The Magazine for ENERGY EFFICIENCY in Compressed Air Systems

COMPRESSED AIR BEST PRACTICES

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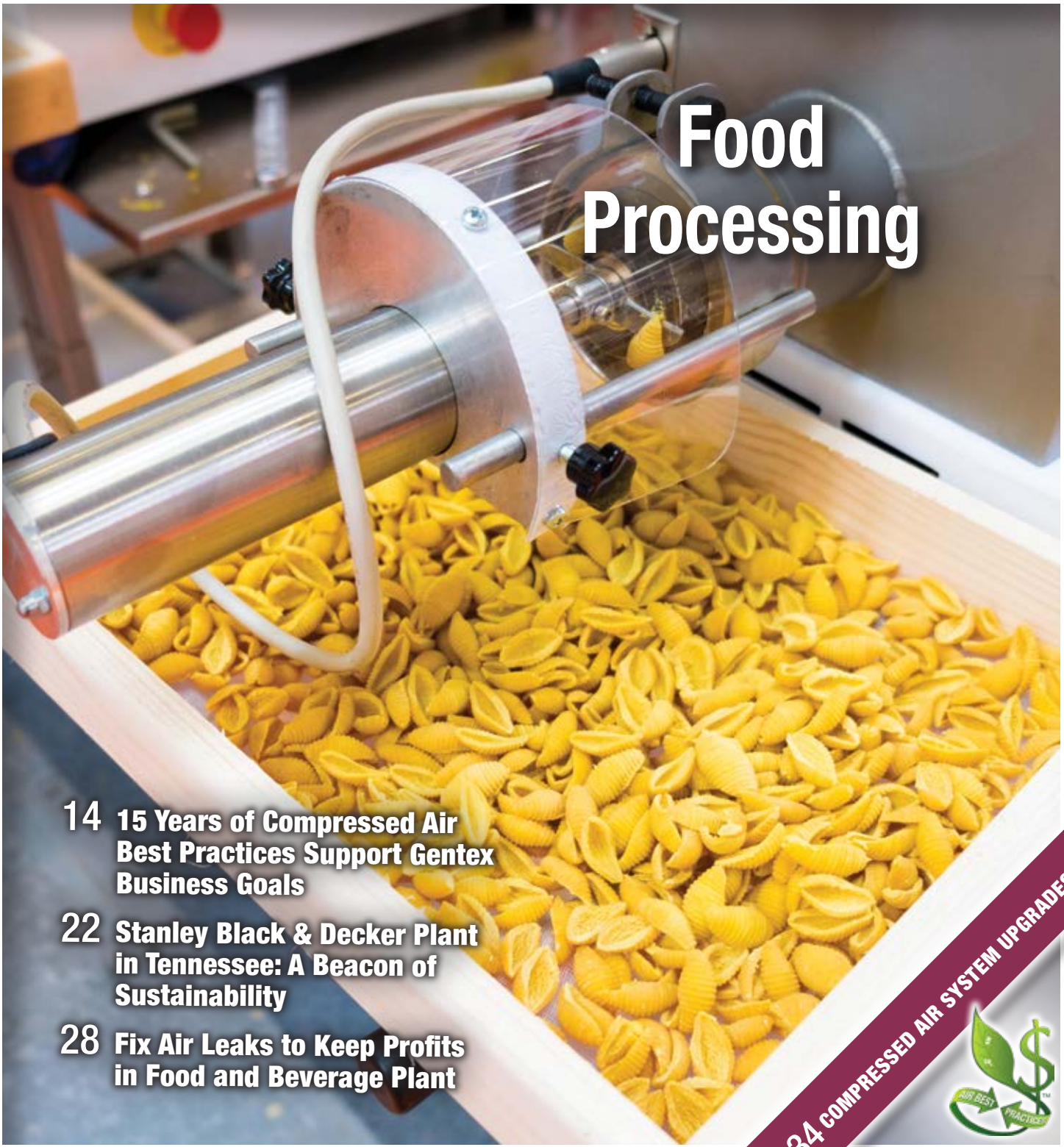
January/February 2020



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FEATURES

QUALITY, SAFETY & RELIABILITY FEATURES

PRODUCTIVITY, SUSTAINABILITY & ENERGY CONSERVATION FEATURES

COLUMNS

FROM THE EDITOR | Food Processing

Quality, Safety and Reliability

John Bilsky works for Gentex Corporation, a leading Tier-1 automotive supplier, and he has provided us with an article detailing his journey implementing "Compressed Air Best Practices." Understanding you don't get there overnight, they began the journey in 2004. This article provides an excellent timeline illustrating their progression over fifteen years and provides a road map for any firm.

Productivity, Sustainability & Energy Conservation

Stanley Black & Decker has gained widespread recognition for their commitment to social responsibility and sustainability. I visited their "pancake" air compressor manufacturing plant, in Jackson TN, and Environmental Health & Safety Manager, Lora Gans, allowed our own Mike Grennier to interview her. I hope you enjoy his article where she explains their ECOSMART™ Sustainability commitment. We learned they've reduced CO_2 emissions by almost 13,000 metric tons in 2018 and 2019 and their goal is to make over 100 operations carbon positive by 2030. Makes me want to go buy Craftsman, DEWALT, Bostitch and Porter Cable products!

Ron Marshall provides us with another excellent article titled, "Compressed Air System Upgrades Need Follow-Up Attention at Food Operation." It's full of the real-world situations in plants where operating conditions change, equipment ages, and optimized compressed air systems are suddenly no longer performing as designed.

Please remember to submit an abstract to be considered as a Speaker (receiving a FREE PASS) at the 2020 Best Practices Expo & Conference, located near Chicago O'Hare International Airport. Visit www.cabpexpo.com

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

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INDUSTRY NEWS

ELGi Acquires Michigan Air Solutions

ELGi Compressors USA, Inc., a subsidiary of ELGi Equipments Limited, a global supplier of compressed air solutions, today announced its acquisition of Michigan Air Solutions, one of the largest independent air compressor distributors in Michigan. This acquisition is an important step that ELGi has taken to expand its presence in the US and strengthen its position as a leading player in the global compressed air industry.

Michigan Air Solutions was established in 2009 and has served the markets in Michigan's Lower Peninsula with compressed air expertise, a wide range of products, and responsive after-sales support. Its product portfolio encompasses all compressed air needs from compressors, dryers, filtration, piping, vacuum pumps, blowers, and more.

"ELGi's acquisition of Michigan Air is a continuation of our strategy to invest in select, inorganic opportunities to gain presence in the North American market," said David Puck, President, ELGi North America. "With ELGi's robust product portfolio and Michigan Air's customer centricity, we are confident of building a strong foundation for market growth in the Midwest."

"On behalf of the Michigan Air team, I am excited for this new journey with ELGi," said Lisa Lewis, General Manager, Michigan Air Solutions. "We recognize ELGi's commitment to manufacturing products with best-in-class reliability and ownership cost. Matched to Michigan Air's proven customer service, we will create a formidable team."

Through this acquisition, ELGi gains access to a significant customer base and establishes a foundation for further expansion in North America. Michigan Air Solution's market leadership will provide ELGi with a significant territory from which to grow.

About ELGi

ELGi Equipments Limited is a leading air compressor manufacturer with a broad line of innovative and technologically superior compressed air systems. ELGi has earned worldwide distinction for designing sustainable solutions that help companies achieve their productivity goals with low ownership cost. ELGi offers a complete range of compressed air solutions from oil-lubricated and oil-free rotary screw compressors, oil-lubricated and oil-free reciprocating compressors and centrifugal compressors, to dryers, filters and downstream accessories. The company's portfolio of over 400 products has found wide application across industries. For further information on the organization and its products, please visit www.elgi.us.

Atlas Copco Has Acquired WestRon

Atlas Copco has acquired WestRon Group of companies. The Group is focused on sales, installations and service of small industrial compressors and blowers. WestRon is located in Calgary, Alberta and has 26 employees. The Group also has branches in Ontario and British Columbia.

WestRon's main focus is servicing and selling compressors and equipment to the general industrial manufacturing industry. "Extending our service offering is a part of our strategy to grow our presence in this important region," said Vagner Rego, Business Area President Compressor Technique. The purchase price is not material relative to Atlas Copco's market capitalization and is not disclosed. WestRon will operationally become part of the Compressor Technique service division.

Atlas Copco Compressor Technique

At Atlas Copco Compressor Technique, we team up with our customers to turn industrial ideas into smart connected air and gas solutions and leading edge compressed air technology. Our passionate people, expertise and service bring sustainable value to industries everywhere.

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 37000 employees. Revenues of BSEK 95/9 BEUR in 2018. For more information: www.atlascopcogroup.com.

WestRon is located in Calgary, Alberta and has 26 employees.

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INDUSTRY NEWS

New Website for VPInstruments

VPInstruments proudly presents its improved website: www.vpinstruments.com. The website of VPInstruments, developer and supplier of energy management solutions, has been a dynamic forum that keeps changing constantly. Now the website is significantly faster, user-friendly and more modern.

In particular, the layout for both the desktop version and the mobile version is a big difference. Thanks to the new and simplified structure, navigation and finding the right information has been greatly improved.

Moreover, we have now a dedicated place within the website to share interesting information with our distributors and end customers, including eBooks, articles, webinars and videos.

Now, customers can find the correct information faster and easier. Furthermore, the new website is ready for upcoming trends and even more expansions!

About VPInstruments

VPInstruments offers industrial customers easy insight into energy flows. We believe that industrial energy monitoring should be easy and effortless, to enable insight, savings and optimization. VPInstruments' flow meters are calibrated on state-of-the-art calibration facility. Our calibration equipment is maintained under our ISO 9001 Quality Management System and is traceable to National Standards.

VPInstruments' products are recommended by leading energy professionals worldwide 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.

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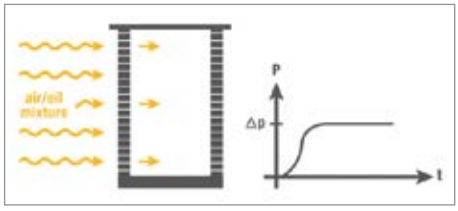
INDUSTRY NEWS

BOGE Releases White Paper on Spare Parts and Maintenance

At first glance, it seems obvious: using generic spare or maintenance compressor parts can help reduce costs. However, what might originally seem like a more economical alternative very quickly proves itself to be false economy. Only by using original parts tried and tested by the manufacturer can you guarantee optimum function of a compressed air system, says German compressed air company BOGE: system maintenance periods set by the manufacturer can be reached, and service life and reliability are increased. Energy consumption remains at a constantly low level – and we shouldn't forget that the energy costs over the entire life cycle of a compressor make up around three quarters of its overall costs.

Purchase costs, maintenance and spare parts for a compressed air system are minimal in comparison to its energy costs, which is why compressed air expert BOGE considers energy efficiency its main priority. This energy efficiency can only be achieved if all the components in a system are optimally designed to run together and spare parts are changed were necessary and the entire system undergoes regular maintenance. If spare parts and wearing parts do not fulfil manufacturer's specifications to perfection, the system will use more electricity, deliver less free air and may even become damaged. This risk must be taken into account when selecting oil separators, air and oil filters and compressor oils.



Too fine filter material in the oil separator achieves high separation rates, but also high-pressure losses.

For everything you need to know about original parts, BOGE has put together a new White Paper which can be downloaded from www.boge.com/en/whitepaper.

About BOGE Compressors

BOGE America is the USA based America's subsidiary of BOGE KOMPRESSOREN Otto Boge GmbH & Co. KG based in Bielefeld, Germany. Whether for centrifugal compressors, screw compressors, high-pressure piston compressors, scroll compressors, controls, air treatment equipment, complete systems or individual devices, BOGE meets the most diverse requirements and highest standards – in a precise and customer-oriented manner. BOGE solutions are used by all sectors of industry to supply compressed air for a wide range of manufacturing processes. The USA Operations of BOGE America stocks the various technologies of high-quality compressors and spares for immediate support to needs. Compressed air systems are designed, sold and serviced through a dedicated network of over 50 distributors in North, Central, and South America. The USA Operations is also the "Center of Excellence" for Technical Trainings for our partners to ensure Top Level Support for the consumer. For more information, visit www.boge.com.

