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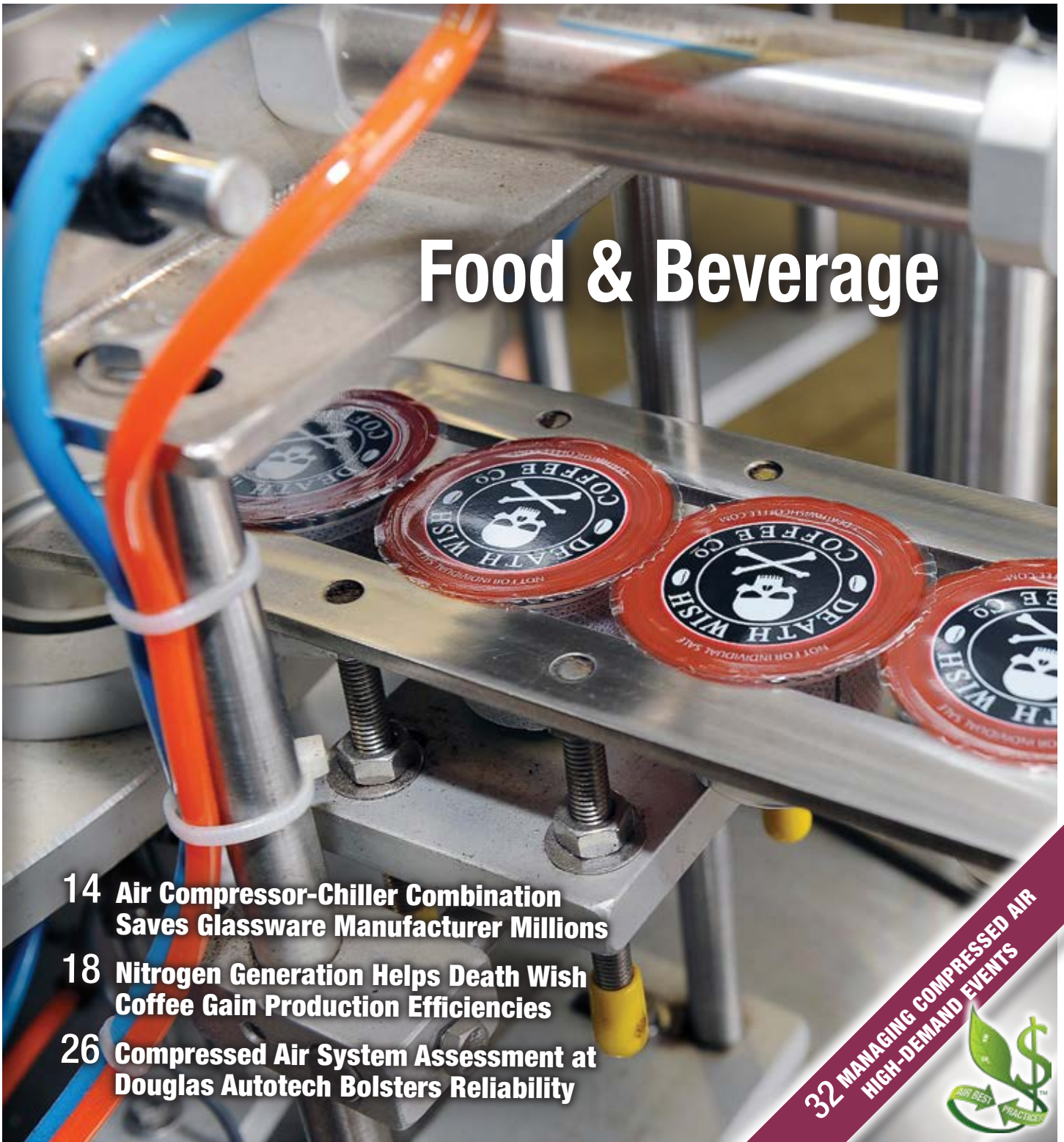

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FEATURES

QUALITY, SAFETY & RELIABILITY FEATURES

PRODUCTIVITY, SUSTAINABILITY & ENERGY CONSERVATION FEATURES

COLUMNS

COVER PHOTO. This month's cover features pneumatic automation in action at the Death Wish Coffee Company.

FROM THE EDITOR

Quality, Safety and Reliability

We kick off this issue with a "home run" case study provided to us by Fernando Arce-Larreta, from Aggreko. A consumer glassware product manufacturer sought a solution for the injection of cold compressed air into its refractory furnace. Rental oil-free rotary screw air compressors, combined with a heat exchanger and chiller, provided the solution – and $9 million in monthly savings!

Death Wish Coffee (what a great name) turned to automation to support their growing coffee roasting operations. They installed a vertical form filler capable of filling thirty one-pound bags of coffee per minute. Tony Hergert, from nano-purification solutions, provides us with a wonderful story about how they helped introduce nitrogen blanketing into this process to ensure the shelf-life and quality of the coffee. This involved the design and installation of a reliable onsite nitrogen generation system.

Proper lubrication of oil-flooded air compressors is one of the keys to the reliability, longevity and performance of the machine. Lubricant life is impacted by the type of lubricant used and the application. Josh Allen, from Isel, has sent us an interesting article about a test process (Rotating Pressure Vessel Oxidation Test) able to pinpoint the expected life of air compressor lubricants.

Productivity, Sustainability & Energy Conservation

Douglas Autotech Corporation is a world-class manufacturer of vehicle directional control systems, such as steering columns. They allowed our own Mike Grennier to write a feature article on the compressed air system assessment and system upgrade done at their 100,000 square-foot plant in Hopkinsville, Kentucky. The result was a more reliable supply of compressed air with $105,000 of annual energy savings.

Does your plant understand where demand for compressed air comes from – and when? Do you have a strategy to maintain reliable pressure in an efficient manner? Neil Mehltretter, from Kaeser Compressors, addresses these questions with a valuable article titled, "How to Manage Compressed Air Systems During High-Demand Events."

Best Practices 2021 EXPO & Conference

Reserve the dates of November 2-4, 2021! Located at the Schaumburg Convention Center, located minutes away from Chicago O'Hare International Airport, we will renew our free EXPO and our expert conference educational experience. Register at www.cabpexpo.com for this great opportunity for maintenance teams and engineers to receive training and PDH hours.

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COMPRESSED AIR SYSTEM INDUSTRY NEWS

Atlas Copco Acquires German Mechanical Contractor

Atlas Copco has completed the acquisition of MEDGAS-Technik GmbH. The company is a manufacturer, distributor, installer and service provider of medical air and medical vacuum systems, pipeline equipment and medical supplies. MEDGAS is headquartered in Berndroth, Germany, and has 80 employees. The company has branch offices in Germany, Austria, and Switzerland.

In 2019 the company had a turnover of approximately MSEK 126 (MEUR12). The purchase price is not material relative to Atlas Copco's market capitalization and is not disclosed. MEDGAS will become part of the Medical Gas Solutions division in the Compressor Technique business area.

About Atlas Copco Group

Great ideas accelerate innovation. At Atlas Copco we have been turning industrial ideas into business-critical benefits since 1873. By listening to our customers and knowing their needs, we deliver value and innovate with the future in mind. Atlas Copco is based in Stockholm, Sweden with customers in more than 180 countries and about 39 000 employees at year-end. Revenues of BSEK 104/BEUR 10 in 2019. www.atlascopcogroup.com.

Lontra Signs Agreement with IAC to Begin U.S. Distribution

Lontra announced an agreement has been signed with Blade Compressors® LLC, a division of Industrial Air Centers with headquarters in Jeffersonville, Indiana (USA), to be the National Distributor for Lontra Blade Compressors® and forthcoming Lontra products and services in North America.

This agreement signifies the start of Lontra's distribution journey, bringing their novel technology package (the LP2 Blade Compressor®) to industry on a global scale. The package is by design a very robust unit. Its operational range and features are as follows:

- Flow rate from 350 cfm to 1550 cfm
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George Burch, C.E.O. of Industrial Air Centers said, "We strongly believe the Lontra Blade Compressor will change the blower market in the USA with its unique combination of excellent reliability and high efficiency in a modern and well-designed package. Based on industry statistical data it is estimated that the market for machines in which the LP2 blower will compete in is approximately 85,000 units per year in the USA and growing."

Blade Compressors LLC will be coordinating and managing the addition of Regional Distributors throughout North America

Industrial Air Centers Named the National Distributor for Lontra Blade Compressors in North America.

to insure nationwide sales and service coverage for Lontra products.

The Blade Compressor® is a patent protected, compact, double-acting rotary compressor which delivers a Triple Win to end-users; it is oil-free, more reliable and provides significant improvements in efficiency for applications in energy intensive industries such as waste water treatment, pneumatic conveying, and industrial compressed air.

Euan McCulloch, Commercial Director at Lontra Ltd. said, "We are very glad to be partnering with an established company such as Industrial Air Centers who are knowledgeable regarding the industry, experienced in all types of air compression and we are very confident that together we will have a major market presence in a relatively short time."

Lontra Non-Executive Board Member, Rick Stasyshan said, "I have been associated with both Lontra and IAC for many years. This is a perfect blend of Lontra providing an innovative, oil-free, energy efficient and reliable compressed air product utilizing the compressed air marketing expertise and product support of IAC's new company, Blade Compressors LLC.

Lontra recently expanded its Midlands Technical Centre to include a brand-new assembly facility in Birmingham (U.K) which has the capacity to meet both demand from North America and from other markets Lontra will enter during 2021. This modern facility includes full testing capacity for every machine that is assembled, with the performance being verified and recorded prior to shipment.

For more information, visit www.lontra.co.uk.

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COMPRESSED AIR SYSTEM INDUSTRY NEWS

ABB Motor and Generator Division Names New President

Henson, who has been with the company for 23 years, leads the team responsible for marketing, designing, and manufacturing ABB and Baldor-Reliance industrial electric motors in the United States. Henson will also continue to be the global head of the NEMA motors product group.

Jesse Henson, President, ABB's US Motors and Generators Division

"I am honored to lead the US industrial motor business," said Henson. "Taking care of customers is in our employees' DNA, and we work hard every day to earn our customers' business and their preference for our motors. I am committed to maintaining that focus and investing for the future." Henson started his career with the company (Baldor Electric Company at that time) in 1997 as part of the drives and motion control team. His customer-first approach has been critical to his success in roles in product management, marketing, and sales. His broad experience across both motors and drives provides a strong level of understanding of customer and application needs as well as buying preferences in the US market.

About ABB

ABB is a leading global technology company that energizes the transformation of society and industry to achieve a more productive, sustainable future. By connecting software to its electrification, robotics, automation and motion portfolio, ABB pushes the boundaries of technology to drive performance to new levels. With a history of excellence stretching back more than 130 years, ABB's success is driven by about 110,000 talented employees in over 100 countries. For more information, visit www.abb.com.

Ingersoll Rand Mocksville Celebrates Safety Milestone

Ingersoll Rand's Mocksville, North Carolina, manufacturing plant just celebrated a safety milestone: working two million hours without experiencing an Occupational Safety and Health Administration (OSHA) lost-time accident. The last lost-time incident at the facility, part of our Industrial Technologies and Services, Americas business, was in December 2017. The team celebrated by distributing T-shirts to every employee noting this achievement.

"Safety is an integral part of our commitment to our employees," said EHS Manager Kulema McKoy. "Reaching this level of workplace safety takes the daily commitment of every employee in our facility, a commitment I know they take seriously. We're very proud of our employees for setting such a high safety standard."

In its quest to keep worker safety as the highest priority, Mocksville has incorporated several initiatives that encourage employee participation and input. Their site safety program is comprised of core elements that are essential to achieving and maintaining a strong safety and health program. By implementing these elements – including a BBS (Behavior Based Safety) program for salaried and hourly employees, "5 Why" incident reviews, monthly safety awareness training, daily safety topics, an onsite nurse and strong management-employee relationships – employees are held accountable by leaders and peers.

"As for the future as we get better at what we do, it will be because the individuals at our site have agreed to become part of something important. They have obviously devoted themselves to creating a habit of safety excellence that will live on," said Kulema.

