The Magazine for ENERGY EFFICIENCY in Compressed Air Systems

COMPRESSED AIR BEST PRACTICES

airbestpractices.com

November 2016

System Specific Power

SUSTAINABLE MANUFACTURING FEATURES

CHILLER & COOLING BEST PRACTICES SUB-SECTION

COLUMNS

FROM THE EDITOR | System Specific Power

A Key Performance Indicator (KPI) every plant should track, within their energy management metrics, is the "System Specific Power" of their compressed air system. Specific power is how much energy is used (kW) per 100 cfm of compressed air produced. In order to develop this metric, measurements must be taken.

Our lead article is a case study about a UniFirst plant in Kentucky, where Kaeser Compressors performed, what they call, an Air Demand Analysis (ADA). The objective was to improve system specific power and the mechanical reliability of the air compressors. The results were not atypical. The existing system was terrifically oversized and unable to produce compressed air efficiently at such low loads. The specific power of the system was 40.98 kW per 100 cfm. I hope you enjoy the story of how they took it down to 21.56 kW per 100 cfm and improved reliability!

Congratulations go to BEKO USA for celebrating their 25 Year Anniversary. They were kind enough to share photos and notes of what was quite a gathering of their partners and customers at their Atlanta headquarters. Separately, Hank van Ormer supplies us with a useful "Centrifugal Air Compressor Basics" article detailing performance terms and definitions end users and engineers should be familiar with.

Ron Marshall provides us with an interesting story about a Mitsubishi Hitachi Power Systems plant in Saskatoon, Canada. They operate five separate compressed air systems, with a total of 740 horsepower of air compressors installed. Measurement identified a VFD air compressor, with some "internal adjustment issues", with a specific power as high as 60 kW per 100 cfm!

We have included two interesting articles about chillers and cooling systems. SPX Cooling Technologies is introducing new cooling tower technologies, designed to bring efficiencies to industrial applications. Lastly, who can resist an article about how Aggreko helped, with their mobile chillers, NASA test the Mars SLS Rocket!

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

ROD SMITH, *Editor, tel: 412-980-9901, rod@airbestpractices.com*

2016 Expert Webinar Series

Join Keynote Speaker Mike Flaherty, from tekWorx, and Chiller & Cooling Best Practices Magazine to review the basics of Energy Treasure Hunts and then how to apply the concept to your facility's chilled water plant.– by signing up for our free November 30th Webinar titled, "Energy Treasure Hunts for Chilled Water" at www.coolingbestpractices.com/magazine/webinars

SEEING IS BELIEVING.

UPTIME™ ASSURANCE

Behind their stunning appearance, world-class components and in-house design, you'll find every ELGi™ air compressor features:

- Patented Axis™ air ends, with the industry's first **lifetime warranty**
- Best in class UPTIME Assurance,™ backed by our **48-hour Air Up Promise**
- Exclusive Thermal Zone layout, for **maximum life and uptime**

We have designed and engineered a full line of rotary screw compressors to keep you up and running more efficiently.

ELGi is changing the way you look at air systems. See it all at www.ELGI.us

ELGi™
AIR COMPRESSORS

AIR UP.

INDUSTRY NEWS

Celanese Recognized as a ENERGY STAR® Partner of the Year-Energy Management

Celanese Corporation is a global technology leader in the production of differentiated chemistry solutions and specialty materials used in most major industries and consumer applications.

Celanese is receiving ENERGY STAR® Partner of the Year recognition for formulating a robust energy management program using ENERGY STAR resources. Key 2015 accomplishments include:

- Reducing energy intensity by 7 percent since 2010 and 28 percent since 2005.
- Completing 200 energy projects to save more than $16 million in 2015, including the startup of a $160 million gas-fired steam boiler system to prevent greenhouse gas emissions and air pollution and to improve energy efficiency.
- Investing in energy efficiency in core production by starting up a state-of-the-art methanol unit.
- Performing energy-saving Treasure Hunts in four facilities in the United States and Mexico to identify more than 500 energy-saving opportunities.

- Sharing its energy management expertise among the ENERGY STAR industrial partners.
- Communicating energy efficiency and ENERGY STAR throughout Celanese.

For more information, visit www.celanese.com/ebs/sustainability or www.energystar.gov

Baldor Introduces Passport Selection Tool for Baldor-Dodge® Products

Baldor Electric Company introduces Passport, a new selection program for Baldor-Dodge® mechanical power transmission products.

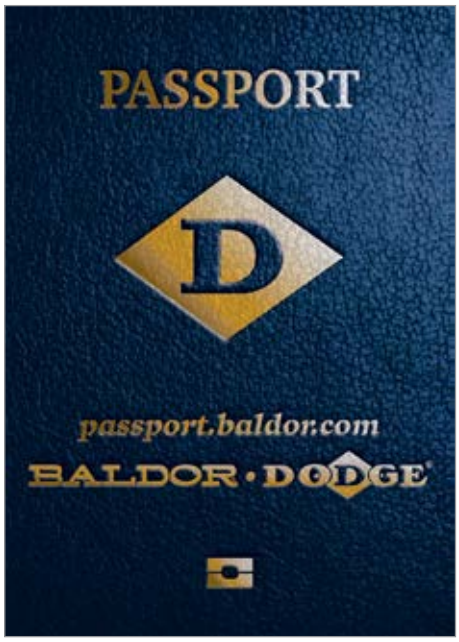
Passport is a web-based tool utilizing an intuitive process to guide both novice and expert users through quick and accurate selections.

During the selection process, Passport offers real-time pricing and availability, enabling customers to make cost effective selections of readily available components. After selections are complete, Passport offers add-to-order capability, seamlessly allowing customers to convert selections into orders via the PT Place e-commerce platform. Passport also delivers a comprehensive summary that includes part numbers, supporting technical performance data and indexes product selections for future reference.

Currently, Passport supports the selection of shaft mounted reducers, as well as V-Belt and synchronous belted drives. Future Passport

"During the selection process, Passport offers real-time pricing and availability, enabling customers to make cost effective selections of readily available components."

INDUSTRY NEWS



Passport is a web-based tool utilizing an intuitive process that offers real-time pricing and availability.

capabilities will incorporate additional Baldor-Dodge mechanical power transmission products, as well as offering an application based approach to developing packaged solutions for a wide range of common industrial applications such as conveying and air handling.

About Baldor Electric Company

Baldor Electric Company (www.baldor.com) is a leading marketer, designer and manufacturer of industrial electric motors, drives, and mechanical power transmission products. Baldor, a member of the ABB Group, is headquartered in Fort Smith, Arkansas.

For more information, visit www.baldor.com access Passport at www.passport.baldor.com or watch the YouTube video to learn more.

Festo Helps Create Mechantronic Apprenticeship Program

Two-year apprenticeship program helps employers fill the skills gap in advanced manufacturing.

Festo Didactic, Sinclair Community College and five companies in the Cincinnati tri-state area (Art Metal Group, Clippard Instruments, Festo Inc., MQ Automation, Nestlé) recently created a two-year Mechatronics Apprenticeship Program to help employers develop the skills

that are missing in the workforce today by combining theoretical education, hands-on training, and on the job training. The apprenticeship is designed to help individuals learn advanced manufacturing skills as well as earn an associate's degree in mechatronics.

Building off a German model

The first cohort of the program includes 11 apprentices who are training for careers as maintenance technicians, automation specialists, service technicians, and manufacturing technicians. The program uses the German apprenticeship model of dual education, where apprentices learn in a classroom and maintain a steady job. Every week each apprentice spends one day at Sinclair Community College for classes, one day using state-of-the-art equipment at the new Festo Learning Center in Mason, and three days working at their respective employers. The apprentices are able to take what they learn in class, practice it at the Festo Learning Center, and then use that new knowledge and skill in a real-life work environment. "In terms of educational modality, the apprenticeship model couldn't be a better fit for manufacturing," says Vice President for Regional Centers at Sinclair Community College Scott Markland.

The Festo Learning Center is a unique part of the program. The Center is designed to meet international standards for production facilities and labs. It provides the apprentices a training facility where they can work with instructors on high-end Festo workstations that simulate a work environment and corresponds to their classroom curriculum.

Collaboration to address the skills gap

The idea for the apprenticeship program was born out of a need for highly skilled workers in the Cincinnati area, an established hub for manufacturing. As advanced manufacturing and Industry 4.0 grow in the area, employers are increasingly looking for mechanical aptitude, skills in automation, the ability to read code and program machines, and electrical skills as

INDUSTRY NEWS

well as problem solving and critical thinking skills. "Technology is evolving quickly," says Jennifer Paine, Site Management Lead at Nestlé. "For us this is about a commitment to our employees, to train them in the skills they need and to advance their skill set to make our company more competitive."

Based on the need from employers and a shared vision to ensure more people receive the training and education needed for today's manufacturing jobs, the partners formed the Mechatronics Apprenticeship Program Partners collaborative. The partners worked together to identify the needs of employers and adapt an existing curriculum at Sinclair Community College accordingly, in order to solve both the educational needs and the workforce needs of the community. "We were hearing from local employers about these needs, but we felt like individually we may not have all the pieces to do it alone but it was something we could collaborate on based on our common vision," says Scott Markland.

Apprentices with bright futures

The program gives the apprentices an advantage in the workforce. Unlike students who are only earning an associate's degree, the mechatronics apprentices are gaining the knowledge and skills they need as well as getting practical experience. "We must continue to find ways to train students in the skills and knowledge they need for today and tomorrow's manufacturing jobs.

Apprenticeship programs like this, help make sure students get that training early," says Thomas Lichtenberger, President at Festo Didactic North America.

For one apprentice it's about recognizing what is happening in the rest of the world and getting a jump-start on his competition. "This is the future of maintenance tech. The more I talk to people in this field the more I see how it is big over in Europe and it's coming this way. You get in on the ground floor and you'll be set," says Nathan Gledhill, a mechatronics apprentice and Nestlé employee.

About Festo Didactic

Festo Didactic is a leading provider of technical education equipment and training. Festo's educational solutions evolved from its world-class automation and engineering division and integrates the latest trends in each learning system it offers. The innovative product range from Festo allows educators and trainers to equip their classroom with the technology they need, from individual workstations to complete Learning Factories, as well as training and consulting, eLearning, courseware solutions, and LMS integration.

To become a Mechatronics Apprenticeship Program partner or for more information contact Corinne Haley by email at corinne.haley@festo.com or by telephone at 848-777-2009.

For more information, visit http://www.festo-didactic.com/int-en/

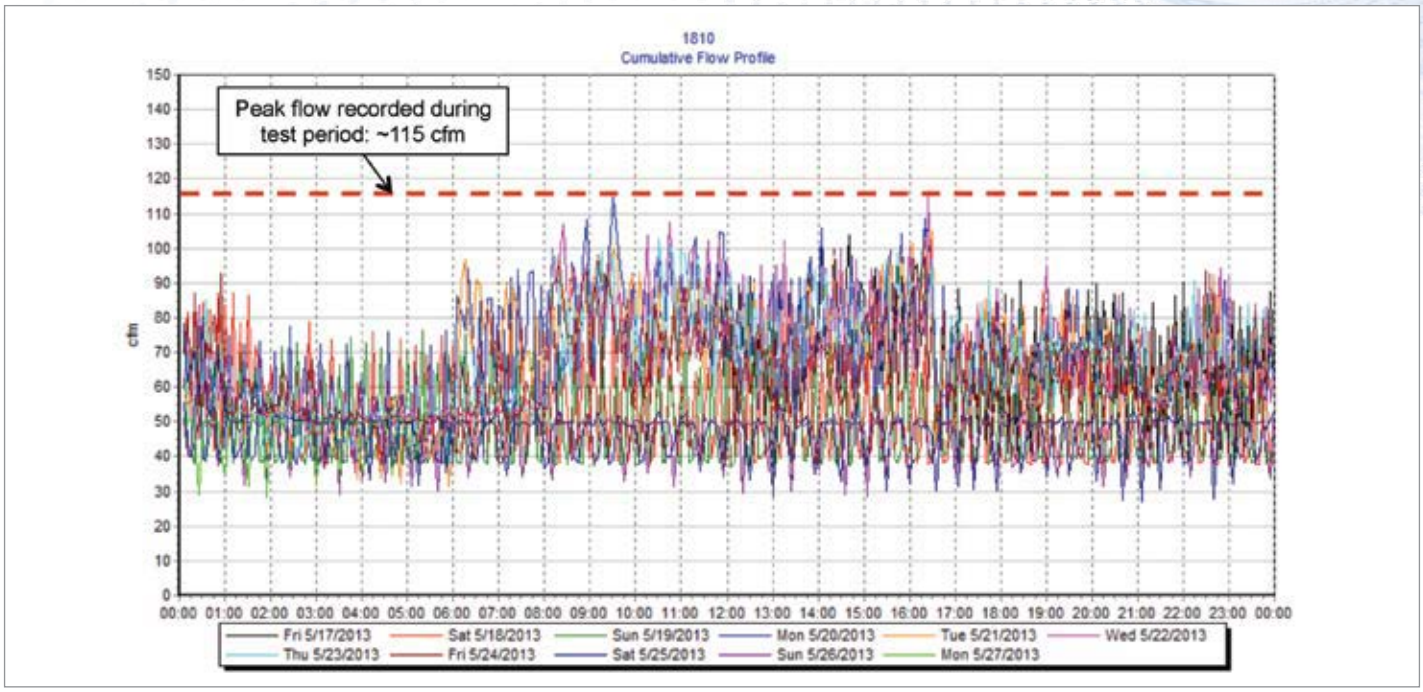
KAESER'S UNIFORM FOCUS on System Specific Power Benefits UniFirst

By Roderick Smith, Compressed Air Best Practices® Magazine

UniFirst's Tim Davis and Bill Jackson approved the performance of an Air Demand Analysis to better understand system flow requirements (left to right).

