotely. A $105,265 cash incentive from Energy Trust helped defray some of the project cost.

Success with the freezer prompted YoCream to turn to Energy Trust again when expanding its refrigeration system. After conducting a thorough study of the system, Cascade Energy, an Energy Trust Program Delivery Contractor, recommended a new energy-efficient, 300-horsepower compressor with VFD, energy-efficient condenser, VFD-controlled condenser fan and sophisticated computer controls. This project dished up more than 500,000 kilowatt hours and a $74,673 Energy Trust incentive.

YOCREAM AND BLOUNT SAVE WITH THE ENERGY TRUST OF OREGON

PROJECT-AT-A-GLANCE

- 115,000-square-foot manufacturing plant and licensed dairy processor
- 100 employees

Project benefits

- Lower operating and energy costs
- Consistent temperature control
- Opportunity to extend equipment life
- Decreased noise
- Improved lighting levels
- Reduced environmental impacts

Projects

- New high-efficiency freezer with VFDs
- Compressor heat recovery for underfloor heating
- Refrigeration operations and maintenance improvements, with operator training
- Cooling tower controls upgrade
- Compressed air leak detection and repair, with operator training
- Conversion of metal halide lighting to high-performance T8 fluorescent
- Conversion of T12 fluorescent lighting to high-performance T8 fluorescent
- Lighting occupancy sensors

Financial analysis

- $204,461 in cash incentives from Energy Trust
- $143,837 estimated annual energy cost savings

Estimated annual savings

- 2,021,857 annual kilowatt hours
- 768 tons of carbon dioxide

"Energy Trust's involvement helps with our decision making," said Clayton Eberle, chief engineer, YoCream. "Their reports include recommendations that might not have occurred to us. The cash incentives, together with detailed estimates of project cost, savings and payback, are useful when seeking upper management approval."

Recognizing that energy efficiency is not only about new equipment, YoCream is committed to fine-tuning the equipment it has. As part of Energy Trust's operations and maintenance offerings, Cascade Energy monitored YoCream's compressed air lines to identify leaks that needed attention. "We noticed a difference as soon as we began repairing the leaks," said Eberle. "Our energy savings went up, and noise

levels went down because the compressor wasn't working as hard."

A year later, YoCream was back for more — this time to make operations and maintenance improvements on its refrigeration system. Energy Trust calibrated refrigeration sensors and showed YoCream how to adjust the set points to the central refrigeration control system. YoCream also learned that a pump on the cooling tower was running continuously, a problem resolved with new controls. These no- or low-cost activities earned another $4,800 incentives, for savings of more than 202,801 kilowatt hours.

"Upkeep on the refrigeration system is now up to us," said Eberle. "We've entered all our set points into a spreadsheet and have a schedule to calibrate the sensors every six months."

YoCream also upgraded lighting throughout its facility. The company converted its 400-watt metal halide lights to energy-efficient, high-performance T8 fluorescent lighting with electronic ballasts. T12 fluorescent lighting, which is becoming difficult to maintain due to a federal phase out, was replaced with high-performance T8s.

"We've made energy efficiency a part of the job at YoCream," summarized Eberle. "Our personnel are actively involved in monitoring energy use. It's a lot about documentation. Employees like it because it's a great chance to walk around with a clipboard and check equipment settings." BP

All photos courtesy of Energy Trust of Oregon. To learn more about energy efficiency for industrial facilities, visit www.energytrust.org or call 1.866.368.7878.

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OIL-FREE TURBO AIR COMPRESSORS FROM FINLAND

By Rod Smith, Compressed Air Best Practices® Magazine

Winter Scene in Finland. Photo credit: Jonna Kannosto

➤ Compressed Air Best Practices interviewed Timo Pulkki (CEO), Hannu Heinonen (President, Tamturbo Inc.) and Mike Batchelor (Director of Sales Americas) from Tamturbo.

Good morning to you in -4 ˚F (-20 ˚C) Finland! Let's start with the beginning. How, why and when was Tamturbo started?

Good morning. Yes, it's a cold and blue-sky day here, a good one for skiing! Since the 1960's, the Tampere region in Finland has been a birthplace of several air compressor innovations – many of which involved Kimmo Laine, a co-founder of Tamturbo. Mr. Laine was a leader in R&D in the air compressor business for many years since the 1960s. This included bringing a high-speed turbo air compressor to market later at Tamturbo. Working together in the 1980's in a division of Tamrock, called Tamrotor - where Hannu Heinonen also worked, Mr. Laine met a gentleman named Jaakko Säiläkivi.

These two technical people stayed in touch over the years as Mr. Säiläkivi's career led him to specialize in high-speed turbo technologies using magnetic bearings – notably with two companies including a 10 years period at HST. HST was a Finnish company, since acquired by ABS and today owned by Sulzer, who pioneered the development of high-speed turbo blower technology using magnetic bearings. One of their first installations, in the 90's, was in a classic Finnish lumber mill.

Mr. Laine and Mr. Säiläkivi shared a vision of being the first company to focus solely on bringing oil-free, high-speed turbo air compressors to the 100 psi (7 bar) market. We are not the first company to bring this technology, but we are the first company whose 100% focus is bringing the benefits of only this technology to the industries using compressed air. In this way, no competing air compressor technologies can dilute the focus and energy required to make customers aware of the benefits of high-speed turbo air compressors at 100 psi (7 bar).

