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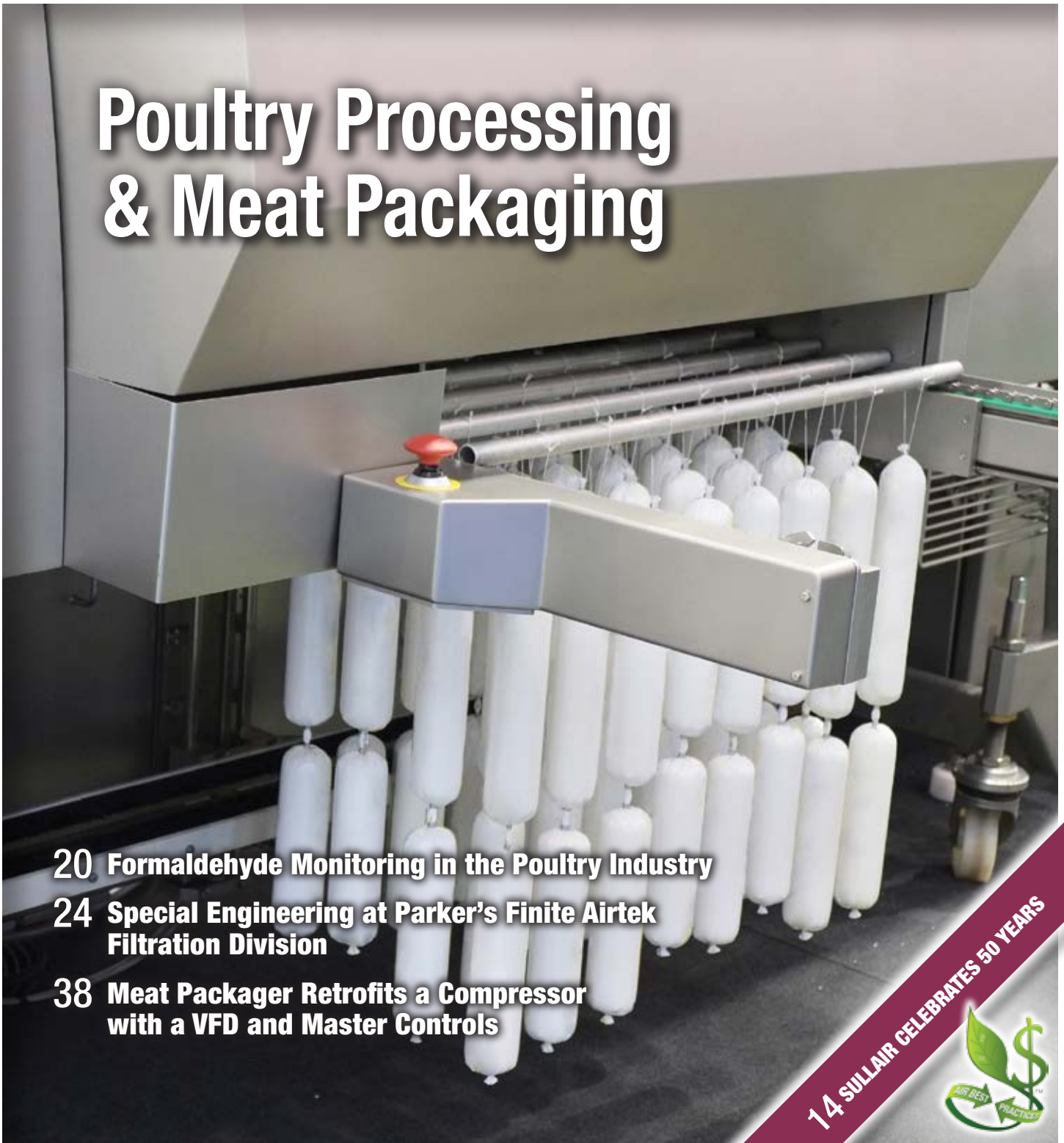

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FROM THE EDITOR | Poultry Processing & Meat Packaging

Congratulations go to Sullair Compressors as they celebrate their 50th Anniversary in 2015! We enjoyed the opportunity to visit with President Scott Nelson and his team in the modern Chicago offices housing their Commercial Business Unit. "Joining the company was an opportunity for me to help strengthen the Sullair brand even further," Nelson says. "The brand's reputation for reliability and durability is second to none. In fact, our research continues to bring back the term 'bulletproof' when describing our air-end durability."

Monitoring ambient air quality in poultry farms is important to protect employee health. "Formaldehyde is widely used by the poultry industry as a disinfectant on poultry farms, in brooder houses, hatcheries and hatchery vehicles," writes ENMET's Nancy Aulisa in her article titled *Formaldehyde Monitoring in the Poultry Industry.* "One of the key elements in protecting workers from dangerous levels of formaldehyde in any industry is having the proper monitoring and detection system."

A company making significant investments in their U.S. operations is Parker Hannifin's Finite Airtek Filtration Division headquartered in Lancaster (Buffalo). I enjoyed touring their 130,000 square foot facility focused on compressed air treatment products. Ted Silva and Allan Hoerner allowed me to "look under the hood" and I was truly impressed by the multi-million dollar investments being made to embrace custom-engineered dryer manufacturing, product performance testing and inventory to support next-day shipments of standard products. It was truly a "see it to believe it" experience and I hope my article does the visit justice.

Quality Compressed Air Services, led by President Michael McCulley, was founded in 2003 in Jackson, Mississippi. The company has now branched out to three locations including one in Louisiana. We hope you enjoy our profile of this compressed air distributor. "We are first and foremost a service company," says Craig Counts, service manager. "Instead of working on one or two brands of equipment, we work on all brands."

A meat packaging plant was experiencing typical production flow of 2200 to 2700 acfm. Weekend air flow was 1400 cfm and an audit estimated a leak load of 800 acfm. A review of the system revealed this could be a good variable frequency drive compressor application. The question became should they buy a new VFD compressor or do a VFD retrofit? Tim Dugan, President of Compression Engineering Corp., provides us with an interesting article on how this question was evaluated.

Thank you for investing your time and efforts into ***Compressed Air Best Practices®.***

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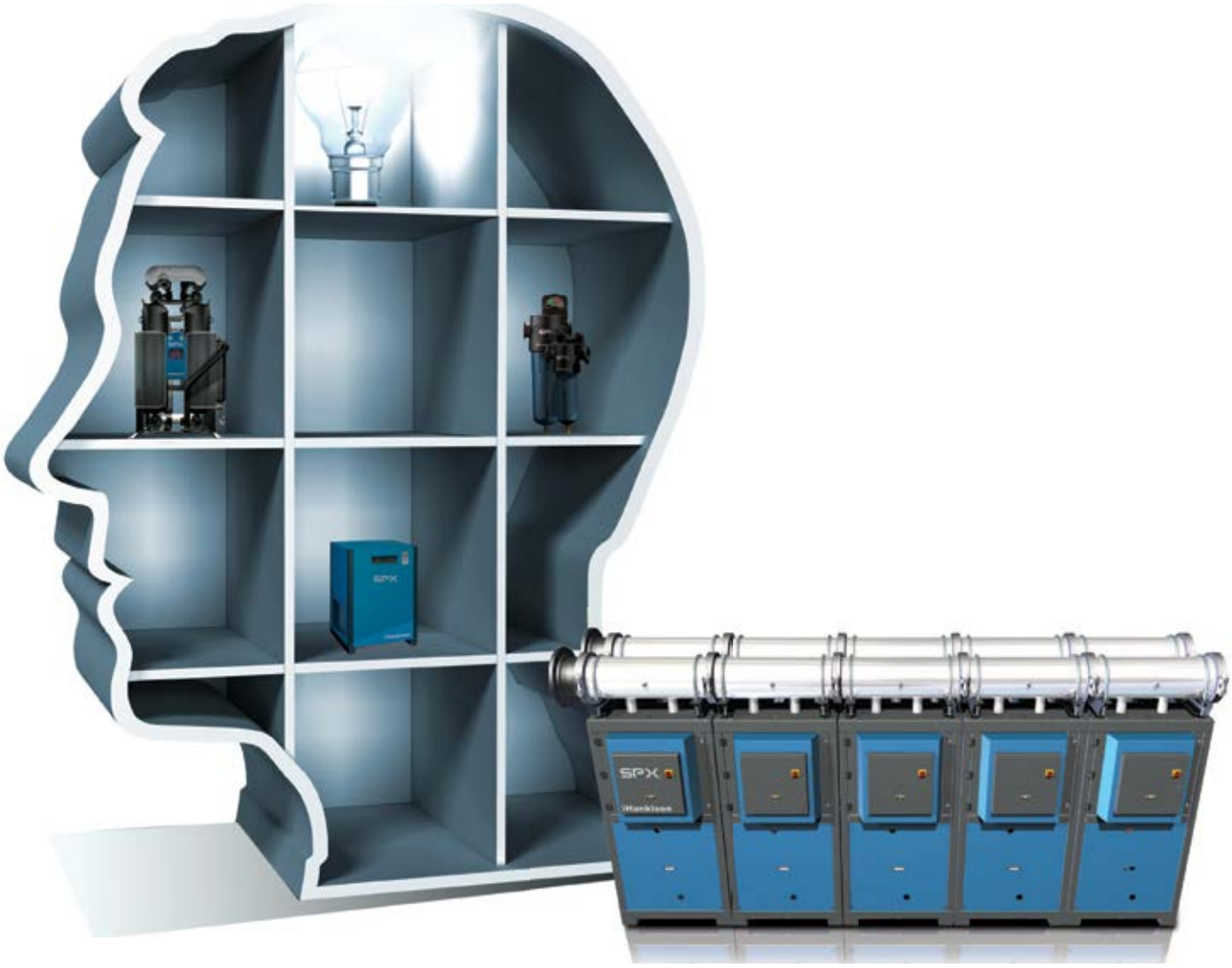

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INDUSTRY NEWS

Kaeser Breaks Ground on New Building Expansion

Kaeser Compressors has broken ground on a new building expansion to their headquarters in Fredericksburg, Virginia.

Representatives from building contractor Emerald Construction, architect McKinney & Co., the Office of Economic Development and Tourism for Spotsylvania County, former Company President Reiner Mueller, and Kaeser employees attended the event.

"As Kaeser grows, our commitment to providing superior customer service and delivering exceptional products will not change. Neither will our ties to the Spotsylvania community. These are all facets of what has helped make Kaeser successful," said Kaeser's Company President Frank Mueller. "The additional square footage we are adding will give us more opportunities to continue being who we are."

The expansion will add approximately 50,000 square feet, accommodate more inventory, and facilitate improvements to the company's growing packaging and shipping operations.