About Ingersoll Rand Inc.

Ingersoll Rand Inc., driven by an entrepreneurial spirit and ownership mindset, is dedicated to helping make life better for our employees, customers and communities. Customers lean on us for our technology-driven excellence in mission-critical flow creation and industrial solutions across 40+ respected brands where our products and services excel in the most complex and harsh conditions. Our employees develop customers for life through their daily commitment to expertise, productivity and efficiency. For more information, visit www.IRCO.com.

Ingersoll Rand's Mocksville plant celebrated two million hours without a lost-time accident.

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COMPRESSED AIR SYSTEM INDUSTRY NEWS

Evonik Acquires Porocel for $210 Million

Evonik Industries AG announced it has entered into a definitive agreement to acquire the Porocel Group for $210 million to accelerate the growth of its catalysts business. Based in Houston, Texas, Porocel offers a technology for highly efficient rejuvenation of desulfurization catalysts, which are in increasing demand to produce low-sulfur fuel. Rejuvenation reduces carbon-dioxide emissions by more than 50% compared with the production of new desulfurization catalysts. In addition, Porocel has available production capacity, enabling Evonik to speed up expansion of its existing business with fixed-bed catalysts.

"This acquisition is the next logical step in the strategic development of our portfolio. Our focus is on stable and high-margin specialty chemicals," said Christian Kullmann, chairman of Evonik's executive board. "We are systematically expanding the share of our specialty businesses – and that at an attractive valuation."

Porocel has more than 300 employees worldwide and production facilities in the USA, Canada, Luxembourg, and Singapore. Porocel's global position strengthens the worldwide presence of Evonik's catalyst activities. The complementary fit to Evonik's existing catalyst portfolio and especially the available production capacities offer considerable growth opportunities. Evonik expects to increase sales of the combined catalyst business to significantly more than €500 million by the end of 2025 without the need for investment in new capacities. Catalysts are essential for the production of many chemical products and for production of clean fuels.

"Our innovation power driven by the talented team at Porocel is well suited to Evonik's culture, and we look forward to growing the business further together," said Terence McHugh, President/COO of Porocel.

"Sustainability and especially circular economy play a decisive role for us when it comes to acquisitions and the orientation of our portfolio," said Claus Rettig, head of Evonik's Smart Materials division. "With the acquisition of Porocel we are meeting increasing demand that is coming from a trend towards sulfur-free fuels as well as reducing CO_2 emissions and saving resources. The catalyst rejuvenation process results in significantly less CO_2 emissions than the manufacture of fresh catalysts, while yielding comparable efficiency and at a much lower cost."

The acquisition gives Evonik access to major customers in the refinery and petrochemicals sector. Porocel's core competence is an efficient technology for purification adsorbents, sulfur recovery catalysts and hydroprocessing services highlighted by rejuvenation of used desulfurization catalysts.

The transaction is expected to close by the end of 2020 and is subject to approval by the relevant authorities. RBC Capital Markets acted as financial advisor and Thompson Hine LLP acted as legal advisor to Porocel.

About Evonik

Evonik, based in Essen, Germany, is one of the world leaders in specialty chemicals. The company is active in more than 100 countries around the world and generated sales of €13.1 billion and an operating profit (adjusted EBITDA) of €2.15 billion in 2019. Evonik goes far beyond chemistry to create innovative, profitable and sustainable solutions for customers. More than 32,000 employees work together for a common purpose: We want to improve life, today and tomorrow. For more information, visit www.evonik.com.

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COMPRESSED AIR SYSTEM INDUSTRY NEWS

Motion Industries Acquires Motion Control/Automation Company

Motion Industries, Inc., a leading distributor of maintenance, repair, and operation replacement parts and a wholly owned subsidiary of Genuine Parts Company, announced that it has completed the acquisition of Applied Machine and Motion Control, Inc. (AMMC), a Kentucky-based supplier of motion control and automation products and services. The transaction closed with an effective date of September 1, 2020.

Founded in 1995, AMMC is headquartered in Park Hills, Kentucky, outside of Cincinnati. The majority of AMMC's business comprises the markets of Indiana, Kentucky, Michigan, Ohio, Western Pennsylvania, and West Virginia. The company's engineering and application expertise propels its specialty services including motion control, drives, HMI, PC and embedded control, automation control, mechanical, robotics, motors, and mechatronics. AMMC's customer base consists primarily of OEMs, plus a few end users.

"We are very excited to join the Motion team," said David Locke, AMMC President and Founding Partner/Owner. "The cultural fit and our common goals make it an ideal match, and we look forward to contributing to the Company's growth. Through Motion, we will have access to even more products and capabilities to enhance our value proposition and level of service to our customers."

"As a premier supplier to the Ohio River Valley area and beyond, AMMC and its talented people will be instrumental in furthering our growth strategy geographically and in the automation arena," said Motion Industries President, Randy Breaux. "In addition to broadening our offerings to customers, their go-to-market approach and line card are remarkably like our other Mi Automation Solutions Group divisions, to which AMMC will be a nice complement. We are pleased to welcome them to the Motion family."

Mi Automation Solutions Group offerings to customers include control panels, conveyors, machine vision, motion control, network connectivity, pneumatics, robotics, aluminum extrusion, sensing I/O, and other automation-related solutions.

Motion Industries completed the acquisition of Applied Machine and Motion Control.

About Motion Industries

With annual sales of $6.0 billion, Motion Industries is a leading industrial distributor of bearings, mechanical power transmission products, electrical and industrial automation components, hydraulic and industrial hose, hydraulic and pneumatic components, industrial and safety products, as well as material handling products and solutions. Motion Industries has over 550 locations, including 15 distribution centers in North America, and Mi Asia Pacific has nearly 200 locations, including eight distribution centers in Australasia. Motion serves more than 200,000 customers from the food and beverage, pulp and paper, iron and steel, chemical, mining and aggregate, petrochemical, automotive, semiconductor, wood and lumber, medical, and pharmaceutical industries. Motion Industries is a wholly owned subsidiary of Genuine Parts Company. Visit our website at www.MotionIndustries.com or contact us toll-free at (800) 526-9328.

Walker Filtration Group Appoints New Group General Manager

Walker Filtration is pleased to announce that Steve Bittle has been appointed to the role of Group General Manager, effective September 1st, 2020. Steve is based at Walker Filtration's head office in Washington, Tyne and Wear, United Kingdom. Steve will be responsible for the strategy, planning, and management of all Walker Filtration Group divisions, driving the full potential of the business and product development in line with customer needs.

Having worked in the Compressed Air and Gas Filtration industry for over 25 years, Steve brings with him a wealth of experience, including an exceptionally strong technical background and impressive industry and product knowledge. He possesses a broad range of management experience, proven

Steve Bittle, General Manger, Walker Filtration.

leadership skills, and a passion for continuous improvement and driving success. Steve said, "I am delighted with my new role and look forward to contributing to the continued success and growth of our Company. As we develop the full potential of Walker Filtration, we will remain focused on customer service, product excellence, and innovation."

Steve has been an integral part of the Senior Management Team at Walker Filtration for the past four years, having joined the Group in 2016 as Chief Design Officer. The Walker Filtration team extend their sincerest gratitude to former General Manager, Sean Fairest, for his leadership and passion over the past two years.

About Walker Filtration

Walker Filtration is an established and recognized leader in advanced filtration, drying and separation technology. As a pioneer in the industry, Walker Filtration serves over 100 countries worldwide with locations in Europe, the United States, Asia, and Australia. Walker Filtration is dedicated to offering a unique design, exceptional engineering, and manufacturing excellence. For more information, contact Molly Spaeder (814) 836-2900 or molly.spaeder@walkerfiltration.com.

QUALITY, SAFETY & RELIABILITY

Air Compressor-Chiller Combination Saves Glassware Manufacturer $9 Million Monthly

By Fernando Arce-Larreta, Aggreko

A large manufacturer of consumer glassware products in the North East sought a solution for injecting cold compressed air into its refractory furnace. Doing so would minimize the internal corrosion thereby extending the life of the furnace lining and their annual maintenance interval. The manufacturer opted for a unique solution from Aggreko Engineering featuring a rental, oil-free rotary screw air compressor combined with a heat exchanger and chiller. Installed in 2019, the solution is expected to save the company $9 million monthly given the ability to maintain extend furnace maintenance from one year to two years – and boost plant uptime.

Any Extension of Furnace Repair Intervals a Plus

The glassware company's refractory furnace is used to melt raw materials during the glass making process. A typical furnace repair can take 18 months to plan and requires between five to six days to complete. A more extensive and complete furnace relining project can take between one to three months to complete. Any maintenance interval extension would result in a significant reduction of service costs and gained production.

During a visit to the facility, the Aggreko engineering team noted the plant was using oil-free diesel air compressors to blow compressed air on the exterior of the furnace. This air was applied to cool the furnace walls as a way to keep the interior temperature of the furnace down. The inefficient use of air pointed to an opportunity to improve the situation, in turn, allowing the plant to achieve its operating goals.

Temperature Control Crucial to Furnace Uptime

Refractory furnaces are often used to contain a high temperature corrosive environment for a particular process. Yet the walls of these same furnaces can lose their thickness and overall mass due to the heat and its environment.

While there are many types of refractory systems the thin lining thickness is usually between 25 millimeters for small systems and 75-plus millimeters for larger systems. Regardless of the wall thickness corrosion is still a common problem that all furnaces face. Managing the heat of the furnace is critical to having less maintenance and repairs over time.

According to a University of Missouri-Ralla study, the corrosion of the refractories (ceramic materials used in the furnace) begin in the melter due to batch carryover (lime, soda, fluorides, lead oxide, borax, silica, other glass constituents), volatile fluxes (i.e., volatile alkali oxides penetrating pores, where solid, liquid, and gas coexist), and melt attack, mainly at the metal line[1].

Erosion and wall degradation often follow this initial phase of corrosion. A study by Clemson University emphasizes the importance of temperature control. According to the study, "It is found that the hot face temperature primarily affects the rate of corrosion reactions. If the hot face temperature is held just below the point that the products of corrosion become liquid (melt), corrosion will be very slow or nonexistent[2]."

The Clemson study concluded the temperature gradient on thick furnace wall linings should not exceed 50°F per inch (10°C per centimeter). While this criteria is typically hard to maintain considering the furnace's application it is critical to achieve in order to maintain its productivity.

It was also noted in the Endell, Fehling and Kley model, "there is a very strong dependence of refractory corrosion rates on hot face, temperature. In fact, temperature is the most important process variable that can be considered in a furnace design or process control[3]."

Engineering a Solution

The Aggreko engineering team is no stranger to that fact that compressed air is often used very inefficiently at industrial facilities

A large manufacturer of consumer glassware products has been able to save $9 million monthly in operational costs by extending the maintenance intervals of its refractory furnace, thanks to a compressed air system featuring an oil-free air compressor, heat exchanger and chiller.

AIR COMPRESSOR-CHILLER COMBINATION SAVES GLASSWARE MANUFACTURER $9 MILLION MONTHLY

The compressed air system at the glassware products facility uses a heat exchanger in combination with a chiller to deliver compressed air to the company's refractory furnace at a temperature of 45˚F (7.2˚C).

and delivered to the production floor at suboptimal pressures and temperatures. Also crucial is air compressor reliability. If the air compressor goes down there is no production.

In this situation, temperature was of the utmost importance. The compressed air temperature leaving a typical rotary air compressor is 15˚F to 20˚F (-9.4˚C to -6.7˚C) above the ambient. While compressed air temperature is normally not an issue with standard production equipment, this particular application required cold air at less than 55˚F (12.8˚C) air.

The team designed a solution featuring an oil-free air compressor rated to deliver 1,500 scfm at 125 psig. The oil-free air compressor prevents the spread of oil vapor, while providing the amount of air needed at the right flow and pressure at all times. Additionally, the rental compressed air system includes a heat exchanger and chiller to cool the compressed air to a temperature of 45˚F (7.2˚C). By lowering the temperature of the air water vapor is condensed into liquid and removed from the air stream.

