COMPRESSED AIR | CHILLER & COOLING

BEST PRACTICES

airbestpractices.com coolingbestpractices.com

June 2026

Stop fixing. Start replacing.

If your compressor keeps costing more, it's time for one that costs less to run.

Breakdowns. Pressure drops. Rising maintenance costs. It starts small. An extra service call here, a replacement part there. But over time, those quick fixes turn into a constant cycle of downtime, inefficiency, and unexpected expenses.

The truth is, aging compressors don't just wear out, they hold your entire operation back.

Modern systems are engineered for reliability, energy efficiency, and consistent performance. That means fewer disruptions, lower operating costs, and the confidence that your equipment can keep up with demand.

Upgrade your old compressor with **AirSwap**, and see how easy it is to replace your compressor and drive higher performance with a peace of mind.

Atlas Copco Compressors
300 Technology Center Way, Suite 550
Rock Hill, SC 29730
Phone: 866-546-3588
Level up your experience at *atlascopco.com*

airSWAP compressor upgrade program

Pure Air, Pure Products.

Ensure Safety, and Your Reputation.

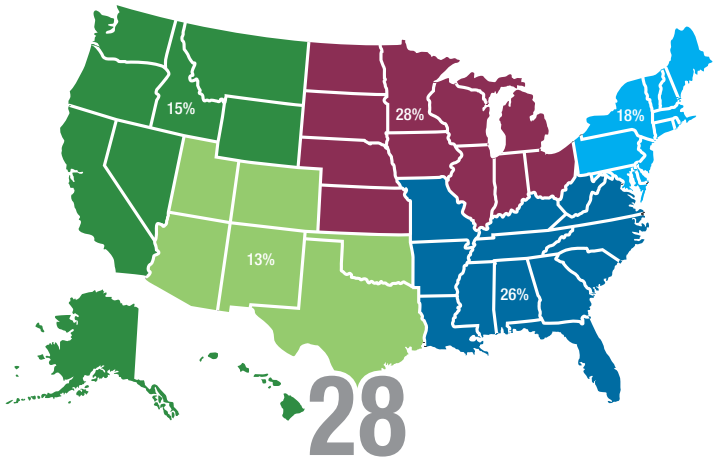
When it comes to food and beverage production, nothing is more important than protecting the intergrity of your product and reputation.

Atlas Copco delivers ISO 8573-1 Class 0 Certified oil-free air, guaranteed to keep every bite and sip pristine. From mixing, fermentation, and aeration to cooling, conveying, and packaging, our compressors ensure your air supply is as clean as the food and drinks you produce.

Purity isn't the only advantage. With Atlas Copco, you'll gain unmatched efficiency with VSD technology, heat recovery systems and CO2 solutions to support smarter production. Plus, you get peace of mind with service experts across the United States.

Atlas Copco Compressors
300 Technology Center Way, Suite 550
Rock Hill, SC 29730
Phone: 866-546-3588
Level up your experience at *atlascopco.com*

20TH ANNIVERSARY ISSUE FEATURES



28

2026 Compressed Air Distributor Sales Survey

Thought Leaders on System Optimization Past & Future

36

66

20 Years of Case Studies: Plants Sharing Best Practices

12

LATEST NEWS

EVERY ISSUE

20

Compressed Air Best Practices® (USPS# 17130) is published monthly except January-February combined by Smith Onandia Communications LLC, 37 McMurray Rd., Suite 104, Pittsburgh, PA 15241. Periodicals postage paid at Pittsburgh, PA and additional mailing offices. POSTMASTER: Send address changes to: Compressed Air Best Practices®, 37 McMurray Rd, Suite 104, Pittsburgh, PA 15241.

FROM THE PUBLISHER

Thank you!

We began publishing *Compressed Air Best Practices® Magazine* in 2006, armed with guidance from industry leaders Hank Van Ormer, Scot Foss, Bill Scales, Frank and Reiner Mueller and Dean Smith. I'll always be grateful to this group.

Our first readers came from the compressed air distributor firms I knew from my Hankison and Quincy Compressor years. The owners of these firms (Brehob, C.H. Reed, McKenzie, Scales, JHFoster, Zorn, Blake & Pendleton) said, "Here's a list of our people, charge us a subscription fee for a year – you'll need it!" Our second reader group came from large manufacturing companies employing Energy Managers who were members of the Association of Energy Engineers. This core readership continues to the present day.

Meanwhile, the Compressed Air Challenge and the Compressed Air & Gas Institute (CAGI) offered that most valuable asset, expert content. Articles poured in from those already mentioned, as well as Tom Taranto, David McCulloch, Bob Wilson, Chris Beals, Paul Edwards, Ron Marshall, Tim Dugan and Steve Briscoe. CAGI technology sections have regularly sent in excellent, impartial articles.

A magazine needs advertisers to survive. Kaeser Compressors, Atlas Copco, Hankison, BEKO, Hitachi, Mikropor, Sullair and many others were early supporters. When our readers asked for blower, vacuum and cooling water system assessment content, the list expanded to include Trane, Carrier, EVAPCO, Busch, Inovair and Aerzen.

We hope you enjoy this special anniversary issue featuring (1) our first-ever compressed air distributor sales survey, (2) 20 thought leaders on the past and future of system optimizations and (3) 20 case studies from manufacturing leaders.

The first annual Best Practices Expo & Conference was held in 2018.

Because of all of you, our small firm is slightly larger now, and I'd like to thank our team who have put an incredible amount of effort into making this and every issue (Troy Dreier, Erik Klingerman, Bill Smith, Kimberly Hill, Brooke Jones, Clare Heinl, Patty Mackey and Anna Buzzelli).

As always, thank you for investing your time and efforts into *Compressed Air and Chiller & Cooling Best Practices.*

Roderick M. Smith
Publisher
tel: 412-980-9901
rod@airbestpractices.com

Smith Onandia Communications

Roderick Smith
Publisher
rod@airbestpractices.com

EDITORIAL

Troy Dreier
Senior Editor
troy@airbestpractices.com

Brooke Jones
Digital Content Editor
brooke@airbestpractices.com

ART

Anna Buzzelli
Graphic Designer
anna@airbestpractices.com

ADVERTISING & EVENTS

Erik Klingerman, *Director of Sales, erik@airbestpractices.com*

Bill Smith, *Regional Sales Manager – Eastern U.S. & EMEA*
bill@airbestpractices.com

Kimberly Hill, *Sustainability Events and Operations Manager*
kimberly@airbestpractices.com

CIRCULATION

Patricia Mackey
Circulation and Events
p.mackey@airbestpractices.com

Clare Heinl
Circulation Manager
clare@airbestpractices.com

KAESER COMPRESSORS®

We've shared more than just advertising space.

Consulting Services • **Compressor Products** • Clean Air Treatment Products • Control Products

To you, optimal efficiency is a benefit. To our engineers, it's an obsession.

See the results of Kaeser's relentless, ongoing push for the ultimate in compressor performance, efficiency and functionality.

See it in our optimized Sigma™ Profile, a Kaeser design innovation that delivers more air for less energy at lower airend speeds. See it in the engineering ingenuity of our Sigma™ Frequency Control compressors, simply the best variable-frequency drive machines on the market today. You'll also see it in our Sigma-Control™ "smart" PC-based controls and communications that match compressor output with varying demand levels.

Those are just the latest in a long line of Kaeser-engineered advances that are continually setting new standards in developing quieter, more efficient, and more practical compressed air solutions. For more information, or the name of a Kaeser distributor near you, call, FAX or e-mail us today.

For 20 years, Kaeser and CABP have shared a mission: to educate, to innovate, and to push the boundaries of system efficiency.

Here's to the next two decades of Best Practices.

When Your Line Can't Stop, Your Air Can't Fail.

When every minute of uptime counts, your compressor needs to be the most **dependable asset** on your floor. This is where Kaeser's **proven reliability** changes the ROI equation.

Built to withstand the rigors of **continuous industrial operation,** Kaeser's **engineering** eliminates the typical vulnerabilities that lead to downtime. Look beyond the purchase price.* With Kaeser, you aren't just buying a compressor; you're **securing your facility's productivity.**

Stop letting your compressor dictate your output. See the Kaeser difference.

* A compressor that's cheaper at purchase can easily become 50% more expensive after its first hour of unplanned downtime. Let's look at the **Total Cost of Ownership** together—**is your current system actually saving you money?**

Subscribers From Around the World

We salute all Best Practices Magazine subscribers from around the world who own, operate, maintain, engineer and provide expertise for the on-site utilities (compressed air, nitrogen generation, vacuum, blowers, chillers, cooling towers and pumps) powering modern plant automation. This subscriber-driven monthly column hopes to build community and recognize all subscribers!

Our sales team had the pleasure of stopping by CompressAir's office in La Porte, IN. This family-owned company has been in operation since 2005 and distributes Sullair reciprocating, rotary screw, centrifugal and portable air compressors. It has two locations serving Northern Indiana and Chicagoland, and takes pride in helping customers reduce energy costs and increase efficiency. Pictured here are Maverick Crowl and Steve Hill (top row, left to right), and Tyler Crowl, Nate Schweder, Brittany Smith and Joe Emerick (bottom row, left to right). Visit https://www.compressair.net.

We're proud to count these members of the U.S. Army Corps of Engineers Jacksonville District as subscribers. Don Beter (left) is a Mechanical Engineer, while Andrei Burke (right) is a Mechanical and Fire Protection Engineer. The district focuses on coastal protection, water management and Everglades restoration. Our Publisher met with them during a work trip to Florida. Visit https://www.saj.usace.army.mil.

American Air Compressor's two locations are in Jacksonville and Orlando, FL, and the company has over 20 years of experience working with manufacturing clients. It provides design, installation, maintenance and repair services, and distributes ELGi and Ozen air compressors and compressed air dryers. Pictured here are Alex Potter, Janice Potter, Alex Espura, Heather Slosser, Ken Atwood and Caleb Jackson (left to right). Visit https://americanaircompressorfl.com.

Submission Guidelines

We invite our subscribers to send in pictures so we can see the people who read our Best Practices magazines! Those holding a recent magazine issue will receive first consideration. Please send a high-resolution picture as a JPG with a note describing the team and company to Troy Dreier at troy@airbestpractices.com.

Stevanato Group is an Italian multinational with pharmaceutical and engineering divisions. Our Publisher toured its pharmaceutical plant in Fishers, IN, which was built with a variety of energy-saving best practices. We hope to profile the plant in a future issue. Pictured here are James Hurdle, Maisa Kent-Doolan, Clint Morris, David Mull, Reese Ricketts, Jacob Brown and Martin Williamson, employees of EMCOR Services, Shambaugh Group, who are embedded at the plant. Visit https://www.stevanatogroup.com.

Chad Gooding, President, G3 Industrial Solutions, attended the Best Practices 2025 EXPO and Conference in October, and was one of the many independent compressed air system sales and service providers who helped make it a success. His company has 12 locations in Kansas, Missouri and Oklahoma, distributing ELGi reciprocating, rotary screw and portable air compressors, BAUER high-pressure air compressors and Hanwha centrifugal air compressors. Visit https://www.g3industrialsolutions.com.

POWERING INDUSTRY WORLDWIDE WITH COMPRESSED AIR SOLUTIONS

CENTRIFUGAL, ROTARY, AND RECIPROCATING AIR COMPRESSORS

As part of the global Fusheng Group, FS-Curtis and FS-Elliott deliver a complete portfolio of compressed air solutions. Our U.S. manufacturing, proven reliability, and engineering expertise help keep critical industries running.

Learn more at fscurtis.com and fs-elliott.com

FSCURTIS | FSELLIOTT

NEWS Compressed Air Industry & Technology

Kaeser Launches MOBILAIR M76 Portable Air Compressor Offering Pressure Flexibility and All-day Operation

Kaeser Compressors announced the MOBILAIR M76 portable air compressor, a versatile and rugged unit engineered for endurance. This addition to the Kaeser Mobilair line delivers flows up to 270 cfm.

The M76 features the company's pV technology and provides superior pressure flexibility. Two variable pressure ranges – 100 to 150 psig and 145 to 200 psig (7 to 10 barg and 10 to 14 barg) – allow users to easily adjust air pressure.

"With Kaeser's exclusive pV technology, included in the Sigma Control Smart air compressor controller, you can easily adjust air pressure in 1 psi increments, making this unit extremely versatile for many applications," said Chance Chartters, MOBILAIR Sales Manager, Kaeser Compressors.

Kaeser's MOBILAIR M76 portable air compressor

At its heart is a heavy-duty, 4-cylinder Kubota diesel engine that meets Tier 4 Final EPA emissions standards. This rugged, fuel-efficient engine is integrated with an extra-large, 34-gallon fuel tank to provide up to nine hours of continuous operation on a single fill. The M76 also features an energy-efficient Sigma Profile airend, a high-capacity cold-start battery and an anti-frost valve protecting air tools from freezing up during cold weather usage.

Designed for easy maintenance and user-friendly operation, the M76 has large, wide-opening enclosure doors for ready access to all components. A lifting eye and a height-adjustable hitch with a rigid tow bar make transporting easy.

This model is ideal for a variety of applications, including underground utilities, sandblasting and general construction. The M76 is now available for order. For more information, visit https://www.kaeser.com.

BEKO USA Introduces Tools+ Mobile App to Streamline Access to Sales and Technical Tools

The updated BEKO USA Tools+ app, now available on Android and iOS, brings the company's powerful online tools straight to users' fingertips. Whether they're in the office or in the field, they'll have instant access to resources helping them work smarter, faster and more efficiently.

BEKO's exclusive Online Dealer Resources portal is designed specifically for the company's business partners. They receive access to dealer-only content created to support sales, marketing and technical needs, including online inventory, product lead time charts, free e-learning and scratch and dent sales.

Available online tools include downloadable brochures and marketing materials, product manuals and technical documentation and a convenient conversion tool. It also provides direct contact information for Regional Sales Managers, order fulfillment and the technical service team. For more information, visit https://www.beko-technologies.us.

FS-Elliott Announces Compressor Maintenance Co. as Channel Partner

FS-Elliott announced Compressor Maintenance Co. as its newest authorized channel partner in the United States. Based in Westminster, MD, Compressor Maintenance Co. will represent FS-Elliott across Delaware and designated counties within Maryland and Pennsylvania.

This partnership brings together two experienced organizations to deliver reliable, energy-efficient centrifugal air compressor solutions and comprehensive service support to customers.

Compressor Maintenance Co. is a trusted provider of compressed air system services, specializing in maintenance, repair and system optimization. With decades of industry experience, the company supports a wide range of air compressor technologies and is known for its responsive service, technical expertise and commitment to maximizing equipment performance and uptime.

As part of the partnership, Compressor Maintenance Co. will offer a range of services to support expanded compressed air needs, including new system consultation, centrifugal compressor maintenance and repair, system audits and performance optimization, preventive maintenance programs, emergency service support, factory-trained service technicians, OEM parts and technical support and compressed air system troubleshooting and diagnostics.

"We are pleased to welcome Compressor Maintenance Co. as our newest channel partner," said Mark McCarthy, Manager, Channel Development Sales, FS-Elliott. "Their strong service capabilities and dedication to customer support align well with our mission. We are confident this partnership will further enhance the value and responsiveness we deliver to our customers." For more information, visit https://www.fs-elliott.com.

Representatives from Compressor Maintenance Co. met with FS-Elliott instructors to complete onboarding training at FS-Elliott global headquarters in Export, PA.

Hertz Kompressoren Unveils New Generation EAGLE Series of Oil-free, Rotary Screw Air Compressors

Hertz Kompressoren is strengthening its presence in the American industrial market with the introduction of the New Generation EAGLE series oil-free, rotary screw air compressors. Designed for critical applications, the EAGLE series delivers certified oil-free air in accordance with ISO 8573-1 Class 0 standards, combining durability, efficiency and intelligent performance.

In industries such as food and beverage, pharmaceuticals and high-tech electronics, air quality is a critical requirement. The New Generation EAGLE series is engineered to minimize contamination risks while supporting consistent production quality. With a focus on delivering dependable oil-free air, the company helps protect both processes and end products.

At the core of the EAGLE Series is an advanced rotor design featuring stainless steel special material (SmartCoat) coating. Unlike conventional materials that may be susceptible to corrosion during downtime, these high-pressure stage rotors are engineered for long service life and high resistance to wear. This ensures reliable start-up performance and operational continuity, even after extended shutdown periods. The New Generation EAGLE series uses a high-performance Hi-Precooler System and the unit masters thermal management before it ever becomes a problem.

Commanding the air compressor is a state-of-the-art 7-inch touchscreen TFT display. Featuring Dual PID Control, the system adjusts in real time to a facility's demands, maintaining perfect pressure and temperature with surgical precision. When paired with variable speed drive technology, the New Generation EAGLE Series can cut energy costs by 35%.

"The EAGLE Series isn't just a piece of machinery; it's a commitment to American manufacturers who refuse to compromise on quality," said the Hertz Kompressoren team. "With this New Generation EAGLE, we've combined engineering precision with the rugged reliability the U.S. market demands." For more information, visit https://www.hertz-kompressoren.com.

Hertz's New Generation EAGLE series oil-free rotary screw air compressor

Atlas Copco Group Acquires German Filter Distributor Zind Verfahrenstechnik

Zind Verfahrenstechnik, a German filter distributor, has become part of Atlas Copco Group. Zind is located in Mainz and was founded in 1998. It has 11 employees. The company distributes filter cartridges and capsules for air, gas and process liquids, filter housings and associated spare parts. Zind's customers are mainly industrial manufacturers in sectors such as pharmaceutical, water, electronics and food and beverage, as well as general industry.

"We are pleased to welcome Zind to the group. This acquisition is fully in line with our ambition to further enhance our process filtration solutions and will strengthen our presence in Germany," said Philippe Ernens, Business Area President Compressor Technique.

The purchase price is not disclosed. During 2024, the company had revenues of approximately 6.8 MEUR (78 MSEK*). The business has become part of the Medical Gas Solutions division within the Compressor Technique Business Area. For more information, visit https://www.atlascopcogroup.com.

SMC®

Airline Components

Air Dryers

In-Line Air Filter/ Clean Glass Filter

Air Tanks/ After-coolers/ Pressure Booster Regulator

Air Management System

SMC Corporation of America

Offering All of Your Energy-Saving, Efficient, and Sustainable Air Production Solutions

Providing clean, dry air is essential for reliable and efficient industrial automation as it protects pneumatic components, sensors, and control systems from contamination and moisture damage. By removing water, oil, and particulates, it helps prevent corrosion, sticking valves, and premature wear—reducing unplanned downtime and maintenance costs. Consistent air quality also improves process precision and repeatability, ensuring equipment operates at optimal performance.

SMC's line of Airline Components provide clean dry air and extends the lifespan of automation assets while supporting higher productivity and product quality.

Air Preparation Filters

Moisture Removal

Auto Drains

Thermo Chillers

www.smcusa.com

800 • 762 • 7621

Automation
Controls
Process

NEWS Compressed Air Industry & Technology

Indiana Manufacturers Association Partners with Best Practices 2026 EXPO & Conference in Indianapolis

The Best Practices 2026 EXPO & Conference announced the Indiana Manufacturers Association (IMA) as a supporting organization. The event takes place Oct. 13-15 at the Indiana Convention Center in Indianapolis. Andrew Berger, President and CEO, IMA, will be a featured speaker at the conference.

IMA's mission is to champion the needs of its members, advocate for policies supporting a competitive business environment and provide valuable resources and networking opportunities to help manufacturers thrive.

The Indiana Manufacturers Association is a supporting organization of the Best Practices 2026 EXPO & Conference in Indianapolis.

"The Indiana Manufacturers Association is proud to support the Best Practices EXPO & Conference as it brings world-class expertise in industrial utilities to Indianapolis. In today's competitive landscape, Indiana manufacturers are constantly looking for ways to optimize their operations and reduce energy costs. This event provides a vital platform for our members to discover the latest technologies and 'best practices' that will drive efficiency and strengthen the future of manufacturing across the state," said Andrew Berger, President and CEO, IMA.

Andrew Berger, President and CEO, IMA

Designed for facility maintenance, plant engineers, energy managers and distributor sales engineers, the Best Practices 2026 EXPO & Conference is devoted to sustainable, safe and reliable on-site industrial plant utilities powering automation – including compressed air, nitrogen, HVAC/process cooling and blower/vacuum systems. Attendees will learn how to save energy and water, increase uptime and reduce product rejects through educational sessions led by industry thought leaders and interactive workshops.

"Manufacturing's percentage of total GDP in Indiana is at the very top in the U.S., and we're looking forward to bringing our 'Best Practices' partners to the state for the first time," said Roderick M. Smith, Publisher, Best Practices Magazines & EXPO. "Optimizing chilled water, compressed air, blower, vacuum and nitrogen systems offers low-hanging fruit opportunities to make every manufacturer more profitable and competitive. We're proud to be an associate member of IMA and hope our expertise will benefit manufacturing plant members."

Secure Super Early Bird rates when you book by June 30. Contact Kimberly Hill for group discounts at kimberly@airbestpractices.com. Register at https://cabpexpo.com/registration-2026.

John Bouchard & Sons Releases Richly Illustrated Story of the Mid-South's Infrastructure History

One of the Mid-South's oldest family-owned firms has created a sweeping photographic and narrative volume, revealing how its people, innovations and grit help shape life in the region – 12 decades strong and going.

John Bouchard & Sons – Since 1900 is a richly illustrated chronicle, published by Grandin Hood, capturing 125 years of industrial craftsmanship, generational leadership and infrastructure development. In great detail, the book depicts the company's evolution from a small 1900 machine shop on Nashville's Harrison Street to a fifth-generation, diversified enterprise serving thousands of industrial, municipal and commercial customers from five regional offices.

This meaningful contribution to the historic record of America traces the JBS journey from John Bouchard's 19th-century immigrant dream story to the modern industrial projects of today. Filled with colorful characters and dangerous episodes, risks taken and loyalties held, the book offers a vivid display of the hard work that keeps mechanisms, and consequently society, running through booms, wars, recessions, floods and generational shifts. The company's story ties together much of the region's significant institutions and history – like unseen wires connecting circuits to power.

John Bouchard & Sons – Since 1900 *is available for purchase online and in a number of local book stores.*

Walk a Nashville sidewalk or drive any street in the Mid-South, and there's a good chance you will pass over manhole covers, valve boxes or drainage grates from the John Bouchard & Sons foundry. If you haven't noticed them yet, you probably will now. These serve as an integral yet often unnoticed component of the region's infrastructure.

If you had family members living in Nashville at any time since 1900, it's a safe bet they drank clean water, rode in elevators, worked in fire sprinkler–protected offices or enjoyed air-conditioned hospitals, movie theaters and schools thanks to the work of Bouchard. As historian John Egerton said, "The family-owned business has helped mechanize the city."

Readers are taken inside mechanical rooms, rooftops, foundries, fabrication floors and job sites where industrial tradespeople kept essential systems running – often without recognition but always with extraordinary skill (and usually humor). The book reveals how JBS infrastructure work has supported regional icons, including Oak Ridge National Laboratory, Memphis International Airport, Redstone Arsenal and Vanderbilt Hospital. For more information, visit https://jbouchard.com.

Yaskawa America Expands Its Industrial AC Drive Lineup with the Addition of the GA501 AC Microdrive

The Drives & Motion Division of Yaskawa America announced the newest addition to its industrial AC drive lineup, the GA501 Industrial AC Microdrive with Embedded Ethernet. Available for sale and shipment today, the GA501 is engineered for modern industrial automation and handles any industrial application thanks to its embedded dual-port Ethernet capability. With support for all major industrial Ethernet protocols, the GA501 eliminates the need for additional hardware, reduces installation time and simplifies system design.

The GA501 integrates seamlessly into a network via EtherNet/IP™, PROFINET®, Modbus TCP/IP, EtherCAT®, BACnet/IP® or MECHATROLINK-4, all within a single AC drive. Customers can reduce installation time with dual-port Ethernet connections, standard DIN rail mounting for up to 7.5 horsepower (hp) and spring-tension I/O terminals. With support for all major industrial Ethernet protocols and topologies, the GA501 eliminates the need for additional hardware, reduces installation time and simplifies system design.

The Yaskawa GA501 Industrial AC Microdrive with Embedded Ethernet

The GA501 can be part of any industrial internet of things (IIoT) via a variety of industrial protocols. Select from the six on-board network protocols with a simple DIP switch.

Available ratings include IP20/Open Type enclosure: 240 VAC single-phase: 1/6 to 5 hp, 240 VAC three-phase: 1/6 to 30 hp and 480 VAC three-phase: 1/2 to 40 hp. Motor operation up to 40 hp includes induction (IM), permanent magnet and synchronous reluctance (SynRM).

The GA501 is designed to let operators program a unit without power applied, using the DriveWizard® Mobile application. With power applied, the innovative LED status ring and network status LEDs display drive status at a glance. For more information, visit https://www.yaskawa.com.

Ozen Air Technology Announces OAMG-N2 Series Nitrogen Generator

Ozen Air Technology launched the OAMG-N2 series nitrogen generator, following its acquisition of Mentis Engineering in 2024. Designed to serve nitrogen applications in food and beverage, electronics, laser cutting, pharmaceutical, chemical, oil and gas and other industries, the OAMG-N2 series is now available worldwide.