Cooperation of Sauer Compressors and TMC

Sauer Compressors and TMC Compressors of the Seas are entering into a strategic partnership. Thus, they are further expanding their market position as suppliers for compressor solutions for worldwide shipping and offshore applications. In the future, they

Strategic partnership for compressor solutions at sea.

will cover the entire product portfolio for all compressed air and gas applications at sea.

With their new partnership, the two companies combine their strengths: the German medium-sized Sauer Compressors group as the world's leading supplier of starting air compressors and the Norwegian manufacturer TMC, a leading supplier of screw compressors in the maritime sector. For the various compressed air and gas applications on board sea-going vessels, both compressor types are required in many cases and are now available from a single source.

"TMC and Sauer will continue to offer our respective products on a stand-alone basis, but this agreement enables us to cooperate more closely and cost-effectively, which could be highly beneficial for both yards and shipowners. We are delighted to team up with Sauer Compressors and its renowned range of German-engineered piston compressors," said Per Kjellin, CEO of TMC.

Harald Schulz, Managing Director of Sauer Compressors, said, "Customers can now approach one contact person who has all the technical expertise. The combined portfolio enables very fast and efficient order processing."

As an established supplier for the international shipping industry, Sauer Compressors offers

INDUSTRY NEWS

a wide range of modern as well as economical piston compressors that meet the industry's high-quality requirements. Especially the 3-stage air-cooled compressors of the Passat and Levante Series convince with maximum reliability, low temperatures as well as low installation and maintenance costs. Common applications include starting diesel and gas engines in marine, industrial and offshore applications.

The screw compressors by TMC are also specially developed for the marine and offshore sector. Like Sauer Compressors, TMC has an international sales and service network that supports customers anytime and anywhere.

About Sauer Compressors

Sauer Compressors is a medium-sized German group of companies with twelve international subsidiaries. The company was founded more than 130 years ago and has over 80 years' experience in compressed air technology. Today, it focusses on the development, production and sale of medium-and high-pressure compressors for applications in commercial shipping, industries, the petroleum industry and the defense sector. The four product lines SAUER, HAUG, Girodin und EK focus on specific fields of application. The SAUER line comprises oil-lubricated high-pressure compressors for a wide variety of applications, while HAUG stands for oil-free and hermetically gas-tight compressors. The Girodin and EK lines offer special compressors for the naval market. Sauer Compressors' modern reciprocating compressors for the compression of air and various gases reach pressures of 20 to 500 barg. Besides standard products, it offers customized solutions for individual customers, OEMs and companies that operate on a global stage. With a global network of agents and representatives, Sauer maintains close proximity to its customers. By supplementing the compressor range with high-quality accessories, engineering services, assembly and service concepts, Sauer offers system solutions right up to complete turnkey installations. For more information, visit www.sauercompressors.com.

CS Instruments North Moves to New Headquarters

CS Instruments is pleased to announce that they continue to grow. This steady growth also creates site-specific challenges from time to time. One of them was their previous office

CS Instruments North Germany Office.

in the North of Germany that has become too small and was "bursting at the seams." So, they had to find a solution. Shall they rent some additional rooms, or shall they outsource some departments? Finally, the decision was made: They will invest in the Northern office and in the future by planning a completely new company building. This decision enables them to look forward to the future challenges in a more economic and energy-efficient way.

Now – after one-year construction time – they are ready to move to their new company building in Harrislee with a space of 2300 m². The building was raised according to KfW Effizienzhaus 55 (= Development Loan Corporation Efficiency House 55) Standard, a 99 kWp photovoltaic system on the company's roof provides the building with sustainable electricity.

You will find them at the following address:

CS Instruments GmbH & Co KG, Gewerbehof 14, 24955 Harrislee, Germany

The phone and fax number as well as your contact persons will of course stay the same.

They are very proud of their new company building and they are looking forward to welcome you in their new office rooms at the next opportunity.

About CS Instruments

For years CS Instruments has been one of the worldwide leading manufacturers of measuring technology for compressed air and gases. Our long-term experience in production, supply and drying of compressed air contributes to research, development and production of innovative portable and stationary measuring instruments. For more information, visit www.cs-instruments.com.

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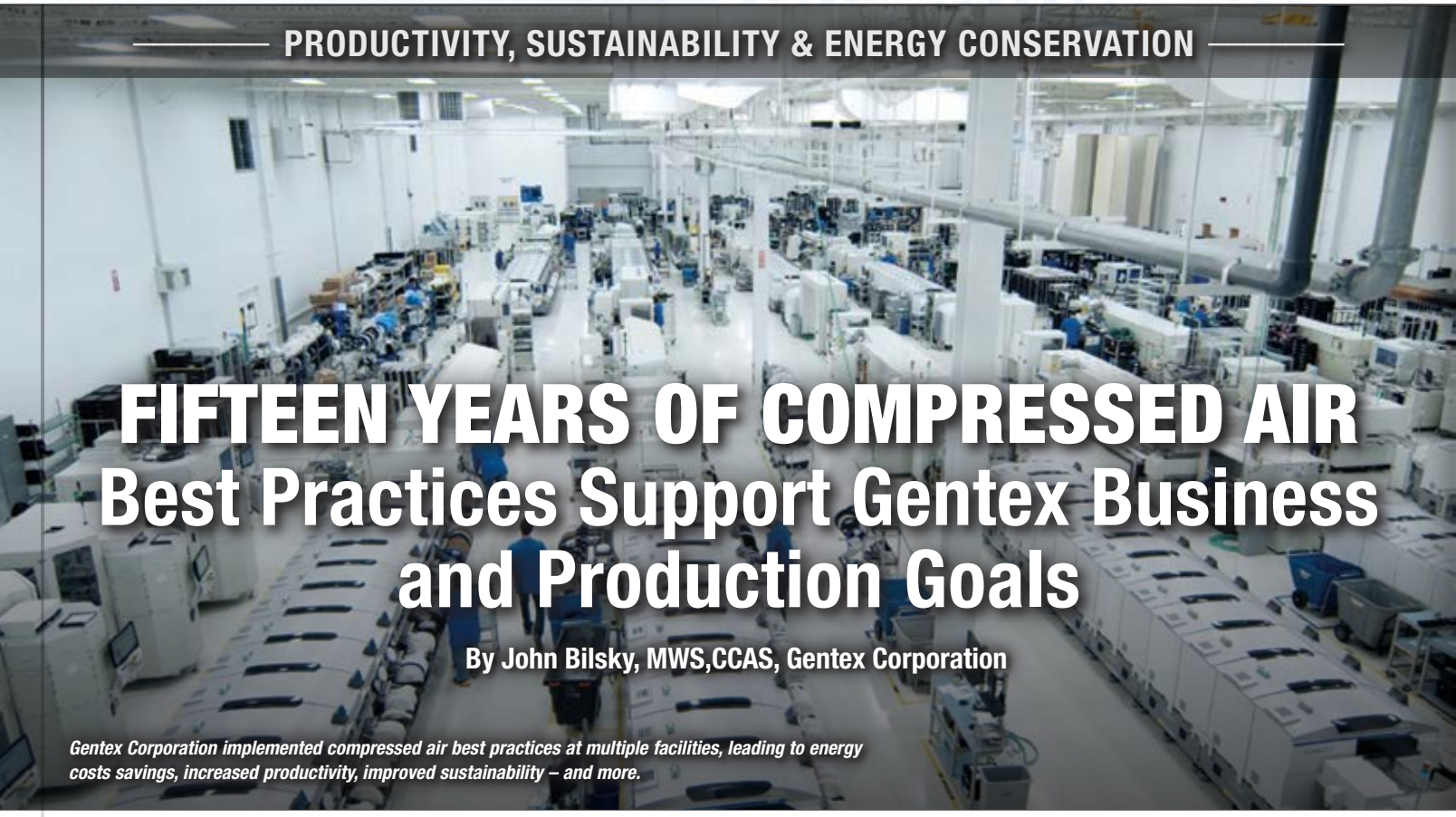

FIFTEEN YEARS OF COMPRESSED AIR Best Practices Support Gentex Business and Production Goals

By John Bilsky, MWS,CCAS, Gentex Corporation

Gentex Corporation implemented compressed air best practices at multiple facilities, leading to energy costs savings, increased productivity, improved sustainability – and more.

While many businesses strive to plan, install and maintain a compressed air system that fulfils the company's specific needs, I've found that implementing compressed air best practices not only accomplishes specific goals, but also results in time-tested advantages that aid in the overall business and production goals of the organization.

Throughout the last 15 years, like many companies, who have been following the growth and change in the compressed air industry, using compressed air best practices will contribute to the success of each compressed air system.

For me, the specific goals these practices must meet are to supply production with reliable pressure, flow, and clean dry air. Broader goals include saving money for the company, easing the burden on the environment, and most of all never shutting down production.

This case study is 15 years in the making and documents the changes over time that have been made to our systems in keeping up with compressed air best practices at our organization as a Tier-1 automotive supplier, fire protection device manufacturer, and producer of dimmable aircraft windows. Our compressed air systems support all aspects of manufacturing, as well as OEM-manufactured components such as microchips, circuit boards and special glass processes and corporate lab services.

This is why we strive to use the best and most advanced technologies available for our compressed air systems, from air compressors to auxiliary equipment.

I started implementing this new compressed air best practices approach in 2004. When new production lines and processes were installed, the tools to measure and help maintain the compressed air supply and demand side of

> "Paired with compressed air best practices, we can look forward to another 15 years of systems that are energy efficient, reliable, and easier to maintain."
>
> — John Bilsky, MWS,CCAS, Gentex Corporation

each system were also added. As the company grew so did needs of each system. What follows is a timeline to illustrate this progression.

Year 2004

- All future air compressor systems that are production-critical must have a planned air compressor unit as a backup only. This air compressor is off except for maintenance to main system air compressors, or if a fault occurs with an on-line machine. The backup units are also rotated with the main system units.
- PSI gauges added on all air compressor equipment, filters, and headers in three buildings (2004). Currently working a new Plant 10 building header (as of 2019).
- Flow meters added to main air compressor outlet headers.
- Compressed air audit completed as required to keep up with growth rate.
- Pressure transducers added to main compressed air header with alarm/paging capability.

Year 2005

- All production lines must have a visible cfm flow meter on each production line supply header.
- Use 45-degree elbows to install air compressors into main header.
- Pressure transducers added to far end of building near end use with alarm/paging capability to measure pressure drop and diagnostic information.
- Built a portable flow meter on a pipe with gauges to prove out "point-of-use equipment."

Year 2006

- Installed first oil-flooded Variable Speed Drive (VSD) air compressor at Plant 4, saving significantly in electrical costs annually over fixed-speed air compressors and more efficient pressure stabilization.
- Moving forward, if applicable, all systems are required to have a VSD air compressor.
- Added centrifugal water separator before air dryers because there was no room for a wet tank.

FIFTEEN YEARS OF COMPRESSED AIR BEST PRACTICES SUPPORT GENTEX BUSINESS AND PRODUCTION GOALS

Testing of flow controllers has been a key part of Gentex's ongoing effort to implement best practices.

Year 2007

- Installed second VSD oil-flooded air compressor in Plant 3. Now saving substantial electrical cost annually and smoothing out the pressure output.
- First building flow controller installed to Plant 3 demand side of the compressed air system.
- Incidentally, despite popular belief at the time, using a VSD air compressor (and a flow controller plumbed after the dry tank in the main header) did not work out so well for the organization. As a result of this discovery, the flow controller was removed, thus beginning the consideration of a central controller.
- Also, the appropriate size air compressor was installed to overcome control gap.

