The Magazine for Quality & Reliability in Energy-Efficient Blower & Vacuum Systems

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March 2022

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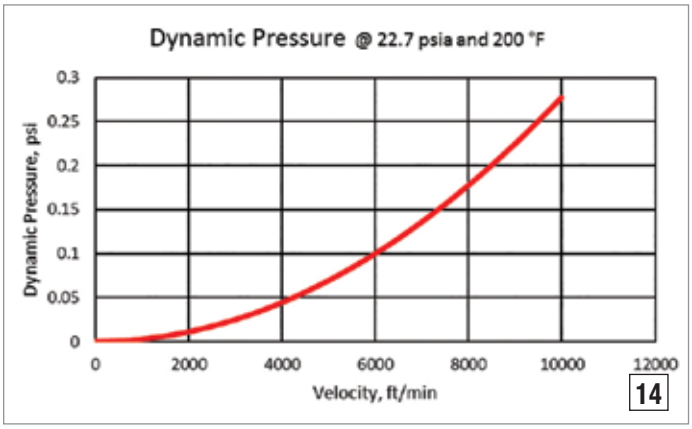

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INDUSTRIAL VACUUM & BLOWER SYSTEMS

EVERY ISSUE


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FROM THE EDITOR

Industrial Vacuum & Blower Systems

Pneumatic conveying is a foundational process within plant automation. Author Bruce Boyers worked with pneumatic conveying solutions pioneer, Vac-U-Max, to provide an excellent article titled, "Sucking Cost and Complexity out of Conveying Systems." In addition to providing guidance, the article interestingly suggests the right questions to ask when designing a pneumatic conveying system:

- Should the system be dilute phase or dense phase – using vacuum, pressure or a combination?
- Given the physical properties of your materials, how exactly will they be best conveyed?
- What is the friction factor of your solids? How do you calculate the expected losses of pressure throughout the system? Given that oxygen doesn't mix well with some chemicals, what gas should you utilize?
- Is the system going to truly automate a process? Will it be reliable without babysitting? What is the actual cost of the system?

Aeration Blower Systems

The American Society of Mechanical Engineers (ASME) released their Wire-to-Air Performance Test Code for Blower Systems, in 2018, designated PTC 13-2018. ASME PTC 13 Committee Chair Tom Jenkins, from JenTech Inc., has sent us an excellent article titled, "Specification Considerations for ASME PTC 13."

Thank you for investing your time and efforts into ***Blower & Vacuum Best Practices.***

RODERICK M. SMITH
Editor
tel: 412-980-9901
rod@airbestpractices.com

Upcoming Webinars

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- **March 24, 2022:** How to Hunt for Vacuum Leaks: Is it Worthwhile? *– Ron Marshall, Chief Auditor, Marshall Compressed Air Consulting*
- **May 19, 2022:** ASME PTC 13 Wire-to-Air Performance Test Code for Blower Systems Part 1 *– Julie Gass, Lead Mechanical Process Engineer, Black & Veatch, Fred Constantino, S&C Project Engineering Advisor, ASME and Andrew Balberg, President, Lone Star Blower and Compressor*

2022 MEDIA PARTNERS

BLOWER & VACUUM INDUSTRY NEWS

Inovair Installed High Efficiency Blowers Outdoors for a Lagoon Application

After two years of research, planning, and execution, a winery in Monterey, CA went live with their expanded capacity wastewater system in November 2021. Focusing on improved efficiency, the winery specifically wanted to move away from their old, inefficient and unreliable surface aerators. The harsh outdoor environment, combined with high efficiency targets, yielded the selection of the Inovair IM-30 stacked geared centrifugal blowers.

The blowers have an operating range of 1,000-4,000 scfm with discharge pressures ranging from 7.6-10.2 psig. With the Inovair gearbox 20+ year design life, the only maintenance for the winery facility staff will be an annual oil change, which takes about 15 minutes per module, and a filter cleaning as needed.

To learn more about this application's anticipated 25%+ energy savings, visit inovair.com.

Atlas Copco Acquires Irish Vacuum Distributor

Atlas Copco has acquired Provac Limited. The company's customers are mainly industrial and scientific companies as well as universities and research institutes in Ireland. Provac Limited is a privately owned company and has 11 employees. The company is in Wexford, Ireland, and is the Leybold vacuum distributor for the island of Ireland.

"We have had a successful partnership with Provac Limited since its founding in 1999," said Geert Follens, Business Area President Vacuum Technique. "Through this acquisition we will get the opportunity to better serve current customers and further strengthen our market presence in Ireland for the Leybold brand."

The purchase price is not material relative to Atlas Copco's market capitalization and is not disclosed. The company will become part of the Vacuum Technique Service Division within the Vacuum Technique Business Area.

About Atlas Copco Group

Our industrial ideas empower our customers to grow and drive society forward. This is how we create a better tomorrow. Atlas Copco is a global industrial group, founded in 1873 in Stockholm. In 2020 we had revenues of BSEK100 and at year end about 40 000 employees. For more information, visit www.atlascopcogroup.com.

Sulzer Announces Baton Rouge Service Center Expansion

To widen support for operators of rotating equipment in the US Gulf Coast area, Sulzer has announced the expansion of its Baton Rouge Service Center in Louisiana. The new purpose-built addition to the existing facility will enhance the service capabilities of the center – which specializes in repairs and reengineering for all types of rotating machinery including pumps and small steam turbines.

The expansion will add 7,200 square foot of floor space to the existing 10,500 square foot service center. New cranage will double the current lifting capacity from 10 to 20 tons, with a large blasting and paint booth to be added. Additional machining capacity will also further increase the number of repair and reengineering projects that can be carried out at the same time. As well as adding equipment and space, Sulzer plans to hire new mechanics, machinists, office staff, sales teams and apprentices from the local area.

Glenn Doerksen, President Pump Services NAM at Sulzer, said, "We are already the premier provider of maintenance and overhaul services for rotating equipment including pumps and small steam turbines. However, we are always looking to further strengthen our capabilities to increase our offering to customers.

Inovair IM-30 stacked geared centrifugal blowers.

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The new facility expansion will allow us to repair larger vertical pumps than ever before locally, optimizing project times. Additional equipment such as 3D scanners will enhance our repair and reverse engineering work for equipment from all manufacturers. This growth also enables us to support the local community by increasing job opportunities in the area. We are looking forward to announcing our opening event soon!"

As a leading pump original equipment manufacturer (OEM) and independent service provider for rotating equipment, Sulzer offers a comprehensive range of expert engineering services. The Baton Rouge Service Center is part of the company's global network and delivers turnkey repair, reverse engineering and upgrade projects. A dedicated field services department also provides on-site engineering support to customers in the power generation, petrochemical, steel and heavy-manufacturing sectors, among others.

About Sulzer

Sulzer is a global leader in fluid engineering. We specialize in pumping, agitation, mixing, separation and application technologies for fluids of all types. Our customers benefit from our commitment to innovation, performance and quality and from our responsive network of 180 world-class production facilities and service centers across the globe. Sulzer has been headquartered in Winterthur, Switzerland, since 1834. In 2020, our 15,000 employees delivered revenues of CHF 3.3 billion. Our shares are traded on the SIX Swiss Exchange. The Pumps Equipment division specializes in pumping solutions specifically engineered for the processes of our customers. We provide pumps, agitators, compressors, grinders and screens developed through intensive research and development in fluid dynamics and advanced materials. We are a market leader in pumping solutions for water, oil and gas, power, chemicals and most industrial segments. Throughout the Americas, Sulzer provides cutting-edge parts as well as maintenance and repair solutions for pumps, turbines, compressors,

The expansion of the Baton Rouge Service Center will enhance the service capabilities and support for operators of rotating equipment in the US Gulf Coast area.

motors and generators. We service our own original equipment as well as third-party rotating equipment operated by our customers. Our technology-based solutions maximize reliability and lifecycle cost effectiveness. For more information on Sulzer, visit www.sulzer.com.

