The Magazine for ENERGY EFFICIENCY in Compressed Air Systems

COMPRESSED AIR BEST PRACTICES

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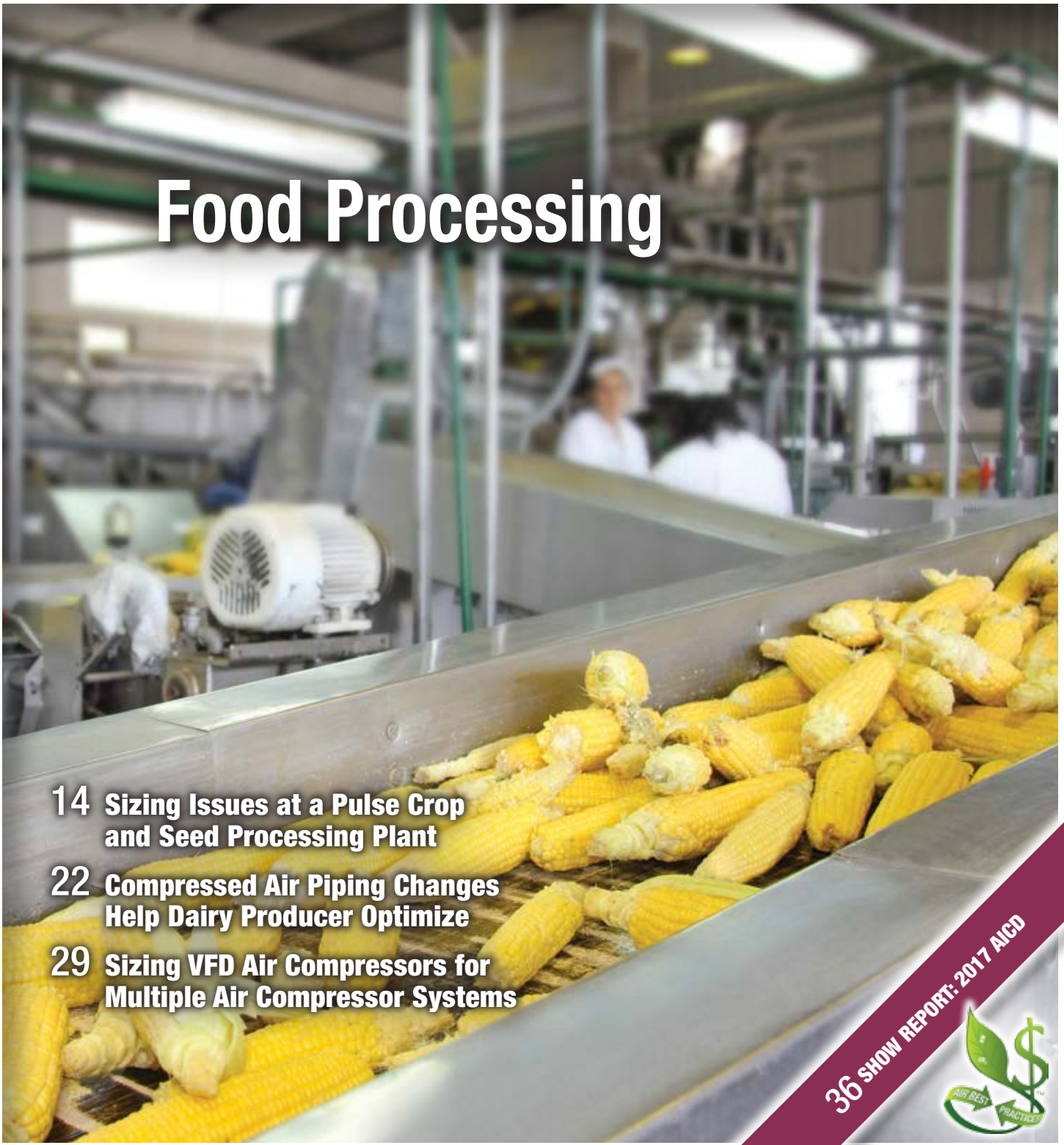
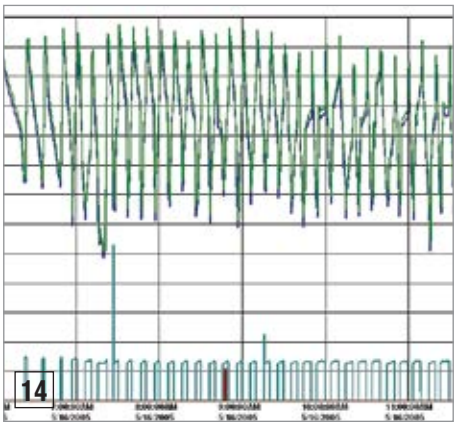
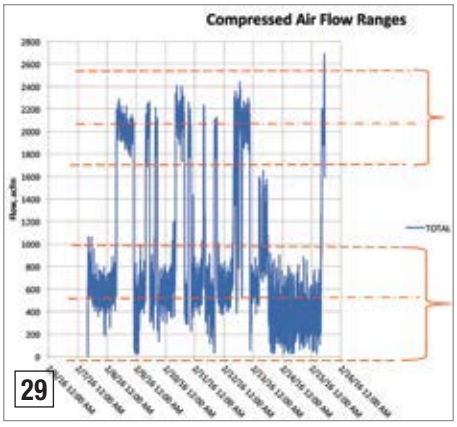
July 2017



Food Processing

SUSTAINABLE MANUFACTURING FEATURES





COLUMNS

FROM THE EDITOR | Food Processing

We begin this issue with an audit story, from Ron Marshall, about a small pulse crop and seed processing facility. They used compressed air for cleaning, sorting and bagging production equipment using pneumatic actuators, cylinders and valves. Planning for growing anticipated demand, they wanted to switch from their loud reciprocating air compressor to a rotary screw. This article illustrates the challenges in designing an oversized compressed air system with load/unload rotary screw air compressors and desiccant dryers.

A dairy plant's annual electric costs, to run the compressed air system, were $148,000 per year. They had two separate compressed air systems. All the air compressors were single-stage, lubricated (food-grade), water-cooled rotary screw air compressors. Don van Ormer writes about the actions required to combine them into one system and realize $22,000 in annual electrical energy savings.

When is it a good idea to add a variable frequency drive (VFD) air compressor to an installation with multiple air compressors? When is it not a good idea? Tim Dugan has contributed a very useful article outlining the steps required to be able to answer these questions.

The 2017 AICD Conference and Exhibition was held in Reno this year. Just a short drive away from Lake Tahoe, I (and others) were fortunate to be able to combine my two favorite activities; outdoor adventures and compressed air! Assuming readers don't want to hear about kayaking and hiking, my "roving reporter" write-up attempts to describe the AICD delivering it's usual excellence in event organization, educational conference sessions and exhibits. I hope you enjoy the write-up.

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

ROD SMITH, *Editor*
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INDUSTRY NEWS

John Henry Foster Hosts 32nd Annual ESOP Meeting

John Henry Foster hosted their 32rd Annual ESOP Meeting at the Donald Danforth Plant Science Center in St. Louis, Missouri. The theme of the 2017 John Henry Foster ESOP meeting, held on May 5th, centered around reflection, recognition and celebration. Events included an interactive, reflective seminar hosted by the Barry Wehmiller Leadership Institute, employee-owner recognition of efforts and achievements and a retirement celebration for a long-time (44-year) John Henry Foster family member.

The ESOP (Employee Stock Ownership Plan), instituted in 1984 by Bob and Kathy Gau (then owners of JHF), made all employees part owners in the company at no cost to them. "As we considered our future and how to ensure our new company would succeed, we knew two things: That we could not do it alone—our employees would have to help us make it happen—and this would be a family business with family principles, morals, and values," Bob said. "It's a great way to reward your people. It's a retirement plan, bonus plan, and

profit-sharing plan all rolled up into one." Today, John Henry Foster employees own over 65% of the company.

John Henry Foster, established in St. Louis, Missouri in 1944, is the Midwest's leading sales and service provider of industrial automation and process control instrumentation. Specializing in pneumatics, hydraulics,

compressed air and electronic controls, JHF designs and manufactures efficient solutions for even the most complex industrial applications.

Call today for more information
314-427-0600 or visit www.jhf.com

C.H. Reed, Inc. Pittsburgh Moves to Larger Facility

C.H. Reed, Inc., has moved to a new, larger facility at 205 Seco Road, Monroeville, PA 15146. The move was made to accommodate growth in all product families, provide a regional training center for employees and customers, and provide a strategic location from which to dispatch service. In addition to the state-of-the-art training center, the new space includes a regional service center, dispatching office, sales office, demo equipment space, and inventory warehouse.

"Reed's approach", says Bob Shields, President, "is to provide a value added solution that is cost effective and sustainable taking into consideration plant processes, productivity, energy reduction, rebate opportunities, environmental concerns, ergonomic matters, reliability, remote monitoring, quality, and safety. Many projects span more than one division, providing an integrated, efficient result on a turnkey basis. We service what we sell in all divisions."

Aaron McCoach, Regional Service Dispatcher, discusses service personnel deployment with Kyle Wertman, Western Region Service Manager (left to right).

INDUSTRY NEWS

Strategically located in Pennsylvania, Ohio, Maryland and Virginia in six facilities with over 110 employees including remote personnel, Reed covers the entire mid-Atlantic area with all three product families.

About C.H. Reed

Founded in 1948 by Charles and Elizabeth Reed and still family owned, C.H. Reed, Inc. provides a broad based total solution of products, services and engineering through division specific product and service specialists in the three core competency areas of:

- Compressed Air
- Finishing and Fluid Handling
- Assembly Tools, Fixturing and Material Handling

Strategically located in Pennsylvania, Ohio, Maryland and Virginia in six facilities with over 110 employees including remote personnel, Reed covers the entire mid-Atlantic area.

For more information, visit www.chreed.com

Ingersoll Rand Expands Global Service Programs

Ingersoll Rand®, a global leader in air compression technologies and services, now offers three flexible service programs giving customers the opportunity to have expertly-trained Ingersoll Rand technicians oversee the service, repair and maintenance of all compressed air assets in their facilities. With all Ingersoll Rand CARE service programs now available in North America, Europe, Middle East, Asia and India, customers around the globe have a variety of service offerings available to fit their unique needs.

"Ingersoll Rand recognizes there isn't a one-size-fits-all approach to service, so we are working closely with our customers on redefining the reliability of their critical compressed air systems and how this directly impacts their bottom line," said Eric Seidel, vice president of product management for Compression Technologies and Services at Ingersoll Rand. "The CARE service programs allow customers to choose an option that fits the needs of their equipment and businesses. Whether customers prefer full-risk transfer or just need help with preventative maintenance, we have a proactive solution that works for them."

The Ingersoll Rand CARE portfolio offers multiple levels of service options to meet a variety of customer needs. In addition, a ten-year extended coverage option is now available for air compressor equipment and parts under select service levels. The portfolio includes the following options:

- PackageCARE™ represents the greatest value to customers who want to manage their assets by transferring operational risk to Ingersoll Rand. Ingersoll Rand is responsible for scheduled maintenance, as well as using predictive and analytical tools to help prevent unexpected interruptions in customers' production. Under the program, Ingersoll Rand service technicians proactively maintain and repair equipment to keep small issues from becoming big problems. PackageCARE allows both parties to do what each does best – Ingersoll Rand maintains the equipment and customers' resources are free to manage their businesses. Coverage for up to 15 years is available for all

new and in-service air compressor equipment under the PackageCARE service plan.

- PlannedCARE™ offers customers the option of sharing in the service responsibility. Under this program, Ingersoll Rand manages the preventative maintenance by scheduling and executing maintenance based on a schedule focused on preventative maintenance. By using Ingersoll Rand factory trained technicians, customers drastically reduce the possibility of unforeseen downtime and help ensure the uptime of their facilities. Five and ten-year extended coverage options are available for new oil-free and oil-flooded rotary screw air compressors under the PlannedCARE service plan.

- PartsCARE™ is designed for customers who can perform maintenance themselves, but realize the benefits of using genuine Ingersoll Rand parts for their equipment. In this program, customers receive the necessary consumable parts in regular shipments tailored to their annual equipment operation. With PartsCARE, Ingersoll Rand keeps track of the service requirements, and customers don't have to worry about forgetting maintenance schedules that void a warranty. For air compressors >37kW, the program also includes inspections and predictive diagnostics twice per year by Ingersoll Rand factory certified technicians to keep equipment running smoothly and prevent issues down the road. Customers with new oil-flooded rotary screw air compressors registered under this program can qualify for five year extended coverage options.

"Unlike extended warranties, these service programs focus on reliability and proactively maintaining equipment, not just reactive coverage when something has already happened," Seidel said. "The CARE service programs are designed for a variety of customer needs and operations, and help customers to reduce total cost of ownership throughout their equipment lifecycles."

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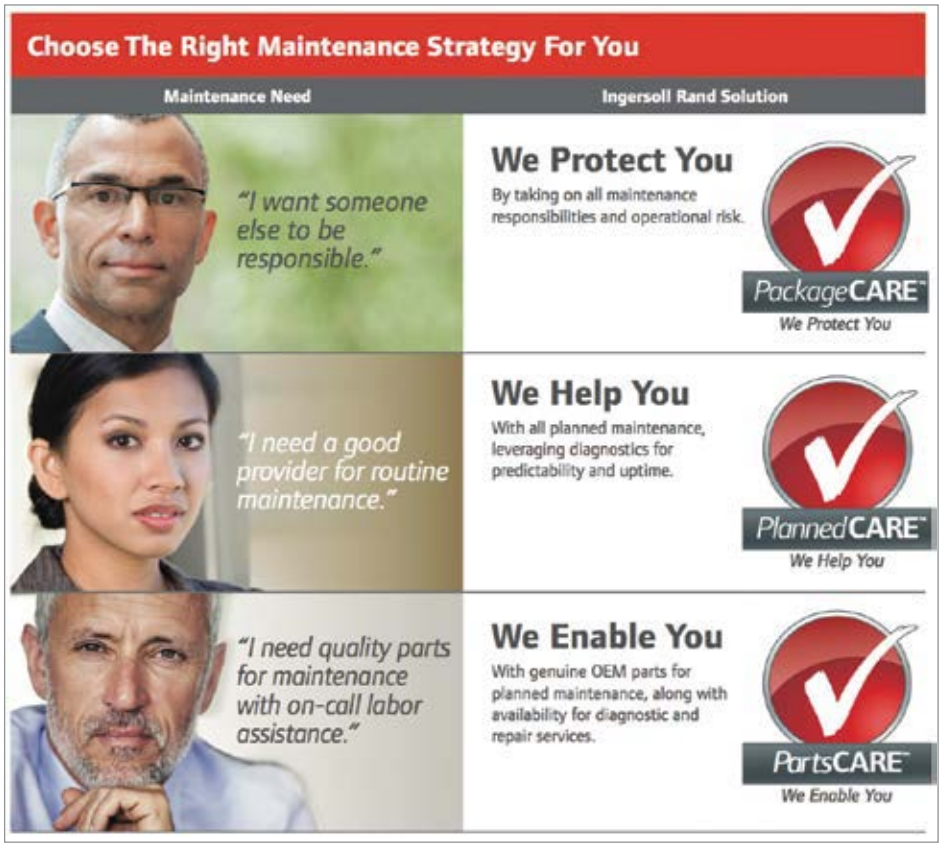

For more information on the CARE service programs, visit www.ingersollrandproducts.com or contact your local service representative.