The team also calculated how heat affects the furnace's lining by taking into account its wall thickness, processing temperature, age and other critical factors. The solution was engineered to ensure compressed air was directed to the external locations within the furnace experiencing the most corrosion. The facility opted for a rental solution since it required its existing air compressors for other areas of plant production.

Production Gains Equal $9 Million Per Month

With the compressed air system up and running, the team noted the furnace's corrosion curve significantly slowed due to the cooler temperatures applied. The cooler temperature also enabled the plant to prolong the life of the furnace lining – in turn – allowing it to achieve its production target and delay the need to shut down their furnace for another year. The company estimates it saves

Cool air delivered by the unique compressed air system gives the glassware manufacturer the ability to extend furnace maintenance from one year to two years, significantly increasing plant uptime.

$9 million per month due to the production gain and extended service interval.

There are several industries that rely on refractory furnaces for production. Yet lining corrosion on the furnaces is one of the most critical challenges companies face given the consistently high temperatures involved. More frequent lining replacements also directly contribute to higher operational costs. Fortunately, more and more solutions are being introduced, such as the oil-free air compressor solution installed by Aggreko Engineering at the glassware manufacturing operation. The result is the ability to mitigate issues with a furnace's temperature for positive outcomes. BP

About the Author

Fernando Arce-Larreta is Aggreko's OFA (Oil Free Air) Leader, email: Fernando.Arce-Larreta@aggreko.com, tel: 713-882-9314.

About Aggreko

We provide power, heating, cooling, oil free air and energy services to make a difference for people, industries and communities, globally. We know that as the world demands cleaner energy, we can fulfill that with our expert people, our dedication and investment in new technology and keeping our customers at the forefront of everything we do. Together we make a difference. For more information, visit www.aggreko.com.

All photos courtesy of Aggreko.

References

1. Refractory Degradation in Glass tank Melters. A Survey of Testing Methods M. Velez, J. Smith, R. E. Moore. University of Missouri-Rolla, Department of Ceramic Engineering, Rolla, Missouri.
2. A Chapter in the Refractories Handbook, edited by Charles A. Schacht, and to be published by Marcel Dekker, Inc., New York, NY 10016 Corrosion of Refractories by Denis A. Brosnan, PhD, PE Clemson University Clemson, South Carolina.
3. "Influence of Fluidity, Hydrodynamic Characteristics and Solvent Action of Slag on the Destruction of Refractories at High Temperatures." Published by The Journal of the American Ceramic Society, December 1939, K. Endell R. Fehling R. Kley.

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QUALITY, SAFETY & RELIABILITY

Nitrogen Generation System Helps Death Wish Coffee Gain Production Efficiencies

By Tony Hergert, nano-purification solutions

Death Wish Coffee's nitrogen generation system helps the company improve efficiencies and save costs at its facility in Round Lake, New York.

➤ As founding members of a startup company in the compressed air and gas purification and separation industry, nano-purification solutions felt a kinship with the owners, employees and mission of Death Wish Coffee Co. The kinship and nano-purification solutions' expertise in onsite nitrogen generation led to the installation of a nitrogen generation system that contributes to the overall efficiencies and operational costs savings at the coffee roaster's production operation in Round Lake, New York.

Growth with a Flair

Death Wish Coffee Founder Mike Brown started the coffee roasting company in 2012 in a basement in Saratoga Springs, New York. The roaster of the "World's Strongest Coffee" has since grown into a 38-member organization

"Companies like Death Wish Coffee are starting to realize they can own and control their own source of clean, dry, reliable nitrogen and demonstrate an ROI of eight to 24 months in most instances."

— Mark Lauterwasser, Nano Nitrogen Product Manager, nano-purification solutions

with corporate offices in Ballston Spa, New York, and a new production facility in Round Lake, New York. Best of all, Death Wish Coffee (https://www.deathwishcoffee.com/) continues to do things on their terms and with a rock and roll flair.

The company gained notoriety in 2015 and 2016 after winning the 2015 Intuit QuickBooks "Small Business, Big Game" award with a grand prize of a free commercial during Super Bowl L in February 2016. The ad helped the company transition from a roast-to-order business into a successful provider of coffee to online retailers such as Amazon. It also became a supplier to brick-and-mortar retailers like Walmart and Kroger where it has been able to command shelf space for its ground and whole bean flagship variety of products, which include Keurig® pods and freeze-dried "Instant Death" instant coffee products.

Automated Filling and Packaging Equipment Installed

With success and new opportunities come new challenges as any growing company knows, and Death Wish Coffee is no exception. Weighing, filling and sealing coffee bags by hand for immediate shipment and quick consumption was a constraint for the growing company, which continued to grow opportunities with retailers eager to put the company's products on highly coveted shelves.

New product development and rapid growth experienced by Death Wish Coffee is precisely why the company's production engineers and C.J. DeLuca, Quality Assurance/Food Safety

NITROGEN GENERATION SYSTEM HELPS DEATH WISH COFFEE GAIN PRODUCTION EFFICIENCIES

Manager at Death Wish Coffee, began looking at ways to increase production and ensure the quality of its product, which could soon be available from the store shelf. Food and beverage products such as pre-ground, bagged coffee and K-Cup® pods require packaging with an inert gas flush to enhance storage and eliminate the chance of oxidation in order to retain rich flavors and extend shelf life.

Death Wish Coffee turned first to automation and installed a vertical form filler capable of filling 30, one-pound bags of coffee per minute. Vertical form fillers provide an automated, highly accurate, hands-free system for packaging food products with a single operator controlling the process. Automated filling machines also allow for inert gas, such as nitrogen (N_2), blanketing to be employed as required. The next step for the company was to ensure efficiencies in the process.

Pros and Cons of N_2 Cylinders Weighed

Like many expanding packagers, Death Wish Coffee initially relied on a local gas company to supply N_2 as a gas in Department of Transportation (DOT) cylinders. Also, like others, Death Wish Coffee needed to weigh the pros and cons of using cylinders as a source of N_2 based on growth in production.

High-pressure N_2 gas cylinders are limited in their storage volume (approximately 290 standard cubic feet of usable gas per cylinder is the norm), are dangerous to move around, and are the costliest way to buy N_2. Yet for a small packaging operation, cylinders are an easy way to get started and ensure longer product shelf-life at relatively low initial investment and commitment.

In the beginning, one to two cylinders could run for an hour or two during an eight-hour

The nitrogen generation system at Death Wish Coffee includes a Sullair ST1509RD, 20-horsepower (hp) rotary screw air compressor and a nano GEN2-2130-Plus nitrogen generator system.

shift to fulfill orders at Death Wish Coffee. But, as orders started increasing in volume and regularity, packaging runs were lasting five or six hours to even a full eight-hour shift. Since their new vertical form filler consumed 240 standard cubic feet per hour (scfh), it was using as many as five to six cylinders per day.

Since there was no sign of a slowdown, Death Wish Coffee realized they needed to make a decision to start buying 16-packs of N_2 gas cylinders, move to a liquid dewar system, or go all-in and install a nitrogen generator sized to meet their 240 scfh requirement without limiting their ceiling of production since the team was planning on continued growth.

In-house Air Separation the Right Choice

The 16-pack option was quickly pushed aside since on eight- to 10-hour-shift days, Death Wish Coffee would still be changing out skids of 16 packs every other day. Higher costs, increased delivery charges and downtime while changing N_2 skids made scratching this idea off the list an easy decision.

Liquid dewars are available in different sizes and can typically contain approximately 3,900 scf of usable N_2. The liquid is expanded through a heat exchanger where it is converted to a gas for use in the packaging operation. While a dewar would last for approximately 16 hours of production, liquid dewar usage typically requires a long-term contract, expensive monthly rental equipment and associated fees and taxes. Liquid dewars are also quite heavy and difficult to move and during times of low to moderate usage, N_2 liquid can boil off into the atmosphere wasting a valuable commodity the company has already paid for.

After several conversations with a local gas company, Death Wish Coffee decided to explore in-house air separation as an alternative to liquid nitrogen. The company turned to the local Sullair air compressor dealer Comairco who also represents nano-purification solutions. nano's Territory Manager Jim McFadden and Comairco's Technical Sales Representative Joe Bonfardeci proposed a turnkey system to Death Wish Coffee.

High Quality Compressed Air a Top Priority

The proposed compressed air system discussed would allow Death Wish Coffee to meet ISO 8573-1:2010 purity classes for compressed air, including Class 2 Particulates, Class 5 Water Vapor and Class 3 Oil.

McFadden pointed out the importance of a system that delivers a slightly better grade of compressed air either by utilizing a desiccant pre-treatment dryer, or by employing one of nano's Pressure Swing Adsorption (PSA) GEN2 Plus nitrogen generators, which feature the unique Adsorbent Media Sheet (AMS) integrated dryer.

The dryer found on the GEN2 Plus would effectively reduce the pressure dew point from approximately 45°F (7°C) to approximately -40°F (-40°C). This improvement would reduce the water content so drastically it would allow for the pores in the GEN2 Plus's adsorbent material to be freed up for adsorbing oxygen (O_2) instead of being unnecessarily blocked by adsorbed water vapor (H_2O).

NITROGEN GENERATION SYSTEM HELPS DEATH WISH COFFEE GAIN PRODUCTION EFFICIENCIES

Additionally, PSA nitrogen generators operate much like a twin tower heatless desiccant air dryer; however, they are set up on a different NEMA-timed cycle and utilize a different adsorbent material called Carbon Molecular Sieve (CMS), which has a high affinity for O_2 molecules. The removal of the oxygen molecules equates directly to N_2 purity. As such, nano-purifications always considers the proper pre-treatment of air ahead of the nitrogen generator when designing a system. nano also recommends lower dew points and improved particulate and oil parts per million retention ahead of the generator, especially as N_2 purity increases, to maintain the highest performance and longest service life from extremely sensitive CMS adsorbent.

McFadden noted how CMS works much like any other adsorbent. Pores in the material have a high affinity for certain molecules while allowing other molecules to pass through. For example, Molecular Sieve has a high affinity to CO_2 and Activated alumina has a high affinity to water vapor. The pores in CMS adsorbent allow for N_2 molecules to flow through the sieve beds

How the GEN2-2130-Plus Nitrogen Generator Works

The technologically advanced nano GEN2-2130-Plus nitrogen generator operates on the Pressure Swing Adsorption (PSA) principle to produce a continuous uninterrupted stream of nitrogen gas from clean dry compressed air.

Dual chamber extruded aluminum columns are filled with Carbon Molecular Sieve (CMS). Joined via an upper and lower manifold, the high-density filled columns produce a dual-bed system. After a preset time the control system automatically switches the beds. One bed is always online generating N_2 while the other is being regenerated. During regeneration, the oxygen that has been collected in the CMS stage and the moisture that has been collected in the optional integrated dryer stage are exhausted to atmosphere. A small portion of the outlet N_2 gas is expanded into the bed to accelerate the regeneration process.

Here's a closer look:

- Clean compressed air enters the inlet into the GEN2 unit where the inlet valves direct the flow to either the left or right column sets.
- After passing through the inlet valve, the compressed air enters one side of the manifold under the extruded columns.
- The compressed air then flows up through the integrated AMS dryer and the CMS beds where first water vapor and then oxygen and other trace gases are preferentially adsorbed and allows the N_2 to pass through.
- The N_2 gas then passes through the supporting bed layer with integrated filter into the outlet manifold before exiting through the outlet valves.
- The N_2 gas continues to the buffer vessel and nano F1 buffer vessel filter before returning to the GEN2 unit for purity monitoring, flow and purity regulation.

unimpeded while other components such as H_2O (water vapor), O_2, etc. are adsorbed by the surface of the CMS. But, unlike a standard desiccant compressed air dryer, the CMS media are not there to adsorb water vapor and, in fact, if more water vapor takes up space intended to be filled with O_2 and other stray gas molecules, a lower purity than expected may result from a correctly sized CMS bed.