SPX Corporation Acquires Cincinnati Fan

Dominus Capital, L.P., a leading private equity firm based in New York, announced that it has entered into a definitive agreement to sell Cincinnati Fan & Ventilator Co., Inc., a leader in engineered air movement solutions, including blowers and critical exhaust systems, to SPX Corporation.

"Dominus has been an excellent partner for Cincinnati Fan," said Paul Burton, President and CEO of Cincinnati Fan. "Dominus supported our growth with strong industry expertise and capital. We completed and integrated two strategic acquisitions and successfully launched new products to deliver more solutions to our customers. Dominus allowed us to maintain our core Cincinnati Fan DNA, while providing the resources to accelerate our growth story."

"Cincinnati Fan has become a leading player in the air movement space," said Bob Haswell, Founding Partner at Dominus. "Dominus was able to bring significant resources to professionalize the business and grow both organically and through acquisition. We completed two acquisitions, expanded capacity, and invested in new product development under our ownership. Paul, management, and the company are very well positioned to drive growth for SPX and its investors."

The transaction is expected to close by year end 2021 and is subject to regulatory approval and customary closing conditions. Other terms of the transaction are not being disclosed at this time. William Blair served as financial advisor, and White & Case LLP served as legal counsel for Cincinnati Fan. SPX was represented by BlackArch Partners, LLC as financial adviser and Holland & Knight LLP as legal counsel.

About SPX Corporation

SPX Corporation is a supplier of highly engineered products and technologies, holding leadership positions in the HVAC and detection and measurement markets. Based in Charlotte, North Carolina, SPX Corporation has more than 4,000 employees in 15 countries. For more information, please visit www.spx.com.

About Cincinnati Fan

Founded in 1956, Cincinnati Fan and Ventilator is a leading manufacturer of engineered air moving solutions for OEM applications across a diverse range of industries. The Company offers reliable, short lead-times on built-to-order industrial fans and blowers, which can be customized to meet end-users' specifications. Primary products include centrifugal fans and blowers, axial fans, portable fume exhausters, critical exhausts systems, high temperature fans and other highly-engineered solutions. The company is headquartered in Mason, Ohio, and has locations in the US and the United Kingdom. For more information please visit www.cincinnatifan.com.

Blower & Vacuum Industry News

Pfeiffer Vacuum Opens New Silicon Valley Innovation Center

Pfeiffer Vacuum, one of the world's leading providers of high-tech vacuum solutions for the semiconductor market as well as the analytical, industrial and research & development markets, opened up a new 10,000 square foot Silicon Valley Innovation Center in San José. This state-of-the-art facility is located at 2381 Bering Drive, San José, CA and will create more than 20 new high-tech jobs.

The SVIC serves North American customers in all technological questions around high-vacuum technology, focusing on semiconductor applications and the integrated Pfeiffer Vacuum products. Customers will be able to test and evaluate new vacuum solutions designed for their applications at early development stages. Onsite specialists and researchers will provide direct know-how support for all Pfeiffer Vacuum products and establish a seamless link to the global Pfeiffer Vacuum R&D organization.

"Opening the Silicon Valley Innovation Center demonstrates our commitment to drive innovation for our customers in the semiconductor market, and to support the development of future technologies," said Dr. Britta Giesen, CEO of Pfeiffer Vacuum Technology AG.

Vacuum technology is used in the semiconductor industry to produce microprocessors, storage media, high-definition displays and more. Customers primarily use many medium and large backing pumps, but also turbopumps and measurement instruments. With contamination analysis and leak detection systems, chip manufacturers can significantly increase their yield.

"The direct collaboration with our customers in Silicon Valley is becoming increasingly important as the complexity of the production of microprocessors continues to increase," said Ming Lee, VP Sales for North America at Pfeiffer Vacuum. "The center and its team of experts will be essential in working even closer with our customers to efficiently design vacuum products and solutions for their technological challenges."

Pfeiffer Vacuum Opens New Silicon Valley Innovation Center.

About Pfeiffer Vacuum

Pfeiffer Vacuum is one of the world's leading providers of vacuum solutions. In addition to a full range of hybrid and magnetically levitated turbopumps, the product portfolio comprises backing pumps, leak detectors, measurement and analysis devices, components as well as vacuum chambers and systems. Ever since the invention of the turbopump by Pfeiffer Vacuum, the company has stood for innovative solutions and high-tech products in the analytical, industrial, research & development, semiconductor and future technologies markets. Founded in 1890, Pfeiffer Vacuum is active throughout the world today. The company employs a workforce of some 3,400 people and has more than 20 sales and service companies as well as 10 manufacturing sites worldwide. For more information, please visit www.pfeiffer-vacuum.com.

WRF and Utilities Fund Nutrient Management Study

The Water Research Foundation has granted $200,000 for the project, Advancing Low-Energy Biological Nitrogen and Phosphorus Removal. The project will develop research and guidelines for the design, implementation, and operation of sustainable, low-energy processes for biological nutrient removal at water resource recovery facilities.

For WRRFs, nutrient management is key to addressing water quality issues in watersheds challenged with rapid urbanization and a growing population. While conventional

biological nutrient removal technologies are effective, they are energy and cost-intensive.

Led by a principal research team of Dr. Jose Jimenez (Brown and Caldwell), Dr. Belinda Sturm (University of Kansas), and Dr. Leon Downing (Black & Veatch), the project will advance low dissolved oxygen BNR to intensify wastewater treatment processes and significantly reduce energy demands and chemical dependency. The approximately $1 million project is partly funded by WRF's Research Priority Program, with $800,000 in-kind contributions from several utility partners.

Grant will advance lower energy nutrient treatment options for wastewater utilities.

"This important study seeks to pave the way for full-scale implementation of low DO BNR to improve effluent quality while significantly reducing the energy footprint of water resource recovery facilities," said University of Kansas Associate Vice Chancellor for Research Dr. Belinda Sturm. "Our team is proud to partner with WRF to help utilities meet stringent nutrient effluent limits while maximizing the use of existing infrastructure."

The research will utilize bench-scale, pilot-scale, and full-scale testing at several WRRFs throughout the U.S. to cover a host of influent and operational conditions to develop a fundamental understanding of low DO BNR implementation at WRRFs. Additionally, the research aims to develop innovative process

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control strategies, combining aeration control with process intensification strategies such as selective wasting and sludge densification.

This breakthrough approach is being studied as part of Brown and Caldwell's Ntensify™ suite of process intensification solutions, developed to help utilities do more with less through improved process capacity, effluent quality, chemical and energy savings, and resource recovery.

Scheduled for completion by year-end 2022, project results will provide a practitioner's blueprint/guidance document which synthesizes key findings for implementing low DO BNR for use by utilities, consulting firms, and other practitioners.

At its core, the project seeks to reduce the environmental footprint and ratepayer costs of essential wastewater treatment.

About The Water Research Foundation

The Water Research Foundation (WRF) is the leading research organization advancing the science of all water to meet the evolving needs of its subscribers and the water sector. WRF is a nonprofit, educational organization that funds, manages, and publishes research on the technology, operation, and management of drinking water, wastewater, reuse, and stormwater systems – all in pursuit of ensuring water quality and improving water services to the public. For more information, visit www.waterrf.org.

Lontra Signs Blackhawk Equipment as Distributor

Lontra Limited, the developer, manufacturer, and exporter of high value industrial machinery for critical industries, is pleased to announce that it has signed Blackhawk Equipment Corporation, as a distributor.

Blackhawk will distribute Lontra's energy saving LP2 blower product within Colorado, Western Nebraska, Southern Wyoming, New Mexico, and Western Kansas.

Blackhawk has a strong reputation in their home state of Colorado and has the largest service center of any industrial distributor in that state. Blackhawk will distribute Lontra's energy saving LP2 blower product within Colorado, Western Nebraska, Southern Wyoming, New Mexico, and Western Kansas. The USA market represents 26% of the global market for compressors and Lontra has already secured the distribution of their products in North America now covering 16 states.