About Ingersoll Rand

Ingersoll Rand (NYSE:IR) advances the quality of life by creating comfortable, sustainable and efficient environments. Our people and our family of brands — including Club Car®, Ingersoll Rand®, Thermo King® and Trane® — work together to enhance the quality and comfort of air in homes and buildings; transport and protect food and perishables; and increase industrial productivity and efficiency. We are a $13 billion global business committed to a world of sustainable progress and enduring results. Ingersoll Rand products range from complete compressed air and gas systems and services, to power tools, material handling and fluid management systems. The diverse and innovative products, services and solutions enhance our customers' energy efficiency, productivity and operations.

For more information, visit www.ingersollrand.com or www.ingersollrandproducts.com.

1,000+ Companies Call for Strengthening ENERGY STAR Program

More than 1,000 U.S. companies and organizations signed a letter to Congress and the administration calling for lawmakers to strengthen the ENERGY STAR program that was recently proposed for elimination under the Trump administration's budget.

"ENERGY STAR is a model for successful collaboration between the public and private sectors," the letter states. "It enjoys a long track record of success and should be strengthened, not weakened, to ensure it

continues providing these important benefits to the public while helping us meet our energy and environmental goals."

The letter was led by the Alliance to Save Energy and signed by leading companies including A.O. Smith, North America's largest manufacturer of residential and commercial water heaters; Andersen Corporation, the largest door and window manufacturer in North America; CBRE Group, Inc., the world's largest commercial real estate services and investment firm; Cree, a global manufacturer of LEDs and other products; Ingersoll Rand, parent company of brands such as Trane; Seattle City Light, the city's publicly owned electric utility; and United Technologies Corp., parent company of Carrier and other brands.

Launched under President George H.W. Bush, ENERGY STAR is among the most successful public-private partnerships in U.S. history, with more than 16,000 partner companies and organizations participating. Run by the EPA, the program certifies a wide variety of products as highly efficient – from appliances to electronics to buildings and manufacturing facilities. It is widely known – with more than 90 percent brand recognition – by the small blue ENERGY STAR logo that appears on products sold across the country.

The program, which costs about $50 million per year to administer, saves consumers more than $34 billion per year in reduced energy costs. It has enjoyed strong bipartisan support for 25 years.

Despite this success, the budget released last month by the White House calls for eliminating ENERGY STAR along with other programs at the EPA.

"Shutting down this program would hurt American businesses, consumers and our overall economy, and we strongly encourage

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the administration to reconsider the budget proposal," said Kateri Callahan, president of the Alliance to Save Energy, an energy efficiency advocacy group based in Washington. "This letter demonstrates the enormous business support for a venerable public-private partnership and sends a clear directive to Washington: keep the Energy Star program going and growing."

Like many of the energy efficiency programs in the federal government, ENERGY STAR delivers enormous benefits to the country. It's stimulating innovation, creating jobs and saving consumers billions of dollars, all while significantly reducing harmful pollution, including carbon emissions. According to DOE, energy efficiency supports nearly 2.2 million jobs across the country in manufacturing, installation, construction and other sectors.

Comments from the business community:

Cree Vice President of Marketing and Public Affairs Greg Merritt: "ENERGY STAR has played an important role in helping Americans adopt more energy efficient products and technologies, including LED lighting, that have saved them money and saved energy. Consumers are able to rely on the ENERGY STAR brand to give them confidence when buying new technologies, and the ENERGY STAR program has benefited consumers, manufacturers and utilities."

Scott Tew, Executive Director, Ingersoll Rand Center for Energy Efficiency and Sustainability: "The ENERGY STAR program doesn't just help our Trane brand differentiate between its energy efficient consumer HVAC products, but it also helps our customers in understanding and marketing the energy performance of their buildings. ENERGY STAR is a proven, credible and 100 percent voluntary program that will grow in consumer confidence if it remains managed by EPA."

Seattle City Light General Manager and CEO Larry Weis: "When consumers see the blue ENERGY STAR logo, they know they'll be conserving energy and saving money. This trusted guide is one of the simplest and most effective means to promote energy efficiency to our customers, which benefits us all."

About the Alliance to Save Energy

Founded in 1977, the Alliance to Save Energy is the leading energy efficiency coalition in the nation – a nonprofit, bipartisan alliance of business, government, environmental and consumer leaders advocating for enhanced energy efficiency across all sectors of the economy. Our mission is to promote energy efficiency worldwide to achieve a healthier economy, a cleaner environment and energy security.

For more information, visit http://www.ase.org

ControlAir Announces Changes to Management Team

ControlAir Inc. announced that Jon Daley has joined the Company as Director of Sales and Marketing and Cameron Crooks has joined as Midwest Regional Sales Manager.

Jon Daley joined ControlAir as Director of Sales and Marketing October of 2016. Most recently, Mr. Daley held product and engineering management positions in the motion control industry. Mr. Daley held the positions of Product Line Manager and Engineering Manager for HaydonKerk Motion Solutions, a division of Ametek. During his time at HaydonKerk, Mr. Daley established a track record of driving sales and customer satisfaction through direct and indirect sales channels. He also had direct experience in developing and maintaining an Ecommerce presence for Ametek.

A ControlAir spokesperson said, "We are very excited to welcome Jon to ControlAir. He arrives

with expertise in marketing, sales and business development that will be a definite benefit to us. It will be great to have someone join our team who brings such a powerful combination of experience, enthusiasm and focus on understanding our customer's needs." Mr. Daley commented on the recent move to ControlAir, "This was a relatively easy decision to make. It was obvious early on in my interview process and subsequent immersion into ControlAir's culture that customer satisfaction is a priority, from top to bottom. Having a solid and growing product line only makes this decision even easier to justify and express to our customers."

Cameron Crooks recently joined ControlAir as Midwest Regional Sales Manager. Mr. Crooks comes to ControlAir with an 8-year track record in sales and the support of a distributor network. Most recently, Mr. Crooks held the position of Business Development Manager for Service Wire Co. At Service Wire Co, Mr. Crooks was instrumental in growing sales through its distribution network and developing business plans to open up doors to new customers. The ControlAir spokesperson said, "I'm sure that Cameron's energy level and knowledge will result in sales growth with all our customers and sales partners in the Midwest region."

About ControlAir Inc.

ControlAir Inc. manufactures precision pneumatic and electro-pneumatic controls. ControlAir's markets include process control, semiconductor, printing and converting presses, diagnostic and surgical medical equipment, robotics, quality control, automotive, analyzers, compressors, pumps and paint equipment. For more information, ControlAir's website, www.controlair.com, offers full product specifications with PDF files, 3-D Interactive Catalogs, downloadable 3-D and 2-D CAD drawings, and company profile.

For more information, visit www.controlair.com

Sizing Issues at a Pulse CROP AND SEED PROCESSING PLANT

By Ron Marshall, Marshall Compressed Air Consulting

A small pulse crop and seed processing facility located in Canada has upgraded their facility compressed air system to accommodate the expansion of their production capacity. While completing this project the facility has learned some valuable lessons about sizing and maintaining lubricated screw air compressors and compressed air drying equipment.

High-Speed Color Sorters Create Variable Loads

The original compressed air system in the plant consisted of a small 15 hp lubricated reciprocating air compressor and refrigerated compressed air dryer. The compressed air was fed to various cleaning, sorting, and bagging equipment in the plant to power actuators, slide gates and general compressed air powered end uses. Parts of the compressed air system are exposed to cooler temperatures in winter, so there were constant problems with lines freezing and water accumulation. Some parts of the system experience contamination from oil carryover.

The air compressor was a high maintenance item. When plant output was high, the unit

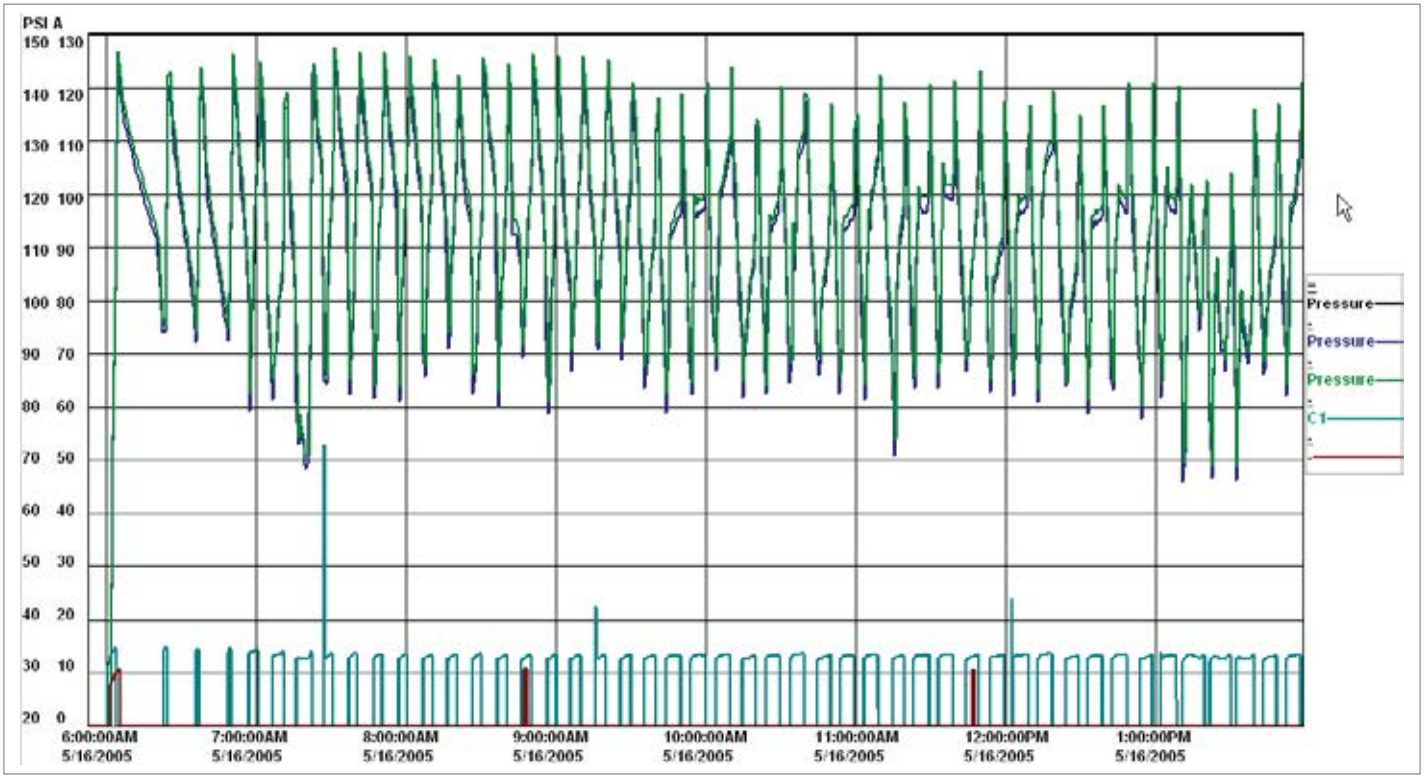

Figure 1: The original reciprocating compressor provided poor compressor control but was fairly efficient

would overheat and the internal intake and outlet valves would fail. This problem, and the constant pounding noise of the air compressor, got plant personnel interested in a change to screw compressors, which are typically quieter, cooler and more efficient at full load.

Technology changes to the industry had also forced plant personnel to consider upsizing the compressed air system capacity. Color sorters were being used to clean and sort beans and seeds to remove undesirable kernels and give the finished package a cleaner and more consistent look. This sets the packages of products apart from other competitive products, and therefore the product becomes more valuable in the eyes of the consumer, increasing the demand for the product.

The color sorters examine each seed as it passes through the processing element and makes decisions on whether to keep or reject the seed. This sorting action is done at high speed using a blast of compressed air to redirect each unacceptable seed. The compressed air demand varies greatly on these sorters, with very low flow consumption when a batch of very clean product is processed, but much higher consumption when rejection rates are high, such as at the end of the storage season. Due to the varying loads, the compressed air system must be sized for the worst case scenario to prevent low pressure from occurring during peak processing times.

Original Findings

Data logging was done before considering the new air compressor and it was found the pressure varied widely from a high of near 150 psi to a low of 65 psi (Figure 1). This is typical of small tank mounted reciprocating air compressors. The pressure band is set very wide to prevent an excessive number of starts from burning out the drive motor. This wide

SIZING ISSUES AT A PULSE CROP AND SEED PROCESSING PLANT

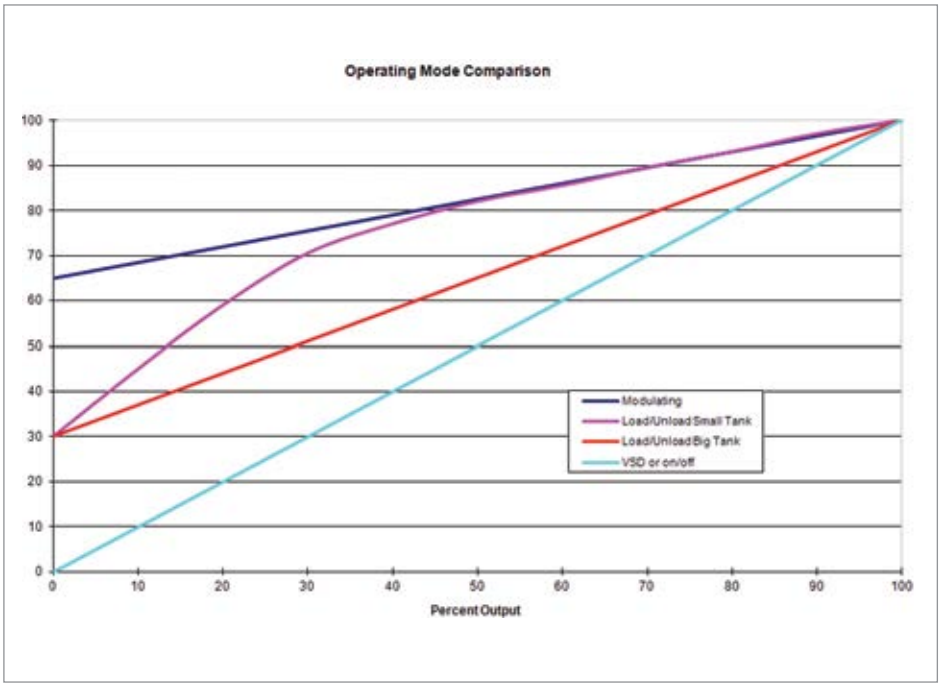

Figure 2: Characteristics of various compressor operating modes

variation did not present significant problems for general plant processing equipment, most of which had pressure regulators, but the new sorting equipment needed more stable plant compressed air pressure at around 100 psi.