UniFirst is one of North America's largest workwear and textile service companies. They outfit nearly two million workers in clean uniforms and protective clothing each workday. Founded in an eight-stall garage in 1936, the Company has grown to 240

UniFirst U1st
Uniforms • Services • Solutions



Averaged over 5 minutes. This chart highlights the cumulative flow throughout the test as measured via the load signals of the compressors.

customer servicing locations throughout the U.S. and Canada servicing 300,000 business customer locations. UniFirst operates five company-owned manufacturing plants and two state-of-the-art distribution centers. The subject of this article is an energy-saving Air Demand Analysis (ADA), conducted by Kaeser Compressors, at UniFirst's centralized 320,000 square foot hub Distribution Center located in Owensboro, Kentucky.

Discovering the "Specific Power" of the System

The compressed air system that Dennis Ginn, from the Louisville branch of Kaeser Compressors, found installed in Owensboro consisted of two fifty horsepower rotary screw air compressors, a wet receiver tank and a refrigerated air dryer. UniFirst invited him in because they were experiencing mechanical issues with the air compressors.

KAESER'S UNIFORM FOCUS ON SYSTEM SPECIFIC POWER BENEFITS UNIFIRST

"They were thinking of buying two new 50 hp air compressors. The first thing I noticed, however, was the air compressors were short-cycling," Ginn said. "A unit would load, unload, load, unload and just kept repeating the cycle." Ginn learned this constant start/stop condition was the norm and informed the plant this was the most likely cause of the mechanical issues.

TABLE 1. SYSTEM PROPOSAL AFTER ADA AIR DEMAND ANALYSIS

PERFORMANCE METRICS	ADA DATA ON EXISTING SYSTEM	PROPOSED SYSTEM WITH TWO SK 15T AIR COMPRESSORS + A BACK-UP UNIT + STORAGE
Annual Energy Cost	$16,732	$8,088
Annual Energy Consumption	223,093 kWh	115,359
Max Power Consumption	35.2	25.8
Specific Power (kW/100 cfm)	40.98	21.22

The second 50 horsepower air compressor was strictly used as backup. UniFirst production runs 24/7 and cannot tolerate any downtime from the compressed air system. Compressed air is "mission critical" as it is used throughout the plant to power pneumatic cylinders used in the vast conveying system moving laundry around the plant. The conveyors have gates, opened and closed by pneumatic cylinders actuated by solenoid valves. Vast numbers of 2" x 3" sewing labels are also sorted, packaged and manipulated with compressed air. No compressed air would mean no production. Members of the maintenance team confirmed they manually rotated the units once a week so as to even out the running hours. Ginn continued, "Once we learned the second air compressor never ran with the first one, we knew the system was over-sized and that UniFirst would benefit from a Kaeser Air Demand Analysis."

Kaeser's Air Demand Analysis (ADA) builds a demand profile by measuring system parameters including flow, pressure, and energy usage (kWh) during a representative work week. One important goal is to discover the important performance metric called "Specific Power" for the whole compressed air system. Specific power is how much energy is used (kW) per 100 cfm of compressed air produced. Tim Davis (Facilities Engineer) and Bill Jackson, DC (Distribution Center) Maintenance Planner, approved the suggestion to go forward with an ADA and received management support to get it done.

After one week of measurement, the ADA report was produced. Specific power was measured at 40.98 kW per 100 cfm of compressed air produced- close to double what Kaeser Compressors targets when designing compressed air systems. The annual energy consumption was 223,093 kWh, costing the plant $16,732. Average system pressure (measured at the receiver tank) was 111 psi. Ginn commented, "The ADA showed their air compressors were oversized. The air compressors can produce at least 200 cfm each and the system was only consuming 70 cfm, on average, with peak consumption reaching only 115 cfm." The air compressors, only able to operate in on/off mode, were simply unable to operate efficiently and reliably at such low loads.

TABLE 2. SYSTEM DATA COMPARISON AFTER INSTALLATION

PERFORMANCE METRICS	ADA DATA ON EXISTING SYSTEM	SAM 4.0 DATA ON NEW SYSTEM
Annual Energy Cost	$16,732	$9,035
Annual Energy Consumption	223,093 kWh	120,461
Max Power Consumption	35	25
Average kW Draw	26	14
Specific Power (kW/100 cfm)	40.98	21.56
Total Flow (cf/yr)	32,666,894	33,525,531
Available Capacity (cfm)	388	213
Peak Flows (cfm)	115	142
Average Flow (cfm)	62	64
Maximum Tank Pressure (psig)	124	125
Average Tank Pressure (psig)	111	118

*Energy costs for both systems calculated at the current energy rate of $0.075/kWh

KAESER'S UNIFORM FOCUS ON SYSTEM SPECIFIC POWER BENEFITS UNIFIRST

The new system features three air compressors (one for back-up) with space-saving integrated dryers.

Designing the Industry 4.0 System Solution

Armed with the average flow requirement data, Ginn was able to design a system able to increase (almost double) specific power efficiency while maintaining the back-up assurances the maintenance team required. The new system would consist of three SK 15 AIRCENTER rotary screw air compressors equipped with integrated refrigerated dryers and receivers, the existing 400-gallon receiver tank, aluminum SmartPipe™ piping, and an oil aerosol coalescing filter. "We proposed three air compressors each sized for average demand and the second one to act as the trim compressor. The third unit would provide the redundancy UniFirst requires." Ginn continued, "I always tell my clients that storage is our friend, so we kept the receiver tank and placed the pressure transducer and set it at 115 psi."

The three SK 15 AIRCENTER air compressors would be controlled by a Sigma Air Manager (SAM) 4.0. This master controller is connected to the three air compressors through the Ethernet. When the system pressure reaches 115 psi, it will activate the second air compressor. It will also rotate the air compressors to keep the working hours even during the year. This allows for one preventative maintenance service trip to be done for all the units. Another feature of the SAM 4.0—it provides the plant with up to one year of reporting, including energy consumption and costs.

Most importantly, specific power was forecasted to drop in half from 40.98 to 21.22 kW/100 cfm. Maintenance issues, caused by short-cycling, would go away as the units would no longer be undersized. After deliberation, UniFirst management decided to install the new system.

Compressed Air Systems are Dynamic

Several months after the new compressed air system had been up and running, a representative day was selected to examine the performance metrics of the system. The UniFirst team was taught how to run the reports themselves off the card in the Sigma Air Manager 4.0. The results were exciting in that not only was specific power cut in half – the proposed/anticipated results were met almost exactly. "Specific power was cut from 40.98 to 21.56 kW/100 cfm," said Ginn. "When clients can take the time to have an ADA Survey done, it's not difficult to accurately predict the performance of a new system."

Mechanical issues caused by short-cycling, over-sized air compressors were no longer an issue and the system was moved to an elevated mezzanine. Ginn commented, "This is an air conditioned facility ideal for our AIRCENTERS featuring space-saving integrated refrigerated dryers. They make a nice tall and skinny package."

As is normal with compressed air systems, the Sigma Air Manager 4.0 Report showed operating conditions had changed. Compressed air flow and pressure requirements had actually increased. The Sigma Air Manager 4.0 had automatically adjusted and the good system design had nevertheless delivered the lower energy consumption figures.

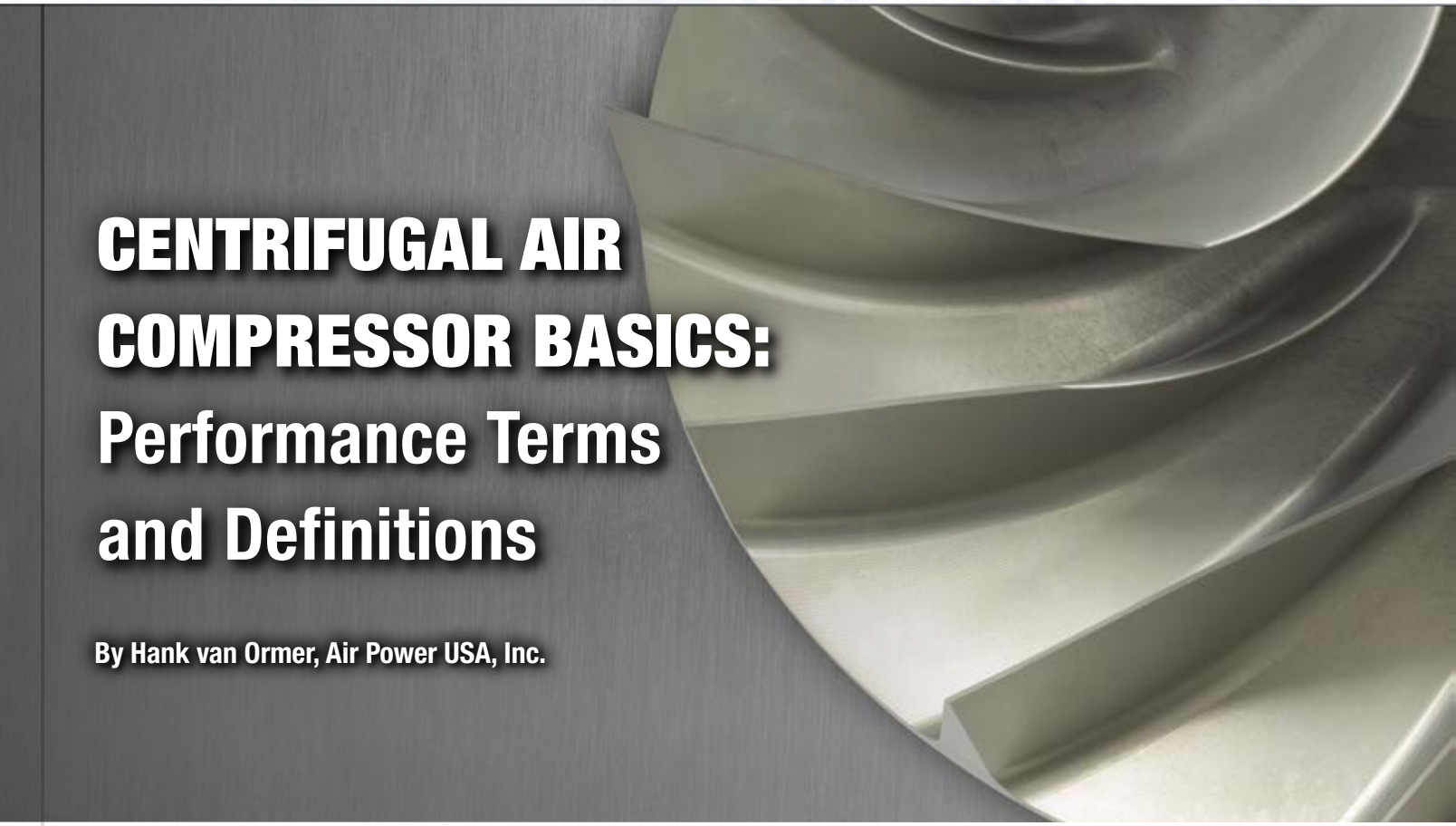
Conclusion

Compressed air is "mission critical" in many facilities. Since production personnel know the plant will shut-down if there's no compressed air, this makes the over-sizing of air compressors common-place. Over-sized air compressors, with load/unload controls, will short-cycle and experience mechanical issues and elevated energy costs. "We run into this situation (where the plant doesn't understand system demand) all the time," said Ginn. "Plants will always err on the side of caution. I just sold a 40 horsepower VSD air compressor to a plant which originally wanted to buy a 150 horsepower air compressor."

Installations like this one, designed after a system analysis is done, show redundancy assurance need not be sacrificed while attaining energy efficiency improvements in compressed air system specific power. BP

For more information contact Kaeser Compressors at email: customer.us@kaeser.com or visit us.kaeser.com/cabp

To read similar ***Compressed Air System Assessment*** articles, visit www.airbestpractices.com/system-assessments



CENTRIFUGAL AIR COMPRESSOR BASICS: Performance Terms and Definitions

By Hank van Ormer, Air Power USA, Inc.

In general, this article focuses on the definitions of terms often used to understand centrifugal air compressor performance. Comments are also made on how to measure power consumption. This article is not intended to be an engineering discussion of the various types and designs of centrifugal and other air compressors.

Compressor Capacity Definitions

Following are some clarifying definitions of terms used, and often misused, to define capacity or flow in centrifugal compressors.

Capacity is the quantity of air at which the compressor will operate at a specific discharge pressure. For all industrial compressors, capacity is rated at the conditions of pressure, temperature and moisture content existing at the compressor inlet flange. The basic reference for all discussion on air flow relates back to mass flow. All definitions and conversions are directly related to conservation of mass flow through the compressor.

Mass flow (lb/min or kg/hr) is a specific value independent of the air inlet conditions. The compressor functions on how much mass flow (lb/min) flows through the machine. For this reason it is the best means of comparing one flow value to another. The problem with using it all the time is that compressor manufacturers size compressors on actual inlet air volume flow. This is done because the compressor size is a function of the actual inlet volume it can hold.

- lb/min wet is the mass of air including the water vapor in the air.
- lb/min dry is the mass of the air without the water content i.e. dry air (0% relative humidity)

"Capacity requirements, in terms of scfm, are best to use because scfm is directly proportional to mass flow; which, when estimated can accurately reflect the input power value."

— Hank van Ormer, Air Power USA, Inc.