The LP2 blower features Lontra's award-winning Blade Compressor® technology: a patent protected, compact, rotary compressor providing significant improvements in efficiency and reliability for applications in energy intensive industries such as wastewater treatment and pneumatic conveying.

"We are very excited about the opportunities that the Lontra LP2 and the Blade Compressor technology will bring to Blackhawk Equipment. Having a premium efficiency, more reliable blower for our customers will open new markets for us in wastewater treatment and pneumatic conveying. We are receiving very favorable feedback regarding power savings of up to 34% compared to other blower technologies, and in critical industries the increased reliability and durability also gives us considerable advantages," said Tom Chmielewski, General Manager at Blackhawk Equipment.

"Blackhawk is a great partner for Lontra and it's a strong endorsement of the amount of commercial and customer interest in our technology that we've signed a distributor of this stature," said Euan McCulloch, Chief Operating Officer at Lontra.

This is a significant step as Lontra builds their USA distribution network for their ground-breaking technology which has been proven to

reduce electricity usage by up to 34% against market leading competitors. This significant energy saving is critical in industries such as water treatment where the electricity to run machines of this type can account for 72% of the total site electricity use.

The Lontra LP2 is a completely packaged blower in a noise attenuating enclosure. The compressor unit is driven by a unique permanent magnet motor with a Yaskawa VSD for outstanding efficiency at all operating conditions.

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

Evonik Delivers SEPURAN® Membranes to 1,000+ Plants

Since the product launch in 2011, Evonik has delivered gas separation membranes in more than 1,000 reference plants worldwide as of the end of 2021. Within just one decade, the specialty chemicals company has become a globally recognized technology leader in polymer-based SEPURAN® membranes for efficient gas separation. The Group is experiencing continued strong demand in biogas, nitrogen, hydrogen and natural gas applications. The expansion of existing production capacities at the Austrian site in Schörfling am Attersee is progressing.

"Having developed and established the biogas industry in close cooperation with our partners, we are establishing now our SEPURAN® membranes in demanding nitrogen, hydrogen and natural gas applications," said Dr. Iordanis Savvopoulos, Head of the Fibres, Foams and Membranes Product Line at Evonik. "We celebrated the 500th biogas reference plant just under a year ago, and now the next market success for the entire membrane portfolio is hitting us, giving us an important boost for further growth. The market is convinced of our innovative membrane technology."

At the heart of Evonik's SEPURAN® membrane technology are polymer-based hollow-fibre

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Evonik launched its first membrane product, SEPURAN® Green, for efficient upgrading of biogas.

membranes made of the high-performance polymer polyimide developed in-house. Evonik is the world's only backward-integrated manufacturer of highly selective gas separation membranes.

"Backward integration is the key driver of our innovative strength," said Dr. Goetz Baumgarten, head of the Membranes Innovation Growth Field at Evonik. "Thanks to our many years of expertise in polymer chemistry, we already adjust the membrane properties at the development stage of the base material – our high-performance polymer – in order to produce particularly selective, productive, and robust membranes that can be used even under extreme process conditions-such as those found in the oil and gas industry or in aviation."

SEPURAN® membranes make it possible to separate gases such as methane (CH_4), nitrogen (N_2), or hydrogen (H_2) from gas mixtures. The advantages of Evonik's membrane technology are more precise separation of the gases and higher productivity. SEPURAN® N_2 membranes for efficient nitrogen generation are used, for example, to inert aircraft tanks. SEPURAN® Noble membranes extract hydrogen transported through natural gas pipelines selectively from the CH_4/H_2 gas mixture at the delivery points. SEPURAN® NG membranes enable efficient natural gas processing from gas sources with high CO_2 concentration.

Evonik launched its first membrane product – SEPURAN® Green, for efficient upgrading of biogas – on the market in 2011, laying the foundations for future business in membranes. This was followed by further membrane products for nitrogen, helium, hydrogen, natural gas, and nanofiltration applications. The membranes, which are now being successfully used in more than 1,000 system installations worldwide, are produced at Evonik's site in Schörfling, Austria. The high-performance polymer-based material is produced in neighboring Lenzing.

About Evonik

Evonik is one of the world leaders in specialty chemicals. The company is active in more than 100 countries around the world and generated sales of €12.2 billion and an operating profit (adjusted EBITDA) of €1.91 billion in 2020. Evonik goes far beyond chemistry to create innovative, profitable and sustainable solutions for customers. About 33,000 employees work together for a common purpose:

We want to improve life today and tomorrow. For more information, visit www.evonik.com.

WELTEC BIOPOWER Takes Over Operations of AD AGRO

With immediate effect, the operations of the biogas plant manufacturer AD AGRO have continued under the umbrella of the WELTEC Group in Germany. "Through the merger of the business fields of AD AGRO and WELTEC, we establish promising synergies in the entire value chain of biogas and biomethane," said Jens Albartus, Director of the biogas specialist WELTEC BIOPOWER.

"AD AGRO was faced with the decision of implementing a suitable succession strategy. The goal was to perpetuate the successful use of the expertise and experience gained in almost 200 biogas projects. The profile of AD AGRO

With immediate effect, the operations of the biogas plant manufacturer AD AGRO have continued under the umbrella of the WELTEC Group in Germany. left to right: Jens Albartus, Franz-Josef Sextro (WELTEC-Group); Uwe Heider (AD AGRO).

fitted snugly in WELTEC BIOPOWER's spectrum of products and services," said Uwe Heider, Managing Partner of AD AGRO.

"Both companies are specialized in custom-tailored, technically mature plants. Thus, this step drives the expansion of our market position and our growth," said Albartus. He said, "In this connection, we are happy to join forces with Mr Heider, a market expert who will henceforth perform sales activities for WELTEC."

AD AGRO had been established as BD Agro Renewables by the Big Dutchman Group in May 2006. In the context of a management buy-out, the business was taken over by its Director Uwe Heider as of October 1, 2012 and continued to operate under the name "AD AGRO systems GmbH & Co. KG."

"We guarantee AD AGRO customers continuity in the business relationship, and with our WELTEC Group, we will be able to offer an even broader range of products and services. Our team of process engineers, biologists, service engineers and other specialists boasts a wealth of experience gained in more than 350 biogas plants that we have planned and built," said Albartus, drawing attention to the benefits of bundling the businesses.

Expressing his confidence that by means of the takeover, WELTEC will further expand its international market position, he said, "In the coming years, the biogas landscape will change and play an even more important role in reducing carbon emissions. Our positioning enables us to effectively take part in this process."

About WELTEC BIOPOWER

The WELTEC Group from Vechta, Germany, has developed into a globally leading specialist for the construction and operation of biogas and biomethane plants since it was founded back in 2001. The Group designs, plans and sets up energy plants, operates them on a permanent or temporary basis, provides 24/7 service and delivers sustainable usage concepts for output flows, thereby covering the entire biogas value chain. For more information, visit www.weltec-biopower.de.

Specification Considerations for ASME PTC 13

By Tom Jenkins, JenTech Inc.

The American Society of Mechanical Engineers (ASME) released their Wire-to-Air Performance Test Code for Blower Systems in 2018. Designated PTC 13-2018, it has rapidly become a standard for inclusion in blower specifications.

Several areas should receive special consideration when writing a specification that includes performance testing. These are areas where the code permits flexibility or where the performance parameters are open to interpretation. Unless they are specified clearly they can result in disagreements between the parties and failure of the test to provide the expected assurance that actual performance coincides with expected performance.

Intent of PTC 13

The intent of PTC 13 is identifying apparatus, procedures, data reporting requirements, and calculation methods needed to establish the total energy consumption of blower systems. The code addresses all configurations, types of blowers, and methods of capacity modulation. Bare blower and complete package systems are compatible with code tests. PTC 13 also provides the methodology to conduct a test and predict performance if inlet conditions at the test differ from specified conditions.