Engineered Nitrogen Generator and Air Compressor Solution

Based on years of experience with coffee roasting and food packaging operations, McFadden recommended the GEN2-2130-Plus nitrogen generator, which could easily meet the 240 scfh requirement – and at the same time – achieve 99.99% nitrogen purity.

The unique adsorbent dryer bed in the modular unit's columns not only provides a base layer for the CMS but also removes unwanted water vapor to a dew point of -40°F (-40°C) pressure dew point, which allows the CMS to be most effective and most efficient at removing undesirable O_2 molecules. It also reduces the purge air a typical heatless regenerative dryer

nano's GEN2 i4.0 controller contributes to the efficient operation of the GEN2-2130-Plus nitrogen generator.

NITROGEN GENERATION SYSTEM HELPS DEATH WISH COFFEE GAIN PRODUCTION EFFICIENCIES

would require while reducing the footprint and extra cost of an additional piece of capital equipment into the system.

nano also quoted additional F1 industrial filtration including a 0.01 micron high-efficiency coalescing filter to reach ISO Class 1 for Particulates and Oil, as well as the unique AMS integrated dryer option to achieve Class 2 for Water Vapor.

Additionally, Bonfardeci selected the correct Sullair air compressor to provide the feed air required by the nano nitrogen generator based on some simple air-to-nitrogen ratio calculations. The recommended system includes the Sullair ST1509RD, 20-horsepower (hp) rotary screw air compressor with tank-mounted refrigerated air dryer and 1.0 micron pre-filter to deliver 80.1 scfm at 125 psig and approximately 45°F (7°C) pressure dew point.

Meeting Current and Future Needs

Death Wish Coffee has been very pleased with the performance of the nitrogen generator but was equally taken with the design of the entire system.

"For a growing company, the modular design of the nano-purification GEN2 system made a lot of sense," said DeLuca. "Our company continues to grow but, thanks to forethought by Jim and Joe, we will not outgrow our air compressor. We have enough compressed air to feed a second generator which is perfect since we are soon going to be adding another packaging line and have already started running a split shift that runs five hours and five hours, five days per week."

DeLuca said he also appreciates how the system has been engineered for longevity and cost savings.

"As we grow, we know we will add the other modular nitrogen generator bank and, in times of low demand, the bank(s) will go to sleep, which will save wear and tear on rotating equipment and switching valves – and save the company the cost of electricity to run the system," he said, noting that Death Wish Coffee expects to triple production this year.

Toward that end, McFadden said the nitrogen generator is designed to ensure efficient performance matched to demand.

"Ecomode and Purity Demand Energy Savings are just two of the unique features of our new GEN2 i4.0 controller," McFadden said. "The system will run as much or as little as Death Wish Coffee's production requires and will do so in the most efficient manner possible. The new controller will also allow for communication through Modbus and PROFIBUS to allow for total connectivity between machines and most company's building management systems."

Nano Nitrogen Product Manager Mark Lauterwasser said the use of nitrogen generators is gaining in popularity with companies like Death Wish Coffee.

"Nitrogen generation is a growing segment and nano-purification solutions is living proof of that fact. Only four or five short years ago, we introduced our first range of gas generators, but today we've seen a substantial increase in inquiries and systems sold on a year-over-year

basis to both new and repeat customers," Lauterwasser said. "Companies like Death Wish Coffee are starting to realize they can own and control their own source of clean, dry, reliable nitrogen and demonstrate an ROI of eight to 24 months in most instances."

Expertise from the outset of any project ensures the end-user is buying and installing a solution that will fit current and future needs. High-quality distributor support ensures proper installation and excellent routine maintenance and service long after the initial sale. The partnership between Comairco and nano is singularly committed to making customers such as Death Wish Coffee long-term, satisfied customers. BP

All photos courtesy of nano-purification solutions.

About the Author

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About nano-purification solutions

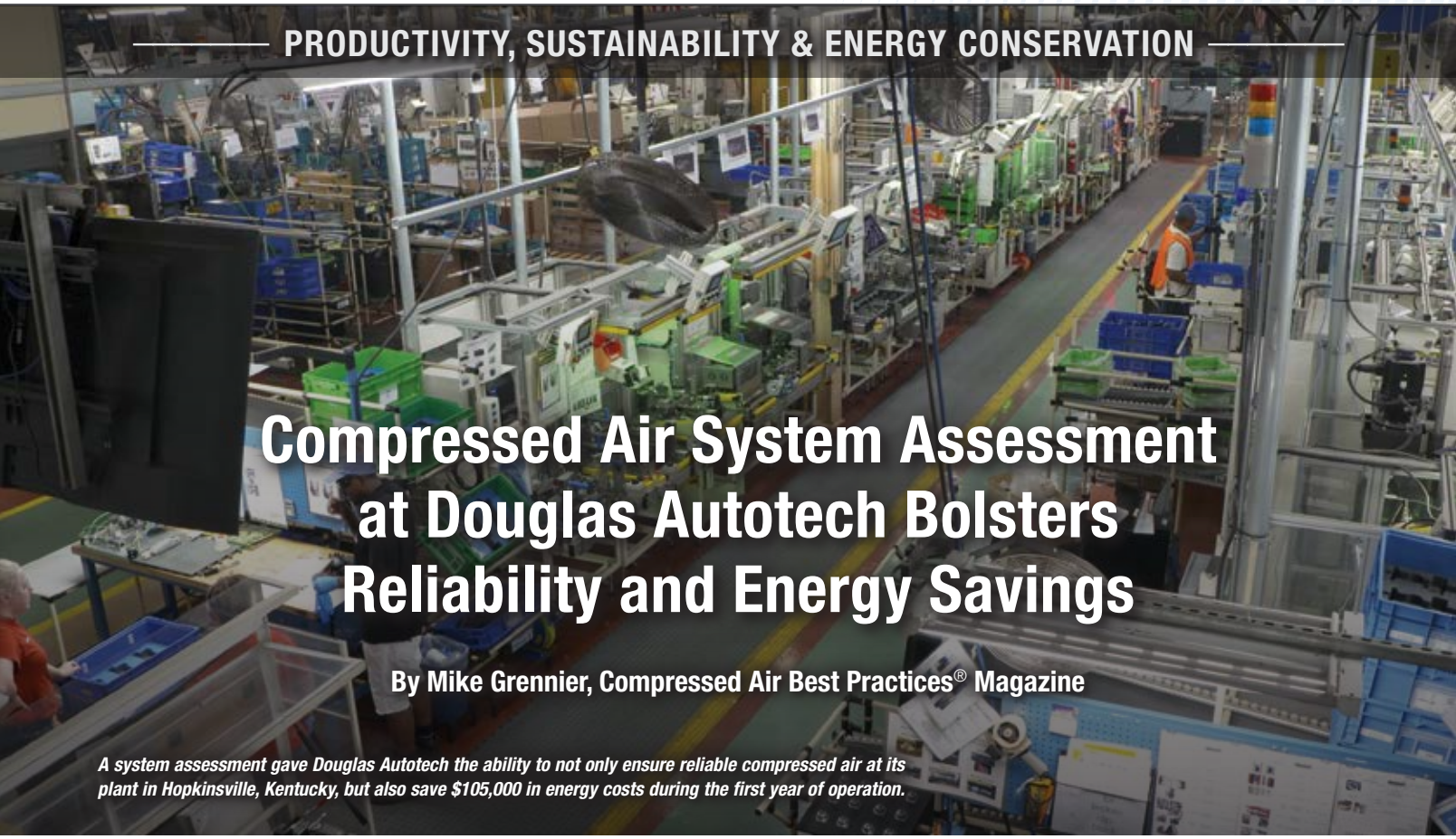
Leading-edge technology and hundreds of years of experience…nano-purification solutions is a world-class manufacturer of state-of-the-art compressed air and gas solutions for industry. Our commitment at nano is to work alongside our customers and provide unique solutions with the highest quality products to solve specific customer challenges. A wealth of experience and industry renowned products are only part of the equation. We at nano recognize world class customer service is the most important component to any successful business. Experience. Customer. Service. www.n-psi.com. For further information, email marketing@n-psi.com.

About Comairco

Since 1972, Comairco's knowledgeable staff have been supporting customers across the United States and Canada by helping them clearly identify their compressed air needs and by selling or renting the most cost-efficient air compressors and compressed air equipment available in the industry. For more information, visit www.comairco.com.

To read more ***Nitrogen Generation System Assessment*** articles, visit https://airbestpractices.com/system-assessments/air-treatment-n2

PRODUCTIVITY, SUSTAINABILITY & ENERGY CONSERVATION



Compressed Air System Assessment at Douglas Autotech Bolsters Reliability and Energy Savings

By Mike Grennier, Compressed Air Best Practices® Magazine

A system assessment gave Douglas Autotech the ability to not only ensure reliable compressed air at its plant in Hopkinsville, Kentucky, but also save $105,000 in energy costs during the first year of operation.

When the time comes to evaluate the reliability of a plant's compressed air system – and one where energy savings are well within reach – a proven best practices is to bring in an expert to conduct a compressed air system assessment and establish a plan for improvement.

That's the approach Douglas Autotech Corporation (http://www.douglasautotech.com/) took at its Hopkinsville, Kentucky, plant when the company's aging compressed air system needed more than just routine maintenance. And the decision paid off for the manufacturer of steering columns for some of the world's leading brands of on- and off-road vehicles.

A system assessment conducted by EVAPAR, the local compressed air services provider, followed by the installation of a lubricated, rotary screw Variable Speed Drive (VSD) air compressor and other improvements, allowed Douglas Autotech to reinforce the reliability of compressed air at the plant while netting $105,000 annually in energy costs.

Proven Track Record Dates to Model T

Douglas Autotech is a world-class manufacturer of directional control systems, such as steering columns, for the international vehicle industry with a rich history dating to 1902 when it began making parts for Henry Ford's Model T. Today, the company manufactures systems for heavy- and off-road vehicles at its headquarters in Bronson, Michigan, while its plant in Hopkinsville manufactures similar systems for cars and light trucks.

Products manufactured at the 100,000-square-foot plant in Kentucky include columns, I-shafts, covers, keylocks, and other dressings, along with shifter applications, such as straight, tap-up/tap-down and gated shifters. In all, the facility supplies automakers with products used in more than 100 different applications, all of which are designed keep vehicles operating safely, smoothly and reliably.

Douglas Autotech's Hopkinsville facility employs 300 people and operates two, 10-hour shifts, five days per week. The plant, which is registered by NSF International to meet the requirements of the ISO 9002; 1994 Quality Standard, manufactures parts from start to finish. Manufacturing capabilities include vertical integrated assembly, CNC machining, welding, heat treatment, and electrostatic wet coat painting, as well as plastic injection molding.

Reliable Compressed Air is Crucial

Compressed air plays a crucial role in the plant's assembly process by powering a host of cylinders, clamps, valves and actuators used in pneumatic production equipment, as well as handheld tools such as torque wrenches. Other uses of compressed air include shot-blasting and painting operations.

Brett Barrett, Engineering Technical Manager at Douglas Autotech's Hopkinsville plant, said the reliability and consistency of compressed

air is imperative, especially when it comes to its precision assembly process and its impact on productivity.

"Most of the machines have a pressure switch on them and if the pressure is not in the correct range, the machine is not going to operate," Barrett said. "There is no workaround. It has to be operational."

Maintenance Issues Spark Changes

Like many manufacturing operations, the Hopkinsville plant adapted its compressed air system throughout the years to meet increased demand for compressed air as the plant expanded and boosted production to keep pace with steady growth.

Over time, the plant's compressed system grew to include three, lubricated fixed-speed, rotary screw air compressors including one 300-horsepower (hp) unit rated to deliver up to 1,206 scfm and two, 100-hp machines rated to deliver up to 366 and 424 scfm, respectively. The original system also included a refrigerated dryer rated at 3,000 cfm and two, 1,060-gallon air receiver tanks.

Barrett said the Hopkinsville team regularly looked to outside companies to maintain its compressed air system through preventive maintenance programs. Yet age and ongoing wear and tear continued to show up in the form of ongoing overheating issues, pointing to a system upgrade.

