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FROM THE EDITOR

The Best Practices 2023 EXPO & Conference Smashes Records

We just returned from Chicago tired but happy after a record-breaking Best Practices 2023 EXPO & Conference. We'd like to thank the record number of attendees who attended, including an all-time high of buyers of compressed air, cooling, nitrogen-generation and vacuum systems. A sincere thanks also goes to all sponsors and exhibitors for the record number of booths featuring global launches of new products.

Sponsored by the Compressed Air & Gas Institute and the Cooling Technology Institute, the Conference made its strongest step towards educating engineering firms, manufacturing plants and sales engineers in both compressed air, vacuum and centralized cooling systems. In many plants, these systems represent 25-40% of total kW consumption and are critical for optimized production levels.

Safety and quality was a major theme as for the first time, microbiologists, food safety consultants and quality/safety managers from food manufacturing plants, spent four (4) straight hours of conference time discussing "compressed air as a food additive." I attended all four hours and must say had my eyes opened. The speakers focused on pathogens and risk assessments to ensure hygienic compressed air systems.

The first Women in Compressed Air, Vacuum and Cooling Systems (WCVC) Luncheon attracted 65 professionals in our industry and was a smashing success. The Daily EXPO $1,000 Energy Treasure Hunt Raffle awarded prizes to attendees from Nissan, Saudi Aramco, Compressed Air & Equipment, Universal Creative, Teknor Apex and Solaire Compresores! Lastly, the Networking Event was a roof-top reunion for our industry.

You will find Bill Smith's detailed and picture-rich show report in this issue and many more at https://cabpexpo.com/. Thank you again and please mark your calendars for next year in Atlanta, October 29-31, 2024 as we return to the elegant Cobb Centre Galleria.

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

Thank you to all attendees, from the Best Practices EXPO & Conference Staff! Pictured are Patty Mackey, Clare Heinl, Kimberly Hill, Patricia Smith, Roderick Smith and Bill Smith (left to right).

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Chiller & Cooling System Technology & Industry News

SPX Cooling Announces New Manufacturing Facility in Missouri

SPX Cooling Tech, a full-line, full-service industry leader in the design and manufacture of evaporative cooling towers and fluid coolers, announced the opening of a new manufacturing facility in Springfield, Missouri, that will expand the company's capacity, while also allowing current operations to further optimize their legacy Marley brand products.

"For over 100 years, Marley has been the preeminent manufacturer of cooling solutions for industries that have become foundational for our communities," explained Sean McClenaghan, President of Global Cooling for SPX. "As we prepare for the next generation of growth, we are pleased to announce that SPX Cooling Tech, with the assistance of the State of Missouri Department of Economic Development, is opening the new facility in Springfield."

The new 100,000-square-feet, SPX-operated facility is projected to be operational within six months, and is expected to employ approximately 60 team members. According to McClenaghan, the new site will support the increased investment in data centers, semiconductor fabrication facilities and battery and EV infrastructure throughout North America.

"We're excited for the opportunities this facility will give our company and our customers, and we are equally as enthusiastic about being able to work within the community of Springfield," said McClenaghan.

SPX Cooling also continues to invest in their existing manufacturing facilities to improve throughput and product quality, including making significant upgrades over the past year to the equipment in the company's main manufacturing location in Olathe, Kansas.

About SPX Cooling Tech

SPX Cooling Tech, LLC is a leading global manufacturer of cooling towers, evaporative fluid coolers, evaporative condensers and air-cooled heat exchangers. For a century, we have provided exceptional quality equipment and service to the HVAC, process cooling, industrial, and refrigeration markets. For more information, visit www.spxcooling.com.

SPX Cooling Tech is a leading global manufacturer of cooling towers, evaporative fluid coolers, evaporative condensers and air-cooled heat exchangers.

Daikin Applied Introduces WMT Water-Cooled Centrifugal Chiller

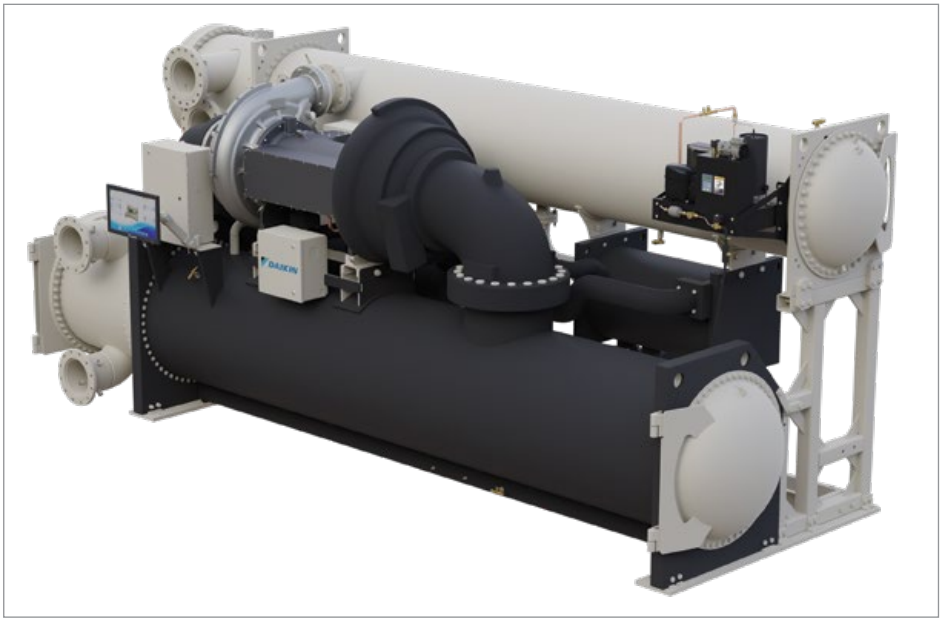
Daikin Applied introduced Magnitude WMT, a next-generation magnetic bearing centrifugal chiller that is able to deliver market-leading energy efficiency at all points of operation. WMT is the only chiller designed for the ultra-low global warming potential (GWP) refrigerant R-1233zd(E) that also features oil-free magnetic bearing technology and a two-stage compressor. This combination provides premium performance and reliability while helping decrease carbon emissions and environmental impact.

"Magnitude WMT is the new gold standard for centrifugal chillers, and a sign of the future of sustainable heating and cooling," said Jim Macosko, vice president of product and sustainability solutions at Daikin Applied. "The chiller checks all the critical boxes for engineers and owners – comfort, efficiency, reliability – and reduces a facility's carbon footprint at the same time. These are the markers of the advancements that Daikin has and will continue to bring to the industry."

The use of low-GWP refrigerants is one of the pillars of building decarbonization. And the WMT helps customers further their environmental goals by using R-1233zd(E), a high-efficiency refrigerant with ultra-low GWP of 1. Plus, the chiller's magnetic bearing compressor with a variable frequency drive provides additional energy efficiency gains, and eliminates lubrication, mechanical seals, wear surfaces and gears. With only one main moving component, the oil-free design reduces

friction and potential points of failure, which simplifies maintenance and extends the life of the equipment.

The WMT's compressor features a two-stage impeller layout enhanced by a refrigerant economizer. The dual-stage setup maximizes part-load performance, which is important because most chillers operate at off-design conditions approximately 99% of the time. With industry-leading full-load efficiency of 0.50 kilowatts per ton (kW/ton) and part-load efficiency of 0.30 kW/ton, the WMT is up to 40% more efficient than standard centrifugal chillers. Achieving these benchmarks while



Daikin Applied WMT magnetic bearing centrifugal chiller.

Chiller & Cooling System Technology & Industry News

simultaneously offering the smallest unit footprint and volume size compared to similar chillers gives engineers an ideal option for equipment retrofits and applications with limited space.

RapidRestore and RideThrough, standard features in Magnitude chillers, offer peace of mind during complete or temporary power loss in data centers and other mission-critical facilities. WMT's low in-rush current at startup is ideal for operations with backup or emergency power systems, and offers the best restart, capacity ramp-up and power trip resilience capabilities to maximize uptime, and decrease disruptions to cooling and vital services. These features can even reduce costs by eliminating the need for a facility to have a waterside economizer.

About Daikin Applied

Daikin Applied, a member of Daikin Industries, Ltd., designs and manufactures advanced commercial and industrial HVAC systems for customers around the world. The company's technology and services play a vital role in creating comfortable, efficient and sustainable spaces to work and live – and in delivering quality air to workers, tenants and building owners. Daikin Applied solutions are sold through a global network of dedicated sales, service and parts offices. For more information, visit www.daikinapplied.com.

Johnson Controls to Accelerate U.S. Heat Pump Manufacturing

Johnson Controls, the global leader for smart, healthy and sustainable buildings, has been awarded a $33 million grant from the U.S. Department of Energy's (DOE) Office of Manufacturing and Energy Supply Chains to help increase domestic production of electric heat pumps by expanding three U.S.-based manufacturing sites. Combined, these facilities will be able to produce approximately 200,000 electric heat pumps per year, representing a nearly 200% production increase. This substantial volume will help drive energy affordability and energy security, while helping combat climate change and creating new jobs.

"We are thrilled to participate in this program and help drive the enormous impact it will have on energy security, reliability and affordability while achieving unprecedented progress in slashing carbon. We also are excited to create 1,000 new family sustaining jobs – a great boost for the communities we call home," said Katie McGinty, vice president and chief sustainability and external relations officer, Johnson Controls.

The grant is part of the first award from DOE's authorization by the Biden Administration to utilize the Defense Production Act (DPA) to increase domestic production of five key clean energy technologies, including heat pumps. The Johnson Controls' project expands production of its York product line at its plants in San Antonio, Texas, Wichita, Kansas, and Waynesboro, Pennsylvania. Within these communities, Johnson Controls is partnering with local unions, economic development

groups, and community colleges to expand internship, apprenticeship and long-term full time job opportunities.

Upon completion, Johnson Controls estimates the initiative will save 1.63 million metric tons of CO_2 emissions from residential heating and 25 million metric tons from commercial and industrial heating per year – the equivalent to greenhouse gas emissions from more than 5.5 million gasoline-powered vehicles driven for one year. The investment also will highlight the versatility of heat pump applications, which, in North America, have historically been concentrated in the residential sector.

"As we move toward achieving nation-wide reductions in greenhouse gas emissions, it is critical that our commercial, institutional and industrial sectors have the technologies necessary for effective decarbonization," said McGinty. "Some of our heat pumps will help homeowners cut their energy bills, while others can play a major role in commercial industries. For example, we already are working with large scale institutions on heat pump deployments that will cut emissions by more than 70% and costs by more than 60%."

Johnson Controls' heat pump customers have seen incredible results and are making immense progress toward their sustainability goals, not just in terms of carbon emissions, but also in reducing water use. Johnson Controls' heat pumps use electricity to efficiently move heat, rather than burn fuel. This makes heat pumps, which transfer three to eight times more working energy than they consume, a critical tool for reducing greenhouse gas emissions and cutting costs. Johnson Controls offers the world's most comprehensive range of heat pumps across residential, commercial, and industrial applications, and was recently recognized on Fortune's 2023 Change the World list for innovative and transformative heat pump technology.

Additionally, Johnson Controls' ongoing workforce development programs across the country are helping inspire and prepare tomorrow's talent for these high-demand and critical careers, like electric heat pump production, installation and servicing. This includes the company's largest philanthropic initiative, the Community College Partnership Program, which is investing $15 million in 30 colleges across the United States to graduate students from historically underrepresented groups and support them in preparing for and embarking on career paths in sustainable building practices.

About Johnson Controls

At Johnson Controls, we transform the environments where people live, work, learn and play. As the global leader in smart, healthy and sustainable buildings, our mission is to reimagine the performance of buildings to serve people, places and the planet. For more information, visit www.johnsoncontrols.com.