For more information, visit www.kaesernews.com/Groundbreaking. To be connected with your representative for additional information, please call (877) 417-3527.

About Kaeser

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

Parker Acquires PpTek for Biogas Solutions

Parker Hannifin, the global leader in motion and control technologies, has announced the acquisition of PpTek Ltd, based in Yapton, West Sussex, UK. With almost 100 installations worldwide, PpTek is the market leader in the provision of regenerative siloxane removal solutions and will become an integrated business unit within the Hiross Zander Division, thus enabling Parker Hannifin to offer a comprehensive portfolio of solutions in the biogas conditioning market.

Volatile Methyl Siloxanes (VMS) are a class of chemicals widely used in personal care products, the dry cleaning industry and

as effective cleaning agents of electronic circuitry. The waste from these products and applications is frequently disposed of in landfill sites or waste water treatment facilities.

As this waste decomposes, it produces methane and carbon dioxide, a mixture of gases which is used for energy and heat generation, comparable to conventional biogas. The siloxanes blend with this gas and contaminate it. Without an effective siloxane removal system, silicon dioxide — a chemical compound resulting from the combustion of the contaminated raw gas — combines with other elements in the gas and forms abrasive sand.

This damages the internal components of the gas engine, leading to downtime and costly repair work. In gas-to-grid or gas-to-vehicle applications, the methane must be totally free from siloxanes contamination to avoid damage to vehicles or gas appliances. Whilst various methods have been employed in the attempt to reduce the effect of these deposits, the regenerative removal system devised by PpTek offers a cost-effective and environmentally friendly solution which allows engines to be run to their full potential between service intervals and overhauls.

"PpTek's expertise in combination with Parker Hannifin's products and in-depth knowledge of gas treatment and dehumidification results in a powerful portfolio in the biogas conditioning market," stated Guido Fogolari, General Manager, Hiross Zander Division. "We can now offer our customers holistic solutions to condition their gas to be used for combined

heat and power, gas-to-grid and gas-to-vehicle installations. In addition, we will jointly develop new products for this emerging market."

About Parker Hannifin

With annual sales of $13 billion in fiscal year 2014, Parker Hannifin is the world's leading diversified manufacturer of motion and control technologies and systems, providing precision-

INDUSTRY NEWS

engineered solutions for a wide variety of mobile, industrial and aerospace markets. The company employs approximately 57,500 people in 50 countries around the world. Parker has increased its annual dividends paid to shareholders for 58 consecutive fiscal years, among the top five longest-running dividend-increase records in the S&P 500 index. For more information, visit www.parker.com

Renner Kompressoren Celebrates 20th Anniversary

In September 2014, Renner Kompressoren celebrated its 20th anniversary together with their international distribution partners looking back at 20 eventful and exciting years. A two-day event featured technical training, a leisure program, a brilliant menu in the workshop, a dinner and evening program at the hall of the local hotel, and the RENNER Cart Race Cup at a race track nearby. The feedback of the guests was outstanding.

It all started in a small workshop in Frauenzimmern in 1994 with only four people including the founders and owners Mrs. Annette Renner and Mr. Bernt Renner. This was the start of a rapid growth story. Today over 100 employees are working at the headquarters in Guglingen, Germany. From the beginning, RENNER focused on the development and production of compressor systems for demanding users in trade and industry. The product range of RENNER includes oil injected screw compressors from 2.2 to 355 kW, scroll compressors from 1.5 to 30.0 kW and water injected oil free compressors from 18.5 to 120.0 kW.

The embarked path at the beginning of the company's sales strategy is consistently implemented still today. The company relies on full sales and service partnerships with compressed air distributors. RENNER has experienced ever-increasing market share at home and in over one hundred countries on all continents, confirming the success of this strategy.

Visit www.renner-kompressoren.de

Chicago Pneumatic Unveils the MOTOCOMP

Attendees at the 2014 SEMA show, in Las Vegas, discovered a fun innovation — the Patriot MOTOCOMP. The Patriot MOTOCOMP is a custom motorcycle frame outfitted with a fully operational variable speed driven piston air compressor. Resembling a custom motorcycle, the MOTOCOMP is a joint venture project between Chicago Pneumatic and Patriot Marketing, and was built by Eric Bigham of Patriot Customs, located in Rock Hill, South Carolina.

"The bike — and its concept — are amazing," said Ellen Steck, President, Chicago Pneumatic. *"The MOTOCOMP is a really fun and innovative way to showcase our product, while helping people remember how integral Chicago Pneumatic is to automotive and mechanical manufacturers across the country."*

The Patriot MOTOCOMP, while intended as show piece, is a fully-functioning, 5 HP piston

compressor and the variable speed drive allows performance and sound changes when the throttle is turned on the handle bars. In place of a speedometer and tachometer display, the gauges read the air pressure and oil temperature of the air compressor.

Baldor Electric Company, which specializes in the design and manufacture of industrial electric motors, donated a 5 HP Baldor motor, and ABB, a leader in power and automation technologies, provided the variable speed drive to the MOTOCOMP project.

"Our automotive customers love cool, custom vehicles," said Rob Little, owner, Patriot Marketing. *"The Patriot MOTOCOMP is a visual representation of Chicago Pneumatic's dedication to designing innovative, high-quality compressors for the automotive industry."*

Attendees at the 2014 SEMA® Show in Las Vegas were invited to stop by the Chicago Pneumatic booth to take their picture with the Patriot MOTOCOMP, or to see a demonstration of the MOTOCOMP in action. *"The Patriot MOTOCOMP has been a fun way to tie Chicago Pneumatic's history with a visual reminder of where we're going,"* said Steck. *"There's no better place for the MOTOCOMP to make its debut than at SEMA."*

INDUSTRY NEWS

About Chicago Pneumatic

Since 1901 the Chicago Pneumatic name has represented high-performance industrial air compressors. Today, Chicago Pneumatic has a global reach, with local customer centers around the world. Chicago Pneumatic portable and stationary air compressors are tailored to the needs of the industrial, vehicle service, and construction markets. Every day we develop and manufacture new products that are meant not only to meet your demands today, but tomorrow as well. To learn more, please visit www.cp.com.

Ohio Transmission Corporation Acquires Ohlheiser

Ohio Transmission Corporation, an industrial equipment service provider and distributor headquartered in Columbus, Ohio, announces the acquisition of Ohlheiser Corporation, an industrial automation distributor based in Newington, Conn., with sales territories throughout all of New England and eastern New York. The acquisition will expand Ohio Transmission Corporation's geographical reach, and the Newington location will join 22 other locations throughout the Midwest and South.

"Ohlheiser has a rich history and outstanding associates with excellent customer relationships," said Phil Derrow, President and CEO of Ohio Transmission Corporation. *"This new addition to the Ohio Transmission Corporation family will strengthen our ability to serve customers and provide opportunities for associates of both companies."*

With the acquisition, Ohio Transmission Corporation will also add all 40 of Ohlheiser's associates to its existing workforce of more than 550 employees and will continue to provide quality products from leading industrial automation manufacturers, including SMC, Gast, Epson, Baumer, Panasonic and Turck. Ohlheiser's product lines include pneumatics, vacuum, fluid power, robotics, motion control, sensing, safety, machine vision and ID, UV curing and aluminum extrusion, with which it has been supplying its customers for more than 50 years.

Ohlheiser Corporation will become a subsidiary of Ohio Transmission Corporation and will benefit from its vast product and service offerings and resources. The acquisition provides ample growth opportunities and will provide Ohlheiser's large customer base with a more comprehensive set of technical solutions.

About Ohio Transmission Corporation

Established in 1963, Ohio Transmission Corporation is one of the largest industrial distributors and service providers in the United States. Its divisions include OTP Industrial Solutions, a provider of expert solutions for industrial motion control, fluid power, power transmission and pumping systems, and Air Technologies®, a compressed air system equipment and service provider and the largest distributor of Atlas Copco compressed air equipment in North America. Ohio Transmission Corporation is a partially employee-owned company that maintains locations throughout the Midwest and South. Ohio Transmission Corporation's 500 associates share its founding vision of delivering excellent value through work with integrity. For more information, please visit www.otpnet.com and www.aircompressors.com.

About Ohlheiser Corporation

Ohlheiser Corporation operates out of a single location in Newington, Conn., and services markets in the Northeast, including Connecticut, Rhode Island, Massachusetts, New Hampshire, Vermont, Maine, and eastern New York. Ohlheiser was founded in 1960, focused on being the leader in providing outstanding customer service, engineering and technical support. Ohlheiser is a very successful and well-respected technical distributor of pneumatic, vacuum, robotic and industrial

automation products. For more information, please visit www.ohlheiser.com.

Spencer Turbine Acquires TIGG Corporation

The Spencer Turbine Company announced it has agreed to purchase Oakdale, Pennsylvania-based TIGG Corporation, a manufacturer of air and water purification equipment used primarily for municipal water treatment, industrial process applications and environmental remediation.

"The complementary products of Spencer and TIGG afford system-integration opportunities in a number of applications that present significant growth opportunities for both companies," said Spencer President Mike Walther. *"We are excited about the acquisition of TIGG and the many synergies it will afford both companies in the municipal and industrial markets."*

TIGG clients will continue to work with the same technical experts they are accustomed to. *"The core of the company remains the same but now we have additional resources thanks to Spencer,"* said TIGG Vice President and General Manager Anthony Mazzoni. *"We're looking forward to offering our clients an expanded array of products and services."*

Since 1977, TIGG has provided a broad range of activated carbon adsorption equipment, systems, filtration media and services for the removal of trace contaminants from air, water, process liquids and gasses. TIGG builds standard and custom equipment at its 155,000 square foot manufacturing facility in Heber Springs, Arkansas. The company will continue to be based at its corporate headquarters in Oakdale, Pennsylvania and to operate its manufacturing facility in Heber Springs. For more information, visit www.TIGG.com

About The Spencer Turbine Company

Since 1892, The Spencer Turbine Company has specialized in bringing a unique engineering edge to the most extreme air and gas handling challenges. Today, Spencer is a recognized global leader in designing, engineering and manufacturing highly specialized blowers, gas boosters, and central vacuum systems. Headquartered in Windsor, Connecticut, Spencer markets and services its custom air and gas handling equipment worldwide. For more information, visit www.spencerturbine.com.

To read more ***Industry News*** articles, visit www.airbestpractices.com

SULLAIR CELEBRATES 50 YEARS OF AIR COMPRESSOR EXCELLENCE

By Neal Lorenzi, Contributing Editor

Sullair operates, in Michigan City, Indiana, one of the world's largest and most advanced production facilities for air compressor airends and full-feature portable and stationary air compressors.