CFM (cubic feet per minute) (M^3/min) is a volumetric measurement not dependent on inlet conditions such as temperature, pressure and humidity. When working with centrifugal compressors, this should be clarified (when working with all compressor types, this should also be clarified).

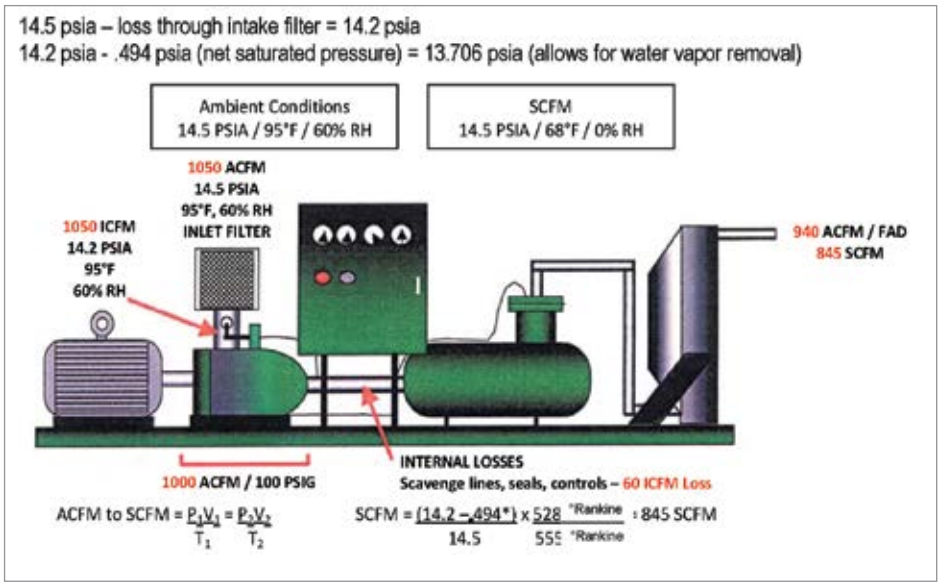
ACFM (actual cubic feet per minute) (M^3/min) is the actual inlet air delivered at the discharge flange. ACFM represents useful air and is independent of the seal losses through the machine. The commonly used value for seal losses with carbon seals is about 1%.

ICFM (inlet cubic feet per minute) (or M^3/hr) is a measure of the air entering the compressor referred back to inlet conditions. ICFM is the most common method of determining centrifugal compressor selection. CAGI and PNEUROP often rate centrifugal compressors in icfm. The only difference between icfm and acfm is that acfm is measured at the compressor discharge flange, whereas icfm is measured at the compressor inlet flange or at the discharge flange and corrected for seal losses. Some centrifugal compressors may have other air losses between the inlet and discharge flanges.

Unlike positive displacement type compressors where icfm is almost always significantly higher than acfm and with the exception of such small items as potential seal leakage, icfm and acfm are often used interchangeably with regard to capacity flow ratings.

FAD (free air delivered) indicates delivered air at inlet conditions. FAD is read before the inlet filter and inlet piping thus not taking into account this pressure drop which is normally anywhere from .2 to .5 psia with a relatively clean filter. This can be misleading because performance is calculated on an inlet pressure that is higher than the actual air volume entering the unit. Calculated discharge pressure and power will also be lower than actual.

CENTRIFUGAL AIR COMPRESSOR BASICS: PERFORMANCE TERMS AND DEFINITIONS



Converting acfm to scfm – establishing a general multiplier

*(.494) The saturation pressure of the water vapor at the inlet temperature (95°F) times the actual RH% is deducted from the available inlet air to allow for the water vapor removal in the form of condensate.

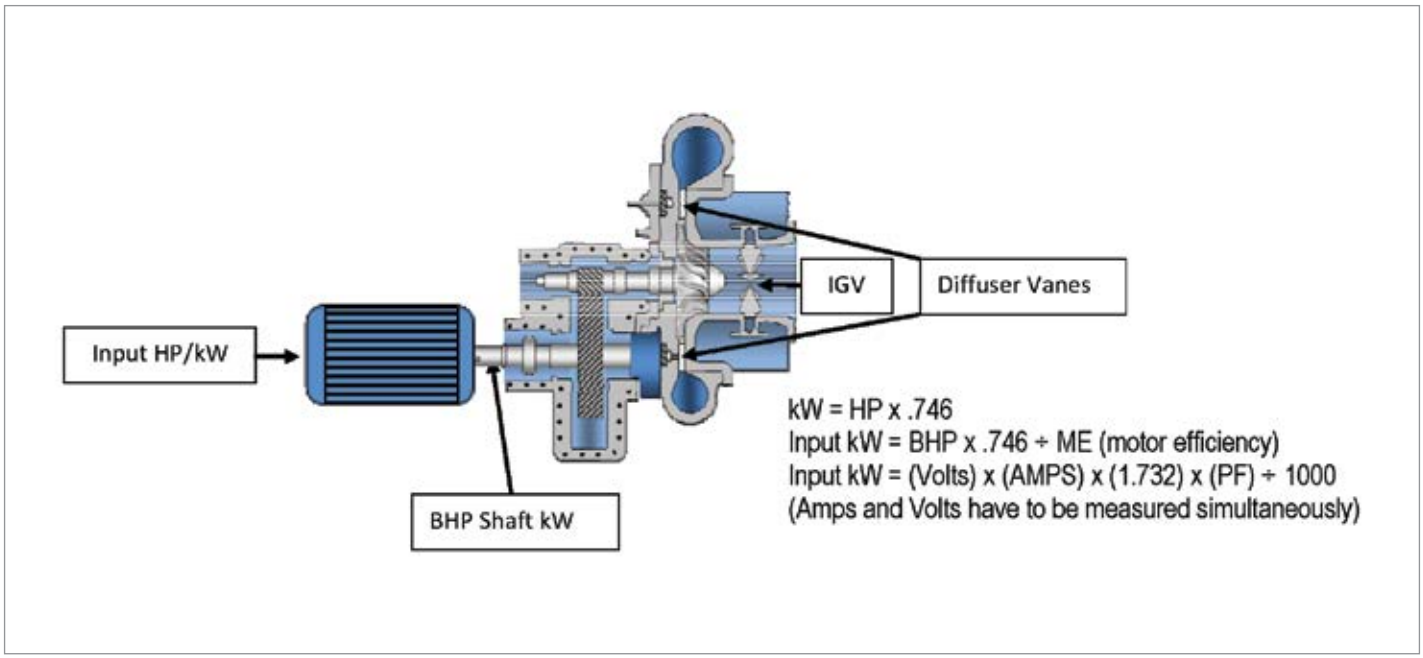
Like icfm and acfm, FAD is also used interchangeably to reference delivered air. However, if using published data to run operating performance compressors it is important to know if the FAD rating is used instead of icfm or acfm and identify where the inlet pressure number is being acquired or estimated.

SCFM (standard cubic feet per minute) (Nm^3/hr) is referred to normal inlet conditions of 14.5 psia (1 bar), 68°F (20°C), and 0% relative humidity. SCFM can be based on inlet or discharge and it should be specified one way or the other. The most common use is inlet flange measurement.

Capacity requirements, in terms of scfm, are best to use because scfm is directly proportional to mass flow; which, when estimated can accurately reflect the input power value. ICFM will yield varying amounts of mass flow depending on the extent to which moisture is removed during intercooling and aftercooling. Most air tools, dryers, flow meters and similar air equipment are rated on the basis of scfm, not icfm or acfm.

Air Power USA always uses scfm when selecting or applying compressors to a project or when comparing operating performance of various units. Be careful to avoid overthinking that scfm ratings always permit direct comparisons as there are several definitions for "standard" conditions. Both CAGI and PNEUROP use 68°F, 14.5 psia, and 0% relative humidity ambient air conditions as standard.

In summary, operating comparisons should only be evaluated at the same inlet temperature, pressure, relative humidity and cooling water conditions, as well as the same discharge pressure. The user's application should specify worst case conditions, i.e. warmest conditions to insure the compressor is capable of meeting the desired output.



Understanding horsepower and power cost

When not specified most manufacturers default to standard design conditions of:

Inlet = 95°F
Barometric = 14.4 PSIA
Inlet 14.1 PSIA
Relative humidity = 60%
Cooling water = 80°F

Compressor Pressure Definitions

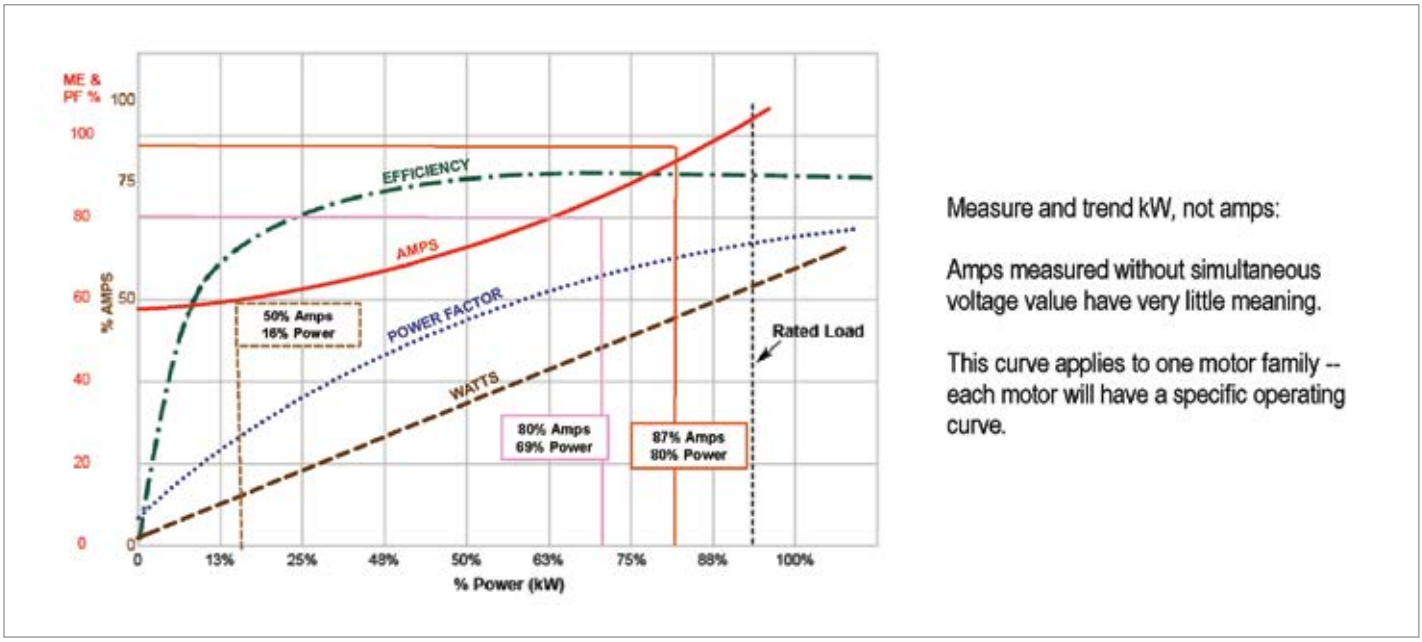
PSI is a pressure rating which means pounds per square inch.

PSIG is gauge pressure which reads the psi above the ambient or barometric pressure:

0 psig = 14.5 psia (nominal sea level)
100 psig = 114.5 psig

PSIA is ambient barometric pressure that varies with the altitude and the weather. This is a very important value when evaluating or estimating any compressor performance; particularly, centrifugal compressors. PSIA is also critical to convert icfm or acfm to scfm

CENTRIFUGAL AIR COMPRESSOR BASICS: PERFORMANCE TERMS AND DEFINITIONS



Typical electric motor operating characteristics (.90 ME) -- Measure and trend kW, not amps

(M^3/hr to Nm^3/hr). The Standard Value for inlet air used by CAGI and PNEUROP, and most manufacturers, is 14.5 psia (1 bar).

Input Power

A common area of misunderstanding where comparing projected or actual operating compressors, but particularly centrifugals.

Motor horsepower – no meaning to power cost, may or may not have service factor usually references the nameplate horsepower.

BHP – brake horsepower is the input power at the compressor input shaft; power required to drive compressor at rated flow and rated pressure.

Input motor power in kW – value which can be measured or calculated that generates kWh; the driving force of the utility bill. Input motor power is affected by such factors as motor efficiency (ME), power factor (PF), motor conditions, starter and disconnect conditions, power quality, and when not at

full load effectiveness of part load controls as applied. In some areas there may be energy cost adders for poor power factors (or kVA adjustments) such as sustained peak kW (often called demand changes). Compressed air consultants usually compare operating efficiencies of existing compressors and or proposed centrifugal compressors utilizing their operating performance curves.

Specific Power = scfm / kW (input)

SCFM (Nm^3/hr) is typically the flow rating projected or measured and input kW. With this data, each unit's specific power in scfm or $Nm^3/hr/kW$ input is calculated. It is important to note that many manufacturers use BHP/100 cfm.

BHP/100 cfm is a relatively accurate value for an air compressor, particularly if the cfm and psi are clarified. However, it does not include the actual operating energy requirement which includes other losses in the couplings, main drive, and controls. These become a very important part of the "whole" and can easily increase the projected operating cost 10 to 20% or more. On older existing motors, which may have been rewound one or more times, this disparity could be much larger.

Measuring kW

Air Power USA recommends measuring and trending kW directly into the motor with the appropriate number of data points to accurately profile the operation.