Measurements were done and determined the plant peak demand was about 50 cfm with very low average flows of 6 cfm over the 6,000 hour operating schedule for the plant. While the 15 hp reciprocating compressor, running in on/off mode, was producing less compressed air per kw than an equivalent sized fully loaded lubricated screw compressor, the efficiency of the air production was quite good because the air compressor does not consume power between load cycles. This air compressor was, on average, running 11 percent of the time, and consuming only about 1.5 kW of power worth about $900 in electrical costs per year.

The audit determined that, based on the expected consumption of potential new color sorters, a screw air compressor and air dryer sized for about 100 cfm (25 hp) would be adequate. The plant personnel were concerned, however, that future additions to color sorting equipment would add more demand to the system. They decided they would be more comfortable with compressed air equipment sized in the 40 to 50 hp range. At about that time, a used 40 hp lubricated screw compressor and heatless desiccant air dryer combination came available at a greatly reduced cost from a local compressed air equipment provider. The plant decided to purchase this equipment for their plant production expansion.

Energy Projections

The plant personnel approached the local power utility to find out if there could be any technical advice and financial assistance available to help with the project. Once the

power utility learned about the pending equipment they became concerned because no additional storage receiver capacity was being considered. The previous reciprocating compressor had 180 gallons of receiver capacity, large enough to keep the small 15 hp compressor motor starts to a minimum with a wide pressure band, but much too small for a 40 hp lubricated screw compressor.

The power utility had experience in assessing other lightly loaded systems that had converted from reciprocating style to screw style air compressors. While it is no question that the screw compressors are more efficient at full load than the small two stage reciprocating style compressors, experience had shown that efficiency problems were to be expected if the screw compressor was installed with limited storage capacity on a lightly loaded system. The problem is the unloaded power consumption of a screw compressor, about 35 percent of the full load power, and the power characteristics of these compressors when installed with small storage.

Figure 2 shows a simplified diagram illustrating the problem. At 11 percent average load the previous compressor consumed only 11 percent of its full load power because it is a start/stop device with a linear power characteristic. Place a larger screw compressor running in load/unload mode on the same system with limited storage and the compressor consumes much more power at the same flow. At the average flow of 8 cfm average a 40 hp screw compressor rated at 175 cfm would be about 5 percent loaded, but would consume about 45 percent of its full load power if it remained running unloaded for the 95 percent of the time. This power consumption in this condition was predicted to be about 15 kW average, about 10 times more than the power of the original reciprocating compressor at the same flow.

SIZING ISSUES AT A PULSE CROP AND SEED PROCESSING PLANT

Compressed Air Dryer and Storage Capacity

Adding to the concern was the addition of a 180 cfm heatless desiccant air dryer to the system. This air dryer, if allowed to operate in an uncontrolled manner with no dew point control, would consume an estimated 27 cfm in purge flow, about 3 times more than the actual average compressed air demand. This additional flow would cause the compressor to consume even more power, increasing the average kW to over 14 times the original level.

The power utility recommended adding larger storage capacity to the system to make the compressor run more efficiently in load/unload mode and take advantage of a control algorithm inside the compressor control that allows the compressor to shut completely off between cycles, if the motor starts are not exceeding the maximum allowed for the compressor motor. The utility has found that, if a compressor of this type is installed with 10 gallons per cfm storage capacity, and run with a 30 psi load/unload pressure band, motor starts at worst case conditions (50 percent load) would be less than about 6 per hour. At this level, if the compressor ran in start/stop mode, the power consumption would be much less, about the same level as an equivalent sized reciprocating compressor.

Using a 30 psi wide pressure band is not without issues, however, this higher than average pressure subjects compressed air consuming devices in the plant to overpressure, which causes unregulated uses (including the dryer purge) to consume more compressed air than required. To prevent this artificial demand a flow control device was recommended to regulate plant pressure to a constant 100 psi level required for the new color sorters.

Unfortunately, in actual practice, there wasn't enough room near the compressor to install over 1,750 gallons of storage, so the plant settled on a 1,060 gallon receiver. Further to this, the air dryer was outfitted with dew point dependent switching that was expected to reduce the average air dyer purge flow to a fraction of the uncontrolled level. Based on the larger storage, and the dryer control, the utility offered financial incentives to help pay for the additional costs of the improvements as long as this saved energy over the worst case scenario of small storage and fixed cycle dryer control.

Verification

As part of the incentive program the utility had an auditor place data loggers to monitor system operation after the equipment installation to ensure the new equipment was installed as planned and that the expected energy savings were being achieved. The auditor was surprised to find that the system flow was very high, in fact, the 40 hp air compressor was near its full flow (Figure 3), with strange pressure events happening exactly every 5 minutes. The auditor investigated to find that the source of the problem was the compressed air dryer. A special test was done where the dryer was turned off for a short period of time, when this happened the air compressor loading reduced to about 5 percent of its capacity, with the dryer operating the compressor loading increased to almost 100 percent.

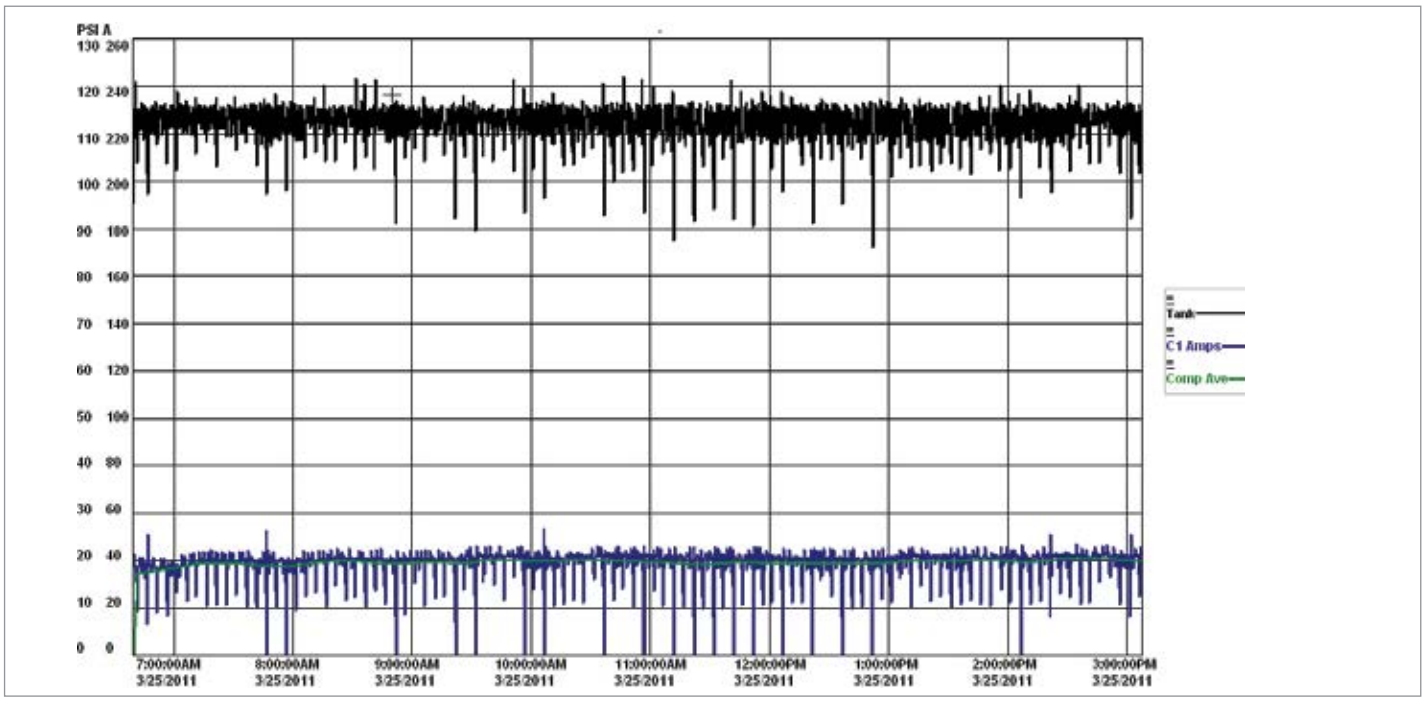

Figure 3: On verification the compressor load was greatly increased with strange exactly 5 minute changes to pressure.

Further investigation was done and found that there was a problem with the air dryer purge flow orifices. This particular dryer design has two simple orifices, flat style that look like washers, that are inserted into pipe union fittings in a purge circuit that connects the two sides of the dryer. The purge flow is restricted by the orifices as it flows from the pressurized side to the side being regenerated. When the dryer was disassembled for installation one of the orifices was lost, causing excessive purge flow when the dryer was placed in service. Since the supplier of the equipment did not properly verify the correct operation of the dryer, the unit was left to operate with abnormally high flows. Due to this high flow the dew point control circuit was not effective in saving any compressed air, so did not turn off the purge flow off at any time.

The compressed air dryer purge was corrected and the system operation settled to expected levels. There were, however, some issues that prevented optimum system operation.

- The air compressor rated pressure is only 132 psi and the required pressure band at the storage receiver for optimum compressor operation is 40 psi. Since the desired plant pressure is 100 psi, this limits the maximum possible pressure band to 32 psi at the compressor discharge.
- Pressure differential across the dryer reduces the working pressure band in the dry receiver by about 4 psi, making the effective pressure band only 28 psi.
- The compressor supplier was not comfortable operating the compressor at 132 psi, so the pressure band was further reduced.
- Due to higher than normal compressor discharge pressure, caused by the wide band, the dryer purge flow during regeneration was higher than rated (because more flow passes through the fixed orifices).

SIZING ISSUES AT A PULSE CROP AND SEED PROCESSING PLANT

Despite the challenges faced due to these conditions the system power consumption fell significantly from the projected base case levels. During very light non-production loads the compressor operated in start/stop mode (Figure 4). During higher flows, or when the dryer needed to regenerate the compressor operated in a modified load/unload mode with the drive motor turning off when the control determined it was safe to do so.

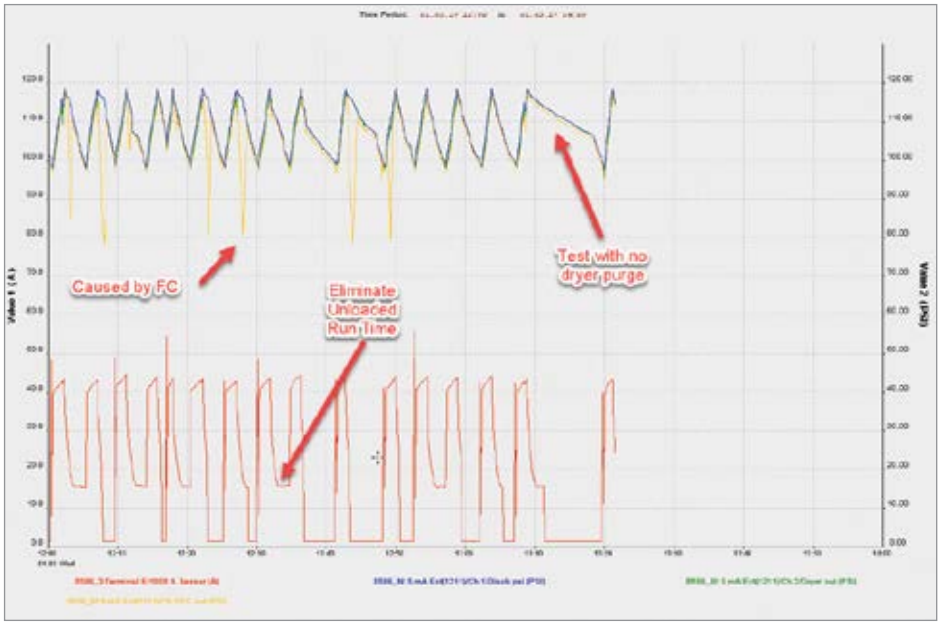

Figure 5: Re-monitoring the system years later showed problems with air dryer control and the pressure flow controller

System Checkup

A few years later the power utility was contacted again to support some additional improvements. Due to the age of the dryer and its mechanical characteristics (the unit is obsolete) the site was having trouble obtaining parts to keep the unit operating properly. Again the system was data logged and problems with the dew point control were preventing any savings due to malfunction. The dew point probe had become contaminated over time and was not operating correctly, the unit was never going into the purge saving mode, despite -100 or lower actual levels being produced. Again special testing was done that showed that the dryer purge flow was consuming over 70 percent of the compressed air the compressor was producing (Figure 5).