Chiller & Cooling System Technology & Industry News

Baltimore Aircoil Enhances Evaporative Condenser Controls

Baltimore Aircoil Company (BAC) announces enhancements to the Vertex Evaporative Condenser, where peak reliability meets easy maintenance. For models with the EC Fan System, enhanced controls are now available including a user interface and integral pump control which maximizes uptime and reliability.

The Baltimore Aircoil Vertex Evaporative Condenser.

"In 2018, when we launched the Vertex evaporative condenser, we began our innovation process by seeking to understand what our customers really need and want from us. After that launch, we continued to listen. We heard you wanted more ways to control the unit and we delivered," said Steve Jaczun, Refrigeration Business Leader.

Vertex evaporative condenser models with the direct-drive EC Fan System maximize reliability and uptime and reduce operating costs while requiring no regular maintenance. These EC Fan System models now have enhanced controls. Included is a user interface with remote connectivity and control which provides enhanced reliability with Modbus and BACnet connectivity. Field installation is simplified with single-point wiring for the EC Fan System and spray water pump. There is also remote unit alarm and status monitoring to ensure the equipment is operating as expected, resulting in maximum uptime.

In addition to the new controls, the Vertex evaporative condenser offers easy and safe access to the unit through a large access door that accommodates a 6'5"-tall person as well as a sturdy step and safety handle. Technicians' feet stay dry while inspecting the low-volume basin from the internal walkway. Inspection of nozzles is fast and easy with optional pre-assembled platforms at an ergonomic working height.

The Vertex evaporative condenser reduces installation costs by aligning the upper section to the lower section in less than 15 minutes per cell, due to the industrial-grade rigidity of the unit. A unique basin design reduces water volume by up to 30% vs. traditional forced draft axial fan condensers, saving on water and chemical costs. This helps reduce the operating weight by an average of 16%.

With redundancy inherent in the overall design of the unit – including fans, motors, and pumps – customers will enjoy peace of mind.

About Baltimore Aircoil Company

With 80 years of industry-leading innovation and experience, BAC creates cutting-edge cooling equipment for the HVAC, Industrial, and Refrigeration marketplaces. We solve each customer's unique needs with our expertise and wide range of high-performance systems. BAC leverages the power of evaporative cooling by optimizing the balance of water and energy, but the true BAC difference lies in our absolute commitment to creating sustainable solutions and delivering value to our customers. For more information, visit www.baltimoreaircoil.com.

Trane Technologies Delivers on Low-Carbon Steel Commitment

Trane Technologies, a global climate innovator, announced a significant milestone for its industry-leading, sustainable climate solutions – with more than one million HVAC units with low-carbon steel shipped to homeowners and commercial customers across the U.S. Less than one year after Trane Technologies established groundbreaking purchase agreements with two major U.S. steel manufacturers, the company's low-carbon steel products – which include high-efficiency heat pumps and air conditioners – are enabling emission reductions in homes, schools, data centers and hospitals.

"As we continue taking bold, innovative action to decarbonize our entire value chain, this milestone highlights another remarkable step on our journey toward a net-zero future," said Keith Sultana, senior vice president, global integrated supply chain, Trane Technologies. "Propelled by our purpose to challenge what's possible for a more sustainable world, we are proud to lead our industry in reducing the embodied carbon of our products – enabling further emissions reductions for our customers and helping to lower their environmental footprints."

Currently representing 20% of Trane Technologies' annual steel purchase, the low-carbon steel, manufactured in an electric arc furnace and nearly 80% less carbon intensive than traditional blast furnace steel, is expected to reduce approximately 16,000 metric tons of carbon annually – the equivalent of emissions generated from powering more than 2,000 homes for one year. As a member of SteelZero, Trane Technologies pledges to procure, specify or stock 50% net-zero steel by 2030 and 100% net-zero by 2050. The company is also a founding member of the First Movers Coalition.

"Decarbonizing the steel industry is crucial to speeding up climate action," said Mike Peirce, Executive Director of System Change for Climate Group. "Our SteelZero campaign is dedicated to working with forward-looking companies like Trane Technologies who are turning their commitments into action, harnessing collective purchasing power and influence to accelerate the transition to a responsible, net zero future."

Through bold, industry-leading action and partnerships, Trane Technologies is advancing its 2030 Sustainability Commitments, including the Gigaton Challenge – a pledge to reduce customer greenhouse gas emissions by 1 billion metric tons (or, one gigaton) – and its pledge to be net-zero by 2050. In 2014, the company set its first science-based 2020 Climate Commitments – accelerating innovation to achieve them two years ahead of schedule. The company's near and long-term emissions reduction targets have been externally validated by the Science Based Targets Initiative (SBTi).

About Trane Technologies

Trane Technologies is a global climate innovator. Through our strategic brands Trane and Thermo King, and our portfolio of environmentally responsible products and services, we bring efficient and sustainable climate solutions to buildings, homes and transportation. For more on Trane Technologies, visit www.tranetechnologies.com.

Chiller & Cooling System Technology & Industry News

Danfoss Turbocor Celebrates a Milestone

Danfoss Turbocor, manufacturer and pioneer of the world's first oil-free, magnetic bearing compressor for the HVAC industry, is celebrating its 10th anniversary as a wholly owned Danfoss company. Initially founded in 1994 and later becoming a joint venture with Danfoss in 2004, its Turbocor compressors have delivered versatile and unmatched efficiency, with low-GWP compatibility, helping to reduce emissions while earning strong return on investment for customers.

"From the beginning, we knew this technology was transformative; the cutting-edge technology combined with our strong manufacturing and sales network enabled us to provide our customers with solutions to improve operating performance and reach unprecedented energy efficiency levels," said Ricardo Schneider, president of Danfoss Turbocor.

The unique oil-free, magnetic bearing technology of Turbocor compressors results in zero performance degradation over the life of the compressor, reducing maintenance and replacement costs. The permanent magnet motors and variable-speed drives provide efficiency at both full and part loads. Their flexibility to be used in air cooled, water cooled or evaporative cooled chillers operating across a wide range of applications such as comfort cooling, low temperature process, ice storage and heat recovery, has resulted in over 130,000 compressors being installed around the world.

Over the years, Turbocor compressors have been recognized with multiple industry awards, including the Alliance to Save Energy's Innovative Star of Energy Efficiency award, the Air Conditioning, Heating and Refrigeration Institute's 2022 Product of the Year and the U.S. Environmental Protection Agency's Climate and Ozone Protection Award.

Globally, Danfoss Turbocor is continuing to grow its footprint, with an expanded facility in Haiyan, China opening next year, and the

Turbocor employees in Tallahassee, Fla. gather to celebrate the company's 10th anniversary as a wholly owned Danfoss company.

establishment of a configuration center in Nordborg, Denmark, at Danfoss' corporate headquarters. The Nordborg site currently handles sales and service for Turbocor's European customers; a new production facility is scheduled for completion in 2026.

At its headquarters in Tallahassee, Fla., Danfoss Turbocor continues to build collaborations with local institutions. In 2021, the company began a five-year partnership with FAMU-FSU College of Engineering, providing $750,000 of scholarships and research grants to first-generation or underrepresented minority students, to develop engineering talent in the local community and help students achieve their career goals. The company has also partnered with Tallahassee Community College on workforce development programs, such as its CNC machinist apprenticeship.

Soon, the company will celebrate another milestone: its new 167,000 sq ft manufacturing facility in Tallahassee is scheduled for completion in early 2024. The new facility will increase current manufacturing capacity to meet a fast-growing demand from American and international markets for high efficiency compressors for cooling and heating. The expansion is projected to create significant additional jobs in the Tallahassee area.

About Danfoss

Danfoss engineers solutions that increase machine productivity, reduce emissions, lower energy consumption, and enable electrification. Our solutions are used in such areas as refrigeration, air conditioning, heating, power conversion, motor control, industrial machinery, automotive, marine, and off- and on-highway equipment. We also provide solutions for renewable energy, such as solar and wind power, as well as district-energy infrastructure for cities. Our innovative engineering dates back to 1933. Danfoss is family-owned, employing more than 40,000 people, serving customers in more than 100 countries through a global footprint of 95 factories. For more information, visit www.danfoss.com.

Chiller & Cooling System Technology & Industry News

YORK Launches Air-Cooled VSD Screw Chiller with R-1234ze

Johnson Controls, the global leader for smart, healthy and sustainable buildings, announced the launch of the first air-cooled variable speed drive (VSD) screw chiller in the United States to use ultra-low-GWP refrigerant R-1234ze.

The YORK YVAA Style B Air-Cooled Screw Chiller, an evolution of the first-generation YVAA, is engineered to drive efficiency now and meet or exceed future regulatory requirements. The R-1234ze refrigerant has a zero ozone depletion potential (ODP) and a GWP of 7, which is well below the Environmental Protection Agency's (EPA) SNAP requirement, making the YVAA Style B a future-forward solution for hydrofluorocarbon (HFC) phase-down requirements.

"The YORK YVAA Style B Variable Speed Drive Air-Cooled Screw Chiller is a win-win product that fulfills our commitment to the planet and to our customers," said Andrew Graybill, director of product management for air-cooled chillers, Johnson Controls. "After extensive evaluation, the decision was made to integrate R-1234ze because of its outstanding performance and ability to surpass low-GWP phase-down requirements."

In addition to the use of ultra-low-GWP R-1234ze, the YORK YVAA Style B features next-generation condenser coils to minimize refrigerant quantity and further reduce its carbon footprint. A newly designed compressor optimizes part-load efficiency to deliver a significant reduction in annual energy consumption. Series flow evaporators coupled with falling film technology help achieve market-leading performance.

YVAA Style B chillers are equipped with state-of-the-art technologies, allowing reliable operation for a wide range of -10°F to 130°F ambient temperatures. YVAA Style B can reach capacity ranges spanning from 100 TR to 400 TR for comfort cooling applications, and 200 TR to 500 TR compatible with data center mission critical requirements. A configurable design meets stringent data center requirements of higher leaving water temperatures up to 75°F.

YVAA Style B chillers have been tested in applications across the globe for more than a decade and offer greater flexibility and configuration options for maximum performance with a smaller footprint.

For more information, visit www.johnsoncontrols.com.

Next-generation, YORK YVAA Style B with R-1234ze surpasses HFC phase-down requirements and is available now to help contractors prepare for the transition.

Thermal Care Updates Chillers with R-454B & R-513A

Thermal Care recently updated their chiller product lines with EPA approved low GWP R-454B and R-513A refrigerants. This release is significantly ahead of upcoming legislation to phase out high-GWP refrigerants that contribute to climate change.

Governments around the world are implementing regulations to phase out refrigerants they believe pose too much risk to global warming including R-134a and R-410A which are commonly used in chillers. The multitude of rulings and enforcement dates, along with the tight deadlines of state regulations have left manufacturers facing challenges in complying. Combined with the fact that low-GWP refrigerants have different thermodynamic properties than high-GWP refrigerants, so major component changes are

required, many companies may find themselves unprepared or unable to produce equipment with the new components needed.

Thermal Care has researched and prepared for these changes for the past two years and is ready to provide the appropriate solutions to meet these new requirements. While other manufacturers may struggle to find the right components, Thermal Care began implementing multi-refrigerant compressors in early 2023. This allows us to offer low-GWP compliant products today with the same cooling capacities and physical dimensions as our previous products.

"In 2024, 12 states will require low-GWP refrigerants and 11 more states are considering it. Those chiller manufacturers that can successfully shift to low-GWP chillers will be well-positioned to succeed," said Mike Shupe, Product Manager. "Thermal Care has prepared for this transition and can offer low-GWP compliant products immediately, well ahead of the required deadlines and helping to make a difference in the fight against climate change."