So with this goal, Mr. Laine and Mr. Säiläkivi founded Tamturbo in 2010 here in Tampere. Their original mission hasn't changed. Tamturbo is focused on bringing 80 to 500 hp air compressors to the 85 – 130 psi (6 – 9 bar) market. We believe it offers customers an excellent alternative to oil-free rotary screw air compressors.

That's very interesting. Please tell us how Tamturbo is structured and provide an overview of your business strategy.

We'd be glad to and will start with the ownership structure. Since our founding in 2010, we knew a significant investment in R&D was required and we also knew we should remain independent. Independence is critical to ensure the effort to promote our technology is not diluted by another. To ensure independence and to finance R&D, we went through several rounds of equity offerings. Tamturbo has a few major shareholders and also many small individual investors – including many of our employees. The major shareholders include an industrial investment firm in Finland, one of our first business angels, and a state-owned Finnish venture capital firm.

Tamturbo has a team of 27 employees focused on R&D, manufacturing and business development. Many of us have invested our own funds into this firm. This truly independent ownership structure enables us to deploy our business strategy. This strategy is to partner with both air compressor OEM's and distributors internationally. We supply in North America completely oil-free turbo compressors which independent distributors sell to their customers. The products are manufactured in Tampere and have endured and passed extensive field testing in real world customer applications to prove their reliability.

Please describe the Company's R&D path. Are there Tamturbo installations? What have the field trials demonstrated?

High-speed turbo air compressor technology, using active magnetic bearing (AMB) and control technology, has evolved from university

Hannu Heinonen (President, Tamturbo Inc.) and Timo Pulkki (CEO) of Tamturbo (left to right).

OIL-FREE TURBO AIR COMPRESSORS FROM FINLAND

Internal cut-away of the Tamturbo® model TT145 3-stage active magnetic bearing air compressor.

View of the Tamturbo® model TT145 3-stage active magnetic bearing air compressor.

research in Finland, first to low-pressure blower applications pioneered by Finland's HST and now to the 85 – 130 psi (6 – 9 bar) compressed air application. As you know, turbo blowers using magnetic bearings, are now widely used in the market as aeration blowers for wastewater treatment. Sulzer and others have used this technology widely for about twenty years. They have gained a market share in Europe, replacing positive displacement technologies, and are now gaining traction in North America. As you also know from your Chiller & Cooling Best Practices Magazine, this technology has also been introduced successfully into the chiller industry. The Danfoss TurboCore refrigeration compressor technology was pioneered by their Smardt Chiller division and is now used across the chiller industry.

Comparing these low pressure and refrigeration applications to two and three-stage 85 – 130 psi (6 – 9 bar) air compressors, however, is like comparing apples and potatoes - they are both edible foods but completely different!

Since 2010, our research and development efforts, have focused on managing the much higher temperatures, pressures and partial load challenges presented by the compressed air application. We can tell you first-hand, understanding active magnetic bearings and how to control the impeller is one of the key R&D challenges. Other companies have found this to be an insurmountable challenge. We are founded by air compressor people and truly understand the importance of reliability. This is why this technology has not been rushed to market. We made our first prototypes in the summer of 2012. We went through several piloting phases and made more final prototypes by the end of 2015. Field trials began in February 2016, in a pulp fluting mill, with commercial prototypes.

We have other trial installations, including one in a meat processing plant, and both customers have been very satisfied and are allowing us to publish testimonial stories. It's worth noting the unit at the pulp mill has not required any maintenance since installation over two years ago.

Congratulations on launching Tamturbo Inc. here in the U.S.. What range of products are you launching?

Thank you. Indeed, we have formally established a U.S. subsidiary, Tamturbo Inc., to look after the Americas market. Mr. Heinonen and Mr. Batchelor are leading that effort. Tamturbo Inc. is based in the St. Louis region and will provide technical and customer service support. Our strategy is to work 100% through distribution and for this reason we have hired Mr. Batchelor to lead these efforts. Spare parts will also be stocked – although that's not a big deal as we have only one consumable part in our air compressors, the air intake filter. This is a shocking lack of parts, compared to rotary screw air compressors.

It's worth noting we have a unit installed in a foundry – and they like it simply because there's virtually no maintenance to do! There is only an air intake filter to maintain if ambient conditions are not good. Clients using rotary screw air compressors have grown accustomed to high maintenance and air end rebuild costs they simply don't have to experience with our technology.

We often publish audit stories about plants using higher air pressure than necessary. Can you describe your low-pressure oil-free product line?

Gladly. Tamturbo is rolling out a low-pressure line for 30 to 70 psi (3-5 bar) applications. The low-pressure line is a 2-stage turbo air compressor model available in models ranging from 80 to 300 horsepower.

This product line targets many process applications such as aeration, air curtains, PSA oxygen generation and pneumatic conveying. So many customers use 100 psi compressed air or use air compressors optimized for 100 psi and are paying unnecessarily high energy and maintenance costs.

What is the pressure and horsepower range of the standard plant air oil-free Tamturbo product line?

For standard plant pressures, between 70 and 130 psi, we are launching 3-stage models in the 125 – 470 horsepower range. They are optimized with a variable speed direct drive system featuring a wide turndown range as there are no step up/down gears. The sophisticated turbo design is meant to work optimally over a wide range of flow conditions, compared to top-flow optimized technologies.