A culture change is in the air at Sullair, a pioneer in air compressor technology, as the company celebrates its 50th anniversary. A global manufacturer of rotary screw air compressors used to power air-driven industrial equipment and tools used in manufacturing as well as the energy, mining and chemicals industries, Sullair operates five manufacturing facilities worldwide.

Sullair was founded in 1965, when it produced its first portable air compressor, and has continued to evolve and grow. Over the years, the company delivered the first 500 psig portable compressor (2003), introduced the Industrial S-Energy compressor line (2006) and unveiled ShopTek compressors (2008) to the industrial market.

In December 2012, Sullair's parent company, United Technologies, divested its industrial division to the Carlyle Group and BC Partners for $3.46 billion. In early 2013, a new company was created called Accudyne Industries consisting of Sullair, Milton Roy, Sundyne, Haskel and a number of other niche-focused brands. Accudyne was created to establish a global leader in compression and flow control technologies that will leverage the synergies amongst these brands, increase investment in product and market development and accelerate the companies' growth.

A new management team is in place at Sullair to bring that vision to reality led by President Scott Nelson. Nelson brings more than 28 years of leadership experience in channel management, product development and strategic growth. He previously led Bobcat Company, a construction equipment manufacturer, after Ingersoll Rand sold this division to Doosan Infracore in December 2007.

Compressed Air Best Practices had a chance recently to speak with Nelson as well as Rebecca O'Mara, Senior Director, Business Development; and David Andrews, Director, Marketing Communications in Sullair's new Chicago offices.

Culture Change

Sullair is one of the pioneers of air compressor technology. However, the company needs to return to its roots to reinvigorate that spirit and regain the trust of its channel partners, according to Nelson. On the plus side, Sullair has a strong brand with an enormous reputation and recognition in the marketplace.

"Joining the company was an opportunity for me to help strengthen the Sullair brand even further," Nelson says. "The brand's reputation

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Since the day our first air compressor rolled off the line five decades ago, Sullair has celebrated generations of leadership, innovative thinking and commitment to quality. To our employees; our distributors; and the many customers using Sullair solutions around the world – we say, "Thank you."

To learn more and to help us celebrate our milestone, visit

Sullair.com

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SULLAIR CELEBRATES 50 YEARS OF AIR COMPRESSOR EXCELLENCE

Sullair History

Milestones: Last 50 Years

1965: Sullair founded — portable air compressor first product produced

1972: Sullair goes public on the Over the Counter market, under the symbol SULL

1977: Sullair Asia established in Singapore

1978: Sullair Argentina joint venture established

1979: Branch office in Taiwan established

1981: Sullair listed on NYSE under the symbol SUL

1984: Sundstrand obtains 100% control of Sullair

1986: Sullair commits fully to independent distribution model

1994: Shenzhen Asia joint venture formed

1999: Sundstrand acquired by United Technologies Corp. (UTC); Hamilton Sundstrand division created

2002: Sullair acquires Champion Compressors of Australia

2003: Sullair delivers the industry's first 500 psig portable compressor

2006: Industrial S-ENERGY compressor line introduced

2007: New line of CE Certified portable air compressors introduced

2008: ShopTek compressors introduced to market

2012: Private Equity firms BC Partners and Carlyle Group acquire Sullair and other industrial brands from UTC

2013: Accudyne Industries Brand introduced

2014: Portable Remanufacturing "Reman" program introduced

2014: Expanded ShopTek product line introduced first into Latin America

2015: Sullair celebrates its 50th anniversary

for reliability and durability is second to none. In fact, our research continues to bring back the term 'bulletproof' when describing our air-end durability. We want to continue that legacy of durability, but add to that a new layer of innovation—leading the marketplace in efficiency and productivity."

The fact that Sullair's sole focus is on the compressed air business gives the company a competitive advantage: It can be more nimble and focused to move quickly to execute in the marketplace.

"Looking back at our history, having a finger on the pulse of our customers was a key driver in product development and solution efforts. Over time, we've become distanced from the end customer, and to a certain extent, from having a meaningful dialogue with our distributors," Nelson says. To bring back that spirit of camaraderie, Sullair is undertaking a number of initiatives, which include:

- Tiger Teams: small groups focused on specific problems, challenges and plans. Comprised of both Sullair employees and distributor representatives, these teams work on key initiatives that benefit all parties.
- Increased support at the field level, specifically with field personnel in sales, aftermarket and service.
- Increased investments in R&D, aftermarket support and field personnel, and increasing the speed to market of new initiatives and improved products.

"We have a unique opportunity as we enter the 50th year of Sullair," says Andrews. "The heart of the company is a strong brand and solid products — that perhaps for a while did not have a chance to shine. Our new ownership group and leadership team have a clear focus on growth and innovation

Since the acquisition, Sullair has been developing an infrastructure to support future growth, and has just begun to see the fruits of that labor with new product introductions beginning in Latin America in 2014, and more to come in the future globally. "Now, Sullair has the opportunity to re-establish its role as a leader in the compressed air industry," Andrews adds.

The Chicago Office is home to the new Commercial Business Unit, which focuses on product management, channel management

Scott Nelson, President, Sullair

Rebecca O'Mara, Senior Director Business Development, Sullair

and aftermarket product management as well as new product development. The office is located about 20 miles northwest of Chicago, near O'Hare International Airport. The office location serves two purposes. It allows easy travel out to visit customers, and serves as a convenient meeting point for incoming customers. "Our new office is located directly in the flight path of O'Hare. In fact, the sound of airplanes flying over is a constant reminder that we need to be in constant contact with our customers and distributors," Nelson adds.

Logistics

In a move to better serve its aftermarket and parts business, Sullair has partnered with third party logistics (3PL) provider, Neovia LLC (previously Caterpillar Logistics) utilizing Neovia's Fairfield, Ohio warehouse facilities. Neovia is being counted on to help Sullair build models of optimal inventory levels to better support its customer base.

"Neovia's heritage is based on its roots with Caterpillar," says Rebecca O'Mara. "They understand what our customers require and logistics are their core competency. We anticipate significant improvements in our operations — specifically in the areas of on-time delivery and order fill rates — by utilizing Neovia's capabilities. Key among these capabilities is inventory management and simulation."

Neovia is being utilized only for Sullair's aftermarket and parts businesses. All whole goods will continue to be managed from Sullair locations throughout the world.

Sullair also has initiated a Sales and Operational Planning (S&OP) process to help ensure that customers receive the right product at the right time. Via this process, operations and planning and sales teams

Airend manufacturing and packaging for Sullair mobile air compressors.

take macroeconomic data, historical sales and customer input to generate estimates of the right production levels. For distributors, this means improved product availability and delivery time.

"The process has been developed in collaboration with our sales partners. Improved information flows will ultimately help improve product availability and lead times. So we will be spending more of our time producing the products our customers are looking for, which helps increase inventory turns and productivity," O'Mara adds.

A sales configurator — Big Machines — also has been added to the mix of tools. It accelerates the sales conversion process by

SULLAIR CELEBRATES 50 YEARS OF AIR COMPRESSOR EXCELLENCE

The plant excels in packaging air compressors for a wide range of customers including customized open-frame compressors for oil and gas-field work to sound-attenuated enclosed packages for manufacturing environments.

Sullair's factory in Michigan City has a rich technical heritage manufacturing a wide range of rotary screw compression technologies including gas, two-stage, low-pressure, vacuum, and single-stage airends.

automating the order and quoting process to the exact specifications required by the customer. Sullair's distributors will be able to accurately develop quotes and submit orders automatically through the configurator.

Distributor Councils

In addition to the previously mentioned Tiger Teams, Sullair is utilizing formal distributor councils to improve the dialogue with its sales channels. These councils serve multiple functions. Key among them is holding Sullair accountable to its distributor partners, but also serving as a forum and focal point for collaboration, planning and communication.

Many distributors value the strength of the Sullair brand, as is reflected in the comments of Kevin Merritt, president of Metropolitan Air Compressor Co. Inc., Roseville, MI, a Sullair distributor since 1997. The company sells Sullair products exclusively to industries ranging from cabinet shops to automotive manufacturing plants throughout Michigan.

"The Sullair line has the most available control options, which allows us to give our customers the best solutions to meet their needs. The product quality and warranty are the best in the market," Merritt notes.

Blake & Pendleton, Macon, GA, has been a Sullair distributor since 1979. Its territory includes Georgia, northern Florida, eastern Tennessee, western North Carolina, Alabama, and central and southern Mississippi. The company supplies compressed air systems to all types of industrial manufacturing plants, which include mineral processing, pulp and paper mills, power plants, textile, chemical, military bases, automotive, aviation and electronics.

"Sullair's number one strength lies in its long-life, severe-duty, compressor air end," says Allen King, president. "We have applied Sullair compressors in difficult applications and environments, with excellent air end life, as compared to our competitors. This reputation has allowed us to grow our compressor business in difficult applications such as mining, chemical, power plants and paper mills."

Blackhawk Equipment Corp., Arvada, CO, has been a Sullair distributor since 1987. The company sells Sullair products to a variety of industries including food and beverage, light and heavy industrial manufacturing, oil and natural gas, petrochemical and pharmaceutical. Blackhawk covers Colorado and southern Wyoming, and has a key international account based in Colorado.

"We started out as a portable and industrial dealer," says Chris Gordon, president. "The previous owner of Blackhawk was a Sullair Rocky Mountain employee and we've had the line ever since. When I joined Blackhawk we had eight employees; we have since grown to 30." Gordon says Sullair's strength lies in its robust compressor design, support for distributors and path to market through distribution.

International Scope

Sullair continues to expand its presence internationally, especially in China, Latin America, EMEA and Australia.

"China is accelerating its role in driving product development globally. In addition,

BLACKHAWK EQUIPMENT CORP
OBVIOUS AIR SUPERIORITY

Blake & Pendleton

METRO AIR
Metropolitan Air Compressor Co., Inc.

> **"Sullair's number one strength lies in its long-life, severe-duty, compressor air end."**
>
> **— Allen King, President, Blake & Pendelton**

as a business unit, our Chinese operations are investing in Southeast Asia with field personnel and distribution development," Nelson explains. "Our Chinese operations are exploring new capabilities with our oil-free businesses with both oil-free rotary screw compressors for Asia, as well as centrifugal offerings in conjunction with our JV partner, IHI."

In Latin America, Sullair is increasing its field personnel and distributor coverage, as well as introducing new products, such as the recent ShopTek launch to meet the requirements of its customer base.

With the recent transition of manufacturing to China from Australia, Sullair's business there is now focused on being a world-class seller and servicer of air compressors supporting industrial, mining and construction sectors with multiple branch locations, enabling strong product support and customer intimacy.