- Operating characteristics will vary with motor type, basic design, motor efficiency, and constant or variable speed.
- Measure and trend kW, not amps.
- Amperage will vary indirectly with changes in rated voltage.
- Amps do not accurately reflect power
- Amps are not proportional to power
- Amps, when measured without simultaneous voltage, means nothing
- kW is power! kWh is energy! Measure and trend kW, not amps:
- Amps measured without simultaneous voltage value have very little meaning.
- Each motor will have a specific operating curve.

Lessons Learned

In summary, this article was written to identify and explain some terms and definitions used to understand centrifugal air compressor operating curves. All data should be equalized to:

- SCFM or Nm^3/hr at full and part loads
- Input power at kW
- Pressures either in psig or bar (only using psia to convert from icfm/acfm to scfm)

Any activity lowering the inlet air weight or mass, such as higher temperature, lowers pressure after the filter and will reduce the mass flow, scfm, and input power accordingly. BP

This article was adapted from Centrifugal Training Materials provided by Air Power USA. For more information, contact Hank van Ormer at hank@airpowerusainc.com, or visit www.airpowerusainc.com.

To read more about ***Air Compressors,*** please visit www.airbestpractices.com/technology/air-compressors.

BEKO USA Celebrates 25 Years

By Compressed Air Best Practices® Magazine

Earlier this year, BEKO Technologies completed the third renovation of its eight-year-old facility, which provided perfect timing for the company's 25th Anniversary Event held on September 22, 2016 in Atlanta, GA. The celebration marked 25-years of operating in the American markets after the German parent company, BEKO Technologies GmbH, first set up shop in the Tulsa, OK area in mid-December of 1990. This important milestone was celebrated with a guided tour at the newly renovated American headquarters that included new product introductions and live demonstrations, live music and art, and a catered luncheon, along with a presentation from executives from both the United States and Germany. All of which was followed by a private party that evening.

> "We are thrilled to celebrate a quarter of a century providing ancillary equipment to the compressed air industry."
>
> — Tilo Fruth, President of BEKO Technologies, Corp.

BEKO Technologies USA President, Tilo Fruth, receiving a 25 Years Certificate from BEKO Technologies GmbH CEO Manfred Lehner (left to right).

BEKO Technologies has been manufacturing and selling industrial technology products throughout the United States, Canada, Mexico and South America since 1991. The American headquarters is located in Atlanta, GA and aside from the German parent company, it is by far the largest subsidiary and manufacturing location within the group, as well as the fastest growing one. During the afternoon portion of the celebration, the company unveiled the first of its kind hyper-intelligent, heated, blower operated desiccant dryer to a full house audience.

New Technologies on Display

In addition, the guided tour offered visitors a first-hand chance to see how BEKO USA manufactures its unique membrane technology, optimized their facility to better serve customers, as well as another exclusive product introduction with the very first membrane air dryer with user programmable dew point controls. The company strives for dynamic and healthy growth and wants to be the technology and quality leader within the market. "We are thrilled to celebrate a quarter of a century providing ancillary equipment to the compressed air industry," said Tilo Fruth, President of BEKO Technologies, Corp.

This event was the world debut of the Drypoint® M eco control membrane dryer technology. The units are equipped with temperature and humidity sensors, a control board, and purge control valves. These allow users to set programmable stable **or** dynamic pressure dew points. This type of dynamic purge control creates significant energy efficiency opportunities in the form of lower purge air use. As ambient and inlet (to the dryer) temperatures increase during the day, for example, the dynamic mode can allow pressure dew point to rise as the dew point suppression remains consistent and the compressed air remains dry.

The newly introduced DRYPOINT XF heated blower purge dryer with ecointelligence auto-adjusting software for purge-saving control.

BEKO USA CELEBRATES 25 YEARS

Almost 200 guests toured the newly renovated facility with 30% more warehouse capacity, energy saving LED lighting, 40% solar power, and 30% energy consumption reduction.

The facility tour included six showcases of recently launched, innovative products like the Drypoint® M ecocontrol membrane dryers

If an end user wants a stable pressure dew point, they can choose six different settings ranging from +10 C to -26 C. This allows end users to experiment with higher dew point specifications (in order to achieve lower purge rates) when before they may have been locked in to one low dew point specification.

Compressed air systems are perhaps best defined as dynamic. Ambient and inlet temperatures, operating pressures and compressed air consumption rates are always changing. Many applications simply require dew point suppression (from ambient and inlet) to achieve dry air. In order to program the dynamic dew point, users choose six settings (from 10 to 55 Kelvin) establishing a stable difference between compressed air inlet temperature and dryer outlet pressure dew point.

Other newly launched technologies included the DRYPOINT XC heatless desiccant dryer with BEKOTOUCH controls, the DRYPOINT XF, a heated blower purge dryer (patent pending) with environmentally aware auto-adjusting, ecointelligence software and BEKOTOUCH 2 interface, and DRYPOINT CT and VSD cycling and variable speed refrigerant dryers.

Customer and Employee Celebration

The afternoon event concluded with a live performance of a remix of the official BEKO Technologies' song by local band, The Bucket Crew, and was followed-up with by a commissioned piece of artwork being created live in front of visitors by local artist Dusty Mauldin during the lunch, meet and greet before heading back to the midtown

area to relax before the evening event. The evening event was held a Summerour Studio overlooking the downtown skyline of Atlanta where guests were treated to a hanging champagne display served by stilt-walkers during the cocktail hour that was followed by a lovely sit down dinner. There was a moment just between the end of the cocktail hour and dinner service that was the perfect opportunity for one of the most important parts of the entire day – honoring the company's customers and employees.

Time was specifically set aside in order to present special plaques recognizing several customers' contribution to BEKO USA's success and their loyalty over the years, and several key individuals from the BEKO group were presented with gifts as well. There was also a heartfelt speech given by company owner, Monique Abeels-Koch, punctuating the overall importance of this event. After dinner, guests were treated to the opening of the "BEKO Blue Lounge" that was created in the event space, as well as a large 16' x 8' history display detailing the past 25-years of the company in the Americas, and the commissioned art piece just happened to make its way to the evening event to serve as the backdrop for the photo booth. At that point, it was just time to socialize and/or party as guests saw fit. It was truly a memorable day, in its entirety, and an event that will not soon be forgotten. BP

For more information visit www.bekousa.com

To read similar articles on ***Compressed Air Treatment*** visit www.airbestpractices.com/technology/air-treatment

Stage interview with Yannick Koch (member of the holding company and owner of BEKO), Manfred Lehner (CEO BEKO Germany), John Hays and Tilo Fruth (BEKO USA).

BEKO presented awards to 30 customers and 20 partners. Pictured (left to right) are Manfred Lehner and Tilo Fruth (BEKO), Georgina Nuñez (Kaeser Mexico) and Frank Mueller (Kaeser Compressors).

CAC TRAINING LEADS TO SAVINGS AT MITSUBISHI HITACHI POWER SYSTEMS CANADA

By Ron Marshall for the Compressed Air Challenge®

KNOW PRESSURE
COMPRESSED AIR CHALLENGE

Attendance at Compressed Air Challenge's Fundamentals of Compressed Air Systems seminar sponsored by SaskPower, the provincial owned power utility in Saskatchewan, proved fruitful for Jayson Koroll, the Senior Engineer at Mitsubishi Hitachi Power Systems Canada Ltd (MHPSC), located in the City of Saskatoon. The information presented at the seminar provided enough inspiration and guidance to allow MHPSC to gain significant savings in combining two separate compressed air systems into one. In addition to this, the measurements he took identified a VSD controlled compressor that was incorrectly adjusted, previously unknown, causing very inefficient compressor operation.

Background

MHPSC Canada is a large facility specializing in machining and manufacturing large pieces for power generation (gas turbines, large hydro, wind) and deep sea oil and gas operations. Smaller machining and manufacturing are also done in the facility, as well as welding and piping fabrication.

The facility runs with 740 hp of total compressor capacity arranged in five separate systems:

- Small Machine Shop Supply : 100hp VFD
- Large Machine Shop Supply: 40 hp
- Large Welding Shop Supply: 100hp VFD
- Blast Booth Supply (2 x No 8 nozzles): 150hp
- Cone Blast Supply (4 x No 8 nozzles): 350 hp

After attending the CAC session, MHPSC purchased flow meters for two systems, the Large and Small Machine Shops, to measure the total compressed air production. Since the two systems have piping that is physically close together, it was felt that there was an opportunity to tie the two systems together to save energy. The readings showed that the compressed air demand was indeed low enough in the two systems to enable a 100 hp VFD compressor to feed the combined systems.

Before this could take place some piping modifications were required. Budget shortfalls were delaying the project until the compressor in the Small Machine Shop unexpectedly failed and was taken out of service. On an emergency basis some temporary piping was run to connect the two systems. This piping has not yet been removed and the systems continue to run successfully as a combined system fed by one compressor. Power meters were installed on the Large Machine Shop compressor both before and after the change and confirmed that combining the two systems saved over $14,400 per year in energy costs. These savings were largely due to lower pressure operation and reduction in unloaded run time for a 40 hp fixed speed compressor. Adding load to the VFD compressor cause the unit to run in a more efficient part of its curve, saving additional power.

During the power measurement the power versus flow curve was plotted by the Senior Engineer and compared to the CAGI curves for the VFD compressor. The baseline readings showed that the compressor was operating inefficiently due to an internal adjustment problem. Some internal adjustments were allowing the compressor to run in modulation

Fundamentals of Compressed Air Systems WE (web-edition)

Join Compressed Air Challenge for the next session of ***Fundamentals of Compressed Air Systems WE*** (web-edition) coming soon. Led by our experienced instructors, this web-based version of the popular *Fundamentals of Compressed Air Systems* training uses an interactive format that enables the instructor to diagram examples, give pop quizzes and answer student questions in real time. Participation is limited to 25 students. Please visit www.compressedairchallenge.org, to access online registration and for more information about the training.

If you have additional questions about the new web-based training or other CAC training opportunities, please contact the CAC at info@compressedairchallenge.org

at low loads, rather than running the unit in more efficient start/stop mode at loads below minimum speed. This mis-adjustment meant that the compressor was producing air at a specific power of as high as 60 kW per 100 cfm where normal is about 24 cfm per 100. It should be noted that the testing was done at site, based on test metering and operating conditions not conforming to CAGI test standards so some differences from specified values should be expected.

The compressor supplier was contacted and they offered to adjust the compressor so that normal operation could be gained. It is felt that these adjustment will bring the unit more in line with the original specifications, saving even more power costs.

The following are interview questions answered by Jayson Koroll, from Mitsubishi Hitachi Power Systems Canada Ltd (MHPSC):

Q: What is your position and responsibility at your company?

A: Interim Maintenance Manager and Senior Engineer Production Technology

CAC TRAINING LEADS TO SAVINGS AT MITSUBISHI HITACHI POWER SYSTEMS CANADA

Figure 1: Internal adjustment problems caused this VFD controlled compressor to run inefficiently until adjustments were made.

Q: Can you provide a general description of what your company does at your facility and some general facts to describe?

A: Various functions:

- Large Machining: Gas Turbine Casings, Large Hydro Parts, Large Valves and Valve Rings, Deep Sea Oil and Gas Drilling Components.
- Small Machining and Manufacturing: Gas and Steam Turbine Replacement Parts, Oil and Gas Parts.
- Fabrication and Welding: Wind Towers, Penstock Pipe, Pressure Vessels, Process Piping
- Power Division/Site Service: Planned and Unplanned Maintenance of Gas and Steam Turbines.

Q: What was your basic knowledge about compressed air efficiency before the training?

A: As a Mechanical Engineer I had a good understanding of the flow of air in piping networks, compressibility of air, and varying energy required to compress air using different methods of compression, including inter-stage cooling to reduce the energy required to compress air.

I had done an energy audit of one of our shops and determined that compressed air used 75% of the energy consumed by the shop. The shop had other large equipment beside the 350 hp of compressors in it including bending rolls that can bend 3" thick material, two submerged arc welders operating at 700A, a plasma cutting table.

Q: Were there any big surprises for you in the material presented?

A: These were the big ones:

- The ratio of energy output by an air tool to the energy required to compress air is 15%. In a blasting application, the ratio drops to 2%.

- The amount of energy used by a compressor on an annual basis. This represents approximately 1/3-1/2 of our annual power consumption at our facility which has approximately 700hp of air compressors.
- The electricity is over 80 % of the cost of running a compressor during it's lifetime.
- Every 2psi drop in shop pressure represents a 1% drop in energy cost.

Q: What did you learn that helped you with your system?

A: Don't power tools with compressed air unless you have to. We bought a 1hp spinning head tool for cleaning pipe and one option was to have the motor air driven. As per my instruction we purchased the electric motor. Shops are trying some electric grinding equipment to replace air grinders from the shop.

One SCFM of air is $100/year in energy.

I bought flow meters for 2 shops and monitored the air flow when the shop wasn't running. This indicated that 50 SCFM was being used when nobody was in the shop. We also used the flow meters to ensure that running both shops on one compressor would be large enough.

Q: What did you do to reduce your energy consumption?

A: We turned down compressor discharge pressure from 135pis to 115psi and turned the shop pressure down from 120psi to 110psi. We combined the compressed air supply of two shops so that only one compressor and one dryer were running.

Q: What were the benefits in upgrading your system?

A: Theoretically:

- 50 SCFM leaks were reduced by 8% = $400 / year saving
- 20 psi compressor pressure equates to a 10% energy savings. As per energy audit this equates to an annual saving of $4,400/year.

Actual:

- Energy audit using a 3 phase power meter on both the 100hp and 40hp compressors shows a net Electricity Cost savings of $9,600/year. This does not include the cost of maintenance of the 40 hp compressor or the Electricity Cost for the 2nd dryer.
- Total Savings = $14,400/year.