"We switched between a couple companies for preventive maintenance programs where they would service the system every three months, but it got to be where we started to think, 'There's a lot more than three

Douglas Autotech's plant in Hopkinsville manufactures directional control systems, such as steering columns, for leading brands of light cars and trucks.

COMPRESSED AIR SYSTEM ASSESSMENT AT DOUGLAS AUTOTECH BOLSTERS RELIABILITY AND ENERGY SAVINGS

months' worth of issues here.' So we started shopping for air compressors. We weren't really looking for cost improvement as far as energy costs are concerned; we had a lot of maintenance issues to address."

In Search of a Strategy

While maintenance issues drove the decision to closely evaluate the compressed air system, Barrett said the Douglas Autotech team also knew efficiencies could be realized based on work done from time to time to address air leaks and by having a thorough understanding of the value of overall system control.

"I think part of the problem we experienced was the absence of a strategy," Barrett said. "The 300-hp air compressor could pretty much sustain the plant on its own, but it wasn't working in tandem very well with the other two air compressors."

The team wrestled with the exact strategy to deploy given how the compressed air system evolved over time, Barrett said.

"We had a control system that was supposed to ramp up and down the two, 100-hp air compressors and manage the air, but we struggled to get that to work properly and that left all 500 hp worth of air compressors running around the clock," he said. "It had been like that for so long it just became normal."

Another vexing issue for Douglas Autotech was an occasional issue of pressure drop. Many had different opinions as to the air pressure setpoint to satisfy the need for plant air throughout the plant.

"We were running the shop air at about 110 psi," Barrett said, adding that some suggested the need to add an air compressor to avoid problems with pressure drop.

"This is something that happened over time and eventually you're not sure what to believe," he said.

System Assessment Guides the Plan

To solve the maintenance issues and firmly establish a strategy for optimization of the compressed air system, Douglas Autotech vetted compressed air service providers. EVAPAR stood out, particularly since the company did more than recommend the purchase of another air compressor: They offered to conduct a compressed air system assessment.

"The study they did," Barrett said about the decision to partner with EVAPAR on the project. "No one else offered to do anything like that, and honestly, a least a couple of vendors didn't have the capability."

Headquartered in Evansville, Indiana, EVAPAR (https://evapar.com/) is a full-service provider of power products. It specializes in compressed air systems, electric generators,

Brett Barrett, Engineering Technical Manager, Douglas Autotech.

and industrial engines, as well as emission control products. The company has branches in Louisville, Kentucky; Memphis, Tennessee; Fort Wayne, Indiana; and Saint Louis, Missouri.

As an authorized Atlas Copco distributor, EVAPAR used Atlas Copco's AIRchitect Survey data logger to monitor and measure the output of the plant's air compressors during a one-week period. Doing so provided insight into the system's electrical usage based on the amp draw of each air compressor during the one-week period. Using pressure monitors, EVAPAR also gained an accurate picture of pressure delivered to the plant.

Data logging demonstrated the ability of the compressed air system to easily satisfy the plant's need for air during the workdays with demand fluctuating between approximately 600 cfm and 1,500 cfm during normal work hours based on the ups and downs of production activity. Yet the assessment also illustrated immediate opportunities for efficiency improvements – confirming Douglas Autotech's view of the situation, said Adam Cartwright, Territory Manager, Compressed Air Systems, EVAPAR.

"One of the 100-hp air compressors ran unloaded for 122 hours," Cartwright. "But it was throttled all the way back so it wasn't really doing anything for them. It was just a 100-hp motor running and it's not making air since the 300-hp unit was actually taking care of the plant."

Aside from the unnecessary consumption of energy, EVAPAR also assessed system pressure in the compressed air pipeline and determined something needed to be done about pressure drop. The assessment pointed to issues with the piping system layout and the diameter of the piping itself.

"We placed our pressure monitor about 25 yards from the air compressor room," Cartwright said. "Pressure at the outlet of the air compressors was at 115 psi, but not far outside the air compressor room we were seeing 70 psi. If they were to fall below 60 psi anywhere in the plant it could threaten to shut equipment down."

VSD Air Compressor Matches Supply with Demand

Based on the assessment, EVAPAR recommended a system upgrade to address energy consumption and tackle issues with pressure drop – in addition to eliminating maintenance challenges with the aging air compressors.

The project included the installation of an oil-injected, 300-hp Atlas Copco GA 250 VSD rotary screw air compressor, and the removal of the two, aging 100-hp air compressor units. This meant the new air compressor, rated to deliver up to 1,900 scfm, would be used alone to satisfy the plant's demand for air at all times, while the original 300-hp, fixed-speed air compressor would serve as a backup machine.

Cartwright said the VSD air compressor is well suited to Douglas Autotech's compressed air usage since it regulates the speed of the motor, which in turn, ensures it only generates enough power to meet demand for air at any given period and no more.

COMPRESSED AIR SYSTEM ASSESSMENT AT DOUGLAS AUTOTECH BOLSTERS RELIABILITY AND ENERGY SAVINGS

"While the plant used more air during the first shift Monday through Friday, they weren't using as much air on second shift or during the weekends. But their original air compressor setup was in no way compensating for that," Cartwright said. "That's where the variable speed technology really shines."

Barrett said the plan for installing the 300-hp, VSD air compressor was a better solution than the Douglas Autotech team originally envisioned.

"We thought we could maybe just add another 300-hp air compressor and then be able to have one of them up while the other one is down for regular maintenance and alternate them," Barrett said. "But we ended up with the VSD unit and it's proving to carry the plant efficiently and effectively on its own."

Pressure Drop Issues Put to Rest

To address pressure drop inside the air compressor room, EVAPAR replaced iron pipe ranging from two to three-inches in diameter with Atlas Copco AIRnet aluminum piping system with a diameter of four inches.

Barrett and his team also investigated pressure drop throughout the plant to ascertain when and why it occurred. To do so, he purchased wireless pressure monitors and located them strategically throughout the plant's piping network.

"We did have a couple of places where we had things like an actuator that was probably undersized and because of that we were running the pressure higher. So we fixed those issues and lowered the setting on the air compressor by five psi a week for several weeks until it got down to 90 psi and everything ran okay."

Compressed Air Energy Use Drops by 53% and is Monitored

The upgraded compressed air system, which includes the VSD air compressor and piping measures to eliminate pressure drop, lived up to the expectations for energy savings as

An oil-injected, 300-hp Atlas Copco GA 250 VSD rotary screw air compressor automatically matches compressed air supply to demand at Douglas Autotech's Hopkinsville facility, resulting in substantial energy savings.

projected based on the system assessment. In the first full year of operation, the system allowed the Hopkinsville plant to save over 1.2 million kilowatt hours (kWh) for a total cost savings of $105,000. In all, the plant reduced its compressed air power consumption by 53% and plantwide by 20%.

Barrett said it didn't take long for the Douglas Autotech team to decide to move forward with the compressed air system upgrade based on EVAPAR's system assessment.

"Honestly, it was a significant enough savings with a quick payback so it was just a matter of when we could get it done," Barrett said.

Energy savings aside, the system now ensures a steady and reliable supply of compressed air. In addition, EVAPAR has assumed responsibility for maintenance of the system, which incorporates the use of Atlas Copco's SmartLink remote monitoring system. The advanced technology provides ongoing insights and early warnings should problems arise.

Essentially, the compressed air system upgrade covers all the bases, Barrett said, adding that Douglas Autotech appreciates taking a strategic approach to addressing issues based on the findings of a system assessment.

"I big part of it is really understanding truly what the demand is, "Barrett said. "With a system like this, you can't continue to throw more capacity at it. Obviously, this is huge expense, but it's the best option. It exceeded all the numbers and everything we projected so it's all positive." BP

For more information visit www.atlascopco.com/air-usa.

All photos courtesy of Atlas Copco.

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PRODUCTIVITY, SUSTAINABILITY & ENERGY CONSERVATION

How to Manage Compressed Air Systems During High-Demand Events

By Neil Mehltretter, Kaeser Compressors, Inc.

One of the challenges with compressed air system design is dealing with periodic large flow demands. Food and beverage manufacturers are among those process industries that often face these events. Adding in the compressed air demands of onsite packaging further adds to the task.

Large air systems that have evolved in the same plant as production demands grew over a span of years often struggle to supply steady pressure during peak production. Bag houses, air knives, packaging machinery, bottle blowing, and other heavy air uses can press the limits of an otherwise reliable system. This is especially true in plants with multiple air compressors that have been added over time without appropriate changes to storage, controls, and piping.

Delivering steady pressure throughout the plant sustains smooth production. A lot of modern production and packaging equipment is designed to operate within a narrow pressure band and may not properly function outside that band. To prevent scrap, some equipment monitors incoming pressure and will shut down if pressure is too low or too high for proper operation. Point-of-use regulators can prevent over-pressurization but not low-pressure situations.

In this respect reliability is king, but it does not have to come at the expense of energy efficiency. It's all about striking the right balance of proper air compressor sizing along with storage and piping. The glue that binds it all together is control – provided through both individual air compressor controls and system controls. Even aging systems can be brought into balance to handle a dynamic production environment. But if compressed air system decisions are made piecemeal, even a system made of good quality equipment can be overrun by the large intermittent demands, resulting in lost productivity and downtime.

Managing high intermittent demand events requires evaluation of multiple aspects of your system:

"It's all about striking the right balance of proper air compressor sizing along with storage and piping."

— Neil Mehltretter, Kaeser Compressors, Inc.

1) Air compressor controls.

2) System master controls.

3) Piping and air velocity.

4) Storage: wet, dry, and at points of use.

5) Identifying and examining large air users.

6) Designing with flexibility and the future in mind.

Air Compressor Controls

The individual, air compressor controls determine how they regulate their delivery of air, e.g., dual control, modulation, Variable Frequency Drive (VFD) or variable displacement. Modern controls also monitor and report the status of internal components to aid in safe operation, maintenance planning and troubleshooting. They also typically keep historical records with date and time stamps, along with alarms and messages which can be pushed to the user via various means (email, text, etc.).

You may ask, how can the individual control information translate to large air demand events?

From a data analysis standpoint, with a simple Ethernet connection to your network, you can have access to important information at the controls and set up messaging (emails, texts) to alert you to events of your choosing. Most individual controllers available today have many functions to help explain system operation. Examining the air compressor duty cycles can really help you understand system operation, as well as your critical information such as operating temperature, pressure, warnings, and alarms. If you can dial into your system, you can also see the current operation as shown in the Figure 1.

Check out the loading and unloading pattern, and then flow stabilizes. Looks like it could be a high demand event, or is it?

First off, this is a VFD air compressor, so the duty cycle here should be close to 100%, which is what we see (27,732 load hours

HOW TO MANAGE COMPRESSED AIR SYSTEMS DURING HIGH-DEMAND EVENTS

verses 28,940 run hours) in Figure 2. We can also see in Figure 2 the wrench icon with an orange light on, signifying maintenance is due on this air compressor. Second, looking at the data itself (Figure 1), starting from the left we see pressure in Blue at zero, while the air compressor is offline. In the graphic, just after 7:30 am we see the air compressor load (green line) and pressure increase.

There's a second such load/unload event, until the air compressor runs fully loaded and then starts to ramp down (again, the green line). We may interpret these initial load periods as high-demand events, but not if it's put it into context. With pressure off before 7:30 am, and with a few fits and starts before staying loaded by ramping down, it's most likely this event is simply a start-up.

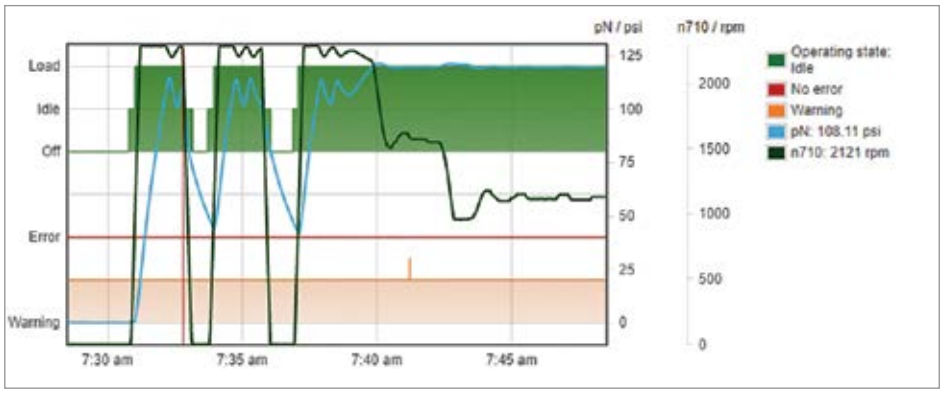

Figure 1.