Featuring serial pressure swing adsorption (SPSA) technology, the OAMG-N2 series is equipped with an integrated desiccant dryer that uses the nitrogen generator's purge oxygen and trace gases to regenerate it. This design ensures zero-loss, clean, dry air delivery with PdP -40°F (-40°C) to the nitrogen generator and decreased compressed air consumption up to 15% for desiccant dryer regeneration.

The OAMG-N2 series has 12 standard models, achieving flow rates from 50-812 scfm at 95% purity and 6-100 scfm at 99.999% purity. Higher-capacity solutions are also available upon request, as well as oxygen generator solutions.

Ozen Air Technology's OAMG-N2 series nitrogen generator

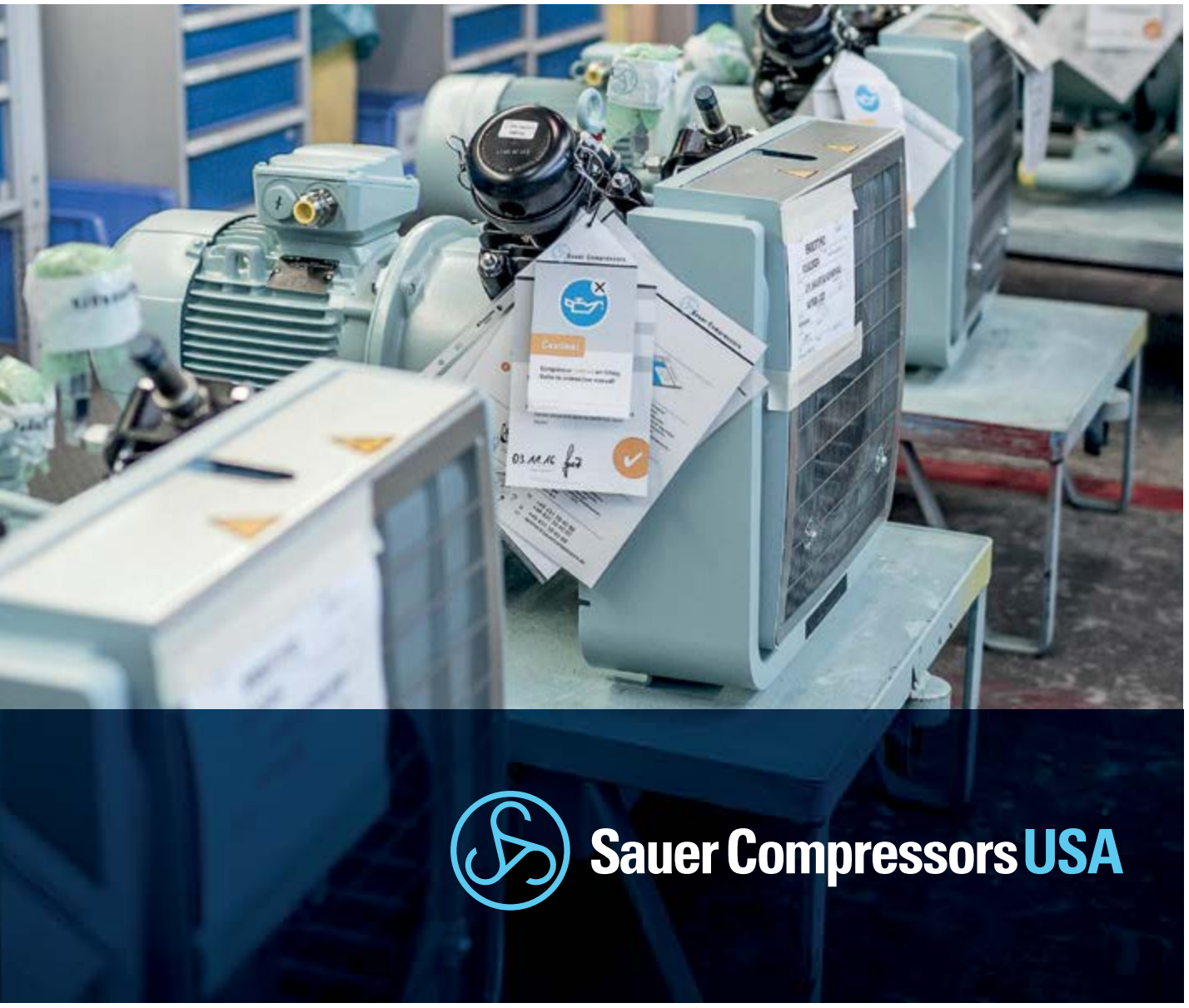
Standard features include a Siemens PLC with 7-inch color touch screen, integrated inlet and outlet filtration, an integrated desiccant dryer for -40°F (-40°C) nitrogen output dew point, plug-and-play skid design, zirconium-type oxygen/nitrogen purity quality sensor, stainless steel valves and piping, continuous monitoring of pressure and purity and flow consumption.

"We are focused on providing durable, reliable and affordable nitrogen solutions with low lead times for our partners. In most cases, our customers see a full return on their investment within the first 24 months compared to buying bulk nitrogen," said Camilo Villalobos, VP and General Manager, Ozen Air Technology. For more information, visit https://www.ozenairtech.com.


Two Decades of Trust,
One Powerful Partnership...
410-604-3142
www.sauerusa.com
235 Log Canoe Circle, Stevensville, MD

For over two decades, Sauer Compressors USA has cultivated a strong and mutually beneficial relationship with Compressed Air Best Practices, reinforcing its position as a trusted leader in high-pressure compressor solutions. Through consistent collaboration, Sauer has been able to share technical expertise, highlight innovative solutions, and showcase real-world applications to a highly targeted audience of industry professionals. This long-standing partnership has enhanced Sauer's visibility, strengthened its credibility in the compressed air community, and provided valuable opportunities to engage with customers, distributors, and decision-makers. In turn, it has supported continued growth, brand recognition, and a reputation built on performance, reliability, and excellence under pressure.

Congratulations Compressed Air Best Practices on 20 years, and many more to come!



NEWS Chiller & Cooling Industry & Technology

Sterling Re-engineers and Expands GPL and LHE Chiller Lines for Food and Beverage Production

Sterling has expanded its range of GPL Packaged Chillers and LHE Central Chillers with features ideal for food and beverage production.

Sterling equipment delivers the consistent performance and precision required to meet the strict standards of highly regulated manufacturing environments. Sterling glycol chillers are engineered for cooling jacketed vessels that hold heated ingredients in food production.

GPL and LHE chillers support applications including chocolate, candy, baked snacks, fruit, ingredients, grain, dairy, meat, beer brewing, wine fermentation, distilleries and pet food.

Both lines of chillers can use R-410A or the more environmentally friendly R-454B refrigerant. R-454B is a low-GWP refrigerant meeting the stricter environmental requirements of 12 U.S. states and Canada.

For its GPL chillers, Sterling has added a remote-cool option available in 10 to 60 tons of capacity. This option allows heat to be released outdoors by locating the chiller condenser outside production facilities while the chiller remains indoors.

Sterling's GPL Packaged Chillers

The GPL line expansion complements the air- and water-cooled GPL models released in 2025. The capacity of those models is 5 to 60 tons. All GPL chillers can also be adapted for full outdoor use, with both chiller and condenser located outside the production facility. GPL chillers operate in a fluid temperature range from 20°F to 80°F (-7°C to 27°C).

Sterling completely redesigned its GPL chillers to include user-friendly features such as easier access to components for faster maintenance, a color touch screen for the controller, a standard audible/visual alarm and lower height for larger models to facilitate shipping.

LHE Central Chillers are available in 20 to 60 ton sizes. While re-engineered to use low-GWP refrigerant, the line retains the key benefits of central chillers: high efficiency and modular expandability. These chillers are for indoor use only.

"At Sterling, we specialize in delivering comprehensive process solutions that power productivity and precision across a wide range of manufacturing industries," said Bill Bruhn, Senior Product Manager, Sterling. "We serve a diverse array of industries, including highly regulated markets like food and beverage, pharmaceutical and plastics." For more information, visit https://www.sterlco.com.

Taco Offers Customized, Packaged HVAC Skid Systems for Industrial Applications

Taco introduced a line of packaged HVAC skid systems, providing a broad range of pre-engineered, pre-assembled and customized mechanical solutions for light-commercial and industrial applications. These systems are based entirely on design and performance requirements.

The Taco skid packages offer factory quality and reliability, reduced installation time and cost, decreased engineering involvement and design effort, space optimization, simplified project management, modularity and scalability and safety and compliance advantages. All skid systems are built and fabricated at the Taco HydroFlo facility in Lubbock, TX.

Packaged HVAC skid system from Taco

"We engineer all facets as single-source manufacturing, typically populated with – but not limited to – Taco-manufactured components such as pumps, circulators, heat exchangers, tanks, hydro separators and domestic water pressure boosting," said Ric Turmel, SVP, Taco Engineered Building Solutions. For more information, visit https://www.tacocomfort.com.

CTI Announces Adiabatic Fluid Cooler Thermal Performance Certification Program

The Cooling Technology Institute announced its thermal performance certification program for adiabatic fluid coolers is anticipated to launch this summer as part of its existing certification program based on CTI Standard 201.

This well-established program currently includes open- and closed-circuit cooling towers and dry fluid coolers. Both forced and induced draft, adiabatic pad-type fluid coolers will be covered by this new certification program, cooling either water or aqueous glycol solutions. By purchasing a CTI-certified model, an owner/operator has assurance their heat rejection device will perform thermally as specified.

Currently, there are 113 manufacturers along with 34 private brand affiliates participating in the Thermal Certification Program across the globe. The program covers 305 certified open- and closed-circuit cooling tower and dry cooler product lines available to the market, comprising a total of over 93,000 individual models. All manufacturers interested in certifying their cooling tower, dry cooler or adiabatic fluid cooler product lines are invited to do so by filling out the thermal certification inquiry form.

The current versions of STD 201 OM (operations manual) and STD 201 RS (ratings standard) documents are available for a nominal charge on the CTI Marketplace. Also available are the associated Acceptance Test Codes (ATC), such as ATC 105 DS for dry coolers and ATC-105 Adiabatic for adiabatic fluid coolers. For more information, visit https://www.cti.org.

Carrier Depot Opens in Central Florida to Support Emergency Cooling Needs for Businesses Across Region

Carrier opened a 12,000-square-foot rentals depot in Central Florida as part of an ongoing investment supporting commercial businesses and government agencies responding to short-term needs and disaster response. The facility includes three acres of storage housing generators, chillers and other large pieces of equipment that can be deployed within hours.

Carrier's Central Florida rentals depot

In recent years, the company has invested tens of millions of dollars into its nationwide network of rental depots, upgrading facilities and purchasing new equipment to better support construction projects, planned shutdowns, equipment failures and special events. The depot is also positioned to respond following a hurricane or other natural disaster.

"There is no business too small or too large for our support," said Jerry Stoll, General Manager, Carrier Rentals and Spot Coolers. "Carrier has invested in our rentals organization to bolster our commitment to our customers to be there when they need us the most. Whether planned or unplanned, we help keep your facilities operational even in the worst of times."

The Florida Depot, near Bartow, FL, one of 13 locations across the United States, is strategically located between Interstates 75 and 95 to support quick delivery of equipment across the southeastern U.S. and the Caribbean.

Depots stock both Carrier and partner equipment, including air- and water-cooled chillers, generators, cooling towers, air handlers, boilers and heaters. The Florida depot supports numerous businesses in the southeast, including theme parks and resorts, airports, schools, retailers, data centers and manufacturing and agricultural facilities. For more information, visit https://www.carrier.com.

Armstrong Fluid Technology Announces Danilo Elez as Chief Executive Officer

Armstrong Fluid Technology announced the appointment of Danilo Elez as Chief Executive Officer. In this role, Elez will lead the company's next phase of growth and innovation. Elez joins Armstrong at a pivotal moment in its history, recognizing the company's clear differentiation in system-level fluid flow. This deep expertise connects system design and analytics to improve performance across the entire lifecycle of a building.

The company's solutions support the infrastructure behind buildings and mission-critical applications worldwide, touching millions every day. That impact comes with a responsibility to optimize energy use, accelerate sustainability and decarbonization globally.

Elez brings extensive experience in the HVAC and building technologies industries, with senior leadership roles at Trane, KONE and Johnson Controls. He has led global organizations and is known for driving sustainable growth, strengthening operational performance and integrating engineered products with services, digital capabilities and system-level solutions. His leadership approach and experience align closely with Armstrong's strategy and values.

Since its founding in 1934, the company has remained privately held, enabling a long-term perspective grounded in its core values of learning, innovation, community and service. For more information, visit https://armstrongfluidtechnology.com.

Sullivan Palatek
AIR COMPRESSORS

SULLIVAN PALATEK
AIR COMPRESSORS

PORTABLE LINE UP

D185PIZ4	
HP	CFM
49	185
PSI	ENGINE MAKE
100	ISUZU TF4

D300PD2KR	
HP	CFM
74	300 | 230
PSI	ENGINE MAKE
100 | 150	REHLKO T4F

D375PHKR & D375PHHKR	
HP	CFM
134	375 OR 350
PSI	ENGINE MAKE
150 OR 200	REHLKO T4F

D210UHJD5	
HP	CFM
74	210
PSI	ENGINE MAKE
100 | 150	JOHN DEERE T4F

INDUSTRIAL LINE UP

LEGACY SERIES	
HP	CFM
15 - 40	50.1 - 154.5
PSI	
125 - 150	

SP13 SERIES	
HP	CFM
40 - 60	131.4 - 266.6
PSI	
100 - 175	

SP16+ SERIES	
HP	CFM
75 - 125	338 - 530
PSI	
125	

SP25 SERIES	
HP	CFM
200 - 350	933.8 - 1540.3
PSI	
100 - 175	

VIEW OUR FULL PORTABLE LINE UP

VIEW OUR FULL INDUSTRIAL LINE UP

★ PROUDLY ★
AMERICAN
★ MADE ★

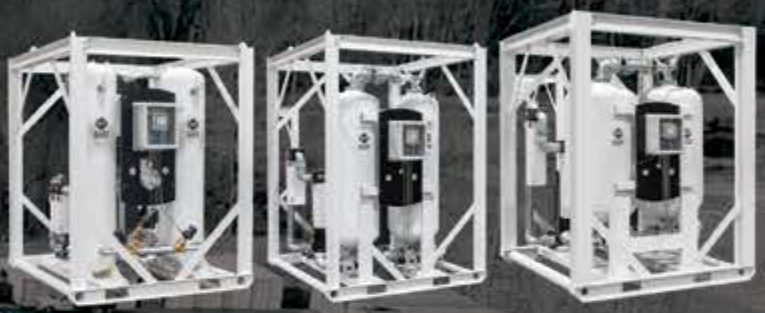
Proudly built in the USA, Sullivan-Palatek compressors represent a commitment to quality, craftsmanship, and reliability that stands above the rest. By manufacturing domestically, we maintain strict control over every component and process—ensuring consistent performance, faster lead times, and dependable support when it matters most. It's more than where our machines are made—it's a promise of durability, accountability, and strength you can trust on every job.

ADD-ON SOLUTIONS

Complete your system with Sullivan-Palatek's full line of filters, separators, and accessories—engineered to improve air quality, protect equipment, and extend system life. With high-efficiency filtration and advanced oil-water separation technology, these add-ons remove contaminants, reduce maintenance, and ensure compliance with environmental standards—all while maintaining optimal system performance.

RENTAL DRYERS

Built for flexibility and performance, our rental dryers deliver clean, dry air when and where you need it most. Ideal for temporary operations, shutdowns, or emergency backup, these units are designed for quick deployment and dependable operation in demanding environments. From moisture removal to protecting downstream equipment, they keep your air sy stem running efficiently—without interruption.



ADD-ON SOLUTIONS

RENTAL DRYERS

PUT AMERICAN MADE POWER TO WORK TODAY

219-874-2497 | sullivan-palatek.com | info@palatek.com

NEWS Industrial Energy & Water Conservation

Whirlpool Corporation Updates Emissions Targets and Shares Progress in Corporate Responsibility Impact Report

Whirlpool Corporation, a leading global manufacturer of home appliances, released its 2025 Corporate Responsibility Impact Report, detailing progress on its sustainability goals across its product innovation, operational performance and value chain initiatives. The company also introduced updated near-term greenhouse gas emissions reduction targets for 2030 and a new long-term milestone for 2050, validated by the Science Based Targets initiative (SBTi). These targets reflect continued gains in appliance efficiency and operational emissions reduction and reinforce Whirlpool Corporation's commitment to net zero.

In 2025, the company made notable achievements toward its sustainability goals, including reducing Scope 1 and 2 market-based emissions by 6% compared to 2024 and by 57% since 2021. It also matched 80% of the electricity consumption across its global operational footprint with renewable energy sources.

Whirlpool Corporation's global headquarters in Benton Harbor, MI

The company will build on this momentum with new goals, all from a 2021 base year. Goals include reducing operational emissions (Scope 1 and 2) by 65% by 2030 and reducing emissions from the use of sold products (Scope 3, Category 11) by 25% by 2030. The company plans to reduce Scope 1 and 2 emissions and key Scope 3 emissions by 90% by 2050.

"We remain firmly committed to continued progress in emissions reductions," said Beat Stocker, Senior Director of Global Sustainability, Whirlpool Corporation. "Our updated, independently validated targets align with the latest science and build on our progress to enable practical, business-balanced emissions reductions across our operations, products and supply chain." For more information, visit https://www.whirlpoolcorp.com.

Bona Releases 2025 Sustainability Report, Sharing 46% Reduction in Scope 1 and 2 Greenhouse Gas Emissions

Bona, a global, family-owned company supplying products for installing, renovating, maintaining and restoring premium floors, has published its 2025 sustainability report. The report outlines the company's progress and highlights the continued integration of sustainability into all aspects of its operations.

In 2025, Bona reduced total Scope 1 and 2 greenhouse gas emissions (market-based) by 46% compared to its 2022 baseline, reaching 1,338 tonnes of CO_2 – surpassing its 2025 target. At the same time, the company improved energy efficiency, lowering total energy consumption to 11,777 MWh and reducing energy intensity to 456 kWh per tonne of produced product, despite higher sales volumes. Renewable energy accounted for 67.7% of total consumption.

Beyond its own operations, Bona advanced efforts across its value chain. The company completed a screening of Scope 3 emissions and strengthened engagement with key material and transport suppliers. A new supplier evaluation process, covering 70% of purchases in 2025, supports responsible sourcing and transparency.

"Our business is built on extending the life of existing flooring materials and reducing the need for replacement," said Lidija Broström, Interim CEO, Bona. "At Bona, we are making steady progress in reducing our impact while building a stronger foundation for the future. By working closely with our partners, we aim to drive meaningful change across our value chain and contribute to a more sustainable future." For more information, visit https://www.bona.com.

Bona's U.S. headquarters in Englewood, CO

Coats Releases 2025 Sustainability Report, Achieving Key 2026 Targets One Year Ahead of Schedule

Coats Group, a Tier 2 supplier of critical components to the apparel and footwear industries, announced the publication of its 2025 sustainability report, highlighting substantial progress against its sustainability pillars, with early achievement of several 2026 targets.

Coats' textile-to-textile thread

The company is committed to reducing its Scope 1 and 2 emissions across operations, while also accelerating its transition to renewable energy on its path to net zero. In 2025, it reduced Scope 1 and 2 emissions by 30%, surpassing its 22% reduction target for 2026. The company contracted enough certified renewable electricity and generated enough solar power to cover more than 60% of its global electricity use. It also received SBTi validation for its 2030 Scope 1, 2 and 3 emissions reduction targets and 2050 net zero goal.

The company was featured on the CDP's A list for the first time, achieving an A- rating for Climate Change and an A rating for Water Security.

"Exceeding several of our 2026 targets ahead of schedule shows what's possible when ambition is matched with disciplined execution and collaboration across our value chain," said Chris Dearing, VP Group Sustainability, Coats. "Although this year's results reflect outstanding progress, we know there's even more work to do and remain fully committed to driving impact-led sustainability across the industry." For more information, visit https://www.coats.com.

Kimball Electronics Releases 2025 Annual Sustainability Report and Announces CDP List Rankings

Kimball Electronics, a global, multifaceted manufacturer offering electronics manufacturing services and contract manufacturing organization solutions, announced the release of its 2025 Guiding Principles Report. Themed "Building Tomorrow, Together," the report outlines progress on environmental, social and governance initiatives, and reflects the company's continued focus on the issues mattering most – where it can make a meaningful and lasting difference for people and the environment, while supporting long-term business success.

The company shared Scope 1 and 2 emissions declined 9.3% year-over-year, advancing the company toward its 2.7°F (1.5°C)-aligned target of a 42% absolute reduction by 2030 from a 2024 baseline and supporting its long-term target of net zero by 2050. Renewable electricity reached 37%, representing a 12% year-over-year increase supported by expanded on-site solar and renewable energy credit procurement. This supports the company's 2030 target to achieve 100% renewable electricity across all locations. Finally, Kimball Electronics reported 12% recycled water, supporting its 2030 target to recycle one-third of water globally with an emphasis on high-stress locations.

The company earned an A- Leadership level score in CDP Climate Change and improved its CDP Water Security score to A- Leadership level from B in the prior year.

"'Building Tomorrow, Together' is more than a theme for this year's report. It is the way we lead. In 2025, we reaffirmed our commitment to shaping a sustainable future alongside our stakeholders and reinforced a principle that guides our execution: Control what we can control," said Richard D. Phillips, Chief Executive Officer, Kimball Electronics. "We kept our focus on the elements making a difference for people and the planet, and we did so with the consistency our stakeholders expect." For more information, visit https://www.kimballelectronics.com.

KEEP YOUR COOL

SAVING ENERGY, EXTENDING SERVICE LIFE FOR COMPRESSORS

YASKAWA SUCCESS STORIES

An industrial compressor manufacturer aimed to reduce energy costs and maximize efficiency in its oil-injected rotary screw compressors by integrating variable frequency drives.

By pairing the GA800 AC Drive with modern software tools, Yaskawa delivered a solution that brought big wins for the compressor manufacturer.

CHALLENGE

While variable frequency drives (VFDs) offer significant efficiency gains, they can be sensitive to harsh environments—excessive heat, dust, moisture, or debris can impact their performance and longevity. Proper system design and environmental protection are essential to ensure reliable operation.

Additionally, integrating VFDs into oil-injected rotary screw compressors presents unique challenges. These compressors rely on internal oil circulation and fan-driven cooling, which may not function effectively at lower speeds. Prolonged low-speed operation can lead to overheating or insufficient lubrication, putting the compressor at risk.

SOLUTION

To demonstrate durability in tough conditions, Yaskawa provided field-serviceable GA800 Industrial VFD samples, known for their ruggedness and reliability. Designed for longevity, the GA800 features maintenance-friendly elements like easily replaceable cooling fans. The customer worked with Yaskawa through a full validation process, including heat runs, load cycling, and capacity reviews, which the GA800 passed with flying colors.

To address cooling challenges in oil-injected rotary screw compressors at variable speeds, Yaskawa used simulation software to fine-tune settings in a lab, avoiding production downtime. The optimized program was deployed via virtual commissioning, ensuring a smooth, disruption-free startup.

RESULTS

Using Yaskawa's simulation software, the team identified optimal operational settings in a lab environment, eliminating the need for on-site trial and error. These settings were verified and loaded into the initial drive through virtual commissioning, resulting in a smooth, disruption-free startup. As a result, the compressors now run more efficiently, consume less energy, and experience reduced mechanical stress, extending equipment lifespan and improving long-term reliability.

COMPANY HIGHLIGHTS

The company is a global supplier of high-quality industrial compressors, with manufacturing and service facilities located wherever air distribution products are in demand.

Its solutions help drive more efficient compressor performance across a wide range of industries, including manufacturing, food processing, automation, lumber cutting, agriculture, machine tools, petrochemicals, and pharmaceuticals.

For more Yaskawa success stories, visit: https://www.yaskawa.com/products/drives/success-stories

YASKAWA

POWER HAS COME FULL CIRCLE

GA800 AC DRIVE FOR INDUSTRIAL APPLICATIONS

Your time is valuable. The easy-to-use GA800 AC Drive from Yaskawa gives you the power to make all of your operations better.

- Rest easy with legendary Yaskawa quality and embedded functional safety.
- Experience ultimate ease-of-use with DriveWizard® Mobile and optional Bluetooth® connectivity.
- Enjoy incredible torque production and network connectivity.