Best Practices for Compressed Air Systems Second Edition

Learn more about optimizing compressed air systems

This 325 page manual begins with the considerations for analyzing existing systems or designing new ones, and continues through the compressor supply to the auxiliary equipment and distribution system to the end uses. Learn more about air quality, air dryers and the maintenance aspects of compressed air systems. Learn how to use measurements to audit your own system, calculate the cost of compressed air and even how to interpret utility electric bills. Best practice recommendations for selection, installation, maintenance and operation of all the equipment and components within the compressed air system are in bold font and are easily selected from each section.

CAC TRAINING LEADS TO SAVINGS AT MITSUBISHI HITACHI POWER SYSTEMS CANADA

Q: Do you have any advice to others in your situation?

A: Here is my advice:

- Find your leaks. In our situation leaks accounted for 20% of the demand.
- Turn compressors off. Shops like ours tend to leave compressors on 24/7/365. New compressors have controllers and software that allow you to run compressors on a schedule. Turn them off and put in an isolation valve between your shop line and storage tank so your storage tank isn't depleted by your shop leaks. This will allow your system to become pressurized quickly when production starts back up.
- Don't buy a non-cycling refrigerant dryer, buy a cycling refrigerant dryer. There is minimal capital cost savings (10%) and it will use a constant amount of energy for the rest of its life regardless of how much air goes through it.

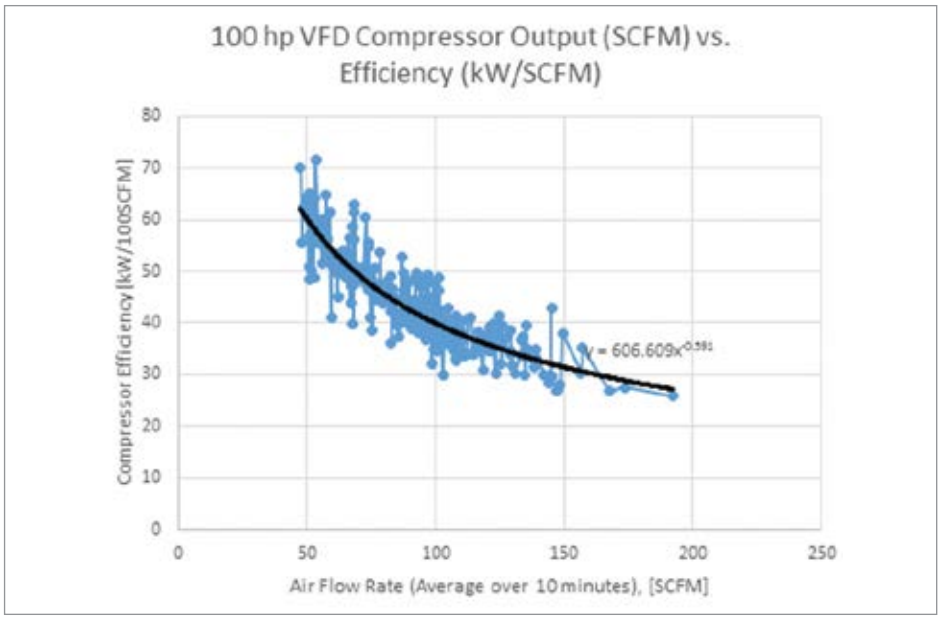


Figure 2: Baseline measurements identified efficiency problems with one of the compressors.

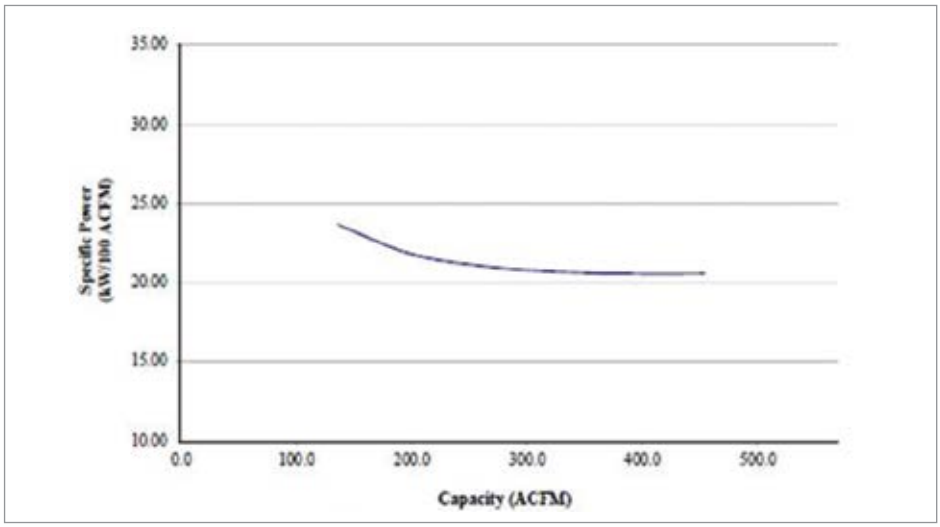


Figure 3: The rated specific power is much lower than measured at site, this was corrected by the compressor vendor.

- Size your air receiver properly. Don't trust the general rule 10gal per SCFM of the compressor output. Size it so that you can shut your compressor off for a reasonably long duration, 10-15 minutes of off time per cycle.
- VFD Compressors are very inefficient below 50 % of their maximum capacity. See below the information that I calculated that isn't on the CAGI sheet for our 100hp compressor. Perhaps CAGI should require VFD efficiency be shown down to 10% of rated output
- Size your compressor right. Regardless of the type of compressor you buy load/unload or VFD if it is sized too big you will pay for the capital and the power for the rest of it's life. The most efficient way to compress air is to size the compressor at 80% of your average working time demand and get a large enough air receiver to cover the spikes in demand.

The results of the small energy efficiency project and Jayson Koroll's interview questions shows the power of new found knowledge in helping make significant improvements to industrial compressed air systems. This effect has been proven time and time again by the actions of attendees of CAC's seminars.

Jayson followed the recommended steps outlined in CAC's Fundamentals of Compressed Air Systems seminar to investigate two of his systems and produce a baseline. These measurement showed that there was significant potential for improvements. It took good initiative on the part of Jayson to convert this knowledge into action, a necessary step in all improvements. BP

For more information about the Compressed Air Challenge, contact Ron Marshall, email: info@compressedairchallenge.org or visit www.compressedairchallenge.org

To read more ***Air Compressor Controls System Assessment*** articles, please visit http://www.airbestpractices.com/system-assessments/compressor-controls

"Coming to IPPE allows me to network with people from around the world and exchange ideas."

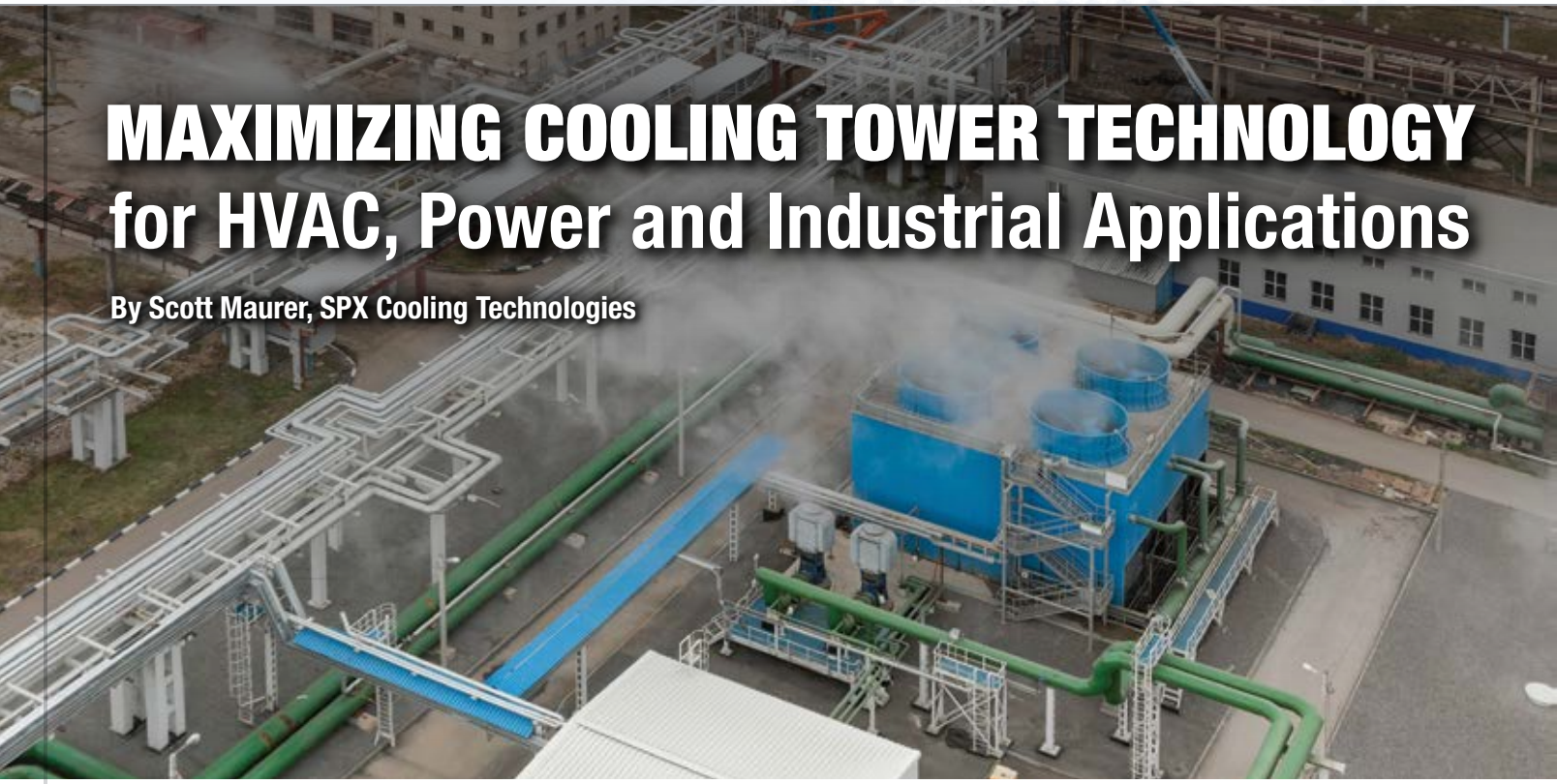
NETWORKING

WHERE THE **ENTIRE** INDUSTRY COMES FOR SOLUTIONS

Join us Jan.31- Feb. 2, 2017, in Atlanta, Ga., USA, for the world's largest annual feed, meat and poultry technology exposition.

Register at www.ippexpo.org #IPPE

INTERNATIONAL PRODUCTION & PROCESSING EXPO



MAXIMIZING COOLING TOWER TECHNOLOGY for HVAC, Power and Industrial Applications

By Scott Maurer, SPX Cooling Technologies

New technology advancements provide up to 50% more cooling capacity, greater energy and installation savings, fewer components and easier maintenance*

Recent developments in factory-assembled cooling tower technology can increase cooling capacity per cell by up to 50%, expanding the applications for so called "package" towers supporting HVAC and industrial processes. Although field-erected towers have long been the preferred product for process cooling in power plants and heavy industry, new robust designs and materials coupled with cost-saving building techniques now make a new generation of modular products logical alternatives for a broader range of applications.

For example, an advanced design factory-assembled cooling tower can be delivered with 60 percent shorter lead time and installed in about 20 percent of the time it would take to build a traditional field-erected cooling tower. With no costly concrete basin construction required, simplified piping and electrical wiring, and more flexible site placement, the cost benefits of advanced factory-assembled towers become clearer.

Reducing Energy and Installation Costs for HVAC Applications

In HVAC applications, energy efficiency is a major driver for end users, who are increasingly focused on building system technologies that reduce energy consumption. A new cooling tower designed specifically to address energy efficiency is the Marley® NC Everest™, a factory-

"New robust designs and materials coupled with cost-saving building techniques now make a new generation of modular products logical alternatives for a broader range of applications."

— Scott Maurer, SPX Cooling Technologies

assembled crossflow design manufactured by SPX Cooling Technologies, Inc. that offers up to 50 percent more cooling capacity per cell and uses up to 35 percent less fan power per ton of cooling.*

In addition to lower energy costs, this new tower design also significantly reduces HVAC system installation costs. The increased cooling capacity per cell means fewer cells, less piping and fewer electrical connections are required, saving labor and material costs.

Table 1 compares installation and operating costs for a conventional factory-assembled cooling tower with the new NC Everest design in a laboratory project application. As shown, a typical cooling tower requires 1125 hp to meet the cooling requirements; the NC Everest requires only 750 hp.

Reducing Field-Erection Costs for Power and Heavy Industrial Applications

A major concern for large power and heavy industrial projects is the cost of cooling tower construction. Tower components are typically shipped to the site over a period of weeks, as the building process advances. It can take 20 weeks or more for components on a typical field-erected project to arrive on site. The process involves large labor forces and expansive staging areas, which contribute to high construction costs. Complex industrial projects also heighten health and safety concerns and weather issues can impact completion.

Alternately, pre-assembled cooling tower modules are built in a controlled factory environment and shipped in 6-8 weeks. The modules are assembled on site in about 20 percent of the time required for a field-erected tower. The modular design and field assembly process reduce onsite labor, work duration, and staging area requirements and contribute to a safer work environment.