Europe, Middle East and Africa (EMEA) is another key area. "We recently had a number of Sullair individuals in Abu Dhabi for a distributor conference to discuss our current and future business in the region," Nelson says. "We've added sales support in Dubai, which will help us bolster our distributor coverage throughout the region. In addition, by utilizing our global manufacturing capabilities, we will be better able to introduce products into the region sourced from both our China and Michigan City, IN, facilities."

Looking ahead, the new team at Sullair is focused on the Diamond Decades ahead. "Our Diamond Warranty provides 10 years of coverage on our stationary compressor line — which means the Diamond Decade to our customers," says Andrews. "Our goal is to experience a company-wide Diamond Decade. When we celebrate 60 years of Sullair, we will be looking back on a decade of change and growth, setting the course for the future as we reach for 100 years of Sullair." BP

For more information, please visit Sullair at www.sullair.com

AUTHOR BIO

Neal Lorenzi is a freelance writer based in Mundelein, IL. He has covered a wide range of industries during his 25 years as a writer and editor.

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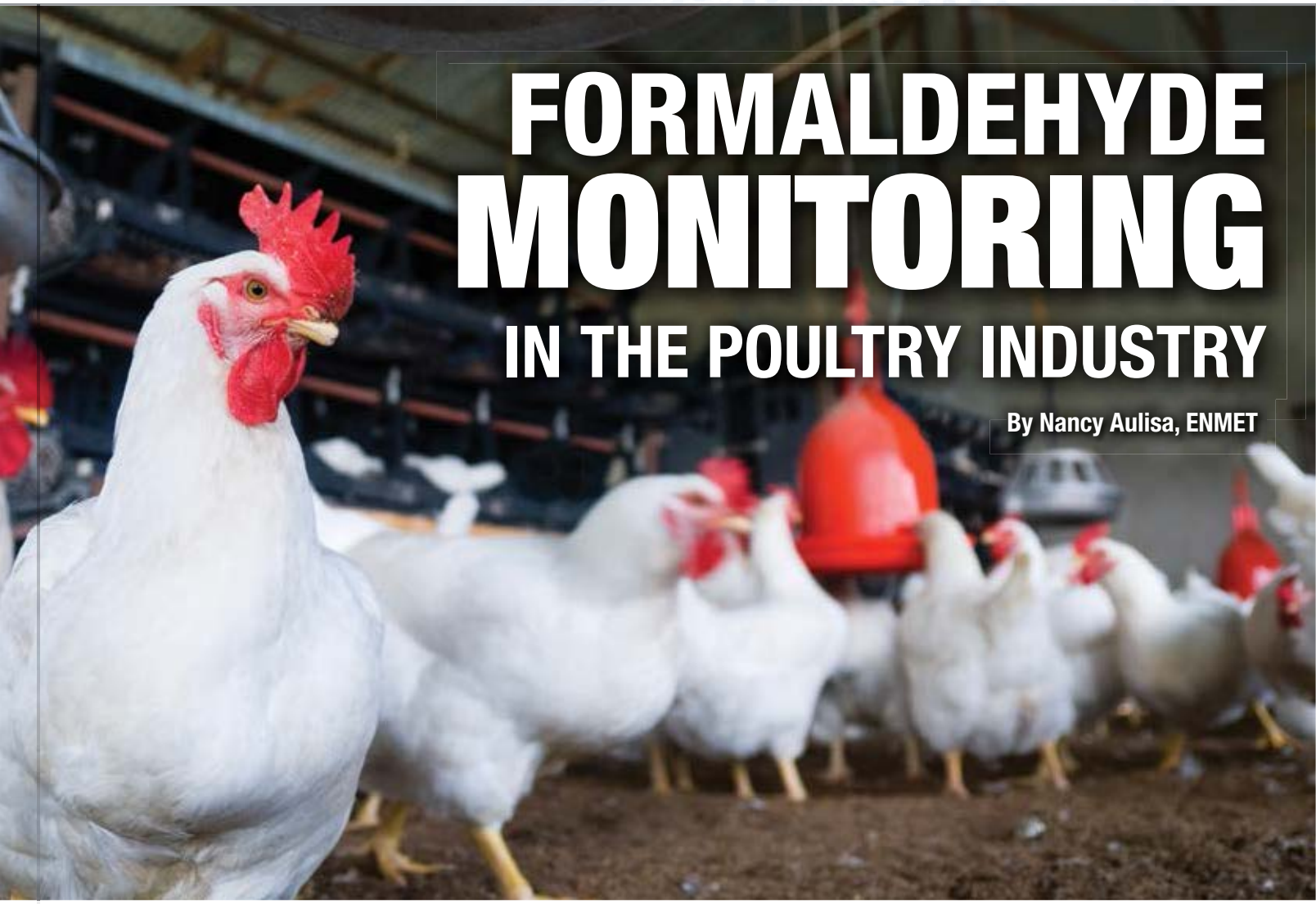

FORMALDEHYDE MONITORING IN THE POULTRY INDUSTRY

By Nancy Aulisa, ENMET

Formaldehyde is widely used by the poultry industry as a disinfectant on poultry farms, in brooder houses, hatcheries and hatchery vehicles. It is highly effective in the reduction of contamination levels caused by bacteria, viruses and molds throughout the production process. Using formaldehyde as the primary disinfection agent will control key organisms, such as Salmonella, Pseudomonas, Proteus, E. coli, H.capsulatum, Staphylococcus, Streptococci and Aspergillus.

Formaldehyde is an organic compound that can adopt several different forms. It can be used in solution form as formalin, as a free gas, or in a solid form as paraformaldehyde prills. Formaldehyde is highly toxic to humans, regardless of the method of intake. At room temperature it is a colorless gas characterized by a pungent odor. Even with very short-term exposure, formaldehyde will cause irritation to the eyes including pain, redness, blurred vision followed by sneezing, soreness, coughing, shortness of breath, headaches and nausea. Exposure to elevated levels can lead to accumulation of fluid in the lungs (pulmonary edema).

A large exposure to formaldehyde is converted to formic acid in the body, leading to a rise in blood acidity, rapid-shallow breathing, hypothermia, and coma or death. Long-term exposure causes chronically impaired lung function, skin hardening, swelling and flaking, dermatitis, allergic eczema, and cancer. Formaldehyde is a skin and respiratory sensitizer. As a sensitizing agent, it can stimulate the body's immune response so that a subsequent exposure to even a very small amount is likely to trigger an allergic reaction. For most people, irritation from formaldehyde is temporary and reversible. *"Overexposure to airborne formaldehyde is dangerous to health, but the risks can be substantially*

reduced if levels are regularly measured and monitored," states PPM Technology's Managing Director, John B. Jones. PPM Technology, based in Caernarfon, Wales, UK, is a leading manufacturer of portable and fixed gas detection instruments for formaldehyde and other toxic gases in indoor environments.

Monitoring Ambient Air in Poultry Farms

It is important to carefully monitor the formaldehyde concentrations in the air at facilities using it as a disinfectant. It is advised to regularly check formaldehyde concentrations in the air to ensure employees are not exposed to dangerous levels. Using a formaldehyde monitor with real-time results is crucial so that potential over exposures can be identified immediately, without any delay waiting for test results. When using a real-time formaldehyde monitor, if dangerous levels of formaldehyde are detected, employees can be evacuated until the risk is subdued.

According to Norman Davis, President, ENMET, LLC, *"Formaldehyde is an excellent choice to use in the decontamination process on poultry farms. Since formaldehyde is a dangerous industrial chemical, workers must protect themselves with personal protective safety equipment to limit their exposure while working in these areas. Most importantly, facilities using formaldehyde should have a monitor that is designed to detect formaldehyde and not rely on general purpose monitors. Having a monitor that is formaldehyde specific will ensure the unsafe levels can be cleared and keep exposure within safe levels."*

One of the key elements in protecting workers from dangerous levels of formaldehyde in any

The ENMET Formaldemeter htV-m

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FORMALDEHYDE MONITORING IN THE POULTRY INDUSTRY

industry is having the proper monitoring and detection system. The best type of instrument is one that is capable of accurately detecting and monitoring formaldehyde, temperature and humidity in real-time.

The Formaldemeter htV-m manufactured by PPM Technology and distributed in the USA by ENMET, LLC is an excellent formaldehyde monitor for this type of application. This portable instrument accurately detects and monitors three important parameters — formaldehyde, temperature and humidity in real-time. It can be used as a manual hand-held instrument or as a continuous monitoring device capable of up to one month of data-logging. The Formaldemeter htV-m can precisely measure formaldehyde concentrations in parts per million (ppm) and mg/m3 under extremes of temperature and humidity. The built in memory and real time clock enables the htV-m to log all three parameters and corresponding times, allowing improved monitoring and analysis opportunities.

With the subject of Indoor Air Quality becoming more prominent and recognized throughout many different industries, it has become essential for the health and safety of the workers to have the proper monitoring equipment. It is extremely important to have a real-time detection system that will monitor and detect for the specific type of hazardous chemical being used in a facility and quickly warn workers if a hazard exists. BP

For more information, contact Nancy Aulisa, Marketing Communications Manager, ENMET, LLC at email: naulisa@enmet.com, tel: 734-761-1270 or visit www.enmet.com

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SPECIAL ENGINEERING MEETS SPEED AT PARKER'S FINITE AIRTEK FILTRATION DIVISION

By Rod Smith, Compressed Air Best Practices® Magazine

Parker's FAF Division conducts hydrostatic testing for ASME Certification on mist eliminator filtration systems.

Compressed Air Best Practices spoke with Ted Silva (Division Sales & Marketing Manager), Allan Hoerner (Division Product Manager), Ron Nelson (Division Lean Manager) and Marvin Walsh (Division Quality Manager) from Parker Hannifin's Finite Airtek Filtration Division (FAF).

Good afternoon. Thank you for the tour of your Lancaster (NY) operations. This is quite a modern facility!

Good afternoon, we're glad you liked it! This is a 130,000 square foot manufacturing, warehousing, application engineering, new product development and customer service center all dedicated to Parker compressed air treatment and chiller technologies. We have 70,000 square feet dedicated to manufacturing, 30,000 square feet to warehousing and shipping, and 30,000 square feet for customer service and application engineering.

Parker has invested $5 million into all areas of this facility - including a $700K state-of-the-art research and development laboratory, training facility, office updates, emergency generators, lean manufacturing processes, robust shipping packaging and a brand new sandblast booth. It's been an exciting journey. The Parker brands supported here include Airtek, domnick hunter, Finite and Zander.

The Parker FAF Division has several market segments we focus on with our technologies and sales channels that include: oil and gas exploration and pipelines, natural gas vehicles and compressed natural gas, biogas

with Siloxane removal, food and beverage, life sciences such as medical equipment manufacturers and pharmaceutical sterile filtration, and industrial manufacturing.