About Thermal Care

Founded in 1969, Thermal Care is a developer of leading-edge process cooling technology with energy-saving and cost-efficient product designs. The company provides heat transfer equipment to more than 50 industries and specializes in meeting the specific needs of all customers by offering both standard and custom designed industrial process cooling solutions. Thermal Care's broad product line includes portable/packaged and central chillers, cooling towers, adiabatic fluid coolers, pumping systems, and temperature control units. The company also delivers extensive experience and engineering knowledge to develop and execute plant-wide cooling solutions. For more information, visit www.thermalcare.com.

When to Repair vs. Replace Your Vacuum Pump: A Guide

By Mary MacGregor Velhinho, Busch Vacuum Solutions

If your vacuum pump is malfunctioning, you are faced with a choice: repair or replacement. Our guide will take you through both options and provide recommendations on when it makes sense to repair vacuum pumps and when to replace them. We will also take a look at how to spot and diagnose common issues before they lead to system failure.

Whatever the path of action, the decision to repair or replace always begins with testing and diagnosis. A factory-trained service technician who specializes in vacuum pump services inspects the equipment and identifies the problem.

Repair

If your vacuum pump can be repaired, faulty components are removed and replaced, and the equipment is returned to manufacturer specifications.

Pros

- **Cost effective:** If the issue is minor, or the vacuum pump is relatively new, there may only be a few spare parts to replace.
- **Low environmental impact:** Fewer resources are used, and less waste is produced.

Cons

- **Potential for higher costs in the long term:** If the vacuum pump's issues are difficult to repair, they may crop up again.
- **Fixes only one specific problem:** Vacuum pump repair doesn't guarantee that other, different problems won't arise in the future.

Replacement

If you opt to replace your vacuum pump, the existing one will be removed and a brand new pump will be installed.

Pros

- **Higher reliability:** New vacuum pumps have entirely new components and may be more energy efficient.
- **New warranty:** A new unit comes with a new warranty, offering peace of mind, and potentially reducing future repair costs.

Cons

- **Higher upfront costs:** Purchasing a new vacuum pump means higher initial costs.
- **Longer installation time:** Installing and integrating a new vacuum pump usually takes longer than to carry out a small repair.

Key Considerations

Before you make a decision for vacuum pump repair or replacement, there are five criteria to assess.

Costs

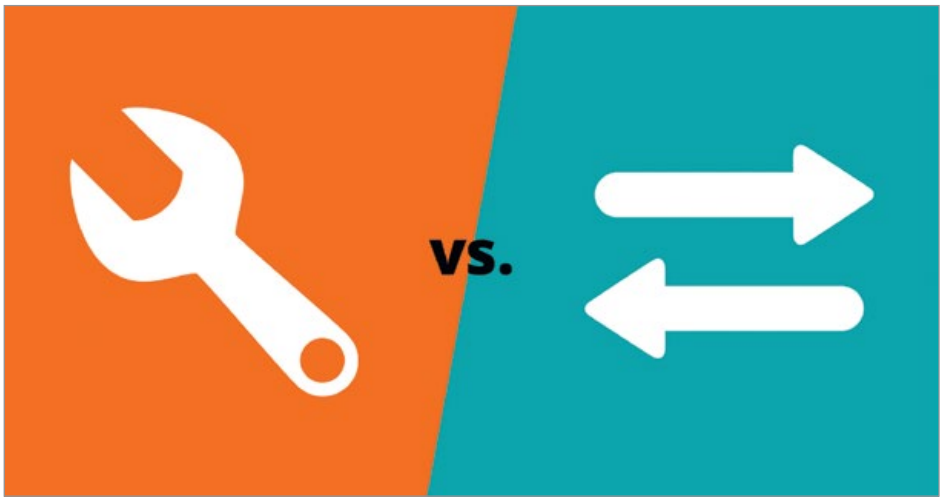
If your existing vacuum pump has only a minor issue, repair may be the more economical option. However, you should also consider longer-term maintenance and repair costs. As a vacuum pump gets older, for example, it may require more frequent servicing. This could add up to more than the price of a replacement over time, even though this will require a much larger immediate outlay.

Process Requirements

Evaluate whether your existing vacuum pump is still the best option for your process. If your vacuum pump is always running flat-out, or reserve pumps are regularly coming online to meet demand, the process may have outgrown the pump's current capabilities. Replacement could therefore be a sensible option. This will help avoid production delays and ensure you maintain optimal quality and performance.

Service History

Has this same problem occurred before? Examine the service history to be sure. Regular maintenance actions like replacing spare parts such as seals, gaskets, or vanes is usually nothing to be concerned about, but if larger issues keep cropping up, repairs may no longer be an option.



When to Repair vs. Replace Your Vacuum Pump: A Guide

Diagnosing and Troubleshooting Common Issues

Vacuum pumps rarely fail with no warning. However, it can be hard to catch the early symptoms of a problem. Regular maintenance is the first step: A problem spotted early is generally easier to repair. It is also helpful to familiarize yourself with common issues and the telltale signs of a failing vacuum pump:

- Excessive noise or vibrations
- Leaks
- Reduced pumping speed
- Overheating

Don't hesitate to ask for assistance from professional vacuum pump service providers and specialist factory-trained technicians to diagnose and troubleshoot these issues. Fixing them promptly is crucial to ensuring cost-effective vacuum pump repairs and minimizing the risk of downtime. It is also worth considering investing in an intelligent monitoring system. This will continuously

Energy Efficiency

Many new generations of vacuum pumps are more energy efficient than the one before. You should therefore consider the benefit of replacing your current vacuum pump with one that consumes less energy. Depending on the difference in consumption between your current vacuum pump and the newest technology, your energy bills could sink considerably. And your carbon footprint too.

Technical Features

Consider how state-of-the-art your current vacuum pump is. Do more modern vacuum pumps come with new technical features that could benefit your process? This could be the right time to invest. You could also look into retrofitting. Some features can be added to an existing vacuum pump – such as a variable speed drive or intelligent monitoring of your vacuum pump. This allows you to upgrade without investing in a full new system.

However, if your pump is getting older, it may no longer be compatible with these newer features that have become available since its purchase. As a result, your process could miss out on some optimization possibilities. You should therefore consider how important this option is to you and your process. This could sway your decision between repair or replacement.

monitor each vacuum pump's performance data and flag any anomalies.

Real-World Example: Weighing Repair Vs. Replacement

In a food packaging plant, the performance of the vacuum pump is critical for the quality and shelf-life of the foodstuffs. However, a vacuum pump was experiencing increased noise and reduced pumping speed, leading to production delays.

After careful inspection, the technician from the vacuum pump repair service provider determined that the problem was the result of a leak. The vacuum pump had been in operation for several years, but this was the first time the issue had occurred. And, although the initial symptoms looked troubling, it was a simple fix. Vacuum pump repair was therefore the most sensible option. The service technician replaced the worn seal, and the vacuum pump was back up and running.

Conclusion

When your vacuum pump isn't running as it should be, you should carefully weigh your options. Consult the experts from vacuum pump repair service providers and have them conduct a proper inspection and diagnosis. You should also assess efficiency, performance, and the cost of repairs – both now and in the future – versus the cost of a new vacuum pump. This will help you determine the best course of action. Ultimately, your decision should be based on what is most cost-effective and beneficial for your production process.

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When to Repair vs. Replace Your Vacuum Pump: A Guide

These criteria can be tricky to assess by yourself, so Busch will be happy to assist. Our specialists will visit you on site, evaluate your current equipment and give you a recommendation on how to move forward. Whatever you decide, we will be there to carry out any necessary repairs, or provide you with a suitable replacement. For even more peace of mind, let us take care of your maintenance with service contracts, intelligent IoT solutions, and 24/7 remote condition monitoring. With 60 years of experience in the world of vacuum, you can be sure your vacuum supply is in good hands. Contact us to discuss the details and restore your vacuum equipment to its optimum performance. BP

About Busch Vacuum Pumps and Systems

Busch Vacuum Pumps and Systems is one of the largest manufacturers of vacuum pumps, blowers and compressors in the world. Our products are at the forefront of vacuum and low-pressure technology. For more information visit www.buschvacuum.com. All images courtesy of Busch Vacuum Pumps and Systems.

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EVAPCO Celebrates Full Spectrum Evolution at 2023 Global Sales Conference

By Bill Smith, Associate Content Manager, Chiller & Cooling Best Practices Magazine

View of the Baltimore Inner Harbor from the Baltimore Marriott Waterfront, host of the EVAPCO 2023 Global Sales Conference.

In October of 2023, eight hundred sales professionals from forty-one countries attended the EVAPCO Global Sales Conference in Baltimore, MD. Under the theme "Full Spectrum Evolution," EVAPCO celebrated the talent of its global sales network, and the evolution of its full spectrum of heat transfer solutions. This article will recount the event functions and share new developments unveiled at the EVAPCO Global Sales Conference, the first since 2017.

During the Welcome Reception, attendees anticipated the days ahead filled with entertainment and training on new product lines, competitive analyses, thermal performance certification efforts and more.

"We will never miss this Conference. The production is unbelievable, and it's very motivational for our team. We brought fifteen of our team members here to experience this," said Rick Hollendieck, President, Sys-Kool.

"In terms of new product innovation and customer service, EVAPCO is premier. This is the technology to be aligned with for the future," said Jim Browe, Principal, R.F. Peck Company.

The "Full Spectrum Evolution" theme refers to its evolving range of factory-assembled

David Fernandez (Integrated Cooling Solutions), Jim Browe (R.F. Peck Company) and Troy Reineck (EVAPCO) catching up at the Welcome Reception (left to right).

and field-erected evaporative, hybrid, dry and adiabatic heat transfer solutions for HVAC, industrial process, and industrial refrigeration markets. SPECTRUM is also the name of EVAPCO's selection software.

"We filled the spectrum. Now it's evolving," said Mihir Kalyani, Global Product Manager, Dry & Adiabatic Coolers.

At the General Session, Pat Strine, Sr. Vice President, Industrial Refrigeration Sales & Marketing, welcomed all 800 attendees, including 44 new representative companies and a large contingent of international sales representatives. Strine also announced a new Versa-Split System product and EJET Ammonia DX product. Next, Bobby Becker, Global Product Manager – Cooling Towers, presented on the evolution of EVAPCO's crossflow solutions, led by an intensive fill development program. This R&D helped launch the new XPak™ Fill product.

The new PHW (parallel hybrid) Closed Circuit Cooler with enhanced rotated Sensi-Coil™ and CrossCool™ technologies were also introduced to complement the existing ESW4 evaporative fluid cooler line.

Jamie Facius, Vice President, North America Sales, advised sales representatives to "think outside of the evaporative box, to engage customers with a consultative selling approach, and become the customer's unbiased subject matter expert."

Since 2017, EVAPCO has made over 147 major investments worth a 9-digit total USD figure

Jasmin Zelaya, Tower Enterprises and J.S. Ratté, Johnson Barrow (left to right).

EVAPCO Celebrates Full Spectrum Evolution at 2023 Global Sales Conference

to continue its growth, according to Chad D. Nagle, Sr. Vice President – HVAC/IP Sales & Marketing. For example, a factory expansion in Madera, CA will be contributing to dry cooler manufacturing capabilities by Q2 2024. In addition, hundreds of new positions were added to EVAPCO's workforce since 2017.

"Out of all the lines we represent, EVAPCO is the best. They go above and beyond to take care of the customer and give us all the tools we need. They understand what customer service is about – something a lot of people have forgotten," said Vince Pilato, President, RWH Mechanical Sales.

Rich Merrill – Director of Advanced Engineering (retired 2004), Wilson Bradley – EVAPCO Chairman of the Board and Co-Founder, Greg Kahlert – EVAPCO Board of Directors, and Jay Calkins – Executive Vice President (left to right).