The code does not identify specification requirements. It does not restrict the system configuration to be tested. These items must be established by agreement between the parties to the test: the engineer, the owner, and the supplier. The surest path to success is to include the essential elements of the test in the documents used by the supplier for bidding.

The specification should identify the action to take if the test results are unsatisfactory. This can include financial penalties, rejection of the supplier's equipment or allowing the supplier to modify equipment and retest at their own expense.

Number of Blowers to Test and Extent of Testing

Most new blower system purchases include more than one blower. The amount of testing is a question of economics and the engineer's judgement. Ideally the full spectrum of performance testing would be conducted on all blowers in all systems. However, testing is expensive and time consuming, and therefore it influences the supplier's pricing. It is hard to justify the same level of testing on a system with 20 hp blowers as one with 1,000 hp blowers.

Systems consisting of large blowers typically require testing every blower at all specified operating conditions. If the system is composed of small blowers it may be sufficient to test a single representative blower at worst-case conditions. In between these two extremes is testing a representative blower at multiple specified operating conditions and other units at a single worst-case design point.

Commonly specified testing includes:

- Testing to provide a full performance curve of power and discharge pressure based on maintaining the control method at a specific setting. The curve is usually based on the control setting needed to meet worst-case inlet conditions at 100% design capacity.
- Testing at a spectrum of flows, discharge pressures, and inlet conditions simulating the expected system duty cycle.
- Testing at worst-case inlet conditions and maximum design flow and pressure.

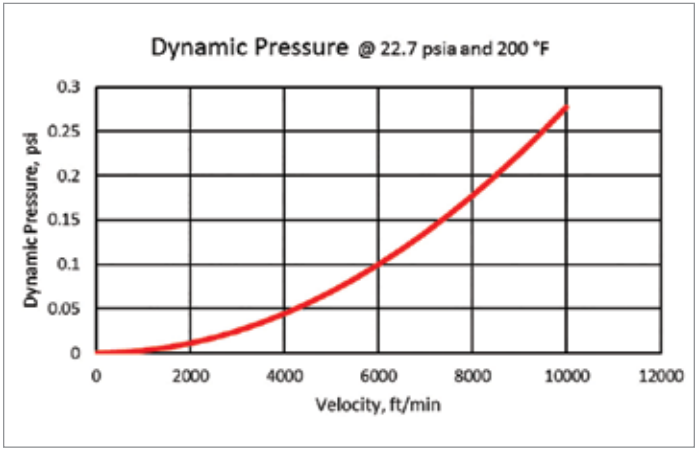

Figure 1

Specification Considerations for ASME PTC 13

Special consideration must be given to packaged systems with multiple motor/blower modules in a single enclosure – commonly referred to as "dual core" packages. The test arrangement is influenced by the site piping design and operating strategy. It is common practice to treat the package as a single blower. The discharge pipes of each module are connected upstream of the customer piping. In that case, the specification should require the test configuration to join the discharge of all modules prior to any measurement locations. Check valves and other items required for parallel operation of modules should also be included inside the test boundary.

Components to Include in Test Envelope

In the past blower systems were often assembled in the field from components and accessories that were shipped loose. Testing a bare blower was normal. The most common blower system today, however, is the factory package – either skid-mounted or installed in a sound reduction enclosure. Packages often incorporate instrumentation, controls, and accessories.

Some package components, such as Variable Frequency Drives (VFDs), directly affect power consumption because of inherent inefficiencies. Others, such as silencers or check valves, indirectly increase blower power consumption by creating a pressure drop. Still other accessories, such as cooling fans, are direct power demands and increase total package power consumption.

The specifications should identify all the components that are to be included within the test boundary. Ideally, anything upstream of the point of connection between the blower system and the customer piping should be in the test boundary. The end of the test boundary should correspond to the point that the designer used to establish the specified discharge pressure. Components not included in the designer's pressure drop calculations should be included in the test boundary.

It may be inconvenient to have some components shipped to the testing facility. In these cases PTC 13 allows the inclusion of a calculated value in the test results. This modification can accommodate mechanical or electrical components. Either a specific value or the method of establishing the calculated value should be identified in the specification.

The code provides guidance on components to consider in defining the test boundary. In PTC 13 Table 3-5.2-1 covers mechanical components and Table 3-5.2-2 covers electrical components. The project specifications should provide a similar listing of components for inclusion in the test.

A broad statement that "all components necessary for operation are to be included in the test" is insufficient. It can lead to multiple interpretations and disagreement between the parties. It is best if the specification explicitly identifies each component.

It is not feasible to exactly match test stand piping to the site configuration. Differences in pipe diameters are accommodated in the code calculation procedures. Other piping differences should have minimal impact on power demand.

Static vs. Total Pressure

Distinguishing between absolute and gauge pressure is standard practice in most specification formats. Typically absolute pressure is used to identify inlet and barometric pressure as psia, and gauge pressure is used to specify discharge pressure as psig. Making a distinction between static pressure and total pressure is less common. Static pressure is the measurement from a pressure gauge or transmitter screwed into a pipe wall with the measurement port at right angles to the direction of air flow. This is the pressure most operators and many designers consider in evaluating pressure. Total pressure is the measurement from a pitot tube with the measurement port pointed into the flow. It is the sum of the static pressure and the dynamic or velocity pressure. The dynamic pressure is a function of air velocity and density. (See Figure 1)

Because the total pressure represents the energy transfer from the blower to the air stream, PTC 13 uses it in the test procedure. Total pressure is composed of two parts: static pressure and dynamic pressure. Although total pressure may be measured directly, it is more common to directly measure only static pressure. The dynamic pressure is then calculated and added to the measured static pressure to obtain total pressure.

The dynamic pressure may be small compared to static pressure and is often ignored during design. Some designers include dynamic pressure in calculating the discharge pressure. Others consider only static pressure. Both methods are acceptable so long as the specification matches the designer's intent. The specification should clearly identify whether specified pressures are static or total.

Temperature is also affected by air velocity. The total, or stagnation temperature, reflects the increase in temperature that occurs if the air stream is brought to rest. The code includes velocity effects on temperature to maintain theoretical correctness, but the influence on test results is often minimal. Specified temperatures normally reflect anticipated ambient conditions. Because ambient velocity is zero, the static and total temperatures are the same and it is unnecessary to distinguish total temperature from static.

Power Penalties

Energy optimization is a consideration in purchasing blower systems. It is common to identify a financial penalty if test results exceed specified or guaranteed power consumption. The penalty is usually calculated as dollars/kW and deducted from the contractor's or supplier's payment.

The specification should clearly identify how the penalty is to be assessed:

- against each blower based on its individual test results
- against all blowers based on the average of all test results
- against all blowers based on the test of a single representative blower

Worst-case inlet and discharge conditions are infrequently encountered in normal operation. Although guaranteed operating points are often specified at worst-case conditions, specifying airflow as scfm at average site inlet conditions will provide a more accurate reflection of operating cost.

The discharge pressure for the power guarantee should be reflective of normal operation. The discharge pressure specified for individual duty cycle points may differ. It is common to use the worst-case design pressure for the entire load spectrum. However, if a lower pressure is anticipated for normal operation that should be used to better reflect actual power consumption. If a Most-Open-Valve or other mechanism will cause pressure to vary with flow then each duty cycle data point may have a different discharge pressure specified.

Specification Considerations for ASME PTC 13

Nonmandatory Appendix F of the code offers suggestions for establishing test points. If the specification includes power guarantees at one or more operating points, it is recommended that a financial power penalty be specified. Otherwise the owner derives little benefit from the guarantee. Without a penalty, if guaranteed performance is not verified by testing the only available recourse would be rejecting the equipment, resulting in controversy and project delays.

Tolerances

It is inevitable that the test performance deviates from the supplier's standard data or projected performance. Most standard data sheets state that actual performance may vary ± some percentage from nominal performance. However, PTC 13 recommends that the test results, projected to specification conditions using the methods in the code, be used directly for comparison to specification values and power guarantees. Any allowance or tolerance would be applied by the supplier prior to providing performance values.