Please describe your manufacturing of refrigerated air dryers.

The Lancaster (NY) facility manufactures Thermal Mass Cycling (200 to 1000 scfm) and Non-Cycling (200 to 1200 scfm) refrigerated air dryers that feature a unique 4-in-1 heat exchanger with less than 2 psi pressure drop.

Our Magnum Series Cycling dryers use our unique tube-in-shell heat exchangers for dryer flows from 1200 to 25,000 scfm. We recently shipped an 18,000 scfm refrigerated dryer to an automotive plant. "Big air" users significantly support this product line due to the smooth-bore copper tube-in-shell heat exchangers featuring very low pressure drops. Unlike other brands using aluminum-block heat exchangers for high air flows, this smooth-bore heat exchanger requires no pre-filter and is cleanable as part of a standard preventative maintenance practice. Contaminated air

Ron Nelson and Allan Hoerner (left to right) at Parker's Lancaster New York manufacturing center.

SPECIAL ENGINEERING MEETS SPEED AT PARKER'S FINITE AIRTEK FILTRATION DIVISION

Newly installed sandblast booth with domnick hunter Grade D breathing air system

goes right through the tube side to the filter. Our facility is unique in that we manufacture the heat exchangers and filter pressure vessels ourselves. We design-in additional capacity to ensure dewpoint and pressure drop integrity.

How do Parker Service Centers (PSC's) support the demand for refrigerated air dryers and filters below 500 scfm?

The answer is with speed and lower freight impacts! Refrigerated air dryers are shipped to our clients from six Parker Service Centers (PSC's) in the United States, one in Toronto and two in Mexico. Our plant, here in Lancaster (NY), ships the filters and dryers to the PSC's. The PSC inventory and purchasing systems are all interconnected and if one item is out-of-stock, it ships automatically from the nearest PSC location. All locations also carry key spare parts. This is another example of how we really leverage Parker's assets.

This investment was made due to research conducted with Parker distributors. The U.S. shipping locations are Lancaster (NY), Oxford (MI), Portland (OR), Austin (TX), Los Angeles (CA) and Charlotte (NC). This decentralized PSC stocking strategy began about a year ago and it's been significantly well received.

Please describe your desiccant dryer and filter manufacturing.

The Lancaster (NY) facility manufactures heatless, heat-of-compression, medical, oil-field rated, high pressure, externally heated and blower purge desiccant dryers. It's a huge line-up of technologies! We can offer almost any type of standard or customized configuration or certification to meet the needs of our customers. Our standard twin-tower heatless desiccant dryer range goes from 10 to 6000 scfm. The externally heated and blower purge desiccant dryer range goes from 100 to 12,000 scfm.

We fabricate filter housings and mist eliminators from 3 inch up to 12 inch connection sizes for flow ranging from 200 to 12,000 scfm. Smaller filter sizes are shipped from stock from all supporting FAF facilities.

I was very impressed by your Engineering Group- particularly that huge whiteboard full of custom projects! Please describe their mission.

Be glad to. A significant portion of our desiccant dryer business goes through our Special Engineering Group. This team is on a mission to provide customers with exactly what THEY want — as opposed to what the "standard special package" is! We embrace taking a clean sheet of paper and working with a distributor and end user on defining their needs. For some clients it's all about product certifications — for

"We have a strong team of degreed Engineers, who excel at helping our customers define the scope of supply and execute the projects."

— Allan Hoerner, Division Product Manager

others it's about meeting some unique challenges provided by their application.

For pressure vessels, we are an ASME Coded shop and provide ASME certification for the North American market and CRN Certifications for all Canadian provinces. We perform our own hydro-test procedures here pressurizing the vessels to 1.3 times rated pressure for the inspectors. Our products are also ETL and CSA approved for electrical.

We have a strong team of degreed Engineers, who excel at helping our customers define the scope of supply and execute the projects. To raise the profile of the projects and key milestones, the team decided to complement our computerized manufacturing processes by placing the key features and deadlines on the "big whiteboard" you saw. The team celebrates hitting the milestones and "seeing" the custom work being delivered to customers. Here are some examples of recent successes.

- Automotive Industry — Magnum refrigerated air dryer with Cold Coalescer, tube and shell heat exchangers, customer specified drains, customer specified air connection orientation, dual semi-hermetic compressors with staged unloading and oversized heat exchangers to meet customer specified pressure drop.
- Oil & Gas Market — Heatless Twin Tower desiccant dryer, -60 °C pressure dew point (PDP), 1/8" corrosion allowance, stainless steel inlet piping, corrosion resistant exterior paint, B31.3 piping (design to meet CRN & ASME), x-ray welds, quantity 6 fabricated filters per dryer.
- Power Generation Market — Heatless Twin Tower desiccant dryer, explosion proof (NEMA 7) outdoor application, panel heater and heat trace.

Inspecting the robust packaging protecting an externally heated desiccant dryer before shipment.

Product performance testing at the new testing laboratory.

SPECIAL ENGINEERING MEETS SPEED AT PARKER'S FINITE AIRTEK FILTRATION DIVISION

- Food and Beverage Market — Heatless Twin Tower desiccant dryer, complete unit 304 stainless steel.
- Oil & Gas Market — Heatless Twin Tower desiccant dryer, -100 °F PDP, oil field construction, cyclic tank design and dryer fatigue analysis.

Please describe your new product development test laboratory.

We are very proud of our research and development laboratory. It's providing fantastic support to our engineering group and to our new product development efforts. We can test both dryers and filters for all kinds of key performance indicators including pressure dew point, pressure drop, and energy consumption at full and partial loads. This allows us to support our customers' needs for reliable dew points at the lowest energy costs and provide documentation like the CAGI data sheets documenting dew point and power consumption at full and partial loads.

We have "hot boxes" where we can test dryer's performance for high ambient temperatures. We can test dryers using all types of voltages for export markets and unique conditions (115v, 230v, and 460 volt, single and three phase). We also test chiller performance in the laboratory. In the near future we plan to expand the filter housing and element testing capabilities of the laboratory.

A 15,000 scfm Magnum cycling refrigerated dryer

Marvin Walsh and Ron Nelson display Parker's ISO 9001 Certifications.

How is your chiller business developing?

As you know, Parker does a significant volume of business with standard chillers. Over the past few years, an exciting development has been our custom-chiller work happening here in Lancaster (NY) for OEM's. One thing OEM's are interested in is Parker's global reach and ability to service chillers and dryers around the world. For example, we've conducted on-site service training and placed key service parts in stock at key global facilities — in addition to the six Parker Service Centers mentioned before.

Thank you for your time. BP

For more information on Parker, visit www.parker.com/faf or www.parker.com/finitefilter

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QUALITY COMPRESSED AIR SERVICES IS TRUE TO ITS NAME

By Neal Lorenzi, Contributing Editor

QUALITY COMPRESSED AIR SERVICES, INC

When a company includes the word "quality" in its name, it had better back up that claim with the right stuff. So it is with Quality Compressed Air Services Inc. (QCAS), a full-service company that follows the motto: for all of your compressed air needs.

QCAS provides service, sales, parts and rental solutions for plant air systems, medical air systems, compressed air treatment and nitrogen generating systems. The company prides itself on being client-focused with a commitment to respond to service needs 24/7. "Our relationship with clients involves more than us just selling equipment, parts and maintenance. We provide system auditing, training, testing and information about innovations in our industry," says Michael McCulley, president.

Based in Jackson, MS, the company serves the following industries: industrial, manufacturing, mining, oil and gas, marine, municipal and construction. Its current facilities are located in Baton Rouge, LA; Jackson, MS; and Lafayette, LA. The company's geographic focus is on Mississippi and Louisiana; however, it will travel where requested, as evidenced by recent service projects in Alabama, Texas and California.

QCAS was founded in 2003 in Jackson, MS, starting with two employees carrying the Sullivan-Palatek compressor line. It started as a service company to service and repair air compressors, air dryers and air diaphragm pumps — basically anything in the compressed air industry. In 2009, the company branched out and entered the Baton Rouge, LA, market.

Once that location was fully staffed, the company branched out to the Lafayette, LA, market in 2013. It now has three locations and 25 employees. "Due to hard work and dedication from all of our team members, we look forward to continued growth in other territories," says McCulley.

Meeting Client Needs

The company's website touts the fact that it can "custom fabricate an air system that will have your business running smoothly and efficiently." According to Ryan Sylvester, sales manager, the QCAS team makes sure it understands its clients' needs and production goals. "The company provides systems designed to perform to the required specifications, including unique applications such as nitrogen generation," he says.

In fact, QCAS provided a nitrogen generating system to Leonard Metal Fabricators, Pearl, MS, enabling that company to supply its laser cutting machine with nitrogen produced in-house using compressed air. The system includes a variable-frequency-drive rotary screw air compressor, desiccant air dryer, nitrogen generator, reciprocating booster compressor and storage tanks.

A bulk handling and plant air compressor application.

"With the nitrogen generator, we no longer depend on an outside source for our nitrogen needs," says Michael Mann, general manager, Leonard Metal Fabricators. "With the laser, we are able to produce more products in a timely manner. With both items, we are able to be more competitive in the fabrication market." The company produces stainless steel kitchen components and related products to clients in Mississippi; however, its reputation in the stainless steel fabrication market reaches all over the U.S.

Referring to the nitrogen generator installation, Mann says that QCAS is a reputable company that puts its clients' needs first when designing such systems. "Installation can be a nightmare but QCAS handled everything down to the smallest detail," he notes. "It was a professional installation. We are pleased with the system they designed and installed for us. We've had little downtime in the past eight years, mainly because of routine maintenance they handle for us."

QCAS can provide complete, fully integrated, supply-side packaged solutions to meet its clients' unique needs as well, according to Sylvester. "The company can provide a reliable system that is ready for installation and operation with little or no modification as received. The packages are designed for both harsh and clean environments, and include all supply-side components, skid-mounted and piped for easy installation," he notes.

The company also can provide its clients with customizable preventative maintenance plans to reduce downtime and maximize efficiency. Specifically, the company can tailor a planned maintenance plan to fit its clients' needs based on their process, environment, specifications and budgets. A basic plan provides routine service to replace filters and oil, as well as external cleaning, and visual inspection based on a checklist. A premium plan includes the above, plus replacement of critical parts as predetermined.

QUALITY COMPRESSED AIR SERVICES IS TRUE TO ITS NAME

A complete on-site nitrogen generation system.

The Service Team

QCAS prides itself on a technical team that provides emergency service to its clients on demand. Since every service person starts in the compressor business with different capabilities, QCAS puts its technicians through a training program, starting with preventative maintenance and theory of compressed air. After mastering these areas, they progress to troubleshooting and machine repair. Technicians are not placed on emergency call status until this training is completed, at which point they are capable of accurately diagnosing and repairing equipment.