Further to this there were plant pressure problems evident. At about the unload pressure of the compressor unexplained dips in pressure would occur and cause

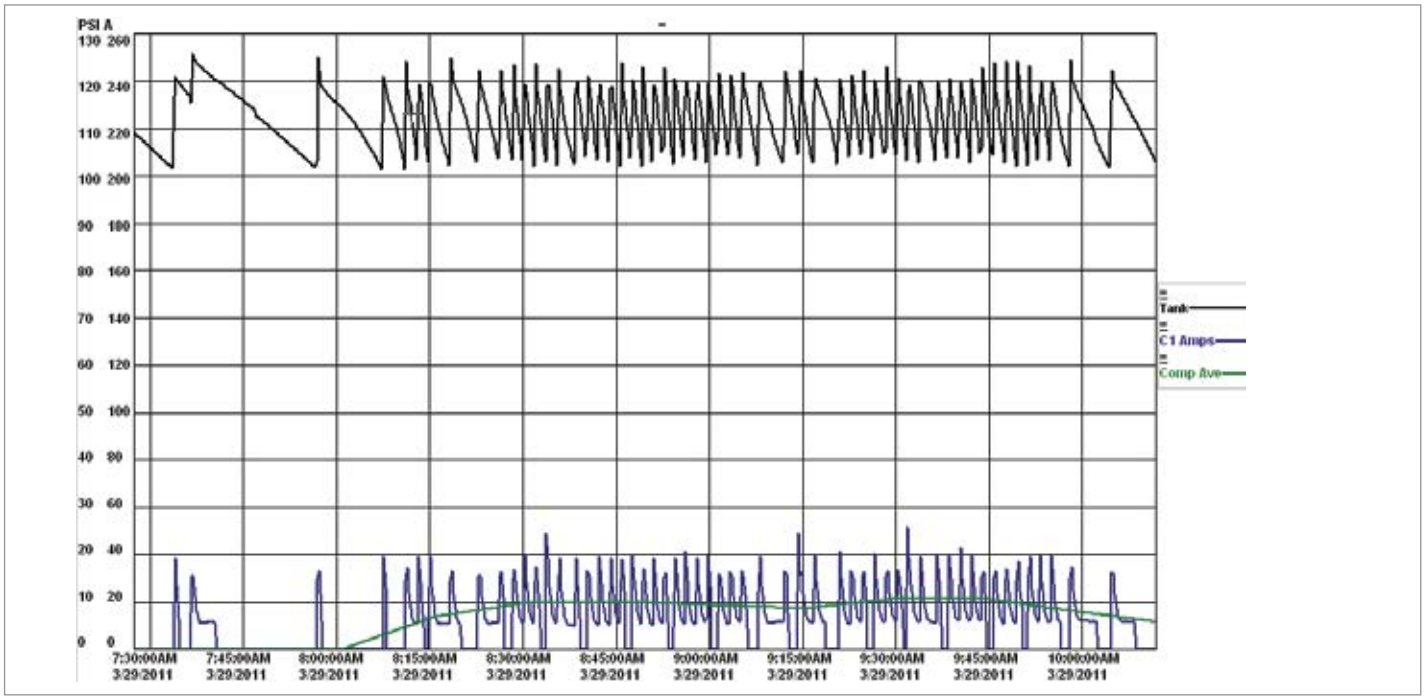

Figure 4: Use of larger storage allows the compressor to turn off between cycles at light loads, saving power.

low pressure in the plant. Investigation revealed that over the years the pressure/flow controller has malfunctioned and the pilot regulator was replaced with a non-standard part. The unit was no longer regulating properly. This caused undesirable pressure dips under certain conditions. The plant personnel had thought the pressure issues were being caused by the air dryer.

The data logging showed that the expected high levels of flow due to additional color sorters never did materialize, the plant flow was averaging about the same as it was when the original project was started. The plant is now considering a smaller right-sized compressor and dryer that would better match the demand. Expected energy savings for a correctly operating air dryer with properly operating dew point control, perhaps a unit with uses much less or no purge flow, are 75 percent of the current levels worth the equivalent of about $9,000 per year at 10 cents per kWh.

Additional Logging

While onsite, the auditor had a chance to place data loggers on another system in a separate building that used a 50 hp VSD compressor and heatless dryer with dew point control. This system recently suffered a failure where the air compressor separator flooded the dryer with lubricant. Data logging showed that the dryer of this fairly efficient system (due to VSD control) was consuming 35% of the compressed air produced by the compressor, about double what is expected. The dew point control of this dryer had also been rendered inoperable due to contamination. Repairs have returned the unit to normal saving an estimated $3,200 per year (28%) in reduced electrical operating costs.

Conclusions

This story illustrates some of the problems associated with oversizing compressed air systems with load/unload screw compressors and desiccant dryers. Important points are:

- In lightly loaded systems a switch from reciprocating to screw compressors may increase the energy consumption significantly,
- It is important to have proper storage installed with lubricated screw compressors,
- If installed, some smart compressor controls can shut down the compressor motors between cycles to save energy, especially if there is large storage installed,
- Using wider pressure bands can slow down the cycles, allowing more efficient compressor operation,
- It is important to properly commission all compressed air components and verify proper operation,
- Proper maintenance of desiccant dryer dew point controls can ensure efficient operation,
- Remeasuring compressed air systems every few years can often detect system problems that can save operating costs. BP

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

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Compressed Air Piping Changes HELP DAIRY PRODUCER OPTIMIZE

By Don van Ormer, Air Power USA

➤ Introduction

Annual plant electric costs for compressed air production, as operating today, are $147,469 per year. If the electric costs of $750 associated with operating ancillary equipment such as dryers are included the total electric costs for operating the air system are $148,219 per year. These estimates are based upon a blended electric rate of $0.087 /kWh. The air system operates 8,760 hours per year. The load profile or air demand of this system is relatively stable during all shifts. Overall system flow ranges from 800- 1,000 acfm during production. The system pressure runs from 95 to 80 psig in the headers during production.

There are actually two compressed air systems, one serves "the Dry Side" of the plant and one is dedicated to "Plant Air". The main purpose of this project is to examine combining the

> "Running a single system at today's current demand of 946 acfm maximum, the annual electric cost for compressed air is $125,445. By combining the system, the plant could save $22,024 per year in electric costs."
>
> — Don van Ormer, Air Power USA

two systems into one by making piping and valving changes. By running a single system at today's current demand of 946 acfm maximum, the annual electric cost for compressed air is $125,445. By combining the system, the plant could save $22,024 per year in electric costs.

Proposed Action Plan

- Combine multiple systems; set up auto shut-off valves with pressure sensors to close the valve if pressure drops.
- Increase the compressor room piping size 6" diameter and add two x 2,000 gallon of storage outside of Compressor Room 2, to help future consideration of a smart control system.
- Install a new 1000 scfm rated cycling dryer, and a mist eliminator pre filter ahead of the dryer and replace trim-coolers with a properly sized for the air demand.
- Replace 6 auto drains with electronic or pneumatic-actuated, level activated type.
- Repair all 32 identified and tagged compressed air leaks. (10 of 32 leaks are previously identified leaks)
- Replace 2 vortex cabinet coolers in Butter Room with controlled heat-pipe type; unless 65°F ambient is acceptable, if so then remove cabinet coolers.
- Move solenoid valves from vacuum side to air side of the vacuum generators to allow for shutting of the compressed air when not in use or when cycling.

Primary Air Compressors

All plant compressors are single-stage, lubricated, rotary screw units with modulation controls. Compressors are water-cooled and running food grade hi-aeon 6,000FG (6,000 hours). The plant is having over-heating and varnishing problem. The service provider has changed out the coolers (many are smaller). Some of the older Joy compressors have a water control valve that can be removed.

TABLE 1: KEY COMPRESSED AIR SYSTEM CHARACTERISTICS – CURRENT SYSTEM

MEASURE	DRY SIDE	PLANT AIR	OPTIMIZED COMBINED SYSTEMS
Average System Flow	378 cfm	568 cfm	946 cfm
Average Compressor Discharge Pressure	100 psig	100 psig	100 psig
Average System Pressure	95 psig	90 psig	90 psig
Input Electric Power	87 kW	106.5 kW	164.6 kW
Operating Hours of Air System	8,760 hrs	8,760 hrs	8,760 hrs
Specific Power	4.34 cfm/kW	5.33 acfm/kW	5.474 cfm/kW
Electric Cost for Air /Unit of Flow	$175.41 /cfm yr	$142.89 /cfm yr	$132.61 /cfm yr
Electric Cost for Air /Unit of Pressure	$331.52 /psig/yr	$405.82 /psig/yr	$627.22 /psig/yr
Annual Electric Cost for Compressed Air	$66,304 /year	$81,165 /year	$125,445 /year
	$147,469 /year		

Based upon on a blended electric rate of $0.087per kWh and 8,760 hours/year.

COMPRESSED AIR PIPING CHANGES HELP DAIRY PRODUCER OPTIMIZE

TABLE 2: CURRENT AIR COMPRESSOR ENGINEERING DATA

MANUFACTURER	JOY	GARDNER DENVER	JOY	GARDNER DENVER	GARDNER DENVER
Model	TA190	EBM99J	TA175	EBMSKC	EMQ995
Unit Type	Lubricated Rotary Screw	Lubricated Rotary Screw	Lubricated Rotary Screw	Lubricated Rotary Screw	Lubricated Rotary Screw
Type of Cooling	WC / ES	WC / ES	WC / ES	WC / ES	WC / ES
Full Load Nominal Published BHP	40	75	40	60	125
Full Load Pkg Horsepower (input)	43.9	75.6	43.7	60.9	134.1
Full Load Motor Efficiency (me)	.92	.92	.92	.92	.945
Full Load Rated Pressure (psig)	110	125	115	125	125
Full Load (input) kW @ rated psig: Calculated	35.6	61.3	35.4	49.3	105.86
	To adjust full load 100-psig class kW to reflect pressure up or down, multiply change in pressure x 0.005 = % up or down in kW (positive displacement compressors only)				
Cooling Fan Input kW	.23	N/A	.23	N/A	N/A
Full Load Flow (acfm)	190	361	170	270	630
Full Load Flow (scfm)	173	291	155	215	491
Full Load Nominal Set Point (psig)	110	125	115	125	125
Type of Capacity Control	Modulation	Modulation	Modulation	Modulation	Modulation
Pressure Control Band	120	125-135	115-125	125-135	125-135
Idle kW	8.35	19	8.2	13.8	31.6
Full Load Specific Power (acfm/kW)	4.83	4.77	4.35	4.42	5.95

Based upon blended electric rates of $0.083 per kWh and operating 8,760 hours per year.

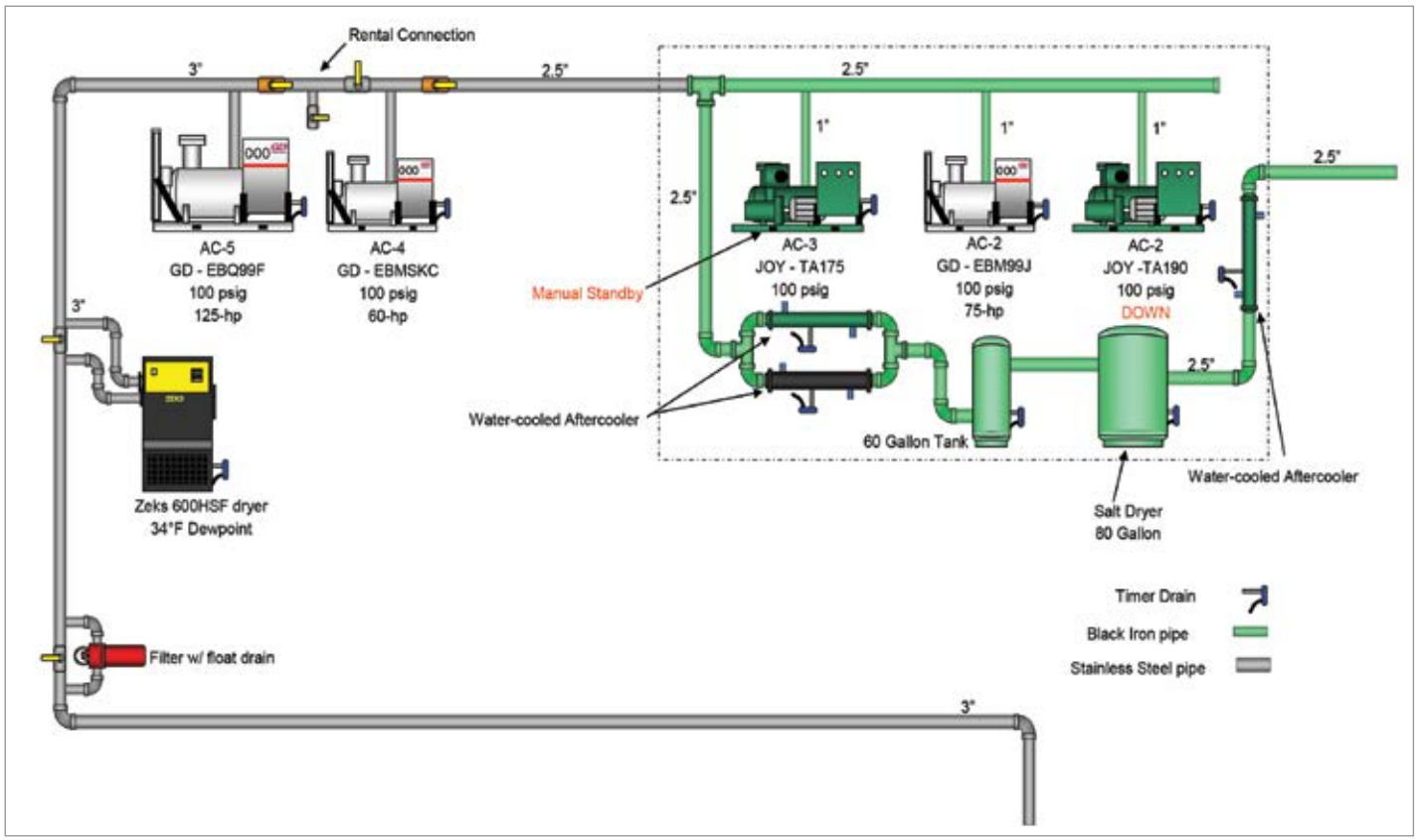

Figure 1: Current Compressed Air System Diagram

Currently there are two systems. The Gardner Denver 125-hp, which is short cycling, and it supplies air to a Zeks 600 cfm cycling dryer, that is short cycling. The other four compressors supply air to the rest of the plant, they normally run just two of the Gardner Denver's.

Recommended Piping and Storage Project

Combine multiple systems; set up auto shut-off valves with pressure sensors to close valve if pressure drops.