Pressure and flow should be specified at zero minus tolerance, and the values the test predicted at site conditions must equal or exceed the specified values. Power should be specified at zero plus tolerance, and the values the test predicted at site conditions must be less than or equal to the specified values.

There are several reasons for doing this. First, it simplifies comparing results to the specification, providing clear pass/fail criteria. Second, it negates differences in tolerances between suppliers. Third, it puts the risk of deviations on the supplier, who is in the best position to know and understand the potential variations.

Uncertainty is an indication of the confidence level for the test. It is not a tolerance. The code provides procedures for determining test uncertainty, but in practice this is usually waived. The code establishes minimum accuracy levels and calibration requirements for the test stand. These are generally sufficient to ensure the accuracy of results. The specification should explicitly identify whether pre-test or post-test uncertainty calculations are required. If uncertainty is to be calculated the acceptable level of uncertainty and the steps to be taken if it is not achieved should be identified.

Data Reported and Format

The code does not identify a specific reporting format. It does identify the minimum data to include in the report. Many manufacturers have standard reporting formats, and organizations such as CAGI have useful data sheets that can be used to supplement other formats.

Performance curves are often required in reports. They can provide useful information for projecting operating characteristics at different process demands. In some cases the manufacturer's standard curve format is simple to understand, but in others extracting useful information is problematic.

Nonmandatory Appendix F of the code provides examples of curve formats that have proven useful.

Other Considerations

Surge is a pulsating flow at the minimum capacity of a dynamic blower. Rise to surge is an indication of the control stability, particularly for variable speed applications. A higher rise to surge typically accompanies a greater speed range and better stability at

reduced airflow. Rise to surge is identified as the difference between discharge pressure at design flow and the maximum pressure achievable at reduced flow without modulating the blower control mechanism.

Rise to surge is sometimes specified as applying under all operating conditions. This is subject to misinterpretation, and instead the minimum rise to surge should be specified as applying under all specified inlet conditions.

Efficiency is not used in the methodology PTC 13 used to establish wire-to-air performance. Efficiency may be a parameter of interest.

Nonmandatory appendix J identifies methods for determining efficiency.

Another parameter of interest is specific power, usually expressed as kW/100 cfm. It may be part of the reported data but is not typically an acceptance parameter.

Discharge air temperature is a concern in many systems. Discharge temperature increases at higher discharge pressure, potentially damaging piping, gaskets, and diffusers. Appendix J provides a calculation method for estimating discharge air temperature. Maximum discharge air temperature at worst-case operating conditions may be reported for information or as an acceptance criterion in critical applications.

Conclusion

The complexity of blower systems, the increasing use of packaged systems, and greater importance of energy use has generated the need for wire-to-air test codes. ASME's PTC 13 answers this need, although other organizations have established or are establishing alternate codes. Regardless of which test code is specified, the designer should be aware of the common problems and necessary clarifications.

The designer's goal in the test specification is to protect the interest of the owner while accommodating reasonable needs of suppliers. The more clearly items of concern are specified the less likely it is that contention will arise during equipment testing and acceptance. BP

About the Author

Tom Jenkins has over forty years' experience in blowers and blower applications. As an inventor and entrepreneur, he has pioneered many innovations in aeration and blower control. He is an Adjunct Professor at the University of Wisconsin, Madison. Tom is the current Chair of the ASME PTC 13 Committee. For more information, visit www.jentechinc.com

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Sucking Cost and Complexity Out of Conveying Systems

By Bruce Boyers

In choosing a system for the safe, clean conveyance of materials, it seems that the choices can be remarkably complex. Prior to such a choice, a facility is usually operating with, live personnel, open conveyor belts and implements such as buckets. While employees may be protected by proper clothing, masks and goggles, materials are exposed to air and dirt, waste is a constant worry, and expensive equipment is endangered by particulates that can slow or jam it. In today's operating environment with its constant economic pressures and forced attention on the bottom line, it then becomes mandatory for companies to seek alternatives and improvements such as pneumatic conveying systems. It seems so simple.

Why, then, when having to confront all the possible options for such a system, does it appear to require an engineering degree? And even those folks are going to have a hard time when posed with questions such as, should the system be dilute phase or dense phase? Should the system be vacuum, pressure or combination? Given the physical properties of your materials, how exactly will they be best conveyed? What is the friction factor of your solids? How do you calculate the expected losses of pressure throughout the system? Given that oxygen doesn't mix well with some chemicals, what gas should you utilize? It even gets worse when you find you have to figure in factors such as solids velocities in horizontal, diagonal and vertical pipe runs and gas densities.

Okay, Hold Up!

Let's take a deep breath, a giant step back, and remember our original reasons for wanting to do this in the first place. The reasons are relatively simple and, fortunately, so are the choices involved.

In evaluating a pneumatic conveying system, a company wants to be convinced of 3 basic pieces of information:

1. Is the system going to truly automate a process?

If a particular process now involves 5 personnel, can most or all of those personnel actually be eliminated from the process and assigned elsewhere? Will it actually be possible to run that process with little to no further attention, save perhaps periodic monitoring?

2. Is the system really reliable?

Will the system run 24X7 without babysitting? Will it stand up to the required process; is it robust and seriously proofed against breaking down? How much maintenance will it require?

3. What is the actual cost of the system?

The overall price of a system is only the beginning of such a question. How quickly would the system pay for itself? How much actual time and cost will be saved by its implementation?

These questions each tie into one other, and each and all must be answered in detail. Fortunately, if reliable expert assistance is sought, that first set of horribly niggly engineering-type questions need not be solved by a facility, and the important questions as above can be answered fully by an outside expert and to a facility's satisfaction.

An understanding of material characteristics is essential when designing a vacuum transfer system – experts often already possess data about a particular substance's behavior and will test within a proposed configuration to ensure it will work properly. This knowledge must, by necessity, be extensive; for example, there are often several product grades within the same product group and those forms may have completely different characteristics such as free flowing, sluggish or non-free flowing. One grade of Zinc Oxide may have the consistency of talc, while another might be

Sucking Cost and Complexity Out of Conveying Systems

An understanding of material characteristics is essential when designing a vacuum transfer system-experts, like VAC-U-MAX, often already possess data about a particular substance's behavior and will test within a proposed configuration to ensure it will work properly.

more cohesive and adhere to inside surfaces of conveying tubes.

Experts in pneumatic conveying solutions, such as VAC-U-MAX, an early pioneer of vacuum technology, are skilled in designing proper solutions based on application specific needs. Rather than trying to dazzle you with the complexity of the technology, a pneumatic conveying company who routinely designs and builds custom pneumatic conveying solutions will most likely have an idea of how to tailor a system to meet present and future needs and will be able to provide solutions that work properly out of the box in the facility.

VAC-U-MAX has large-scale testing facilities at its New Jersey headquarters where tests are performed to confirm material flowability and the required convey rate for materials specific to end user applications.

Pneumatic systems, like this one by VAC-U-MAX, convey material from closed hoppers through closed lines and requires little to no intervention.

Individual Cost-Saving Benefits

Implementing the correct pneumatic conveying system – or correctly expanding an existing system – yields numerous benefits, and when working with a company that has experience in solving a wide range of problems, switching to pneumatic conveying system is a simple solution that yields amazing cost benefits.

Clean Up

The right system means reduced or eliminated cleanup. Because the system is fully enclosed, problems with particles escaping and messy accidents are eliminated and so is the labor-intensive cleanup from floors and surfaces, and unnecessary cleaning of machinery. A fully enclosed system also translates to a healthier work environment because it reduces or eliminates worker exposure to hazardous substances and deadly dust that can cause explosions.

Although engineers on the plant floor do everything, they can to protect workers, such as using extensive exhaust ducting and respiratory protection for the workers in the area, they often continue to search for a better solution.