"We are first and foremost a service company," says Craig Counts, service manager. "Instead of working on one or two brands of equipment, we work on all brands. So our technicians are exposed to different controls and machine operation. All of our technicians are capable of performing emergency repairs. Naturally you will have technicians that are stronger in certain areas than others but by constant training in areas where they are challenged, we have developed a very competent and talented service department."

Along with technical excellence, QCAS team members possess the qualities of character, integrity, ethics and pride, according to Counts. He provides the following example of how these team members handled an emergency situation:

On a Friday evening, a cement blending plant located in Odessa, TX, called the blending plant manufacturer stating that its two 50-hp vacuum units had shut down and discharged all of their oil. The cement blending plant initially contacted a local service company; however, the local service company was unable to accommodate the request.

"The vice president of the blending plant manufacturer asked us to go to Odessa, TX, to see what was going on with the vacuum units," explains

> "Providing sales and full service support after the sale for multiple manufacturers enables us to provide clients with options versus the 'one size fits all' approach."
>
> — Marc McCulley, Territory Manager, QCAS

Marc McCulley, territory manager. The QCAS service team left Jackson, MS, at 9:30 p.m. Friday and arrived in Odessa, TX, at 9:30 a.m. Saturday.

The team found that the units had sucked themselves full of gray powder (cement). Mud on the inside of the separator element indicated a ruptured element and the fluid filter element was plugged.

"It takes more than 50 psi differential to collapse a fluid filter. With a plugged inlet and a plugged fluid filter, the only path to atmosphere is through the separator, which we knew was compromised," McCulley adds. "That would allow the pressure in the pump to go out the discharge line, causing the vacuum fluid to blow out the discharge line when the unit shut down. The material that went to the fluid filter had passed through the vacuum pump and all the bearings. As a result, the pump bearings had been exposed to cement and were compromised."

So the problem was not due to an equipment failure, but to a lack of maintenance in the facility's bag house. The QCAS service team began an extensive flushing and cleaning of the two units, and then trained plant operators on proper maintenance procedures. At 10:30 a.m. Sunday, the team pulled out of Odessa, TX, and headed back to Mississippi. Both vacuum units were running and the plant was back to blending cement.

Sullivan-Palatek

Sullivan-Palatek, Michigan City, IN, has enjoyed a 12-year relationship with QCAS. "We've watched them grow from a two-person, two-bay rental facility in Jackson, MS, to acquiring property and building their own corporate sales and service center to better serve their clients," says Greg Verheyen, western regional manager, Sullivan-Palatek. "In 2011, they purchased the assets of another distributor in Baton Rouge, LA. They recently opened another sales and service location in Lafayette, LA. Sales, rentals, OEM parts, service and plant audits are available at each location."

QCAS is now a Master Distributor of Sullivan-Palatek compressed air products in Mississippi and southern Louisiana. These products include a rotary screw compressor line ranging from 5 to 500 hp in both fixed and variable-speed drive, air dryers in refrigerated and regenerative configurations, filtration, oil/water separation products, master controllers and data logging equipment.

"QCAS has factory-trained and certified technicians at each of its locations. They've even had their sales team attend our service schools to better understand the technical side of the compressors they're offering," Verheyen adds.

"From our perspective, the main benefit of working with QCAS is their singular focus on compressed air products and systems. They know their market, their clients and their competition. We've had a great working relationship with Michael McCulley and his team over the years and look forward to many more years of growth and prosperity."

Looking Ahead

Air compressor technology has made advances in recent years and QCAS has been able to keep up with those changes, according to McCulley. "Air compressor technology, along with the rest of the industrial world, has become more and more computer-controlled. Mechanical controls have given way to a programmed digital brain. Air compressor manufacturers are incorporating more proprietary components and software programs into their units, and standardizing to the point that they are offering fewer options or add-ons," he says.

"Our company understands that 'one size does not fit all'; therefore, we distribute multiple brands. Providing sales and full service support after the sale for multiple manufacturers enables us to provide clients with options versus the 'one size fits all' approach."

One of the challenges the company faces on a regular basis is recruiting cohesive team members, according to McCulley. The supply

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A complete air compressor, air treatment and air storage installation at an industrial plant.

of skilled labor in the U.S. is far less than the current demand, which certainly provides for increased competition when recruiting. Most importantly, though, the company strives to recruit people that possess character, integrity, ethics and pride. "If we can get this, then we can train the rest."

Maintaining control of growth is another challenge. "The demand for service is always present and plentiful, for which we are grateful; however, without controlled growth we can drown in opportunity," McCulley explains. "Educating clients, providing clients with reliable equipment, and convincing clients to let us perform non-price driven, premium-level preventative maintenance helps to overcome this challenge as we reduce the volume of emergency, unplanned service calls."

The company is interested in expanding to areas where cohesive team members are available, as they are its most important asset. "QCAS does have near-future expansion plans; however, the company maintains these plans internal to the organization, as we prefer to fly under the radar," McCulley says. BP

For more information visit Quality Compressed Air Services Inc. at www.QCAS-INC.com

AUTHOR BIO

Neal Lorenzi is a freelance writer based in Mundelein, IL. He has covered a wide range of industries during his 25 years as a writer and editor.

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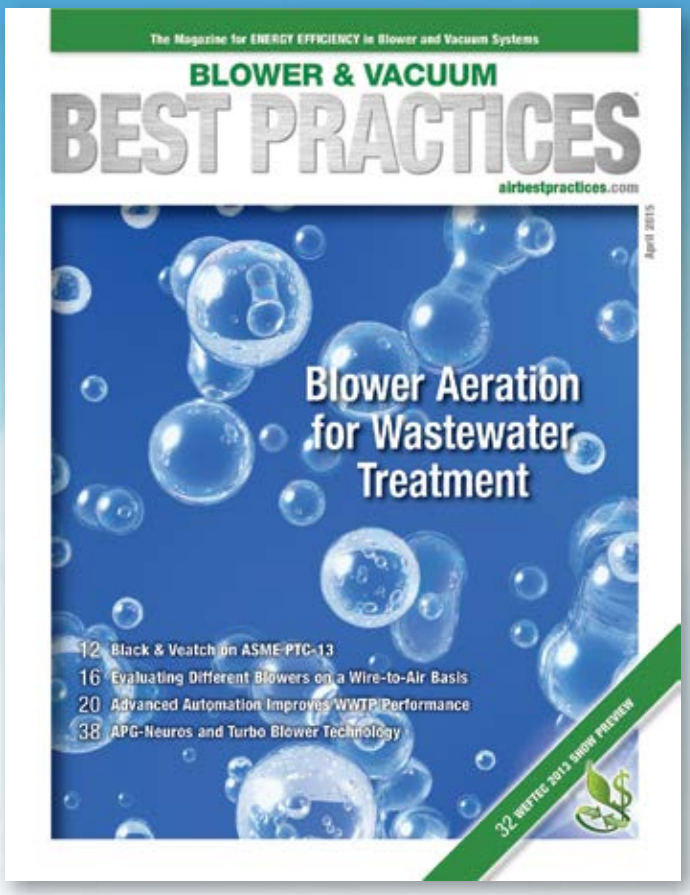

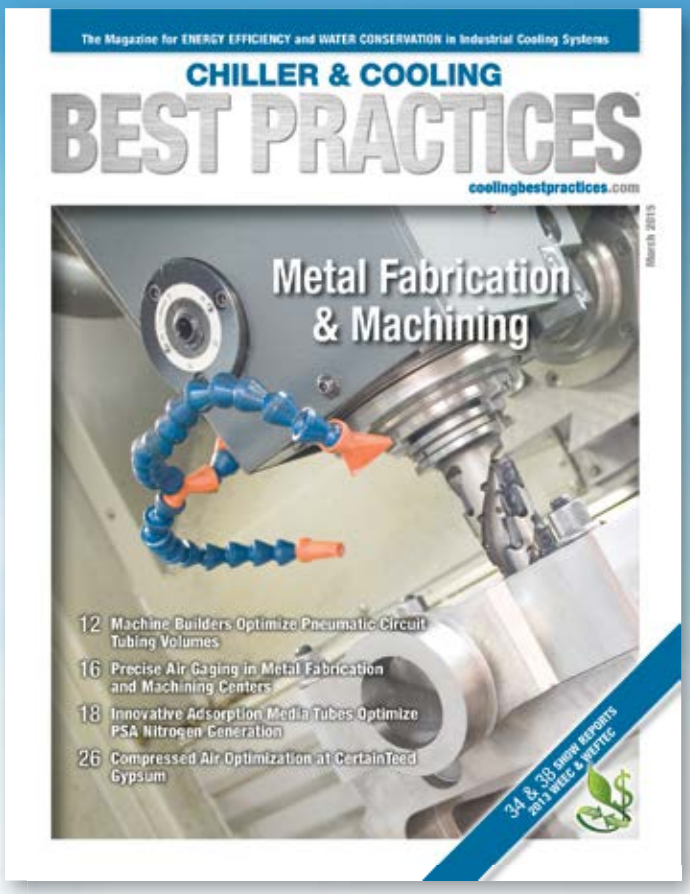

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MEAT PACKAGER RETROFITS A COMPRESSOR WITH A VFD AND MASTER CONTROLS

By Tim Dugan, P.E. President,
Compression Engineering Corporation

➤ As readers of this publication know, there are many ways to save energy in industrial compressed air systems. One common supply side technology is the variable frequency drive (VFD) of the compressor. It is well-documented that positive-displacement compressors with VFDs provide cost-effective savings in comparison to inlet modulating, load-unload, and variable displacement control. Early in the development of VFD compressors, they were essentially "bolt-on" drives. The OEM delivered a fixed-speed compressor and installed a separate VFD to control it in the field. Most manufacturers of screw compressors now offer new packaged VFD compressors, designed with the drive integrated into the compressor's controls. Air-end, motor, lubrication, cooling, and speed-range are optimized for VFD operation. There are definite advantages to packaged units, particularly if a new compressor is needed anyway. However, there are good reasons to retrofit some compressors with a VFD.

The goals of this article are to make the case why VFD-retrofits are sometimes a good option, recommend prerequisites for such a project, and recommend a template for a typical project. A case study at a meat packaging plant project will be referred to.

Five Reasons to Consider a VFD Retrofit Project

1. Energy savings are a priority. Without this priority, the project will not be worth it.

2. A new VFD compressor is too costly. If there is limited available capital, a retrofit might be able to be justified.

3. There is no room or electrical capacity for a new, large VFD compressor. New VFD compressors require higher peak current than a conventional compressor of the same nominal motor power. This is because the compressor is not at its peak efficiency at the high speed, and there are additional VFD losses that are max at top speed.