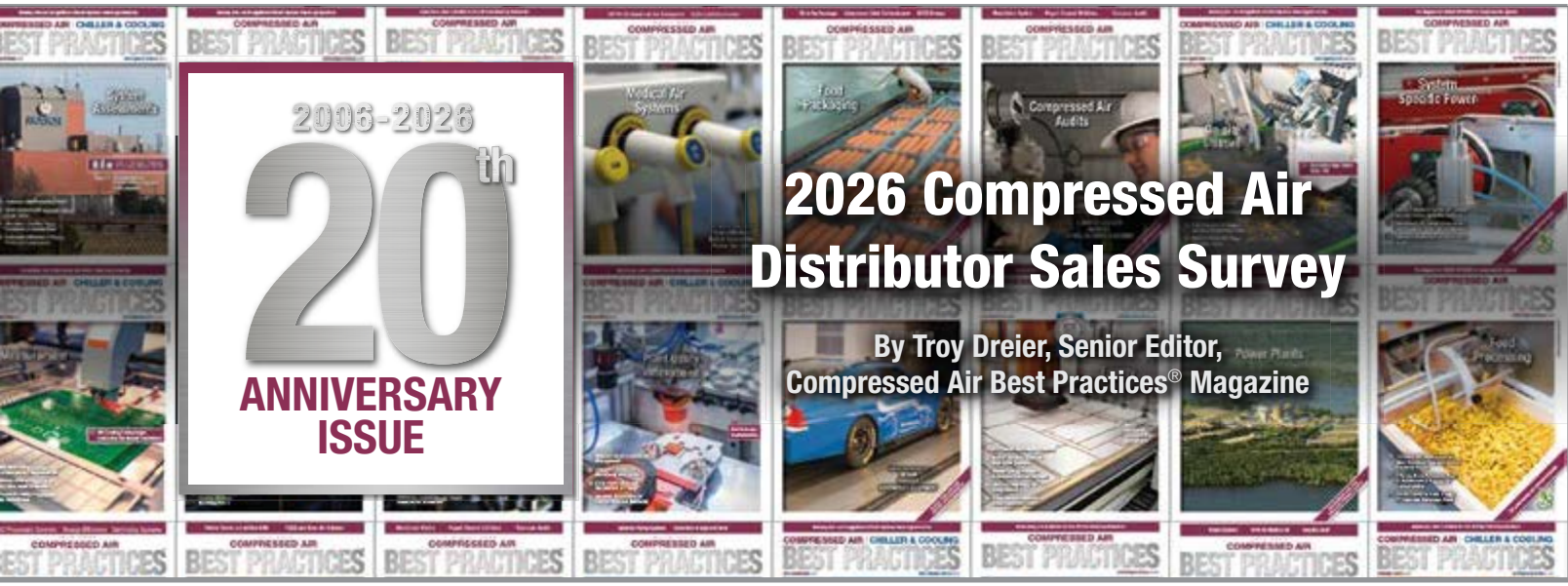
Your days are complicated enough. Let us help simplify them. To learn more, visit or call Yaskawa today at 1-800-YASKAWA.

200 - 240 VAC: 1- 150 HP
380 - 480 VAC: 1 - 1000 HP

FOR MORE INFORMATION:
https://www.yaskawa.com/ga800

IT'S PERSONAL

Yaskawa America, Inc. 1-800-YASKAWA
Email: info@yaskawa.com | yaskawa.com



2026 Compressed Air Distributor Sales Survey

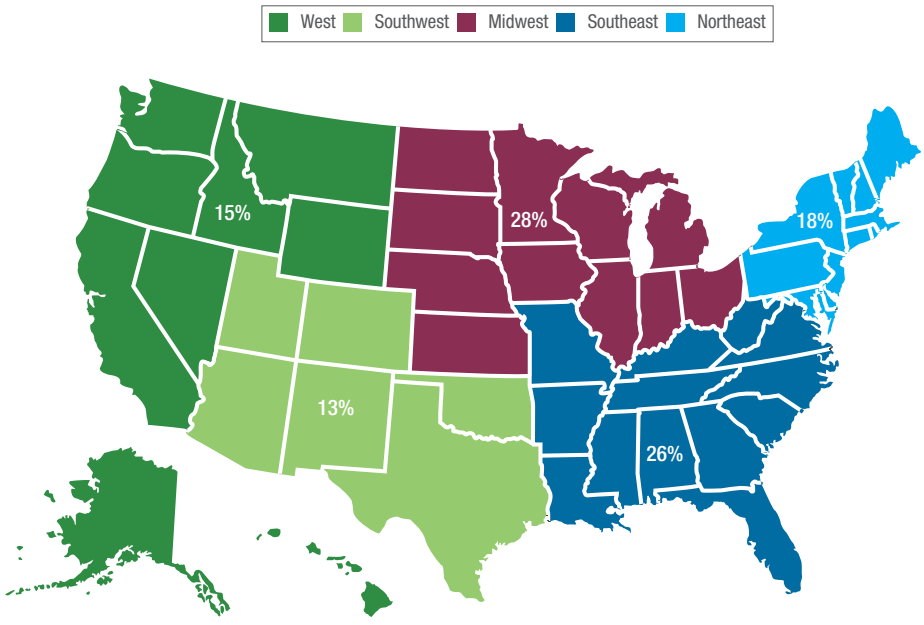
By Troy Dreier, Senior Editor, Compressed Air Best Practices® Magazine

Compressed Air Best Practices® Magazine has conducted its first-ever reader survey for this 20th anniversary issue, and the results show a positive outlook for compressed air system sales in the near future.

We surveyed 1,951 *Compressed Air Best Practices® Magazine* subscribers who work for *independent* compressed air system sales and service companies in the United States. The goal of our survey is to understand sales forecasts, product line trends and challenges facing revenues. Job titles of those surveyed included territory sales engineers, directors of sales and general managers. The survey was conducted over the last week of March and the first week of April 2026. In all, 89 subscribers responded, representing nearly 5% of the surveyed group.

Survey Demographics

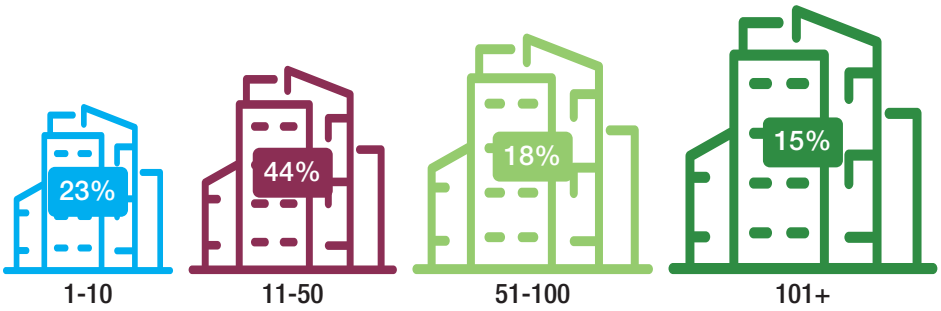
In what U.S. region does your business mostly operate?



The survey's first questions look at the demographics of the survey group. The largest block (28%) comes from the Midwest, followed by 26% in the Southeast, 18% in the Northeast, 15% in the West and 13% in the Southwest.

Over half of the respondents are in the Midwest or Southeast, which is understandable given the number of compressed air equipment manufacturers, independent compressed air distributors and manufacturing plants in both parts of the country.

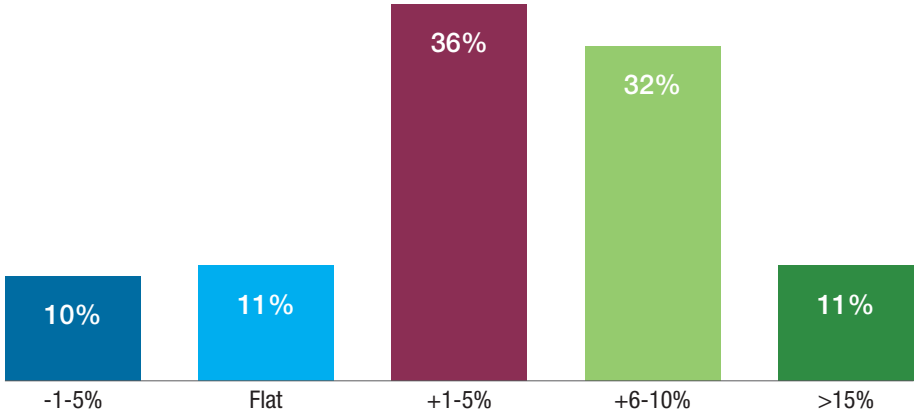
How many total employees work at your firm?



Over two-thirds of respondents work at companies with 50 or fewer employees: 44% have 11 to 50 employees and 23% have 1 to 10 employees. An additional 18% work at companies with 51 to 100 employees, and only 15% work at companies with 101 or more employees.

Company Forecasts and Challenges

Forecast the percent sales revenue change in 2026 compared to 2025 for your firm or territory in all compressed air system products.

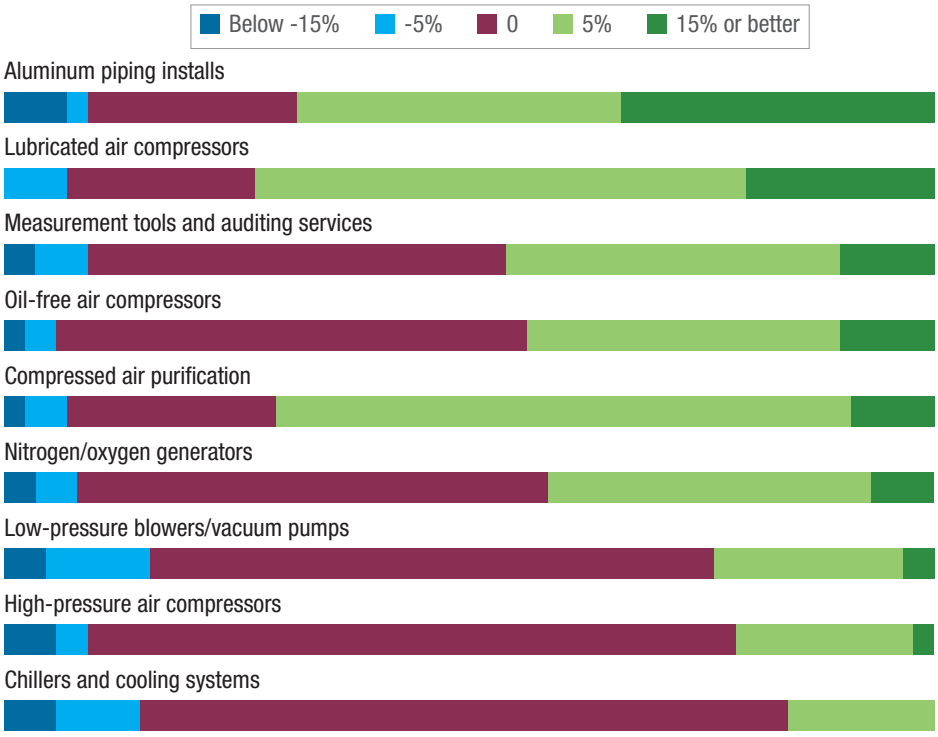


Over three-quarters of respondents forecast increased sales in 2026. Asked about the expected revenue change between 2025 and 2026 for all compressed air system products, 32% said they expected 6 to 10% growth, 36% expect 1 to 5% growth and 11% expected over 15% growth. Only 11% said they expected sales to remain unchanged, while 10% expected sales to diminish by 1 to 5%.

For this question, we dug into the geographies of the respondents to see which region was the most bullish about 2026 sales revenue. The Southwest was the most optimistic, with 92% forecasting an increase in sales. After that, came the Midwest at 83%, the Northeast at 79%, the West at 77% and the Southeast at 65%.

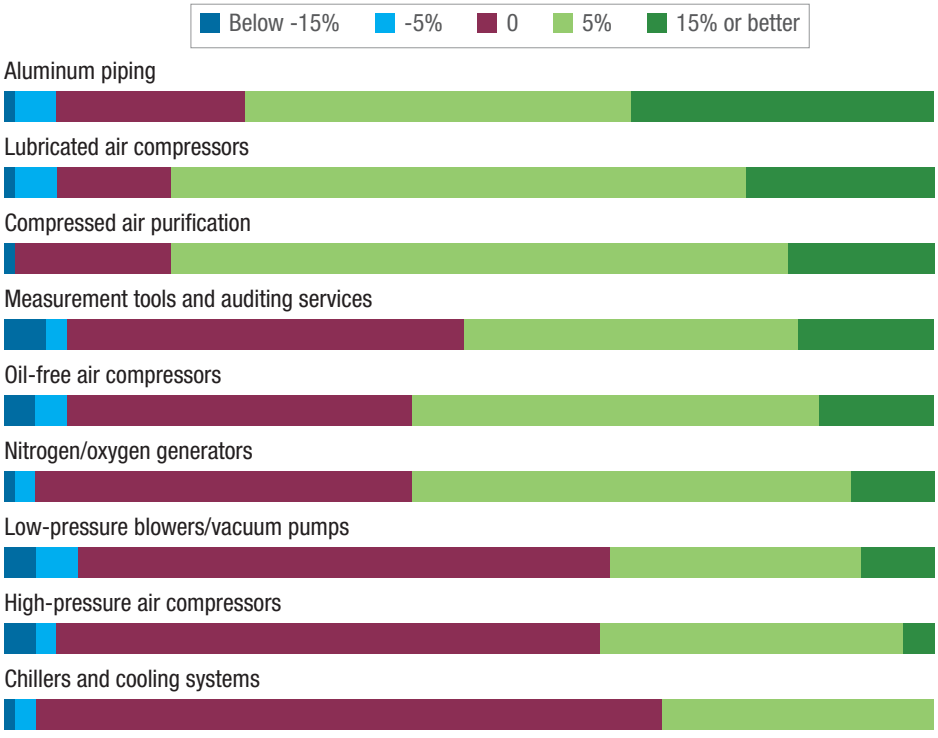
2026 Compressed Air Distributor Sales Survey

What was the percentage change for each of these product lines over the past 12 months?



We asked respondents the percentage change for compressed air system components for the previous 12 months. Components showing the strongest increase included compressed air purification products, lubricated air compressors, oil-free air compressors, aluminum piping, measurement tools and nitrogen or oxygen generators. Several product categories showed flat growth – including high-pressure air compressors, low-pressure blowers and vacuum pumps and chillers and cooling systems – but that could be because some respondents don't carry those products and simply indicated a neutral response.

What percentage change do you forecast for these product lines over the next 24 months?



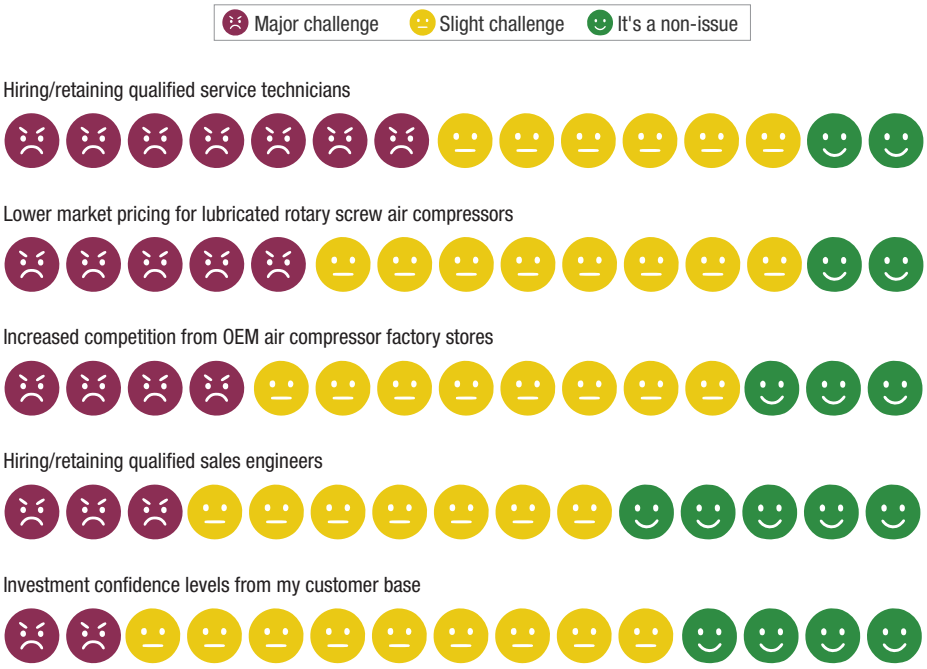
Looking to the future, we asked about the percentage revenue change predicted for compressed air system product lines over the next 24 months. We saw the strongest expectations for compressed air purification, lubricated air compressors, aluminum compressed air piping, measurement tools and nitrogen or oxygen generators.

As with the previous survey question, several product categories showed largely flat growth predictions. This could be because some respondents don't carry those products and chose to indicate a neutral response.

How much of a challenge are the following items to your business?

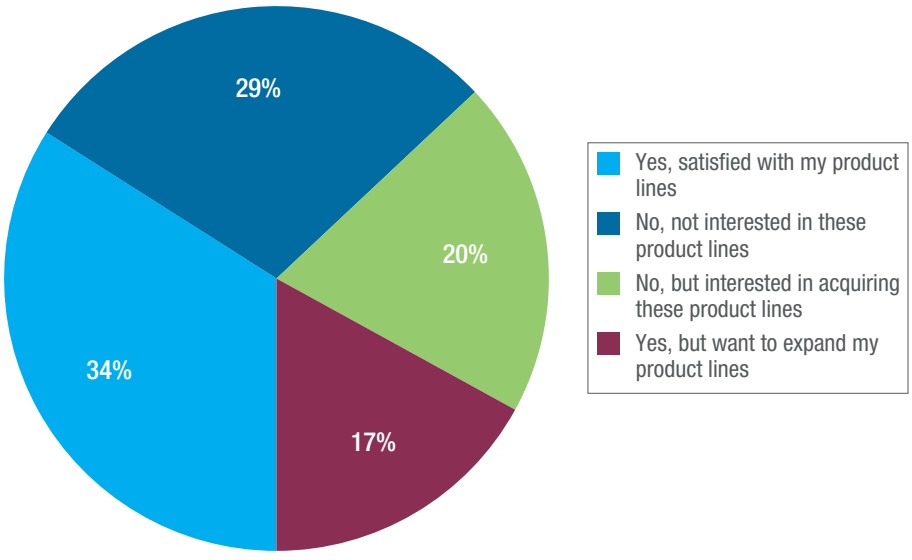
We also asked about the biggest challenges in running a compressed air system sales and service company, and discovered the biggest headache for respondents is hiring and retaining qualified service technicians. That was followed by lower market pricing for lubricated rotary screw air compressors, increased competition from OEM air compressor factory stores, hiring and retaining qualified sales engineers and investment confidence levels from the customer base.

The fact that investment confidence was the lowest-ranked major challenge could suggest healthy demand levels for products.



Does your firm sell chillers and/or cooling towers?

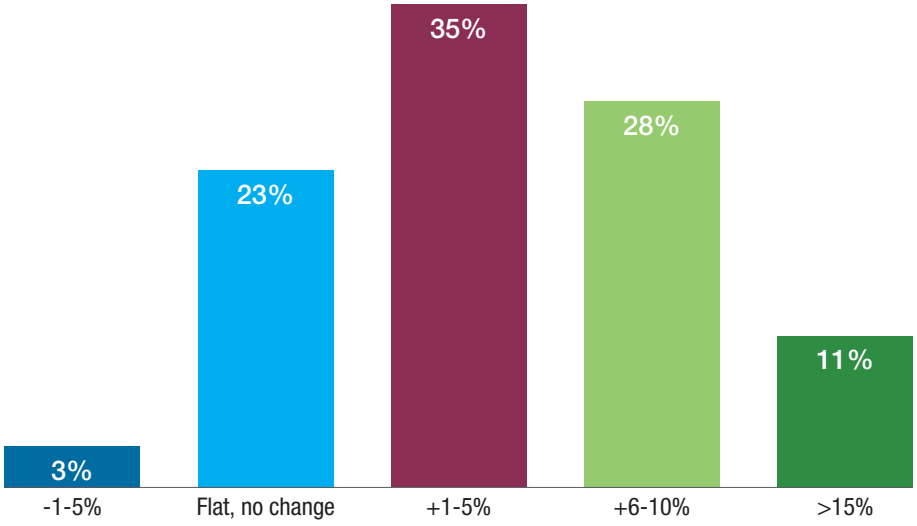
Diversification into cooling systems seems to be establishing itself, with a lot of room for growth. 34% of respondents replied they are already engaged in selling chillers and/or cooling towers. 17% said they're engaged, but want to expand their cooling product lines. While 20% replied they are not in the cooling business, they're interested in representing these product lines. Only 29% didn't carry these lines and weren't interested in doing so.



2026 Compressed Air Distributor Sales Survey

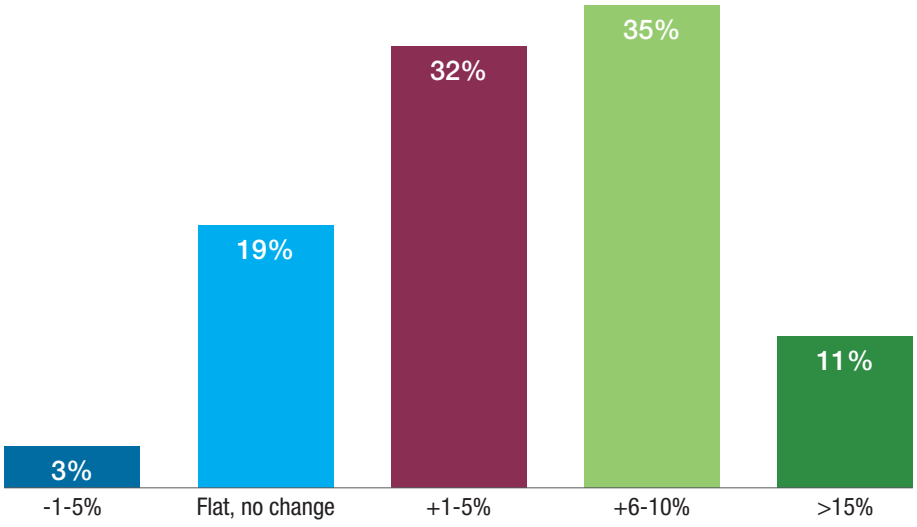
Lubricated Air Compressors

Forecast percent sales revenue change in 2026 compared to 2025 for lubricated rotary screw/vane/scroll air compressors (under 25 hp).



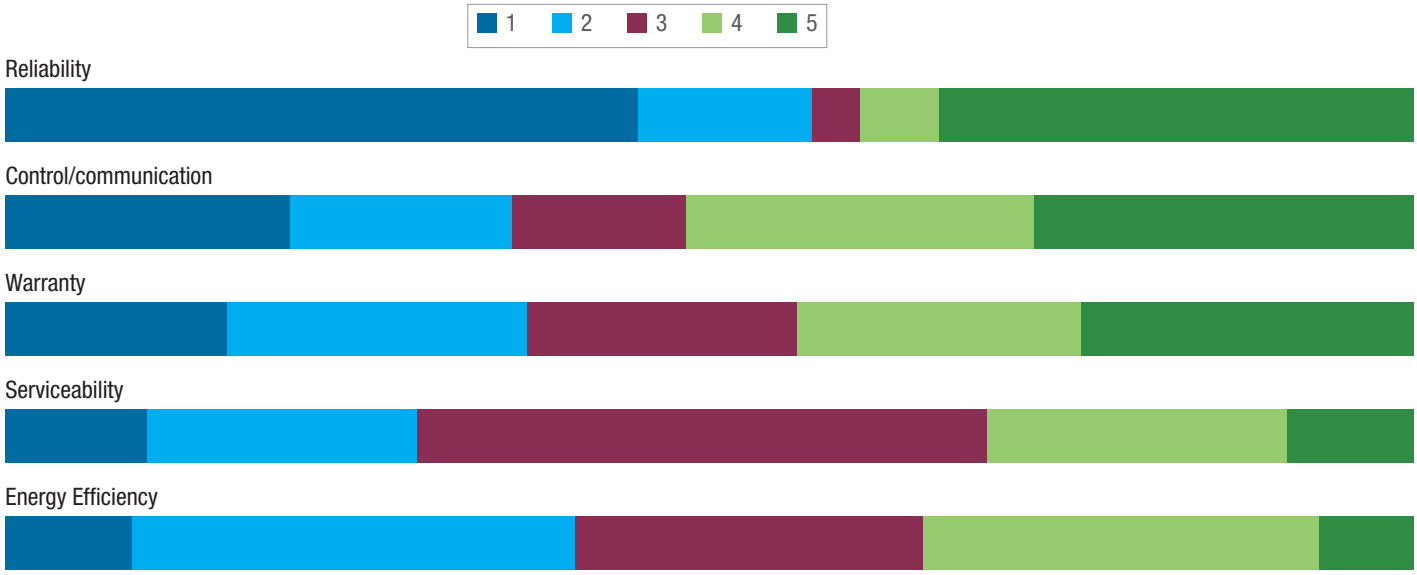
Asked to forecast the sales revenue change for lubricated 25 horsepower (hp) or under rotary screw, vane or scroll air compressors for 2026 compared to 2025, over 74% see sales increasing, with 11% seeing sales increasing by 15% or better. This confirms the long-standing trend of rotary screw air compressors replacing reciprocating air compressors.

Forecast percent sales revenue change in 2026 compared to 2025 for lubricated rotary screw/vane/scroll air compressors (30-200 hp).



When asked about lubricated 30-200 hp rotary screw, vane or scroll air compressors, over 77% see sales increasing in 2026, with 11% predicting sales will increase by 15% or better. We were pleasantly surprised to see sales growth confidence in larger horsepower machinery sales exceed the confidence in smaller horsepower sales.