Year 2008

- Added oil and water indicators to all dry tanks to alert the facilities department to possible contaminants, and thus, protecting production processes. All were – and continue to be – inspected and replaced at regular intervals.
- First compressed air leak audits performed for all compressed air systems and associated plumbing distribution loops. For compressed air alone, this cost savings is unparalleled for our organization. This includes

43 audits across multiple plants. This process is completed annually and as of about 2017 these audits qualify for a rebate from the local power company, which makes the audit cost less. Documented leak audits can and have led to substantial energy cost savings.

- Added the testing of flow controllers instead of standard regulators on two production lines in Plant 2 to respond for faster flow changes, making pressure more stable and reducing pressure drop. It continues to be successful.

Year 2009

- Began point-of-use analysis and documentation of pressure and flow requirements to over 250 pieces of equipment. The goal was to lower the plant pressure without faulting out a production line. This was successful as the plant was taken from 125 to near 100 psi without a single end-use component fault. Lowering the operating pressure will allow less money to be spent on energy and help reduce the company's carbon footprint.
- Plant 5 had the addition of a system flow controller. This installation dropped the demand side of the compressed air system to 80 psi. As mentioned, lowering power consumption helps with sustainable goals that are becoming more prevalent in the compressed air industry. We also added a 1,000-gallon compressed air storage tank. This eliminated the need for a larger air compressor, in turn, saving equipment and electrical costs based on dropping the pressure.
- Zero loss drains implemented for all condensate drains. For critical locations, I plumbed two in parallel in case one failed. This feature saves money as no compressed air is wasted when the air compressor condensate is discarded to the drain.

Year 2010

- Installation of a third VSD oil-flooded screw air compressor in Plant 6, creating a more stable pressure band. Production currently has a 100 to 88 pressure band to run the four machines. The variable speed unit maintained a tighter pressure band while the base machines came on as needed. (The average psi band moved to 97-93 psi.)
- The backup machine of this system can be called upon five to eight psi sooner than the current pressure band control method.
- Standardized all compressed air plumbing to non-rustable piping.

Year 2011

- Installed a fourth VSD oil-flooded screw air compressor in Plant 1. Using the VSD unit is saving electricity and resulting in a smoother pressure band for the third-shift operation.
- Central controllers and data acquisition equipment purchased and installed for compressed air systems at Plants 1, 2, 3 and 4. The central controller reduced the pressure band depending on the building (worst case) from 30 to 3-4 psi.
- Kilowatt (kW) meters required on all air compressors moving forward in addition to central controllers, which monitor power consumption/amp/voltage and alarm any abnormalities to the end-user.

FIFTEEN YEARS OF COMPRESSED AIR BEST PRACTICES SUPPORT GENTEX BUSINESS AND PRODUCTION GOALS

- The central controller data allowed faster root cause analysis and saved downtime and maintenance costs. The software used trends every three to five seconds.
- Compressed air, reverse osmosis, and Nitrogen (N_2) flow data charts became available for facilities viewing.
- Continuous diagnostics of compressed air system includes air compressor faults, dryer faults, inlet and outlet filter differential/air flows/kW/dewpoints/cooling water, air and oil temperatures. All are now monitored and can alarm out to end-users.
- Continuous in "in-house" system energy audits began. The central controllers and data acquisition equipment allowed us to have compressed air and energy audits performed in house 24 hours/day, seven days a week. There is no need to wait for contractor support for auditing.

Gentex added larger compressed air storage tanks to its operations for increased compressed air storage.

As a best practice, Gentex began to install zero loss drains with alarm outputs on its compressed air systems. Shown are drains with different elevations.

- All current (and future) compressed air, purified water and nitrogen flow meters were all added to the new data logging system with alarm capabilities via 4-20 milliampere (mA) output through the company's Intranet. Overuse of air began to be managed from an operator's desk computer. System reports and graphs allow processes to be monitored more closely. The new detailed data minimized wasted compressed air, nitrogen and purified water by alarming at high flow rates. As such, it saves on energy costs each year.
- Plant 3 is now using a central controller to operate the compressed air system. The pressure is stabilized at the desired 90 psi for three shifts, which is saving energy over the previous pressure band control that swung from 100 to 125 psi.
- More precise control of the air compressors would allow for energy savings on non-production days.
- All data points were to have alarm options.
- Addition of desiccant heated blower purge desiccant dryer in Plant 1 for electronics production. This improved microchip and circuit board production by adding ultra-dry air to support production.

Year 2012

- Upgraded Plant 6 to larger fifth VSD air compressor and moved current VSD unit to storage for use at a later date. Added a central controller with all the options previously described.
- Added larger compressed air storage tanks; wet and dry side. All tanks are required to be powder coated on the

interior and exterior. Wet tank volumes should be less than dry side tank volume(s).

- Changed to thermal mass compressed air dryers when new or upgrades are needed making the drying side of the system more efficient.

Year 2013

- Upgraded Plant 2 with sixth VSD air compressor that was stored from Plant 6 upgrade of 2012.
- Installed first "oil-free" VSD dry screw air compressor in Plant 8. Making this the seventh VSD air compressor. in creating a new standard for oil free air. A typical oil-flooded rotary screw air compressor could consume one half gallon of oil every 2,000 hours, which means one must rely on filtration to remove the oil from the air. This possible oil contamination is 99% eliminated with this type of screw air compressor as there is still oil mist coming from the gear box breather assembly.
- Added another central controller for the compressed air system and data management.
- Began to install zero loss drains with alarm outputs that would create email and texting alerts. A factory programed drain fault will shut down an air compressor in 10 minutes. This condensate system has a primary bank and a secondary bank. If a primary drain fails then an alert goes out, and automatically a secondary drain picks up the condensate and sends it to drain. The compressed air system was programed to look at the secondary drains, which gave the facilities team time to fix the primary drain before the air compressor shuts down as required.

Year 2014

- Installed two oil-free centrifugal air compressors in Plant 7. As described above, possible oil contamination is 99% eliminated with this type of unit. As with the dry screw air compressor this also has a breather assembly that can mist an oil vapor.
- Installed another central controller for air compressor and data management.
- Began using a compressed air testing lab to confirm air quality.
- Began installing Y fittings for air compressor header hookups.

Year 2015

- Upgraded Plant 2 with two oil-free centrifugal air compressors.
- This upgrade enabled us to hook four buildings together with the four centrifugal air compressors.
- The four buildings went from seventeen 100 horsepower (hp) units to four 450 hp units. This lowered compressed air system maintenance costs for the four-building system. More importantly, it reduced the oil contamination risk to critical processes.
- Added a flow controller to an individual process in Plant 1 production line, reducing pressure drop and greatly improving pressure stability.

FIFTEEN YEARS OF COMPRESSED AIR BEST PRACTICES SUPPORT GENTEX BUSINESS AND PRODUCTION GOALS

Year 2016

- To improve diagnostic time, all new or retrofitted air drops to production lines and or separated processes required installation of a pressure gauge with a ball valve to isolate the gauge in case of repair, and when required, a scfm flow meter.

Year 2017

- Addition of one oil-free centrifugal air compressor at Plant 2 to maintain a backup unit to the four-building distribution system.

Year 2018

- Installed the first "no-touch or wear" centrifugal VSD air compressor with permanent magnet motor technology and active magnetic bearings in Plant 6. With this unit, all air compressor core components are integrated on a levitating shaft without any mechanical touch or wear. Previously a great deal of money was spent annually to maintain an oil-flooded unit; now it is substantially reduced (although it still needs air filters). Over a five-year period, there will be exceptional savings. There are no bull gear, impeller, motor bearings or oil seals to service. There are no oil filters to change and oil to discard. There is no oily condensate water to filter, and no oil leaks to fix or separators to replace. Eliminating the waste of used oil and the associated oil components going into landfills will help with sustainability measures. For the corporation's purposes, this was another big upgrade from other traditional air compressors.

Gentex installed one of the industry's first "no-touch or wear" centrifugal air compressors, which resulted in substantial costs savings.

Year 2019

- Began working with production maintenance and a leak audit (energy) company to scope individual production lines (over 200) for air and nitrogen leaks near production-critical processes. While our Facilities Group has been auditing the pipelines within buildings, sensitive end-use audits were not included prior to this year.
- Company-wide, over 88 zero loss drains are now in use.
- Upgraded Plant 2 robot cells to larger piping and flow controllers instead of traditional regulators. Pressure is very stable.
- Over 850 data points are now being monitored through eight central control systems. All inputs are manageable from an operator's desk.

Compressed Air Best Practices Pay Off

This 15-year case study can account for many cost saving initiatives. Not described in this article is the amount in electrical savings from better control changes, faster troubleshooting and repairs which creates less downtime.

Gentex will continue to look for new cutting-edge technology that can improve its processes and save money while lowering the carbon footprint. Paired with compressed air best practices, we can look forward to another 15 years of systems that are energy efficient, reliable, and easier to maintain. Whether it is a new install or a retrofit, other companies too can benefit from utilizing the best of compressed air practices. BP

About Gentex Corporation

Headquartered in Zeeland, Michigan, Gentex Corporation is a global, high technology electronics company that is vertically integrated in highly automated electronics, CMOS camera development and manufacturing, vacuum coatings, and glass bending and fabrication. It specializes in a broad spectrum of technologies and processes to deliver high quality products to the automotive, aerospace and fire protection industries. For more information, visit www.gentex.com.

About the Author

John Bilsky is experienced in engineering design/improvements and maintenance for compressed air, nitrogen, and water purification systems, including those involving reverse osmosis and deionized water. He also has in-depth knowledge of production, as well as management of capital projects. Bilsky serves as the Facilities Specialist at Gentex Corporation for Compressed Air, Nitrogen, and Purified Water, email: john.bilsky@gentex.com, LinkedIn: www.linkedin.com/in/john-e-bilsky-24715b10/.

All photos courtesy of Gentex Corporation.