4. New VFD compressors don't always integrate well into customer's master controls. Often, new VFD compressors are sold as stand-alone units in multiple compressor systems, and the integration issues are ignored. In cases where we attempt to integrate them, some models don't interface well with a third-party master control and monitoring system. Some OEMs are getting better at supporting integration.

5. A suitable compressor for retrofit exists

Prerequisites Recommended for a VFD Retrofit Project:

- Correct Size and Type of Compressor is Available and in Good Condition:

  a. To properly integrate a VFD compressor into a multiple compressor system, the VFD compressor must have a "turn-down" (min-max speed flow range) of more than any of the fixed speed compressors in the system. That allows the VFD compressor to operate as the "fixed trim", or the unit that is always meeting the varying load. If the VFD turn-down is not large enough, the control system will have "dead-band" problems. One or more fixed-speed compressors will load and unload at the same time the VFD is "hunting" from max to min speed, and vice-versa. If there are multiple VFD compressors that together have the necessary swing range, it is possible to operate them together as the "trim" capacity.

  b. The retrofitted compressor must be a positive-displacement compressor. While it is theoretically possible to run a centrifugal compressor in a small speed range, we don't recommend it for a retrofit project.

  c. The retrofitted compressor must have a known speed range. This is easier to determine if the air-end on the unit is packaged in a VFD, gear or belt-drive package that has a known male rotor speed range. Typically, oil-flooded rotary screw compressors can be run down to 900 rpm at 100 psig, often lower. Oil-free compressors are more sensitive to speed reduction, because of temperature increase with slip at lower speeds.

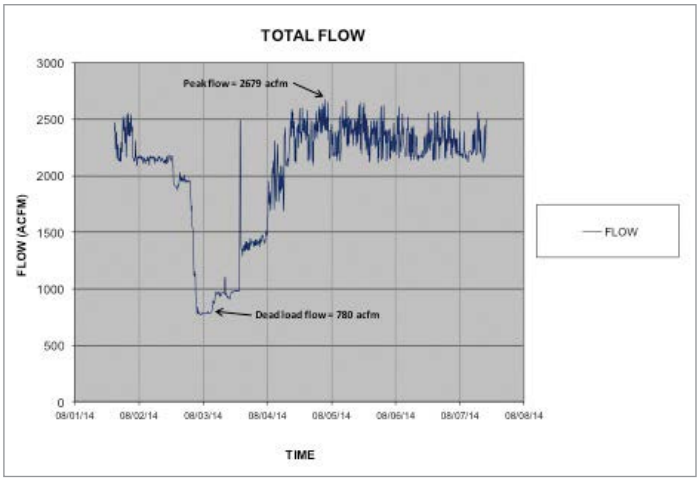
  d. The retrofitted compressor must not have oil-flow systems that demand full speed operation for proper oil flow. We are not aware of this in a standard package, but it might exist.

- Motor can handle VFD-operation. There are several things to look out for. First, the current draw will be slightly higher than it is now at 100% load, particularly at low frequencies, and the cooling will drop off. Some compressors have marginally-sized motors and are running modulated, and with a VFD, the 60 Hz current will be higher than it used to be (modulation will be turned out). Also, some motors are not well

MEAT PACKAGER RETROFITS A COMPRESSOR WITH A VFD AND MASTER CONTROLS

cooled now and will be vulnerable to overheating at low speeds, particularly TEFC motors. An engineering evaluation needs to be done to see if the motor is suitable.

- Adequate technical support is available. There is an electrical contractor who can act as an integrator, preferably with a controls programmer/engineer on staff, and a compressor engineer available to properly design and commission the system. Some customers have the in-house resources to implement this type of project. Most do not.
- Customer understands that master controls need to be installed or changed. If there is a "sequencer" in the system already, it has to be reprogrammed or possibly replaced. If there are no master controls, some are needed.



Case Study Background

For this article, I will refer to the working conditions encountered at a meat packaging plant:

- Typical production flow = 2200 to 2700 acfm
- Weekend flow = 1400 acfm
- Leak load = 800 acfm
- (1) 400 hp 2200 acfm and (1) 200 hp 960 acfm 2-stage variable displacement fixed-speed screw compressors, good mechanical condition, some controls problems, 10-15 yrs old
- 400 hp compressor turn-down = 1100 acfm (1800-900 rpm)
- (2) 150hp 750 acfm screw compressors, fixed-speed, water-cooled, good mechanical condition, some controls problems, 25-30 yrs old
- Master control system installed but turned off.
- 400 hp running in variable displacement, 200 hp stuck at 50% displacement, 150hp's off.
- Common wet header, refrigerated drying, N2 generation, 100 psig

In 2011, the 400 hp compressor was converted to water-cooled so that it could run more reliably at full capacity, and the master controls were installed. The control mode that the system was previously set up for was with the master controls was as follows:

- 0-960 acfm (never ran here): 200 hp load-unload, 400 hp off
- 960-2200 acfm: 400 hp compressor, running in variable displacement mode with unloading
- 2200-3700 acfm: 400 hp compressor, running in variable displacement mode, (1) 150hp running full load

Average efficiency was good, 5.53 acfm/kW.

In 2014, we recommended repair and improvements, including the following:

1. Re-commission master controls (they were shut off for some reason). Efficiency had dropped to 5.35 acfm/kW
2. Retrofit 400 hp compressor with a VFD
3. Re-program master controls to control VFD compressor
4. Reduce demand
5. Segment high/low systems, install small high pressure compressor

The meat packaging plant decided to do only project #2, and we talked them into doing #1 as a prerequisite. We calculated that this would save about 10% energy, achieving an efficiency of about 5.90 acfm/kW.

Nine Implementation Steps Recommended for a VFD Retrofit Project

1. Correct all local control issues with compressors: The compressors have to be able to run properly in "local" before they can be run in "remote". The following issues were diagnosed and corrected in the case study, prior to re-commissioning of master controls:
   - The variable displacement controls on the 400 hp and 200 hp compressor are pneumatically controlled with a mechanical regulator, and not capable of being controlled by a PLC. We bring this up as the main reason we believe that the master control system was turned off. These pilot valves can be manually adjusted to overlap in the master controller pressure range and can malfunction, wreaking havoc on remote controllability. This modulation control will be adjusted above the master control set point. The inlet modulation point will be set even higher than that, but still within the maximum pressure capacity of the compressor and motor.
   - The variable displacement controls on the 200 hp were set so low that the compressor never developed 100% flow. It ran at 50% flow or off. That will be adjusted up, above the auto control setting.
   - The inlet valve on the 200 hp compressor would not close. When the compressor tried to unload, the blow-down valve vented the sump, the inlet valve mechanism moved to the closed position, but the inlet valve itself did not close. Thus, the compressor delivered somewhere between 25-40% flow when it was supposed to be fully unloaded. The displacement controls were stuck at 50% and the blow-down valve wide open. This will be repaired.
   - We tested one of the 150hp in modulation control, and the pilot valve would force the compressor to run 0%/100% back and forth. It could not even control the modulation valve in a stable manner. All electro-pneumatic components on the two older (150 hp) compressors will be replaced.
   - Motor maximum current was an issue, so we trimmed the top end by permanently adjusting the variable displacement controls to trim capacity by about 6% and current by about 4%.
2. Modify and test fixed-speed compressor controls for proper remote control: The following changes are recommended. All of these had been done prior in our case, but needed to be verified prior to going into remote.
   - Two-position local/remote switch at each compressor, or controller set for "remote" control.
   - Remote start and load, and feedback for standby, running, and alarmed. These can either be with relay dry contacts or with bits on the communications network.
   - Verify that remote load and start work prior to going into full auto. We installed simple two-position switches that mimicked the control system for testing. Verify that motor current/power comes up to the full load range when remotely loaded, and drops to the no-load range when remotely unloaded.
3. Select the VFD properly.
   - We recommend a line filter to eliminate noise reflected back to the customer's electrical system.
   - Include interface controls and PID board. The minimum interface is start/stop and pressure set point. The minimum feedback is current, speed and alarm.

"If the VFD retrofit project is lower cost, better integrated, and more reliable than a new VFD compressor project, it should be considered as a viable option."

— Tim Dugan, P.E. President, Compression Engineering Corporation

MEAT PACKAGER RETROFITS A COMPRESSOR WITH A VFD AND MASTER CONTROLS

- Select a constant-torque VFD. Positive displacement compressors are constant torque, actually slightly increasing in torque at lower speeds due to slip. Some VFDs are designed for variable torque applications like fans and centrifugal pumps. A constant torque VFD will handle higher current at low speed.
- Select a VFD that isn't just the lowest cost and is locally supported.

4. Install the VFD properly.
   - Enclosure and ventilation issues. VFDs in dusty environments do not do well. They might need to be located in a clean MCC or enclosed properly (dust-proof with cooling fans).
   - Distance from motor to VFD. Special wiring might be needed.
5. Motor issues to consider:
   - If the motor is TEFC and/or in a hot area, we recommend improving cooling and installing a motor RTD and alarm.
   - Check motor suitability for VFD operation. Some motors do well running on a VFD and some don't. Consult your motor supplier.
   - Install a shaft-grounding brush or ring on the motor to prevent eddy currents being induced in the bearings and premature bearing failure.
6. Control the VFD itself properly.
   - Consider compressor starting and stopping the compressor through the VFD directly. It can be either done through the existing starter in-line with the VFD or with the VFD itself. However, fewer components is simpler.
   - Give the VFD a remote pressure set point from the master controller. Let it control pressure on its own PID card and transmitter.
   - Locate the VFD transmitter at the same location as the master controller transmitter.
   - Integrate all useful VFD operational data into the master controller. At minimum, current (for running and overload condition) and speed (for control of other compressors) is needed.
7. Test the VFD compressor prior to being master-controlled.
   - Min and max speed operation. Are all temperatures, current/power and pressure in allowable and expected range.
   - AC current into drive should be roughly 50% linear with speed. Power factor will drop, so it might be as high as 60%. Current to motor needs to be within motor service factor. Overloads might need to be adjusted.
   - Oil temperature differential should not change a lot. The oil flow will drop the same percentage as the heat rate. Excessive differential is not good, indicating low oil flow.
8. Test VFD compressor controls in local control: Make sure the gains and timers are set correctly on the PID board, particularly the proportional control settings. The pressure and speed should be stable within about 2 psi of set point with varying load.
9. Program master controller for "target" algorithm: This is an algorithm that maintains the "base-load" compressors (all but the VFD) in a pressure differential that encompasses the VFD range, using the VFD set point as the "target". See my article http://www.airbestpractices.com/system-assessments/compressor-controls/compressor-sequencer-problems-and-solutions for more information on target sequencers.