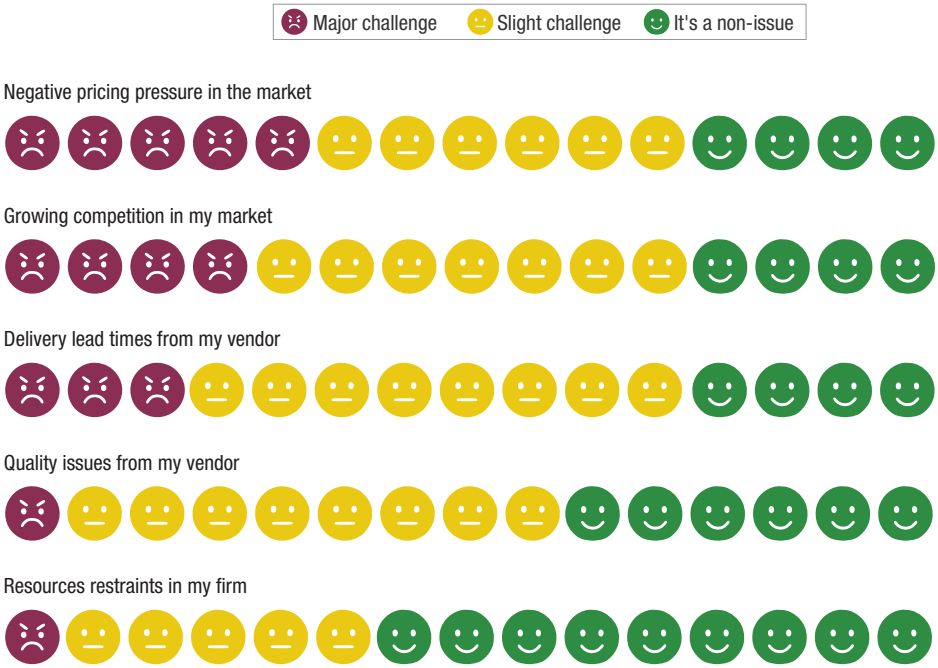
Rank from 1 to 5 (1 being highest) the product features most important to buyers of lubricated air compressors (30-200 hp)?



What features are buyers looking for in a 30-200 hp lubricated air compressor? We presented respondents with five options – reliability, control/communication, warranty, serviceability, energy efficiency – and asked them to rank these features in importance from one to five, with one being the most important and five the least important. The results weren't as clear with this question. Reliability was ranked first or second far more often than the other choices, but it was also ranked fifth more often than the other choices. Perhaps the respondents who ranked it fifth think lubricated air compressor reliability is strong enough across the board that it's no longer a buying consideration. The other four options received roughly the same number of combined first- and second-place rankings, with energy efficiency narrowly edging out the others. While energy efficiency has the lowest number of first-place votes, it takes the second spot when we add in second-place rankings.

2026 Compressed Air Distributor Sales Survey

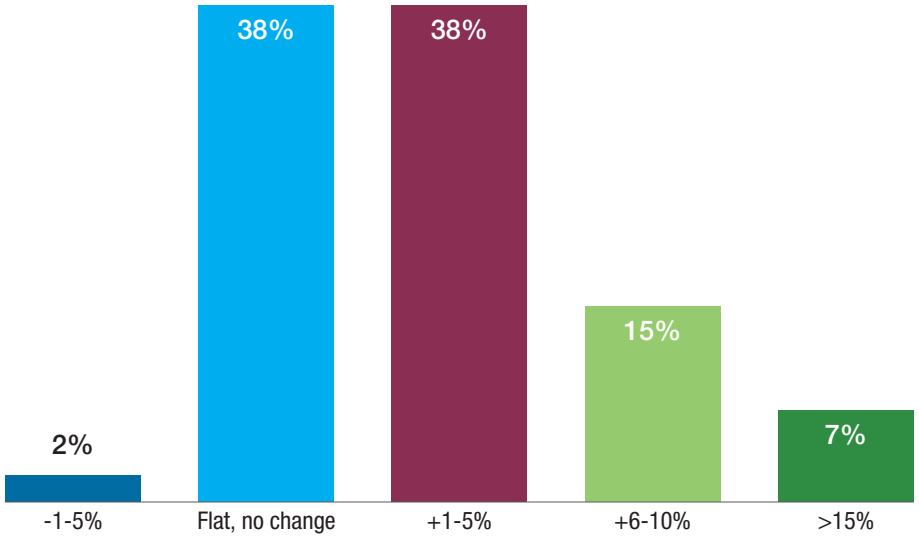
How much of a challenge are the following issues when selling lubricated air compressors (30-200 hp)?



The biggest challenge in selling 30-200 hp lubricated air compressors is negative pricing pressure in the market, respondents said. That was followed by growing competition in the market. The issues of delivery lead times from vendors and quality issues from vendors were more often seen as slight challenges. Few saw resource constraints in their companies as a challenge.

Oil-Free Air Compressors

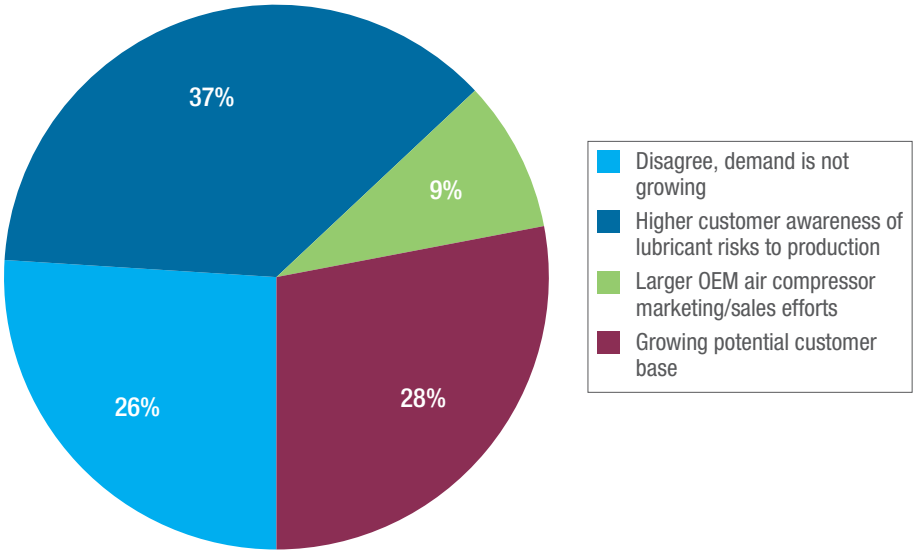
Forecast the percent sales revenue change in 2026 compared to 2025 for oil-free rotary screw/scroll air compressors.



Asked about the expected change in revenue for oil-free rotary screw or scroll air compressors for 2026 compared to 2025, 60% see sales increasing, with 38% forecasting a 1-5% improvement, 15% forecasting a 6-10% improvement and 7% forecasting an improvement of 15% or better. A significant 38% forecast flat sales.

Why is demand for oil-free rotary screw/scroll air compressors growing?

Why is the demand for oil-free rotary screw or scroll air compressors growing? 74% of respondents agreed with the question's premise, that demand is indeed growing, with the largest share (37%) saying it was thanks to higher customer awareness of lubricant risks to production. Next, a growing potential customer base for oil-free air compressors was cited by 28% of respondents, while 9% said the growing demand for oil-free air compressors is due to the marketing and sales efforts or larger air compressor OEMs.



To read similar articles on ***Air Compressor Technology,*** please visit https://www.airbestpractices.com/technology.

We'd like to thank all who participated in our inaugural compressed air distributor sales survey and made it a success. This is valuable compressed air industry data unavailable anywhere else, and we appreciate all the respondents who provided confidential insights into their businesses. Congratulations to David Sullivan, President – Industrial Products, Atlas Machine & Supply, the randomly chosen winner of our drawing for a $100 Amazon gift card.

Our next compressed air distributor sales survey will appear in the January/February 2027 issue of *Compressed Air Best Practices® Magazine*. If you're a subscriber and work for an independent compressed air system sales and service company in the United States, please watch for an email later this year asking for your participation. BP

Visit our Webinar Archives to listen to expert presentations on ***Air Compressor Technology*** at https://www.airbestpractices.com/webinars.

Thought Leaders on System Optimization Past & Future

Industry experts reflect on the past 20 years of system optimization, then predict what the next 20 years will bring.

Edited by Troy Dreier, Senior Editor, Compressed Air Best Practices® Magazine

As *Compressed Air Best Practices® Magazine* celebrates its twentieth anniversary, we wanted to take a moment to reflect on the remarkable system efficiency gains achieved since our first issue. We also wanted to give subscribers a peek at what the next decades might bring. To do this, we asked a hand-selected list of original equipment manufacturers, independent compressed air system sales and service companies, manufacturing plants and independent system auditors to share their thoughts, highlighting the changes they've seen over the past 20 years, then predicting what the next 20 years will bring.

A Shift to Total Cost of Ownership

Frank Mueller, *President, Kaeser Compressors*

We congratulate *Compressed Air Best Practices® Magazine* on 20 years of serving the compressed air, blower and vacuum industry. Reflecting back on the past 20 years, we've seen several major mergers as well as the emergence of new competitors. From a technical perspective, we've seen some real innovation as well as fads that came and went, but two overarching trends stand out as major wins for the customer.

Firstly, we've seen a shift away from comparing unit specs towards evaluating the total cost of ownership. There have been big improvements in air compressor efficiency, but fortunately, we've replaced outdated measures of efficiency (remember "brake horsepower"?) with verifiable performance (kW/cfm). More importantly, the focus has shifted from individual air compressor efficiency to system-level performance. Advanced tools for designing compressed air systems, combined with better installation practices, have raised the bar for the entire industry.

Another significant area of change has resulted from the myriad advances in computing, communications and sensor technology. Better onboard sensors and controls now help protect the machinery and allow remote monitoring for better reliability and uptime. Likewise, the introduction of more accurate downstream pressure, flow and air quality sensors provides real-time information on system function and allows allocation of compressed air costs to specific production lines.

Looking ahead, we expect the adoption of IIoT (industrial internet of Things) to accelerate as advancing communications, sensor technology and AI improve reliability through predictive maintenance. The benefits of remote monitoring and integrating compressed air into production controls will continue to improve energy efficiency, air quality, pressure stability and overall productivity.

We also expect to see more adoption of less conventional, more comprehensive solutions. These include compressed-air-as-a-service (CAaaS), such as Sigma Air Utility, and complete engineered compressed air systems delivered on site, ready to operate. These are designed to better control the operating environment to ensure reliability, offer more predictable compressed air costs and be

This 3,000 cfm compressed-air-as-a-service utility was delivered ready-to-run in two custom all-weather enclosures.

flexible for changing plant needs. They reduce CAPEX for new equipment or construction. As industrial workforces become leaner, CAaaS allows customers to focus on their core business rather than system maintenance.

In short, customers will more and more depend on compressed air professionals to be partners in solving challenges, rather than just vendors. *Compressed Air Best Practices® Magazine* has been vital in this evolution, keeping the industry informed of the technologies and ideas that drive U.S. manufacturing forward.

Transformation in PET, Sustainability and Manufacturing

Eric Baronnet, *PET Blowmolder and Injection Specialist, Nestlé Waters*

The past two decades have reshaped the global food and beverage industry, and nowhere is this transformation more visible than in PET packaging and manufacturing efficiency.

For Nestlé Waters, this era marks a decisive shift from output driven industrial performance toward precision, sustainability and intelligent operations, balancing environmental stewardship with world class productivity.

In the early 2000s, PET bottles were heavier, more energy intensive and produced on equipment designed for volume rather than efficiency. Lightweighting quickly became a breakthrough innovation: Advances in preform engineering, the introduction of recycled PET (rPET), bottle eco design evolution and stretch blow molding reduced bottle weights by 30-50% across formats. These improvements cut plastic use, lowered transportation emissions and significantly reduced the total cost.

Simultaneously, manufacturing technology underwent a fundamental leap. High pressure air recovery, servo controlled stretching, optimized oven designs and variable frequency drives significantly lowered the energy footprint of blow molding. Blowing pressure requirements, once 508-580 psig (35-40 barg), have steadily decreased, and next generation blowers are expected to run below 218 psig (15 barg), delivering another major step forward in efficiency.

Compressed air utilities have followed a similar trajectory. New PET platforms should operate with a low-pressure supply below 73 psig (5 barg). At the same time, both high and low pressure compressed air systems have seen substantial improvements in the energy ratio.

Nestlé Waters works closely with leading suppliers to develop and optimize the next generation of air compressors, targeting higher efficiency and improved integration into future low pressure blowing technologies.

The last decade introduced a new frontier: data driven performance management. Real time monitoring, automated quality control, and predictive maintenance helped factories operate with greater consistency and fewer disruptions. Line efficiency increased, changeovers accelerated and scrap rates declined, lowering the cost of producing a liter while elevating manufacturing discipline. This was supported by Nestlé's broader sustainability strategy, integrating renewable electricity, optimizing water use and mobilizing global energy expert networks to accelerate best practice deployment.

Nestlé Waters & Premium Beverages

Looking ahead, the next 20 years will redefine PET and manufacturing once again. Circularity will dominate: Large scale rPET adoption, chemical recycling and mono material solutions will reshape packaging sustainability. AI will take center stage in production, enabling digital twins, self stabilizing process loops and fully connected line ecosystems. Energy use is expected to fall further as electrification, heat recovery loops, thermal process optimization and low pressure molding technologies mature.

Our "Reduce, Rethink, Replace" CO_2 reduction framework – paired with renewable energy investments – will anchor the next phase of transformation.

Manufacturing excellence will depend on aligning environmental responsibility, resource efficiency and competitive cost structures.

The last 20 years have revolutionized PET production. The next 20 will redefine what responsible, low carbon, high efficiency manufacturing can achieve, setting new standards for the entire industry.

unipipe®

ALUMINUM PIPING SYSTEM

Six Options • Many Applications

AIR | NITRO | VAC | HP | OIL | COMING SS IN 2027










NO SPECIAL TOOLS NO SPECIAL SKILLS

ONE SCAN. ALL THE GOODS.

Customer Support: Drawings • BOMs • Take-Offs
STEP Files • Submittal & Technical Specs • Price Lists
Videos & Animations • Demo Kit Request Form

IN STOCK

SHIPS FAST

Orders Received By 12PM CST

- **24 HOURS** $10K ORDERS OR LESS
- **SAME DAY** $2.5K FITTING ORDERS OR LESS
- **48 HOURS** $50K ORDERS OR LESS

GUARANTEED
20 YEAR WARRANTY
NOT TO LEAK OR FAIL










NO CRIMPING NO GROOVING NO LUGGING

Thought Leaders on System Optimization Past & Future

Compressed Air: Past Lessons, Future Opportunities

Maggie Rios, *VP Marketing and Communications, Atlas Copco Compressors*

Over the past 20 years, compressed air has quietly gone from being a basic utility to something much more critical across food and beverage, manufacturing and automotive operations. What used to be a "set it and forget it" system is now something companies actively manage and optimize. Energy efficiency has been a major driver of that change. Variable speed air compressors help reduce wasted energy, while oil-free compressed air systems have become essential for maintaining product quality in food and beverage environments. In manufacturing and automotive plants, the addition of sensors and monitoring tools has made it easier to catch issues early and avoid costly downtime.

Another big shift has been the role of data. Compressed air systems are now connected, which means operators can see how their systems perform in real time. That visibility has changed how decisions are made. Instead of reacting to failures, teams can plan maintenance and adjust based on actual usage. Efficiency has also become a much stronger focus than it used to be. Companies are looking closely at how much energy their compressed air systems consume and finding ways to improve performance, whether that's through more efficient equipment or recovering heat that would have been wasted in the past.

Looking ahead, the next 20 years will likely bring even more integration and automation. Compressed air systems will continue to become smarter, with artificial intelligence helping fine-tune performance based on demand. In food and beverage, there will be even tighter control over air quality and traceability. Manufacturing environments will rely more on fully connected systems communicating with each other, and automotive production will keep evolving alongside the shift toward electric vehicles.

There is also a noticeable shift toward e-commerce to stay aligned with how customers are evolving technologically. Atlas Copco has expanded its digital platforms to better match the expectations of modern buyers who prefer connected, self-service experiences. By investing in e-commerce, we aim to make it easier for customers to explore products, configure solutions and handle orders within a fully digital environment. This approach reflects a broader move toward speed, transparency and accessibility. Customers increasingly expect intuitive tools, real-time information and seamless support that fits into their own digital workflows without unnecessary delays.

Inside a modern air compressor room at Atlas Copco, where advanced engineering meets efficiency.

While compressed air may appear to sit behind the scenes, it plays an active role in how modern industries operate and plan for the future.

Compressed Air Basics Will Always Matter

Doug Barndt, *Senior Manager, Campbell Soup Company*

The basics of compressed air management remain fundamental and yet easier said than done without organizational understanding, alignment and commitment to details. The end goals are system performance, reliability and lower total cost of ownership. Having a written standard is essential for decisions. The standard should be specific in criticality but have flexibility for anomalies. Having a long-term, trusted, objective compressed air professional partner is highly recommended to fill end-user gaps and blind spots. Planning, having accurate system data, objective analysis of options and systematic critical thinking are also essential to decision making, where ignorance, urgency, lower cost and easier implementation can pressure success.

Supply system components should be designed for current needs but also considered for potential future changes. A simple compressed air system with less equipment is a theme. Provide physical access for maintenance and replacements. Common component cautions are pressure drop, receiver capacity, pipe sizing, type and layout and the final feet of delivery to point-of-use applications, especially for older systems. Condition the compressed air per clear end-user quality needs. Try to operate with two or three air compressors (and without the need for master controls), and wisely design and choose the turndown method. Having continuous header flow volume and pressure in a data historian is important for performance and energy efficiency management. Be intentional about backup and contingency plans.

Compressed air demand is often an unwise low priority and a supply-side afterthought. Instead, demand excellence should be the expectation. Have a written plan in the formal project management program for fixing and keeping artificial demand to a minimum. Do not allow long-term compressed air assists to help with mechanical problems that can be addressed otherwise. Purposely buy pneumatic equipment and work with suppliers strategically to require less compressed air volume and pressure, even if it may result in a higher purchase cost. Regulate compressed air to the required pressure. Know which equipment and applications are prone

to pneumatic problems, such as cleaning a VFD to prevent early failure from heat.

The past 20 years' reflections still apply to the future, especially with cost and resource pressures. AI and machine learning with monitoring data can probably lead to better efficiency and system monitoring, as well as fewer unfavorable surprises. Having an effective and lower-cost project management program could be challenging, as industry trends toward higher-cost comprehensive service programs, yet effectiveness is pressured by employee turnover. Having proficient service techs and quicker turnaround times on parts and service are risks.

Efficiency and Lifetime Costs Guide the Way for Plant Operators

David C. Andrews, *VP, Global Marketing and Communications, Hitachi Global Air Power*

Thinking back 20 years, my musical mind immediately starts humming along to the Beatles and Sgt. Pepper: "It was 20 years ago today…"

My thoughts settle on two major industry factors: a massive shift in the competitive set and an aging workforce.

The competitive set in the industry has seen both consolidation and proliferation. On the one side, we've seen massive consolidation as major air compressor manufacturers have consolidated additional products and lines in the compressed air space, including compressed air treatment, compressed air piping and blowers. The flip side has seen more entrants, especially in the lower horsepower ranges.

At the same time, an aging workforce has impacted manufacturing plants. As recently as 10 years ago, it was common for companies to have dedicated on-site engineers to manage their air compressor rooms, as well as other operations. Increasingly, we're seeing the individuals who knew the operations side retiring and the roles not being directly replaced. Most of my industry colleagues speak of the declining availability of qualified service techs.

So where does this lead us? Efficiency will continue to increase in importance as users fully understand most of the lifetime cost of an air compressor is based on energy use. This efficiency drive will push air compressor manufacturers to optimize not just products but also how customers use and service equipment.

The increased use of data and AI will be foundational. While today's air audit uses data to build an optimized compressed air system, the future will see real-time analysis and system adaptation. Much like cars with continuously variable transmissions can adapt to changes in driving, the compressed air system of tomorrow will be able to continuously monitor and adapt to system changes.

Predictive AI will identify issues before they happen, and new system applications will enable not only remote monitoring but remote servicing, as well. While mechanical equipment will always need some physical touch, digital connectivity will drive more system support to actions done either by the air compressor itself or by technicians who never set foot in the air compressor room.

In the next 20 years, AI-driven compressed air systems will offer continuous monitoring and adaptation.

KELTEC

The Industrial World's **Favorite Partner**

Complete compressed air and gas filtration solutions
backed by decades of experience and OEM-equivalent performance.

ORDERING IS EASY USING OUR ONLINE PORTAL.

KELTECINC.COM

Why **KELTEC**

40+ years
of filtration expertise

12,000 products
crossing to 33,000 OEM parts

Any Part, Any Time

Massive inventory, unmatched range—exactly what you need, exactly when you need it.

Performance You Trust

Whatever the spec, whatever the scale—our products keep the industrial world working.

Industrial Performance Experts

We know the most important parts of industrial performance systems.

Always Connected

Instant access, intuitive search, and easy ordering—our digital tools make your life easier.

Find Your Exact OEM Replacement

+1 (330) 425-3100 **KELTECINC.COM**

/KELTECINC

Fast, Reliable Shipping: In-stock products ship in 1-2 business days, with expedited shipping services available.

Built to Perform. Complete Filtration Solutions.

- Separators
- Oil Filters
- Intake Air Filters
- Coalescing Filters
- Compressed Air Filters
- Dryers

Thought Leaders on System Optimization Past & Future

Redefining Air Quality: Two Decades of Innovation

Tilo Fruth, *President, BEKO TECHNOLOGIES USA*

Over the past 20 years, the compressed air industry has undergone a remarkable evolution – one driven by tighter quality demands, rising energy costs and increased environmental responsibility. When I look back, the most transformative shift has been the movement toward a deeper understanding of compressed air not simply as a utility, but as a critical manufacturing input whose quality, efficiency and reliability directly influence product integrity.

Two decades ago, compressed air systems were often designed around basic filtration and drying, with monitoring added only when problems occurred. Today, the market expects – and regulations often require – precise air quality aligned with ISO 8573 1 standards. This shift accelerated demand for high performance adsorption compressed air dryers, intelligent condensate management systems and oil free solutions, all areas where BEKO TECHNOLOGIES has invested heavily. The integration of advanced sensors and real time monitoring has been equally transformative. Plants now make decisions based on data, not guesswork, which has elevated reliability and reduced unplanned downtime across industries.

Another major change has been the industry's response to sustainability pressures. As energy costs climbed and carbon reduction goals became mainstream, the efficiency of compressed air systems became a financial and environmental priority. Heat of compression drying, variable speed technologies and optimized condensate treatment have reshaped how facilities manage the full lifecycle of their compressed air operations. The industry shifted from simply drying and filtering air to optimizing entire systems – and we're proud to have helped lead that mindset change.

Looking ahead 20 years, I see an equally dynamic future. Digitalization will continue to expand, moving beyond monitoring into predictive optimization. Compressed air systems will increasingly adjust themselves, anticipating load patterns, minimizing energy consumption and aligning quality automatically with production requirements. Sustainability will also intensify, with even more emphasis on reducing waste, recovering energy and eliminating harmful condensate byproducts.

B.E.R.T. stands for BEKO's Expert Robotic Technician. It was named in honor of Berthold Koch.

Finally, I expect a growing convergence between compressed air and broader plant automation. Compressed air treatment components will no longer operate as standalone devices; they will be intelligent, networked contributors to a fully integrated production ecosystem.

The last 20 years reshaped what compressed air quality means. The next 20 will redefine how it's achieved. We intend to remain at the forefront of both areas.

Compressed Air System Improvements in the Cement Industry

Bhaskar Dusi, *Manager Process Fuels & Energy, CalPortland*

In the cement industry, compressed air is a flexible yet inefficient energy source, with 8-12% conversion efficiency at best. Its flexibility often leads to misuse, which can significantly increase costs. Poor design and maintenance can make compressed air systems a major area of energy waste.

In past years, when plants were built, individual air compressors were installed in departments throughout the plant with no or little storage. There was no compressed air system piping linking the air compressors and no central control systems. To learn the operating pressure and other operating information, one needed to go to the air compressor and note the information. Each air compressor operated as an island and supplied air to one location. This necessitated the need for many air compressors with inefficient operation, as extra capacity from any air compressor couldn't be shared with other locations. Most of the compressed air piping was underground, making leak detection and rectification difficult.

Conducting detailed compressed air assessments was rare due to low power cost and a lack of sophisticated instrumentation for measuring pressure, flow and leak detection. With the advent of new technology, nowadays we perform compressed air assessments to evaluate the operational issues facing the plant. The goal of these assessments is to get specific recommendations addressing the cost of operation, air quality, repeatability, reliability issues, maintenance and potential productivity improvements.

The most important issues are how the compressed air is made and used. Assessments help operators and maintenance personnel understand the cost per scfm and the air consumption of various processes in the facility. The focus should be on maintaining compressed air as a controllable expense and promoting interdepartmental cooperation.

Demand-side assessments are important, as lowered demand enhances plant productivity by easing the burden on clean-up equipment, improving system stability and pressure flexibility and increasing redundancy as air compressors are turned off. Additionally, reducing compressed air consumption helps avoid capital expenses by extending the life of air compressors.

One of the most common problems in cement plants is low air pressure. Improved control strategies and waste reduction can resolve this issue. In one plant, we reduced the overall output requirements of the air compressors by over 800 scfm, which saved considerable money.