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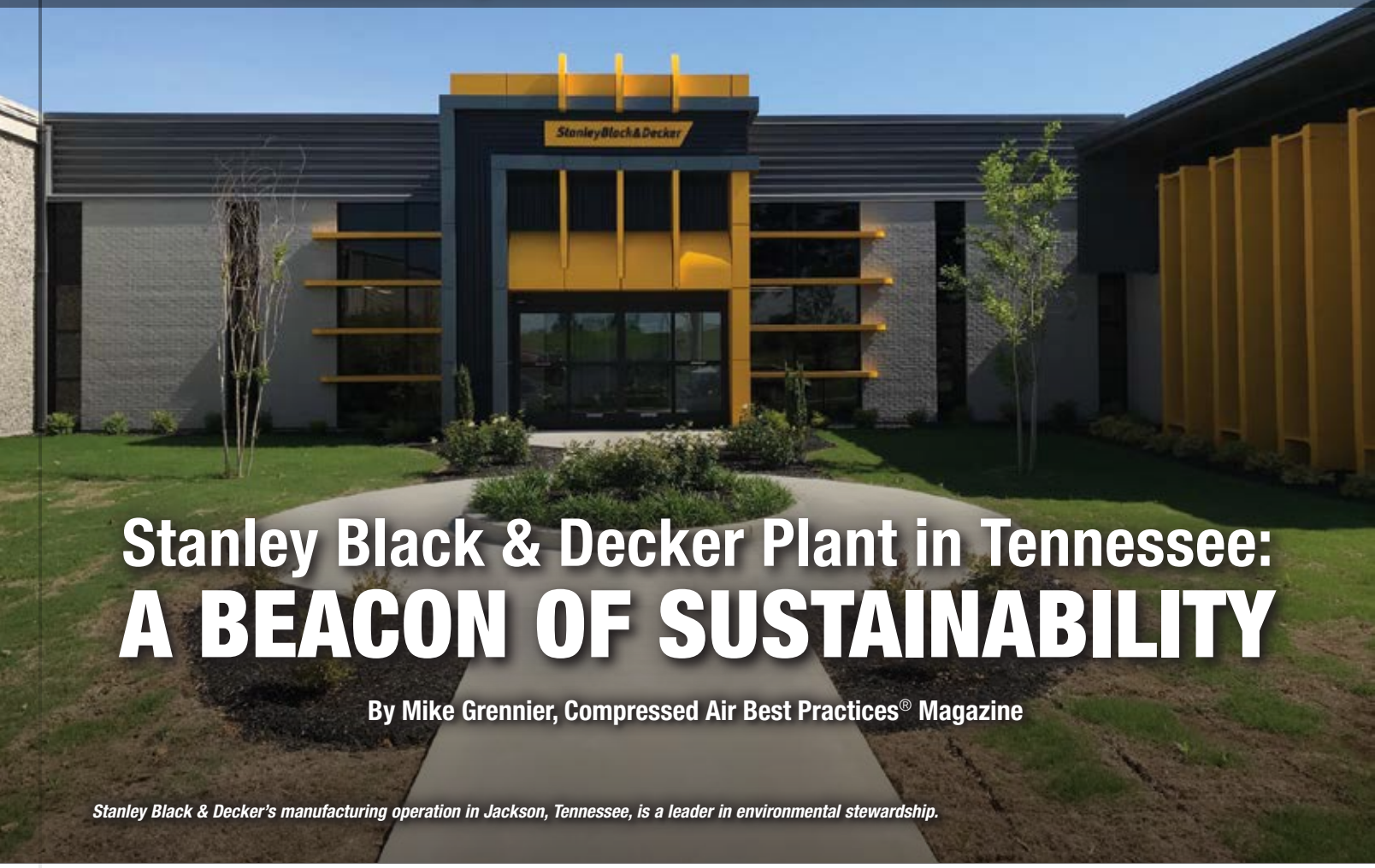

Stanley Black & Decker Plant in Tennessee: A BEACON OF SUSTAINABILITY

By Mike Grennier, Compressed Air Best Practices® Magazine

Stanley Black & Decker's manufacturing operation in Jackson, Tennessee, is a leader in environmental stewardship.

New Britain, Connecticut-based Stanley Black & Decker has gained widespread recognition for its commitment to social responsibility and sustainability – and with good reason: The company has reduced CO_2 emissions in 2018 by 8,840 metric tons and in 2019 it was on track to further reduce greenhouse CO_2 emissions by another 4,000 metric tons.

And its leadership continues. Stanley Black & Decker's goal is to make its more than 100 operations worldwide carbon positive by 2030, which means its carbon capture will be greater than its CO_2 emissions. All the while, achieving sustainable water use and reaching a goal of zero-to-waste landfill is equally paramount – across all operations.

Among these operations is the Stanley Black & Decker's manufacturing plant in Jackson, Tennessee. It serves as a sterling example of how a leader in environmental stewardship (www.stanleyblackanddecker.com) achieves its goal of being "a force for good." The plant has reduced energy consumption by 7.8% since 2015, which equates to a carbon footprint reduction of 45.5%. It has also reduced water

"Our commitment to sustainability is a corporate-wide effort and a plant wide-effort. We want the next generation to have the same or better experiences than we have now."

— Lora Gans, Environmental Health & Safety Manager, Stanley Black & Decker

consumption by more than 1.7 million gallons. Additionally, the operation became a landfill-free manufacturing plant in 2019 – meaning it no longer sends any waste to the local landfill. There are also substantial initiatives in the works, taking sustainability to an even higher level at the Tennessee operation.

"We have to ensure as we're manufacturing products that we're not doing anything to harm the environment during our processes," said Lora Gans, who serves as the Environmental Health & Safety Manager at the Jackson plant. "We're always paying attention to whether there is something we could be doing better."

Setting the Example for Others

The Jackson plant is a key operation within Stanley Black & Decker's Global Tools & Storage (GTS) business, which has established itself as the world's largest maker of power tools, hand tools, accessories and storage products for tradespeople and Do-it-Yourselfers.

With more than 800 employees on campus, the Jackson operation takes great pride in manufacturing hand-carry air compressors from start to finish under the leading brand names of Craftsman, DEWALT, Bostitch and Porter Cable. The plant also manufactures precision components, such as gears and shafts, used in a wide range of tools. The plant ships the components to other Stanley Black & Decker operations for final assembly.

The 450,000-square-foot manufacturing plant, which is ISO 9001:2015 and ISO 14001:2015-certified, employs 620 people. Remaining employees work at the operation's onsite 600,000-square-foot distribution center. The manufacturing plant is also expected to become ISO 45001:2018-certified. In 2016, Stanley Black & Decker named the Jackson operation a GTS Lighthouse Manufacturing Site. The designation means the plant serves as a beacon for other plants to emulate for innovative methods of production and environmental sustainability.

The ECOSMART™ Advantage: A Corporate-wide Commitment

One major component to Stanley Black & Decker's strategy is to create a more sustainable world through "ECOSMART™," a company-wide approach to product sustainability.

"ECOSMART is a philosophy that describes how we as a corporation embed sustainability in every single thing we're doing," said Gans. "And it's not just within our plants; it's embedded throughout our entire value stream chain. We not only want to improve our

Lora Gans, Environmental Health & Safety Manager, Stanley Black & Decker, Jackson, Tennessee, manufacturing plant.

STANLEY BLACK & DECKER PLANT IN TENNESSEE: A BEACON OF SUSTAINABILITY

operations but carry it over to our products and into the community."

ECOSMART is an integral part of the corporation's dedication to social responsibility. The pillars of Stanley Black & Decker 2030 social responsibility strategy are to empower employees and citizens to thrive in a changing world; innovate products that enhance the lives of people and improve environmental impacts; and to create a more sustainable world – and positively impact the environment through its operation. Plans call for achieving CO_2 reductions through ECOSMART projects, utility-specific programs, renewable energy generation initiatives and energy attribute certificates.

Stanley Black & Decker also uses science-based targets to quantify and measure its sustainability efforts and commitment to sustainability. This includes an ECOSMART Scorecard, which serves as a statistical record of its achievements using 2015 as a baseline for measuring success. The company's annual social responsibility and sustainability reports are available at https://www.stanleyblackanddecker.com/social-responsibility/annual-sustainability-reports.

Everyone Has a Role

The Jackson plant uses ECOSMART to help guide its path, while also employing a successful formula involving multiple elements that come together to allow the operation to achieve – and typically surpass – its sustainability goals.

One foundational element of success, Gans said, is the people who work at the Jackson operation and all of those who come into contact with it.

A Stanley Black & Decker employee tests a hand-carry air compressor at the company's plant in Jackson, Tennessee.

"Everyone is a part of sustainability," she said. "For example, it has to be the people on the production floor participating in the effort to reduce our waste and increase recycling. You need their buy-in and understanding, which makes it really important for us to communicate the entire program to everyone."

Achieving success in sustainability also involves partnering with organizations and companies dedicated to environmental stewardship, Gans said. As an example, the plant is an active member of the Tennessee Green Star Partnership (TGSP) program, which connects leaders in manufacturing sustainability in Tennessee looking to implement or improve efforts to save energy and reduce or eliminate pollution from air, water and/or land. The voluntary program also recognizes companies in Tennessee committed to sustainable best practices. (Read more about the program at https://www.airbestpractices.com/sustainability/energy-incentives/incentive-program-profiles/shining-spotlight-manufacturing-sustaina.)

"The program is extraordinary," Gans said. "We have the opportunity to link up with other Tennessee Green Star Partners and share our experiences and we can see how all of us can take the next step with different opportunities."

Another major factor in the Jackson plant's success is its ability to innovate and think creatively, which is especially important given the uniqueness of the operation.

"We're a very complex plant because we do both precision-machining of parts, while also assembling air compressors from start to finish. At the same time, some of our equipment is older and we have state-of-the-art robotics. We are very innovative in what we do and how we do it," Gans said, adding how the operation never stops thinking about ways to improve sustainability.

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Energy Savings Initiatives Take Off

Gans said innovation also means carefully assessing and implementing initiatives that save energy and deliver the best possible results. On that score, there are no shortage of successful projects at the Jackson plant.

One successful project implemented a few years ago is the plant's replacements of incandescent lighting with LED lighting. The plant also installed motion sensors on overhead fans used for comfort cooling. Both initiatives contributed significantly to enhanced energy savings.

More recently, the plant replaced a fixed-speed 400-horsepower (hp) rotary screw air compressor with two energy-efficient, fixed-speed rotary screw air compressors, one of which is rated at 200 hp and the other at 250 hp. The compressed air system powers production equipment and processes throughout the plant. In addition to air compressors the upgrade features an automated control system, which allows one unit to provide the majority of the compressed air needed throughout the plant, while the second machine only operates when needed to meet peaks in demand for compressed air. Additionally, the plant will soon install solenoid valves on production equipment to automatically shut off the use of compressed air when it isn't needed.

Another recent project involved the replacement of one 50-year-old 650-ton, water-cooled central chillers with a Variable Speed Drive (VSD) water-cooled chiller rated to deliver 330 tons of cooling. Unlike the old chillers, the new VSD chiller only generates the cooling water needed, when needed – in turn saving considerable energy.

Combined, the compressed air system and central chiller project allow the Jackson plant to reduce energy consumption by more than 200,000 kilowatt hours (kWh) per year, which equates to an annual CO_2 reduction of 1,414 metric tons.

Yet another energy-savings project in the works involves a waste-heat recovery project in the painting operation of the plant.

The painting process incorporates the use of gas-fired burners to warm water stored in holding tanks. Water is used to wash manufactured components before they're painted. Plans call for the installation of an air-to-water heat exchanger on the roof of the plant to capture waste heat from an oven used in the paint drying process. The heat exchanger will capture thermal energy that would otherwise exit through the flue stack and use it to warm the water in the tanks. The project is expected to save 141,000 thermal units of natural gas, resulting in a CO_2 reduction of 748 metric tons.

Gans said energy-savings initiatives – as well as any sustainability efforts – tie back to innovative and creative thinking.

At the Stanley Black & Decker plant in Jackson, Tennessee, hand-carry air compressor tanks enter an oven as part of the paint curing process.

"We often have to take a step back and think about what we're doing, how we're doing it by asking a lot of questions," she said. "It's not always easy, but it involves really thinking about the things we can do to protect the environment."

Millions of Gallons of Water Saved – and No More Waste to Landfill

Innovative thinking, combined with hard work, extends to the Jackson plant's progress in water conservation – and its achievement in totally eliminating waste sent to landfills.

To save water, the operation installed automatic toilet flushers and faucets throughout – and as a result – reduced water consumption by 1.7 million gallons. It also dialed back the amount of water used in washing components in the painting operation, saving 200,000 gallons of water without impacting production or product quality.

Another major achievement is the plant's designation as a landfill-free manufacturing site. The project, which began several years ago, involved the creation of numerous ways to recycle materials consumed in every aspect of the operation.

The landfill-free initiative requires ongoing education and relationship-building with recycling vendors, said Gans.

"We needed to educate our employees from the ground up," she said, adding how landfill reduction and recycling efforts also involves consistent communication and reinforcement.

In the meantime, Gans works closely with numerous recycling companies who are not only proven and qualified, but also share the same philosophies as Stanley Black & Decker.

"It requires a lot of research to make sure we're comfortable working with them and to make sure they're good stewards of the

environment. We really do our due diligence when it comes to vendors," she said. "We are very happy with the vendors we now partner with to achieve our goals."

Looking Out for the Next Generation

All of the Jackson plant's sustainability efforts are closely examined for how they can best support the operation's specific goals, while also being closely aligned with the corporate mission of Stanley Black & Decker.