TABLE 1 – COOLING TOWER INSTALLATION AND OPERATION COST COMPARISON

	CONVENTIONAL FACTORY-ASSEMBLED COOLING TOWER	NC EVEREST DESIGN
Number of cells required	9	6
Horsepower	1125	750
Piping and wiring costs	$265,000	$185,000
3-year operating costs	$420,000	$280,000

MAXIMIZING COOLING TOWER TECHNOLOGY FOR HVAC, POWER AND INDUSTRIAL

Construction of a field-erected tower is a complex process that can take 20 weeks or more to complete.

A new generation of pre-assembled cooling towers, such as the Marley NC Everest, delivers 60% faster than field-erected towers and installs in about 20% of the time.

The shorter delivery and construction times of a pre-assembled tower offer power and industrial customers a distinct advantage because meeting capacity requirements and managing downtime and outages are of critical concern to their operations.

For example, a recent construction estimate to replace a field-erected cooling tower in the southeast United States required 4500 hours and 7 weeks of field labor. When a modular pre-assembled tower, such as the NC Everest, was specified, installation duration was reduced to less than 2 weeks – an enormous savings in time as well as plant operational efficiency. And the plant's additional costs for temporary cooling were eliminated.

Building a field-erected cooling tower requires construction of a foundation in the form of a concrete cold water basin. The cost of this basin alone typically adds 40% to the tower construction costs. A factory-assembled tower, such as the NC Everest, includes an integral basin which eliminates this additional construction cost. The basin is assembled and leak-tested in the factory.

Onsite testing of field-erected towers is often required to verify they meet the specified cooling capacity. Conducted by independent third-party agencies, the tests typically cost about $25,000. These additional expenses are eliminated with factory-assembled towers which are certified by the Cooling Technology Institute to meet thermal performance as specified.

Design Advantages of New Cooling Tower Design

The new Marley NC Everest Cooling Tower is constructed of heavy mill galvanized or stainless steel and engineered to withstand the

APPLICATIONS

demands of both HVAC and heavy industrial applications. It utilizes advanced MarKey™ drift eliminators which achieve the lowest measurable drift rate, down to 0.0005% of circulating water flow, so less water escapes the tower.* In addition, convenience features make inspections and maintenance less complicated and safer. These include seven-foot high access doors and an expansive interior with service decks.

Cooling towers are typically designed to meet summer cooling demand. The crossflow design of the pre-assembled NC Everest permits "variable flow" operation, to reduce water flow rate and energy consumption during cooler months. By contrast, the counterflow design of many field-erected towers does not readily allow changes in flow rate. Crossflow design also inherently shields cold water basins from sun exposure, discouraging algae growth. In cold weather, crossflow design helps prevent high winds from causing water escape, which can lead to icing and safety concerns.

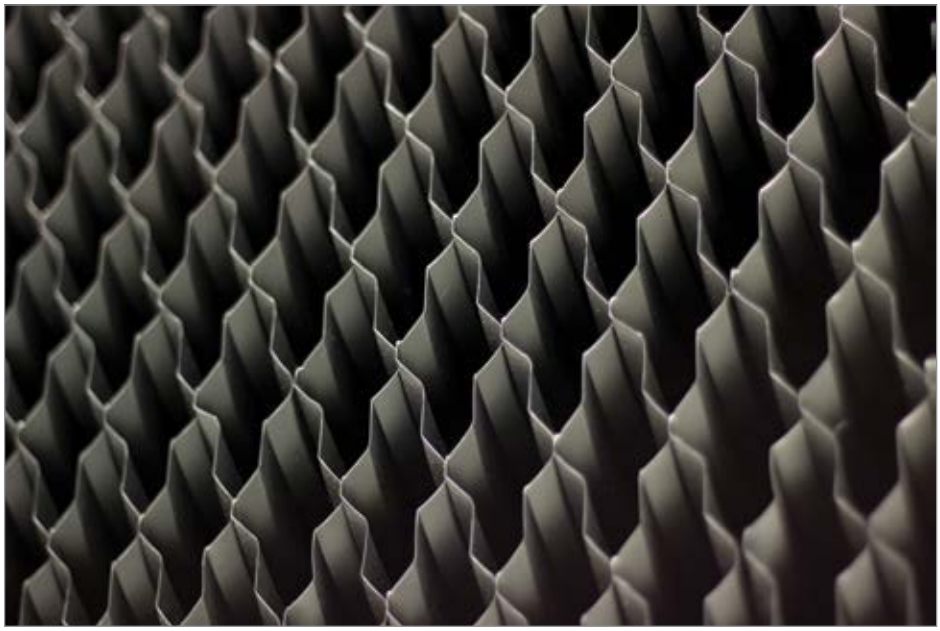
Whether designing a new cooling system or replacing an aging traditional cooling tower, this new crossflow pre-assembled cooling tower design merits careful consideration for HVAC, power generation and heavy industrial cooling applications. BP

For more information visit www.spxcooling.com

About the Author:
Scott Maurer is the Global Product Manager for factory-assembled products at SPX Cooling Technologies, Inc. in Overland Park, Kansas.

*Compared to other factory-assembled single-cell cooling towers.

To read similar ***Cooling Tower Technology*** articles visit www.coolingbestpractices.com/technology



Advanced drift eliminator design, such as the patent-pending MarKey™ product incorporated into the NC Everest tower, achieves the lowest measurable drift rate, down to 0.0005% of circulating water flow, so less water escapes the tower.

Aggreko Chillers Assist NASA Tests ON MARS SLS ROCKET

By Steven Bukoski, Project Manager, Aggreko

NASA's SLS is dubbed as the biggest, most capable rocket ever built for human exploration.

Mars is that much closer. The journey toward new human exploration missions beyond Earth's orbit took a major step forward on June 28 with the successful completion of the second and final qualification test of a five-segment rocket motor for NASA's heavy-lift Space Launch System (SLS). The motor manufacturer, Orbital ATK, based in Dulles, Va., recently confirmed the QM-2 motor performed as designed.

Low-Temperature Performance Is Key Test Objective

NASA's SLS is dubbed as the biggest, most capable rocket ever built for human exploration. It's getting a lot of attention given its ambitious, deep space, human exploration goals and the estimated $10 billion investment in rocket technology alone. As with every rocket program, the heavy lifting starts on the ground, where development and qualification motors are thoroughly tested before first flight. SLS development followed a five-test protocol that began in 2009 and culminated with the final, successful qualification test of the QM-2 in June. This final test included 82 qualification objectives. Among the most important of these was the evaluation of solid rocket motor performance at its low-temperature range, 40˚F, +/- 2˚F.

Cooling a 12 foot diameter, five segment rocket requires equal parts performance, diligence and patience. Orbital ATK relied on Aggreko, based in Glasgow, U.K., to provide the cold conditioning system to reduce propellant mean bulk temperature (PMBT) from its initial 73˚F down to a test-ready PMBT of 40˚F.

The 154-foot long, five-segment solid rocket motor was housed in Orbital ATK's T-97 test facility in Promontory, Utah. This free-standing, moveable enclosure was built on an electrically driven rail system. Keys to successful cold conditioning the rocket and propellant inside this facility included:

- Controlling humidity
- Maintaining positive pressure within the enclosure
- Minimizing foreign object debris
- Providing a portable system
- 48-hour resolution of any necessary repairs or replacements of system components

Mobile Temperature Control System Hits Target

To meet testing requirements, Aggreko helped Orbital ATK design a temporary, portable solution for temperature control and power generation. At the heart of the system were two, 200-ton, low-temperature mechanical chillers and two pumps used to deliver a 50 percent propylene glycol solution to the air handling units (AHU). Three sets of two, 120-ton AHUs circulated cold air to the enclosure. The tandem arrangement allowed one AHU to deliver chilled air while the other operated in defrost mode. An additional AHU dehumidified and cooled outside air to maintain positive pressure in the enclosure.

CHILLER & COOLING
BEST PRACTICES
coolingbestpractices.com

FREE SUBSCRIPTION

DIGITAL EDITION FREE WORLDWIDE | PRINT EDITION FREE TO U.S. SUBSCRIBERS

EVERY ISSUE CONTAINS BEST PRACTICES FOR:

Plastic Injection & Blow Molding • Chemical Plants & Refineries

Measurement • Metal Fabrication & Machining

Subscribe Now!

Subscribe at **coolingbestpractices.com**

AGGREKO CHILLERS ASSIST NASA TESTS ON MARS SLS ROCKET

Aggreko temperature control and power gen equipment onsite at Orbital ATK's T-97 test facility.

Behind it all was a temporary power system designed for two purposes. The first was to power the distribution panel for the chillers and pumps. The second was to provide backup power for three, three-phase, 480-VAC power stanchions for the AHUs. Aggreko provided two, containerized 500 kW generators and cabling to meet these requirements.

Finally, a senior technical support team provided continuous on-site oversight and support for the duration of the conditioning protocol, including on-demand control of the cool-down rate based on customer instructions.

Once the systems and personnel were in place, the conditioning started at T minus 80 days to test. The required PMBT was achieved in approximately 64 days. Ultimately, the motor and propellant were successfully delivered for the test at 40°F, within the specified, acceptable temperature range.

"The scale of NASA's investment and the historic significance of SLS testing, especially the final qualification test before flight, are things you can't help but get excited about," stated Steven Bukoski, on-site program manager for Aggreko. "When the rocket fires, all the work that went into making sure we had the propellant at the right temperature is easily forgotten. Our team is good with that. Being part of something this important is very worthwhile and fulfilling."

"While it's easy to get caught up in the dramatic 126 seconds of ground testing, the importance of cold conditioning can't be overlooked," stated Curtis Wise, Test Motor Program Manager, for Orbital ATK. "Reducing and maintaining the propellant temperature to the exact test specifications requires well-engineered, reliable systems, as well as a full staff of support personnel around the clock. Aggreko met all of our requirements."

Ready to Take Flight

QM-2 was the final ground test before Exploration Mission 1—the first planned flight of the SLS scheduled for late 2018. According to Orbital ATK, the test provided critical data that demonstrated nozzle, ballistics and other design performance parameters met requirements at the design temperature of 40°F. The previous qualification test, QM-1, validated motor performance at its high-temperature range of 90°F. The QM-1 test, as well as the Design Motor tests, DM-1, DM-2 and DM-3, also employed Aggreko temperature and power generation systems.

Supplying temporary, mobile cold conditioning systems can easily go unnoticed. Relatively speaking, it's not rocket science. But it is essential that these systems and the people who support them perform reliably—especially when they're at the heart of establishing a critical test objective for the most advanced rocket development program in NASA's history. BP

For more information visit us.aggreko.com

To read similar ***Cooling Tower Technology*** articles visit www.coolingbestpractices.com/technology

***See a YouTube Video of the Test Firing**: https://youtu.be/7yT8Sc-ifZw?list=PLBEXDPatoWBmX3yrpEObbUoNF5rbbNcgX*

RESOURCES FOR ENERGY ENGINEERS

TECHNOLOGY PICKS

Powerex Systems Recognized as ISO 8573-1 Class Zero

Powerex announces that TÜV recognizes our oil-less scroll and oil-free rotary tooth systems to be ISO 8573-1 ***Class Zero*** for oil content. Class Zero air is the concentration of total oil (aerosol, liquid, vapor) in mg/m^3 that is measured to be a level much less than Class 1 ($\leq .01\ mg/m^3$).

For thirty years, Powerex has been a trusted manufacturer of oil-free compressed air systems. Now we have independent verification of the quality of compressed air we produce with our oil-less scroll and oil-free rotary tooth systems. You can continue to count on Powerex for the most demanding applications requiring clean, dry, oil-free compressed air, including:

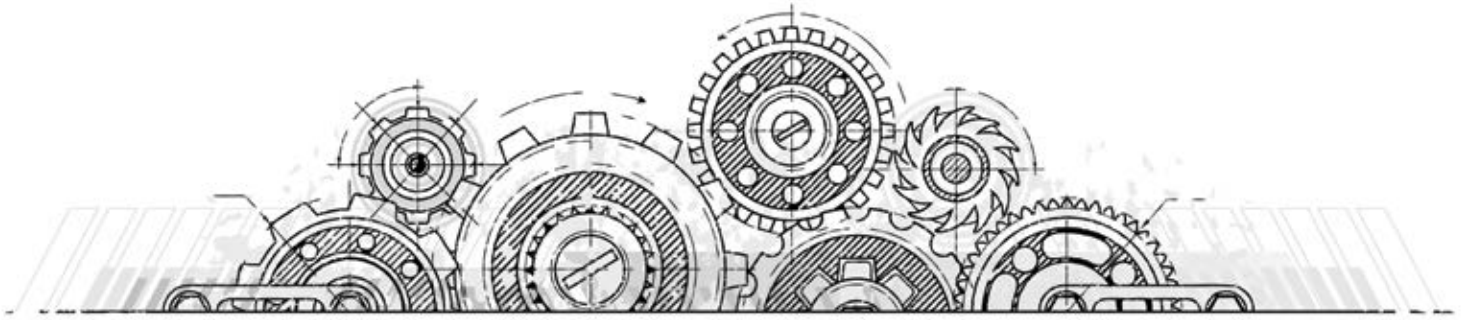
- Laboratory
- Food/Beverage Processing and Packaging
- Gas Generation
- Environmental
- Pharmaceuticals and Nutraceuticals
- Textile
- Semiconductors
- Medical Devices

SE04007 40HP Oil-less Scroll System

Powerex is a proud manufacturer of ISO 8573-1 "Class Zero" Oil-free compressed air systems using oil-less scroll (3HP through 60HP) and oil-free rotary tooth (50HP) technology. Powerex, located just outside of Cincinnati, OH, is a leading manufacturer of oil-less compressed air and vacuum systems for medical gas, laboratory, and critical-process industrial applications. We are an ISO 9001 manufacturing facility that is able to provide complete air systems including tanks, UL508A control panels, and dryers.