Electric demand of current air compressor system	28.9 kW
Relative gain in efficiency	15%
Annual hours of operation for current unit (new conditions)	8,760 hrs/yr
Annual energy savings	$22,029/year
Equipment and installation cost for new unit including tanks	$40,000

TABLE 3: KEY COMPRESSED AIR SYSTEM CHARACTERISTICS – PROPOSED SYSTEM

	CURRENT SYSTEM			PROPOSED SYSTEM	
System Comparison	Dry Air	Plant Air	Combined Systems (Optimized)	Combined Systems (Optimized)	Addition of 2-Stage VSD
Average Flow (cfm)	378	568	946	779	779
Compressor Discharge Pressure (psig)	100	100	100	100	100
Average System Pressure (psig)	80	90	90	90	90
Electric Cost per cfm	$175.41 /cfm/yr	$142.89 /cfm/yr	$132.61 /cfm/yr	$135.00 /cfm/yr	$124.25 /cfm/yr
Electric Cost per psig	$331.32 /psig/yr	$405.82 /psig/yr	$627.22 /psig/yr	$525.86 /psig/yr	$483.95 /psig/yr

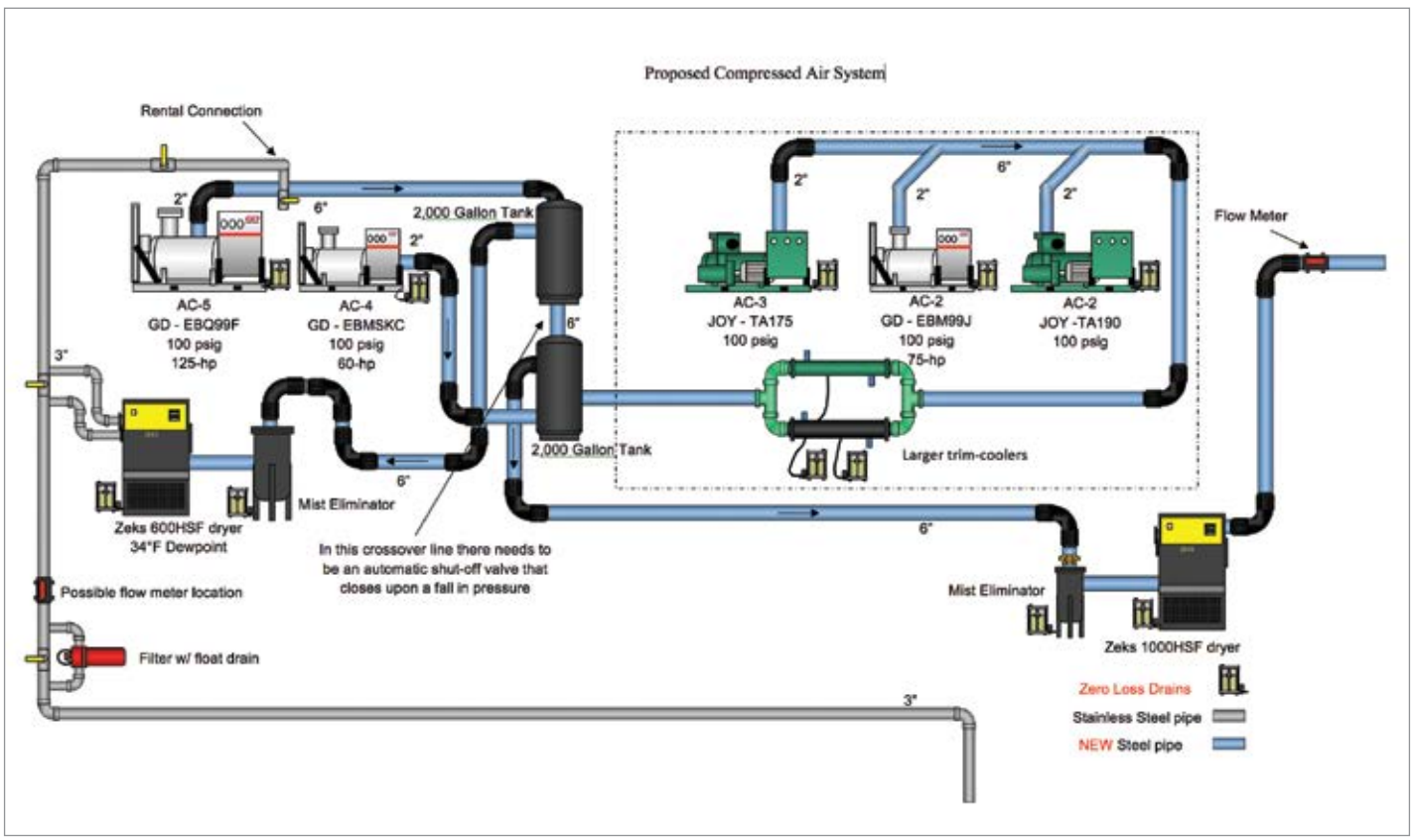

Figure 2: Proposed Compressed Air System Diagram

COMPRESSED AIR PIPING CHANGES HELP DAIRY PRODUCER OPTIMIZE

TABLE 4: COMPRESSED AIR LEAK LIST

LEAK #	LOCATION	DESCRIPTION	DB	CFM	COMMENTS
1	Compressor Room	Timer drain is broken and bleeding air.	83	5.3	Timer drain is from the final aftercooler in compressor room.
2	Boiler room	Regulator leaking in between milk tanks	67	3.7	Tagged steam line below regulator. Reading taken from 8' away.
3	Rogers 2 47 ft. level	FRL leaking on in feed side to rogers 2.	33	1.1	FRL is on #1 of the row of dust collectors. Reading taken from 10' away
4	Rogers 2 Floor 2	Regulator leaking on in feed	49	2.2	
5	Niro Room – ground level	Poly tube leaking	58	2.9	6' above standing height
6	GEA Evap.	½" poly tube connection leaking	60	3.1	
7	GEA Evap.	¼" poly tube to panel wb-6	78	4.8	
8	GEA Evap.	Valve leaking to poly tube connection	58	2.9	This valve is on the cream transfer press
9	GEA Evap.	¼" poly tube above separator balance tank leaking	41	1.6	The poly tube is on the control valve to the tank
10	Rogers 1 ground level	Leaking inside control box of feed tanks	36	1.3	
11	Rogers 1 ground level	Regulator below Nucon leaking	53	2.5	The regulator might need replaced entirely
12	GEA CIP Room	Threading under control box leaking	49	2.2	Between tanks GP4-5
13	Butter/Churn room	90 degree elbow leaking at threading	73	4.3	
14	SAPAC bag room	1/4" poly fitting leaking at connection	54	2.6	
15	SAPAC bag room	Threading on out feed of valve from ¾" drop leaking	40	1.6	
16	SAPAC bag room	Pneumatic unit leaking through exhaust	46	2.0	Pneumatic unit was not running at the time.
17	Super Sack Room	Air gun leaking near trigger of unit	54	2.6	
18	Super Sack Room	Threading on in feed of regulator is leaking near union.	40	1.6	
19	Wiegant Evap.	1" union leaking on in feed to "Foam it"	62	3.3	This leak was tagged by previous leak study
20	Wiegant Evap.	PC 1 outlet FV4619 leaking	60	3.1	
21	Wiegant CIP room	¼" poly tube fitting	37	1.4	Tagged fluid line below. Leak recorded at 4' away
22	Wiegant CIP room	Hole in ¼" poly line.	58	2.9	
					Total CFM: 55.9

Increase compressor room piping size to six inch, for the collection header, and add two x 2,000 gallon storage tanks outside of Compressor Room 2 to help with the future consideration of a smart control system. By adding additional storage it allows units to operate more efficiently, with complete blow down and idle, by allowing the storage to supply peak demands without affecting the overall system. Install an auto open valve to tie the two systems together on a pressure signal or isolate each system. We recommend utilizing a flow based control system and flow meters.

Compressed Air Leak Survey

Most plants can benefit from an ongoing air leak management program. Generally speaking, the most effective programs are those that involve the production supervisors and operators working in concert with the maintenance personnel.

A partial survey of compressed air leaks was conducted at the plant and 22 leaks were identified, quantified, tagged, and logged. Potential savings totaled 56 cfm for the 22 leaks that were identified. We estimate 10 leaks at 3 cfm each of previously tagged leaks, for an additional 30 cfm.

Air Power USA recommends an ultrasonic leak locator be used to identify and quantify the compressed air leaks. We use an Ultraprobe leak detector manufactured by UE Systems. Shutting off or valving out the air supply to these leaks when the area is idle would save significant energy. Reducing the overall system pressure would also reduce the impact of the leaks, when air to the machine cannot be shut off. Repairing the leaks can save additional

energy. The savings estimates associated with a leak management program are based on the unloading controls of the compressors being able to effectively translate less air flow demand into lower cost.

With a few minor exceptions, most of the leaks could not have been found without the use of an ultrasonic leak detector and a trained operator. Leak locating during production time with the proper equipment is very effective and often shows leaks that are not there when idle. However, a regular program of inspecting the systems in "off hours" with "air powered up" is also a good idea. In a system such as this one, some 80 to 90% of the total leaks will be in the use of the machinery, not in the distribution system.

Some of the areas surveyed in the leak study included a great deal of high background ultrasound noise that shields many of the smaller leaks. In continuing the leak management program, plant staff should perform leak detection during non-production hours in order to eliminate some of the high ultrasonic background noise.

Repair all 22 tagged and identified compressed air leaks as well as the 10 already tagged leaks by plant personnel. Continue your ongoing leak identification program. BP

Number of leaks	32 leaks
Estimated reduction of air flow with proposed project	86 cfm
Recoverable savings from air flow reduction	$117.75/cfm yr
Annual electric cost savings with proposed project	$10,126/year
Unit cost of leak repairs ($25 materials per leak and $75 labor per leak)	$3,200
Total project cost (materials and installation)	$3,200

For more information, contact Don van Ormer, Air Power USA, at don@airpowerusainc.com or visit www.airpowerusainc.com.

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Sizing VFD Air Compressors for MULTIPLE AIR COMPRESSOR SYSTEMS

By Tim Dugan, P.E. President, Compression Engineering Corporation

➤ Introduction

It is becoming a "best practice" to install a variable frequency drive (VFD) air compressor whenever one is replacing an old air compressor. As a result, real systems have fixed-speed and VFD air compressors, mixed. I have observed several VFD compressor sizing methods. In my last article, I referred to a common method: size one VFD compressor for the whole system. This can work. However, if it doesn't meet a higher peak demand, one or more of the old compressors will be started, and a mixed system results. Another method is to replace a compressor with the same size, but with a VFD. If the compressor that was replaced is large, a big VFD is installed. If small, a small one. Yet another method is to segment the system. In all these cases, there is a VFD compressor in a system that has not been really designed. It just happened. Many of these systems aren't operating efficiently or reliably, because system issues and VFD compressor sizing wasn't well thought out.

The goal of this article is to give some pointers for selecting and installing the right size VFD air compressor in a multiple compressor system.

Summary

In a nutshell, I recommend the following when a VFD air compressor is added to a multiple-compressor system:

1. Develop a Solid Flow Profile
2. Determine Flow Ranges for "Trim" Air Compressor(s)
3. Size VFD & Base-load Air Compressor(s) From Variance & Base-load Size(s)

Develop a Solid Flow Profile

When you have multiple air compressors, developing a flow profile might be easier said than done, particularly if there are multiple air compressor stations. Installing one permanent flow meter at the outlet of each compressor station's dryers is the preferable method. They can be easily hot-tapped. Several manufacturers make thermal

Figure 1. Typical Thermal Mass Flow Meter

SIZING VFD COMPRESSORS FOR MULTIPLE AIR COMPRESSOR SYSTEMS

mass flow meters, which are the preferable type. I prefer un meters able to data-log and shipped with a restraint cable. See Figure 1. If your system has regenerative compressed air dryers, you need to add dryer purge to the measured flow profile.

If flow meters are not installed, one must do an "audit" to develop the flow profile. This requires current (or power) and pressure to be data-logged for all air compressors - for a period long enough to develop all typical production profiles, accurate calculations of flow to be made based on measured data and air compressor performance curves, and all compressor flow summed. Even if you are measuring worn-out air compressors, I recommend assigning full factory specified curve flows to the compressor, to be conservative. Data-log at 30-seconds or finer, depending on the load-unload intervals. This is how I have done most of my audits. One should not just scale current to flow by a factor. This will be very inaccurate.

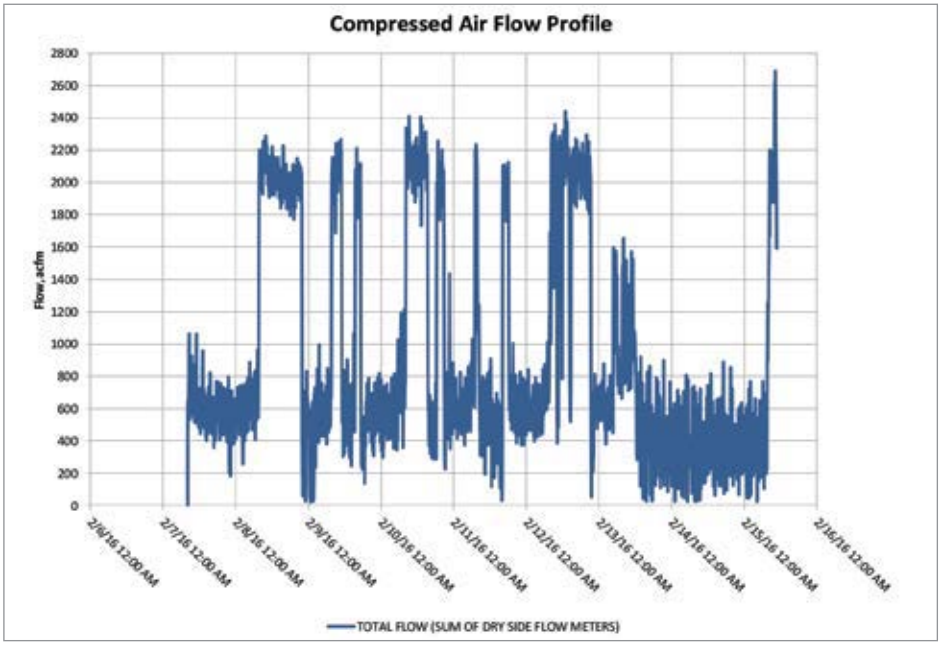

Figure 2. Flow Profile

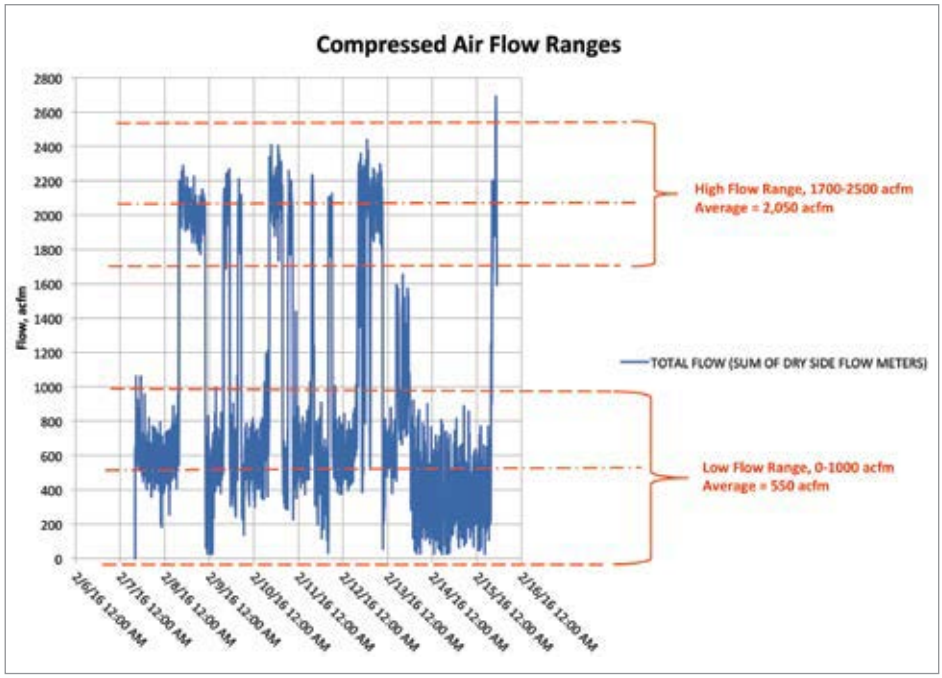

Figure 3. Flow Ranges

In either method, flow metered or calculated flow, one must "dampen out" the flow values numerically (in the Excel model) if there are load-unload or start-stop compressors in the mix. They make the system appear more "peak" than it really is. If the load-unload interval is 2 minutes, I would run a 5-10 min running average on flow to smooth it out.