Long-term optimization strategies include continuous monitoring of compressed air systems and upgrading control systems. Some of the best practices we implement include reducing compressed air operating pressure and providing the appropriate amount of compressed air storage for load-unload control. All dust collectors use differential pressure pulse-jet control with a pulse jet management system. Air slides use low-pressure blower-produced air instead of compressed air. Cement kiln shell cooling is accomplished with high-volume flow fans rather than compressed air nozzles. We installed a VSD air compressor with multi-air compressor controllers to improve compression efficiency and automatic reserve capacity. We also use hurricane air canons, which use 50% less air.

This older kiln blow-off system, which used 100 scfm of compressed air, was replaced with a new kiln blow-off system that included air cannons using 30 scfm of compressed air.

In the coming years, we expect more plants to opt for centralized compressed air stations with central control and monitoring systems. Plants will also put appropriate storage tanks at each demand department to operate air compressors at full load for maximum efficiency with one or two modulating air compressors.

HydroThrift Provides Closed-Loop Cooling That Protects Uptime

Integrated cooling and control systems built to reduce downtime, minimize maintenance, and improve operating efficiency.

Eliminates Contamination
Scaling and corrosion prevention

Reduces Water Usage
Lower discharge and operating costs

Maintains System Stability
Consistent, controlled perfomance

Continuous Monitoring
Complete system visibility

Integrated, packaged systems engineered for consistent performance and simplified installation

sales@hydrothrift.com
330-837-5141

A Complete Cooling System Approach

CD Systems
Air-cooled, water-free heat rejection

PCX Systems
Liquid-to-liquid cooling with system isolation

ACP Controls
Advanced monitoring and system control

Scan to visit our website
www.hydrothrift.com

HydroThrift

Thought Leaders on System Optimization Past & Future

Shifting Service Models and Distributor Value Propositions

Andy Poplin, *Vice President of Sales and Service, Atlas Machine and Supply*

Over the past 20 years, the compressed air industry has shifted from being a hidden utility to a visible lever for plant profitability. Two major developments stand out. First, the widespread adoption of variable speed drive (VSD) air compressors improved part-load efficiency by matching supply to demand, cutting energy use and smoothing pressure profiles. Second, improved system assessment techniques – most notably, high-resolution data logging and advanced leak detection – changed how plants prioritized projects. Portable ultrasonic leak detectors, continuous remote monitoring and affordable data loggers let auditors quantify leak loads and control inefficiencies in ways that were previously speculative. Together, these changes reframed compressed air from an assumed free utility to a measurable cost center, spawning targeted repair programs, strategic load sharing and capital optimization.

Those two shifts also drove service models and distributor value propositions. Equipment vendors and service providers evolved from simple parts suppliers and changers to partners offering system analytics, managed maintenance contracts and packaged energy-savings projects with attractive ROIs. The result: Compressed air optimization moved into mainstream energy management programs and corporate sustainability targets.

Over the next 20 years, compressed air systems will be shaped by increased digitization, tighter integration with plant energy systems and broader decarbonization imperatives. Expect three converging trends: First, real-time edge analytics and AI-driven controls will enable truly predictive, demand-driven compressed air networks that automatically sequence

The widespread adoption of VSD air compressors improved part-load efficiency by matching supply to demand.

machines and coordinate with on-site generation and thermal loads to minimize both cost and carbon footprint. Second, electrification and hybridization – paired with on-site renewables, hydrogen fuel cells, battery storage and heat-recovery systems – will let plants optimize total-site energy rather than air compressor-specific metrics, turning waste heat and storage into economic assets. Third, tighter sustainability reporting and carbon pricing will make lifecycle efficiency central to procurement decisions, accelerating adoption of oil-free air compressors, environmentally-friendly refrigerants and heat-of-compression compressed air dryers.

For operators and service providers, the imperative is clear: Embrace data-driven service models, invest in workforce skills for analytics and controls and frame projects around whole-facility outcomes (energy, reliability and emissions). The next two decades will reward teams treating compressed air not as isolated equipment but as a dynamic, controllable part of a plant's energy strategy – delivering both operational resilience and measurable sustainability gains.

Integrating Efficiency, Sustainability and System Performance

Everson De Campos, *CEO, FS-Elliott*

Over the past two decades, one of the most significant shifts in compressed air has been the transition from viewing air compressors as standalone machines to recognizing compressed air as critical plant infrastructure requiring lifecycle optimization. Twenty years ago, purchasing decisions often prioritized first cost and nameplate capacity. Today, manufacturers increasingly evaluate total lifecycle cost, energy requirements, reliability and air quality risk across the entire system.

This shift has elevated the role of oil-free centrifugal technology in large industrial applications, particularly in high-flow systems where efficiency gains have the greatest lifecycle impact. As energy costs and sustainability pressures increased, the superior efficiency of centrifugal air compressors at scale became more widely recognized. At the same time, industries such as food, pharmaceuticals, electronics and advanced manufacturing placed greater emphasis on ISO 8573-1 Class 0 air to eliminate contamination risk. The result has been broader adoption of oil-free centrifugal air compressors as facilities moved toward high-reliability, high-efficiency compressed air systems designed for continuous operation.

System assessment practices have also advanced significantly. Where audits once focused primarily on leak detection and pressure reduction, modern assessments incorporate flow profiling, demand variability, control strategy optimization and lifecycle energy modeling. These tools help plants right-size equipment, improve turndown efficiency and quantify the long-term value of high-efficiency technologies.

Looking ahead, the next 20 years will likely bring even greater integration of compressed air into plantwide energy and digital strategies. Energy optimization and decarbonization initiatives are already pushing manufacturers to reduce energy needs across all utilities, including compressed air. This will accelerate demand for ultra-efficient, oil-free centrifugal compressed air systems in high-flow applications where efficiency improvements deliver the greatest system-level impact.

Digitalization will transform compressed air management. Advances in sensing, analytics and intelligent monitoring enable predictive maintenance, performance optimization and continuous system visibility. Rather than periodic audits, plants are moving toward real-time optimization of compressed air systems as dynamic assets within connected, energy-managed facilities.

Compressed air is evolving from a background utility to a managed, efficiency-critical infrastructure. The plants succeeding over the next 20 years will be those treating compressed air not simply as equipment to be purchased, but as a strategic system optimized over its entire lifecycle.

Oil-free centrifugal air compressors help plants meet ISO 8573-1 Class 0 (oil content) specifications.

Air Compressor Performance Verification and Regulations

Bruce McFee, *President, Sullivan-Palatek*

It has been 20 years since the U.S. rotary screw air compressor industry began its formal performance verification process. This work originated when distributors and manufacturers agreed that a consistent and credible way to compare air compressor energy consumption would be beneficial to consumers. Through the Compressed Air and Gas Institute (CAGI), competing manufacturers were able to work together on standards development with the shared goal of improving transparency. Over time, this led to the CAGI Performance Verification Program, which provides standardized data sheets and third-party certification of published performance.

This 75 hp lubricated rotary screw air compressor delivers reliable performance with CAGI-verified efficiency, and is built for demanding industrial environments.

As the program matured, regulatory involvement introduced additional complexity. In 2016, the U.S. Department of Energy (DOE) expanded performance requirements by introducing minimum efficiency standards based on isentropic efficiency. Although the rule included a five-year implementation period, it was withdrawn in 2017 under the then-current administration. Several states challenged that decision, and, in 2020, the rule was reinstated by court order, with a delayed compliance date of January 10, 2025. In the interim, California, Washington and Colorado implemented the federal standard at the state level, requiring compliance beginning in January 2022.

In May 2025, the DOE announced its intent to rescind the federal rule once again, along with dozens of other product regulations. As of mid-April 2026, no final determination has been issued, leaving the industry in a state of regulatory uncertainty.

Despite inconsistent government policy, the industry has made steady gains in efficiency over the past two decades. Improvements have come from multiple sources, including better machining tolerances facilitated by modern rotor grinding equipment, improved rotor and airend designs, air compressor package layouts that reduce pressure drops and the use of higher-efficiency electric motors.

Looking ahead, federal standards are likely to continue fluctuating with changes in political leadership, while additional individual states may impose their own requirements in the absence of a consistent national policy. Nevertheless, many CAGI members expect efficiency improvements to continue regardless of regulation, as customers pay more attention to the use of standardized performance data.

Walker Filtration: 20+ Years of Clean Air Innovation and Continued Growth Across the Americas

Over the past two decades, Walker Filtration has quietly become one of the most trusted names in compressed air and gas filtration. What began as a company focused on engineering excellence and innovative product design has grown into a truly global organization, serving customers across multiple industries, continents, and applications.

Today, Walker Filtration stands as a recognized industry leader, known for performance, availability, and a customer-first mindset.

Built on Engineering, Innovation, and Service

Established more than twenty years ago, Walker Filtration was founded with a clear mission: to design, test, manufacture, and distribute high performance air and gas filtration solutions that meet the evolving demands of modern industry. From compressed air and gas applications to medical, vacuum, and sterile air systems, Walker's products have always been shaped by rigorous engineering and an uncompromising focus on quality.

That foundation has allowed the company to earn an enviable reputation, not only for innovative filtration solutions, but also for outstanding customer service and dependable, off the shelf availability of filter housings and elements to meet a variety of industrial applications.

The U.S. Market: A Catalyst for Growth

While Walker Filtration's footprint is global, the United States has played a pivotal role in the company's expansion over the last 20 years. Recognizing the importance of being close to customers, Walker Filtration made a strategic investment in March 2001 with the opening of a light manufacturing, warehouse, sales, and technical support facility in Erie, Pennsylvania.

This U.S. facility became far more than a distribution point. It evolved into a hub for technical expertise, customer support, and rapid response serving customers across North, Central, and South America. The Erie team has been instrumental in strengthening relationships with OEM air compressor, dryer, and vacuum pump manufacturers, as well as growing network of valuable distribution partners. By combining local presence with global engineering resources, Walker Filtration has been able to deliver faster lead times, improved technical support, and tailored solutions for a growing U.S. customer base.

Expanding Customers, Channels, and Capabilities

Growth for Walker Filtration has never been limited to geography alone. Over the years, the company has successfully expanded:

- **Customer Base** – Welcoming new OEMs and Distributors from a wide range of industries
- **Channels to Market** – Supporting OEM partners, large distributors, and regional specialists with consistent quality and service
- **Product Portfolio** – Continuing to introduce high performance filtration solutions for increasingly demanding applications

One area that has played a particularly important role in Walker Filtration's success is its individual customer branding capability. The ability to brand filter housing assemblies and filter elements to match a customer's corporate identity has proven to be a deciding factor for many OEMs and larger distributors. For these partners, Walker Filtration has become a true one stop shop for compressed air and gas filtration products.

One Stop Shopping, Backed by a Performance Guarantee

Sourcing multiple types of compressed air filter elements can be complex and time consuming. Walker Filtration addressed this challenge head on by investing heavily in its ability to manufacture, package, and stock Alternative Filter Elements at its Erie facility.

Today, customers benefit from:

- ✓ Rapid cross referencing for most major brands
- ✓ Competitive pricing and fast delivery
- ✓ Alternative Filter Elements backed by a performance guarantee

It's a model that simplifies purchasing, reduces downtime, and delivers confidence that matches exactly what customers expect in critical air and gas applications.

Growing Across the Americas: Canada and Mexico

As Walker Filtration's reputation and customer base have grown, so too has its reach. The company continues to expand its presence across Canada and Mexico, supporting customers with the same commitment to quality, availability, and technical expertise that defines its U.S. operations. These expansions reflect Walker Filtration's long term vision for the Americas as a key strategic region for continued growth.

A Strong Partnership with Compressed Air Best Practices

Walker Filtration's collaboration with Compressed Air Best Practices Magazine reflects a shared commitment to education, best in class system performance, and continuous improvement. Through this partnership, Walker Filtration actively supports the exchange of knowledge across the compressed air industry, helping customers and system operators understand how proper filtration improves efficiency, reliability, and total cost of ownership.

It's a natural fit for a company that has always placed value, not just on products and on long term performance, but on continually growing close relationships with our customers.

Looking Ahead: Clean Air, Clear Growth

With more than 20 years of proven success behind it, Walker Filtration is firmly focused on the future, with continued investment in product innovation, customer support, and regional growth across the Americas. Walker Filtration and its customers are set up to succeed for decades to come.

From Erie, Pennsylvania to customers throughout the U.S., Canada, Mexico, and beyond, Walker Filtration remains driven by a simple principle: where engineering excellence meets innovative filtration design.

As we look forward to the next 20 years, the best is still to come.

Walker Filtration Inc, 4748 Pacific Avenue, Erie, PA 16506, USA
tel: +1 814 836 2900 email: usa@walkerfiltration.com web: www.walkerfiltration.com

Thought Leaders on System Optimization Past & Future

Monitoring Evolves into a Continuous, Real-Time View

Jim Miller, *President, CASCO USA*

When I started in the industry over 40 years ago, we had no printers, fax machines or cell phones, and little by way of automation. 20 years later – though still 20 years ago – the internet was in its infancy, and cell phones started to become more common. Understanding a compressed air system meant setting up temporary tools, flowmeters, kilowatt meters and pressure transducers to capture a brief snapshot of system performance. These measurements provided valuable insight, but only for a limited window. Beyond that, air compressors themselves retained little data, leaving much compressed air system performance open to interpretation.

Today, that snapshot has evolved into a continuous, real-time view. Industry 4.0 technologies, remote monitoring and advances in on-board data collection have transformed the amount and quality of information available. Systems are now monitored 24/7, tracking dozens of parameters. Customers, distributors and manufacturers alike can access this data to anticipate maintenance needs, diagnose issues more quickly and minimize downtime, especially in critical applications where reliability is essential.

Looking ahead, the rapid growth of AI and large-scale data analytics will further reshape the industry. Maintenance will become increasingly predictive rather than reactive, with service intervals optimized based on actual system performance. Technicians will rely on detailed system insights to diagnose and resolve issues more efficiently. Sales teams will be better equipped to right-size equipment and design efficient systems tailored to specific applications. Manufacturers will be able to leverage vast amounts of field data to design products that are more durable, efficient and responsive to real-world conditions.

This Pittsburgh-area foundry updated its compressed air system with around-the-clock monitoring.

As data increasingly flows across every part of the industry, each step in the process becomes more informed. This evolution creates benefits across the board: End users gain more reliable and efficient systems, service providers gain the tools to respond quickly and effectively and manufacturers gain the insight needed to drive continuous improvement. The result is a more connected, more intelligent compressed air industry. I am excited for the next 20 years of innovation.

One thing the past 40 years of business have taught me is that you cannot fully predict the changes that will take place. Change brings with it both opportunity and challenges. The only way to succeed over time is by providing consistent, quality effort, coupled with the right mix of people to take on the challenges coming our way.

Food Producers Are Now Held to a Higher Quality Standard

Phil Kruger, *Vice President and General Manager, Harris Equipment*

Early in my career as a compressed air salesman, I took my first steps into the food processing industry. As I toured a factory's compressed air room, taking inventory of its air compressors, distribution system and air treatment, I noted where and how compressed air was being used. The air compressors were oil-flooded (and not H_1 food grade oil-flooded) rotary screws, and the air treatment consisted of a refrigerated compressed air dryer. It was 2001, and Safe Quality Foods (SQF) had just emerged in our industry. While I was unfamiliar with SQF, I understood at the very least that a synthetic hydrocarbon oil coming into direct and indirect contact with food couldn't be a good thing. After watching the contaminated compressed air blown into products I had seen sitting in my kitchen that morning, I began to educate myself on the standards associated with safe food manufacturing. I also made sure my wife never purchased this company's products again.

Over the past 20 years, awareness of microbiological contamination has become more prevalent, as food manufacturers are being held to higher standards. ISO 8573 is internationally recognized as the standard for determining the purity and or quality of compressed air. Section 1 is the purity classification, with sections 2-9 outlining testing methods for compressed air. ISO 8573-1:2010 provides the guideline for purity of compressed air classifications, which food manufacturers use to provide the safest quality of product.

As food factories have become more aware of these standards, I have seen a more intentional push towards cleaning up the compressed air system. From implementing regular testing and reporting to upgrading equipment, the food industry has leaned into providing safe, quality food to consumers.

However, one big talking point I have been having regularly is the fact that simply cleaning up maintenance programs and upgrading

equipment isn't always working. Pushing clean, dry oil-free air through 30-year-old distribution systems sometimes re-contaminates the air at the point of use. As we progress, I believe future plant managers and plant engineers will have more conversations about replacing entire distribution systems or transitioning to point-of-use compressed air treatment to ensure they provide the highest quality of product for their customers. Stay Tuned.

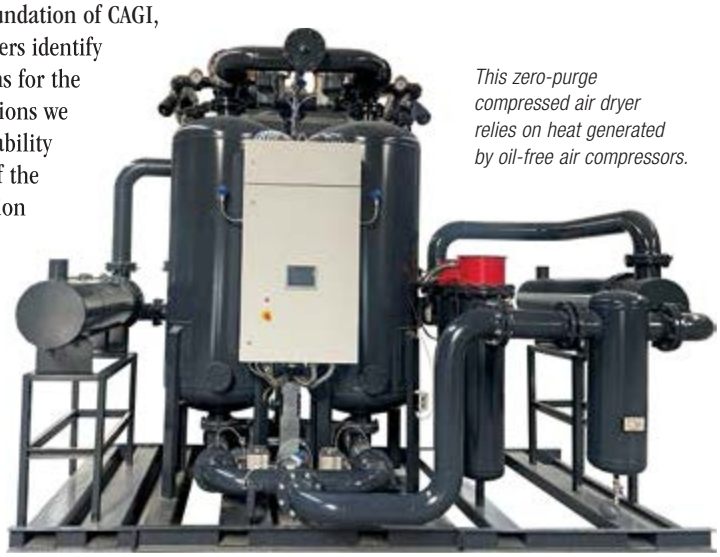
CAC and CAGI Educate on the Correct Use of Energy-saving Technologies

Matt Smith, *Vice President of CAS Sales, Mikropor*

Nearly 20 years ago, I had just finished my MBA and made the move from Ingersoll Rand's Security Technologies business unit to its Air Compressor business unit. One of my first jobs was working through warranty consideration for misapplied variable-frequency drive (VFD) air compressors. It was the early days of VFDs and hybrid permanent magnet (HPM) motors. There was a lot of excitement around the benefits of the technologies. There was also a lot of misunderstanding of how and when to use them. Some manufacturers pushed the energy savings of VFDs without training enough on how to analyze the demand profile to determine if VFDs were appropriate. And some utilities offered "prescriptive" rebates for VFDs, which rewarded misapplication of VFDs in many scenarios where fixed-speed machines would have been a better choice. This still happens, but the situation is improving due to the good work of the Compressed Air Challenge, which helps everyone in the industry understand there is no silver bullet when it comes to saving energy in compressed air systems. VFD and HPM are great technologies, but you need to understand the compressed air system to know when to apply them appropriately.

There is still so much to do. The good news is the trend we've seen over the last two decades to educate all stakeholders in the industry continues, and it will accelerate thanks to the combination of two important industry organizations. The important unbiased education function CAC has provided for the industry will now blend seamlessly into the mission of CAGI, and it will not be de-emphasized or forced to take a back seat. The timing is perfect. CAGI recently added personnel certification programs, so taking on the mantle of educating the industry perfectly complements this push for certification.

CAC, the education foundation of CAGI, will help all stakeholders identify the correct applications for the energy-saving innovations we develop, ensuring reliability continues to be part of the equation. But innovation will continue, and more energy-saving products will be introduced. We'll see VFD technology expand on the air treatment side of the business. In addition, we'll see more innovation with combination compressed air dryer technologies, where large systems with specific demand profiles can achieve significant energy savings by pairing refrigerated and desiccant technologies. At the end of the day, we'll continue to innovate on the product side and improve the reliability and efficiency of compressed air through an industry-wide commitment to education and certification.



This zero-purge compressed air dryer relies on heat generated by oil-free air compressors.

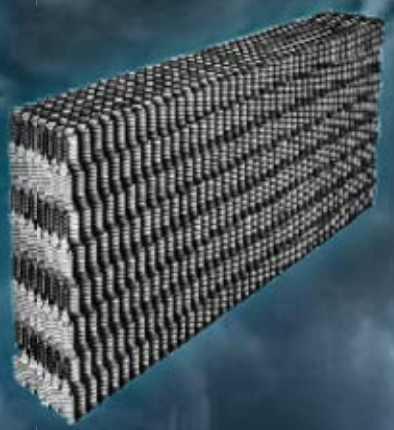
evaptech

GULF SERVICES

Are you prepared for hurricane season?

Severe storms can result in major cooling tower damage, crippling plant operations. Be prepared, contact EvapTech Gulf Services for pre-season inspections, maintenance, upgrades and to ensure availability of critical spares.

Email gulfservices@evaptech.com or Call (281) 529-6526



Should storms impact plant operations, EGS is on call 24/7 to restore cooling tower service.

Email fixmytower@evaptech.com or Call (936) 247-GULF

Fast Solutions. Faster Response. EvapTech Gulf Solutions.

evapco®

The team you
can count on for
LIFE

50 Years of Reliable Cooling

Innovation, efficiency, and support you can count on

SINCE 1976

EVAPCO engineers and manufactures evaporative cooling and refrigeration equipment in 36 locations across 14 countries worldwide.

evapco for LIFE
CELEBRATING 50 YEARS

evapco.com

>> Thought Leaders on System Optimization Past & Future

Cooling Practices Adapt to Water Efficiency Goals

Troy Reineck, *Business Development Manager, EVAPCO*

Over the past 20 years, the landscape of heat rejection equipment and industrial cooling practices has undergone a significant evolution driven by shifting priorities in energy management, water conservation and operational efficiency.

In the early 2000s, energy efficiency stood as the dominant force shaping equipment selection and facility design. During this era, open cooling towers were widely adopted as the primary method for heat rejection, valued for their effectiveness and relative simplicity. In the data center space, power usage effectiveness (PUE) quickly became the industry's foundational metric, guiding decisions aimed at reducing the amount of energy consumed by supporting systems relative to computing workloads. This metric-driven approach led organizations to invest heavily in technologies minimizing electrical consumption while ensuring high-performance operation.

Over the past decade, however, the conversation broadened. Water efficiency began moving to the forefront as global awareness of water scarcity increased. This shift prompted a growing reliance on hybrid, adiabatic and dry cooling systems, as well as other water saving technologies designed to strike a balance between thermal performance and responsible water use. As both water and energy concerns intensified, the industry entered a new era where the challenge was no longer singular. Instead, it became essential to balance water and energy consumption simultaneously. This dual-focus approach laid the groundwork for a more holistic understanding of operational sustainability.

Looking ahead to the next 20 years, water scarcity is expected to become a defining factor in how heat rejection equipment is designed, selected and installed. Regions facing heightened water stress will require solutions dramatically reducing or even eliminating dependence on evaporative cooling. Meanwhile, the rise of AI data centers and massive industrial facilities will transform expectations for scale, resilience and efficiency. These facilities will operate with unprecedented intensity, demanding innovative approaches to cooling and power distribution. As a result, PUE, water usage effectiveness (WUE) and overall operational risk will emerge as the three primary forces shaping future technology decisions. The interplay among these factors will influence not only equipment choices but also broader design philosophies as industries seek systems that are energy efficient, water conscious and resilient in an unpredictable global environment.

This dry fluid cooler provides air-cooled heat rejection.

Customers Expect Outcomes, Not Simply Equipment

Larry Rasmussen, *CEO and President, Rasmussen Air & Gas Energy*

Over the past 20 years, the compressed air, vacuum and cooling industry has undergone a quiet but profound transformation. Historically, success in this space was driven by mechanical reliability and incremental improvements in equipment performance. While reliability remains foundational, the center of gravity has shifted toward data, connectivity and how effectively organizations bring solutions to market.

One of the most notable changes has been the increasing complexity of go-to-market strategies. End users are no longer simply purchasing equipment – they're seeking outcomes: efficiency, uptime, sustainability and total lifecycle value. This has challenged traditional distribution models and forced manufacturers and service providers alike to rethink how they engage customers. At the same time, consolidation among major OEMs has reshaped the competitive landscape. As large players have merged and streamlined portfolios, opportunities have emerged for global and niche brands to enter and gain traction, often by being more agile or specialized.

Private equity has also played a significant role in accelerating change. Investment has brought both capital and urgency, driving operational efficiencies, expanding service platforms and increasing expectations for scalability and returns. In many cases, this has elevated professionalism across the industry – but it has also intensified competition and shortened decision cycles.

Perhaps the most impactful shift has been the rise of data and digital technology. Where once maintenance was reactive or scheduled, today it is increasingly predictive. Sensors, remote monitoring and analytics are transforming how systems are managed, moving the industry closer to true performance-based partnerships.

Yet, for all this change, one aspect of the industry has remained remarkably constant: sales. At its core, sales hasn't fundamentally changed over centuries. The most successful organizations are still those prioritizing strong relationships, deep customer understanding and exceptional service. Technology may inform decisions, but trust closes deals – and great sales teams continue to be defined by their ability to deliver value and support over the long term.