This product line targets traditional users of oil-free rotary screw air compressors. This means all food and beverage applications as well as sensitive use applications such as semiconductors, pharmaceutical and laboratory air.

How is the Tamturbo oil-free technology different from standard oil-free centrifugal and rotary screw air compressors?

A traditional centrifugal oil-free air compressor has a two-pole motor running a huge bull

OIL-FREE TURBO AIR COMPRESSORS FROM FINLAND

Winter Scene in Finland. Photo credit: Jonna Kannosto

gear turning the impellers at high speeds. Oil-free rotary screw air compressors also have gear cases requiring lubrication. They both depend upon critical sealing technologies to keep the oil from the compression chambers.

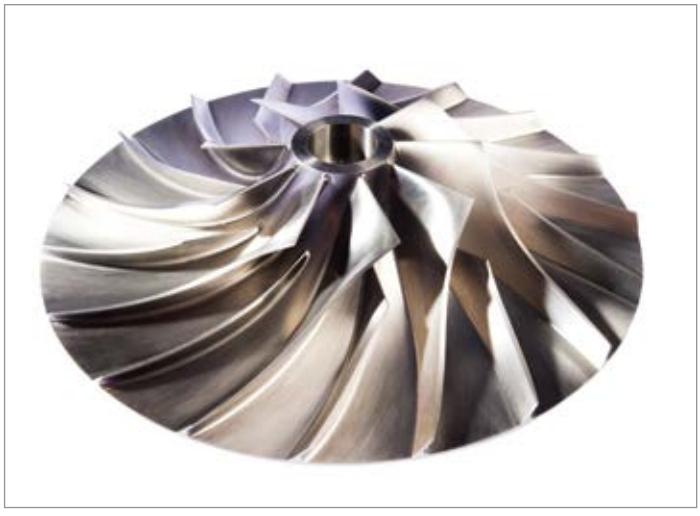
The other issue is the positive pressure in the gear case creates an oil mist inside the machine. One firm has a patented oil mist recapture system to try and manage this – so we're not making this up! We have a client, for example, who manufactures flat screen technologies. Their process cannot tolerate any contamination. They are interested in eliminating any potential ambient hydrocarbons coming from the gearboxes of the air compressors.

The basis of the development of this technology was to eliminate the use of any oil in the entire machine. We like to call the Tamturbo 100% oil-free. We have absolutely no oil in the system.

Titanium impellers at high speeds controlled by active magnetic bearing technology. Please describe how this works.

When you power up a unit, the shaft levitates in a magnetic field. This is why this unit has only one rotating part. The impellers are integrated directly on the motor shaft without any couplings and the rotational speeds for our product lines are between 30,000 to 35,000 rpm. Magnetic bearings have radial and axial positioning sensors measuring the rotor position precisely in micrometer level. When the rotor turns, any axial movement is automatically corrected. Position sensor measurement frequency occurs 15,000 times per second. This is called active magnetic bearing technology.

An active magnetic bearing (or AMB) is a bearing used in high speed rotating machinery using electromagnetic forces to levitate a rotating shaft in space. The application of AMBs allows the rotating shaft to maintain its position. This is accomplished by actively controlling the electromagnets, leaving zero contact between the bearing and the rotating mass. Essentially, magnetic force support moving parts without physical contact. This permits relative motion with practically no friction and no mechanical



Tamturbo® titanium impellers rotate at 30,000 to 35,000 rpm

Editor's Note: What is an Active Magnetic Bearing?

A typical active magnetic bearing is made up of an electromagnet assembly, a set of power amplifiers to supply current to the electromagnets, a controller, and gap sensors with associated electronics to provide the feedback required to control the position of the rotor within the gap. Power amplifiers supply equal current to two pairs of electromagnets on opposite sides of a rotor. This constant pushing and pulling is mediated by a controller, offsetting the current by equal but opposite amounts of current as the rotor deviates by a small amount from its center position. Sensors provide information to the controller for specific rotor position allowing the controller to interpret and control the amount of current provided by the power amplifier.

wear. Due to the very low amount of friction, magnetic bearings support the highest speeds of all kinds of bearing and have no maximum relative speed. The friction-free operation also eliminates the need for many machine components, leading to a clean, reliable and efficient machine.

In closing, can you define Tamturbo's mission and future goals?

Sure. Tamturbo is committed to supplying the finest quality, most technologically advanced air compressors to our customers worldwide. Our plans are to be a $110 million revenue company by 2022 after successfully penetrating the U.S. market through high-level service oriented distributors. Our touch-free technology creates what we believe are the lowest maintenance and highest reliability air compressors in the market with a truly oil-free design. We believe these are the winning advantages that will make us successful.

Thank you for your time. BP

For more information, visit www.tamturbo.com or contact Hannu Heinonen at email: hannu.heinonen@tamturbo.com or Mike Batchelor at email: mike.batchelor@tamturbo.com

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SHOW REPORT
Chillers, Cooling Towers and Compressed Air at NORTHWEST FOOD & BEVERAGE WORLD

By Rod Smith, Compressed Air Best Practices® Magazine

Northwest Food & Beverage World, held January 8-10, 2018 in Portland, Oregon, is the marquee event for Food Northwest (recently renamed and better known as the Northwest Food Processors Association). This "nation's largest regional show" has a 200,000 square foot exhibit floor and also has an interesting educational conference track. The show floor brings together the premier vendors of packaging and machinery with key decision makers in the Northwest's food and beverage industry.