Then, adjust measured (flow meter) flow to air compressor intake flow, in volumetric units like "acfm" or m3/hr, not normalized units like "scfm" or "nm3/hr". This profile becomes the basis for sizing air compressors, and compressor delivery is the rated at the intake of the package. Use the following formula:

Intake flow = measured flow x 29.92 / Ambient pressure (mm Hg)

I also adjust my flow profile for pressure, since some systems are rather unregulated, and have large pressure variances. This takes more spreadsheet manipulation than you might want to do, but here is what I do, for every data sample:

Adjusted flow at P2 = flow at P1 x [1 + unregulated ratio x (P2 – P1)/100]

For one large aerospace customer of mine, I got their thermal mass flow meter data, which they logged in their SCADA system, validated it, and summed it. In this case,

I was recommending heat-of-compression dryers, so I didn't add back dryer purge. See Figure 2. Note the high variance in flow, and the "two mode" behavior. Note also the high "noise" in the data. Even after dampening, the noise is significant.

In Summary

Develop an Excel model of the full range of flow that the entire compressed air system has to develop, for all typical production days, when the system is under a controlled pressure.

Determine Flow Ranges for "Trim" Air Compressors

This step requires "eyeballing" the above flow profile. That isn't a skill I learned in engineering school, but in the real world of doing hundreds of compressed air analyses. In the aerospace project example, clearly there are two modes. High flow, which is a testing process that simulates airborne operation of auxiliary hydraulic units, and low flow, which is general pneumatics for HVAC plus maintenance. This is a "batch" process. Your plant might not vary this much. I am using this as an example, because at least half of my projects have large swings in air flow, and your plant might vary more than you think. Many operators say "my flow is constant", and then I do the audit, and it has a large variance. It only takes one 1" valve to open to create a 1,000 scfm demand peak, and it might be muffled from the operators so they don't know it's happening.

First, throw out obvious outlier data. One typical data set to ignore is pumping up the system after it has been shut down. In this data set, it was always pressurized. Other outliers might be for a short enough period of time that you effectively ignore them for primary compressor sizing, and expect the back-up compressor to capture it. Like the peak on 2-15-16 at about 10AM in this data.

Second, look for ranges that are close to the same in max-min difference. This data shows two ranges that are about 800-1000 scfm max-min. See Figure 3.

Size VFD & Base-load Air Compressors From Variance & Base-load Size

As described in the last article on sizing VFD compressors for single-compressor systems, you should stay in the 30% to 80% range most of the time. In this profile, the low end appears to go to zero often. Clearly, that is data noise. The system is too big to do that. So, if you wanted to size a VFD air compressor to magically work in those two ranges, you would want about a 1200-1300 acfm unit, with an

SIZING VFD COMPRESSORS FOR MULTIPLE AIR COMPRESSOR SYSTEMS

800-1000 acfm turn-down on speed control, or about 500-1300 acfm on speed control. However, you have to have a 1200-1300 acfm base-load compressor in the system to run at the high flow end, so your options are limited to the set of base-load compressors that make the most sense overall, and whether they are being replaced at the time the VFD is being installed.

I'll stop here and give you a couple rules of thumb that can work well for multiple-compressor system design:

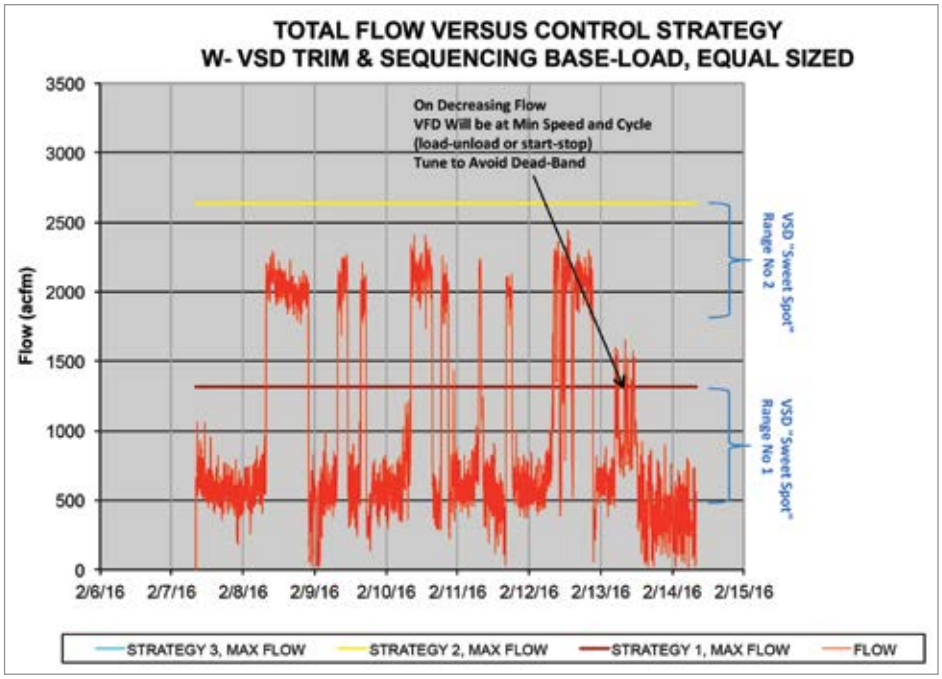

Figure 4

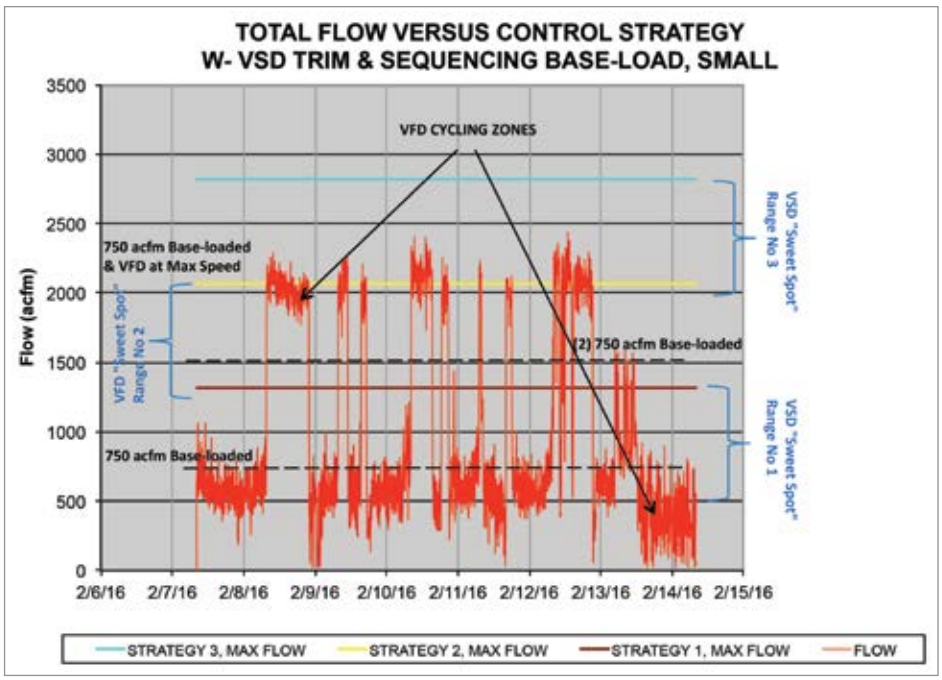

Figure 5

1. Always have a sequencer, and one that can control the VFD compressor as "fixed trim", not as one of the compressors that is staged in and out.

2. Always have adequate storage. Other articles have been written on this, but I like to have at least 3-5 gallons per acfm with oil free screw and 6-10 with lubricated.

3. For fixed-speed compressors, equally-sized, sequenced compressors of the same type, with one spare at peak, is always the most robust design.

4. If a VFD compressor is in the system, it should stay in "trim" all the time. Ideally, just one of them, and in its sweet spot, 30-80% speed, most of the time.

5. To avoid "dead-band" control problems, the VFD compressor needs to be slightly larger than the base-load compressor, certainly not smaller.

I'll run through three options on this flow profile, and you will see what works best. In the real world, it will depend on what base-load options you are constrained to.

Option 1. Two (2) Equally-sized Air Compressors (VFD and Base-load)

Air Compressor selections:

- (1) VFD: 1300 acfm, 500-1300 acfm speed range
- (1) Base-load (+ 1 standby): 1300 acfm/ea

This can work, if the flow doesn't land in the mid range very often. As shown in Figure 4, this isn't often the case in this system. However,

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SIZING VFD COMPRESSORS FOR MULTIPLE AIR COMPRESSOR SYSTEMS

if your demand floats randomly up and down, and would be in the middle 20% of the range a lot, I would not use this design. You would short-cycle between the VFD and base-load compressor frequently.

Here are some observations:

- Low Flow: VFD Cycles
- High Flow, VFD in Sweet Spot
- Look Out for Mid Zone, 1300-1800 acfm, "Dead Band
- *OK for "2 Mode" Profile. BAD in Mid Range.*

Recommendation:

- *Don't use if flow is in mid range >10% of the time.*
- *Size storage and tune controls to dampen out transition from 1=>2 and 2=>1 compressors running.*

Option 2. Larger VFD and (2) Equally-sized Base-load Air Compressors

Air Compressor Selections:

- (1) VFD: 1300 acfm, 500-1300 acfm speed range
- (2) Base-load (+ 1 standby): 750 acfm/ea

This is an attempt to follow the rules of thumb most rigidly, with available sized compressors. The challenge with this flow profile is the large jump. It outstrips one base-load and the VFD often, requiring the second base-load to start. See Figure 5. This would normally be a "best-practices" design if the flow varied more randomly. But this is the real world, so let's see how it works. See Figure 5.

Here are some observations:

- Low Flow, VFD cycling in low range
- High Flow, After 2nd Base Starts, VFD swings back, cycling in low range
- *Small base-load is GOOD in general, but watch the VFD low range.*

Recommendations:

- *Size storage and tune controls to dampen out transition from 1=>3 and 3=>1 compressors running.*
- *Avoid 2=>3 and 3=>2 operation by sequencer timers. Give the VFD sufficient time to spin back and stabilize with two small base-load compressors running.*

Option 3. Oversized Base-load Air Compressor

Air Compressor Selections:

- (1) VFD: 1300 acfm, 500-1300 acfm speed range
- (1) Base-load (+ 1 standby): 2000 acfm

This violates all the rules. I'm illustrating it to show why you shouldn't do it. I have frequently had facility engineers clients who want to have a "large" base-load and a "small" VFD compressor. They are thinking about one load only, a flat demand at a flow rate they think they are at. They are not thinking about the flow ranges where this model falls apart, which will likely happen over the life of the system. In some cases, there is a newer large base-load compressor already in the system, and a new, smaller VFD trim compressor is added.

I call the middle range "no-man's land". Technically, it is a "dead band" control problem, where the control ranges of both the trim and base-load compressor are overlapping. Both will try to meet demand, and the system will be unstable. See Figure 6.

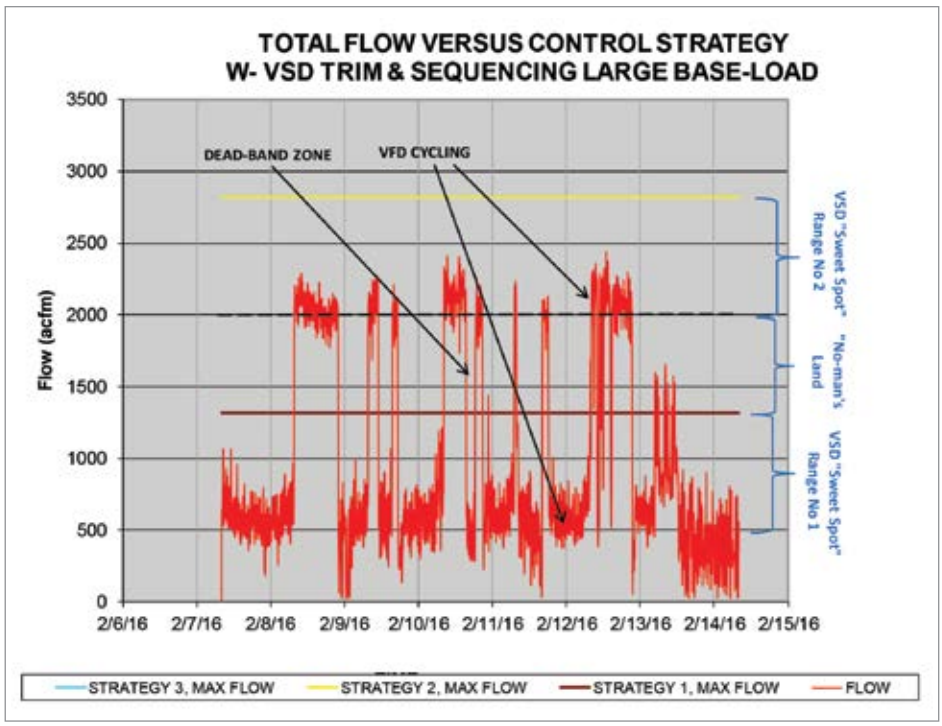

Figure 6

Here are some observations:

- Low Flow, VFD cycling
- Mid Flow, base-load & VFD cycle, unstable
- High Flow, VFD cycling
- *Large Base-load BAD*

Recommendations:

- *Don't do it, if you can avoid it.*
- *If it's unavoidable, use flow-based controls and upper range modulation with the base-load compressor so it runs the system alone in the mid range. This is a custom controller.*

Conclusions

To match a VFD to a multiple air compressor system, do the following:

1. Develop a solid flow profile
2. Observe profile, and determine ranges for trim compressor to operate
3. Always include a master controller and storage in the system, designed to control the trim compressor as "fixed trim".
4. Size trim and base-load compressors in a way that avoids short-cycling and dead-band problems. *In general, it is safest to size the VFD 1.5 X the base-load, and to have equally-sized, sequenced base-load compressors, with one spare.* BP

For more information, contact Tim Dugan, tel: (503) 520-0700, email: Tim.Dugan@comp-eng.com, or visit www.comp-eng.com.

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SHOW REPORT:
Compressed Air Technology at the
AICD CONFERENCE & EXHIBITION 2017

By Rod Smith, Compressed Air Best Practices® Magazine

AICD President Phil Kruger and Sullivan Palatek's Bruce McPhee (left to right).

Jan Hoetzel, Steve Briscoe and Dan Ryan, from the Compressed Air Challenge®, made a presentation at the conference (left to right).