CLASS ZERO

For more information, please contact Joe Knueven at 513-367-3307, email: jknueven@powerexinc.com, or visit www.powerexinc.com



COMPRESSED AIR
BEST PRACTICES
airbestpractices.com

FREE SUBSCRIPTION

DIGITAL EDITION FREE WORLDWIDE | PRINT EDITION FREE TO U.S. SUBSCRIBERS

2016 FOCUS INDUSTRIES!

Poultry & Meat Packaging • Plastic Extrusion & Molding • Food Processing & Conveying • Chemical Plants & Refineries • Energy-Efficiency System Assessments
Woodworking • Compressed Air Measurement • Wastewater Aeration • Commercial Bakeries, Snack Foods, Breads • Metal Fabrication & Machining • Air Compressor Controls

Sustainable Energy Savings with Compressed Air Best Practices®

Compressed Air Best Practices® is a technical magazine dedicated to discovering **Energy Savings** in compressed air systems — estimated by the U.S. Department of Energy to represent 30% of industrial energy use. Each edition outlines **Best Practice System Assessments** for industrial compressed air users — particularly those **managing energy costs in multi-factory companies.**

"We're in 75 to 80 locations. We've done literally hundreds of compressed air modifications, changes, upgrades and audits."
– William Gerald, CEM, Chief Energy Engineer, CalPortland (feature article in August 2015 Issue)

"Compressed air is essential to any manufacturing process, particularly in the automotive industry, and it accounts for about 23 percent of total energy costs at our powertrain facility."
– Mike Clemmer, Director/Plant Manager-Paint & Plastics, Nissan North America (feature article in October 2015 Issue)

"Demand Side" and "Supply Side" information on compressed air technologies and system assessments is delivered to readers to help them save energy. For this reason, we feature Best Practice articles on when/how to correctly apply **air compressor, air treatment, piping, storage, measurement and pneumatic control technology.**

Industrial energy managers, utility incentive program managers, and technology/system assessment providers are the three stakeholders in creating energy efficiency projects. Representatives of these readership groups guide our editorial content.

"Each of our 10 production plants has an Energy Coordinator who is part of the corporate energy team."
– Michael Jones, Corporate Energy Team Leader, Intertape Polymer Group (feature article in July 2014 Issue)

Subscribe Now!

To subscribe visit **airbestpractices.com**

RESOURCES FOR ENERGY ENGINEERS

TECHNOLOGY PICKS

New Atlas Copco OSS Oil-Water Separator

Atlas Copco has launched the new OSS oil-water separator for condensate treatment in low-flow compressors. Using the same principles as the OSC oil-water separator range, the OSS performs condensate treatment for oil-injected piston and screw compressors below 15kW.

The new Atlas Copco OSS Oil-Water Separator

Oil-water separators are typically installed with large air compressor and dryer systems to clean condensate before disposal. Though smaller air systems are often overlooked, they also produce condensate that can harm the environment. Through extensive testing in Atlas Copco's in-house laboratory, the OSS is proven to deliver the same level of separation quality to low-flow compressors as the company's OSC range.

"The new OSS oil-water separator is an environmentally friendly way for users with low-flow compressors to treat their condensate," said Mike Robinson, product marketing manager with Atlas Copco Compressors. "It's also cost effective, because it eliminates the need for a third party to collect and dispose of the residual oil."

The OSS treats condensate in multiple phases of treatment including a depressurization chamber and pre- and post-filtration. The OSS utilizes an advanced absorption media to reach purity levels below 15 ppm at flows up to 60 cfm. Condensate quality can easily be checked at the outlet on a regular basis with an optional sampling kit. A lightweight design allows the OSS to be wall mounted for easy access and replacement. A disposal cap and plug make a clean replacement routine possible, and the entire unit is 100 percent recyclable.

To learn more about the OSS oil-water separator, please visit http://www.atlascopco.us/usus/products/air-and-gas-treatment/3507136/3594707/.

Atlas Copco is a world-leading provider of sustainable productivity solutions. The Group serves customers with innovative compressors, vacuum solutions and air treatment systems, construction and mining equipment, power tools and assembly systems. Atlas Copco develops products and services focused on productivity, energy efficiency, safety and ergonomics. The company was founded in 1873, is based in Stockholm, Sweden, and has a global reach spanning more than 180 countries. In 2015, Atlas Copco had revenues of BSEK 102 (BEUR 11) and more than 43,000 employees. Learn more at www.atlascopco.com

Atlas Copco Compressors LLC is part of the Compressor Technique Business Area, and its headquarters are located in Rock Hill, S.C. The company manufactures, markets, and services oil-free and oil-injected stationary air compressors, air treatment equipment, and air management systems, including local manufacturing of select products. The Atlas Copco Group, which celebrated its 140th anniversary in 2013, is among the Top 100 sustainable companies in the world and a member of the Dow Jones World Sustainability Index. Atlas Copco Compressors has major sales, manufacturing, production, and distribution facilities located in California, Illinois, Massachusetts, North Carolina, South Carolina, and Texas. www.atlascopco.us

Edgetech DPM-99 Drift-Free Dew Point Monitor/Alarm for NFPA 99 Compliance

NFPA 99, a Standard issued by the National Fire Protection Agency, is the code used to design compressed air systems for medical air in domestic hospitals and healthcare facilities. In these facilities there are two types of medical air systems, Level 1 and Level 2, defined by the Standard as:

Level 1 Medical Piped Gas and Vacuum Systems. Systems serving occupancies where interruption of the piped medical gas and vacuum system would place patients in imminent danger of morbidity or mortality.

Level 2 Medical Piped Gas and Vacuum Systems. Systems serving occupancies where interruption of the piped medical gas and vacuum system would place patients at manageable risk of morbidity or mortality.

RESOURCES FOR ENERGY ENGINEERS

TECHNOLOGY PICKS

Further, the NFPA 99 Standard states:

Dew point shall be monitored and shall activate a local alarm and all master alarms when the dew point at system pressure exceeds +4°C (+39°F).

Compliance to the Standard is not only important to protect expensive equipment such as ventilators and respirators but most importantly to protect the patient.

Edgetech Instruments' DPM-99 is the Drift-Free Alternative Dew Point Monitor and Alarm for Compliance with the NFPA 99 Level 1 and Level 2 Medical Air Standard

The Edgetech Instruments DPM-99 is a complete, continuous medical air dew point monitoring and alarm system consisting of a chilled mirror hygrometer with LED display plus audible and visual alarm functions, contained in a NEMA-12 enclosure. Using a first principle dew point sensor, it is the drift free alternative meeting Level 1 and Level 2 requirements of the NFPA 99 Standard for Medical Air. This specifically designed monitor exceeds the requirements set forth by the NFPA and was a collaboration with Airvac Technical Services who are certified medical gas inspectors.

Other types of dew point sensors, due to inherent drift, require recalibration at regular intervals to remain within their accuracy specifications. The chilled mirror dew point sensor of the DPM-99 is a primary, drift free device, with accuracy traceable to NIST. Its Automatic Balance Cycle keeps the sensor's operation in top condition without the need for regular maintenance or periodic calibration. This feature gives the user peace of mind and greatly reduces maintenance costs.

Safety is the foundation of the Edgetech Instruments DPM-99 Medical Gas Dew Point Monitor. It features very high accuracy and sensitivity, fast response, failsafe alarm functions and analog outputs. Its ruggedized metal enclosure protects against electrical interference and environmental shock. An uninterruptable backup power supply is optionally available.

For more information contact Edgetech Instruments Inc., Phone: (508) 263-5900, Email: marketing@edgetechinstruments.com, www.edgetechinstruments.com

Rotronic CRP1 Clean-Room Panel for monitoring humidity, temperature and low dew point

The CRP1 clean-room panel is characterized by its compact construction and simple handling. Its HygroClip2-compatibility allows humidity to be registered to the highest degree of accuracy. Depending on demand and application any other Rotronic probe might be connected. The data can be transferred via analog outputs or MODBUS. Measured values, alarms and measurement curves are shown on the display.

Features:

- Monitors humidity, temperature and low dew point
- Designed specifically for clean rooms
- Works in combination with the HygroClip2-series but also with any other Rotronic probe (customized to your needs)
- FDA- and GAMP-compatible
- Digital communication via MODBUS RTU / HW4
- Analog output signals freely configurable
- Stainless steel front panel highly resistant to chemicals
- Alarm output acoustic, or via relay or LCD display
- Simple probe calibration outside the room being monitored

The Rotronic CRP1 Clean-Room Panel

The CRP1 clean-room panel is the obvious choice wherever precise measurement of

2017 ENERGY SHOWS

PHILADELPHIA • LONG BEACH • ATLANTA

GLOBALCON™

Energy, Power, & Facility Management Strategies & Technologies 2017

March 22-23, 2017

Pennsylvania Convention Center
Philadelphia, PA

www.globalconevent.com

WEST COAST EMC 35th®

Energy Management Congress

June 7-8, 2017

Long Beach Convention Center Long Beach, CA

www.energyevent.com

September 27-29, 2017

Georgia World Congress Center
Atlanta, GA

www.energycongress.com

2017 WEEC World Energy Engineering Congress 40 Years

Presented by

40 Years aee® Association of Energy Engineers

RESOURCES FOR ENERGY ENGINEERS

TECHNOLOGY PICKS

humidity and temperature is of vital importance, and a high degree of cleanliness must be maintained. Such as clean rooms in hospitals, in the pharmaceutical, electronics or foodstuffs industries and other applications in which humidity and temperature are monitored. The comprehensive functional capabilities of the CRP1 can be used for many measurement and control tasks.

In combination with the Rotronic HC2-LDP probe the CRP1 specially meets the requirements of monitoring dry air in compressed-air equipment and battery fabrication.

Rotronic AG with its headquarters in Bassersdorf, Switzerland, was founded in 1965 and is an owner-managed Swiss trading and manufacturing company with 8 subsidiaries and 42 sales points worldwide.

For further information on the CRP1 and other Rotronic measuring solutions, please see www.rotronic.com or call your local Rotronic specialist.

Siemens Expands Sinamics V20 Drive Family

Siemens announced the release of its new single-axis Sinamics V20 AC drive, frame size E, with both Low Overload (LO) and High Overload (HO) ratings. The V20 family features easy setup and operation with excellent cost and energy efficiency. With a power rating ranging from 1/6–40hp at 480V AC, Sinamics V20 drives are available in five frame sizes and are ideal for material handling, conveyor, pump, fan and compressor applications.

This compact drive can be connected and installed the conventional wall-mounting method or, optionally, mounted with heat sinks pushed through the enclosure wall. Since no additional modules or add-on options are required for operation, installation time is minimized.

The integrated Basic Operator Panel (BOP) enables trouble-free commissioning and operation on-site. Besides the universal serial interfaces that allow for easy connection to Simatic programmable logic controllers (PLCs), a Modbus interface is also included for communication with third-party controls. Pre-built connection and


UNITED STATES POSTAL SERVICE®

Statement of Ownership, Management, and Circulation (Requester Publications Only)

1. Publication Title	2. Publication Number	3. Filing Date
Compressed Air Best Practices	17130	Sept 14, 2016
4. Issue Frequency	5. Number of Issues Published Annually	6. Annual Subscription Price
Monthly Except January-February	11	

7. Complete Mailing Address of Known Office of Publication (Not printer) (Street, city, county, state, and ZIP+4®): Smith Onandia Communications, LLC. 37 McMurray Rd. Suite 106 Pittsburgh, PA 15241 — Contact Person: Patricia Smith; Telephone (Include area code): (412) 980-9992

8. Complete Mailing Address of Headquarters or General Business Office of Publisher (Not printer): Smith Onandia Communications, LLC. 37 McMurray Rd. Suite 106 Pittsburgh, PA 15241

9. Full Names and Complete Mailing Addresses of Publisher, Editor, and Managing Editor (Do not leave blank)
Publisher (Name and complete mailing address): Patricia Smith - Smith Onandia Communications, LLC. 37 McMurray Rd. Suite 106 Pittsburgh, PA 15241
Editor (Name and complete mailing address): Roderick Smith - Smith Onandia Communications, LLC. 37 McMurray Rd. Suite 106 Pittsburgh, PA 15241

10. Owner (Do not leave blank. If the publication is owned by a corporation, give the name and address of the corporation immediately followed by the names and addresses of all stockholders owning or holding 1 percent or more of the total amount of stock. If not owned by a corporation, give the names and addresses of the individual owners. If owned by a partnership or other unincorporated firm, give its name and address as well as those of each individual owner. If the publication is published by a nonprofit organization, give its name and address.)