"We'll do the footwork at the local level in terms of planning," Gans said. "If it's a capital project we'll then put together a proposal for corporate's approval to show the total cost, the energy or water savings to be achieved, and the payback period."

One unique proposal under consideration at the corporate level is for the Jackson plant to implement a major solar power initiative. Plans call for an energy company to install solar panels onsite at the facility. Additionally, the company will execute the project at no cost to Stanley Black & Decker. Instead, it will charge the plant for the solar-generated electricity supplied. The project is expected to provide the plant up to 40% of the electricity needed, which would allow it to offset the operation's CO_2 emissions by as much as 6,306 metric tons.

"For us to continue on our path toward success, we're going to need to do what we can to get us to the carbon-free footprint," Gans said, adding continued success also means thinking about the next generation.

"Our commitment to sustainability is a corporate-wide effort and a plant wide-effort. We want the next generation to have the same or better experiences than we have now. I'm proud to be a part of this effort," Gans said. BP

All photos courtesy of Stanley Black & Decker.

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PRODUCTIVITY, SUSTAINABILITY & ENERGY CONSERVATION

FIX AIR LEAKS TO KEEP PROFITS in Food and Beverage Applications from Vanishing into Thin Air

By Javier Irazola, Fluke Corporation

Portable sonic industrial imaging technology adds a visual component to traditional compressed air leak detection best practices for easier detection and fixing of air leaks.

Compressed air is the food and beverage industry's clean and accessible "fourth utility" after the big three of water, electricity and natural gas. The reliability of this fourth utility depends on predictable air pressure, which means even small leaks can come at a high price.

According to the Compressed Air & Gas Handbook Seventh Edition (https://www.cagi.org/education/handbook.aspx) published by the Compressed Air & Gas Institute (CAGI), "A single ¼-inch leak in a compressed air line can cost a facility from $2,500 to more than $8,000 per year. Locating and fixing leaks will result in significant savings depending on pressure requirements and energy costs."

Here's a look at air leaks commonly found in the food and beverage industry, along with best practices and technologies to address them.

> "An advancement in leak detection technology in the form of a portable sonic industrial imager is making it easier to detect leaks and avoid lost profits."
>
> — Javier Irazola, Fluke Corporation

Compressed Air Applications in the Food and Beverage Plants

Food and beverage manufacturers have unique considerations when it comes to compressed air leaks because product consistency is critical to brand reputation and compliance, especially since production plants and equipment are subject to strict controls and regulations to avoid contamination.

In food and beverage plants, multiple air compressor assets connect through pipes to deliver compressed air in order to move product, operate pneumatic tools or pump liquids for a variety of purposes in production chains, packaging and cleaning. Here are some examples:

- Snacks and nitrogen air cushioning: Nitrogen flushing is used to fill bags to air cushion delicate snacks to prevent damage. Oxygen is excluded for use because it reacts with food products, especially those made with oils.
- Food and cleanliness: Compressed air is purified and filtered to ensure food safety and to maintain the proper pressure dewpoint needed to prevent microbial growth.
- Fruit and vegetable peeling: In preparation for packaging, pressurized air jets efficiently remove peels from fruits and vegetables. High-pressure compressed air is also used to cut foods as a cleaner alternative to knives or blades.
- Breweries, fermentation and bottling: Compressed air increases oxygen levels to complete the bacterial fermentation process. Air compressors reduce residual oxygen during bottling and bottles are flushed with carbon dioxide and filled with beer using pneumatically powered machinery. Because breweries operate in warm environments, systems are more vulnerable to leaks.

Air leaks at any point can slow down production, affect product quality, create safety or contamination problems, or all four – and damage the bottom line.

The High and Often Hidden Costs of Air Leaks

Compressed air and gases need to be available at a specified pressure to achieve production targets, yet many facilities accept air leaks as a cost of doing business. Those costs can be high: a leak that can't be seen or heard runs $500 per year per leak. Easily felt and heard leaks can cost much more as noted.

Multiple factors associated with air leaks negatively impact profitability:

- Lost efficiency: Compressed air systems not regularly maintained after installation could lose 20 to 30 percent of compressed air in leaks alone.
- Additional expense: Pressure drop is often misdiagnosed as equipment failures, resulting in additional capital investment in new air compressors.

FIX AIR LEAKS TO KEEP PROFITS IN FOOD AND BEVERAGE APPLICATIONS FROM VANISHING INTO THIN AIR

Pilot Test Helps Coffee Roaster Easily Identify Energy Savings of 10%

Project engineers at a coffee roasting company participated in a pilot study using sonic imaging technology in a facility where conditions tend to generate many leaks. The test identified the company could save more than 10% per year in energy consumption with the new leak detection device.

The 300,000-square-foot facility houses a coffee roasting and packaging area, coffee wet process area, and tea blending and packaging area. All operations require proper air pressure to efficiently complete processes and traditional leak detection methods couldn't keep up.

On an average day, the facility uses from 1,000 to 1,600 cubic feet per minute (cu. ft/min) of compressed air. The company's compressed air system, which consists of five air compressors totaling 585 horsepower, powers automation and tubing used to feed the operation's nitrogen generation system. Nitrogen is used to improve the quality of coffee. Additionally, the inert gas is used for blending of tea.

With the sonic imaging device, the team identified potential energy savings of 10%, which is in keeping with its goal of improved sustainability. The new approach also showed how the team could simplify the air leak detection process, allowing the project engineers to keep staff working on products rather than stopping for long periods to detect and fix air leaks.

In a pilot test, a coffee roaster used a sonic imager to easily identify and tag as many as 52 air leaks – including leaks in many difficult locations.

- Downtime: Lost production time from pressure drops or installing new equipment will require equipment downtime and negatively impact planning schedules. Unplanned downtime costs an average of $200 per minute making it critical to avoid.
- Product quality: Insufficient pressure results in defective package sealing or the edible product not meeting consistent texture or flavor requirements.
- Product safety: Leaks that cause contamination lead to high costs from waste, compliance penalties and reputational damage.
- Environmental impacts: Systems with air and gas leaks become inefficient, which impacts a company's carbon footprint and prevents them from meeting sustainability or environmental targets.

The formula used to determine the extent of compressed air leaks at a facility is:

$$\text{Leakage } (\%) = (T \times 100) \div (T + t)$$

T = onload time (minutes),

t = offload time (minutes).

If the compressed air system is configured with start/stop controls, start your air compressor when there is no system demand – after hours or off-shift. Then take several readings of compressor cycles to determine the average time to unload the system.

Methods and Traditional Technology for Fixing Air Leaks

The first step in controlling processing and costs is to find air leaks at their point of origin. Here's a list of common leak points:

- Condensate traps
- Couplings
- Fittings
- Flanges
- FRLs (filter, regulator, lubricator combinations)
- Hoses
- Packings
- Pneumatic holding tanks
- Quick disconnects
- Threaded pipe joints
- Tubes
- Valves

Air leaks are a big issue because they're abundant and hard to find. Once found and fixed, more leaks tend to pop up due to normal wear and tear on the system.

While it may not be possible to eliminate every single leak, it is possible to reduce the total number with focused inspection using traditional detection methods. With these methods, once a leak is located, a paper tag is used to mark the spot. Four traditional detection methods include:

1. Sound: Hissing indicates leaks, which means the leak is sizeable since only a sound level greater than 60 dBA is audible without leak detection equipment. Since most plants are noisy and often require worker ear protection, listening for leaks must occur during downtime – between shifts, on weekends, or during scheduled maintenance.

2. Water and soap: Technicians spray soapy water on areas of audible leaks, and where bubbles appear is the leak spot. The method is protracted, far from precise, and requires cleanup since soapy water overspray creates a slipping hazard. In some clean and contamination-protected processes it is not allowed.

3. Ultrasonic acoustic detection: During downtime, technicians wearing earphones scan potential leak spots with a parabolic-dish or cone-shaped accessory. When a leak-indicating noise is detected, the technician switches to a wand-shaped device that must be held a couple of inches from the leak to pinpoint the exact location.

4. Using outside experts: Engineers or other experts are engaged usually once a year to save money and disruption. They use one or all the traditional techniques, and repairs and checks handled by in-house technicians.

None of these methods is foolproof and most require downtime, which leads to lost time and money.

Viewing Air Leaks with Portable Sonic Imaging Technology

An advancement in leak detection technology in the form of a portable sonic industrial imager is making it easier to detect leaks and avoid lost profits.

The sonic imager introduced by Fluke Corporation allows users to locate and view air leaks on an LED screen in real time with a point-and-shoot process that doesn't require

FIX AIR LEAKS TO KEEP PROFITS IN FOOD AND BEVERAGE APPLICATIONS FROM VANISHING INTO THIN AIR

The Fluke sonic industrial imager scans areas up to 50 meters in normal industrial conditions.

a specialized technician. Most users can get up to speed in about 10 minutes. Technicians can also work quickly from a safe distance while equipment is running. Additionally, the device makes it easier to find leaks in hard-to-reach spots or to distinguish between multiple leaks within the same area.

The hand-held sonic industrial imager contains an array of ultra-sensitive microphones that detect sounds in both the human hearing and ultrasonic ranges for sound and then presents them visually. The device then applies proprietary algorithms to the results and instantly produces a visual map of the leak on screen. The image of the leak is layered over a visible-light image of the area so operators can quickly pinpoint the leak location.

The sonic imager can also be used to verify successful repairs. If there's a question, scans captured as stills or live videos can be shared and discussed with colleagues. The captured images eliminate the need to climb ladders or mark the leak with the usual fragile physical tag.

Best Practices to Reduce Compressed Air Leaks

Using common or new detection methods, there's no time like now to remove the hidden costs and unnecessary waste of air leaks. Here are some best practices to follow:

- Take a systems approach: Often fixing a leak will increase system pressure, making smaller leaks larger, affecting the entire system. Combine changes with overall strategies for improved energy use and more robust control systems. Although they may be challenging to make, capital purchases often yield energy savings that substantially reduce payback time.
- Audit frequently: Frequent auditing – more often than the typical yearly or quarterly leak inspections – saves time, money and resources over the long run, even if you need to shut down equipment. New imaging technology means you can zero in on leaks and fix them on an ongoing basis without losing valuable production time.
- Confirm root causes of pressure drops: Pressure drop can be misdiagnosed as equipment failure. Before making capital expenditures, leak checks and fixes may save thousands or hundreds of thousands of dollars and help instantly regain capacity.
- Log and track and verify over time: It's important to record exactly where leaks have occurred since these weak spots tend to be where new leaks will happen and inspect those areas regularly. Logging information online allows data to be easily shared and used to impose discipline on the review process. Check soon after the repair is made to determine whether leaks have either been eliminated or need further attention. BP

About Fluke Corporation

Founded in 1948, Fluke Corporation is the world leader in compact, professional electronic test tools and software for measuring and condition monitoring. Fluke customers are technicians, engineers, electricians, maintenance managers and metrologists who install, troubleshoot and maintain industrial, electrical and electronic equipment and calibration processes. For more information, visit www.fluke.com.

About the Author

Javier Irazola, Global Product Manager for the Industrial Imaging Group at Fluke Corporation, led the recent launch of Acoustic Imaging solutions. He has eight years of previous experience in engineering and project management for utility projects in the United States and European Union and three years working for the Product Innovation department and as a Product Manager for Fluke Corporation. Email: javier.irazola@fluke.com.

All photos courtesy of Fluke Corporation.

To read similar articles on ***Compressed Air Leaks*** visit www.airbestpractices.com/system-assessments/leaks.