Many industrial users have VFD air compressors like this example. They are a great option to dial in the pressure and provide maximum benefit should the air compressor need to run below full flow for long periods of time, not too low of course. If you hear the VFD ramping up and down constantly, or if you have multiple VFD air compressors ramping up and down constantly, this could be an indication of high intermittent demand events. At the very least, it's an indication that the system should be reviewed and corrected.

One roadblock to viewing data from your controller directly is that it could be limited, our previous graphic was only about 15 minutes. If you're pulling this data via Modbus, Ethernet/IP or other, then you might not have such limitations. Either way, many individual controllers store this data and it can be downloaded to paint a bigger picture on how the air compressor (or air compressors) is responding to system demands. This data should be discussed with your compressed air professional.

System Level Controls

In larger, multi-unit systems, individual air compressor controls adjust to changing demand – but only to a point. Keep in mind they typically are responding to pressure signals at the air compressor discharge, so there is inherent delay in how they can respond to pressure changes hundreds or thousands of feet away. System controls improve response time by taking their cues

from pressure signals downstream. By measuring not just the pressure but the rate of change in pressure, smart controls can pick which air compressor(s) to load and unload to maintain steady pressure.

System master controllers make the air compressor work in concert, ensuring the air compressors are optimized, system dynamics are balanced, and pressure is maintained. An additional key aspect of master controllers is the monitoring of the entire compressed air system. That might include dryers, filters, valves, multiple air compressor rooms, as well as remote sensors.

We recently looked at a particular compressed air system that was experiencing multiple service issues, including over-cycling of the air compressors and constant blow-off protection at the dryers. The air compressor station included four, fixed-speed air compressors, two desiccant dryers, along with two wet tanks, and two dry tanks.

When we looked at data from the master controller on the digital display (Figure 3) we found a few periods where demand was low and the compressors were idling (motors on, but not making air). This was immediately followed by a somewhat sharp drop in operating pressure seen at the dry tank. Three of the four air compressors loaded to satisfy this demand event, and then immediately unloaded after pressure was satisfied.

Master controllers have a wealth of information, from message and alarms for individual air compressors, to message and alarms for the station; all in one place. They also provide data and trend analysis, either limited at the screen, or in some cases years' worth of data available via a web-browser. Pulling this data can help identify whether the high-demand event is an air compressor control issue or a point-of-use issue. In our case, multiple air compressors were loading and there was only a mild pressure swing in the air compressor room, yet in order to maintain plant pressure, three air compressors loaded almost simultaneously. Reviewing historical data and walking the plant, as well as monitoring additional signals, allowed for a trend analysis and helped identify the issue was outside of the air compressor

Figure 2.

HOW TO MANAGE COMPRESSED AIR SYSTEMS DURING HIGH-DEMAND EVENTS

room, generating from the point of use due to lack of point-of-use storage.

Piping and Air Velocity

One very important point about data, is that it is only a certain point in time and it doesn't necessarily give us a full picture of how the system is actually installed. Piping can have a significant effect on air compressor operation, especially for systems with high demand events. There's a good amount of reference information available for pipe selection, sizing, and design, but two major points to focus on is to keep the velocities manageable and the pressure drop low. The narrower the pipe, the faster a given volume must flow through it to feed demand on the other end. This has multiple negative effects.

In the air compressor room, high velocities will reduce contact time within air treatment components and they will not fully dry and filter the air to specification. The impact on your production includes higher scrap and more frequent maintenance to pneumatic equipment. In some cases, severely high velocity can damage air treatment equipment (especially filters). So keep air compressor room velocity to approximately 15 feet per second. There are a number of online tools that will tell you what size pipe you need to achieve this with a given flow rate.

Large air demands pull air through the pipe faster. In the main distribution piping, higher velocities cause higher pressure drop, which translates to production problems as well as higher energy costs. Keep distribution piping velocity to approximately 30 feet per second. If you're exceeding the velocity recommendations this can lead to condensate moving from one location to another, which could again affect production. Plus, if there is potential rust and scale in your piping, this can easily be moved to the point of use with higher velocities.

Finally, keep the velocity in point-of-use piping to 45 feet per second. Point-of-use equipment can vary widely in recommended air compressed air velocity. Typically, each manufacturer will specify a pressure, flow, and air quality. Further, each manufacturer will select an appropriate connection size to their piece of equipment. Based on that information, the air velocity into the piece of equipment would be dictated. Many production equipment manufacturers may also include point-of-use filtration, dryers, and/or storage to ensure proper air quality is maintained.

In general, a good rule of thumb is to keep the pressure gradient from the air compressor(s) to the furthest point in the distribution piping at 10% or less of air compressor discharge pressure. Considering the bulk of that pressure drop will be through dryers and filters, piping should have very little if any effect on pressure drop. Consider the cost of increasing your plant pipe size, whether this could improve your production by stabilizing operating pressure, and the decrease in energy cost by minimizing plant pressure. So when selecting pipe size, take advantage of the online tools or charts in the *Compressed Air and Gas Institute Handbook* published by the Compressed Air and Gas Institute (CAGI).

While you are looking at the demand side, seek to eliminate excess demand. First and foremost, examine the largest users to make sure they are well regulated and not using

more air than needed. And assess your leaks. Leaks are simply an unintended (and unregulated) source of demand. Find the worst leaks and fix them. Finally, eliminate "artificial" demand resulting from legitimate, but unregulated air users. These efforts will help with maintaining pressure during large demand events elsewhere in the system.

Data Monitoring

We talked about getting information and data from your individual controller or master controller to help analyze large demand events, but what if that data isn't available?

Monitoring your existing station is a great way to start. Monitoring pressure, flow, and power for each air compressor as well as operational signals is recommended. However, that's just on the supply side; the input to your system.

If you're having issues in the facility, monitoring pressure and flow in the demand side will complete the puzzle. In Figure 4 we see a fairly simple example of some additional pressure measurements to create a pressure profile, as well as a point-of-use flow meter. When measuring high intermittent demand events, make sure your monitoring equipment (flow meters, pressure transducers, and recording devices), have the necessary recording frequency to capture the event, and that the data recording is long enough to get a good trend analysis for the plant.

Storage Considerations

Stored volume in the air compressor room is critical to air compressor operation. A wet tank will prevent over cycling, not only helping to maintain steady pressure but also lower maintenance and repair requirements. A larger

Figure 3.

HOW TO MANAGE COMPRESSED AIR SYSTEMS DURING HIGH-DEMAND EVENTS

dry tank after dryers and filters provides the main system storage and helps reduce velocity through the air treatment. Point-of-use storage can have a huge effect on system reliability. It provides a reservoir of clean, dry air ready to meet the large demand while minimizing the impact of the large flow on other air users.

Piping when amply sized can also provide additional storage in the plant, which can help balance demands. However, it should not usurp storage receivers in the air compressor room, or the point-of-use receivers to specifically address high demand events. At the very least, piping should be sized to avoid excess velocity and pressure drop as discussed above.

An additional tool in the storage category is the flow controller. With the development of more sophisticated air compressor and system controls, this once popular device is not commonly designed into new systems. It's still a valuable tool, especially in cases where time and budgets prohibit significant changes to the air system, as well as in cases where portions of the plant need significantly lower pressure than other areas or where the bulk of the air demand fluctuates considerably and point-of-use storage just cannot cover.

Design for Flexibility and the Future

Design with flexibility and the future in mind. System dynamics can change from shift to shift and will certainly do so as soon as you add, remove or change production equipment. The system designed based on what the plant was doing a year ago may not perform nearly as well now unless it was purposefully designed for flexibility.

The main contributors to flexibility: using multiple air compressors versus one (and having space for more as demand grows), smart controls that learn and adapt to changing patterns of use, and sizing piping with growth in mind. Adding more air compressors and

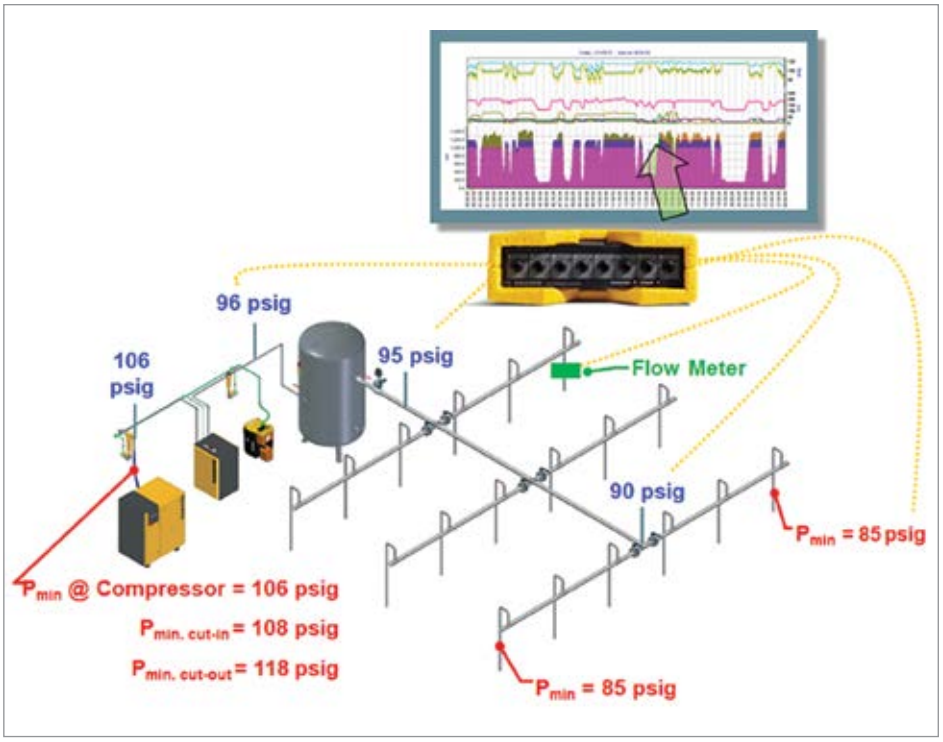

Figure 4.

storage as your operation grows is relatively easy. Upgrading your piping to accommodate more air flow is expensive and disruptive.

As you have read, there are several considerations to addressing large systems with dynamic demands.

- *Controls* maintain compressor operation safely, whether individual or master. These controls respond to demand events, and both have a lot of great data and information; take advantage!

- *Piping* – limit the pressure drop in the system and minimize velocity. Increasing the diameter times two, quadruples the cross-sectional area of the pipe, and reduces the velocity to one fourth of where it was.

- *Storage* in air compressor room provides a control buffer, helping preserve the longevity of your compressed air system, as well as saving energy allowing your air compressors necessary time to idle and shutdown or ample time to load a trim or back-up air compressor. Storage at point of use eliminates noise back into system and maintains operation at point of use, so production can run smoothly.

Remember be flexible with your air compressor and dryer sizing, bigger is not necessarily better. And, future size. Spending a little more for a larger pipe or multiple smaller air compressors rather than one large one can provide significant longer term compressed air improvement, as well as increase productivity by way of eliminating downtime and unnecessary pressure drop.

If you experience lost productivity or downtime due to large demand events, these are key aspects to look at to tame that tiger. BP

About the Author

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About Kaeser Compressors, Inc.

Kaeser Compressors 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 https://us.kaeser.com/.

All photos courtesy of Kaeser Compressors, Inc.

To read more ***Air Compressor Technology*** articles, please visit https://airbestpractices.com/technology/air-compressors.