One such company worked with a pneumatic conveying expert and found an alternative to manually dumping 50lb bags of toxic material into a mixer on the plant floor. The solution was to use a monorail-mounted hoist to lift and position semibulk bags to an unloader which formed a dust-tight seal against the ring on the discharge opening. Agitator pads and an auger under the storage bin were used to deliver material at a controlled rate into a weigh hopper on the floor below, and then conveyed to a blender on an upper floor which enclosed the material path entirely.

Reclamation

In many industries product reclamation is an important aspect in reducing costs. From fine powdery substances to larger particles such as plastic pellets, pneumatic experts know how to achieve minimal waste.

In one example involving the manufacture of marshmallows, bucket-elevator type systems had been being used which just threw starch around. Outside of the need for bi-weekly cleaning, the company was also wasting substantial quantities of a valuable ingredient in the process.

The solution was to install vibratory pans within a pneumatic conveying system that shake loose excess starch from the marshmallows as they exit cooling drums. The starch goes through filter separators and is recycled back to manufacturing for reuse. The safe, enclosed system reclaims about 1,000 pounds of starch a day and reduces product loss by up to 2 percent.

Downtime is one of the worst enemies of a manufacturing facility and immediately impacts revenue. Because pneumatic conveying systems, like this VAC-U-MAX system, have few moving parts there is virtually no maintenance or cleaning necessary.

Experts in pneumatic conveying solutions, such as VAC-U-MAX, an early pioneer of vacuum technology, are skilled in designing proper solutions based on application specific needs.

Streamlined Production

Often companies seek out pneumatic conveying solutions to improve production because the material moves quicker and there is less room for error. This is especially true with processes that are operated with open conveying systems and containers that need to be moved, filled and emptied by personnel. Pneumatic systems convey material from closed hoppers through closed lines and requires little to no intervention.

Since labor is one of the highest costs in a plant or facility, reducing man-hours becomes a prime target of any executive interested in reducing operating cost. A prime benefit of a pneumatic conveying system should be the reduction of man-hours. Where numerous staff were previously required to manipulate material, there might now be the need for only one to add material at the front end of the process.

One company knew they needed to make dramatic changes in order to assure their future and compete with major players. Their human-assisted blending process had severe limitations, costing the company 20 minutes to blend 1.5 tons of product. With pneumatic conveying, that same output was able to be completed in 20 seconds – a 60-fold improvement. With the money saved implementing more cost-effective operations, the company was able to invest the cost savings into additional R&D, marketing and sales staff.

Reduced Maintenance

Downtime is one of the worst enemies of a manufacturing facility and immediately impacts revenue. In addition to reduced or eliminated downtime for maintenance, downtime for cleaning is also considerably decreased with pneumatic conveying systems.

A particular facility found that there was virtually no maintenance or cleaning necessary in pneumatic conveying systems because they

Sucking Cost and Complexity Out of Conveying Systems

have few moving parts. They were able to simply clean or swap out hoses and check the motor and oil twice a year. Approximately 30 hours of production per year was added.

Adaptability

Of course, a system should be tailored to the specific material being utilized within the process – and if needed, the system should be able to accommodate different materials if more than one process will be being performed on a line at different times or have the ability to adjust based on the volume of production necessary for specific runs.

For example, one company utilized a pneumatic conveying dump station to feed ingredients to blenders for smaller and normal size orders. But for higher volume products such as snack-food coatings and flour, they pneumatically loaded blenders directly from silos at an even greater rate of speed.

There are even cases when a system must be mobile so that it can be moved to a different location within a plant. If this is a needed requirement, it can and should be accommodated.

Pneumatic conveying systems can be utilized for virtually any material and application, including conveying water treatment chemicals.

Keep Your Eye on the Prize

The entire goal of pneumatic conveying systems is to automate operations and make them more cost-effective; in effect, to simplify processes. Less complexity equals less downtime, reduced man-hours and reduced overall cost. There should not be added complexity in evaluating and choosing such a system. With expert guidance such as that from VAC-U-MAX, a company should be able to follow the evaluation elements as roughly laid out above and stick to them – and thereby attain them. BP

Since labor is one of the highest costs in a plant or facility, reducing man-hours becomes a prime target of any executive interested in reducing operating cost. A prime benefit of a pneumatic conveying system should be the reduction of man-hours. Where numerous staff were previously required to manipulate material, there might now be the need for only one to add material at the front end of the process.

For more information about VAC-U-MAX pneumatic material handling or industrial vacuum cleaning solutions, write to them at William Street, Belleville, NJ 07109; call (888)241-6992 or (973) 759-4600; e-mail info@vac-u-max.com; or visit their website www.vac-u-max.com

Bruce Boyers is a freelance writer based in Glendale, California.

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Compressed Air Piping System Sizing & Design

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On-site Nitrogen Generation Replacing Bulk Liquid Nitrogen

Presenter Antonio Mayne P.Eng., Utilities Optimization Engineer, Molson Coors Beverage Company – Toronto Brewery
Thursday, March 10, 2022 – 2:00PM EST
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MAR 24

How to Hunt for Vacuum Leaks: Is it Worthwhile?

Presenter Ron Marshall, Chief Auditor, Marshall Compressed Air Consulting
Thursday, March 24, 2022 – 2:00PM EST

APR 28

Air Compressor Cooling, Water- or Air-Cooled?

Presenter Tom Taranto, Owner, Data Power Services
Thursday, April 28, 2022 – 2:00PM EST
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MAY 19

ASME PTC 13 Wire-to-Air Performance Test Code for Blower Systems Part 1

Presenters Julie Gass, Lead Mechanical Process Engineer, Black & Veatch, Fred Constantino, S&C Project Engineering Advisor, ASME and Andrew Balberg, President, Lone Star Blower and Compressor
Thursday, May 19, 2022 – 2:00PM EST

JUN 23

Compressed Air System Design for Lowest kW/100scfm

Presenter Tom Taranto, Owner, Data Power Services
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JUL 21

Applications for Adiabatic Cooling Technology

Presenter Bert J. Wesley, Sr. Principal Industrial Plant Engineering Practice Leader, Woodard & Curran
Thursday, July 21, 2022 – 2:00PM EST
Sponsored by Evapco

JUL 28

ASME PTC 13 Wire-to-Air Performance Test Code for Blower Systems Part 2

Presenters Hiran DeMel, Senior Project Manager and Principal Technologist, Jacobs and Jacque Shultz, Senior Turbomachinery Specialist, Howden
Thursday, July 28, 2022 – 2:00PM EST

AUG 18

Liquid Ring Vacuum Pump Sizing Fundamentals & Best Practices

Presenter Michael Cicalese, President, Wintek Corporation
Thursday, August 18, 2022 – 2:00PM EST

OCT 27

Compressed Air: What You Don't Know Can Hurt You

Presenter Ron Marshall, Chief Auditor, Marshall Compressed Air Consulting
Thursday, October 27, 2022 – 2:00PM EST
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NOV 10

ASME PTC 13 Wire-to-Air Performance Test Code for Blower Systems Part 3

Presenters John Conover, Consultant, Mark Addison, Senior Engineer, Artesian Water Company, and Fred Constantino, S&C Project Engineering Advisor, ASME
Thursday, November 10, 2022 – 2:00PM EST
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DEC 08

Compressed Air: Reliable Source for Nitrogen Generation

Presenter Loran Circle, Senior Consultant, Circle Training & Consulting
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BLOWER & VACUUM TECHNOLOGY NEWS

Kaeser Announces Rental Blower Program

Announcing Kaeser's new rental blower program! Whether you need to take a unit off-line for service without compromising operations, meet a temporary surge, or want to try out a new blower technology without spending capital, you can rent a portable rotary screw blower from Kaeser. Available in three sizes with oil-free flows ranging from 200 to 2309 cfm, these variable speed rotary screw blowers are extremely efficient and provide exceptional flexibility for a variety of low pressure applications.