Bobby Becker, Chad D. Nagle, Jamie Facius and Troy Reineck during the World Headquarters and R&D Facility Tour/Unit Showcase in Taneytown, MD.

Nagle also introduced the Advanced Energy & Water Analysis Tool available to EVAPCO sales representatives. Design engineers are requiring more and more information – according to Matt Sniezek, Sr. Product Application & Marketing Engineer. The enhanced tool enables the salesperson to provide design engineers with power and water usage efficiencies, annual/monthly power and water consumption, chiller operation, and much more.

"Whether it's a 100 ton or 100 MW system, this tool enables you to help design engineers calculate these values to design efficient and reliable systems productively," said Sniezek during a dedicated business session.

"What I love about EVAPCO is the ease of doing business with them. They understand what it's like going to market as a representative, and they enable us to be successful in helping customers," said David Fernandez, CEO, Integrated Cooling Solutions.

EVAPCO reported significant growth in the industrial and data center markets. The eco-Air series of dry and adiabatic fluid coolers is meeting demands of these markets, sold with a 100% thermal performance guarantee by EVAPCO. According to Sarah Twigg, Marketing & Application Engineer – EVAPCO is still the only manufacturer with CTI-certified dry fluid coolers per CTI Standard 201. Adiabatic coolers aren't far behind from being included in CTI STD-201 since the adiabatic acceptance test code was recently completed.

"Design engineers should only specify CTI certified equipment. Owners should only purchase CTI certified equipment. Under-performing units will consume more energy and water, and will miss temperature set points. For dry coolers, we are seeing competitors overstate cooling capacity by 20% or more. CTI Certification give engineers and owners peace of mind that they are getting what they specified and paid for! It will perform as rated," said Troy Reineck, EVAPCO Professor.

"I'm eager to hear about enhancements to the dry and adiabatic fluid coolers," said Seth Bartkowski, Klima New Jersey. Bartkowski learned the adiabatic products now use a pressurized water distribution system (instead of gravity fed), introduced in 2023, to further reduce water consumption. Sarah Twigg also shared concerns and negative impacts of manufacturers overstating adiabatic pad saturation efficiency during a dedicated business session.

To further celebrate the talent of the EVAPCO sales force, the General Session was produced to the theme of a well-known televised talent show competition. Between each presentation, attendees enjoyed a balancing act, a PowerPoint comedian, and a magician/mind reader. Max Duarte, from SOLIREF, also an EVAPCO Eagle (a member of its representative advisory board), was the crowd volunteer for the mind reader act.

An eco-Air Double Stack Dry Cooler with 14,816 MBH heat rejection capacity.

Bill McQuaide, Greg Stoughton and Clay Boggs from Energy Transfer Solutions in Philadelphia, PA (left to right).

Members of EVAPCO's leadership team and marketing engineering team contributed to the entertainment with a professionally filmed comedic skit, plus a cooling tower remix and lip-sync music video to a popular '90s boy band song. However, EVAPCO's very own Devon Nickoles stole the show when she performed a new original company theme song.

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Julie Gass
Lead Mechanical Process Engineer, Black & Veatch

Andy Smiltneek
President, Growth Solutions Consultants

Tim Dugan, P.E.
President and Principal Engineer, Compression Engineering Corp.

Hiran de Mel
Senior Project Manager and Principal Technologist, Jacobs

Tom Taranto
Owner, Data Power Services

Clayton Penhallegon, Jr., P.E.
Integrated Services Group

JAN 11
How to Boost the Energy Efficiency of Rotary Screw Air Compressors
Presenter Andrew Smith, P.E., Co-Founder, SMARTCAir
Thursday, January 11, 2024 – 2:00PM EST

JAN 25
Using ASME PTC 13 to Evaluate the Energy Efficiency and Performance of Different Blower Technologies
Presenter Julie Gass, Lead Mechanical Process Engineer, Black & Veatch and Hiran de Mel, Senior Project Manager and Principal Technologist, Jacobs
Thursday, Jan 25, 2024 – 2:00PM EST

FEB 08
Centrifugal vs Rotary Screw Air Compressor Performance: Full Load and Part Load Efficiency
Presenter Mike Lenti, Senior Auditor, Compressed Air Consultants
Thursday, February 8, 2024 – 2:00PM EST

FEB 22
Storage Tank and Pipe Sizing for Large Plants: How to Meet CFM Needs
Presenter Ron Marshall, Chief Auditor, Marshall Compressed Air Consulting
Thursday, February 22, 2024 – 2:00PM EST

MAR 07
Sizing Vacuum Pumps and Piping for Various Applications
Presenter Andy Smiltneek, President, Growth Solutions Consultants
Thursday, March 7, 2024 – 2:00PM EST

MAR 21
Control of Distributed Systems with Multiple Air Compressor Rooms
Presenter Tim Dugan, P.E., President, Compression Engineering Corporation
Thursday, March 21, 2024 – 2:00PM EST

APR 04
Refrigerated vs Desiccant Dryers and Choosing the Right One
Presenter Don Van Ormer, Auditor, APEnergy
Thursday, April 4, 2024 – 2:00PM EST

APR 18
CTI STD-201RS Thermal Certification for Cooling System Heat Rejection Equipment Part 2
Presenter Cooling Technology Institute
Thursday, April 18, 2024 – 2:00PM EST

MAY 09
How to Identify and Eliminate Artificial Demands
Presenter Tom Taranto, Owner, Data Power Services
Thursday, May 9, 2024 – 2:00PM EST

MAY 23
Sensors for Compressed Air Systems: Data Management and Analysis
Presenter Andrew Smith, P.E., Co-Founder, SMARTCAir
Thursday, May 23, 2024 – 2:00PM EST

JUN 13
Advanced Aeration Control for Blowers
Presenter Tom Jenkins P.E., President, JenTech Inc.
Thursday, June 13, 2024 – 2:00PM EST

JUN 27
Heat Recovery from Chillers: How to Capture and Use Waste Heat
Presenter TBD
Thursday, June 27, 2024 – 2:00PM EST

JUL 18
How to Determine the Optimal Size of a Nitrogen Generator
Presenter Mike Flowe, President, Flowe Nitrogen Systems
Thursday, July 18, 2024 – 2:00PM EST

JUL 25
Instrumentation and Monitoring for Vacuum Systems
Presenter TBD
Thursday, July 25, 2024 – 2:00PM EST

AUG 08
How to Diagnose and Fix Common Issues in Rotary Screw Air Compressors
Presenter TBD
Thursday, August 8, 2024 – 2:00PM EST

AUG 22
Thermal Performance of Evaporative and Dry Cooling Systems
Presenter Clayton Penhallegon, Jr., P.E., Integrated Services Group
Thursday, August 22, 2024 – 2:00PM EST

SEP 12
Aeration Blower Sizing and Selection
Presenter Tom Jenkins P.E., President, JenTech Inc.
Thursday, September 12, 2024 – 2:00PM EST

SEP 26
Heat Recovery from Compressed Air Systems
Presenter Don Van Ormer, Auditor, APEnergy
Thursday, September 26, 2024 – 2:00PM EST

OCT 10
How to Interpret Audit Data and Improve Your Compressed Air System
Presenter Mauricio Uribe, Auditor, Compressed Air Consultants
Thursday, October 10, 2024 – 2:00PM EST

NOV 21
Power Consumption Curves for Vacuum Pumps: Fixed-Speed vs Variable-Speed
Presenter Andy Smiltneek, President, Growth Solutions Consultants
Thursday, November 21, 2024 – 2:00PM EST

DEC 12
Compressed Air Leak Detection: Techniques, Methods, Tips, and Tools
Presenter Ron Marshall, Chief Auditor, Marshall Compressed Air Consulting
Thursday, December 12, 2024 – 2:00PM EST

DEC 19
Selection Criteria for Oil-Free Air Compressors
Presenter TBD
Thursday, December 19, 2024 – 2:00PM EST

Ron Marshall
Chief Auditor, Marshall Compressed Air Consulting

Tom Jenkins, P.E.
President, JenTech Inc.

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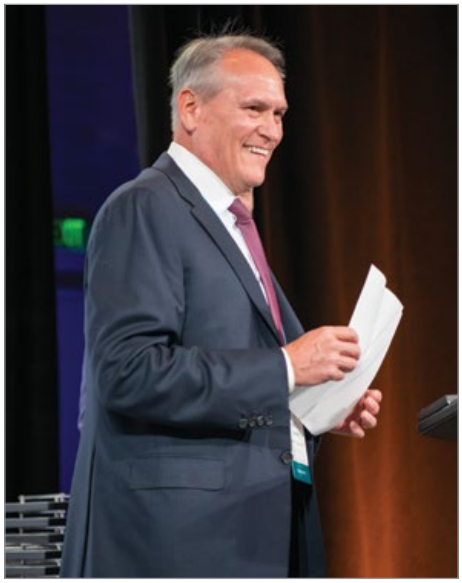
EVAPCO Celebrates Full Spectrum Evolution at 2023 Global Sales Conference



Bill Bartley, EVAPCO President & CEO.

Representatives from Heat Transfer Systems of Georgia, R.F. Peck Company Albany and Mechanical Products Nevada at the Sales Awards Banquet.

At the Sales Awards Banquet, Stephen and Fanny Lee of Newark Engineering (Singapore and Malaysia) were presented with the Lifetime Achievement Award. Newark Engineering is the third recipient of this award in EVAPCO's history.

"Newark Engineering is one of our best representatives in the entire world," said Bill Bartley, President & CEO, EVAPCO.

The event concluded with a grand prize giveaway, and tour of the World Headquarters and Research Facility in Taneytown, MD, where a fortuitous sales representative won a 2023 Tesla Model S 75. Guests were also treated to a dinner cruise around Baltimore's Inner Harbor.

"Thank you all for coming to this very special event. It has been wonderful to see old acquaintances and meet many new people. I hope this event has stirred your passions and enthusiasm for selling EVAPCO. Additionally, I'd like to give Joe Mandato (Executive Vice President, retired 2019) and the whole EVAPCO team a special thank you for their efforts in organizing this event," said Wilson Bradley, Chairman of the Board & Co-Founder of EVAPCO. BP

About EVAPCO

Founded in 1976, EVAPCO, Inc. is an industry leading manufacturing company with global resources and solutions for worldwide heat transfer applications. EVAPCO is dedicated to designing and manufacturing the highest quality products for the evaporative cooling and industrial refrigeration markets around the globe. Headquartered in Taneytown, MD, EVAPCO products are engineered and manufactured in 33 locations across 14 countries and supplied through a sales network of more than 250 offices. For more information, visit www.evapco.com.

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Crimping Pipe Nozzles for Improved Efficiency

By Murray Nottle, Working Air System Engineer, The Carnot Group

Blowing a jet of compressed air at an object is a common but "poor" use of compressed air. Often the blowing nozzle is a piece of pipe on a hose with a manual valve for control. This quickly solves a production problem when a more efficient factory made nozzle is either physically too big, too expensive, or not on site when needed. Retrofitting with factory made nozzles is often ruled out by for the same reasons, and the time needed by managers and fitters to change a nozzle for often little gain in production.

A pipe nozzle can be made both more effective and more efficient by crimping the pipe 5 diameters back from its outlet. This can be done in a workshop, or to installed nozzles, without affecting the general shape of nozzle. Maintaining nozzle shape is important so that the carefully bent tubes keep blowing at "just the right spot".

Crimping small copper tube nozzles can be done in a few minutes. Nozzles from stronger materials or that are bigger may take longer depending upon the crimp shape and the tools used.

Crimping a pipe nozzle is a quick, zero capital, technique to save compressed air.

Using crimped pipe nozzles, one site saved >90% of the compressed air used by one process and >63% by another.