In summary, we believe that some projects are best engineered using a VFD retrofit. This is not a majority. However, since it is usually neglected, we recommend it be looked at during the planning phase. If the VFD retrofit project is lower cost, better integrated, and more reliable than a new VFD compressor project, it should be considered as a viable option. BP

For more information, contact Tim Dugan, P.E., President, Compression Engineering Corporation, tel: 503-520-0700 or visit www.comp-eng.com

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Ingersoll Rand R Series 5-15 hp Compressors

Ingersoll Rand extends its R-Series line of compressed air solutions to include small rotary compressors with V-Shield™ technology to reduce leaks and improve reliability.

Built on a common platform, the new R4-11kW compressors are available in 4-11 kW (5-15 hp) with flows 8.1 cfm – 57.5 cfm and pressures up to 200 psig on fixed speed units and 145 psig on variable speed drives. The R4-11kW models will be available for order in December 2014 through Ingersoll Rand representatives.

"The compact design of the R-Series makes it the ideal workplace compressor with a 20 percent reduction in footprint and sound levels as quiet as a dishwasher," says Jason Grizzi, channel marketing leader, Ingersoll Rand Compressed Air Systems and Services in North America.

V-Shield™ Technology Makes the R-Series More Reliable

With the application of V-Shield™ technology, the leak path and connections on the R-Series compressors have been reduced by more than 15 percent. V-shield™ technology ensures all critical fittings are secured with o-ring face seals in a method that is nearly free from distortion. Leaks are virtually eliminated and performance isn't sacrificed, regardless of how many reconnections are made. Leaks are also reduced by the use of polytetrafluoroethylene (PTFE) braided, stainless steel hoses for all oil-carrying lines.

Other advancements on the R4-11kW increase reliability and ease-of-use, including:

- A totally enclosed fan-cooled (TEFC) motor that has a premium IE3 efficiency
- A simple design with fewer components, reducing maintenance
- Large, convenient electronic controls and a digital output display to support easier programming and operation

Tri-Voltage Motors Plus Total Air Systems Create a Plug-and-Play Solution

R-Series fixed speed compressors come standard with tri-voltage motors that adapt to the supply voltage, while variable speed motors come in multiple voltage options, allowing for more flexibility when configuring the system. An improved, leak-free, next-generation airend features an integrated separation system to optimize air and oil separation for peak air quality.

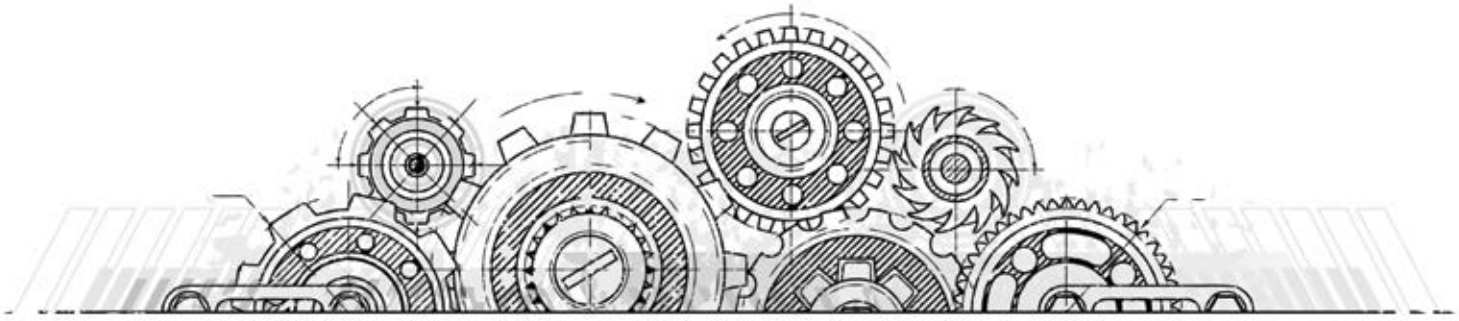
All R-Series units are available as fixed and variable speed units that can be configured with integrated dryers as a Total Air System (TAS). Each TAS unit comes with high-performance dryers, a three-in-one heat exchanger and an independent fan circuit to consistently generate dry, clean air.

"When customers select our Total Air System configuration, the R-Series from Ingersoll Rand is a complete plug-and-play solution that, as a standard offering, generates the cleanest, driest compressed air right out of the box," adds Grizzi.

Easy-to-Use and Ideal For Compact Workspaces

An innovative new design vertically stacks the drive components of the R4-11kW, reducing the equipment's footprint by 20 percent and providing easier access to the components when maintenance and service are necessary. To further optimize its performance in limited workspaces, the drive components are mounted on an Ingersoll Rand vibration isolation system reducing noise pollution and vibration.

Visit www.ingersollrandproducts.com for a complete list of specification for the Ingersoll Rand R4-11kW fixed and variable speed compressors.



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About Ingersoll Rand

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GfG RAM 744 In-line CO Monitor

The RAM 744 AutoCal® from GfG Instrumentation is a continuous in-line CO monitor with low maintenance, and a dependable, long-life electrochemical sensor. It can be wall mounted or used as a fully portable compressed air monitoring system for up to 8 users.

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New Festo SDAT Position Transmitter for Actuators

The new SDAT-MHS T-slot programmable position transmitter from Festo provides the same functionality as position transducers and mechanical potentiometers at a significantly lower price point. These new sensors offer OEMs a flexible solution for sensing the position of pneumatic cylinders. By sensing the magnetic piston, cylinder position can be transmitted to the PLC with repetition accuracy of 0.1 mm.

The five sizes of the Festo SDAT-MHS correspond to the most commonly used strokes of Festo pneumatic cylinders. The SDAT-MHS detects complete strokes without projecting beyond the end of the cylinder, including full stroke length and end position sensing. In addition to analog position data, the SDAT-MHS also features a programmable digital switching output that can replace an existing cylinder switch.

Analog current output, digital switching output, and IO-Link are combined within this sensor. Using traditional analog and digital inputs the user can see current analog cylinder position as well as one digital switching output that is freely programmable to give normally open or normally closed cylinder switch, window comparator, or hysteresis comparator modes. Users with IO-Link gain three additional switching outputs as well as the opportunity to program the switch through a convenient graphic interface.

Key specifications of the SDAT-MHS include:

- Sensing ranges 50, 80, 100, 125, and 160 mm
- Repetition accuracy 0.1 mm
- Linearity error Typically 0.25 mm
- Resolution 0.05 mm

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- Analog output 0…20 mA
- Mounting Inserted in the T-slot above the cylinder
- Protection classes IP65, IP68
- Port 30 cm cable with M8, 4 Pin plug

For more information on the low-price-point, versatile SDAT-MHS T-slot programmable position transmitter, call Festo at 800-993-3786 and visit http://www.festo.us.

About Festo

Festo is a leading manufacturer of pneumatic and electromechanical systems, components, and controls for process and industrial automation. For more than 40 years, Festo Corporation has continuously elevated the state of manufacturing with innovations and optimized motion control solutions that deliver higher performing, more profitable automated manufacturing and processing equipment.

New Siemens Inverter for Compressors

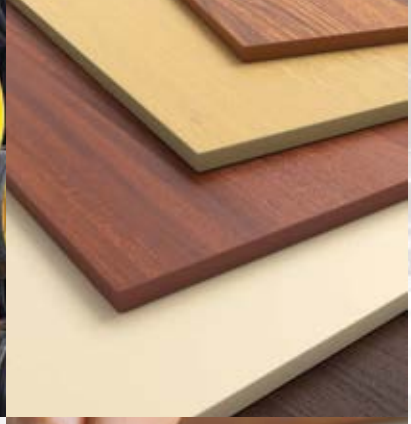
With the Sinamics G120C, Siemens Drive Technologies expands its product portfolio of inverters. This compact device has been designed for various applications in industrial environments. It is suitable for use with pumps, compressors and fans, as well as mixers, extruders, conveyor belts and materials handling machines. The target groups for this new line are production machine builders (OEMs) and distributors seeking to buy ready-to-install inverter units.

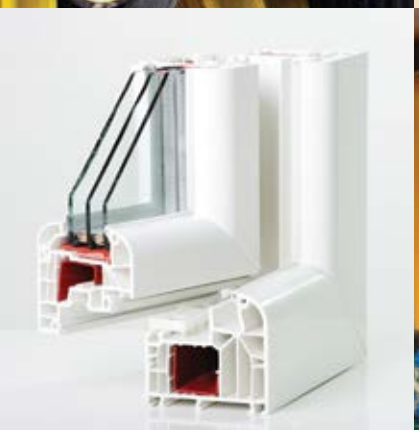
The Sinamics G120C, with a rated power range of 0.55 to 18.5 kW, sets new standards in its class with compact dimensions, fast commissioning times, simplicity of operation, ease of servicing and highly integrated functionality. The Sinamics G120C has been specially optimized for use in today's smaller control cabinets, mounted directly onto or positioned near production machines. These applications often require simple speed-controlled drives with a high power density in a smaller package.

This compact inverter offers one of the highest power densities in its class and can be mounted directly as a machine module, without sacrificing power. Compared to conventional systems on the market, the G120C requires up to 30 percent less space, with up to 40 percent higher power density. Quick-connecting plug-in terminals allow faster installation.

A port for inserting a memory card enables significantly faster inverter commissioning, as well. Instead of a blind cover, the operator panel may also be mounted for easier commissioning. It can also be parameterized using a PC, via USB interface. Standard protective coatings on the enclosure make the unit extremely robust in hostile or corrosive environments. This new Siemens inverter is designed for ambient temperatures of up to 60 °C (140 °F).

Each G120C inverter features the integrated Siemens safety technology branded "Safety Integrated" as standard, to ensure the drives can be stopped safely. The unit is equipped with a double safe input ex-works to control the STO (Safe Torque Off) function without the need for external devices. The G120C also offers users





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the established control procedures of the Siemens Sinamics platform, including sensorless vector operation, which enables precise, cost-effective control and more energy-efficient operation of induction motors.

For network communications, this new inverter supports the Profibus bus system from Siemens. It can also be directly integrated into other widely-used communications structures via USS field bus protocol, RTU mode and CAN bus. The ex-works default setting on each G120C enables direct application without time-consuming parameterization work on the field bus system.

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A division of Siemens Industry, Inc. (SII), the Drive Technologies (DT) Division is the world's leading supplier of products and services for production machinery and machine tools. With nearly 40,000 employees worldwide, the Drive Technologies Division posted worldwide revenues of $13.4 billion in fiscal year 2008. www.usa.siemens.com/drives

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