Forty or fifty booths were given, free of charge, to local food businesses selling their cheeses, ice creams, coffee, tea, chocolates and spirits. The show called this section, "Taste of the Northwest". What a great idea to enhance a show experience and promote local small businesses. It not only provided visitors (and us exhibitors) tasty samples and refreshments, but you saw purchasing agents from regional retail chains visiting the booths and conducting business. Umpqua Dairy was my favorite with their incredible chocolate peanut butter ice cream. Based

Randy Haugstad, Conrad Morrow, Cameron McKillop and "Captain" Tyler Courtney at the Rogers Machinery booth next to a KNW Series oil-free rotary screw air compressor (left to right)

Tim Wright, Nicholas Kuffel and Bobby Thompson at the Beckwith & Kuffel booth (left to right).

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CHILLERS, COOLING TOWERS AND COMPRESSED AIR AT NORTHWEST FOOD & BEVERAGE WORLD

Steve Hefflin, Kirk Jackson and David Frost (Quincy Compressor) at the Cascade Machinery & Electric booth (left to right).

Valerie Allison (Parker Balston) and Patrick Hyland standing next to a fully enclosed Parker Balston nitrogen generator at the Valin booth.

Doyle Hartman, Ike Trexler and Jim Hamilton at the Summit Lubricants booth (left to right).

in Roseburg, Oregon, their t-shirts quite rightly say they are "Udderly Delicious!" The local utility incentive folks, at the Energy Trust of Oregon, told me they run an efficient plant as well - having recently received incentive funds for a new energy efficient VFD rotary screw air compressor for their system. Visit www.umpquadairy.com

Yes, I did do something besides eat ice cream and drink coffee during this trip. Compressed air, chiller and cooling tower experts were well represented at the show. I'll try to provide a quick glimpse of what they were exhibiting and talking about.

Compressed Air Systems

Portland is home to the headquarters of the Rogers Machinery Company. They had a busy booth where they displayed their new K Series of "heavy duty" lubricated rotary screw air compressors and vacuum pumps. "The K Series is designed, assembled and tested at our Centralia (Washington) facility," said Rogers President and CEO Andrew Regan. "To support the growth forecasts for the K Series, we broke ground in January on a new 51,000 square foot building in Centralia." The 10 to 500 horsepower K Series product line has single and two-stage units, air and water-cooled options, and standard fixed and variable speed drive units. The flow range is from 35 to 2621 scfm at 40 to 200 psi. Director of Global Sales, Lane Hawkinson, is leading the team selling the product internationally, "The success of our oil-free rotary screw Kobelco KNW Series has created demand for an equally heavy-duty lubricated rotary screw product offering." Visit www.rogers-machinery.com

Beckwith & Kuffel is the longtime Gardner Denver distributor serving the Pacific Northwest out of the three Washington offices in Seattle, Vancouver and Spokane. They represent the full line of GD compressed air, blower and vacuum technologies. At the show they said they were receiving inquiries for the Gardner Denver EnviroAire oil-free scroll air compressor and also for the Gardner Denver Quick-Lock (< 2 ½" diameter) and Big-Lock (>2 ½" diameter) aluminum piping systems. They also represent Wilden pumps and I had an interesting conversation with Nicholas Kuffel about how they teach customers on how to optimize their use of AODD (Air-Operated Double-Diaphragm) pumps. "We have many applications where the reliable and rugged performance of AODD technology makes it the perfect solution," said Kuffel. "The Wilden ProFlowShift technology significantly reduces the compressed air consumption on particularly their 2" and 3" inlet connection AODD pumps." This technology provides a mechanical solution to automatically reduce AODD "purge air" and displace more volume per stroke of the pump. Visit www.b-k.com

Cascade Machinery & Electric was founded in 1918 in Seattle and has a branch office in Portland. They offer pick-up and delivery services in Seattle, Tacoma, Everett, Portland, Spokane and Boise. Like many Pacific Northwest firms, Cascade has a diversified business covering compressed air systems, process pumps and electric motor (motors, drives, starters) products. A pretty big piece of news I learned is Cascade Equipment now represents Quincy Compressor products in the Northwest. Their other main product lines are Becker vacuum pumps and Warren Rupp pumps. Cascade's Kirk Jackson said, "Our business is growing reflecting the growth in residential and commercial construction. This demand has helped the industries supporting construction and driven demand for air compressors and vacuum pumps." Visit www.cascade-machinery.com

I had an interesting visit at the Donaldson booth. Donaldson has expertise with sterile air, culinary steam and liquid filtration products used in process industries. The primary purpose of their P-SRF and P-SRF N sterile filters is to filter out bacteria. They can withstand up to 100 sterilization cycles without loss of integrity. They are installed

Compressed Air Best Practices and Blower & Vacuum Best Practices Magazines greeted show visitors as they arrived.

CHILLERS, COOLING TOWERS AND COMPRESSED AIR AT NORTHWEST FOOD & BEVERAGE WORLD

Adam Iverson and Lisa Kiichle displayed sterile filtration systems at the Donaldson booth.

Randy Vielmetti and Tony Galvan (Schreiber Water) at the Fox Engineering booth (left to right).