Why it Works

Crimping a pipe nozzle changes the jet it creates from being low speed (sub sonic) to high speed (supersonic). The crimp creating the nozzle throat, reduces pipe area and so the fluid flow rate.

In a convergent nozzle, the pressure energy of the fluid is converted to velocity but only where the fluid is affected by a lower downstream pressure. Pressure changes move upstream in the fluid at the speed of sound (Mach 1). When the fluid speed reaches Mach 1 at the nozzle throat, no change in pressure ratio will increase the fluid speed. This is called the critical pressure ratio and for air is 1.89:1.

For the air speed to increase above Mach 1, it needs to be able to expand sideways. To allow this the nozzle walls after the throat diverge so a supersonic nozzle is also called a convergent – divergent nozzle.

Figure 1 shows the air flow patterns in and from different nozzle shapes. For:

- The flattened pipe nozzle the throat is at the pipe outlet. For any upstream air pressure > 13.1 psig (91 kPag) the outlet speed is Mach 1. For pressures >13.1 psig, outside the pipe the air expands sideways. The jet speed is ≤ Mach 1 and the jet has a wide angle.
- A straight pipe, the throat is an upstream restriction e.g. the fitting connecting the pipe to a hose, valve, or an elbow. The jet will have a speed of ≤ Mach 1. If the air is:
  - Fully expanded before it enters the pipe, the jet angle will typically be 15 – 18°.
  - Under expanded, the jet angle will be wider like the flattened pipe.
- A sonic nozzle, the throat is the small section in the middle of the nozzle:
  - At its design pressure ratio. The pressure inside the pipe end is 0 psig. The jet speed is >Mach 1 with the typical angle of 15 – 18°.

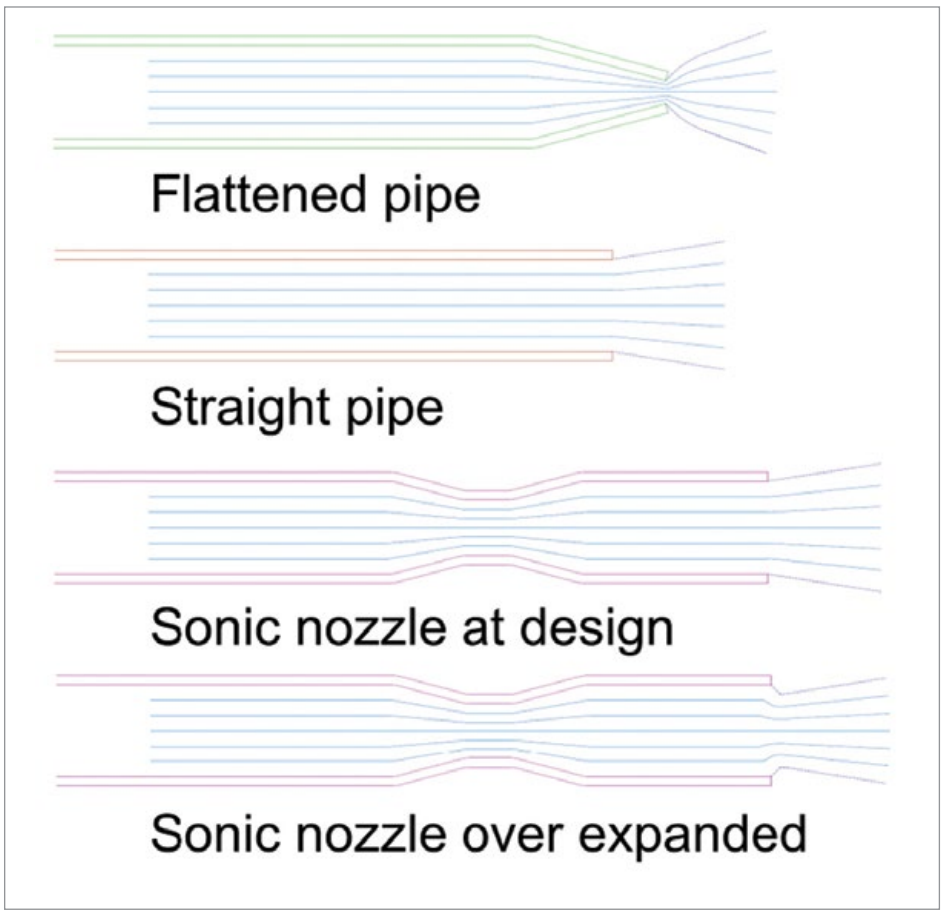

Figure 1: Flow through different nozzles.

Crimping Pipe Nozzles for Improved Efficiency

Figure 2: West air slide with close up of one of the air blows.

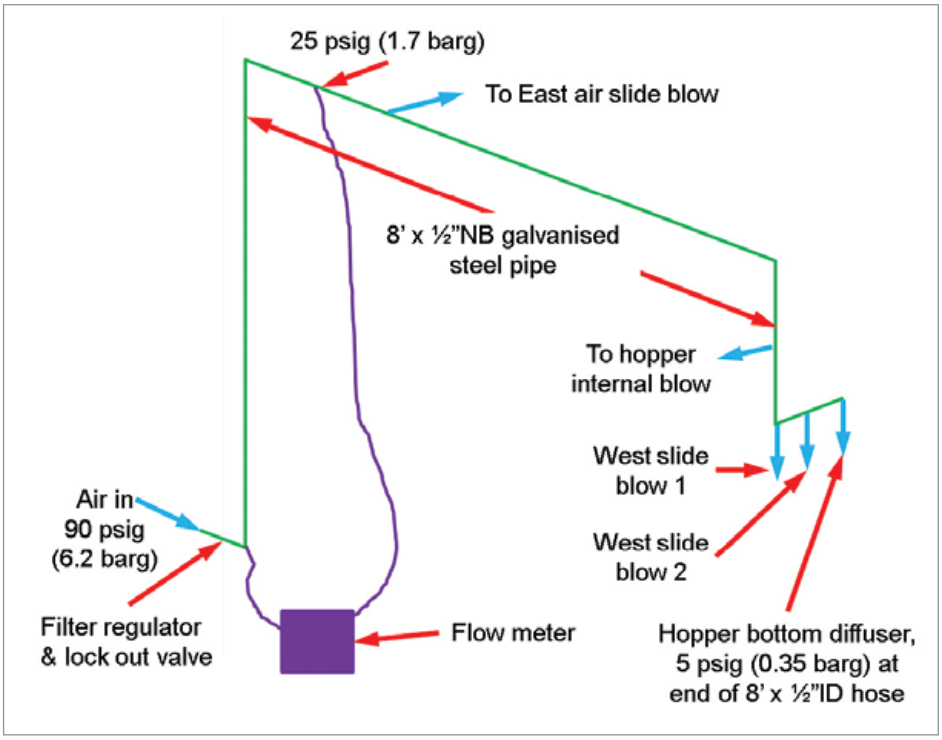

Figure 3: Hopper compressed air blows supply piping.

- Above its design pressure ratio (no image), inside the pipe end is >0 psig. The jet speed is >Mach 1 but like the flattened pipe the air will expand sideways outside the pipe giving a bigger than typical jet angle.

- Below its design pressure ratio, the pressure inside the pipe end is <0 psig. The jet speed is >Mach 1 but narrowed by the surrounding air pressure.

These sonic nozzle jet shape descriptions are simplified. Use the Internet to read more detailed ones.

What Crimp Shape to Use?

The throat shape is ideally round but creating it requires a rotary swaging tool. The throat can also be a shape with straight sides (triangle, square etc) which are easier to crimp. The number of throat sides affects the nozzle area ratio and performance, but for >3 sides this is predictable as the sum length of the nozzle sides must equal the pipe circumference.

A two sided crimp (squeezing the side of the pipe together with pliers or in a vice) can have any area ratio, but the error between "design" and "manufactured" area ratios can be large and unpredictable. A two side crimp can also lower the strength of the nozzle so should only be considered if reworking flattened end nozzle.

Table 1 shows the theoretical performance of different shaped crimp pipe nozzles. The

"Relative Jet momentum" is the jets force compared to an open pipe at the same supply pressure.

A Case Study

The Carnot Group has a customer with a large, conical hopper feeding powder into two air slides (East and West). The flow of the powder along each air slide is controlled by a knife valve.

To prevent the powder jamming the valves, compressed air is blown against the back of each valve blade. The air nozzles are OD½" tube welded to the sides of the air slides. ID ½" air hoses connect the nozzles to a manifold. Figure 2 shows the West air slide which has a nozzle on each side of the slide (blue air hoses). The East slide only has 1 nozzle.

The hopper is fluidised above the air slides by blower supplied air. To fluidise the hopper below the air slides, there is a porous "tile" at its base supplied with compressed air. There is also an OD ½" tube lance entering from the side of the hopper that bends down internally to blow the top of the tile. In total there are 5 compressed air blow points around the hopper.

Figure 3 shows the compressed air piping supplying the blow points. For testing purposes, a flow and pressure logger was temporarily installed using valves to bypass and isolate section of the pipe.

Initial testing showed:

- A flow of 72 CFM (2.04 m^3/min).
- After passing through a filter regulator, lock out valve and 2 elbows, there was only 25 psig (1.7 barg) in the pipe before any take off. The regulator was set to a much higher pressure. This pressure was measured before air was diverted through the flow meter.

This loss of pressure should be no surprise. There were 5 x ½" hoses being supplied by a single ½" pipe. There was sonic expansion (pressure ratio >1.8:1) in either the regulator or isolation valve to the extent that both were tagged as leaks due to the amount of ultrasound noise being emitted.

Table 1: Performance vs number of throat sides

No throat sides	3	4	5	6
Pipe/throat area ratio	1.65	1.27	1.16	1.10
Pressure ratio	6.46	4.00	2.89	2.33
Supply psig	80	44	28	20
Supply barg	5.5	3.0	1.9	1.4
Mach no out	1.97	1.65	1.48	1.37
Relative Jet momentum	1.19	1.29	1.28	1.24
Approximate air saving, %	49	39.3	32.4	26.8

Crimping Pipe Nozzles for Improved Efficiency

From the logged data, the nozzle jet momentums were estimated. Engineered nozzles could not be fitted to these points, so crimp pipe nozzles were used. These were OD 3/16" copper tube with a 3 sided crimped throat as shown in Figure 4. Figure 5 shows the modified electrical lug crimp tool used to crimp the tube throats.

The tube nozzles were placed inside the existing ½" tube nozzles using ¼ BSP x 1/4" tube compression and other fittings. The new internal blow nozzle was 18" long but being annealed copper tube, it was able to pass through the bend in the original ½" steel tube one.

Pressure regulators were fitted to the supply to each blow point and after consultation with the plant operators were set in the range of 20-30 psig. The bottom tile had a regulator and restricting orifice fitted to control its air flow.

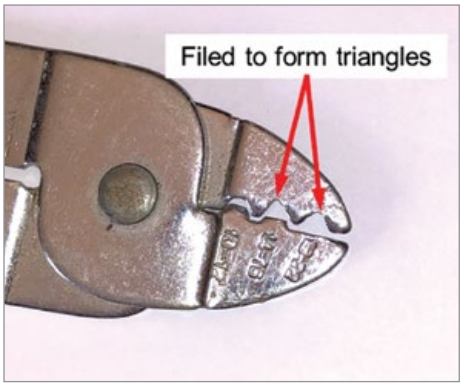

Figure 4: Tool used to crimp 3 sided throat.

Figure 5: Crimped pipe nozzle from OD3/16" tube.

Follow up testing showed:

- A compressed air flow of 3.2 CFM (0.09 m^3/min) a >90 % saving.
- A pipe pressure of 75 psig (5.2 barg) instead of 25 psig (1.7 barg).