QUALITY, SAFETY & RELIABILITY

Rotating Pressure Vessel Oxidation Test Pinpoints Expected Life of Air Compressor Lubricants

By Josh Allen, Isel Inc.

When it comes to the selection of a lubricant for an air compressor application, one of the major deciding factors is the expected life of the fluid. Yet exactly how the expected life of the fluid is determined and compared, especially between manufacturers, can be confusing. Fortunately, there are tools and tests that can provide reliable predictions of performance – one of which is a Rotating Pressure Vessel Oxidation Test (RPVOT). Having the test performed goes a long way toward helping those responsible for air compressor performance and maintenance make an accurate comparison between the life expectancy of lubricants offered.

Oxidation Impacts Lubricant Life Expectancy

Most fluids are considered to have reached the end of their useful life when they have oxidized to the extent that their characteristic properties are no longer within the specifications required to provide sufficient lubrication to the unit. Oxidation of lubricants has the added detriment that, in addition to thickening and creating heavy deposits, they also cause the fluid to increase in acidity, e.g., the Total Acid Number (TAN) goes up.

The importance of understanding the oxidation and the life expectancy of a lubricant, of course, is crucial. Equally important is the ability to make a head-to-head comparison of new fluids, or when deciding on oil change intervals in critical applications.

"This method of testing, as well as others, can save thousands of dollars in operation costs and possible repairs and downtime."

— Josh Allen, Isel Inc.

In an ideal world, the most reliable way to compare fluids is to place them in identical units operated under identical conditions and to routinely sample the fluids. Afterward, the results would be graphed to determine varnish content, viscosity, and TAN. The processes would be repeated with the same test multiple times with various conditions changed each time. While this would provide the best, most accurate results, it is not practical. Instead, accelerated aging conditions are used to determine the relative performance of fluids under stringently controlled parameters as part of rigorous lubricant testing processes used to gauge the life expectancy of fluids.

The challenge is that lubricant manufacturers are not always clear when providing justification for how they come up with estimates for the expected life of fluids. In addition, it is not always safe to assume that the oxidative stability of one fluid is equal to another simply because the manufacturer states the fluid is rated for the same number of operating hours. There is also no industry standard for providing the rating commonly relied upon.

Gauging Long-term Oxidative Stability

There are multiple tests available that provide varying amounts of information about the state of oxidation of in-service lubricants. All are equally invaluable when evaluating lubricants used in air compressors as part of a routine maintenance program, but RPVOT stands out as a way to gauge the long-term oxidative stability of fluids when choosing between one lubricant over another for use in all types of air compressors.

The most common monitoring method of in-service air compressors is often observations of changes in viscosity and TAN via routine oil analysis. Additional techniques involving Fourier Transform Infrared Spectroscopy (FTIR) can also be used to determine, to a certain extent, the quantity of oxidation byproducts.

RPVOT originated in the world of turbine fluid analysis and takes much longer to run versus these other methods and was designed to be used annually on large (10,000-plus gallon) reservoir systems to monitor the remaining oxidative life of the oil of an in-service air compressor. While a RPVOT isn't a practical test to perform routinely on in-service compressor lubricants since it can take multiple days to run to completion on oil with significant oxidative stability, the method lends itself nicely to the observation of the long-term oxidative stability of fluids.

The standard test procedure for the performance of a RPVOT is outlined in ASTM International's ASTM D2272 test procedure, which was developed and written to "evaluate the oxidation stability of new and in-service turbine oils."

Typically, air compressor users looking to fully understand the life expectancy of one lubricant versus another submit samples of new lubricants to companies with RPVOT capabilities for comparison, whether it's an OEM, lubricant supplier or independent laboratory. When analyzed and correlated with real-world results, the test can provide valuable insights into the comparative oxidative stability of fluids.

ROTATING PRESSURE VESSEL OXIDATION TEST PINPOINTS EXPECTED LIFE OF AIR COMPRESSOR LUBRICANTS

A senior laboratory technician at Isel Inc. prepares a sample for a RPVOT.

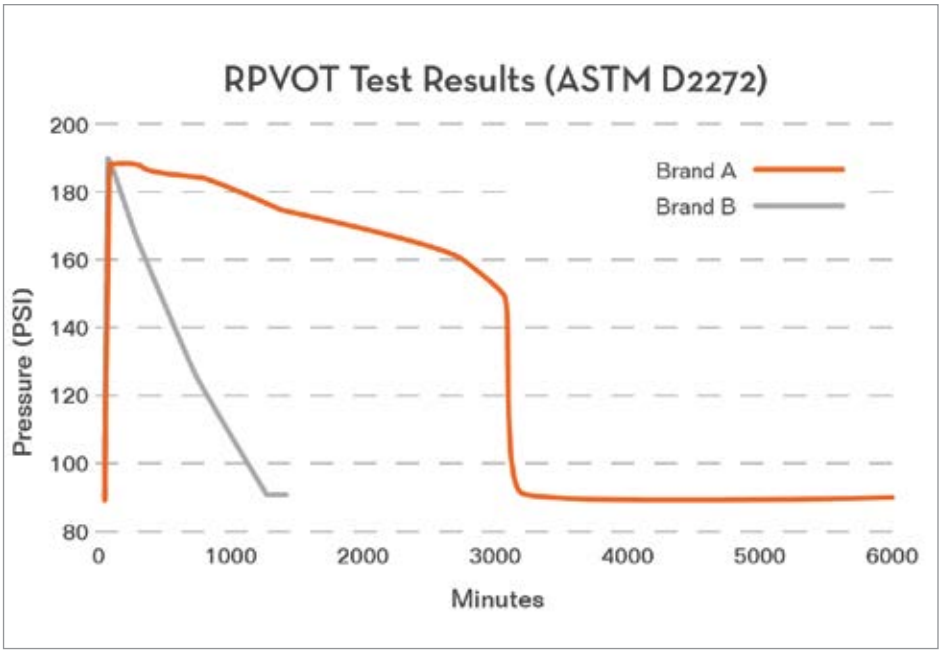

Figure 1.

RPVOT Mimics Real-world Air Compressor Use

The RPVOT methodology consists of a lubricant sample being placed into a glass chamber with a copper catalyst and water. The chamber is then sealed, purged, and pressurized with pure oxygen. Heat is also added and the chamber is slowly rotated. These conditions do a reasonably good job of mimicking the conditions a lubricant would be expected to experience during its usage in an air compressor.

To compare the relative anticipated life of new fluids with various compositions, additional results and additional interpretation of the data is required. As such, the test doesn't end after a specified pressure drop. Rather, it's best for the testing to continue until Minimum Pressure Oxidative Stabilization (MPOS) is reached since it correlates with the real-world performance of a fluid in a compressor over an extended period.

Determining MPOS is also important since it has to do with the process of oxidation of the lubricant, which is a multi-step reaction that can best be described by a free radical mechanism. Intermediate products of this process such as alkyl radicals and hydroperoxides preferentially react with the antioxidants which slows the overall rate of reaction. As the lubricant begins to oxidize, consuming the gaseous oxygen, the pressure inside the chamber decreases. The rate of change of the pressure in the vessel is directly related to the performance of the antioxidant treatment of the lubricant. Once the antioxidants are completely depleted and the fluid begins its final stages of oxidation, the pressures reach their MPOS.

By observing the performance of fluids under these stringent test conditions and comparing them to the real-world analysis and performance of the fluids in-service in air compressor applications, there is a direct correlation between the anticipated life of the fluid and the results obtained through RPVOT testing.

At the conclusion of the test, additional details may be gathered to assist in the comparison of fluids. It has been found that significant variations can occur in the final TAN of the fluid post-test. This variation is believed to be due to the type and quantity of acidic byproducts produced as a result of the oxidation of the fluid and can be indicative of the severity of the acidification of lubricants in operating air compressors.

Figure 1 is an example of RPVOT results. It shows the pressure in the RPVOT chamber as the lubricant in the rotating vessel reacts with pure oxygen at 302°F (150°C). As the reaction proceeds and oxygen is consumed, the pressure in the chamber drops. The more slowly the pressure drops, the better the oxidative stability of the lubricant. Slower oxidation is shown with Brand A when compared with Brand B.

Figure 2 shows the readings for the same test. Measurements are recorded in minutes from the start of the test to the point at which the pressure has dropped from the maximum pressure as measured in the chamber to a specified change in chamber pressure. MPOS is the time from the start of the test to the point at which the pressure stops decreasing with time. The longer the time, the better the oxidative stability of the lubricant – and the longer the fluid will continue to properly lubricate the machine.

RPVOT Test Results	BRAND A	BRAND B
Maximum Pressure, PSI	188.8	187.0
25.4 PSI Drop	2,605 minutes	382 minutes
Minimum Pressure Oxidative Stabilization	90 PSI at 3,400 minutes	90 PSI at 1,110 minutes

Figure 2.

Supporting the Decision-making Process

There are several other advantages of utilizing RPVOT to compare the anticipated lubricant performance life of new lubricants. One is the ability to control for all variables except for the composition of the fluid. It can also be performed on fluids from various manufactures to compare the performance of their antioxidant treatments. And by the nature of the apparatus, there is virtually no room for operator bias in the performance of the procedure or the interpretation of the results.

A firm understanding of the methods used for establishing and comparing specifications of various lubricants can provide plant management with data to make informed decisions. When selecting a lubricant, there are many options available, with a wide range of different compositions. For most applications, a select few of these lubricants will function ideally, so by using test methods such as RPVOT, we can ensure the lubricant chosen has the oxidative and temperature resilience to handle a specific application.

The test can also be accomplished in a matter of hours as opposed to the months that would otherwise be required to fully test a lubricant in the field. This method of testing, as well as others, can save thousands of dollars in operation costs and possible repairs and downtime. BP

About the Author

Josh Allen is a Technical Specialist with Isel Inc. Allen earned a Bachelor's Degree in Mechanical Engineering following six years military service. His experience includes project management, product development, maintenance management, and failure analysis. Email: josh.allen@iselinc.com, tel: 904-378-3232.

About Isel Inc.

Isel has provided custom blended air compressor lubricants around the world for over 25 years. Known throughout the industry as an extremely flexible, customer support-based manufacturer, Isel uses cutting edge chemistry and revolutionary manufacturing techniques to deliver lubricants of unmatched quality and durability. Isel is committed to providing air compressor manufacturers as well as service companies with the most advanced products available. For more information, visit https://iselinc.com/.

All photos courtesy of Isel Inc.

To read more ***Air Compressor Technology*** articles, please visit https://airbestpractices.com/technology/air-compressors.

COMPRESSED AIR SYSTEM TECHNOLOGY NEWS

VPInstruments Introduces the Wide Range 3 Phase Power Meter

VPInstruments is proud to launch a new model of the 3 Phase Power Meter. With the 3 Phase Power Meter you can measure the voltage and current of all three phases, thereby, providing a high-accuracy measurement of the real power consumption.

The new model 3 Phase Power Meter can handle a very wide range of voltages: the same meter can be used for all nominal voltages between 100 Vac and 600 Vac, with delta and wye configurations at 50 Hz or 60 Hz. With this one-size fits all model, selection is now quite easy. The new model replaces all current models, leaving just one model for your measurement application.

The wide range 3 Phase Power Meter provides power, voltage, current, cos(phi) and many more electrical parameters. All of these are communicated via the RS485 (Modbus RTU) interface. VPInstruments 3 Phase Power Meter is the recommended power meter for permanent measurements. The 0.333 VAC CT inputs enables connection to universal current transformers. Or just rely on the VPInstruments current transformers to complete the power measurement solution.

About VPInstruments

VPInstruments offers industrial customers worldwide easy insight into energy flows. We believe that industrial energy monitoring should be easy and effortless, to enable insight, savings, and optimization. VPInstruments products are recommended by leading energy professionals and offer the most complete measurement solution for compressed air flow, gas flow and electric energy consumption. Our monitoring software VPVision can be used for all utilities, and enables you to see where, when, and how much you can save. Our products can be found all over the world. We serve all industrial markets, for example, automotive, glass manufacturing, metal processing, food and beverage and consumer goods. We can also help your industry. Let us open your eyes and start saving energy. For more information, visit www.vpinstruments.com.