The 2017 AICD Conference and Exhibition was held May 21-23 at the Grand Sierra Resort in Reno, Nevada. The membership of the Association of Independent Distributors came together to share ideas and discuss business methods to help their businesses prosper. "The AICD has grown by 15% with 9 new distributor members," said AICD President Phil Kruger. "The event provides both members and vendors with excellent educational and networking opportunities designed to help grow our businesses."

The Conference

The Keynote Speaker was Mike Weinberg, the author of *Sales Management Simplified.* The focus of his presentations was on the role and effectiveness of the Sales Manager. He covered many areas – all of them very applicable to those running air compressor sales and service companies. Topics included sales talent management, supercharging sales team meetings, a list of 16 common reasons sales teams underperform, recruiting and interviewing, sales process, sharpening the sales story, solving customer issues, and a sales leadership/high-performance culture checklist. I thought it was an excellent presentation demonstrating what a huge impact a strong sales manager can have on an organization. Yes, he did convince me to buy his book!

Break-Out Sessions included round-tables on business diversification and maintenance contracts vs. agreements and a presentation from

the Compressed Air Challenge®. It is interesting to be in a room full of owners and sales managers, of air compressor distributorships, talking about diversification. Diversification can involve geographic expansion, compressed air product or service capability expansion, or expansion into other related technologies such as blowers, vacuum, chillers and cooling towers (to name a few of my favorites)! Every company had a different history and perspective on the topic. Many firms pointed to their diversified product offerings. Others said diversification is a distraction and can cause the company to lose focus on the core air compressor business. While it's clear there is no single right answer or strategy on diversification, all agreed the topic should only be broached if the core air compressor business is excelling and receiving the full investment required. "For smaller companies with resource constraints, diversification can make the most sense in rethinking and repackaging what you are already doing," said AICD President Phil Kruger. "Existing preventative and predictive maintenance services like oil analysis, thermography, and vibration analysis can be repackaged and presented in different ways."

The Compressed Air Challenge® was represented by President Steve Briscoe and Board Members Jan Hoetzel and Dan Ryan. They gave the attendees an informative presentation on the training programs they run and encouraged air compressor distributors to consider hosting a seminar. They particularly recommended the "Fundamentals of Compressed Air Systems" one-day seminar.

The Exhibition – Air Compressors

The exhibition portion had at least 70+ companies exhibiting and during the hours allocated, I only had a chance to visit (rapidly at that)

Kevin Ray and Biren Bhalla next to the Huron B10 Airsystem at the DV Systems booth (left to right).

Robert Groendyke and Elif Sasmaz next to the Hertz Kompressoren HDD Series direct drive rotary screw air compressor.

Mark Duty, Chris Canipe, Rick Walsh (Q-Air), Roy Douglass (Air Technology West), Lane Hawkinson and Jeff Brennan (Compressed Air Power) at the Rogers Machinery booth (left to right).

> **"The event provides both members and vendors with excellent educational and networking opportunities designed to help grow our businesses."**
>
> **— AICD President Phil Kruger**

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Randall Corthouts, Adrian Fernandez, Josh Borrego, Eric Johnson and Jorge Ubeda next to the DRYPOINT RA variable speed drive refrigerated dryer from BEKO Technologies (left to right).

Anthony Yacucci and Aaron de Koning displayed new JORC remote monitoring and control of compressed air condensate management systems (left to right).

Mike Lewis, Ray Brahm, Roger Michael and Chris Spainhower next to the new Hankison FLEX energy-saving refrigerated dryer from SPX FLOW (left to right).

a small sampling of the booths. My apologies go out to all the booths/exhibitors not mentioned or photographed here.

DV Systems exhibited the Huron B10 Airsystem. Kevin Ray and Biren Bhalla were kind enough to describe this interesting single-phase system featuring an extremely low maximum 55 Amp draw enabling installations for customers uninclined to convert to 3-phase power. They told me it was introduced five years ago and has been extremely well received. The features on this 10 horsepower variable speed, direct drive unit include a 68 dBa enclosure, standard TEFC motor, an advanced controller able to sequence up to 8 compressors, a refrigerated dryer with prefilter, a 80 gallon horizontal dry tank with an optional demand drain. The system can deliver 37 scfm at 145 psi.

Sullivan Palatek continues it's story of steady growth focusing on reliable products and long-lasting partnerships with distributors. President Steve Van Loan gave me a product update saying the SP16 Series (75 to 125 hp) has newly upgraded airends providing higher energy efficiency – particularly on the 75 hp model. Their customers and distributors like how the standard product is an open configuration – with sound attenuation packages, Wye-Delta Starters and everything else as convenient options. We will be writing more about Sullivan Palatek this summer. They've been in their consolidated and expanded manufacturing headquarters for a few years now and it's about time we took a look! We are also very impressed and supportive of Bruce McPhee's work dissuading the Department of Energy from attempting to regulate air compressor manufacturing – likely elevating the cost of manufacturing significantly and putting most smaller packagers/manufacturers out of business. Why attempt to regulate for 2-5% efficiency gains when the industry is improving efficiency on it's own in order to compete? Why regulate the air compressor when, on average, 25% of compressed air continues to be lost to leaks in the system?!

The Kobelco oil-free rotary screw KNW Series is a two-stage 20 to 500 hp fixed speed or VFD product line delivering 72 to 2400 scfm at pressure ranges from 40 to 150 psig. Sales Manager Lane Hawkinson said the growth of the product line has been as robust as the heavy-duty two-stage compression module which is designed, tested and manufactured in the USA. They use ASTM 1144 steel rotors with exclusive PTFE coatings. Hawkinson said they've upgraded the I/O Link communication capabilities tied into the Allen Bradley PLC. Rogers Machinery, by the way, is doing very interesting heat recovery package installations – more to come on that later this year.

Hertz Kompressoren is entering the U.S. market and had their first booth at the AICD. Robert Groendyke is the Vice President and General Manager of their Charlotte-based U.S. subsidiary. Hertz Kompressoren is the brand name, for all international markets, for the parent company – Dalgakiran Kompresor. I have seen them exhibiting for many years at the Hannover Show. They have been in business for over fifty years. They told me their "phase 1" in the U.S. will be with UL and ASME approved HDD Series, direct drive, lubricated screws up to 75 horsepower. The full HDD range is from 22 to 335 kW.

Schulz of America has been based outside of Atlanta since 1999. Sales Manager Terry Emery demonstrated their new 7.5 hp model for their Compact belt-drive rotary screw compressor line (7.5 to 40 hp) offered with a standard horizontal 60 gallon tank. They are also excited about the late 2017 launch of their new FLEX drive line of VSD compressors (25 to 250 hp).

BOGE is introducing the new and updated C-2 Series lubricated rotary screw compressors specifically for the U.S. market. The 15-30 horsepower units are now direct driven with standard options such as variable speed drive, tank-mounted and heat recovery. Sales Manager Jerry Elsen and Regional Manager Curt Greifer expect this product line to have a significant impact on their business.

Hitachi General Manager Camilo Villalobos was talking about their oil-free rotary screw air compressors with standard 3-year warranties. The DSP Series range is from 30 to 300 hp and the SDS Series range covers 335 to 900 hp. I didn't know they could reach 900 hp with an oil-free rotary screw! Trivia time: did you know Hitachi introduced their first air compressor in 1911? It was a 75 kW reciprocating air compressor.

The Exhibition - Compressed Air Purification, Piping and Measurement

BEKO Technologies continues to innovate and was exhibiting their DRYPOINT RA VSD variable speed dryer rated for 800 to 6000 cfm and are in stock (Atlanta) up to 3000 cfm. These units use R407c and R134a environmentally-friendly refrigerants. The unit has high pressure and low pressure transducers for refrigeration system troubleshooting and a 160°F maximum inlet temperature.

JORC introduced several new Industry 4.0 concepts into the compressed air condensate management technologies starting with a new timer drain concept. They have eliminated the potentiometers (the time cycle knobs)! You can program the ON and OFF intervals from your smart phone. A key advantage is the knobs can't be tampered with and left

Jim Ellis (Brehob) and Allan Hoerner next to the innovative new modular desiccant dryer at the Parker GSF booth (left to right).

Howard Kielar, Craig Thoresen and Roberto Bettin at the MTA booth (left to right).

Nitin Shanbhag, Michael McCulley (Quality Compressed Air Services) and Volkan Ayhan at the Mikropor America booth (left to right).

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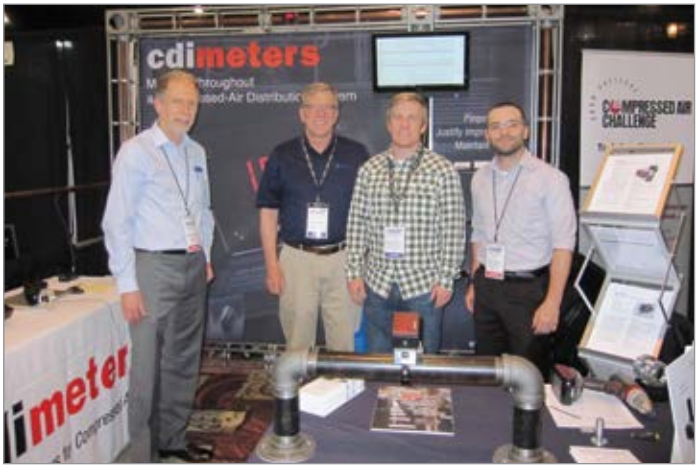
Nick Herrig, Jane Sexton, Simon Galloway and Jim McFadden at the nano booth (left to right).



Roger Dennison, Rob and Michael Merrion (Remco Equipment) and Chris Corsino at the CDI Meters booth (left to right).

Keith Beatty and Paul Heston reviewed "Safety Shower Water Tempering Systems" at the Hydrothrift booth (left to right).

ON as we often see. President Jan de Bie also showed me their "no air-loss" KAPTIV-CS drains, where they've introduced a digital sight port so one can monitor the condensate level in the reservoir and monitor the operation. JORC introduced their vision of being able to wirelessly monitor and control all drain and oil-water separator operations to ensure reliable condensate management.

SPX FLOW launched the new 75 to 550 scfm FLEX Series of phase change material (PCM) energy saving refrigerated dryers. Sales Manager Ray Brahm told me they expect to launch units up to 3000 scfm by the end of the year. These cycling dryers feature a controller with a digital readout communicating the percentage savings at that moment in time. The units have oversized condensers and demand drains on the condensate separator. The new technology is what they call PCM (phase change material) encapsulated between the refrigeration and compressed air circuits and serving as a highly effective reservoir for thermal storage. The 3-in-1 heat exchangers using PCM are patent pending. This cycles the refrigerant compressor less often than conventional energy-saving designs. Another benefit is that the PCM itself is an eco-friendly refrigerant that melts and solidifies above 0°C (32°F) and does not require the use of glycol, pump, tank or hot gas bypass.

After private labeling for a number of years, MIKROPOR is now aggressively introducing their own brand of compressed air treatment products into the U.S. Corporate Vice President Volkan Ayhan announced the appointment of Nitin Shanbhag as President, Mikropor America. Their effort is supported by their 75,000 square foot warehouse in Michigan City (Indiana) - fully stocked with UL and ASME approved MKUS refrigerated dryers, desiccant dryers and filters. Mikropor participates in the CAGI Testing program for refrigerated dryers.

Parker's Gas Separation & Filtration (GSF) Division had a very important product launch at the AICD. Allan Hoerner was kind enough to walk me through the new Parker Airtek CDAS (Clean Dry Air System) and OFAS (Oil Free Air System) featuring the newest generation of adsorption drying technology. Deploying an integrated activated carbon filter for oil vapor, the OFAS is third-party validated by Lloyds Register to provide ISO 8573-1 Class 0 compressed air - with respect to total oil content. The packaging and design of these units makes me think I could even do the maintenance. Features include threaded top end-caps for speedy desiccant cartridge replacement and a 5-year cartridge life. Pre-mounted Parker domnick hunter OIL-X pre-filters and after-filters are front-mounted and easy to get to. A prominent large HMI display screen cleverly allows users to select from three ISO 8573-1:2010 pressure dewpoint classes: -4°F (Class 3), -40°F (Class 2), and -94°F (Class 1).

This feature, along with the ability to automatically extend purge cycles to respond to varying inlet and ambient conditions, allows for energy savings in the form of reduced purge air. I was extremely impressed these two new innovative products.

MTA continues it's history as a leader in cycling energy-saving refrigerated air dryers. Howard Kielar and Roberto Bettin showed me their DE ETM (Enhanced Thermal Mass) cycling dryers which have just arrived in the U.S. Very innovative! We also reviewed the DEi TECH refrigerated dryers and the TAEevo TECH chiller range from 1.7 TO 57.5 tons. MTA USA is on a growth surge with the largest regional manager sales force I've seen them have capitalizing on a strong surge of very interesting new product development coming from Italy. As a side note, their vertical market approaches are very innovative – Western Regional Manager Craig Thoresen always has me learning a thing or two about business development (my favorite topic!) when we meet.

Nano-purification solutions has a strong focus on nitrogen generation. Nick Herrig said their modular nitrogen generators continue to take market share away from dewars and other traditional nitrogen supply methods. INFINITY aluminum piping systems, supplied by applied system technologies, had an impressive booth. What jumps out is their solid brass, nickel-plated fittings making the system easy to use and install. Regional Manager Chris Downs said the systems can be handled and installed easily by one person.

CDI Meters was introducing their new CDI 5450 hot-tap flowmeter for compressed air systems. They gathered quite a crowd! The CDI 5450 is a modified version of the 5400 model allowing installation under pressure. It incorporates two valves through which the probes pass and a muffler that collects chips from the drilling process. It takes an equal amount of installation time as the standard flow meter. Very interesting new technology!

Once again, the AICD exceeded expectations plus every one has a great time. I hope this report provides a taste of what happened – there's no way to cover the whole event and do all the exhibitors justice in these short pages. I'll note the event is run perfectly - with no hitches. The 2018 AICD will be held May 20-22 in San Antonio, Texas. For more information, please contact Kasey Gould, AICD Administrator, tel: 409-860-9961, email: admin@aicd.org, or visit www.aicd.org BP

To read more about Compressed Air Technology,
please visit www.airbestpractices.com/technology

Rodney Rushing and Jim Hamilton introduce me to their Sublime® water scale solvent at the Summit Industrial booth (left to right).

Fabio Rosa, Mark Nelson and Terry Emery at the Schulz booth (left to right).

Chad Timmer, Malcolm Lindsay and Chris Downs at the Applied System Technologies booth (left to right).

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TECHNOLOGY PICKS

Sullair Expands Oil Free Offerings with OFC Series Compressor Line

Sullair, an industry leader in innovative compressed air solutions since 1965, announced the addition of the Sullair OFC Series, a brand new line of completely oil less scroll air compressors. The new line is a more efficient, cost-effective option for customers seeking oil free compressed air in a lower horsepower range.