All units feature our standard full enclosure with sound-proofing to promote safe working conditions and neighbor-friendly operation. They feature additional protection from rain and snow as well as auxiliary heaters in both the mechanical and electrical cabinets, making them suitable for outdoor installations in temperatures from 5 to 115° F. Each model has multiple control modes including pressure regulation, flow control, and fixed speed.

Kaeser rental blowers offer efficiency and flexibility for a wide variety of applications.

Kaeser rental blowers are easily integrated into existing plant controls. Plus, if a new equipment purchase is the ultimate goal, the standard Sigma Control 2 will continuously record and store air demand and power usage to help size the permanent blower and calculate ROI from energy reduction.

About Kaeser Compressors, Inc.

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

Atlas Copco Develops HEX@ Vacuum Controller

Atlas Copco has developed the industrial vacuum controller of the future with HEX@. It serves as an enhanced control center for vacuum pumps and systems. Ensuring higher vacuum performance and functionality as well as increased user empowerment across a large range of applications. By also offering increased connectivity and system integration, HEX@ brings convenient remote access to their vacuum system with increased control anywhere.

HEX@ has a clean and intuitive user interface. HEX@ users access key data directly on the home screen and can access further settings and controls easily using the on-display menu. Relevant pump data is displayed quickly and legibly. "The controller can be individually configured by our customers so that only selected values, such as discharge temperature, power consumption or inlet pressure are displayed," said the responsible product manager at Atlas Copco, Alistair Darroch.

The communication options for HEX@ enabled pumps are also diverse, users can access the unit remotely using smartphones, tablets, laptops or PC; alternatively, access can be via the onboard HMI interface, or a local

device connected to the machine using wired or Wi-Fi based connections. "Customers can choose to connect fully to their local network and the cloud to take complete advantage of a fully connected pump including automatic updates to software and functionality as well as remote support from Atlas Copco in the event support is required. If this level of connectivity is not desired, HEX@ can connect only to the customers network or even not at all," said Alistair Darroch. Further, HEX@ will also support other communication protocols such as Ethernet/IP, EtherCat, Profinet, Modbus TCP, Profibus and OPC UA.

The HEX@ controller is continuously collecting and processing a wide range of pump data. When it comes to making use of this data, Atlas Copco have defined four elementary yet powerful vacuum system attributes we can use to evaluate a vacuum system: Uptime, Performance, ECO and Health. These indicators allow customers to quickly assess the status of their vacuum pump, to understand the impact of any changes made on their vacuum system and ultimately, their process. The uptime is the indicator for the availability of the pump. It documents how long the pump runs without failures. In the case of performance, HEX@ considers if the pump is achieving the required vacuum targets set by the customer. The so-called ECO status provides information about the efficiency potential of the vacuum pumps. By comparing the targeted set-point pressure with the current operating pressure, users receive feedback if vacuum pump is using more energy than necessary. Finally, the health status evaluates failures and key measurements to assess the pumps status and considers when services are due. Informing the customer if their pump health can be improved.

"These four key performance indicators are used to draw conclusions about the current conditions on what we introduce with HEX@ as Insight Cards, which provide feedback on the status of the vacuum system as well as optimization recommendations," said Alistair Darroch. In addition, they include recommendations for increasing pump life, reducing energy consumption, improving the carbon footprint and extending maintenance intervals.

The configured pump settings can be saved as a "mode" and then recalled at any time. The appropriate mode ensures that the pump also calls up the required performance. These HEX@ modes can be accessed easily and quickly by the user by pressing a button 3 on the control panel or by accessing the pump remotely. The HEX@ has additional smart functionalities, such as Trends: Trends showcase historic data to give valuable overviews of various measured parameters, including data on inlet pressure, engine speed, power consumption oil temperature and more. By comparing the current and historic data, users can better understand the consequences of changes in process or pump settings. There is no doubt that HEX@ puts the customer in the driving seat when it comes to monitoring, controlling and optimizing their vacuum installation and vacuum using processes.

Atlas Copco HEX@ industrial vacuum controller.

About Atlas Copco Vacuum Technique

Atlas Copco Vacuum Technique Great ideas accelerate innovation. At Atlas Copco Vacuum Technique, we collaborate with our customers to turn industrial ideas into leading edge technology in vacuum and abatement solutions. Our passionate people, expertise and service bring sustainable value to industries everywhere. Atlas Copco is based in Stockholm, Sweden with customers in more than 180 countries and about 40,000 employees. Revenues of BSEK 100/ 10 BEUR in 2020. For more information, visit www.atlascopco.com.

Blower & Vacuum Technology News

Busch Announces Reusable and 100% Recyclable Plastic Shipping Crates

Busch Vacuum Solutions USA, one of the largest manufacturers of vacuum pumps, blowers, compressors, and systems, announced a new environmentally sustainable initiative for shipping their vacuum pumps using reusable, 100% recycled plastic shipping crates. The new shipping crates support Busch's efforts to become more environmentally sustainable throughout their supply chain. Made from high-density polyethylene 100% recycled plastic, the shipping crates withstand harsh environmental conditions while keeping the vacuum pumps secure and protected. Significant benefits include reusability and removal of corrugated boxes and shrink wrap traditionally used to ship the vacuum pumps. Eliminating disposable materials results in less waste in landfills, less pollution of the air, water, and soil, and fewer carbon emissions during the manufacturing process.

Made from high-density polyethylene 100% recycled plastic, the shipping crates withstand harsh environmental conditions while keeping the vacuum pumps secure and protected.

According to Melissa Schatzel, Vice President of Purchasing & Supply Chain at Busch, "The environmental sustainability metrics using the new shipping crates are substantial. Plus, storage and freight costs are lower due to their compact size and durability." The low-profile cases are ergonomic, safe to use, and faster for workers to prepare the vacuum pumps for shipment and as well as unpack. Schatzel added, "The new reusable crates are custom engineered, turnkey alternatives to less environmentally friendly disposable packaging for shipping our vacuum pumps." Conversion to the new shipping crates for all vacuum pumps manufactured in the USA is expected by early summer 2022.

About Busch Vacuum Solutions

Busch Vacuum Solutions offers vacuum and pressure solutions for all industries from individual vacuum pumps, blowers, and compressors to tailor-made vacuum systems. Busch USA headquarters is in Virginia Beach, VA where a team of 500 dedicated employees takes care of their customer's industrial vacuum needs. Busch USA is part of the global Busch family-owned company with over 3,500 employees in more than 40 countries. For more information about Busch, visit www.buschusa.com.

MD-Kinney Introduces Dry Claw Vacuum Pumps

Kinney vacuum pumps by MD-Kinney in Springfield, MO has been manufacturing blowers and vacuum pumps for over 120 years. Used in applications around the world, Kinney products stand up to the demands of harsh processes with proven vacuum technology. Kinney is the brand you trust for vacuum pumps and vacuum boosters.

MD-Kinney proudly offers the KVC dry claw series of vacuum pumps in the Kinney vacuum portfolio. The series is a contact free dry claw vacuum pump that operates efficiently and economically. Contactless operation means minimal wearing parts and maintenance needed with oil-free compression. The KVC dry claw pumps offer a compact footprint requiring a minimal amount of floor space and are very easy to install. The pumps have a highly efficient design for optimal CFM per HP.

About MD-Kinney

Kinney Vacuum Company founded in 1907 by J. Royal Kinney in Jamaica Plain, MA, USA which is best known for the design of the first rotary piston vacuum pump in 1909. This technology was first used in food, chemical, and other process industries. In 1927, Kinney published the first compilation of technical data that would be the industry standard for vacuum pump sizing. In 1950, Kinney merged a positive displacement blower with vacuum pumps, making the first booster pump combo. In 1972, Kinney introduced a full line of liquid ring vacuum pumps in the US market with both single and two stage pumps. For more information, visit www.MD-Kinney.com.