QUALITY, SAFETY & RELIABILITY

Compressed Air System Upgrades Need FOLLOW-UP ATTENTION AT FOOD OPERATION

By Ron Marshall, Marshall Compressed Air Consulting

There is usually a deep feeling of pride welling up inside the designers and installers after completing the installation of a new compressed air system, especially if it starts up and works perfectly. There is great satisfaction in seeing the machines working perfectly, producing a reliable, clean, dry flow of compressed air at the lowest possible cost. It puts smiles on the faces of all involved and pleases power authorities and energy organizations who might then write some very significant checks to partially fund these efficient installations.

But what happens after a few years, are things as perfect as at the start? This is a question with an answer that very few people know for their system. This article describes some interesting experiences with a food products company at two plants where compressed air assessments of optimized systems done a few years after the system upgrades showed problems.

Plant No. 1: System Upgrade Saves Energy, Delivers Quality Air

The first large plant, which was built about 20 years ago, featured a compressed air system consisting of three 300-horsepower (hp), air-cooled lubricated air compressors running on a central controller in the main boiler room. Parts of the plant are cooled to an ambient temperature near 40 °F to prevent product spoilage, so desiccant drying is used to maintain air quality. A heated blower style

> "The results of the assessments of these systems showed that despite the fact that the systems were all set up with efficient equipment, and should have run very well, changes to the plants, control settings, and aging or failure of components caused inefficiencies and air quality problems."
>
> — Ron Marshall, Marshall Compressed Air Consulting

dryer was installed to condition the compressed air, along with an onboard pressure dewpoint-dependent switching control feature that saves energy by reducing regeneration power consumption and desiccant cooling purge when moisture loads are low.

The system has two very large storage receivers in the main air compressor room to assist with air compressor control, slowing down changes to pressure to allow the air compressors to shut down and to start up again without any low-pressure events. A pressure/flow controller was installed to regulate plant pressure to the lowest possible pressure to reduce artificial demand caused by supplying production machinery with higher than required pressure.

All the air compressors were originally fixed-speed units, but one was upgraded to Variable Frequency Drive (VFD) about five years into the life of the system to save energy. This system upgrade was supported with an energy incentive when it was installed, so verification readings were done a few months after the project with impressive savings numbers found.

When left conditions were excellent. The air compressor controller maintained very good compressed air system efficiency by keeping the air compressors' discharge pressure as low as possible within a single pressure band. The VSD retrofit allowed the modified air compressor to be used as a trim unit, speeding up and slowing down to vary its flow output to achieve more constant pressure within its control range. This operation minimized wasteful unloaded runtime. Typically, in unloaded operation fixed-speed air compressors consume 30% of the rated full load power, in this case about 80 kW, while running unloaded and producing no air. System design should always focus on minimizing this runtime or the power within it.

Compressed air quality was excellent and the air compressors and dryers were operating as efficiently as possible. The large blower-style heated desiccant dryer maintained compressed air pressure dewpoints of -40 °F and below during all conditions. The dryer was well sized, being rated slightly larger than the capacity of the three air compressors. Only two units were originally required for peak flows, leaving one for backup duty. Since the air dryer was only loaded to a fraction of its capacity its onboard pressure dewpoint controller delayed the regeneration cycles until they were needed, reducing the power consumption of the dryer and the necessary cooling purge that flows to cool the desiccant after a heating cycle.

Plant No. 1: Compressed Air System Performance Falters

As the system aged various changes affected the installed equipment. A compressed air scoping assessment was recently done that showed some major problems that have affected system efficiency and the quality of air the system produced. As with any system, as the plant ages more and more system leakage develops, loading the system to higher levels. Also, additional devices are added to the compressed air system as production processes are upgraded. This has increased the compressed airflow, in this case the additional flow has pushed the compressed air demand higher than the capacity of the two main air compressors, requiring a third unit to run. This is a reliability problem, because the failure of any one air compressor will now cause pressure-related production outages during peak demands, affecting the product throughput of the plant.

A primary problem currently is heat. Higher system load means more heat is produced by

COMPRESSED AIR SYSTEM UPGRADES NEED FOLLOW-UP ATTENTION AT FOOD OPERATION

the air compressors. This system is located in the main boiler room of the plant, so ambient temperatures are always high. Since the air compressors are air-cooled, this high temperature negatively affects the system and its various components. The first component to feel the effects was the VFD unit, this air-cooled device ran successfully for a number of years, but finally suffered premature heat-related failure. The plant struggled with this component for quite a number of months, repairing it, and then having the drive fail over and over again until the maintenance staff gave up trying. The removal of this device reduces the overall efficiency of the system by bringing back inefficient unloaded runtime.

In addition, after a few more years, the central air compressor controller, also located in the boiler room failed due to excessive ambient temperature (Figure 1). This controller had become obsolete so, parts are not available. This failure meant the air compressors now had to run in a cascaded pressure band control strategy, which caused higher than desired average air compressor discharge pressures. The higher the discharge pressure, the more energy an air compressor consumes per unit output, making the system less efficient still. The controller replacement was deemed too expensive for the plant's tight budget so it was never done.

The central controller also controlled the pressure/flow regulator. With the failure of the main controller also came the failure of the pressure/flow controller, which increased system pressure substantially. This caused extra compressed airflow, which in turn caused the air compressors to consume even more energy, creating even more heat.

And finally, due to high ambient temperatures, and the occasional failure of the air compressor cooling air ventilation dampers, the air compressors were regularly subject to overheating. As these machines aged, the lubricant coolers within the enclosure became less and less able to remove the heat of compression, causing higher than desired air compressor discharge temperatures. Overheated air compressors often have this problem because the heat will cause the air compressor lubricant to break down at an accelerated rate, causing varnish to form on internal heat transfer surfaces. This varnish and the resulting degradation of the cooler performance causes high discharge temperatures, even during normal ambient conditions.

The high discharge temperatures caused problems with air drying equipment. A rule of thumb states the moisture content of undried air compressed air doubles for every 20 ˚F increase in temperature. Therefore, overheated compressed air hitting the air dryer overwhelms the unit due to excessive water vapor content. In the overloaded condition the dryer cannot maintain rated pressure dewpoint, and during mid-shift peak production the pressure dewpoint of the compressed air going into the refrigerated plant reached unacceptable levels for this plant (Figure 2).

The excessive water in the compressed air causes stress on the desiccant and at times free water is present in the output of the dryer. Some of this water fouled the onboard pressure dewpoint probe used to control the dryer causing it to fail. After quite a few expensive replacements local staff gave up with operating the pressure dewpoint-dependent switching feature of the dryer, the unit was switched to fixed-cycle mode, causing the system to become even more inefficient due to higher than required heater and cooling air duty.

As is typical with many companies these days, the operational and maintenance staff are overloaded, and budgets are tight. This is preventing the much-needed repair and replacement of the older malfunctioning compressed air equipment and is leading

Figure 1. The air compressor controller stares blankly out at the operators. This heat-related problem is more of an issue because the controller is obsolete with no parts available.

Figure 2. High inlet temperatures cause poor pressure dewpoint in Plant 1 (levels should be below -40 ˚F). The pressure dewpoint control has been turned off due to this problem, causing wasted energy during light loading.

to reduced reliability, inefficient system operation and poor air quality.

Plant No. 2: Multiple Issues Drive Compressed Air System Upgrades

This processing plant is actually two plants in one. The building has been in place for over 50 years but has undergone various extensive renovations, the last being an expansion for a new product. For some reason the company chose to install a separate independently controlled compressed air system, rather than connecting the new line to the old main system.

The main compressed air system was retrofitted about 15 years ago to add a water-cooled VSD air compressor to the plant's two fixed-speed air compressors. A second air-cooled VSD air compressor was installed after one of the older fixed-speed units came to the end of its useful life. A third air-cooled remote VSD air compressor was installed near a critical production line a few years ago because the line was having low-pressure events.

Since the production areas are where refrigerated desiccant style dryers are used, a main heatless desiccant dryer with pressure dewpoint control was installed for the original air compressors, then when the second air compressor was installed a separate heated style unit was purchased. When the third VSD air compressor was installed the company purchased a surplus heatless desiccant dryer with pressure dewpoint control for the remote system air demand, isolating the new air compressor from the main plant system with a check valve so it could run independently from the main plant system in the event of trouble.

For the new expansion two 75-hp VSD air compressors were installed with separate heatless desiccant dryers. Large storage and flow control was designed into the system to help with air compressor control and lower plant pressure. Early in the production of the plant it was found the two air compressors were not large enough to maintain pressure during peak flows so a third 100-hp air compressor was added. The system was originally verified by the local power utility and shown to be operating at peak efficiency but degradation in the system characteristics occurred when the larger air compressor was installed.

Plant No. 2: Assessments Point to System Efficiency and Air Quality Issues

Recent plant assessments on both systems found less than desirable system efficiency and some air quality problems were occurring.

For the main system, the air compressors are all run independently with no central control system, the local controls were set to make the VSD air compressors all share the load. This led to undesirable operation where the variable air compressors all run near minimum speed, the least efficient point for this style of air compressor. One of the air compressors was found to have internal problems that caused it to run at very poor specific power of over 35 kW per 100 cfm when it is running at the bottom end of its curve, yet the unit continued to run in this condition due to the compressor settings. The remote air compressor, being separated by a check valve, continued to run at night and on weekends, even during light loads where only one main air compressor is needed for the whole system.

Malfunctions with the air dryer controllers due to age and lack of maintenance caused two of the three dryers to continue to cycle at full purge throughout non-production periods. The dryer purge represents most of the plant load during low flow periods, wasting significant power. One of the dryers was found to have a failure preventing it from purging but the unit remained stuck partway through its operating cycle (Figure 3). This dryer was allowing saturated air into the dry side of the

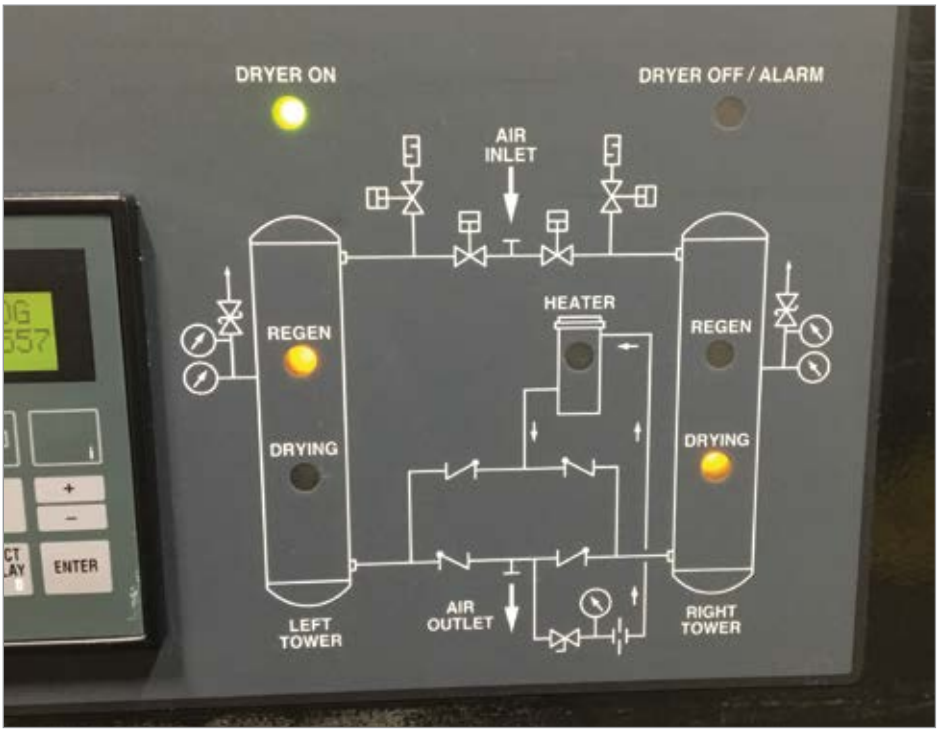

Figure 3. All looked normal with this air dryer control, but careful monitoring showed it was stuck on one part of its cycle.