"Our oil free division has seen exponential growth since our refocus in 2015," said Manhar Grewal, product manager - Oil Free & AirLinx.™ "Our customers have been asking for a lower horsepower option, and this provides that option. The new Sullair OFC line is a natural extension of our product offerings that allows us to provide customers with an even broader range of complete air solutions."

Available in horsepower ranges from 5 to 40 hp (3.75 to 30kW), Sullair OFC Series air compressors are capable of providing pressures nominally rated from 85 to 145 psi (6.5 to 10 bar) with flows from 12 to 118 acfm. These types of air compressors are beneficial in industries that require lower flows of 100% oil free air, including dentistry, pharmaceuticals and specialty trades.

The Sullair OFC Series utilizes scroll compression – which not only makes the units low maintenance but also extremely quiet – as low as 56 dBA. The Sullair OFC series air compressors are also very energy efficient to help keep customers' energy demands and expenses low. The Sullair OFC Series is currently available to customers in the United States as well as Latin and South America.

Under the ISO 8573-1 Class Zero certification, the Sullair OFC Series offers 100 percent Class 0 oil free air for applications in which air purity is essential. Sullair OFC Series air compressors are available in enclosed and tank-mounted options, and all models are available in both 230- and 460-volt configurations.

The OFC Series joins the expanding line of Sullair oil free options. In addition to the new scroll offering, Sullair provides customers with rotary screw and centrifugal options. The rotary screw offering includes the Sullair OFS Series of oil free air compressors, which features models ranging from 100-350 hp (75-261kW). Sullair centrifugal offerings provide pressures up to 600+ psig and flow rates to 130,000+ SCFM.

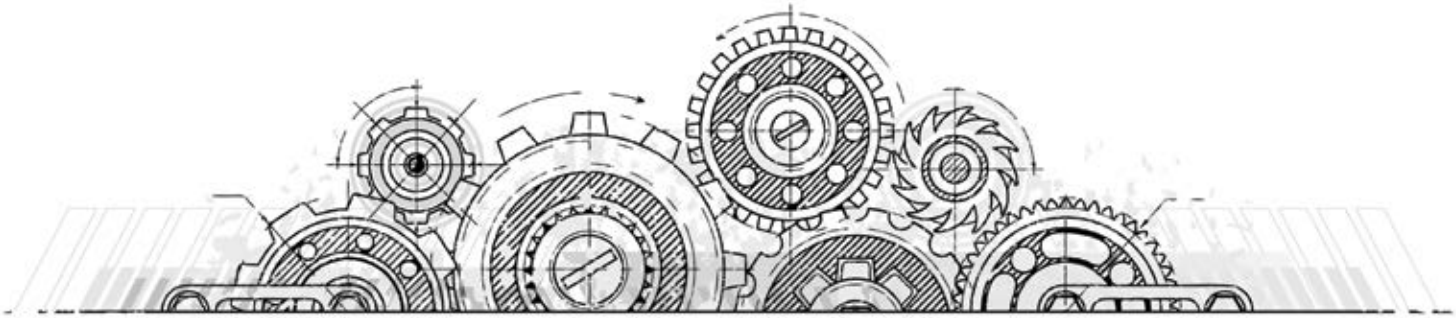
Customers can learn more about the new Sullair OFC Series by visiting www.Sullair.com or by contacting their local distributor.

Sullair has announced a brand new line of oil less scroll air compressors.

About Sullair

Since 1965, Sullair has developed and manufactured air compressors with proven reliability and wear-free durability. Sullair is globally recognized as a leading manufacturer of portable air compressors, contractors' air tools, stationary air compressors, compressed air treatment equipment and vacuum systems. Additionally, Sullair provides customers with a full line of aftermarket parts, fluids and services. Sullair has manufacturing capabilities in Michigan City, Indiana; Shenzhen and Suzhou, China; Mahindra World City, India; as well as a JV (IHI-Sullair) based in Suzhou.

For more information, visit www.sullair.com.



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New BOGE Scroll Air Compressors for Oil-Free Compressed Air

Whether in medical technology, pharmaceuticals or the food processing industry – cleanliness is paramount. BOGE Kompressoren has now extended its EO range of oil-free scroll air compressors to ensure full protection from contamination. The Boge EO Series is available in simplex, duplex, triplex or quadplex packages covering the full performance range of 5.5 kW, 11 kW, 17 kW and 22 kW. Alternatively in an upgrade-ready version, the EO 11, for example, can be ordered with an integrated or separate refrigerant compressed air dryer, mounted on a tank as a duplex system. Its compact design combined with operation at 59 dB(A) means there is no problem installing the system next to the workplace.

BOGE's oil-free EO air compressors meet the requirements of oil-free compressed air for sensitive applications. The recipe for success here is the scroll compressor technology operating without oil lubrication. The aluminum spirals in the compressor chamber interlock but do not touch. The resulting compressed air is pulsation-free and absolutely free of oil. In the medical sector, such as dental practices and clinics, pure compressed air protects the health of patients while preventing the contamination of highly sensitive equipment. "When it comes to food processing for example, such as wine bottling, EO scroll compressors are perfect for connecting to a nitrogen PSA generator from BOGE's NP series. Nitrogen helps to prevent bacteria forming in the bottle, which benefitting the fermentation process. The result, "an improvement in the shelf life and quality of the product," explains Jerry Elsen, General Manager at BOGE America.

Modular, Compact, Application-Oriented

Up to four air compressors can be installed in a common enclosure to ensure flexible adaptation to the compressed air demand. At 10 bar the EO series can cover delivery rates from 490 l/min to 1,960 l/min, while at 8 bar the supply of compressed air ranges from 620 l/min to 2,480 l/min. Featuring a modular design, the EO series can be ordered with an integrated or separate refrigerated compressed air dryer. Available in base or tank mounting.

Flexibility – more than just a catchword

BOGE's control system, focus control 2.0, can regulate up to four EO scroll compressors horizontally with base load switching, thus ensuring efficient control for as many as 16 compressor units. And when maintenance is required, users benefit from unrestricted operation of the compressed air system. Durability and efficiency are backed up by a two-stage cooling concept. A primary surface cooler systematically cools down the compressed air along with an aftercooler in stainless steel. The pressure dew point for delta t is approximately 8° K.

About BOGE Compressors

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

For more information visit www.boge.com/us

The new BOGE EO scroll air compressor range covers the performance segments from 5.5 to 22 kW.

TECHNOLOGY PICKS

New Kahn Instruments Cermet II Dewpoint Hygrometer

Kahn Instruments, Wethersfield, CT, a leading manufacturer of advanced moisture-measurement instrumentation, announced the new Cermet II Dewpoint Hygrometer. Cermet II is a panel-mounted instrument designed for dewpoint measurement from -148˚F to +68˚F with typical accuracy of ±1.8˚F.

Applications include dewpoint monitoring of non-flammable gases, such as air, nitrogen, sulfur hexafluoride, carbon dioxide, helium or argon in a wide range of industrial and commercial applications.

Cermet II consists of a digital display with integral signal conditioning board, interconnecting cable and the advanced Kahn Cermet II Moisture Sensor. The sensor can be inserted directly in the gas line or in a separate sampling system by using the optional sample block. The display can easily be mounted in a control panel or other appropriate location. When used in conjunction with an intrinsically safe barrier unit, the Cermet II, with a dedicated sensor, may be used in environments containing flammable gases.

Standard Cermet II features include a NEMA 4 sensor housing, user selectable 4-20 mA or 0-10 VDC analog output, dual alarm relays, automatic temperature compensation, manual and automatic pressure compensation, and user selectable display units, including ˚C, ˚F, PPMv, #/MMSCF and g/m^3.

Cermet II incorporates intelligent, microprocessor-based architecture in the advanced Kahn Cermet II Moisture Sensor. The sensor utilizes Kahn's unique ceramic based moisture sensing technology which is highly resistant to contamination and whose calibration is backed by the longest warranty available in the marketplace. All sensors are fully interchangeable and calibration is traceable to the National Institute of Standards and Technology.

For more information contact Kahn Instruments, Inc., email: hygros@kahn.com or visit www.kahn.com

Bimba Enhances Flat-1® Compact Air Cylinders

Bimba, an industry-leading innovator of pneumatic, hydraulic and electric motion solutions, announced the release of the latest in its cutting edge, compact air cylinders – the Blue and Improved Flat-1®. "Blue (as in *New*) and Improved" designates Bimba products that have been redesigned to offer enhancements applying the most recent advances in design technology.

The Blue and Improved Flat-1® features 19 new product enhancements such as permanent grease lubrication, an improved bumper design and hard chrome-plated piston rods with an option for stainless steel. The Blue and Improved Flat-1® continues the Blue and Improved program initiated a few years ago with the release of the Blue and Improved Original Line®.

Kent Sowatzke, Bimba's Chief Operating Officer, says, "The Blue and Improved Flat-1® project reflects Bimba's continued commitment to improving our core products and providing solutions that serve our customers in the compact cylinder market. For applications in which space is tight, the Blue and Improved Flat-1® offers durability and precision, across an industry-leading breadth of cylinder options."

Bimba's Blue and Improved Flat-1® cylinder has 19 new features

To celebrate the release of the Blue and Improved Flat-1®, Bimba is offering its customers an opportunity to win a trip for two to Pack Expo 2017 (September 25-27) in Las Vegas. To qualify, contestants must submit fun photos of the new Flat-1® character in amusing and interesting places. The customer who submits the picture of the Flat-1® character with the most original photo placement will receive two free airline tickets and three nights complimentary lodging at the Mirage Hotel. The highlight of the trip will be a visit to *Dig This Las Vegas* where the Bimba team will present the winners the opportunity to

Bimba is offering customers the chance to win a trip for two to Pack Expo 2017. To win, contestants must submit photos of "Flat Charlie" in unique places.

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operate heavy construction equipment to "flatten" various objects such as cars in a large "sandbox for adults."

About Bimba: "We Make Things Move®"

Bimba is a forward-thinking innovator providing industry-leading pneumatic, hydraulic, and electric motion solutions that are easy-to-use, reliable and ready for all engineering solutions. Including its brands Acro, TRD, Vaccon and the Pneumatic Controls Group (Mead/MFD/Pneumadyne). Bimba markets an extensive line of industry-leading products including pneumatic, hydraulic, and electric actuators; valves; fittings; vacuum products; air preparation and a variety of safety and production solutions. In addition to its broad line of standard catalog products, the company's business develops many custom and semi-custom products designed for specific customers and applications. These products, used in machinery and automation, are sold to original equipment manufacturers and end-users throughout the world in an expanding variety of industries.

For more information about the The Blue and Improved Flat-1® and to print off your Flat-1® character, visit bimba.com/flat.

Martech Waterborne Breathable Air Combo System

As the use of waterborne paints becomes more popular and in some areas, required, the need for clean and dry compressed sprayable air is a critical component. The need for the proper filtration to remove moisture, oil vapors, gaseous hydrocarbons, dirt, rust, scale, and other potentially dangerous contaminants is clear. Then if the dew point and relative humidity can be drastically lowered, you can create a quality of spray air necessary to properly apply today's waterborne paint products.

Tom Wright, Director of Sales & Marketing for Martech Services Company, says "The Model 50-WB has all the features of a *Quality Air Breathing System,* Model 50 series system, plus the additional ability to lower the dew point and relative humidity for spraying waterborne paints." Further, Wright states, "it only makes sense that if the air is safe for breathing air, then it would be superior sprayable air. Add to that, a way to lower the dew point and the relative humidity and you have a complete combo system."

The convenience of having a solution to comply with OSHA regulations for proper air supplied respiratory protection, and delivering ***Ultra Clean & Ultra Dry Air*** from a single system,

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is cost effective and efficient. The Model 50-WB can process up to 50 SCFM of Breathable Air or 35 SCFM of ***Ultra Clean & Ultra Dry Air,*** or any combination within those parameters.

The Model 50-WB is designed to work with your existing compressed air source to properly filter and monitor the compressed air for Grade "D" Breathable Air, plus this system also provides ***Ultra Clean & Ultra Dry Air*** for use in spraying waterborne or solvent based paints.

This system can handle up to two painters at the same time. The Model 50-WB is a 50 SCFM system, and is also available in an 80 SCFM system.

For more information please contact Martech Services Company at 1-800-831-1525, or on their website at: www.breathingsystems.com

The Martech Services Model 50-WB

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airbestpractices.com

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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.**

"Compressed air encompasses 20 percent, on average, of a Darigold plant's electrical energy spend."

– Uli Schildt, Energy Engineer, Darigold Dairies
(feature article in April 2016 Issue)

"Compressed air is our lifeline. Everything here runs on compressed air."

– Curtis Wood, Facilities Team Supervisor, HAECO Americas
(feature article in June 2016 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.

"Compressed air optimization measures reduced consumption by 31% resulting in 3.8 million kWh and $255,000 in annual savings."

– Abdul Mohideen, Electrical Energy Manager,
PROTON Automotive, Malaysia

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Ad dimensions are 2.36" wide x 3.91" tall. We can help you design the ads. Send us your logo, product photo, and text to rod@airbestpractices.com. We recommend 20-50 total words of text.

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THE MARKETPLACE

TECHNOLOGY

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BUILT BETTER

Clean Sweep!

Air system study yields multiple benefits to bottom line

Problem:

An aerospace parts manufacturer was experiencing high maintenance costs as well as excessive downtime with their compressed air system. Their modulation control compressor caused unnecessary energy usage on the weekends and off peak times, resulting in exceptionally high energy costs. Additionally, problems with air quality led to product rejects and costly scrap rates.

Solution:

A comprehensive Air Demand Analysis was conducted to understand the plant's fluctuating demand. It revealed that the 200 hp modulating control compressor was grossly oversized. With proper controls and additional storage, two 50 hp compressors could efficiently handle the demand and save 871,500 kWh per year. A third 50 hp unit was added to ensure uptime and accommodate growth.

Result:

These sweeping changes created immediate and sustainable energy savings. The combination of more storage, more efficient compressors and master controls drove system specific power consumption down 77%—and that doesn't include the savings from leak reduction. As a direct result of the new air treatment equipment, the plant also saw improved product quality and reduced maintenance on the expensive production equipment that may surpass energy in terms of bottom line benefits.

Specific Power of Previous System:	93.89 kW/100 cfm
Specific Power of New System:	21.14 kW/100 cfm
Annual Energy Costs of Previous System:	$107,431/year
Annual Energy Cost Savings:	$ 87,151/year
Savings Due to Fixing Leaks	$ 12,500/year
Utility Rebate:	$ 92,000
TOTAL FIRST YEAR SAVINGS:	**$191,651**

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

customer.us@kaeser.com