Pfeiffer Vacuum Presents Virtual Service Management

Pfeiffer Vacuum's new "Virtual Service Management" is a free web app that makes it possible to manage vacuum equipment from different manufacturers. The app is integrated into Pfeiffer Vacuum's new Select & Request Portal, so that interested parties who register in the portal can access the new service directly. It takes just a few clicks, for example, to create your own locations, departments and machines, to which the various vacuum components are assigned, so that you can manage the vacuum equipment more easily.

The corresponding product data and operating instructions are stored and made available in the system. A clear display of organizational units and vacuum components makes planning and documentation over the entire

MD-Kinney proudly offers the KVC dry claw series of vacuum pumps.

Blower & Vacuum Technology News

service life much easier. The dashboard on the start page can be customized. Frequently required components can be easily marked as favorites and, if desired, displayed directly on the dashboard. Customers can also store additional information, such as maintenance intervals, the average running time and the last service date.

This makes it possible for the software to organize servicing and maintenance intervals worldwide and to involve the relevant Pfeiffer Vacuum service center in good time. System downtimes can be minimized by synchronizing maintenance activities. This improves decision making and planning reliability. Creating a service request is also quick and easy since the data can be filled in automatically. Photos and additional documents can be easily attached.

Each vacuum component is uniquely identified via an ID code and QR code. The tool offers the option of exporting QR codes in several formats. With the mobile app, the QR code can be scanned by smartphones or tablets, providing an instant overview of the most important data. A "guided tour" explains the various functions in detail. The tour can be skipped or restarted at any time. This ensures quick and safe handling at all times.

About Pfeiffer Vacuum

Pfeiffer Vacuum is one of the world's leading providers of vacuum solutions. In addition to a full range of hybrid and magnetically levitated turbopumps, the product portfolio comprises backing pumps, leak detectors, measurement and analysis devices, components as well as vacuum chambers and systems. Ever since the invention of the turbopump by Pfeiffer Vacuum, the company has stood for innovative solutions and high-tech products in the analytical, industrial, research & development, semiconductor and future technologies markets. Founded in 1890, Pfeiffer Vacuum is active throughout the world today. The company employs a workforce of some 3,300 people and has more than 20 sales and service companies as well as 10 manufacturing sites worldwide. For more information, please visit www.pfeiffer-vacuum.com.

Pfeiffer Vacuum's Virtual Service Management

Dekker Announces Duravane Series Vacuum Pumps

The new DuraVane vacuum pump offerings are oil-sealed rotary vane pumps that are expertly engineered to deliver constant and reliable vacuum, while being both quiet and efficient. This makes the Dekker series the ideal solution for a wide range of applications. The series is the ideal solution for many demanding industries that include woodworking, food processing, meat packaging, plastics and rubber, electronics, paper & printing, material handling and medical vacuum.

While every one of these industries pose unique challenges for vacuum pumps, the Dekker Duravane oil-sealed vacuum pumps series is expertly designed using tried and true oil-sealed rotary vane principles that have been used for years in a multitude of industrial applications. The compact vacuum pump design, proven time and time again, is capable of continuous operation over the course of its lifetime.

The durable industrial-grade components found in the pumping module can withstand heavy use in the harshest environments. Boasting a long list of innovative features, the Dekker Duravane series ensures optimal performance at the lowest possible lifecycle cost. To assist in water vapor handling capability, a built-in gas ballast comes standard with the pump. Other features include the lubricant retention and return mechanism which means that these machines are suitable for continuous operation between atmospheric pressure and their ultimate pressure. The integrated bypass valve in the

exhaust filters protects the Duravane against over pressurization.

Not only that, but the Dekker Duravane series is designed with a smaller footprint and clean operation in mind. The vacuum pumps is upfitted with highly efficient integrated mist filters, optimized oil retention system, low noise and vibration level to minimize environmental impact. A highly efficient cooling system also enables low operating temperatures and increased oil life, improving overall reliability.

To learn more, visit www.dekkervacuum.com.

Dekker Duravane oil-sealed vacuum pumps are expertly designed using oil-sealed rotary vane principles.

Blower & Vacuum Technology News

Edwards Vacuum Launches New Cryopump

Edwards Vacuum launched a new cryopump for semiconductor applications, the CTI-Cryogenics On-Board® IS 320F XVS Cryopump, which aims to maintain Edwards' tradition of delivering the most reliable and best performing cryopump on the market. The new cryopump was designed to maintain stable consistent vacuum performance between regenerations and over the lifetime of the pump. Providing a stable process vacuum is consistent with improved process yield. Together with the highest hydrogen pumping speed, it makes it the perfect choice for the most demanding ion implant applications.

Edwards Vacuum CTI-Cryogenics On-Board® IS 320F XVS Cryopump.

The intelligent system control integrated in the cryopump ensures better process quality, vacuum consistency, and uptime, while providing real-time system information for

optimum control of array temperatures. Vacuum quality is enhanced by automatic adaptation to changing thermal/gas loading conditions. On-Board® IS 320F XVS is compatible with all On-Board® IS cryopump systems and with the IS-1000, IS-2000V and IS-1800 XVS Compressors.

Speaking of the new cryopump's environmental impact Paul Amundsen, Strategic Product Manager said, "Edwards is committed to providing products that reduce impact to the environment, and the On-Board® IS 320F XVS cryopump is no exception. By using our new cryopump together with an On-Board IS variable speed helium compressor, customers can expect a reduction in energy consumption of up to 44% compared to usage with fixed speed helium compressors."

About Edwards Vacuum

With over 100 years of rich heritage, Edwards is the partner of choice for tens of thousands of customers in critical applications around the world. Vacuum is required in diverse sectors, from the generation of power to the production of steel, to the challenging environments of space simulation and high energy physics research. Everywhere you find vacuum requirements, you will find Edwards leading the way. From medicines to mobile phones, from computers to coffee beans, to cars and chemicals, we pride ourselves in making a difference to people's lives. And we do it responsibly, ensuring that we innovate sustainably, whilst helping our customers to maintain their competitive advantage and operational excellence. Edwards is part of the Atlas Copco Group, a Sweden-based provider of industrial productivity solutions. For more information, visit www .edwardsvacuum.com.

Piab Introduces the piFLOW®am

The piFLOW®am is a small vacuum conveyor designed based on requirements from OEMs within Additive Manufacturing segment. The small and compact design features Piab's proprietary and highly efficient COAX® vacuum technology as well as a butterfly valve. The butterfly valve is not sensitive to pressure fluctuations and is able to keep a material batch inside without the pump being mounted. It has a standard TC connection which makes it simple to integrate for the customer. The unit is simple to use and is easily integrated with any type or brand of 3D printer, sieve, hopper and other intermediate vessel. The product is controlled by pneumatic or electrical control units.

The piFLOW®am is a small vacuum conveyor designed based on requirements from OEMs within Additive Manufacturing segment.

Piab's vacuum conveying technology can be used to solve many different challenges related to additive manufacturing. It is a perfect technology for filling a printer with metal powders, reclaiming/cleaning excess material from the printers and postproduction, and filling or emptying metal powders from/to adjacent equipment such as a sieve or a powder container.

The piFLOW®am is made of stainless steel and can withstand a material temperature of up to 140°F. The conveyor unit weighs 33lbs and reaches a maximum feed pressure of 101.5 psi.

About Piab

Piab provides smart solutions for the automated world, helping thousands of end users and machine producers in e-commerce logistics, food, pharma, automotive and other manufacturing industries to improve energy-efficiency, productivity and working environments. With almost 500 employees and SEK 1.2 bn in sales 2018, Piab is a global organization, serving customers in almost 70 countries from a network of subsidiaries and distributors. By leveraging the ongoing technological development in automation and robotics, and targeting high-growth segments and geographies, Piab's vision is to become the global leader in gripping and moving solutions. For more information, visit www.piab.com.

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*"Data loggers were placed on the vacuum system pumps, at an envelope manufacturer, measuring 870,000 kWh at a cost of $70,000 per year. Interesting to note that the compressed air system consumed **3.5 times less power.**"*

— Ron Marshall, Marshall Compressed Air Consulting

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