Steve Barton, Charles Beckwith and Gary Dunn at the APCCO booth (left to right).

in either aluminum, hybrid aluminum/stainless steel or all-stainless steel housings. The housing type used depends upon whether a Sterilization-in-Place (SIP) or a Autoclave sterilization process is used. The performance of these sterile filters is protected, upstream, by standard compressed air dryers, filters and drains. Visit www.donaldsonprocessfilters.com

My visit to the Summit booth was both educational and enjoyable (those Texans know how to kid each other)! We discussed food-grade lubricants and how many brands on the market are not designed for more than 5,000 hours. I actually had a pet food processor visit my booth and say that exact thing. Summit's food grade lubricant is guaranteed to last 10,000 hours and Jim Hamilton (who says he's retiring but I don't believe him) explained, "Summit lubricants have always been formulated specifically for air compressors – by air compressor people – and that's why they perform uniquely well." Jim owned an Ingersoll Rand distributor in Los Angeles - before joining Summit as their 2nd employee – 35 years ago! And you wonder why, after 26 years, I still feel like a compressed air rookie sometimes. "All of Summit's food grade lubricants are registered with NSF® for H1 application," said Ike Trexler – Summit's Food & Beverage Industry Manager. "Our facility is NSF certified to meet the ISO 21469 standard." The guys, when they were done insulting each other, also said their electric (heater-based) oil water separator and their Sublime water scale solvent for heat exchangers is working very well. A new product for me was Varnisol – able to lower air compressor discharge temperatures by dissolving varnish. Summit also offers a comprehensive Oil Analysis program. Visit www.klsummit.com

Valin is a San Jose, California diversified wholesale distribution company bringing technology and application engineering to industry. They have branches spread across ten states ranging from Washington to Texas. They represent Parker Balston products. I spoke to Parker Balston's Western Regional Sales Manager Valerie Allison and with Patrick Hyland who is the Parker Balston product specialist at the Valin Portland branch. They said the food industry and the laser cutting industries continue to see the logic of using nitrogen generators (using compressed air). "Clients don't want to worry about nitrogen dewar delivery issues," Hyland said. "They also appreciate not losing any nitrogen as they do in their liquid nitrogen systems." Both also reported success with their Parker Balston compressed air purification products, "Valin performs SQF (Safe Quality Foods) Compressed Air Quality Assessments for clients on a quarterly basis," said Hyland. Valin also designs pneumatic systems for their clients. I had a good conversation with Bill Nevils, Valin's Technical Specialist for Pneumatics and Automation. According

to Nevils, "Most clients could optimize their pneumatic circuits to use less flow and operate at lower pressures." Nevils tries to educate his OEM clients on "dual pressure" opportunities eliminating needless compressed air consumption on the backstroke of a pneumatic cylinder. Visit www.nalin.com

Chiller, Cooling Tower and Wastewater Systems

Fox Engineering is based out of Oregon City and has been providing process systems and equipment associated with heat transfer, environmental quality, steam process and HVAC since 1984. They work extensively with Evapco cooling towers in the Northwest. Fox Sales Engineer Randy Vielmetti told me about their 2017 project installing Evapco AXS Crossflow Cooling Towers at the Portland International Airport. We then discussed the new Eco-Air line of air-cooled condensers from Evapco. "More and more clients want to reduce water consumption," said Vielmetti. "The eco-Air series offers fully dry and adiabatic condensers." He also said there was demand for their "1/2 wet and ½ dry" system offered in the Evapco Eco-Line of cooling towers. Specifically eco-ATW and eco-ATWE Series units using an extended surface spiral fin heat exchanger designed to use cold ambient air conditions instead of water - when cold temperatures permit. They also work extensively with Lakos heat transfer filtration products designed to protect heat exchangers, evaporative condensers and cooling towers. Visit www.foxengineering.com

Clean Water Technologies is a global provider of water and wasteater solutions. The company designs, builds and installs primary, secondary (MBR and Anaerobic Reactors) and tertiary treatment systems. Their main U.S. office is in Los Angeles and I spoke with Project Manager Jason Hicks. Their GEM primary treatment system is being retrofitted into plants replacing their DAF (Dissolved Air Flotation) systems. A benefit they claim is "superior aeration" with this GEM system as they inject 100-120 psi compressed air into 100% of the wastewater stream before flocculation occurs. Visit www.cleanwatertechnology.com

My booth neighbors at the show were from Apcco – a very important industrial refrigeration and mechanical contracting firm. Established in 1981 and headquartered in the California central valley, this Modesto based firm focuses on supporting the process cooling needs of the food industry across the whole West Coast. They have long standing partnerships with Baltimore Aircoil, Johnson Controls, Evapco, Frick and many other important vendors. Visit www.apcco.net

About Northwest Food & Beverage World

Northwest Food & Beverage World is held annually in Portland, Oregon. Next year the event will be held January 14-16, 2019. It is the marquee event of Food Northwest. For more information please visit www.foodandbeverageworld.org BP

The NWFPA (Northwest Food Processors Association) recently announced their renaming to Food Northwest. This association was founded in 1914 as a canners association. Food Northwest supports the needs of the Pacific Northwest food processing industry in Oregon, Washington and Idaho. For more information visit www.foodnorthwest.org

To read more about the ***Food Industry,*** please visit www.airbestpractices.com/industries/food

RESOURCES FOR ENERGY ENGINEERS

TECHNOLOGY PICKS

Sullair Announces OFD1550 Oil Free Portable Compressor

Sullair, an industry leader in innovative compressed air solutions since 1965, announced its new OFD1550 Oil Free Portable Air Compressor at The Rental Show. The OFD1550 represents the latest solution in the ever-expanding Sullair oil free portfolio. As more customers seek options for sensitive compressed air needs – including pharmaceuticals, food and beverage, electronics and more – products are needed for dedicated oil free plant air and back-up oil free air.