Looking ahead, the next 20 years will likely amplify these trends. Artificial intelligence and advanced machine learning will further enhance predictive capabilities – not only identifying equipment failures before they occur, but also anticipating demand patterns, supply chain disruptions and even the effects of geopolitical and regulatory changes. The industry will need to adapt quickly, integrating these tools into both operations and strategic decision-making.

Successful organizations will balance technological sophistication with practical execution – leveraging data without losing sight of the fundamental need for reliable systems and trusted relationships. As the landscape evolves, adaptability – grounded in service – will remain the defining competitive advantage.

System reliability is achieved through the integration of proper equipment selection, expert installation and planned maintenance – now enhanced by data, connectivity and predictive analytics.

ENMET

GAS DETECTED. PEOPLE PROTECTED.

COMPRESSED AIR MONITORING & FILTRATION SYSTEMS

- Meet OSHA Grade D and NFPA 99 standards.
- MedAir 2200 and ProAir 2200 are UL and CSA certified, deliver real-time monitoring of up to 4 gases.

ENMET CREATIVE GAS DETECTION SOLUTIONS

AirGuard Plus

Portable breathing air filtration system for CO, (O2 or H2S) and Pressure Dew Point

AirGuard Classic

Portable breathing air filtration system for carbon monoxide (CO) and dew point

Matrix Air

Comprehensive compressed breathing air monitor with menu driven software and comprehensive data logging

MedAir 2200

Hospital medical air compressed airline monitor for CO, CO2, O2 and dew point

ProAir 2200

Process air compressed airline monitor for up to four gases

CO-Guard

Carbon monoxide (CO) airline monitor for compressed breathing air

AFP-100

Compressed breathing air filtration panel, incorporates a 3-stage filtration process

LEARN MORE AT ENMET.COM

Thought Leaders on System Optimization Past & Future

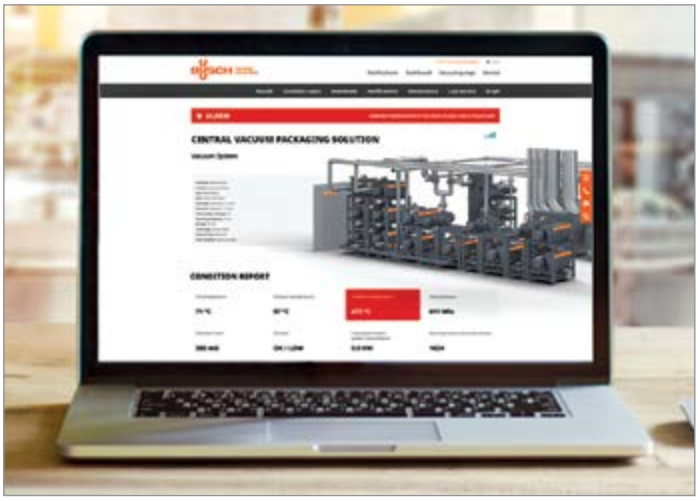
Vacuum Technology Is Crucial for Highly Technical Manufacturing

Turgay Ozan, *President, Busch Group USA*

Over the past 20 years, I have seen a remarkable shift in how vacuum technology is perceived in manufacturing. When I first began working in this industry, vacuum systems were often viewed as secondary components – important, but rarely the focus of strategic discussions. Today, that perspective has changed significantly. Vacuum technology has become a critical enabler of many of the most advanced production processes in the world. Industries such as semiconductor manufacturing, pharmaceuticals, food processing and advanced materials all depend on highly reliable and precisely controlled vacuum environments to maintain quality, efficiency and safety.

One of the most significant changes during this time has been the growing complexity of manufacturing processes. As production technologies have advanced, the performance requirements placed on vacuum systems have increased dramatically. Systems must operate with greater precision, higher energy efficiency and greater reliability than ever before. At the same time, manufacturers are under constant pressure to improve productivity while reducing operational costs. This has pushed companies like the Busch Group to innovate continuously – developing new technologies, improving system designs and expanding service capabilities to support customers more effectively throughout the lifecycle of their equipment.

Another major transformation has been the increasing role of digitalization. Twenty years ago, system monitoring was largely reactive. Maintenance was often scheduled at fixed intervals or performed after a problem occurred. Today, digital monitoring and connected systems allow manufacturers to track performance in real time, anticipate maintenance needs and prevent downtime before it disrupts production. This shift toward predictive maintenance has improved reliability while helping companies operate more efficiently.



O110 is a digital monitoring service for vacuum pumps and industrial vacuum systems.

Looking ahead to the next 20 years, I believe the pace of innovation will accelerate even further. Emerging industries such as renewable energy, hydrogen production and next-generation semiconductor manufacturing will require even more specialized vacuum solutions. At the same time, sustainability will become an even more important factor in equipment design and system operation.

Energy efficiency, reduced emissions and responsible resource use will be central to the future of industrial technology. Vacuum systems will play an important role in helping manufacturers meet these goals while maintaining the high levels of productivity that modern industry demands.

In my view, the next 20 years will be defined by the intersection of innovation, digital intelligence and sustainability. Companies combining these elements while maintaining strong partnerships with their customers will help shape the future of manufacturing.

Reflections on 20 Years of Change in Compressed Air

Melinda Niewiemski, *VP of Sales & Operations, Danmar Industries*

Over the past 20 years, the compressed air industry has changed quite a bit, driven by advances in technology, increased market competition and evolving customer expectations. For those of us who have spent decades in the field, the transformation has been both impressive and, at times, worth reflecting on.

Many of us turned to trade publications such as *Compressed Air Best Practices® Magazine*, which has played an important role in the industry. For years, it has provided education, case studies and practical insight that helped improve system performance and reliability. Many professionals – myself included – have relied on these resources to stay informed and continue learning throughout our careers.

At the same time, the culture of the industry has shifted. Troubleshooting once depended heavily on experience and critical thinking, often without the benefit of today's advanced diagnostic tools. Many of us learned how compressed air systems behaved by listening to equipment, observing patterns and drawing conclusions from years of hands-on work. Those lessons were often passed on from mentors or gained through experience, building customer trust that defined many successful companies.

Today, electronic diagnostic and monitoring tools play a much larger role. Sensors, controllers and data systems provide faster access to operating information. These tools are extremely valuable and have improved our ability to detect issues early. However, they can, in some cases, replace the deeper analytical thinking that once guided troubleshooting. Technology should enhance expertise, not replace it.

Another noticeable change has been the increasing focus on market share and profitability. In a competitive environment, some manufacturers have shifted priorities toward rapid growth and cost reduction. While this has expanded product efficiency and encouraged innovation, it has also raised questions about whether long-term reliability always receives the attention it once did.

Despite these concerns, the industry has made meaningful progress. Modern systems offer far more precise monitoring, control, and efficiency than those of 20 years ago. Advanced technology now allows us to understand compressed air systems with a level of detail that wasn't possible – or easily determined – years ago.

Looking ahead, technology will continue to advance, with greater reliance on data, automation and system optimization. The challenge will be balancing these innovations with the foundational knowledge and critical thinking that have long defined the industry.

Looking back, the greatest strength of the compressed air industry has always been the combination of knowledge, experience and innovation. Moving forward, the challenge will be ensuring that new technology supports – rather than replaces – the practical wisdom built through years of experience in the trade.

Combining Multiple Technologies to Meet Process Requirements

Greg Duffy, *Director of Engineering, Aerzen USA*

The last two decades have delivered compounding advances across practically every dimension of blower and air compressor technology. Simulation tools that once required dedicated computer infrastructure now run on local clients. Advances in 3D design and CFD modeling have pushed machine geometries closer to their practical isentropic efficiency limits. Wider access to additive manufacturing and five axis CNC machining has improved tolerances while compressing development cycles, making meaningful iteration faster and less costly than at any point in the industry's history.

A positive displacement, hybrid rotary screw and turbo blower

Older air compressors may have been louder and less efficient than today's models, but thanks to their durable construction, many are still in operation today.

The most visible product-level shift has been the maturation of the high-speed direct-drive turbo blower. Entering the U.S. market around 2006, it weathered a technically demanding adoption period and ultimately proved itself as a platform capable of delivering high efficiency, low maintenance and true plug and play simplicity.

As mechanical efficiencies approach their practical ceiling, a more holistic systems engineering approach has taken hold. Drives, motors, couplings, lubrication, cooling circuits and local instrumentation, once secondary considerations, are now recognized as being just as critical to efficiency and performance as the core aerodynamics themselves.

Looking forward, there are remarkable innovations on the horizon. But the most significant shifts are unlikely to center on any single machine technology. Instead, they will come from how those technologies are combined, integrated and delivered. Industrial customers are increasingly looking for engineered solutions rather than individual components. The opportunity lies in assembling blowers, air compressors, vacuum systems and the controls and instrumentation binding them into integrated packages or turnkey unit processes solving a defined problem and arriving ready to commission. Doing this well demands fluency across pressure ranges, process requirements, applications and disciplines that few suppliers can credibly claim.

Markets rewarding this approach will continue to grow. These include wastewater and biogas, pulp and paper, oil and gas, pneumatic conveying, food and pharmaceutical processing, hydrogen and alternative energy storage. What they share is complexity, systems where the interactions between unit operations matter as much as the performance of any individual machine.

The deeper we understand those processes, the more value we can deliver. That has always been true. What has changed is the breadth of portfolio and application expertise required to act on it, along with the growing expectation that we arrive not as a commodity supplier, but as an engineering partner.

Thought Leaders on System Optimization Past & Future

A Focus on Energy Efficiency

Chad Larrabee, *Technical Editor, Compressed Air and Gas Institute*

Twenty years ago, the compressed air industry was moving at full speed in a rapidly evolving digital landscape. Powerful handheld computing was emerging, the industrial internet of things (IIoT) was taking shape and the industry was exploring whether compressed-air-as-a-service (CAaaS) might follow the same path as cloud computing, replacing on-premises servers.

The working group for ISO 11011 is currently reviewing and rewriting the standard to include current and future needs.

Perhaps the most exciting thing to watch unfold, however, has been the focus on energy efficiency, including audits (a.k.a., assessments). Few could have predicted how profoundly this shift would change the way compressed air systems are delivered, evaluated and managed. Utility programs and U.S. Department of Energy (DOE) initiatives played a key role in raising awareness. The launch of the Compressed Air Challenge in 2000 marked an important milestone, even as a 2001 DOE study noted customer awareness and concern for compressed air efficiency remained low. Over time, that mindset changed. System owners increasingly recognized measurement was essential before improvements could be made, fueling rapid growth in demand for assessments and the birth of best-practice guidance such as this publication.

Formal energy efficiency standards for compressed air soon followed. ASME EA 4 and ISO 11011, released in 2010 and 2013, respectively, helped bring consistency and credibility to compressed air system assessments. The working group for ISO 11011 is currently reviewing and rewriting the standard to include current and future needs.

How will energy efficiency look in the next 20 years? Lower cost instrumentation and AI will change the landscape from point-in-time assessments to continuous, autonomous, system wide efficiency management. Real-time intelligence will produce automated diagnostics and allow for continuous baselining of the system. Optimization will be the result of multiple correlated signals and algorithms self-correcting. Learning-based digital twins will move from nice to have to table stakes for ongoing optimization. As we know, the opportunity isn't just an air compressor play; it's a systems play.

While AI will change the work, it will not eliminate the workforce. Human interaction will continue to be needed, but will be better targeted with reduced time to resolve issues. Lower cost of ownership, ease of use and operational transparency become added value drivers to the traditional business goals of safe, reliable and efficient compressed air systems. This long-term shift toward data driven, standardized and continuously optimized compressed air management is only accelerating and will shape the next 20 years of the industry even more profoundly than the last. I look forward to the next 20 years with *Compressed Air Best Practices® Magazine* in the mix, helping report and guide on efficiency trends.

Truths in Efficiency, Nitrogen Generation and High-Pressure Compression

Nitin G. Shanbhag, *President, Alkin & Aykom Compressors*

Twenty Years…it seems like only yesterday Rod was just starting *Compressed Air Best Practices® Magazine*.

Truth in Efficiency. For the longest time, an engineering data sheet from a manufacturer was all that was available to buyers. Those data points prevailed; there was no other way to know the efficiency and performance of an air compressor. But around that time CAGI created and fostered a program for third-party verification of power, capacity, pressure drop and more. Now, for a majority of brands, customers can know what they're getting before they buy.

Nitrogen Supply and Generation. Traditionally, large white liquid N_2 tanks were a common sight outside plants. These tanks are managed by bulk gas providers to supply N_2 for a variety of industries. But how well does the system perform? In 2020, I witnessed one of the biggest changes in the supply chain of nitrogen, leading to a reshaping of the industry. COVID brought about many supply chain disruptions, including for N_2. Bulk providers sent force majeure letters to end users – often with less than 24 hours' notice – about stopping the N_2 supply. It paralyzed many critical industries, including medical, food, pharmaceuticals and metalworking.

Faced with a crisis, manufacturers learned compressed air can be used to make nitrogen safely and at a fraction of the cost of the bulk providers. N_2 generation projects were launched at astounding rates with justified ROI. Many customers have taken this path to N_2 supply independence, and their growth continues.

Higher Pressure Air and Gas Compression. Boosting nitrogen has also grown at an astounding rate. Technology

This 290 psi (20 barg) variable speed drive rotary screw air compressor is a capable choice for high-pressure air and gas compression.

has not changed dramatically; however, the method has. Traditionally, boosting to higher pressures was left to traditional reciprocating air compressors, requiring high installation costs. Today, multiplex, standalone, smaller reciprocating compressed air boosters are able to do the same job, albeit with great reliability and less power. An additional industry trend is the use of higher-pressure rotary screw units (290 psi/20 barg) for metal cutting. The ability to cut certain metals with air instead of nitrogen leads to further cost reductions and efficiencies.

The next 20 years will be a bright time for our industry. Fasten your seatbelts and let's go!

VFDs and Power Electronics Impact Chiller and Utilities Operations

Clayton Penhallegon, Jr., *Managing Member, Integrated Services Group*

In 2006, AC inverter variable frequency drives (VFDs) were becoming familiar efficiency applications in chiller systems and other plant utilities, but they were still substantially limited in their use. They were cost-constrained to selective installation, for example, as trim units on groups of cooling towers or pumps, where one would have a VFD and the others would be staged on/off as needed.

Since then, lower relative cost and improved reliability have made them ubiquitous in utility systems. Energy codes now require their use in certain applications (e.g., cooling tower fan parallel operation), and they are frequently OEM components in chillers and other packaged devices such as air compressors. Besides dramatically improving energy efficiency and system-side power factors, properly controlled VFDs significantly improve process stability and equipment maintenance costs when compared to using throttling valves, bypasses or other capacity control methods that leave motor speeds continuous at rated rpm.

Variable frequency drives are now common in utility systems.

Moreover, drive integration has created the possibility of applications inconceivable just a few years ago. One is the modest overspeed of standard pumps and fans (up to perhaps 3-10%, highly application specific), where nominal speed operation is shy of the required output. Another is chiller refrigerant compressors spinning, without gearing, at speeds multiple times the nominal 3,600 rpm. Another use is heat recovery chillers that run through much wider ranges of conditions, yielding significantly more effective heat recovery at higher temperatures. All-variable cooling systems, where every component is operated with VFDs, create the potential for optimizing efficiencies throughout the system. Altogether, these have revolutionized the potential for efficiency and performance of plant utilities.

Going forward, complementary evolution in power electronics and AI integration will further advance the performance of plant utilities. This will bring additional efficiency to systems during the great many hours of off-design operation, capturing savings that quite often now are too marginal to pursue. Additional advances in battery storage, permanent magnet motors and other power control capabilities will drive higher efficiency. Self-learning controls will process data from integrated VFDs for self-identification of off-normal or undesirable conditions (such as high leak rates vs. useful air use), more accurate maintenance needs identification and other benefits.

Thought Leaders on System Optimization Past & Future

Compressed Air Assessments Reveal True System Costs

Paul Edwards, *President, Compressed Air Consultants*

Over the past 20 years, one of the most important changes in compressed air and related utility systems has been a gradual increase in the visibility of what is actually at stake. Plants are generally more aware today that these systems affect far more than energy. Awareness is increasing that "It's about money," which translates to operating costs, productivity issues and capital costs. That is real progress.

At the same time, end users have changed more slowly than many would like to admit. Too many decisions are still made too low in the organization and are often treated primarily as maintenance matters. Maintenance is essential, of course, but many system decisions have broader operating and financial consequences than a maintenance lens alone can capture. Awareness at upper levels of management is increasing, but there is less time for their involvement, even though it is critical to loop them in on the decision process. They don't need to understand the technical aspect, but are vital to understanding the financial impact.

Equipment suppliers have upped their abilities, but still, too often, that improvement process is undertaken from an equipment perspective. That is, what equipment can be sold to reduce cost rather than dealing with first principles for optimization. One only has to look at the multitude of VSD air compressors sold into systems with multiple air compressors to realize optimizing the customer's spend isn't always driving the recommendations. To be fair, this isn't a blanket statement, but it is happening more often than it should. It's why there are $20,000 leak detectors when a $7,000 one will produce 90% of the same result. Audits have gotten more prevalent and much better, but they still have a way to go.

The next 20 years will likely be shaped heavily by AI-driven improvements. AI should help accelerate analysis, monitoring, service response and decision support. It may also improve how opportunities are communicated at the corporate level. But that future comes with an important question:

Paul Edwards discovered this Imperial Type 10 air compressor at a plant in Finland, where it performed for over 90 years. He believes there will be as much change in the compressed air industry in the next 20 years as there has been since this model was built.

Will AI be fed sound system knowledge and good plant data, or a mixture of good information, bad assumptions, incomplete measurements and commercial bias?

That question matters because AI can accelerate good judgment, but it can also magnify weak thinking. A corporate system may recommend an action that looks logical on paper, yet fits plant reality poorly. Sales tools may become more polished faster than the underlying recommendations become more accurate. Service may become more predictive, but only for what is measured well. The cost for studies will likely drop significantly as the value proposition of expertise is replicated en masse.

The market for air compressors may actually shrink, as well, because plants will be more focused on optimizing consumption with the help of AI. If that happens faster than markets grow, consolidation of the industry will continue despite the explosion of OEMs in the last 10 years. And there will be failures as well. It isn't clear whether or not the equipment companies are prepared for this. In addition, AI will likely come up with novel technologies to further enhance equipment performance. It may be that the be-all end-all air compressor comes from a company that doesn't even exist today.

In that sense, the future may not reduce the value of strong system assessment. It may increase it. Assessments are the foundation of the future because a quality assessment provides better data, better context and a better basis for decisions. As AI and other tools become more capable, the real advantage will still belong to those who begin with the best understanding of the system.

System Assessments Evolve from Giveaway to Gold Standard

Tom Taranto, *Owner, Data Power Services*

In the early 1990s, as a Fluid Power Sales Engineer, I watched compressed air distributors train customers to expect application expertise for free. Jack Keough, Editor of *Industrial Distribution Magazine*, captured the era's struggle with a blunt ultimatum: "If you don't charge for it, it's not a service – it's a giveaway. And if it's a giveaway, what is it worth? Nothing." Expert application engineering was being commoditized.

The change came with the development of the systems approach mindset: Air compressors are one element of the system, which also includes storage, compressed air treatment, distribution, controls and end uses. Training and standards turned audits into billable engineering. Key milestones include the introduction of the Compressed Air Challenge (1998), DOE AIRMaster+ training (2001), ASME EA 4 and ISO 11011 assessment standards (2010–2013) and industry certifications such as CAGI's specialist and assessor credentials (2018-2026). *Compressed Air Best Practices® Magazine* helped make those ideas practical and widespread.

The payoff is clear: Service providers and compressed air distributors who charge for assessments preserve margin, differentiate their business by delivering greater value to customers and create technical barriers from price-only competitors. Compressed air, the fourth utility, is also a process variable.

The next 20 years will extend the systems-first approach – powered by data, models and outcome-based services. These five priorities will help define the next 20 years:

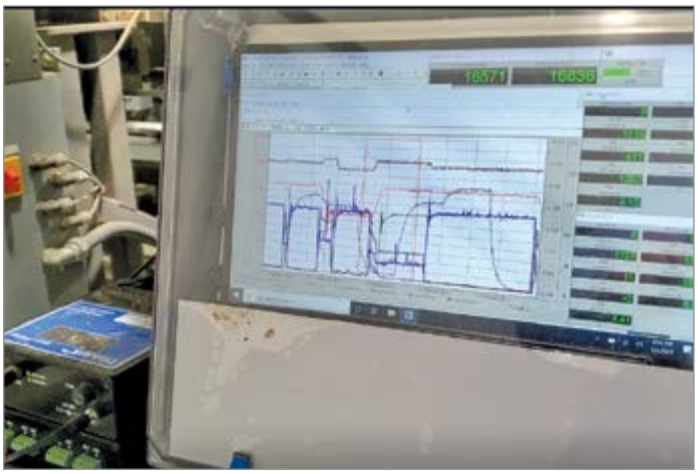
Measure before you replace. Make metering and system-wide monitoring routine; eliminate wasted cubic feet at the process level before recommending new air compressors.

Build digital twins from real-time data. Telemetry-driven models let engineers simulate failures, test retrofits and quantify production impacts, shortening payback justification and improving proposal credibility.

Use machine learning for diagnostics and prediction. Machine learning will surface leak patterns, intermittent loads and performance degradation earlier, enabling targeted maintenance and prioritized retrofits.

Shift commercial focus to outcomes. Value uptime, product quality and throughput improvements alongside energy savings via value-based contracts and subscription assessment services.

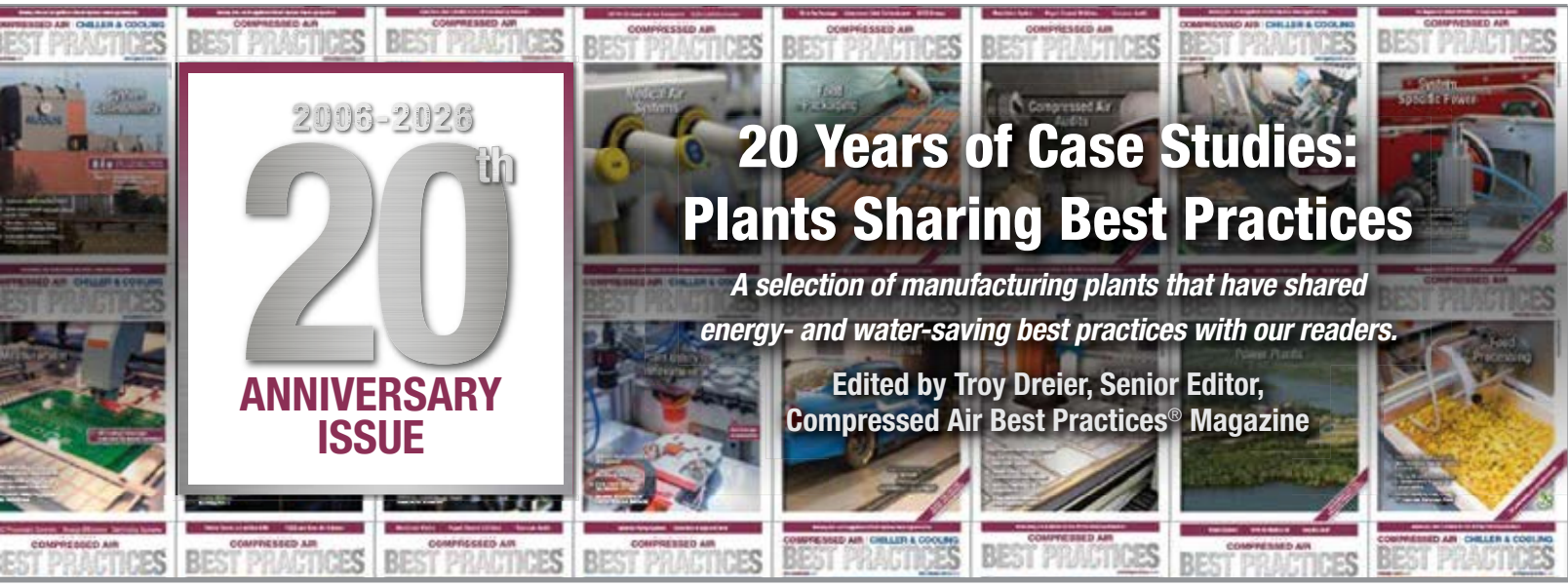
Standardize credentials and methods. Broad adoption of ANSI/ASME and ISO assessment methods and verified assessor qualifications will let buyers compare proposals on measured value, not marketing claims. BP



An edge computing supervisory control and data acquisition (SCADA) system connected to a production air compressor characterizes performance and records operating parameters.

To read similar articles on ***Compressed Air System Assessments***, ***Chiller and Cooling System Assessments*** or ***Blower and Vacuum System Assessments***, please visit https://www.airbestpractices.com/system-assessments, https://coolingbestpractices.com/system-assessments or https://www.blowervacuumbestpractices.com/system-assessments.

Visit our Webinar Archives to listen to expert presentations on ***Compressed Air System Assessments*** at https://www.airbestpractices.com/webinars.



20 Years of Case Studies: Plants Sharing Best Practices

A selection of manufacturing plants that have shared energy- and water-saving best practices with our readers.