On another process, 3 x 5/16" pipe nozzles were changed to 3 x 3/16" crimp pipe nozzles dropping the compressed air flow from 35 to 13 CFM (1 to 0.37 m^3/min) a 63% saving.

Conclusion

Compressed air nozzles made from pipe are a quick solution to production problems. Engineered, factory made nozzles have better performance, but are often too costly and not at hand when needed. Crimping the pipe nozzle so that it becomes a sonic (convergent divergent) nozzle, can quickly provide most of the benefits of a factory made nozzle when the latter, is not practical or cost effective. BP

For more information please contact Murray Nottle, The Carnot Group. mnottle@carnot.com.au, www.carnot.com.au.

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HVAC/Process Cooling at Best Practices 2023 EXPO & Conference

By Bill Smith, Chiller & Cooling Best Practices Magazine

A record number of exhibitors and attendees came to the Best Practices 2023 EXPO & Conference.

➤ In late October 2023, professionals from around the world gathered at the Best Practices 2023 EXPO & Conference at McCormick Place in Chicago, Illinois to source and learn about *Sustainable, Safe and Reliable On-Site Utilities Powering Automation* including chillers, cooling towers, motors, compressed air, blowers, vacuum, pneumatics and more.

"Recent energy price instabilities and our sustainability targets have accelerated our needs to improve energy efficiencies and better utilize our existing utility assets," said Bing Cheng, Director of Global Utilities, Givaudan – a global fragrance and ingredients company, during his keynote presentation.

The Best Practices Conference featured over seven hours of sessions dedicated to cooling water reliability, safety, quality and efficiency. This report will recount the cooling water system educational curriculum at the Conference, and technology displayed at the EXPO. This event was also co-located with a large food and beverage processing trade show.

Conference Recap

Cheng shared direct examples of Givaudan's efforts to optimize its chilled water system reliability and efficiency. "During heating and cooling seasons, we're looking at increasing and decreasing our temperature set points so we're not over cooling or heating our facilities.

Frank Foster, Consultant and Membership Committee Chair, Cooling Technology Institute.

Mark Pfeifer, PE, LEED AP BD+C, Sr. Manager – Technical Services, SPX Cooling Tech speaking at the Conference.

Brian Justice, Hudson Technologies, speaking at the Conference.

We also have maintenance procedures in place to ensure our evaporator and condenser coils aren't fouling," said Cheng. In addition, Givaudan's asset replacement plan is pushing very hard for heat pump technology as boilers are reaching replacement age.

The inaugural Women in Compressed Air, Vacuum & Cooling (WCVC) Networking luncheon.

An Event Co-Sponsor was The Cooling Technology Institute (CTI), an industry association advocating and promoting the use of all environmentally responsible commercial cooling technologies through education, and the development of codes, standards and guidelines. Frank Foster, CTI Membership Committee Chair, gave an opening keynote presentation titled *CTI Engineering Resources & Cooling Tower Thermal Performance Certification.*

CTI also held a three-hour conference session, focused on fundamentals of cooling towers, adiabatic coolers, and cooling tower water treatment. Mark Pfeifer, PE, LEED AP BD+C, Sr. Manager of Technical Services, SPX Cooling Tech, kicked off the session with cooling tower fundamentals and design. Pfeifer covered principles of operation, selection parameters, tower types, tower components, capacity control, sound, and water consumption. Next, Andrew Sickler, Baltimore Aircoil, presented fundamentals of adiabatic heat rejection. Sickler shared technology comparisons between dry & adiabatic vs. evaporative cooling systems, principles of operation, water and energy comparisons, and more. After lunch, Jon Cohen, Buckman Chemical covered water chemistry 101, the objectives of water treatment, cycles of concentration, bleed control, generic water treatment programs, feed & control equipment, and more.

Bert Wesley, Sr. Principal, Woodard & Curran, presented *Engineering Cooling Systems for Maximum Production Output* in the Plenary Session.

"Our number one objective for cooling water system design is to deliver the correct amount of cooling at the correct temperature and flow rate across all production speeds," said Wesley.

HVAC/Process Cooling at Best Practices 2023 EXPO & Conference

Clayton Penhallegon Jr., Principal, Integrated Services Group, chaired a session called *Advanced Cooling Water System Design for Reliability and Performance.* To begin the session, Brian Justice, Hudson Technologies presented *Mystery of Industrial Chiller Failures Solved with Creative Testing.* Justice shared how a system assessment determined copper chloride had formed in components of a problematic water-cooled chiller contaminating refrigerant and making the water conductive. The system was flushed until all solids were removed and conductivity of the flush outlet water was similar to the inlet water. Along with other measures, Justice's team reclaimed the contaminated refrigerant back to AHRI 700 standards for resale, and recharged the problem chiller with certified reclaimed refrigerant.

Next, Suzan Sun-Yuan, PE, CDT, LEED AP, Technical Authority – Mechanical, ESD Consulting/Stantec, presented *Central Utility Plant (CUP) Promises Reliability, Reduced Capital Cost, and Energy Savings.* Sun-Yuan presented her system design work at the Las Vegas Convention Center – recognized as a 2023 Honorable Mention in the ASHRAE Technology Award Competition (V: Public Assembly). She provided an overview of the CUP with (4) 1,750-ton 4,160 voltage centrifugal chillers with VFD and (4) crossflow cooling towers, and variable primary and variable secondary systems. She also shared the equipment sizing strategies used, the main system distribution and load reduction strategies, plus the design standardization, CUP operation and maintenance.

Mike Wlodarski, Hydrothrift presented *Cooling Towers/Well Water Isolation with a Liquid-to-Liquid Heat Exchanger System,* to discuss scale prevention on point-of-use high temperature surface such as aftercoolers, intercoolers and oil coolers in a water-cooled air compressor.

Penhallegon presented *Holistic Cooling System Controls – the Secret Ingredient for High Efficiency Operation.* Cooling plant system-wide controls are critical to efficient operation, according to Penhallegon. He shared three typical control situations found: Unit/device controls only – "no controls" [25% – air-cooled or simple]; Isolation/Focused Controls – "Standalone Controls" [55% – typical]; and Typical Function Systems – "Standard System Controls" [20% – Larger Plants].

Dan Mizesko, President of Dalkia U.S. Chiller Services, presented *Most Chillers Are Operating Above Their Design Efficiency!* Rebecca Moore with Aggreko presented *Water Consumption and Environmental Impact: How to Reduce Water Usage While Maintaining Production Goals.*

The Women in Compressed Air, Vacuum & Cooling (WCVC) Networking Group held its inaugural luncheon sponsored by Ingersoll Rand and Quincy Compressor on Day 1 of the event. At the end of Day 1, attendees enjoyed rooftop views of Chicago during the Networking Event, sponsored by BEKO Technologies, Sullair, Mikropor and Aggreko.

Frank Foster and Jalene Fritz at the CTI booth (left to right).

John Senay, Leslie Marshall, Jack Gusciora, Chris Dominick and Paul Humphreys at the Atlas Copco Compressors booth (left to right).

Exhibitor Sampling

Atlas Copco Compressors offers the TCX 4-90A Process Cooling Chiller Range – a compact, all-in-one water (or water/glycol mix) chiller with an air-cooled condenser and integrated hydro module. Key components of the TCX range include all-aluminum microchannel condensers, fully hermetic scroll compressors, an 1P54 sound attenuated canopy design with galvanized steel structure and more. It's cooling capacity ranges from 13.877 – 326.4 BTU/hr (reference condition: ambient air 95°F, evaporator in 53.6°F / out 45°F without pump).

Delta Cooling Towers made its debut at the Best Practices EXPO. Headquartered in Roxbury Township, NJ, Delta Cooling Towers is a leader in manufacturing of high-density polyethylene (HDPE) evaporative cooling towers. Delta's team was excited to share they're expanding its manufacturing facility in Philippi, West Virginia.

Mikropor offers its MCHILL Water Process Chillers, available in 18 sizes from 1.7 – 55.3 tons. Its standard components include hermetic scroll compressor (R-410A), aluminum microchannel refrigerant condenser

Jay Flaherty and Dave Blodgett at the Delta Cooling Towers booth (left to right).

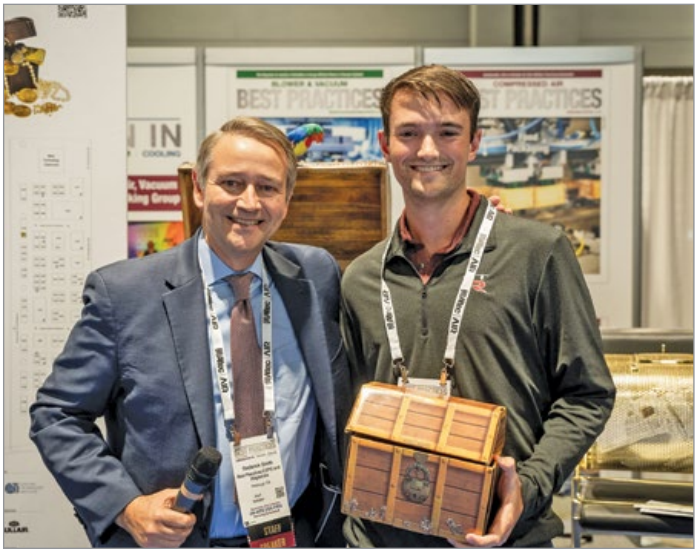
Dave Lange, Volkan Ayhan, Jeff Crutchfield, Aaron Duke, Ryan Loeffler, Stephanie Glassman and Chris Wells at the Mikropor America booth (left to right).

Sahith Sanike and Parker Beck at the SMC Corporation of America booth (left to right).

Don Joyce and Hamilton Terrell at the Industrial Water Chiller booth (left to right).

HVAC/Process Cooling at Best Practices 2023 EXPO & Conference

Todd Allison and Jim McFadden at the nano booth (left to right).



Roderick Smith (Best Practices Expo) congratulates Jacob Key (Energy Engineer, Nissan) for winning $500 at the Daily EXPO $1,000 Energy Treasure Hunt Raffle!

with variable speed EC fan motor, thermostatic expansion valves, brazed plate stainless steel evaporator, integrated cold storage tank, 3 bar integrated centrifugal water pump and electronic control with mobile app support.

SMC Corporation of America offers an array of process chillers including high efficiency, large capacity, dual channel, rack mount and more.

Brentwood Industries displayed its engineered fill media and components for cooling tower applications.

Along with its compressed air treatment and gas generation equipment, nano-purification solutions offers the C1 range of precision controlled industrial process chillers. The C1 range of 24 factory models achieves cooling capacities from 0.6 – 104.6 tons (6,284 – 1,255,668 BTU/h).

Industrial Water Chiller, a T.J. Snow company, enjoyed the show. "We're having a good year, but after all the people we met today, next year could be a *great* year!" said Don Joyce, National Sales Manager.

On Day 1 and 2, attendees from manufacturing plants, engineering firms, mechanical contractors and manufacturers representatives participated in the Daily $1,000 Energy Treasure Hunt Raffle. Lucky winners included:

- Julio Marquez, Solaire Compresores
- William Qualls, Teknor Apex
- Sean Ferris, Universal Creative
- Jacob Key, Nissan
- Abdulaziz Dulaijan, Saudi Aramco
- Bridgette Graham, Compressed Air & Equipment

Over 1,000 attendees attended the Best Practices 2023 EXPO & Conference. The Best Practices 2024 EXPO & Conference occurs October 29-31, 2024 at the Cobb Galleria Centre in Atlanta, GA. For more information about participating, contact us or visit www.cabpexpo.com. BP

To learn more about the ***Best Practices 2024 EXPO & Conference*** please visit https://cabpexpo.com/

Visit our Webinar Archives to listen to expert presentations on ***Chiller & Cooling Best Practices*** at https://coolingbestpractices.com/magazine/webinars

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Aeration Blowers at Weftec 2023

By Roderick M. Smith, Editor, Blower & Vacuum Best Practices Magazine

Weftec 2023 took place October 2-5, 2023 in Chicago at McCormick Place.