"The OFD1550 fills a strong customer need," according to Russell Warner, Sullair's VP rental & infrastructure sales. "With Sullair's growing focus in oil free air, having options to provide back-up plant air is critical. This compressor fits that growing need – providing a solution for our distributors and rental customers to satisfy more of their customer demands."

"Compressors designed for back-up plant air must stand up to the rigors of continuous operation," according to Friedmar Rumpel, Sullair's global VP of product and program management. "In designing this product no detail was too small to maximize reliable and durable performance. The engineering completed on the OFD has resulted in a truly innovative air flow package design to provide optimal performance and cooling under various load and ambient situations."

The Sullair OFD1550 provides 1,550 cfm of Class 0 oil free air per ISO 8573-1 at 125 psi.

The Sullair OFD1550 is assembled in the U.S.A., and provides 1,550 cfm of Class 0 oil free air per ISO 8573-1 at 125 psi. Providing the power behind the unit is a powerful tier 4 final diesel end. The Sullair oil-free air end includes rotors specifically designed for oil free operation and coated with FDA-approved food-grade PTFE to help resist corrosion and extend air end life.

Additionally, the OFD1550 is packed with features to help ensure versatile operations and maximum uptime, including:

- Full color seven-inch Sullair Touch Screen controller providing all compressor and engine operation data at the touch of a finger.
- Sullair AirLinx® remote monitoring and telematics.
- Refinery Package – including 110% fluid containment, anti-static belt, non-metallic fan and engine air shut-off valve.
- Cold Weather Package – allowing operation at temperatures as low as -20 ˚F (-29 ˚C).

About Sullair

Since 1965, Sullair has developed and manufactured air compressors with proven reliability and wear-free durability. Sullair is globally recognized as a leading manufacturer of air compressors for use in manufacturing, oil and gas operations, food processing, construction and more. The Sullair compressor line includes oil flooded rotary screw compressors as well as oil free compressors including rotary

TECHNOLOGY PICKS

screw, scroll and centrifugal options. Sullair also offers a complete line of construction air tools, compressed air treatment equipment and vacuum systems. Customers around the world keep their compressors running optimally with a full line of aftermarket parts, fluids and services. Sullair has manufacturing capabilities in Michigan City, Indiana; and Shenzhen and Suzhou, China; as well as a JV (IHI-Sullair) based in Suzhou. For more information, visit www.sullair.com. Sullair is A Hitachi Group Company.

The Hitachi Group is a global leader in the Social Innovation Business with over 300,000 employees worldwide. Through collaborative creation, Hitachi is providing solutions to customers in a broad range of sectors, including Power / Energy, Industry / Distribution / Water, Urban Development, and Finance / Government & Public / Healthcare. For more information, visit www.hitachi.com.

ProAir 2200 Compressed Airline Monitor from ENMET

Compressed air is often used in the production and packaging process in pharmaceutical manufacturing. Compressed air and other process gases such as nitrogen, oxygen, argon and carbon dioxide can come in direct contact with pharmaceutical products. Process air must be tested and monitored to prevent the risk of contamination and ensure the quality and safety of the pharmaceutical products.

ENMET's ProAir 2200 compressed airline monitor is designed for monitoring process air quality during manufacturing processes using compressed air. The ProAir 2200 can continuously and simultaneously monitor up to four gases. It can be custom configured to monitor a variety of hazardous gases and dew point during pharmaceutical manufacturing. Consider using ENMET's ProAir 2200 compressed airline system to monitor the air quality and prevent contamination of products in any type of manufacturing process. Contact our ENMET Sales Team today for more information, or visit www.enmet.com.

The ProAir 2200 can continuously and simultaneously monitor up to four gases.

Kaeser Expands Compressed Air Filter Line

Kaeser Compressors, Inc. has expanded their compressed air filter line to cover flows from 20 cfm – 11,875 cfm. Kaeser's rugged filters deliver reliable compressed air quality with exceptionally low pressure drop for energy savings year after year.

Kaeser has expanded their line of compressed air filters to cover flows up to 11,875 cfm.

The new larger capacity filters include bowl-style housings with a bayonet style connection for flows from 650 cfm to 1,130 cfm. Pressure vessel style filters begin at 1,250 cfm and cover flows up to 11,875 cfm. The pressure vessels are ASME/CRN rated, and feature full vessel-diameter access for simplified maintenance.

The comprehensive line includes a liquid separator, particulate, coalescing and oil vapor adsorbing filters to meet a wide range of air quality needs for any ISO 8573.1 air quality level. Particulate and coalescing filters feature deep pleated filter elements wrapped in stainless steel cages for superior filtration and increased efficiency. Vapor filters use high efficiency carbon matting to prevent channeling, reduce pressure drop and prevent particles from escaping.