Edited by Troy Dreier, Senior Editor, Compressed Air Best Practices® Magazine

For 20 years, *Compressed Air Best Practices® Magazine* has helped subscribers in manufacturing plants around the world reduce power demand, lower water needs and improve compressed air, cooling, blower and industrial vacuum system performance. Along the way, we've been fortunate to share success stories from companies large and small, detailing how they created more energy- and water-efficient systems so all our readers can benefit. In this anniversary feature, we present a sampling of those stories. This is a thank you to the companies that welcomed us inside their plants and allowed our readers to learn their best practices. We encourage readers in manufacturing plants to contact us and share their own best practices in a future issue.

Plastics and Packaging

Ball Corporation Engineers a Reduction in Cooling Tower Load

March 2017

By *Chiller & Cooling Best Practices Magazine*

Ball Corporation is a container manufacturing giant with facilities around the world. The four production lines of its Saratoga Springs, NY, plant produced millions of aluminum cans per day. We spoke with Bob Nelson, Engineering Manager, to learn about the plant's heat recovery efforts.

With so much depending on the cooling loop, the cooling tower's capacity needed improvement. However, the capital expenditure for increased cooling tower capacity would have been expensive. Instead of replacing the tower, the engineering team at Ball Corporation carefully evaluated other options. Conveniently, another Ball plant was divesting itself of a heat exchanger, which Nelson creatively put to use at the Saratoga Springs plant.

"I didn't want to spend a lot of money to expand the cooling tower capacity," Nelson explained. "One of our sister plants was putting in some cooling towers, and they had an Alfa Laval heat exchanger they were not going to use anymore." Incoming makeup water from the city system is typically 55°F (13°C). The team set up pipes

Ball's Saratoga Springs, NY, plant produces millions of aluminum cans per day.

to transport this water to the new heat exchanger and installed temperature and pressure gauges. Using this heat exchanger has resulted in a 10°F (6°C) reduction in the temperature of water returning to the cooling tower.

Reducing the cooling tower load has had a number of other benefits. The cooling tower's two 25 hp fans can now run at lower speeds, and the makeup water needed for the evaporation process has been reduced.

Making an Impact at Berry Global

July 2021

By Roderick Smith, *Compressed Air Best Practices® Magazine*

Berry Global has over 15 different plastic production processes, including injection molding, blow molding, cast film and blown film.

Once a small hometown company, Berry Global of Evansville, IN, became a global leader in packaging and protection solutions, with 120 manufacturing sites across the U.S. We spoke to members of the Corporate Plant Engineering Team to understand work being done to improve system reliability and energy efficiency.

"Compressed air is a relatively new initiative at the corporate level. The plants obviously have been managing compressed air for a long time," said Daniel K. Pemberton, Corporate Project Engineer.

"Since Berry Global is the product of so many acquisitions that had different equipment preferences, maintenance schedules and practices and capital reinvestment strategies, the first step has been to create an inventory of all compressed air system assets. For each entry in this database, we track basic nameplate information, age and how well it's been maintained. We enter every single asset into our inventory. This generates a risk score for each asset and then an overall risk score for the system as it relates to reliability and energy. We are evaluating whether or not the system or any component within the system could have any impact on production in terms of downtime hours or making scrap product. The intent is also to identify some of the older and less efficient pieces of equipment. Through this study, we have learned that our average system size is in the 100 to 500 hp range at most plants. We believe there is a 5-15% leak rate opportunity at most sites."

Sustainable Operations in Practice at Klöckner Pentaplast

October 2024

By Roderick Smith, *Compressed Air Best Practices® Magazine*

Klöckner Pentaplast designs and manufactures plastic films and trays for many applications, including food, medication, medical devices and durable products. Founded in 1965, it had 30 manufacturing plants, including six in North America. We interviewed Ethan O'Brien, Group Sustainability Director, about the company's initiatives in sustainability and energy efficiency.

"The funny thing about low-hanging-fruit energy efficiency projects is that the fruit grows back after a year. Doing the basics brilliantly is about not allowing that fruit to appear again or, if it does, addressing it right away. We are learning to excel at doing annual compressed air leak surveys, cleaning our chiller condensers, measuring our condenser temperatures, monitoring our cooling setpoints and improving the power factor at sites, to name a few examples. It also means creating checklists for operators to shut off machines correctly when idle.

"This year, we implemented a new, more advanced shutdown mode on production lines at sites in Germany. Prior to the new mode, calender lines were cooled down to 248°F (120°C) during shutdowns. All machinery was operated at this temperature level when production was stopped. The process of switching lines to standby mode was therefore relatively inefficient, as lines idled at higher temperatures than required. In our streamlined shutdown operation, only circulation pumps and safety-relevant components remain in operation. This approach ensures optimal functionality without sacrificing reliability or lead times. We remain focused on maintaining peak performance while minimizing negative effects. Through this initiative, we saved a remarkable 4,600,000 kWh of electricity, natural gas and steam – equivalent to $1.9 million (€1.7 million) worth of energy annually."

An aerial view of one of the two plants Klöckner Pentaplast operates in Gordonsville, VA.

20 Years of Case Studies: Plants Sharing Best Practices

Food and Beverage

Nestlé Beats the Heat: Innovative Air-to-Water Heat Exchanger Recovers Heat from Air-Cooled Compressors

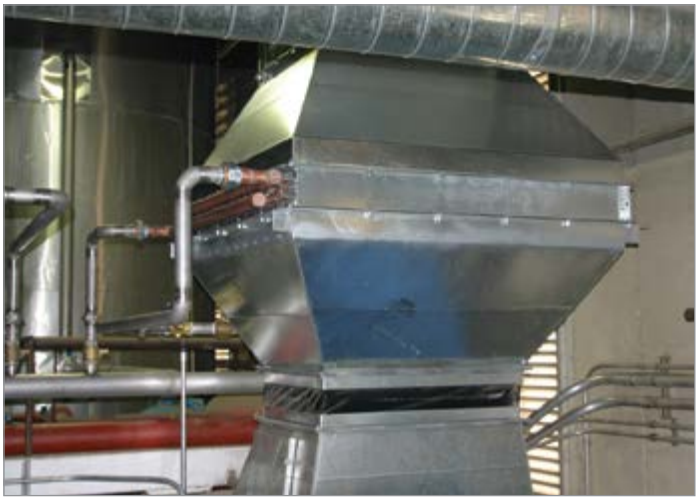
October 2014

By *Compressed Air Best Practices® Magazine*

Nestlé's Ice Cream factory in Tulare, CA, produced Dreyer's Grand and Häagen-Dazs ice cream products on eight production lines. Compressed air was used in a wide range of pneumatic applications. The plant had four 125 horsepower (hp) oil-free, air-cooled rotary screw air compressors. Two air compressors ran 24/7. Each air compressor rejected 11,500 cfm of 160°F (71°C) air, leading the company to explore heat recovery options.

Heat rejected from each operating air compressor, amounting to more than 350,000 BTUs per air compressor per hour, would be scavenged in an 11,500 cfm airflow and fed via ductwork through a finned coil much like a car radiator. Water from the plant's hot water make-up supply would flow through the coil and pick up heat rejected by the air compressor. Water exiting the coil would be warmer than when it went in, so less natural gas would be required to raise the temperature of water for the plant's hot water applications. Each air compressor would have its own heat exchanger, and the heat recovery process would operate in series whenever an air compressor was running.

Tom Finn, Project Engineer, developed the make-up water recirculation system, and a colleague designed the air-to-water heat exchanger coils, but some additional system engineering was required. "We determined that the air compressor's heat rejection fan, which pushes air across the air compressor to cool it, was going to need help moving sufficient air through the coil to maintain the efficiency of the rejection system," he explained. "Our solution was to add an assist fan downstream of each coil to pull the air through."



Heat coming off the air-cooled air compressors is ducted through finned coils that transfer more than 350,000 BTUs per air compressor per hour to preheat the plant's hot water makeup supply.

Innovative Energy Program Assessments at Darigold

April 2016

By *Compressed Air Best Practices® Magazine*

Darigold's facility in Sunnyside, WA, is the company's largest plant.

Darigold is a farmer-owned dairy coop in the Pacific Northwest, and its 11 production facilities took in milk from over 500 farmers across the region. As a partner of the Environmental Protection Agency's (EPA) Energy Star program and a member of the Department of Energy's (DOE) Better Plants program, the company set a goal of reducing energy intensity by 25% over 10 years, with an annual target reduction of 3% over the first four years.

Darigold's energy management program is largely based on ISO 50001, an international standard for establishing an energy program. While the company is not compliant with the standard, the guidelines nevertheless provide a systematic framework for improving the energy efficiency of each plant. Being a part of the DOE Better Buildings, Better Plants program also offers valuable resources for Darigold's energy management team.

"We are part of the DOE Better Buildings, Better Plants program, and by signing up for that program, we've adopted their goals," Uli Schildt, Energy Engineer, said. "The DOE provides a technical account manager that we work with, and I consult with him regularly for assistance towards meeting our goal. Another benefit of being a Better Plants partner is the free training offered by the program. In 2015, Frank Moskowitz conducted a three-day compressed air training at Sunnyside, offered at no cost."

Darigold is also a partner of EPA's Energy Star. While they are separate programs, Schildt said, "Each system, each agency, is complementary. The DOE focuses more on the technical aspect, and Energy Star more on the energy program management aspect."

Unilever Ice Cream Plant Reduces Compressed Air Consumption with Pneumatic Energy Efficiency Module

August 2020

By Randy DeForge, Festo

Just one of the five Magnum production lines at Unilever's ice cream factory in Heppenheim, Germany, produced over 20,000 ice cream bars per hour. The plant also produced the Feast, Viennetta and Carte d'Or product lines. To reduce compressed air demand for pneumatic components, the plant installed an energy efficiency module.

"The energy efficiency module gave us the opportunity to see the amount of compressed air we were using during operation of a line," said Hemmerich. "In addition, we were able to determine how the compressed air requirement developed when we switched off individual consumers. We were thus able to locate leaks and eliminate unnecessary consumption."

The module automatically monitors and regulates compressed air supply, also actively monitoring the condition of the pneumatic system in real time. Doing so provides access to up-to-the-minute process-related data as well as comparative data over time. Data can help personnel determine historical trends on consumption, the amount of air consumed per product batch and pressure and flow at the time of a malfunction or bad batch of product.

Based on user-defined parameters, the module detects when a machine is idle and automatically shuts off the air supply. When the unit receives a startup signal from an operator, it re-supplies compressed air. In the case of a particularly complex production process, automatic standby detection can be deactivated in favor of manual operation. Compressed air consumption is thus reduced to zero during system downtimes and breaks.

Using an energy efficiency module, the Unilever ice cream plant gained visibility into compressed air powering pneumatics on its ice cream production lines. This helped reduce compressed air consumption.

Brewing Energy Conservation at Molson Coors Canada

June 2021

By Roderick Smith, *Compressed Air Best Practices® Magazine*

The Molson Coors Toronto brewery handles the full brewing process, including receiving raw materials, brewing beer and packaging finished goods.

The Molson Coors Toronto brewery, one of the largest in Canada, produced the equivalent of 980 million 12 oz. cans per year. We spoke to Doug Dittburner, Chief Engineer; Antonio Mayne, Utilities Optimization Engineer, and Khalil Daniel, Engineering Intern, about the brewery's mission to reduce carbon emissions. It identified compressed air as an energy-intensive utility and carefully monitored demand. At the time, it had four oil-free rotary screw air compressors and ran two at a time.

We are entering all our compressed air leaks into our general maintenance system so they are all tracked. We'll have an identifier in one of the fields, and we can see how we are doing, if parts are on order, and if they are scheduled to be fixed. Leaks are in the backlog of maintenance items just the same as fixing a motor. If leaks are on a separate spreadsheet, they can get lost.

One way we find leaks is by scheduling someone to look for leaks during planned stops on the production line, when we take it down for 10-15 minutes. Operators and maintenance use these planned stops to clean and inspect the production lines, and they are an opportunity to find compressed air leaks. We also perform dedicated leak inspections. We bought an ultrasonic imaging leak detector.

We've been doing compressed air leak detection for a few years now. Since we started, we've seen a 20-30% reduction in weekend usage of compressed air, which is how we calculate our leak load.

20 Years of Case Studies: Plants Sharing Best Practices

New Belgium Brewing's Path to Low-GWP Refrigeration

April 2026

By Troy Dreier, *Compressed Air Best Practices® Magazine*

New Belgium Brewing aimed to reduce scope 1 and 2 greenhouse gas emissions by 55% from a 2019 baseline. That commitment extended to process equipment selection, including refrigeration systems. In late 2022, the brewer began evaluating alternative refrigerants to reduce the environmental impact of its process cooling infrastructure. The immediate need was tied to a CO_2 reclamation system being installed at New Belgium's Fort Collins, CO, facility. The reclamation system required a dedicated process chiller, creating an opportunity to align refrigeration design with the brewery's sustainability objectives. It worked with G&D Chillers to design a chiller with near-zero global warming potential (GWP).

Ammonia (R-717) was considered early on, but eliminated due to toxicity and system complexity. For a packaged chiller supporting a brewery process, ammonia introduced operational and permitting burdens disproportionate to the scale of the system. Carbon dioxide (R-744) systems were also evaluated, but presented performance and economic challenges for much of the U.S. climate.

Propane (R-290), with a GWP of approximately 3, offered near-zero climate impact and strong thermodynamic performance.

"Not a whole lot changes when we go with R-290," said Scott Timms, Business Development Manager, G&D Chillers. "From a service standpoint, technicians understand it, and the cost premium is relatively small, often around 10% compared to an A2L chiller." A2L is a new category for refrigerants that don't meet A1 requirements, but aren't as flammable as A2 refrigerants.

New Belgium Brewing integrates sustainability into its operations and engineering culture: It's committed to achieving carbon neutrality across its brands by 2030.

Automotive and Transportation

Boeing Canada Winnipeg Recognized for Compressed Air Project

July 2014

By Ron Marshall for Compressed Air Challenge®

The new system uses four rotary screw air compressors and two boosters.

Boeing Canada Winnipeg (BCW) is one of the largest aerospace composite manufacturers in Canada. The plant produced nearly 1,000 end-item composite parts and assemblies for Boeing Commercial Airplanes. The plant relied on large autoclaves, which had to be pressurized with compressed air, but its existing system using centrifugal air compressors proved to be inefficient. Instead, the plant adopted a new system using four rotary screw air compressors and two boosters.

The main compressed air system is designed with 100% redundancy; that is so half of the air compressors can be removed from service with no effect on production capacity. Two 225 hp VSD rotary screw air compressors were installed with two 100 hp base air compressors providing inlet air to two 50 hp high-pressure boosters. Two cycling air dryers with dual parallel mist eliminator filters efficiently condition the main plant air. Stored air is dried to -40°F (-40°C) dew point with a compressed air dryer for outdoor storage, even in the winter. Compressor room piping is sized for the complete capacity of all air compressors, resulting in minimal piping pressure losses across the complete system.

All air compressors are controlled within a narrow pressure band by a sophisticated sequencing control system and the accurate regulation of the VSD air compressors. The system is designed so that usually only one of the four main air compressors is running, with the other active for fill duty. If an autoclave fill exceeds the capacity of the two active air compressors, a special fill valve adds stored air into the system to maintain stable plant pressures.

Nissan Curbs Compressed Air to Achieve Energy Savings

October 2015

By *Compressed Air Best Practices® Magazine*

Nissan's powertrain assembly plant in Decherd, TN, encompassed 1.1 million square feet and manufactured engines for 14 different vehicles. The company's energy management program, the Nissan Green Program, helped it earn recognition as an ENERGY STAR® Partner of the Year from the U.S. Environmental Protection Agency (EPA) every year since 2010. We met with Mike Clemmer, Director/Plant Manager – Paint & Plastics, Nissan North America, to learn about the company's energy management strategy.

"Compressed air is essential to any manufacturing process, particularly in the automotive industry, and it accounts for about 23% of total energy costs at our powertrain facility," Clemmer said. "With that in mind, we have two full-time workers in each of our manufacturing facilities – vehicle assembly plants in Smyrna, TN, and Canton, MI, and the powertrain plant in Decherd, TN – dedicated to identifying and repairing air leaks. By regularly checking the meters, conducting leak checks and repairs and performing audits, the energy team aims to achieve a compressed air leak rate of less than 10% of air compressor output."

The energy team also works to reduce the amount of compressed air consumed in production.

"Our maintenance team at the Decherd powertrain plant recognized a series of solenoid valves that frequently failed, becoming permanent leaks," Clemmer said. "We set up a temporary flow meter and observed leak rates as high as 600 scfm for a production station. We worked with the plant maintenance team to upgrade the solenoid valve technology and reprogram the operation sequence to minimize compressed air consumption."

The end result was tremendous: The equipment stations now consume 75% less compressed air.

The Nissan powertrain assembly plant in Decherd, TN, encompasses 1.1 million square feet and spans 964 acres.

Atlas Machine Helps Ahresty Save $151,000 with Master Controls

November 2015

By Andy Poplin, Atlas Machine & Supply

The ACES-16 air management system is a powerful energy optimization tool.

Ahresty Wilmington Corporation (AWC), a tier-1 automotive supplier, was founded in 1988 and is located in Wilmington, OH. The company's compressed air system grew from two 50 hp rotary screw air compressors in 1989 to 16 air compressors located in four different air compressor rooms 25 years later. Atlas Machine & Supply's Engineered Solutions Group performed a comprehensive compressed air audit to establish a baseline of compressed air consumed by the plant. It found the combination of the plant size and having 16 air compressors distributed throughout four rooms made it impossible to prevent load sharing among the running air compressors.

The obvious corrective action to reduce the excessive load sharing was to design and install a master control system. Ahresty selected Atlas Machine's Allen Bradley RSLogix 5000-based ACES-16 energy management system. By eliminating all inlet modulation and controlling turn valve (variable displacement) actuation, along with only starting air compressors when necessary, yearly energy consumption has been reduced by over 2 million kWh.

Of course, when air compressors are no longer permitted to modulate or "turn down," maintaining tight pressure control is far more difficult. Our solution was to add 6,000 gallons of compressed air storage along with a pressure/flow controller in compressor room 2. These changes effectively converted compressor room 2 into a dedicated trim station. From an economic and functional standpoint, using existing assets (air compressors 10 and 11) in conjunction with Atlas Machine's BFC-3000 would deliver better pressure control with a quicker return on investment than adding a large variable speed air compressor.

20 Years of Case Studies: Plants Sharing Best Practices

DENSO Compressed Air Leak Detection Program Drives CO_2 Reduction Results

January/February 2024

By Mike Grennier, *Compressed Air Best Practices® Magazine*

Automotive components manufacturer DENSO has production facilities across North America. The robust leak management program at the company's Maryville, TN, facility, combined with other energy-saving initiatives, helped it reduce annual energy consumption by 3% annually and cut carbon emissions by over 15%.

The most common leaks are found in the connection points of the plant's compressed air lines. The largest leaks are typically found on couplings on compressed air piping. Other leaks can be found in plastic tubing used to feed compressed air to machinery in the diecasting area.

"This single program accounted for 26.5% of the total energy savings we achieved overall for 2022," said Terry R. Jones II, Facilities Energy Engineer, IV, Facilities Engineering, at DENSO. "It's pretty astounding that one program accounted for one quarter of our total campus goal for the year."

The program, combined with other initiatives, such as better methods of compressed air control and shutting down production equipment when not needed, has contributed to the team's ability to lower overall plant pressure and reduce the cfm required to maintain production.

Energy-saving compressed air initiatives, like a leak management program, have also had a positive impact on the operation's air compressors. The system in Maryville consists of several 1,000 hp and 500 hp air compressors. Originally, the system was designed to have multiple running within a building to meet production demand, and as a result of the program, it now only requires one.

A compressed air leak management program generated excellent results at DENSO's Maryville, TN, manufacturing facility.

Cement, Building Materials and Mining

Dust Collector Pilot Program Points to 16 GWh of Energy Savings at Imerys Minerals Processing Facilities

January/February 2021

By Mike Grennier, *Compressed Air Best Practices® Magazine*

The Imerys S.A. calcine plant in Sandersville, GA, implemented a dust collector pilot program to reduce compressed air use.

A best practices pilot program at Imerys S.A.'s Sandersville, GA, calcine plant greatly reduced the amount of compressed air required for dust collectors. After quickly rolling out to other plants, this practice looked to save the company 16 GWh of electricity across North America and reduce CO_2 emissions by over 7,500 metric tons.

By far the biggest users of compressed air are the plants' baghouse dust collectors, which filter, separate and capture dust and particulate matter in various processes and then release clean air. One particular area of interest was the level of pressure used to pulse dust collectors. The plant's compressed air system delivered pressure to the dust collectors at 100 psi, which was unnecessary. Supplying more pressure than needed was due to antiquated methods, said Robin Davis, an Engineer with Imerys Performance Mineral Americas.

"It's how the plant did it for 20 years," Davis said. "After we talked with some of our vendors, we realized too much pressure can cause problems in terms of reliability and the life of the dust collector bags."

The plant manager opted to experiment with the concept of lower pressure as part of the pilot program. The experiment meant shutting off one of the plant's seven air compressors, which in turn lowered the pressure supplied to the plant from 100 psig to 85 psig.

"We hit the off button on one of the air compressors and waited for the alarms and complaints from people," Davis said. "We didn't hear anything right away, so we went the rest of the day and still didn't hear anything."

CalPortland® Continues to Walk the Walk in Sustainability

April 2021

By Mike Grennier, *Compressed Air Best Practices® Magazine*

A major producer of cement and building materials, CalPortland's energy management efforts reduced the company's overall energy intensity by 17.5% from 2003 to 2021, avoiding $149 million in unnecessary energy costs and over 3.3 million metric tons of greenhouse gas (GHG) emissions. In 2020, the company earned the ENERGY STAR® Partner of the Year Award for the 16th consecutive year.

When it comes to making changes in compressed air systems, CalPortland is a proponent of regular system assessments and ENERGY STAR Energy Treasure Hunts across its facilities.

"We're not trying to find things wrong with a plant. It's finding treasure and finding opportunities to improve efficiencies," said Steve Coppinger, Vice President of Engineering Services.

A recent project involved a compressed air system at a ready mix plant that was not keeping pace with demand. The team at the plant determined it needed to replace an existing air compressor with a new one to remedy the issue. Before taking action, however, the plant planned a treasure hunt to assess the situation before proceeding. As part of the treasure hunt, Bill Jerald, Chief Energy Engineer, searched for compressed air leaks using an ultrasonic leak detector. He appreciated wearing the leak detector headphones, given the size of the leaks discovered, along with other issues.

"We fixed the leaks, and guess what? They didn't need an air compressor anymore. The capital project was canceled, saving at least $50,000," Jerald said.

CalPortland operations, such as the company's cement plant in Oro Grande, CA, have long been recognized for success in sustainability.

Metals and Pulp and Paper

A View From Canada: Tembec Sawmill and Pneu-Logic Stabilize Pressure

April 2011

By Roderick Smith, *Compressed Air Best Practices® Magazine*

Dusty Smith, P.E., Director of Engineering, Pneu-Logic, stands in front of an air receiver installed to help deliver large volumes of compressed air instantly to meet sudden process demands.

Compressed air is used in sawmills in many ways, including moving materials and blowing off sawdust. Most compressed air is used in air cylinders, which are highly sensitive to air pressure fluctuations. Jon Pritchard, P.Eng., Manager Wood Products Engineering, Tembec, offered a tour of sawmill compressed air operations, then explained his sawmill's effort to reduce energy costs.

The Canal Flats project began by fabricating a demand controller and purchasing a 10,000 gallon upright air receiver to act as a trim receiver. "We knew the demand controller would level out the pressure swings in the mill," said Pritchard. "One way of looking at the demand controller and the large storage tank is that the combination of the two represents a computer-controllable source of air instantly available if there is a sudden demand for extra airflow into the plant." This ability to deliver compressed air instantly and at high volumes, for short periods of time, is what makes a demand controller successful. A normal air compressor cannot react quickly to a sudden increase in demand because it must reload, if it is already running, and so the reaction to a demand event can take 15-30 seconds for oil-flooded rotary screw air compressors.

The Pneu-Logic PL-4000 air compressor sequencing control system was selected to manage the whole system. The PL-4000 acts as a backup for the demand controller by intelligently controlling both the operation and use of the demand controller, the air receiver and the air compressors.

20 Years of Case Studies: Plants Sharing Best Practices

International Wire Trims Compressed Air Costs Using the 'Systems Approach'

March 2012

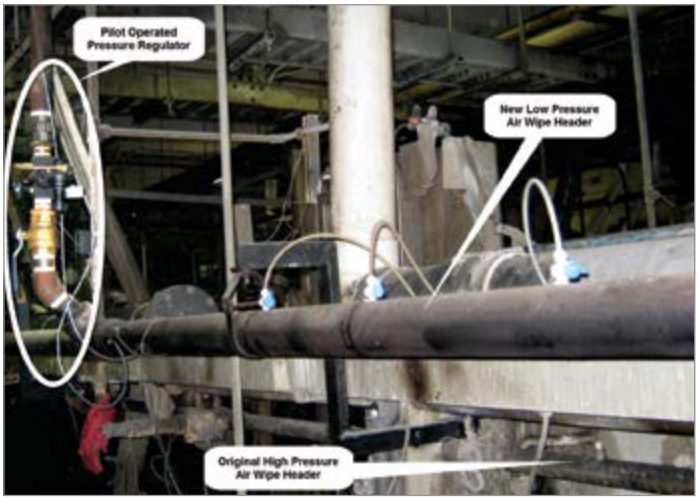
By Tom Taranto and Ram Kondapi for the Compressed Air Challenge

Headquartered in Camden, NY, International Wire Group (IWG) was the largest manufacturer of bare copper wire and copper wire products. High-speed plating lines passed wire through liquid chemical process tanks, and compressed air was used to blow off residual liquid between tanks. Driven by air compressors, this was a large consumer of electricity.