Wide Range 3 Phase Power Meter from VPInstruments.

CALMS Air Announces New 4G Remote Energy Audit Platform

CALMS announced the release of the new version of their biggest independent platform. The update focuses on energy assessments and energy audits based on independent energy experts and auditors. It supports collecting monitoring data and tracking end-user progress with KPIs and connecting with independent experts, service providers, OEMs and ESCO investors.

The new version supports assessments and monitoring that are performed on the compressed air system to ensure a broader picture is captured while still containing details needed for analysis and simulations. Universal data collection with IoT in mind is necessary to collect data from most sensors available on the market through the advanced communication CALMS edge device, virtual edge device or existing PLC with OPC software or even smart transmitters. The devices are based on IoT standards to collect all relevant data of the compressed air system in real-time with 1 second sample rate.

The assessment includes a general interview, waste management (leaks, artificial demand, and inappropriate uses) and audits and additionally is compliant with ISO11011 standard. The general interview leads through the system efficiency and reliability of the supply side, distribution side and demand side and compares to the best in class. The advantages of leak management are that it uses a mobile application for data collection and a web interface for validating, repairing, reporting, and calculating the cost of air leaks.

The audits show where to save on energy costs, help improve energy efficiency, create a forecast for energy consumptions and much

The new platform supports additional energy utilities such as steam, electricity, gas, water, and air cooling.

more. Monitoring uses advanced tools for fault troubleshooting and energy management that enable a systematic approach towards improvements in reliability and energy efficiency with reduction of energy costs. Monitoring is based on CSA837 standard with a powerful reporting platform fully compliant with the ISO 50001 standard.

Other features include auto and manual detail analyses and alarms for unexpected trips and energy consumption. The system is based on pre-defined and custom KPI-Key Performance Indicators and trend-lines per CSA 837. The system will send alarms via SMS or E-mail to the relevant person. Automatic notifications generate weekly or monthly survey and repair reports, manager reports with financial progress, and an overview of company energy improvements and optimizations.

The platform also offers event and action plan tracking as before and after monitoring and compares solutions based on TCO-Total Cost of Ownership – helping the end-user select the best solution.

About CALMS Air Inc

CALMS Air Inc USA is a branch office of CALMS Air Europe, with the headquarters located in Slovenia. Together we introduce modern information technology and advanced energy services to the demanding technical fields of compressed air. The team consist of 20 experts in the fields of compressed air, electrical engineering, mechanical engineering, computer sciences, mathematics, and physics. As the platform is growing, so is our team, and we encourage many new experts and auditors to join us in building the biggest independent platform for the future. For more information you can visit www.calms.com.

nano Introduces EHA Externally Heated Desiccant Dryers

nano's new range of EHA externally heated twin tower desiccant air dryers remove water vapor by lowering the pressure dew point from your compressed air stream to -40°F to ensure a continuous supply of clean, dry compressed air. With the combination of both low pressure drop and consistent dew point performance, the units are designed for the most demanding applications.

PLC controlled operation and the highest quality valves make the new dryer one of the most technologically advanced systems on the market today. The EHA range uses a low watt density heater to heat the dry purge air to regenerate the desiccant beds using less air than heatless type dryers at approximately 6-8% thus an excellent return on investment.

Manufactured in nano's New Bethlehem, PA facility and backed by more than 40 years of manufacturing and engineering expertise, the range includes flows from 100 to 5000 scfm. High quality construction includes ASME coded pressure vessels, UL/cUL compliance and made in the USA activated alumina desiccant.

For more information, visit www.n-psi.com.

nano's new range of EHA externally heated twin tower desiccant air dryers.

COMPRESSED AIR SYSTEM TECHNOLOGY NEWS

FLIR Si124 Ultrasonic Imaging Camera Now Available Globally

To help customers take advantage of the benefits of ultrasonic imaging, FLIR made its Si124 industrial acoustic imaging camera available for purchase globally. The FLIR Si124 industrial acoustic imaging camera senses, displays and records sound waves producing a precise acoustic image. The acoustic image is overlaid, in real time, onto a digital camera image all with an easy-to-use, ergonomic, one-handed camera solution weighing a little more than 2 pounds (980 grams).

The blended visual and sound image can be viewed live on screen to help users' pinpoint issues from the sound source, helping staff identify issues up to 10 times faster than traditional inspection methods for common mechanical, electrical, vacuum and compressor systems. Built with 124 microphones and a high definition visible-light camera, the battery-powered Si124 can detect potential issues up to 100 meters away, even in loud industrial environments, for up to seven hours of continuous use. Two primary use cases for the Si124 include detecting compressed air leaks and partial discharge (PD) such as corona, arcing, and tracking.

The FLIR Si124 Industrial Acoustic Imaging Camera.

Compressed air is often the single most expensive energy source in factories, but air is often lost due to undetected leaks or equipment inefficiencies. That leaked air can be difficult to detect by the human ear or touch, particularly in loud manufacturing environments where workers are required to wear hearing protection. The Si124 can solve this issue by visually pinpointing the exact source of a leak instantaneously, especially in hard to reach places that might otherwise go unnoticed.

For high-voltage electrical systems, PD can preface a catastrophic failure, creating an unsafe environment and potential unplanned downtime. The Si124 provides the ability to perform quick non-contact inspections from a safe distance.

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The system then immediately provides the PD type, allowing users to prioritize repairs.

What sets the Si124 further apart from other cameras is the FLIR Acoustic Camera Viewer cloud service. Image captures are quickly uploaded over Wi-Fi to the cloud service then immediately analyzed, providing the user in-depth information such as the size and energy cost of a compressed air leak or the PD classification and pattern of an electric fault. This information is accessible on the Si124 and through the online cloud portal. In addition, users get 8 GBs of storage and wireless data transfer capabilities, making sharing photos and data simple and efficient.

To learn more, view the Si124 product page: www.flir.com/products/si124.

Emerson Introduces AVENTICS Series AF2 Flow Sensor Monitor

The AVENTICS Series AF2 flow sensor monitors air consumption in pneumatic systems, enabling fast action in case leaks are detected. It will issue alerts when the leakage rate exceeds a predetermined value, so leaks can be diagnosed early and addressed before they become a major issue. By giving customers actionable insights on machine data such as flow, pressure and temperature, the AF2 helps to optimize energy consumption, prevent machine downtime and reduce costs. The AF2 is a highly flexible flow sensor that can be directly interpreted by many controllers, and offers multiple communications options, including an IO-Link connection, Ethernet connectivity, OPC-UA server, MQTT communication and on-board webserver. The sensor can be fitted on new installations and its seamless IoT integration makes it perfect for retrofitting existing machines.

AVENTICS Series AF2 flow sensor

For more information, visit https://www.emerson.com/en-us/catalog/aventics-af2

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ADVERTISER INDEX

COMPRESSED AIR SYSTEM TECHNOLOGY NEWS

Peak Scientific Introduces Genius XE SCI 2 Gas Generator

Peak Scientific, the global leader in gas generation for laboratories, today introduced its latest nitrogen gas generator innovations with the launch of a new suite of products engineered to support SCIEX's newly released Mass Spectrometry platforms. Developed in collaboration with and exclusively for SCIEX, the new suite of products comes in three variants, each tested and validated by SCIEX, for use with the new SCIEX Triple Quad™ 7500 LC-MS/MS System – QTRAP® Ready. The three product variants are as follows: a standalone gas generator (Genius XE SCI 2); an MS bench system with fully integrated gas generator inside (MS Bench (G) SCI 2) suitable for placing the LC on; and an MS bench designed to house the SCIEX 7500 system's vacuum pumps (MS Bench SCI 2). The Genius XE SCI 2 standalone generators can also cater for the gas flow requirements of the recently released SCIEX Echo® MS System.

The Genius XE SCI 2 gas generator incorporates the latest cutting-edge technology to provide customers with a consistent, dependable and cost-effective gas source that has been optimized to meet the specific gas requirements of the SCIEX 7500, in a compact and easy to use plug & play system. MS Bench (G) SCI 2 combines the same Genius XE generator technology with the practicalities and form factor of a workstation bench and features a corrosion resistant worktop for your SCIEX LCMS workflow. This variant gives customers the best of both worlds with a gas generator solution for the SCIEX 7500 fully integrated and enclosed within a high specification laboratory bench workstation.

Genius XE SCI 2 Gas Generator from Peak Scientific.

The third product in the suite, MS Bench SCI 2, is in the workstation form factor but without the integrated gas generator, instead offering a custom designed worktop for locating the SCIEX 7500 System, ensuring optimal instrument height and positioning as well as safe and practical enclosure of the roughing pumps underneath. Petra Gierga, Product Manager for Peak Scientific, said, "Having worked in close collaboration with SCIEX for nearly two decades delivering tailored solutions for SCIEX instruments, these new products give customers unrivalled peace of mind." The Genius XE SCI 2 product series are now available to order directly from Peak Scientific, as well as its approved distribution partners or from SCIEX as part of a complete package solution.

For more information, visit www.peakscientific.com.

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BEST PRACTICES

2021 EXPO NOVEMBER 2-4 CHICAGO, IL

COMPRESSED AIR / VACUUM / COOLING

OPTIMIZE ON-SITE UTILITIES

Powering Automation

Research and Identify Innovations

to Enhance the Efficiency and Reliability of Your Systems

Compressed Air

Air Compressors
Air Compressor Controls
Air Purification & Piping
Condensate Management
Pneumatics

Blower & Vacuum

Aeration Blowers
Industrial Blowers
Vacuum Pump Systems
Inlet Filtration/Oil Separators

HVAC & Process Cooling/Steam

Chillers
Heat Exchangers
Cooling Systems
Cooling Towers
Water Treatment
Boilers
Steam Traps

Motors & Drives • Lubricants • Measurement Instruments • IoT Automation & Monitoring

EXPO HOURS

Tuesday, November 2 12:00-6:00PM

Wednesday, November 3 12:00-6:00PM

SAVE THE DATES ON YOUR CALENDAR!

Located at the modern Schaumburg Convention Center just 10 minutes from Chicago O'Hare International Airport.

cabpexpo.com

Sponsored by CAGI Compressed Air & Gas Institute

THE MARKETPLACE

TECHNOLOGY & JOBS

When a float drain is not tight, high costs are involved as a result of leakages. Timed solenoid valves also cause compressed-air losses. During the opening of the valves, compressed air - which was generated at high cost - escapes into the environment without being used. In contrast to this, the electronic level control of the **BEKOMAT®** guarantees drainage without any loss of compressed air, meaning no energy loss. This not only saves energy and therefore costs but also CO2 emissions.

The **BEKOMAT®** benefits at a glance:

- TRUE ZERO AIR LOSS
  Maximum energy savings
- HIGHEST RELIABILITY
  Engineered for industrial applications
- LOWEST MAINTENANCE
  Reduce overall time and costs
- SENSOR CONTROLLED
  Safe for all condensate types
- FULLY AUTOMATIC
  Monitors both level and function
- ALARM CONTACT
  Provides real time feedback on drain performance

Our promise

www.bekousa.com beko@bekousa.com +1 (800) 235-6797

Truth in Compressed Air
Reliable | Efficient | Innovative

BEKO

Had Enough?

If you're tired of oil-free compressor equipment, service and support that's more trouble than it's worth, it's time to take action.

With their *Built for a lifetime* engineering, our 2-stage oil-free rotary screw compressors deliver the best combination of efficiency and reliability.

- Flows from 192 to 1,774 cfm
- Pressures from 45 to 145 psig
- Designed for lower service costs and more uptime
- Fixed or variable speed models available
- Excellent specific performance (kW/100 cfm)
- Integrated refrigerated and heat-of-compression dryer options
- Advanced control and monitoring
- Heat recovery-ready

Learn more about how Kaeser's fresh take on oil-free design reduces downtime and increases your productivity. Visit **us.kaeser.com/cabp**.

Where innovation meets reliability.

KAESER COMPRESSORS®

Built for a lifetime.

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