RESOURCES FOR ENERGY ENGINEERS

TECHNOLOGY PICKS

About Kaeser

Kaeser is a leader in reliable, energy efficient compressed air equipment and system design. We offer a complete line of superior quality industrial air compressors as well as dryers, filters, SmartPipe™, master controls, and other system accessories. Kaeser also offers blowers, vacuum pumps, and portable gasoline and diesel screw compressors. Our national service network provides installation, rentals, maintenance, repair, and system audits. Kaeser is an ENERGY STAR Partner.

For more information, visit www.kaesernews.com/pvfilters. For more information or to be connected with your local authorized Kaeser representative, please call (877) 596-7138.

SERIES WE08 and WE35 Brass Ball Valves from Dwyer

W.E. Anderson™ by Dwyer is announcing the release of the Series WE08 Two-Way Brass Ball Valve and the Series WE35 Three-Way Brass Ball Valve, great for flow rates with minimal pressure drop. The valves feature a blowout proof stem for added safety, reinforced PTFE seats and seals for longer life, and a brass ball for better performance. Actuators are direct mounted for compact assembly in tight spaces.

The Series WE08 and Series WE35 can be configured with either an electric or pneumatic actuator. Electric actuators are available in weatherproof or explosion-proof, a variety of supply voltages and two-position or modulating

The Series WE08 and Series WE35 can be configured with either an electric or pneumatic actuator.

TECHNOLOGY PICKS

control. Two-position actuators use the supply voltage to drive the valve open or closed, while the modulating actuator accepts a 4 mA to 20 mA input for valve positioning. Actuators feature thermal overload protection and permanently lubricated gear train.

The pneumatic double acting actuator has two supply ports, using the air supply to drive the valve open and closed. Spring return pneumatic actuators use the air supply to open the valve and internally loaded springs return the valve to the closed position. Actuators are constructed of anodized and epoxy coated aluminum for years of corrosion free service.

For more information, please visit www.dwyer-inst.com

Martech Services Company Introduces Breathable Air System

Compliance with the OSHA requirement for Grade "D" Breathable Air can be accomplished with the use of a *Quality Air Breathing System* manufactured by Martech Services Company.

According to Tom Wright, director of sales and marketing, when placed near the point of use, a *Quality Air Breathing System* will work with the existing compressed air supply. The four-stage filtration, filters the air, and the on-board carbon monoxide monitor continuously monitors the air quality for compliance with current OSHA standards. "*Quality Air Breathing Systems* are by design, the affordable solution to providing the breathable air required to protect painters, blasters, and welders" Wright said. "Complete systems designed to fit the users' facilities and needs, to include hoods, masks, and hoses are also available."

With the ever-increasing awareness and need to properly protect workers while working in contaminated air spaces, the systems are designed for multiple users and ease of use. Systems are capable of supporting two or more persons at the same time. Accessories can even increase or decrease the temperature of the air supply for improved user comfort.

Major corporations look to Martech Services Company for their air supplied system needs. National dealer equipment programs

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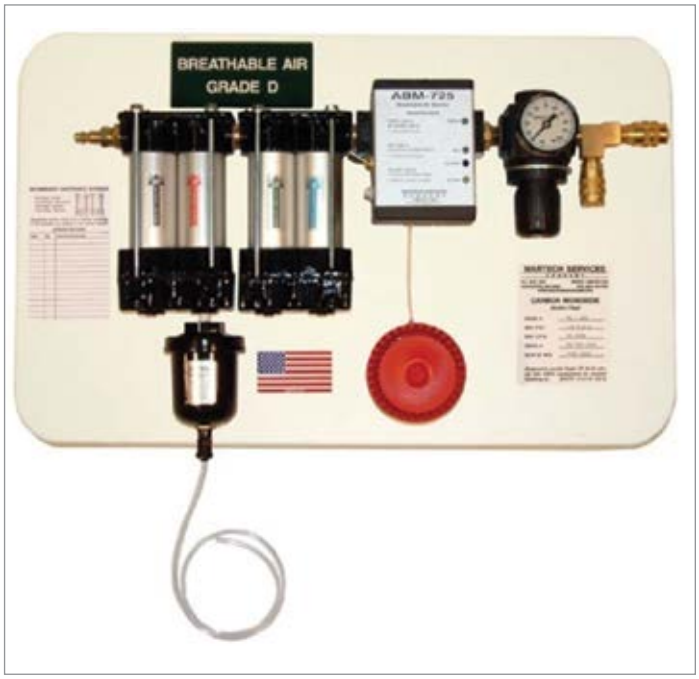


A Quality Air Breathing System can accomplish OSHA Grade "D" Breathable Air.

and major paint manufacturers, alike, have chosen Martech as their preferred source. Additionally, each system is backed by a one-year warranty and supported by a toll-free sales and service, telephone support staff, around the clock, 7 days a week.

More information on *Quality Air Breathing Systems* can be obtained by calling Martech Services Company at 800/831-1525 or visit www.breathingsystems.com.