Full Name	Complete Mailing Address
Roderick Smith	37 McMurray Rd. Suite 106 Pittsburgh, PA 15241
Patricia Smith	37 McMurray Rd. Suite 106 Pittsburgh, PA 15241

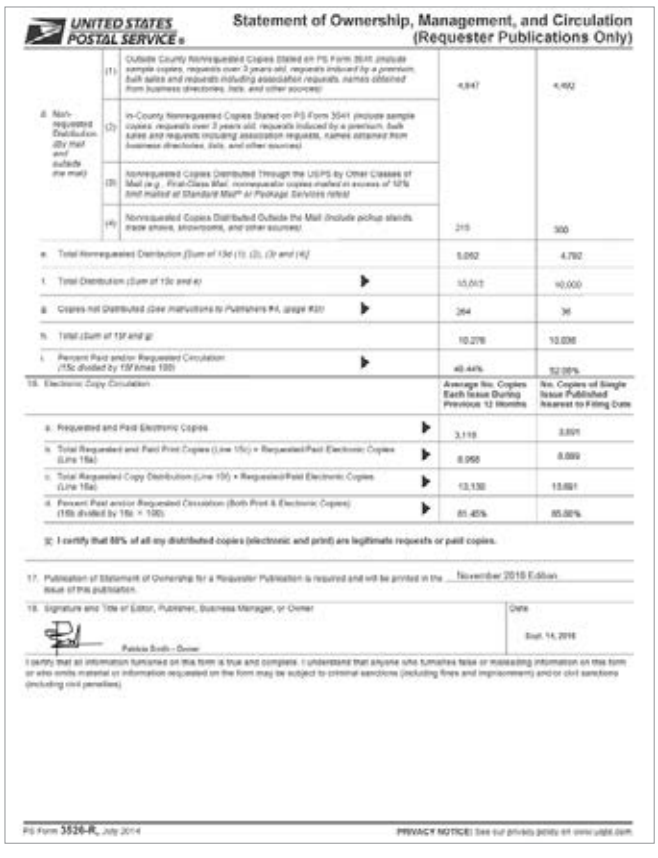
11. Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding 1 Percent or More of Total Amount of Bonds, Mortgages, or Other Securities. If none, check box → ☐ None

12. Tax Status (For completion by nonprofit organizations authorized to mail at nonprofit rates) (Check one)
The purpose, function, and nonprofit status of this organization and the exempt status for federal income tax purposes:
☐ Has Not Changed During Preceding 12 Months
☐ Has Changed During Preceding 12 Months (Publisher must submit explanation of change with this statement)

13. Publication Title	14. Issue Date for Circulation Data Below
Compressed Air Best Practices Magazine	September 2016

15. Extent and Nature of Circulation			Average No. Copies Each Issue During Preceding 12 Months	No. Copies of Single Issue Published Nearest to Filing Date
a. Total Number of Copies (Net press run)			10,276	10,036
b. Legitimate Paid and/or Requested Distribution (By Mail and Outside the Mail)	(1)	Outside County Paid/Requested Mail Subscriptions stated on PS Form 3541. (Include direct written request from recipient, telemarketing, and Internet requests from recipient, paid subscriptions including nominal rate subscriptions, employer requests, advertiser's proof copies, and exchange copies.)	4,950	5,208
	(2)	In-County Paid/Requested Mail Subscriptions stated on PS Form 3541. (Include direct written request from recipient, telemarketing, and Internet requests from recipient, paid subscriptions including nominal rate subscriptions, employer requests, advertiser's proof copies, and exchange copies.)		
	(3)	Sales Through Dealers and Carriers, Street Vendors, Counter Sales, and Other Paid or Requested Distribution Outside USPS®		
	(4)	Requested Copies Distributed by Other Mail Classes Through the USPS (e.g., First-Class Mail®)		
c. Total Paid and/or Requested Circulation (Sum of 15b (1), (2), (3), and (4)) ▶			4,950	5,208

PS Form 3526-R, July 2014 — PSN: 7530-00-000-9855 — PRIVACY NOTICE: See our privacy policy on www.usps.com


UNITED STATES POSTAL SERVICE®

Statement of Ownership, Management, and Circulation (Requester Publications Only)

d. Non-requested Distribution (By Mail and Outside the Mail)	(1)	Outside County Nonrequested Copies Stated on PS Form 3541 (Include sample copies, requests over 3 years old, requests induced by a premium, bulk sales and requests including association requests, names obtained from business directories, lists, and other sources)	4,847	4,992
	(2)	In-County Nonrequested Copies Stated on PS Form 3541 (Include sample copies, requests over 3 years old, requests induced by a premium, bulk sales and requests including association requests, names obtained from business directories, lists, and other sources)		
	(3)	Nonrequested Copies Distributed Through the USPS by Other Classes of Mail (e.g., First-Class Mail, nonrequestor copies mailed in excess of 10% limit mailed at Standard Mail® or Package Services rates)		
	(4)	Nonrequested Copies Distributed Outside the Mail (Include pickup stands, trade shows, showrooms, and other sources)	215	300
e. Total Nonrequested Distribution (Sum of 15d (1), (2), (3) and (4))			5,062	4,792
f. Total Distribution (Sum of 15c and e) ▶			10,012	10,000
g. Copies not Distributed (See Instructions to Publishers #4, page #3) ▶			264	36
h. Total (Sum of 15f and g)			10,276	10,036
i. Percent Paid and/or Requested Circulation (15c divided by 15f times 100) ▶			49.44%	52.08%

16. Electronic Copy Circulation	Average No. Copies Each Issue During Previous 12 Months	No. Copies of Single Issue Published Nearest to Filing Date
a. Requested and Paid Electronic Copies ▶	3,119	3,691
b. Total Requested and Paid Print Copies (Line 15c) + Requested/Paid Electronic Copies (Line 16a) ▶	8,068	8,699
c. Total Requested Copy Distribution (Line 15f) + Requested/Paid Electronic Copies (Line 16a) ▶	13,130	13,691
d. Percent Paid and/or Requested Circulation (Both Print & Electronic Copies) (16b divided by 16c × 100) ▶	61.45%	63.06%

☒ I certify that 50% of all my distributed copies (electronic and print) are legitimate requests or paid copies.

17. Publication of Statement of Ownership for a Requester Publication is required and will be printed in the November 2016 Edition issue of this publication.

18. Signature and Title of Editor, Publisher, Business Manager, or Owner — Patricia Smith – Owner — Date: Sept. 14, 2016

I certify that all information furnished on this form is true and complete. I understand that anyone who furnishes false or misleading information on this form or who omits material or information requested on the form may be subject to criminal sanctions (including fines and imprisonment) and/or civil sanctions (including civil penalties).

PS Form 3526-R, July 2014 — PRIVACY NOTICE: See our privacy policy on www.usps.com

TECHNOLOGY PICKS

application macros are used for facilitating application-specific settings. For units with power ratings higher than 10hp, a braking resistor can be connected directly to the integrated braking chopper.

Operating the Sinamics V20 drive is just as easy as commissioning. Parameters that have been optimized for one application can easily be transferred to other drive units using SD cards via the Basic Operator Panel or the battery-operated Parameter Loader. The built-in display has the ability to list only those parameters changed from the factory default values rather than having to scroll through all of them.

Tailored inter-connectivity and application macros (i.e. for pumps, fans and compressors) provide the correct settings for the particular application. The Keep Running Mode automatically adapts the V20 drive to the power supply to achieve higher availability when operated on unstable networks. In this mode, line fluctuations are compensated for internally and error messages are acknowledged autonomously. Thanks to enhanced cooling and coated PCBs and electronic components, the Sinamics V20 is extremely rugged, making the unit reliable even in harsh environments.

The demand-driven regulation of the motor speed also provides increased energy savings even for many applications. The Sinamics V20 is equipped with an energy-optimized control mode (ECO-mode) for increased energy efficiency. ECO-mode automatically adapts the magnetic flux in the motor to the optimum operating point. The DC link coupling enables efficient energy utilization of drives grouped together. The Sinamics V20 can also be set to hibernation mode, which prolongs the service life of the motor and also reduces system component wear (i.e. pumps). Additionally, by displaying real-time energy consumption on the operator panel display, the operator always has the drive's energy and cost efficiencies in focus at all times.

For more information about the Sinamics V20 drive, please visit: www.usa.siemens.com/sinamics-v20-pr

The new Siemens Sinamics V20 drives are available in five frame sizes

COMPRESSED AIR BEST PRACTICES
airbestpractices.com

ADVERTISER INDEX

Company	Page	Web Site
Kaeser Compressors	Outside Back Cover	www.us.kaeser.com/cabp
Atlas Copco	Inside Front Cover	www.atlascopco.us
DV Systems	Inside Back Cover	www.dvcompressors.com
ELGI Compressors	5	www.elgi.us
Nano Purification Solutions	7	www.n-psi.com
Relevant Solutions	8	www.relevantsolutions.com
BEKO Technologies	9	www.bekousa.com
JORC Industrial	10	www.jorc.com
Sullivan-Palatek	11	www.sullivan-palatek.com
Clean Resources	13	www.cleanresources.com
FS Curtis	14	us.fscurtis.com
CDI Meters	15	www.cdimeters.com
ISEL Lubricants	16	www.iselinc.com/solutions
VP Instruments	17	www.vpinstruments.com
Sullair	19	www.sullair.com
SKF	20	www.skfusa.com
Chicago Pneumatic	21	www.cp.com
Proportion-Air	22	www.proportionair.com
Anest Iwata	23	www.anestiwata.com
Parker GSF	29	www.parker.com
Festo	31	www.festo.com/us/airquality
Association of Energy Engineers	47	www.globalconevent.com

THE MARKETPLACE

JOBS

SPXFLOW

HIRING REGIONAL SALES MANAGER

SPX FLOW is seeking to expand its dehydration equipment presence across all US Regions. In order to continue providing world class support to the air treatment market, we are looking for Sales Managers with strong backgrounds in mechanical, dehydration, compressed air, and refrigeration equipment. Ideal candidates would have experience working with distribution based compressor businesses and OEM's.

SPX FLOW offers competitive healthcare benefits, 401k company contributions, vehicle allowance, and possible relocation assistance if necessary.

Please contact Colton Tingen at Colton.Tingen@spxflow.com for more information, or visit our career website at www.spxflow.com.

CLS

ACCOUNT REPRESENTATIVE

Compression Leasing Services, Inc. is looking for a high-energy and an extremely motivated individual to focus specifically on selling compression equipment to all industries; specifically construction companies, power plants and manufacturing facilities in the Denver, Colorado and Front Range area. For more information please go to www.compressionleasing.com.

Full benefits package is included and relocation will be offered with certain conditions. To apply please submit a resume to: AHagan@compressionleasing.com.

FS-CURTIS AIR COMPRESSORS

To support growth, FS-Curtis, a leading manufacturer of air compressors, has an excellent opportunity for a developing business leader at our U.S. headquarters located in St. Louis, MO.

OIL FREE BUSINESS DEVELOPMENT MANAGER

This business leader will drive sales and business development for a rapidly expanding portfolio of oil-free compressors. Drawing on her/his understanding of both the key business drivers in industries requiring oil-free air and the distribution and service model required to satisfy customer needs, the OF Business Development Manager will be a key player in the continued growth of FS-Curtis.

Send resume to HR@curtistoledo.com.

COMPRESSED AIR BEST PRACTICES®
www.airbestpractices.com

Advertising & Editorial: Rod Smith
rod@airbestpractices.com
Tel: 412-980-9901

Subscriptions & Administration: Patricia Smith
patricia@airbestpractices.com
Tel: 412-980-9902

A Publication of: Smith Onandia Communications LLC
37 McMurray Rd. Suite 106
Pittsburgh, PA 15241

Compressed Air Best Practices® (USPS# 17130) is published monthly except January-February combined by Smith Onandia Communications LLC, 37 McMurray Rd., Suite 106, Pittsburgh, PA 15241. Periodicals postage paid at Pittsburgh, PA and additional mailing offices. POSTMASTER: Send address changes to: Compressed Air Best Practices®, 37 McMurray Rd, Suite 106, Pittsburgh, PA 15241.

TECHNOLOGY

THE MARKETPLACE

TECHNOLOGY

IT'S NOT ONLY THE PRODUCTS, BUT PEOPLE AT DV SYSTEMS THAT MAKE THE DIFFERENCE FOR MY BUSINESS.

DENNIS BERMANI, OAK STREET CLASSICS, MOORESVILLE, NC

AIR COMPRESSORS 5 TO 200 HP

JOIN US, BECOME A DISTRIBUTOR

With over 125 years of manufacturing excellence it's not only our products that are built to last, we strive to build lasting relationships. Contact us to learn more.

dvcompressors.com **1-877-687-1982**

DV Systems Ltd. 128-B Talbert Rd., Mooresville, NC 28117

BUILT BETTER

The Sweet Sound of Savings!

Dramatically reduced energy costs is music to the ears

Problem:

A music studio equipment manufacturer had problems maintaining steady pressure with their compressed air system. Additionally, there never seemed to be enough air to meet production demand despite having both a 50 hp and a 75 hp rotary screw compressor. Month after month, energy costs soared with the compressors being the highest consumers. And during the summer months, increased condensate in the lines caused severe air quality issues.

Solution:

An Air Demand Analysis (ADA) revealed that the 50 hp unit (with modulation control) was producing only a fraction of its total capacity yet consuming full load kW. A single 50 hp compressor with adequate storage could easily meet the plant's demand and provide significant energy and maintenance cost savings. The air quality issues were due to undersized storage and air treatment.

Result:

The new, energy-efficient 50 hp dual control compressor provides all the air that's needed and keeps the plant pressure rock steady—with the 75 hp compressor still there for backup. The new refrigerated dryer with energy-saving controls and condensate management system have solved the air quality issues, while the 361,099 kWh reduction in annual energy consumption has this customer singing a happy tune.

Specific Power of Previous System:	59.74 kW/100 cfm
Specific Power of New System:	19.05 kW/100 cfm
Annual Energy Costs of Previous System:	$52,981 per year
Annual Energy Cost Savings:	$36,110 per year
Utility Rebate:	$41,921
TOTAL FIRST YEAR SAVINGS:	**$78,031**

Let us help you measure and manage your compressed air costs!

Visit us at FABTECH in Booth #C18043

KAESER COMPRESSORS
Built for a lifetime.™
Kaeser Compressors, Inc. • 866-516-6888 • us.kaeser.com/CABP

customer.us@kaeser.com