Weftec 2023, a leading event for industrial and municipal wastewater treatment facilities took place October 2-5, 2023 at Chicago's McCormick Place. The objective of this article is to provide readers with a sampling of aeration blower technologies on display at the show. We regret not being able to include all exhibitors or visits made due to article length considerations.

Aeration Blower Technology

There's a lot going on with Aerzen. I was first shown their completely newly redesigned rotary screw blower package called the Delta Hybrid 2.0. The four new models are optimized for performance at 8-15 psig for flows from 59 to 5,300 cfm. The product line has cylindrical roller bearings good for 70,000 hours at any operation point, an updated casing, 12-20% brake horsepower improvement in energy efficiency, improved thermal stability achieved by modified process air flows and air intake within the new sound enclosures. Lastly the units feature an advanced AERtronic control system as a standard feature. Aerzen Rental was also present and said there's a healthy demand for renting their blowers and even diffuser grids in industrial and municipal wastewater applications.

I was very interested to learn a bit more about two firms, with adjacent technologies, which Aerzen has acquired over the past couple of years. They are Specialty Treatment Solutions (STS) and Aquarius Technologies. STS Systems are, in layman's terms, a containerized entire wastewater treatment plant for industrial applications. These pre-engineered systems have had primary success as wastewater treatment systems for high strength influents seen at wineries, breweries and other food industry applications. Aquarius Technologies is a manufacturer and designer of fine and coarse bubble diffused aeration systems. They also produce Nebula® MultiStage Biofilm Systems.

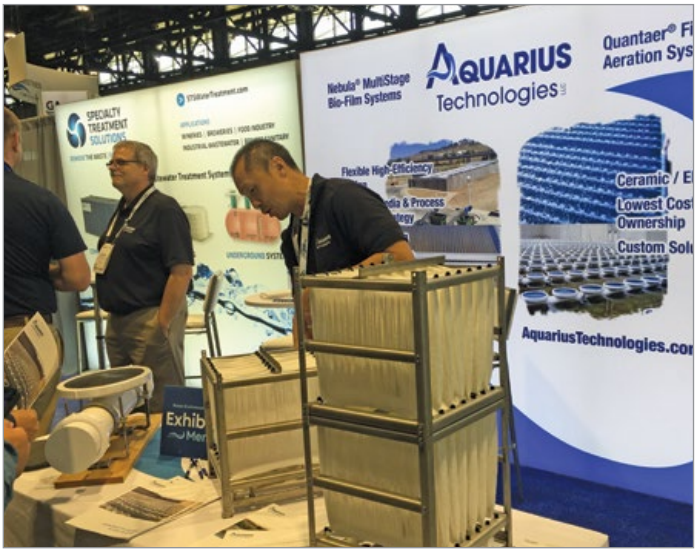
Inovair continues to grow both their business and their integrally-geared centrifugal blower product line. Their manufacturing and engineering campus is located just outside Kansas City, Kansas. CEO Ken Jones and VP Sales & Marketing David Sperber told me it has expanded significantly with a new PTC-13 test booth which has already performed it's first witness test with engineering firms. This will be featured in an upcoming PTC-13 Webinar we are hosting. The plant expansion also accommodates the growth of their core technology process, the 5-axis machining of their 7075-T6 aluminum impellers. They introduced two new models, the IM30/IM-40 (40-400 horsepower) and the IM-40/IM-50 (200-600 horsepower), which will be launched in 2024.

The Atlas Copco booth featured many blower technologies but my visit focused on their ZS Series gear-box driven, rotary screw blowers designed

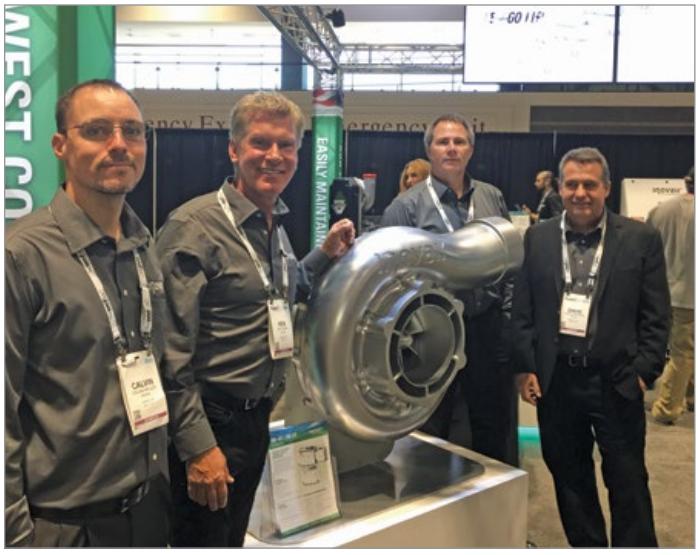
for industrial and aeration blower applications. Flow ranges are from 160 to 5,300 cfm at pressures from 4.4 to 22 psig. Blower Business Line VP, Travis McGarrah, explained the gear-box drive is an important feature as it improves energy efficiency and eliminates maintenance. Another important feature is a pressurized oil circuit with a filter and oil cooler. He also pointed out a new OGP+ Series oxygen generator, which when combined with a blower, provides almost double the flow of oxygen compared to a traditional compressed air supply.

APG-Neuros displayed large 500 hp, 1000 hp and 1500 hp models of their high-speed turbo blowers. The 500 hp and 1,000 hp (dual core) units deploy air bearings while the 1500 hp (single core) unit uses magnetic bearings. I was surprised to see such large units and Adam Hammoud confirmed the firm has successfully entered, over the past five years, the "very large" (that's my technical term) turbo/centrifugal blower market. He also said a purchase order has been received from a Toronto area municipal wastewater facility for a complete retrofit of what they believe

Adam Clarke and Justin Haag next to the Delta Hybrid 2.0. at the Aerzen booth (left to right).



There was a lot of activity at the booths of Aerzen's recently acquired firms, Specialty Treatment Solutions and Aquarius Technologies.



Calvin Miller, Ken Jones, Nate Neufeld and David Sperber, displaying their new 600 hp geared centrifugal blower, at the Inovair booth (left to right).

Travis McGarrah next to a ZS 4 VSD rotary screw blower at the Atlas Copco booth.

Aeration Blowers at Weftec 2023

to be one of the largest aeration blower installations in North America. They plan to fulfill this order in 2024. He also showed me what they call a "medium voltage design" where they have integrated a transformer into a blower package.

Kaeser Compressors' booth featured their CompaK lobed blower package but the real highlight was the Second Generation design of their rotary screw blower product line. The CBS-HBS product lines cover a flow range of 190 to 5,650 cfm at pressures from 4 to 15 psi. Peter Werhahn and Stephen Horne showed me a new FBS unit in the booth. This new generation of machines feature gear drives and SYNRM (synchronous reluctance) motors offering 7% higher efficiencies and an integrated VFD installed with front access where the control panel is located. This space saving integration of the VFD allows for side-by-side installation of VFD blowers. They also had a 200 horsepower rental package of their magnetic bearing turbo blower in the booth.

Craig Phelps and Adam Hammoud at the APG-Neuros booth (left to right).

Peter Werhahn and Stephen Horne next to the new generation FBS rotary screw blower at the Kaeser booth (left to right).

Jim Trace and Ricardo Alzate next to a 200 kW magnetic bearing turbo blower at the Howden booth (left to right).

Cody Shultz, Katherine Garratt, Ronan Cox, Chris Hyde, and Edgar Arreaza at the Lontra booth (left to right).

Lontra had a large booth with their new LP2 Blade Blower technology. Their Commercial Director is Chris Hyde, who it turns out is a veteran like me of the European compressed air market in the '90's. Their sales manager in the U.S. is also very experienced, Edgar Arreaza. They told me they are actively seeking "sponsored installation sites" in the U.S. and encourage our readers to contact them. They had a 110 horsepower VFD blower in the booth which uses a permanent magnet motor. They say their new technology (they describe it as a cross between a vertical recip and a rotary vane) is 22 to 34% more efficient than a traditional lobe blower and that it has an 80% turndown while holding high efficiency levels.

There have been some significant changes at Howden. First, they were acquired by Chart Industries in March 2023. The Chart website says it's "a global manufacturer of highly engineered cryogenic equipment servicing multiple applications in the clean energy and industrial gas

George Hubbard, Robert Sexton and Andre Narbonne at the Hoffman and Lamson booth (left to right).

Charles Davis and Amber Roberts at the Lone Star Blower and Compressor booth (left to right).

Scott Matthews at the Next Turbo booth.

Roger Blanton at the Eurus Blower booth.

Aeration Blowers at Weftec 2023

Luis Enrique Beltran at the TNE booth.

Jon Jensen next to the Air Management System at the SMC booth.

market." Second, Ingersoll Rand completed the acquisition of Roots from Chart Industries in August, 2023. What hasn't changed is that Howden is the owner of the powerful Turblex™ brand name and at their booth they were showing a 200 kW Howden turbo blower using a Turblex™ airend with a permanent magnet motor with active magnetic bearings. Jim Trace and Ricardo Alzate explained there are four models in the 100 to 300 kW range and that the design eliminates the need for lubrication oils. They also said their customers like their fully integrated multi blower control system able to manage up to eight blowers.

Hoffman & Lamson is part of the Nash Division and manufactured by Gardner Denver Inc., which is part of Ingersoll Rand. I think I'm expressing that correctly. Interestingly, their booth only featured the Hoffman & Lamson brand name. The booth team showed me the Hoffman Defender PD lobe or rotary screw product line, featuring "Robuschi inside", with models up to 500 horsepower. They also displayed a Hoffman Revolution Plus turbo blower, using air foil bearings, with models up to 700 horsepower. They also continue to manufacture a full range of traditional multistage centrifugal blowers from 10 to 2,000 horsepower.

Lone Star Blower and Compressor displayed their wide range of blowers including a high speed turbo which uses air bearings. Based in Houston, Lone Star manufactures centrifugal, geared, gearless and multistage blowers and air compressors.

Roger Blanton at the Eurus Blower booth said they've experienced significant growth over the past few years. Eurus manufactures rotary lobe PD blowers and said their strength is their reliability plus the fact they have five warehouses in North America with good lead times. Mentioning industry consolidation and acquisitions as a factor, Roger said OEMs have turned to them as reliable partner for on-time deliveries and reliable performance. I was surprised to hear him say they've also been making headway with multistage centrifugal blower sales.

Next Turbo Americas is based in Kansas City, MO, where it has manufacturing, assembly and service capabilities for their line of integrally geared turbocompressors manufactured in Italy. General Manager Scott Matthews kindly took some time to give me a crash course on some key features of their integrally geared turbocompressors (pressures to 23 psi) available in six frame families to above 3,000 horsepower. He started with saying their design is a favorite with service technicians and maintenance people. For example, the easy access to the impeller allows them to train their customers to clean the diffuser vanes every three years. After saying their designs are for 3600 rpm machines, he went into the two types of bearings they use (1) ceramic

anti-friction bearings and (2) hydrodynamic multi-pad bearings. One item stuck with me regarding the ceramic bearings when he said they only require a fill of 10 gallons of oil vs. journal bearings which can require fills of 80 to 130 gallons.

TNE is a Korean manufacturer of air bearing, gear-less, high-speed turbo blowers. Their literature states they have a business in Oakland, California. It goes on to list four product lines ranging from 10 to 900 horsepower. I spoke briefly with their manager for business in Mexico, Latin and South America, Luis Enrique Beltran, who said he's been working for them for many years with good results.