1008S Pressure Gauges from Ashcroft

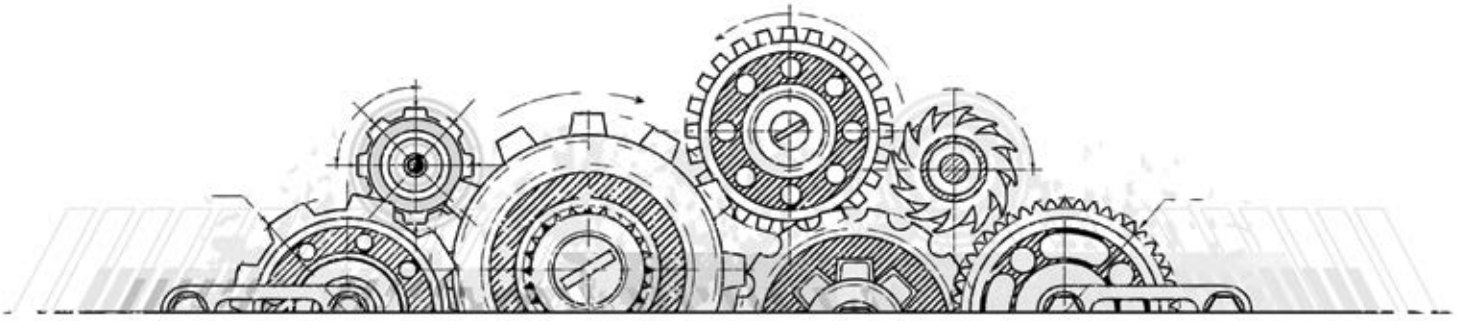
When space is limited, Ashcroft® 1008S 40mm (1.5") and 50mm (2") diameter pressure gauges provide the quality and performance of a larger gauge, but in a smaller diameter. A NEMA 4/IP66 ingress rating and a stainless-steel case allow the 1008S to be used outdoors or in harsh environments. Liquid fill, or the patented Flutter Guard™ movement enhancement, protect the gauge and make it easier to read in high vibration installations. Available in ranges up to 20,000 psi, the rugged 1008S stands up to a variety of tough applications where lesser quality gauges may fail.

About Ashcroft

Ashcroft® Inc. manufactures gauges, thermometers, switches, transducers, transmitters, data loggers, calibration equipment and isolators for pressure measurement, monitoring and control. Product brands include Ashcroft®, Heise®, Willy™ and Weksler®. As a global provider, Ashcroft® Inc. maintains a network of manufacturing facilities, sales offices and distributors worldwide.

For more information, please call 203/385-0635 or visit www.ashcroft.com.

The 1008S Pressure Gauge is available in ranges up to 20,000 psi.



RESOURCES FOR ENERGY ENGINEERS

TECHNOLOGY PICKS

New Air Gun with Variable Flow from EXAIR

EXAIR's new VariBlast® Compact Safety Air Guns are a small and lightweight cast aluminum air gun capable of handling tough jobs. Due to the engineered variable flow trigger they are able to produce light, medium or heavy force upon a target simply by pulling the trigger. This comfortable and ergonomic air gun has two ¼ NPT air inlets and a storage hanger for convenience. Air consumption of the VariBlast Compact air gun is only 10-17.5 scfm, depending on the nozzle installed, among one of EXAIR's most efficient air guns. It is capable of producing up to one pound of force, making it a great choice for light to medium duty applications.

These CE compliant air guns can use EXAIR's extensions up to 72" long for extended reach, and can be purchased with a chip shield. This product line of VariBlast Compact Safety Air Guns utilizes EXAIR's 1/8 NPT engineered air nozzles, reducing compressed air use and meeting OSHA requirements for dead-end pressure and noise exposure.

All of EXAIR's Safety Air Gun product lines use engineered air nozzles for high performance and safety – designed to maximize safety and minimize air consumption. The Heavy Duty and Soft Grip Safety Air Guns provide higher force for tougher applications. All are available with extension pipes and Chip Shields. VariBlast Compact Safety Air Gun Prices start at $58.

EXAIR's new VariBlast Compact Safety Air Guns consume only 10-17.5 scfm, depending on the nozzle installed.

For more information, visit www.EXAIR.com or call: (800) 903-9247.

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Compressed Air Best Practices® is a technical magazine dedicated to discovering **Energy Savings** in compressed air systems — estimated by the U.S. Department of Energy to represent 30% of industrial energy use. Each edition outlines **Best Practice System Assessments** for industrial compressed air users — particularly those **managing energy costs in multi-factory companies.**

"We had three 900 hp air compressors. A big part of the reduction was getting the right air compressors in place."

– Bob Nelson, Engineering Manager, Ball Corporation, Saratoga Springs (NY) Facility (feature article in March 2017 Issue).

"We performed a compressed air leak survey at a refinery identifying 1,726 leaks resulting in 13,324 cfm of lost air to leakage."

– James Nipper, Vice President, Petro Chemical Energy (feature article in May 2017 Issue).

"Demand Side" and "Supply Side" information on compressed air technologies and system assessments is delivered to readers to help them save energy. For this reason, we feature Best Practice articles on when/how to correctly apply **air compressor, air treatment, piping, storage, measurement and pneumatic control technology.**

Industrial energy managers, utility incentive program managers, and technology/system assessment providers are the three stakeholders in creating energy efficiency projects. Representatives of these readership groups guide our editorial content.

"The membrane dryers are able to drop the pressure dew point to -121 ºF (-85 ºC) for the laboratory."

– From April 2017 feature article; "NMR Spectroscopy Lab Requires a -112 ºF Dew Point and Pure Nitrogen."

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Please visit Compressedairsystems.com for more information. Send resume and cover letter to KKR@compressedairsystems.com

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