COMPRESSED AIR SYSTEM UPGRADES NEED FOLLOW-UP ATTENTION AT FOOD OPERATION

system which negatively affected air quality. The operating staff were unaware of this problem as no secondary pressure dewpoint measurement devices monitor the system pressure dewpoint.

With the new expansion, control problems were being experienced with the system because of control gap and the existence of check valves within the air dryers. Since the 100-hp base air compressor is larger than then individual VSD air compressors there were times where the air compressors were fighting for control, with the lead VSD speeding up and slowing down, but at the same time with the fixed-speed rapidly loading and unloading (Figure 4). Problems with system control were also caused by the check valves. These valves prevented system pressure from passing back to the individual air compressor controllers. When an air compressor would unload and shut off, the air dryer purge would cause the pressure at the air compressor discharge to fall rapidly causing the air compressor to start back up again, even though it was not required.

A central air compressor controller was installed later to attempt to correct the control problems, but this unit, for some reason that was never determined, was incapable of properly controlling multiple VSD air compressors. Even under central control the air compressors would fight due to a control gap caused by the mismatch in size of the 100-hp, fixed-speed unit and either one of the two 75-hp variable air compressors. A general sizing rule is to have the main VSD air compressor slightly larger than base fixed-speed units to avoid control problems, although this rule was not followed when the base air compressor was purchased, with negative consequences.

When the compressed air assessment was done an air quality problem was found with the dryer for the fixed-speed air compressor. This dryer had developed a condition where it would freeze for long periods of time in the same position during the repressurization part of its operating cycle. This caused the side drying the airflow to become saturated, passing wet air into the dry side of the system, increasing the pressure dewpoint to unacceptable levels for a refrigerated plant. The problem was diagnosed as a sensor calibration issue, the dryer was designed to wait until the side being depressurized reached a low pressure. Due to a pressure transducer calibration error the pressure signal to the dryer control never reached the required setting, therefore the dryer froze midway through its regeneration cycle and stayed that way until a random pressure fluctuation allowed it to continue. This problem was only identified during the assessment, the operating staff were unaware of these problems, again no remote secondary pressure dewpoint measurement was in place to ensure the compressed air output remained dry.

Compressed Air Leaks Addressed

The compressed air assessment in both plants turned up a significant number of leaks, over 200 in total, by far the most leakage occurred in the older plant. A database of leakage locations, including photographs, was created and passed to the maintenance department for repair. This plant, as with the other, is staffed to a minimum level and the maintenance department finds it difficult to remedy the leakage flow. Most of the repair requires work to be done during midnight shift, weekends or holidays. After much

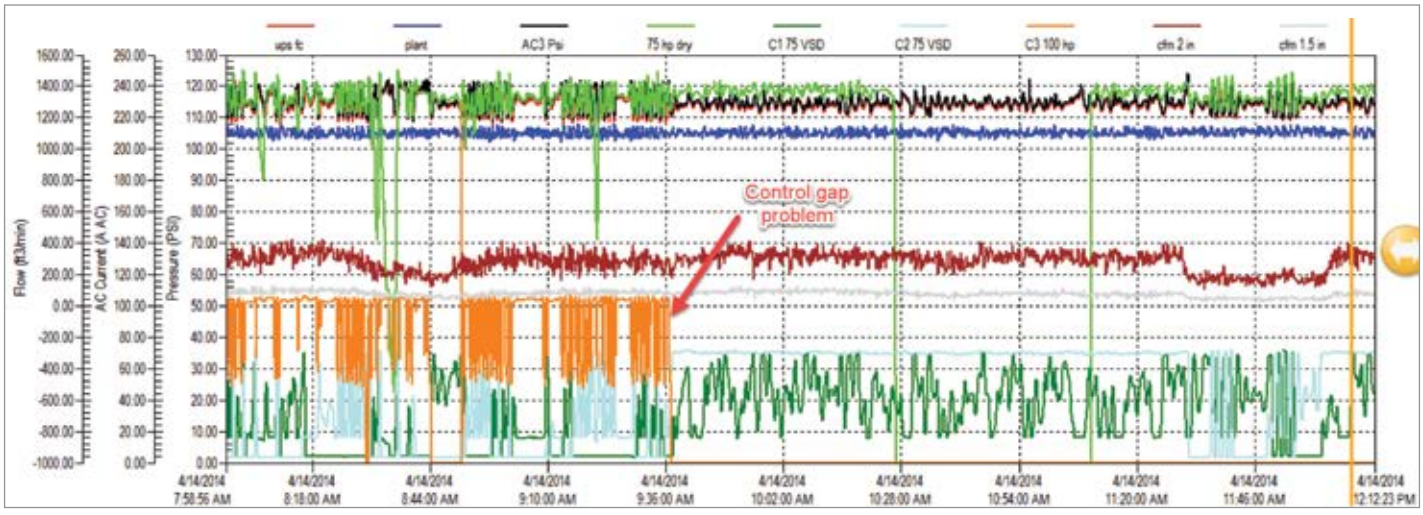

Figure 4. Mismatch of air compressor sizes and location of check valves caused control gap problems when a large base unit (orange trace) was running. It is seen loading and unloading, fighting the control of the VSD air compressors (dark green and light blue).

trouble in arranging the work, a leak repair blitz was initiated by plant staff, resulting in a significant reduction in leakage flow.

Assessments, Monitoring Recommended

The results of the assessments of these systems showed that despite the fact that the systems were all set up with efficient equipment, and should have run very well, changes to the plants, control settings, and aging or failure of components caused inefficiencies and air quality problems. In most cases plant operators were unaware of the problems. This shows the value of regular compressed air assessments by a third party.

Also missing on these systems is any working air quality measuring and alarming system. Air dryers often fail, allowing wet air to pass into the plants. It can be many hours, days or even months before the operating personnel realize the problem and make corrections. It is best to have secondary air quality monitoring instruments installed downstream in a location that can best detect negative conditions and allow quick notification of issues to repair personnel.

These systems had air compressors and air dryers that ran inefficiently for many years, feeding excessive leaks, consuming much more power than required. A good monitoring system for pressure, flow, power, specific power, pressure dewpoint and leakage could have gone a long way in allowing plant managers to see the problems as they developed and make timely repairs.

It is nice to be able to report the plant management has decided to upgrade the systems in all of these plants in the near future to renew the equipment and improve efficiency, reliability and air quality. More happy days are coming! BP

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

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

QUALITY, SAFETY & RELIABILITY

PROFILE: Ozen Air Technology

By Mike Grennier, Compressed Air Best Practices® Magazine

Compressed Air Best Practices® interviewed Fehmi Esen, President of Ozen Air Technology, LLC.

Good afternoon! Tell us about Ozen Air Technology and your history with the company.

We manufacture and market a full line of low- and medium-pressure piston and screw air compressors, as well as air dryers, air tanks and accessories. Ozen Air Technology is a subsidiary of Ozen Kompresor based in Konya, Turkey. Our company has been manufacturing air compressors and related equipment for more than 50 years. In 2018, we expanded into North and South America with an operation in Charlotte, North Carolina, which is exciting for us given the opportunity we see.

I've served in a variety of management roles in the areas of manufacturing and engineering during the past 10 years with the company. I became President of Ozen Air Technology in 2016. I feel fortunate to be working with manufacturers we serve because my experience in manufacturing, combined with my background as a materials and metallurgy engineer, gives me the right perspective. I've been in our customers' shoes and I know what they need to succeed – and importantly – what we need to do as a company to help them.

Describe a typical manufacturer's needs and how that influences product design and engineering at Ozen Air Technology.

It's all about efficiency and Overall Equipment Effectiveness (OEE). Any air compressor must efficiently provide high-quality air at all times to help manufacturers hold down energy costs. It's also an understatement to say air compressors are the heart of most industrial manufacturing facilities and key to overall OEE. If the air compressors stop, the whole facility stops for sure, which has a big impact on overall productivity and cost. So Ozen manufactures reliable air compressors that operate with minimal downtime.

Fehmi Esen, President, Ozen Air Technology, LLC.

> "If our distributors win it means Ozen Air Technology wins. It gets back to the critical need for us to focus 100% on equipment that provides efficiency, reliability and durability."
>
> — Fehmi Esen, President, Ozen Air Technology, LLC.

These are the two biggest factors driving everything we design and manufacture. We closely follow ISO 9001 standards to continuously maintain and improve our process and the products we produce. Here in the United States, and elsewhere, we focus on demand-flow assembly lines and offers a comprehensive range of spare parts and a high level of service.

We also offer one of the most comprehensive warranty programs in the United States with warranties from 12 to 120 months. We're also upgrading our testing facility in Turkey in order to participate in the Compressed Air & Gas Institute's Performance Verification Program. We expect to be an active member of the program in 2020.

Our commitment is to manufacture quality products at competitive prices. It's a chain that starts with the customers' success.

What does success look like for distributors and end-users you serve?

Let me first give you my definition of customer success. It's not just another phrase for customer satisfaction. It's more than that. It is success. If our equipment is part of an end-user's ability to make a profit that means our distributors win. If our distributors win it means Ozen Air Technology wins. It gets back to the critical need for us to focus 100% on equipment that provides efficiency, reliability and durability.

This approach applies to everything we do in over 50 countries, including Eastern Europe, the Middle East and now North and South America where we've put all the initial building blocks in place, including our North Carolina facility where we assemble small, 5.5 to 40 horsepower (hp) rotary screw air compressors. We expect to assemble larger rotary screw units at this location within the next six months to keep pace with growth.

Ozen Air Technology offers rotary screw booster air compressors, which range from 25 to 75 hp (18-55 kW) and deliver up to 580 psi.

We also stock parts for our entire inventory at our North Carolina operation so we can deliver parts immediately at any time of any day to customers in this region of the world. We also use the facility there to train distributors and OEM partners.

We currently have more than 100 distributors worldwide and we're looking forward to expanding our network in the United States, with an emphasis early on in the Southern and Southeastern areas of the country.

Explain your strategy for partnering with distributors in North America, or elsewhere.

We want to partner with distributors who don't just sell compressed air equipment, but instead work with end-users to help them lower costs, whether it's improved equipment maintenance or lower energy consumption. Of course, it's also a matter of a compressed air system contributing to overall plant uptime and productivity and we want our distributors to play a key role in those areas with customers.

This all means our distributors must have a very high level of technical knowledge of compressed air systems and extensive knowledge of the customers they serve. I think it's also important to point out that we're a flexible company. We work with distributors on a customer-by-customer basis to create the solutions that work best.

Speaking of solutions, tell us about some of Ozen Air Technology's products.

A key offering is our OABC D rotary screw booster air compressors. We are the only manufacturer that supplies this type of air compressor, which is commonly found in applications such as polyethylene terephthalate (PET) bottling operations and laser cutting machines where pressure of up to 500 psi is needed, versus the typical 100 to 140 psi required at typical manufacturing plants. We provide a range of rotary screw booster air compressors from 25 to 75 hp, each of which delivers up to 580 psi.

PROFILE: OZEN AIR TECHNOLOGY

We see a lot of growth potential for these products since most operations that need high pressure currently use reciprocating piston booster air compressors and they stand to benefit by replacing those with rotary screw booster air compressors.

The reason we are optimistic about sales growth for boosters goes back to our fundamental goal of helping end-users drive down the cost of ownership of their air compressors. Our Variable Frequency Drive (VFD) rotary screw air booster air compressor uses 15 to 20 percent less energy than a reciprocating unit operating as a load, no-load unit. Additionally, the service interval for a rotary machine is 8,000 hours whereas a reciprocating unit has service intervals of 2,000, 4,000 and 8,000 hours. The costs for replacement parts are also less for rotary screw booster air compressors when compared with reciprocating units.

Of course, we also expect to see continued growth with other key products, such as our OASC Series of rotary screw air compressors.