SMC had a booth with all their pneumatic solutions. Jon Jensen showed me, once again, their Air Management System. The AMS, in my opinion, is an excellent next-step for anybody wondering how to continue demand-side improvements after getting their compressed air leak load under control. The system can automatically close valves and shut off compressed air supply to idle work stations. It can also incorporate a simple dew point measurement device to warn of poor compressed air quality.

WEFTEC 2024

Weftec 2024 is scheduled for October 7-9, 2024, in New Orleans at the Ernest N. Morial Convention Center. For more information visit https://www.weftec.org/ BP

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Compressed Air Technology News

ELGi Launches AB Series Oil-Free Air Compressor

ELGi North America (ELGi) launched the "Always Better" AB Series oil-free screw air compressor earlier this year. The AB Series represents breakthrough technology improvements in terms of quality of compressed air, consistent performance over the product life cycle, lower operating temperature, reliability of compressor and operating cost, translating to a lower cost of ownership in industries such as packaging, pharmaceuticals and food and beverage processing.

Compressed air is essential in industries like packaging, food processing, and pharmaceuticals as it powers pneumatic systems and enables sealing and packaging processes. Moreover, air quality is critical when selecting a compressor for packaging operations. While many facilities use oil-lubricated compressors with a risk of oil contamination, the ELGi's AB Series compressors consistently deliver 100% oil-free air, in compliance with the stringent norms of ISO 8573 – 1 Class 0 and ISO 8573 – 7, eliminating contamination risks in packaging applications.

The AB Series oil-free compressor can also be equipped with an optional variable-speed drive, allowing for significant energy savings as it smoothly adjusts to fluctuating air demand. AB Series compressor's compact footprint, lower operating noise, proprietary coating of the rotor and airend housing, and simplified design approach make it unique within oil-free compressed air offerings.

The AB Series is backed with an industry-leading 5-year air end warranty and a 5-year warranty on the compressor package including the motor and cooler.

Visit https://www.elgi.com/us/ab-series-oil-free-screw-air-compressor-15-150hp/ to learn more about ELGi AB Series oil-free compressor range.

About ELGi North America

ELGi North America, headquartered in Charlotte, NC, is a subsidiary of ELGi Equipments Limited, a leader in compressed air solutions for over 60 years. Established in 2012, ELGi North America, in conjunction with its subsidiaries, Pattons, Pattons Medical, and Michigan Air Solutions, offers a comprehensive range of compressed air products and services. Our product offering includes oil-lubricated and oil-free rotary screw and reciprocating compressors, dryers, filters, and ancillary accessories. ELGi and its subsidiaries serve multiple industry verticals spanning medical applications, pharmaceuticals, food & beverage, construction, manufacturing, and infrastructure. For further information, please visit https://www.elgi.com/us/.

Equipped with pioneering technology, the AB Series meets industry needs by offering enhanced reliability and reduced ownership cost.

Festo Introduces MS-Basic Air Preparation Units

Festo launches MS-Basic, a family of pneumatic service units in polymer housings that offer attractively priced components covering most application needs. MS-Basic air preparation components have the functionality to perform the most important technical tasks necessary for proper compressed air preparation and consist of pressure regulators, filter regulators, electric on/off and soft start valves, as well as manual on/off valves with filter/regulator combinations.

MS-Basic components are fully compatible with the existing Festo MS line of premium service units. Machine builders and end-use customers can combine inexpensive MS-Basic pressure regulators, filter regulators, on/off and soft start valves with MS series safety valves, lubricators, distributors, filters, and dryers to assemble the best mix of low-cost basic functions with high-end functionality.

The MS-Basic pressure regulators and filter regulators are powerful, yet lightweight. These units have a high flow rate of up to 6000 l/min. The polymer materials reduce unit weight by up to 30% compared with the metal housing units. For the filter regulator, Festo integrated the filter in the bowl. This makes changing the filters easy and saves installation space. The transparent bowl provides clear indication whether dirt needs to be removed.

A manual or normally closed, fully automatic condensate drain provides process reliability and protection against contamination. The new electric on/off valve is also available as a soft start/quick exhaust valve. Soft start units

The MS-Basic series is light weight, compact and incredibly powerful. Advanced polymer materials make these compressed air components up to 50% lighter than competitive products and equally robust.

safely and slowly build working pressure at an adjustable rate until it reaches 50% of set pressure before switching to full set pressure. Festo provides a free online configurator to quickly and easily configure the optimum air preparation system.

MS-Basic service units are featured in the new Festo Pneumatic Essentials program – an ambitious global undertaking to streamline ordering and ensure fast delivery of guaranteed in-stock pneumatic components nearly anywhere in the world.

Festo Essentials, which fit most pneumatic applications, include service units, high wear polyurethane tubing, one-way flow control valves, high flow valves for normal and harsh environments, self-teaching proximity switches, mini slides, guided drives, repairable pneumatic cylinders conforming to NFPA interchange dimensions, and metric and imperial round and compact cylinders. Customers are assured of world-renowned Festo quality components that boost machine performance, lower waste, and reduce the risk of downtime. Festo Essentials are also compact for today's smaller footprint, energy efficient machines.

About Festo U.S.

Festo is a leading manufacturer of pneumatic and electromechanical systems, components, and controls for process and industrial automation. Celebrating 50 years in the U.S., Festo Corporation has continuously elevated the state of manufacturing with innovations and optimized motion control solutions that deliver higher performing, more profitable automated manufacturing and processing equipment. Through advanced technical and industrial education, Festo Didactic Learning Systems and its partners prepare workers for current and future manufacturing technologies. For more information, visit www.festo.com.

Teledyne FLIR Expands Ex Pro-Series Thermography Cameras

Teledyne FLIR, part of Teledyne Technologies Incorporated, announced the focus-free FLIR E5 Pro and FLIR E6 Pro cameras, providing a larger 3.5-inch touchscreen display along with access to FLIR Ignite Cloud connectivity within the same point-and-shoot, pistol-grip form factor as legacy Ex-Series thermal cameras. The versatile cameras are designed primarily for close-up, professional-grade mechanical, building, and electrical thermal inspection scenarios. These include detecting water intrusion, air leaks, electrical connections, temperature differentials between equipment, and impending equipment failure.

Through a built-in touchscreen, FLIR Ex Pro users can share captured images with colleagues, partners, and clients over Wi-Fi via the FLIR Ignite Cloud software. FLIR provides 1GB of free storage, with the option to purchase additional annual storage subscriptions for heavy users. The FLIR Ignite Cloud can be accessed anywhere from a wide variety of mobile devices, web browsers, or PC desktops, eliminating the need to carry extra USB flash drives, card storage, or cables. Images can be reviewed, edited, analyzed, and shared as files or within quick reports. Files can be synchronized with FLIR Thermal Studio software for situations requiring more advanced editing and reporting capabilities.

"Effective condition monitoring programs today require connected, cloud-enabled thermal imaging devices, such as the Ex Pro-Series, that empower inspectors to share and analyze data in real-time quickly and efficiently," said Rob Milner, global business development director, Teledyne FLIR. "Not only does this help inspectors gain a better understanding of and provide a more comprehensive view of potential equipment failure, but it also enables organizations to more accurately predict maintenance requirements grounded in easily accessible data and analysis through FLIR Ignite Cloud and FLIR Thermal Studio."

New FLIR E5 Pro and E6 Pro join the E8 Pro providing point-and-shoot, focus-free thermal imaging capture with FLIR Ignite™ cloud connectivity.

Compressed Air Technology News

The FLIR Ex Pro-Series features improved 640 × 480 screen resolution, providing greater visual detail when paired with the respective 240 × 180 thermal resolution of the FLIR E6 Pro and the 180 × 120 thermal resolution of the FLIR E5 Pro. The Ex Pro-Series cameras also feature built-in 5MP digital cameras and LED lamps to help users better understand their inspection area and capture visual details in low light. With FLIR-patented Multi-Spectral Dynamic Imaging (MSX®) capability, which overlays the edge detail of the visible camera upon the thermal image, users experience greater detail and contextual awareness, even in low light, without sacrificing any thermal data. Users can also leverage new on-screen annotations to highlight key findings.

To handle the rigors of outdoor and industrial environments, the entire line of Ex Pro cameras are drop-tested up to two meters (6.6 ft). The ruggedized form factor also includes an IP54 rating, 25G-shock, and 2G vibration test ratings along with a built-in lens cap for added protection.

The Ex Pro-Series cameras also feature four hours of continuous operation on one battery, which can be quickly swapped out and recharged for all-day use.

Along with the previously announced FLIR E8 Pro, the FLIR E5 Pro and E6 Pro are available for purchase worldwide from Teledyne FLIR and its authorized dealers. Each purchase includes a removable and rechargeable battery, a hard-carrying case, a power supply, FLIR Thermal Studio starter software, and printed documentation. To learn more or to purchase, visit www.flir.com/ex-pro.

About Teledyne FLIR

Teledyne FLIR, a Teledyne Technologies company, is a world leader in intelligent sensing solutions for defense and industrial applications with approximately 4,000 employees worldwide. Founded in 1978, the company creates advanced technologies to help professionals make better, faster decisions that save lives and livelihoods. For more information, please visit www.teledyneflir.com.

ABB Survey Reveals Unplanned Downtime Costs $103,000 per Hour

According to the new "Value of Reliability" survey from ABB, 69% of industrial businesses experience unplanned outages at least once a month, compared to 69% globally. This costs the typical US business close to $103,000 per hour, compared to $125,000 globally. Despite this, 22% of US businesses surveyed still rely on run-to-failure maintenance.

The survey, conducted by Sapio Research in July 2023, gathered responses from 3,215 plant maintenance decision-makers globally across the energy generation, plastics and rubber, oil and gas, wind, chemicals, rail, utilities, marine, food and beverage, water and wastewater, and metals sectors. It is part of a report that provides insights into how businesses currently manage maintenance and how they can reduce unplanned downtime.

The findings demonstrate the importance of equipment reliability and maintenance. Globally, 92% reported that maintenance has increased their uptime in the last year, with 38% reporting an improvement of at least a quarter. Also, three-quarters of respondents said that reliability positively impacts their business reputation and financial performance, and helps them meet contractual obligations, prevent waste and secure repeat business. Reliability was rated by respondents as the top priority when purchasing new equipment.

Looking forward, 60% plan to increase their investment in reliability and maintenance in the next three years, with a third planning to boost spending by more than 10%. Nine in ten respondents expressed interest in outcome-based maintenance agreements. Under these,

According to the new "Value of Reliability" survey from ABB, 69% of industrial businesses experience unplanned outages at least once a month.

operators pay service partners based on achieved outcomes, such as increased uptime or energy efficiency. This results in efficient and effective service delivery with predictable cash flow.

Speaking about the results of the survey, Rob Snyder, Local Division Manager, Motion Services, said, "Proactive planned maintenance is essential for preventing costly downtime. Without it, organizations are at higher risk for substantive financial losses and the challenge of relying on increasingly difficult-to-source labor. With this in mind, industrial businesses should aim to progress from a high-risk run-to-failure maintenance approach to a long-term outcome-based strategy. This will improve reliability, business reputation, competitivity, cut costs, and provide peace of mind, empowering businesses to focus on their core competence."

This new, outcome-based model of maintenance will help industrial businesses meet incoming emissions targets and regulations as the world fights against climate change. In addition, it will help overcome the industry skills gap as experienced technicians reach retirement age.

For more information, read the full survey report.

About ABB

ABB is a technology leader in electrification and automation, enabling a more sustainable and resource-efficient future. The company's solutions connect engineering know-how and software to optimize how things are manufactured, moved, powered and operated. Building on more than 130 years of excellence, ABB's 105,000 employees are committed to driving innovations that accelerate industrial transformation. For more information, visit www.abb.com.

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