At Compressed Air Challenge (CAC) training, the IWG Team learned about the CAC systems approach: Matching compressed air supply to actual production requirements for pressure and flow. Upon return to the plant, team members explained to IWG management that rather than focus only on the air wipes, the solution was to look at the entire compressed air system and understand the actual production requirements of pressure and airflow.

The plant team learned about artificial demand and how operating compressed air end-use applications at greater than necessary air pressure increases air consumption without any benefit to the production end-use performance. Therefore, one technical objective of the system assessment was to assess air wipe performance and compressed air consumption at various supply pressures. Perhaps rather than reducing the number of air wipes, savings could be attained by controlling the air wipe pressure so that each air wipe consumes less compressed air.

Testing concluded that operating air wipes at 40 psig resulted in 45 scfm compressed air demand reduction. For six plating lines, the projected air demand reduction was 270 scfm. Analysis was performed with the U.S. DOE AIRMaster+ compressed air system software tool, and energy savings of 624,306 kWh/yr and $59,309 per year cost savings were projected.



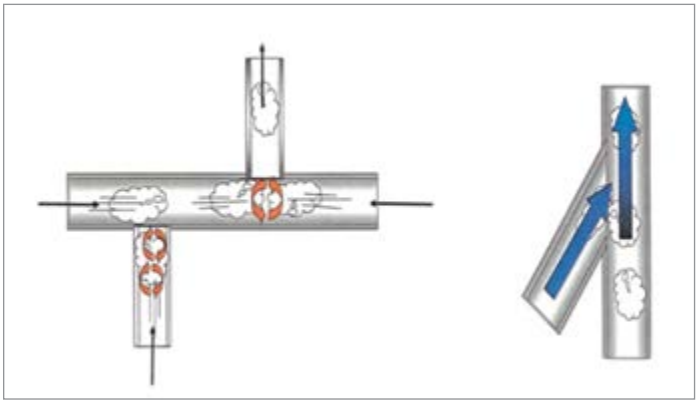
Air wipe test, pilot-operated regulator and new low-pressure air wipe header

Pharmaceuticals, Health and Research

Roxane Laboratories' System Assessment

May 2010

By Hank Van Ormer, Air Power USA



Roxane Laboratories' crossing tee configuration created erratic and significant pressure spikes, leading to extreme short cycling.

Roxane Laboratories of Columbus, OH, needed to double the size of its compressed air system to support a plant expansion. Air Power USA conducted a complete review and audit of the compressed air system and demand-side production areas. It found limitations in the compressed air piping and compressed air dryers.

Air Power USA identified the piping size (2-inch copper) discharge line to a 3-inch copper header. Although the resistance to flow of copper is less than black iron, the very high velocities (49 fps) in the 3-inch header trying to handle the load from each air compressor, combined with the "crossing tee" configuration, create erratic and significant pressure spikes, causing extreme short cycling. This short cycling was a principal cause of the premature airend, motor and cooler problems.

The other major problem that existed in the air supply was significant condensate carryover past the primary dryers, where it had to be handled in a secondary trap area requiring significant maintenance time to successfully protect the production area.

The primary problem here again was configuration, as the piping going from a 4-inch copper line in and out of a 1,550 gallon receiver split into two 3-inch lines going to 550 scfm and 750 scfm rated non-cycling refrigerated compressed air dryers. The crossing tee where the 550 scfm dryer tried to feed into the discharge line from the 750 scfm dryer, combined with long convoluted piping to the 750 scfm dryer, allowed little compressed air flow through the 550 scfm dryer, thus often overloading the 750 scfm compressed air dryer and raising the pressure dewpoint and pressure loss.

Hershey Medical Center Saves $300,000 per Year in Energy Costs

October 2018

By Mike Grennier, *Chiller and Cooling Best Practices Magazine*

The Penn State Health Milton S. Hershey Medical Center in Hershey, PA, adopted a software and analytics platform to optimize its three chiller plants, leading to a savings of 4.2 GWh/yr and $300,000 annually. Supported by an incentive from the local utility, the multi-phase initiative had an ROI of 4.3 years.

The optimization effort streamlined chiller operations that staff had performed manually without a complete picture of the system. The switch to a variable-flow approach and the adoption of an automated system required a new mindset, said Kanoff.

"They had to watch how the equipment performed and live with the system for a while to realize how the optimization strategy works to provide chilled water in an efficient way. Now, we're not managing things on the edge of our seats. Instead, our operators have better tools to manage chilled water production and can do it with less stress," said Kevin Kanoff, C.E.M., Penn State Health Campus Energy Engineer.

Another element of the strategy included the replacement of two aging centrifugal chillers at the central chiller plant with magnetic-bearing centrifugal chillers, each of which is rated to deliver 1,000 tons of cooling.

"The new chillers are now first on since they're most efficient for managing low flows," Kanoff said. "As demand for chilled water increases, the optimization system will add the next chiller and so on based on the operators' determination that it's the right way to go. It's now totally optimized, but in a way we wanted with the operators having the final say in the decision process."

Magnetic bearing centrifugal chillers at the Hershey Medical Center's central chiller plant.

Midwest Machinery Replaces a Cooling Tower for Bayer Crop Science

January/February 2025

By Troy Dreier, *Chiller & Cooling Best Practices Magazine*

Midwest Machinery engineered a three-cell, double-stack, dual air inlet, crossflow, factory-assembled cooling tower on the old cooling tower's foundation.

Bayer Crop Science runs a 240-acre fertilizer production facility in Kansas City, MO. Among the multiple cooling towers at the facility was a 40-year-old field-erected, three-cell, wooden, crossflow cooling tower used for rejecting heat and providing cooling for multiple processes. The facility occasionally called upon Midwest Machinery to inspect and service the aging cooling tower, but as the cooling tower's condition worsened, replacing it made more financial sense than repairing it.

The older cooling tower had a variable-frequency drive (VFD) that wasn't part of its original construction. The new cooling tower, likewise, has a VFD. During partial load conditions or when the weather is cooler, Bayer can use the VFD to reduce fan speed and save money.

Besides helping with the project specification and design, Midwest Machinery offered Bayer Crop Science's operations team advice on the best way to run its cooling tower. The optimal way is running all three cells, said Spencer Kaufman, Sales Engineer, Midwest Machinery, and ramping all three up or down together with the VFD. That delivers the greatest energy efficiency. If Bayer has only one-third of the load, for example, it's more energy efficient to run all three fans at 33% rather than shutting off two and running the third at full capacity.

While gaining efficiency wasn't the driving force behind this installation, Kaufman notes Bayer Crop Science's new cooling tower is more energy efficient. It has more cooling capacity than the previous, even though it has the same footprint and hp rating, with an increase in efficiency in the 5-10% range.

>> 20 Years of Case Studies: Plants Sharing Best Practices

Wastewater Treatment

Three Blower Technologies Help Pennsylvania Wastewater Plant Meet Wide Range of Operating Conditions

September 2018

By Mike Grennier, *Blower & Vacuum Best Practices Magazine*

When the Clearfield Municipal Authority (CMA) of Clearfield County, PA, upgraded its regional wastewater treatment plant, plans included the installation of a new aeration blower system capable of efficiently and cost-effectively delivering proper aeration across a variety of daily and seasonal operating conditions. The result used three aeration blower technologies: turbo blowers, hybrid blowers and positive displacement blowers.

The engineering firm specified a system for the reactors that includes two 75 hp turbo blowers, each of which is rated to provide 1,500 cfm at 10 psig, and two 150 hp turbo blowers, each of which is rated to provide 2,700 cfm at 10 psig. Each blower is equipped with variable frequency drive controls and has a 2:1 turndown. The turbo blowers are located in a newly constructed building located next to the reactors.

Each turbo blower is designed with airfoil bearings, which rely on compressed air in the two radial bearings of the drive shaft and in the axial bearing for absorbing axial forces. The airfoil technology is based on the principle that, in operation, an air cushion forms automatically and thus without further energy input. The turbo blowers, as with other blowers at the plant, are sound attenuated for quiet operation.

The engineering firm opted for turbo blowers rather than positive displacement or hybrid blowers for the reactors because units are typically more efficient and cost-effective in applications with narrow swings in turndown, which is the case with the reactors at the CMA plant, where the operating pressure requirements are consistent and highly predictable. BP

Hybrid and positive displacement blowers were housed together in a newly constructed blower room.

To read similar articles on ***Compressed Air System Assessments***, ***Chiller and Cooling System Assessments*** or ***Blower and Vacuum System Assessments***, please visit https://www.airbestpractices.com/system-assessments, https://coolingbestpractices.com/ system-assessments or https://www.blowervacuumbestpractices.com/system-assessments.

Visit our Webinar Archives to listen to expert presentations on ***Compressed Air System Assessments*** at https://www.airbestpractices.com/webinars.

FACILITY MAINTENANCE

Condensate Management Requires Detailed Planning

By John Bilsky, Facilities Specialist, Gentex Corporation

All compressed air systems need condensate drains. Whether you're running a 50 horsepower (hp) air compressor or a 450 hp air compressor, water will never stop. Here at Gentex Corporation, we follow the same condensate plan for all systems: Condensate drains must be zero-loss drains, and the drain controls must include fault-alarm notifications.

When planning a compressed air system, we lay out the equipment, plumbing and then the drains, which are located near our condensate sources. In this column, I'll use a centrifugal, oil-free compressed air system as an example to show where condensate drains should be installed and how many are needed.

Most water is removed at the compression stage. The condensate drain system for our centrifugal, oil-free air compressors uses six zero-loss condensate drains: two for each of the air compressor's two stages, and two for the aftercooler. It includes three primary drains and three secondary drains. If a primary drain fails, an alert goes out and the secondary drain begins operation. The centrifugal air compressor controller monitors the secondary drains for a shutdown alarm. This gives facilities time to fix the primary condensate drain before the air compressor is required to shut down, protecting against a catastrophic event.

Air leaving an air compressor is considered wet, and gravity pulls the water down. Air compressors have an outlet that, in most cases, turns up and joins a main header. Add a condensate drain just before that turn. Following that, air and water move to a wet tank. Water collects in the wet-side header. To relieve this, add a condensate drain at the bottom of the header. Our general practice is to slope the wet side header slightly, so water moves toward the header drain. Next, add a set of condensate drains to the bottom of the wet tank, no matter the size of the tank. One is a backup drain. When a condensate drain fails on a wet tank, the weight can be enormous. A 1,000-gallon tank full of water weighs over four tons.

Next, wet air moves toward the refrigerated compressed air dryer. We add another set of condensate drains at the bottom of the compressed air inlet filter. We want to ensure the filter always drains. If it clogs, water droplets will get into the compressed air dryer, which won't be able to remove them. Every compressed air dryer I've used came with its own condensate drains pre-plumbed.

After the compressed air dryer, we have what is considered dry air. People may think condensate drains are no longer needed, but a catastrophic event could occur, causing the compressed air dryer to allow water through. For safety, we add single condensate drains on all dry post filters and dry compressed air tanks. BP

This two-tier condensate drain system offers full redundancy.

Add a condensate drain before the wet-side header, and two condensate drains to any wet tank.

About the Author

John Bilsky is the Facilities Specialist for compressed air, nitrogen and purified water at Gentex Corporation. He's experienced in engineering design, engineering improvements and maintenance for compressed air, nitrogen and water purification systems supporting production, R&D and lab services. For more information, visit https://www.linkedin.com/in/ john-bilsky-24715b10/.

To read similar ***Compressed Air Treatment*** articles, visit https://www.airbestpractices.com/system-assessments/air-treatment-n2.

Visit our Webinar Archives to listen to expert presentations on ***Compressed Air Treatment*** at https://www.airbestpractices.com/webinars.

SALES ENGINEERING SKILLS

What Closers Do Differently

By Mark Allen Roberts, CEO, OTB Solutions

➤ Every sales team has them and every sales manager wants more of them. They're the sales engineers who consistently hit quota, the ones who close deals others can't. After assessing thousands of B2B salespeople, we found 67% struggle with closing skills.

Here's what most people get wrong: Closers aren't better at the end of the deal; they're better at everything leading up to it. Closing is the outcome of doing everything right during the sales process. If a deal is hard to close, something was missed upstream.

What Do Industrial B2B Sales Closers Do Differently?

They Qualify Early. Average reps chase deals. Closers disqualify aggressively. They ask questions like: Is there a real business problem? Is there money to solve it? Who makes the decision, and when does it need to be made? If they can't answer the above, they move on to closeable opportunities, and the prospect returns to marketing lead nurturing.

Mark Allen Roberts will lead a Sales Engineering Workshop at the Best Practices 2026 EXPO & Conference in Indianapolis, IN. Visit https://cabpexpo.com to register.

They Sell to Decision Makers. Most compressed air sales reps stay where it's comfortable, spending time with gatekeepers assigned to gather information. Closers find ways to have conversations with decision makers.

They Diagnose Before They Prescribe. Average reps are transactional and too quick to quote. The customer or prospect asks for a quote on a 70 horsepower variable-speed air compressor, and they send one quickly. Closers slow down. They ask questions and learn about the process and desired throughput. They may offer to do an audit first. Closers say, "Here's what this problem is costing you. This is what we suggest after our analysis, and here is what we will save you."

They Make Value Tangible. Features and benefits don't close deals; value does. Closers quantify the impact the customer will receive by approving their proposal.

They Control the Process. Average reps let the buyer manage the conversation. Closers lead the buyer, understanding where the buyer is in the buying process, then guiding them to an ideal solution. Closers define next steps, timelines and the decision process. They say, "Here's what needs to happen next to move this forward to meet your timeline."

They Create Urgency (Without Pressure). Closers don't rely on discounts or end-of-quarter pressure; closers create urgency by connecting the problem, the impact and the cost of doing nothing.

They Follow Up Professionally. Many B2B salespeople quote and assume the buyer will buy when ready. They don't want to look pushy, so they wait. Closers follow up with purpose.

They Own the Outcome. Closers take ownership if a sale stalls. They study what they missed, where they lost control and what they could have done differently.

Most compressed air sales engineers try to close hard at the end, but that's backwards. To close more deals, focus earlier in the sales process. The close is not an event; it's the natural conclusion of a well-run sales process. BP

About the Author

Mark Allen Roberts is the CEO of OTB Solutions, which provides professional training and coaching. Visit https://www.nosmokeandmirrors.com.

To read similar articles on ***Air Compressor Systems***, visit https://www.airbestpractices.com.

Visit our Webinar Archives to listen to expert presentations on ***Air Compressor Systems*** at https://www.airbestpractices.com/webinars.

Real-World Installations & Maintenance

Edited by Troy Dreier, Senior Editor, Compressed Air Best Practices® Magazine

There's much we can learn from real-world compressed air, blower, vacuum, chiller and cooling tower installations. This column asks readers to share lessons learned from system installations and maintenance practices they encounter in the real world.

Chiller Gets Rained on in the Basement

Based in Houston, TX, Hunton Services specializes in helping commercial and industrial facilities operate at their best through expert HVAC service, building automation, energy solutions and equipment support. As Houston's local Trane OEM service provider, it focuses on delivering reliable service, technical expertise and long-term value for customers. Visit https://huntonservices.com.

This early design centrifugal chiller is located in a commercial building in Houston, TX. Matt Fryar, C1 Field Supervisor, was called in after the control panel got wet and stopped working. The problem occurred when building maintenance drained the chiller to perform annual servicing, including cleaning heat exchanger tubes. This is a tall building, so the water pressure in the piping was over 300 psi. When maintenance opened a ball valve to bleed pressure, water shot up to the ceiling and rained down on the control panel, frying the modules inside.

Be aware of high-pressure water when performing chiller maintenance, as this chiller was soaked by its own bleed valve.

The Mystery of the Overheating Portable Air Compressor

Maverick Compressor Group, a veteran-owned business based in Houston, TX, provides top-tier service, compressed air equipment sales and comprehensive aftermarket support to industries across the Greater Houston area, including Dallas and San Antonio. It offers 24/7 emergency service, preventive maintenance programs, diagnostics and repairs and installation support. Visit https://maverickcompressorgroup.com.

Alex Rubio, Rotating Equipment Engineer, put on his detective cap to figure out why an oil-flooded, 50 horsepower, 150 psig, portable air compressor was overheating. Owned by a North Houston company that drills wells, it shut off frequently due to discharge temperatures of 225°F (107°C). The unit had enough oil, he found, but the thermal valve wasn't opening as it should. He replaced the valve, but that wasn't the root cause. Next, he noticed the belt flapped when the unit ran; it wasn't tight enough. The alternator had recently been replaced, but the belt wasn't tensioned correctly afterwards. Rubio tightened the belt, and the discharge temperature returned to 190°F (88°C).

When an air compressor's belt slips, the fan can't achieve the correct speed and cool the oil as it should.

Submission Guidelines

We invite subscribers to share stories and photos of remarkable system installations they've come across. Email Troy Dreier at troy@airbestpractices.com. Please send a high-resolution image as a JPG or GIF file and a note describing the installation.

THE MARKETPLACE

TECHNOLOGY & JOBS

Job & Product Marketplace Advertising Information

Reach 16,200+ readers of Compressed Air Best Practices® Magazine with Marketplace Ads every month!

Prices are $625 per Job or Product Marketplace Ad ($440 if 6 or more ads are placed).

Contact Erik Klingerman at erik@airbestpractices.com to schedule your Marketplace Ads.

COMPRESSED AIR BEST PRACTICES®
www.airbestpractices.com

ADVERTISER INDEX

Company	Page	Web Site
Atlas Copco Compressors	Inside Front Cover, 3	https://atlascopco.com
Mikropor	82, Inside Back Cover	https://www.mikroporamerica.com
Kaeser Compressors	6, 7, Outside Back Cover	https://us.kaeser.com
Ozen	9	https://ozenairtech.com
FS-Curtis, FS-Elliott	10, 11	https://us.fscurtis.com, https://www.fs-elliott.com
Quincy Compressor	13	https://www.quincycompressor.com
SMC	14, 15	https://smcusa.com
Bauer Compressors	17	https://www.bauercomp.com
Sauer Compressors USA	18, 19	https://www.sauerusa.com
ZIEHL-ABEGG	21	https://www.ziehl-abegg.com/en-us/campaign/retrofit-playbook
Sullivan-Palatek	22, 23	https://www.sullivan-palatek.com
Hertz Kompressoren	25	https://www.hertz-kompressoren.com/en-us/
Yaskawa	26, 27	https://www.yaskawa.com

Company	Page	Web Site
Tamturbo	29	https://tamturbo.com
Sahara Air Products	33	https://saharahenderson.com
South-Tek Systems	35	https://www.southteksystems.com
Unipipe	38, 39	https://www.unipipesolutions.com
Best Practices 2026 EXPO & Conference	41, 45, 56, 65, 76	https://cabpexpo.com/us/
KELTEC	42, 43	https://keltecinc.com
Hydrothrift	46, 47	https://www.hydrothrift.com
Walker Filtration	50, 51	https://www.walkerfiltration.com
Compressed Air Challenge	53	https://www.compressedairchallenge.org
EvapTech, EVAPCO	54, 55	https://www.evapco.com
Cooling Technology Institute	57	https://www.cti.org
Enmet	58, 59	https://enmet.com
Compressed Air and Gas Institute	63	https://www.cagi.org/training-and-certification-personnel-certification

Advertising/Editorial Rod Smith • rod@airbestpractices.com • Tel: 412-980-9901
Subscriptions Administration Patricia Smith • patricia@airbestpractices.com • Tel: 412-980-9902

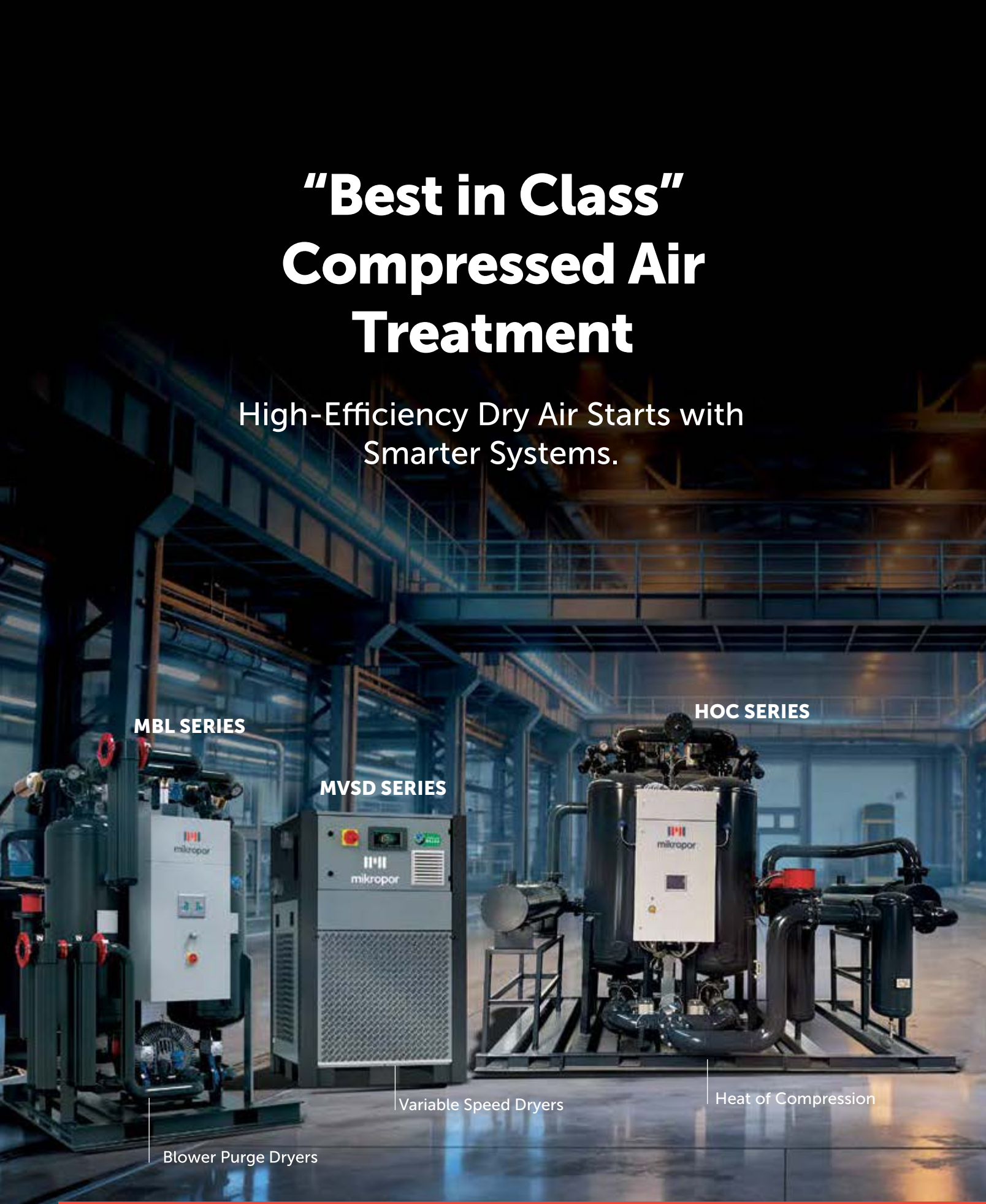
A Publication of Smith Onandia Communications LLC
37 McMurray Rd., Suite 104, Pittsburgh, PA 15241

THE MARKETPLACE

TECHNOLOGY & JOBS

“Best in Class” Compressed Air Treatment

High-Efficiency Dry Air Starts with Smarter Systems.



mikropor | www.mikroporamerica.com

mikropor

Mikropor doesn't just develop energy-efficient products—it ensures they are engineered, applied, and optimized to deliver measurable efficiency.

Uncompromised excellence in design and performance, providing consistent long-term, real-world reliability.

High Performance

Long Service Life

Low Energy Consumption

Minimum Maintenance Cost

kW Saver
Energy-Saving

4921 Ohio Street, Michigan City, IN 46360 • T: 219 878 1550

Compressor Downtime is a Recipe for Disaster.

In high-volume food manufacturing and packaging, compressor failure and air contamination are more than an inconvenience - they're a **critical threat to operations**. When the air stops, pressure drops, product is compromised, and your margins evaporate.

At Kaeser, we engineer air systems that treat **purity as a performance metric**. Our two-stage, dry-running screw compressors deliver **ISO Class 0 oil-free air**, ensuring that the only thing touching your product is the quality you intended. We've turned the utility of compressed air into a **strategic asset** that optimizes your Total Cost of Ownership.

When air purity, uptime, and operating costs are non-negotiable, Kaeser turns compressed air from a critical control point into a **competitive advantage.**

Stop managing air and start optimizing production.
Request a System Audit Today.

KAESER COMPRESSORS®

us.kaeser.com ● 866-516-6888