Tank-mounted OASC Td series air compressors, which range from 5.5 to 40 hp (4-30 kW).

What makes the OACS Series stand out for distributors and industrial manufacturers?

This is a complete line of air compressors, ranging from 5.5 to 430 hp with the capacity to deliver 19 to 2,000 scfm with delivery pressure at 100 to 190 psi.

Our OASC Series units are available as belt-drive or direct-drive units. We think customers will also appreciate a number of standard features on these machines, including dryer bypass lines, phase reversal relays and automatic drain valves. Our OASC D Series (Direct Drive) air compressors also come standard with Danfoss VFD drives, which of course, adjusts the machine's motor speed according to the actual air demand profile. The result is an energy savings up of to 35% when compared with a non-VFD air compressor working continuously in load/unload mode.

How would you describe the outlook for Ozen Air Technology's in North America?

We're in the early stages of gaining a good market share and we expect that to continue.

Our strategy is to slowly introduce ourselves to North and South American markets, which is in addition to putting the initial building blocks in place I mentioned earlier. We're very optimistic about the future as we progress with our strategic goals. BP

Thank you for your insights, Ozen Air Technology.

For more information, visit www.ozenairtech.com.

To read similar ***Air Compressor Technology*** articles visit
www.airbestpractices.com/technology/air-compressors.

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TECHNOLOGY PICKS

Sullair Introduces LS160 Rotary Screw with Improved Air End

Sullair, an industry leader in innovative compressed air solutions since 1965, today announced the introduction of the modified LS160 oil-flooded rotary screw air compressor featuring a larger and higher efficiency air end. The new air end results in greater free air delivery and increased efficiency in LS160 units up to 150 psi.

"Since the original introduction of the Sullair LS160 in 2018, the product has been one of the most well-received in decades," said Brit Thielemann, Senior Product Manager – Commercial & Industrial Air Solutions. "We are excited to introduce the enhanced product and provide our end customers with even greater efficiency, increased air delivery and an opportunity to reduce their energy costs."

The new generation of Sullair air ends combines decades of experience in designing and manufacturing rotors – the most important part of the air end – with the latest in research and technology. The new air end is larger in size, providing even greater efficiency than the previous air end included in the LS160 units introduced in 2018. In addition, after testing, the enhanced LS160 was found to consume less power, resulting in increased energy savings for customers.

The modified LS160 also includes a 25% larger low restriction inlet valve. This allows for less restriction and a more efficient air path, resulting in less power required and a reduction in pressure drop.

Sullair LS160 Rotary Screw Compressor with Improved Air End.

These enhanced features are all in addition to the features standard on the LS160, including a full enclosure, Electronic Spiral Valve, 10-inch Sullair color touch screen controller, TEFC premium efficiency motor, Wye-Delta starter, phase monitor and a zero loss drain.

The LS160 also offers Sullair AirLinx™ remote monitoring as standard. AirLinx provides customers the opportunity to monitor all operational parameters in real time via computer, tablet or smartphone. Aside from the ability to monitor operations, AirLinx may also be customized to provide automatic alerts when an unexpected reading or fault occurs. This speed-to-alert helps users minimize unplanned downtime.

The LS160 Series includes offerings from 125-200 hp and 90-160 kW. With multiple offerings, the units provide options to help customers meet their specific application needs, including steel mills, tire plants, automotive, forging plants, chemical processing, paper industry and large manufacturing facilities, among others.

About Sullair

Since 1965, Sullair has developed and manufactured air compressors with proven reliability and wear-free durability. Sullair is globally recognized as a leading manufacturer of air compressors for use in manufacturing, oil and gas operations, food processing, construction and more. Sullair has manufacturing capabilities in Michigan City, Indiana; and Shenzhen and Suzhou, China; as well as a JV (IHI-Sullair) based in Suzhou. For more information, visit www.sullair.com. Sullair is A Hitachi Group Company.

About Hitachi, Ltd.

Hitachi, Ltd. headquartered in Tokyo, Japan, is focusing on Social Innovation Business combining its operational technology, information technology and products. The company's consolidated revenues for fiscal 2018 (ended March 31, 2019) totaled 9,480.6 billion yen ($85.4 billion), and the company has approximately 296,000 employees worldwide. Hitachi delivers digital solutions utilizing Lumada in five sectors including Mobility, Smart Life, Industry, Energy and IT, to increase our customer's social, environmental and economic value. For more information on Hitachi, please visit the company's website at www.hitachi.com.

TECHNOLOGY PICKS

Kaeser Rolls Out New 185 Cfm Portable Compressor

Kaeser's new M55PE Mobilair™ compressor delivers 185 cfm at 100 psig – adjustable up to 125 psig. Built with reliability and durability in mind, these portable compressors are ideal for rental, construction, demolition, sand blasting, repair trucks, and other demanding applications.

The new M55PE is packed with features that increase reliability and safety while reducing downtime.

The heavy-duty Tier 4 Final D1803CR-T Kubota diesel engine coupled to the new Sigma 17G airend produces even more air with less horsepower. With its large 21-gallon fuel tank, the M55PE can run fully loaded for 10 hours before refueling. The convenient eye-level, curbside instrument panel features the Sigma Control Smart electronic controller with intuitive user display, system monitoring and diagnostics. The cold start battery assures year-round reliability and Kaeser's anti-frost valve prevents tool freezing.

The powder coated steel chassis is topped with a scratch and dent-resistant polyethylene enclosure with wide-opening gull wing doors for easy access to maintenance points. The new spin-on air/oil separator greatly simplifies maintenance and reduces overall weight. On the road, torsion bar suspension, larger wheels and tires, and LED lighting package ensure excellent handling and safety.

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. For more information or to be connected with your local authorized Kaeser representative, please call (877) 417-3527.

Atlas Copco Releases New Cast Iron Piston Compressors

For many industry professionals, the piston air compressor has historically been the compressor of choice due to their rugged, tough and durable characteristics. Today, Atlas Copco Compressors is further building on the piston compressor's strong reputation by announcing the release of a new line of compressors featuring full cast-iron designs.

Introducing its CR Range, Atlas Copco Compressors provides a line of durable single and two-stage cast iron piston compressors combining reliability and maximum productivity for demanding industrial, automotive and commercial applications. The CR Range offers a variety of customization options including auto drain, after cooler, low oil level switch, TEFC motor, NEMA4 control panel, pressure-lubricated pump, and simplex and duplex configurations.

"Our piston compressor lines have been a consistent and reliable product over the years, and we are thrilled to take that product to the next level by offering a line with all cast iron pistons," said Ryan Wilburn, product marketing manager for piston compressors at Atlas Copco Compressors. "With cast iron construction and industrial class bearings, our CR Range guarantees longevity and durability, even in the most demanding environments."

Atlas Copco Compressors' wide range of piston air compressors comes in a variety of configurations to provide flexibility and affordability while remaining well-suited to any and every need. The CR Range's technical

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specifications include working pressures from 100 psig – 175 psig and flow capacities up to 72 cfm.

The CR Range provides affordable compressed air in a small, lightweight package and is available in three series: Contractor, Professional, and Industrial. Features and benefits for each include:

- Bumper-to-Bumper Warranty Program
- Duplex or Simplex
- Single stage units best for low demand applications up to 135psi, two-stage units can meet higher demands, offering pressures up to 175psi, with higher duty cycle pumps
- Fully enclosed belt guard and ASME safety valves
- Pilot valve control on gas drive units to reduce engine speed on low demand

Contractor Series: The low-profile cast-iron design, semi-pneumatic wheel, heavy gauge wire belt guard and rugged pump design provides the ideal solution for small, portable applications.

Professional Series: The balanced counter weighed crankshaft and cast-iron design provide smooth, easy operation with a range of unit options supplying an idea solution for demanding applications. The professional series opens up a range of options not available in the contractor series including electric drain, aftercooler, TEFC Motor, NEMA4 Control Panel, Pressure Lubricated Pump

The CR Range is newly engineered to be more robust and dependable.

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Industrial Series: All models come equipped with an electric drain, belt guard aftercooler, and low-oil level switch; the 10 and 15 horsepower models also come equipped with head unloaders. The TN4 configurations also come with a TEFC motor and NEMA4 control panels.

To learn more about all the all-new CR Range and other available options in piston air compressors, contact an Atlas Copco Compressors representative today or visit online at www.atlascopco.com or here http://bit.ly/2Xakqtp.

About Atlas Copco Compressors

Atlas Copco Compressors LLC is part of the Compressor Technique Business Area, headquartered in Rock Hill, South Carolina. Atlas Copco Compressors provides innovative solutions including world-class compressors, vacuum pumps, air blowers, quality air products and gas-generation systems, all backed with full service, remote monitoring and auditing services. With a nationwide service and distribution network, Atlas Copco Compressors is your local, national and global partner for all your compressed air needs. Learn more at www.atlascopco.com/air-usa.

Gardner Denver Continues to Enhance L and LRS Product Lines

2019 was a pivotal year for Gardner Denver oil lubricated compressors as they were positioned to deliver a record number of product enhancements and new products to the market. Earlier last year, Gardner Denver continued to enhance an already robust product line with the release of the updated 30-45kW and 90-132kW L and LRS Series compressors. They are now excited to launch the updated 55 and 75 kW L and LRS Series compressors.

These 75 to 100 HP compressors now feature a state-of-the-art color touch screen controller on all models and an Eaton Variable Frequency Drive in the 55-75kW LRS models. With superior serviceability and exceptional performance in the large horsepower end of the market, L and LRS Series compressor products uniquely combine simplicity with cutting edge technology to provide consistent, high quality air.

About the Gardner Denver Industrials Segment

Gardner Denver Industrials Segment delivers the broadest range of compressors and vacuum products, in a wide array of technologies, to end-user and OEM customers worldwide in the industries it serves. The Segment provides reliable and energy-efficient equipment that is put to work in a multitude of manufacturing and process applications. Products ranging from versatile low- to high-pressure compressors to customized blowers and vacuum pumps serve industries including general manufacturing, automotive, and wastewater treatment, as well as food & beverage, plastics, and power generation. The Segment's global offering also includes a comprehensive suite of aftermarket services to complement its products.

Gardner Denver Industrials Segment, part of Gardner Denver, Inc., is headquartered in Milwaukee, Wisconsin, USA. Gardner Denver was founded in 1859 and today has approximately 6,500 employees in more than 30 countries. For further information, please visit: www.gardnerdenver.com/gdproducts.

Gardner Denver updated the 55 and 75 kW L and LRS Series compressors.

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Lupamat Compressor Unveils a New Generation 4 Bar Compressor

Lupamat Compressors unveiled a new generation 4 bar compressor. Especially suited for textured yarn product and cement plants, the aim of the texturing process such as synthetic fibers (obtained by chemical means) and the appearance of natural fibers (cotton, wool, linen, etc.) give superior results. The compressor provides maximum performance at low pressures.

Thanks to the newly developed Lupamat design, the compressor provides maximum performance no matter how bad the ambient conditions. The new generation compressor, manufactured with industry 4.0 compatibility in mind, is capable of 24-hour monitoring and control.

Lupamat, which currently introduces 2 models as 160 kw and 200 kw, announced it will launch models in the 15-250 kw range in 2020.

About Lupamat

Lupamat started production in 1968 and has been a pioneer of many innovations in the compressed air industry for over 51 years. Having become part of the Dirinler family in 2000, Lupamat has made great progress in quality thanks in part to the cooperation with other companies within the group. In our group, there is Dirinler Makina, established in 1952 for eccentric-hydraulic press production; Dirinler Sanayi Makinaları producing CNC lathes, CNC double machining centers and multipurpose and completely customer personalized CNC machines, and Dirinler Döküm, which carries out cast iron production, 80% of which is aimed at export for the wind energy sector. For more information, visit www.lupamat.com.

Lupamat new generation 4 bar compressor.

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