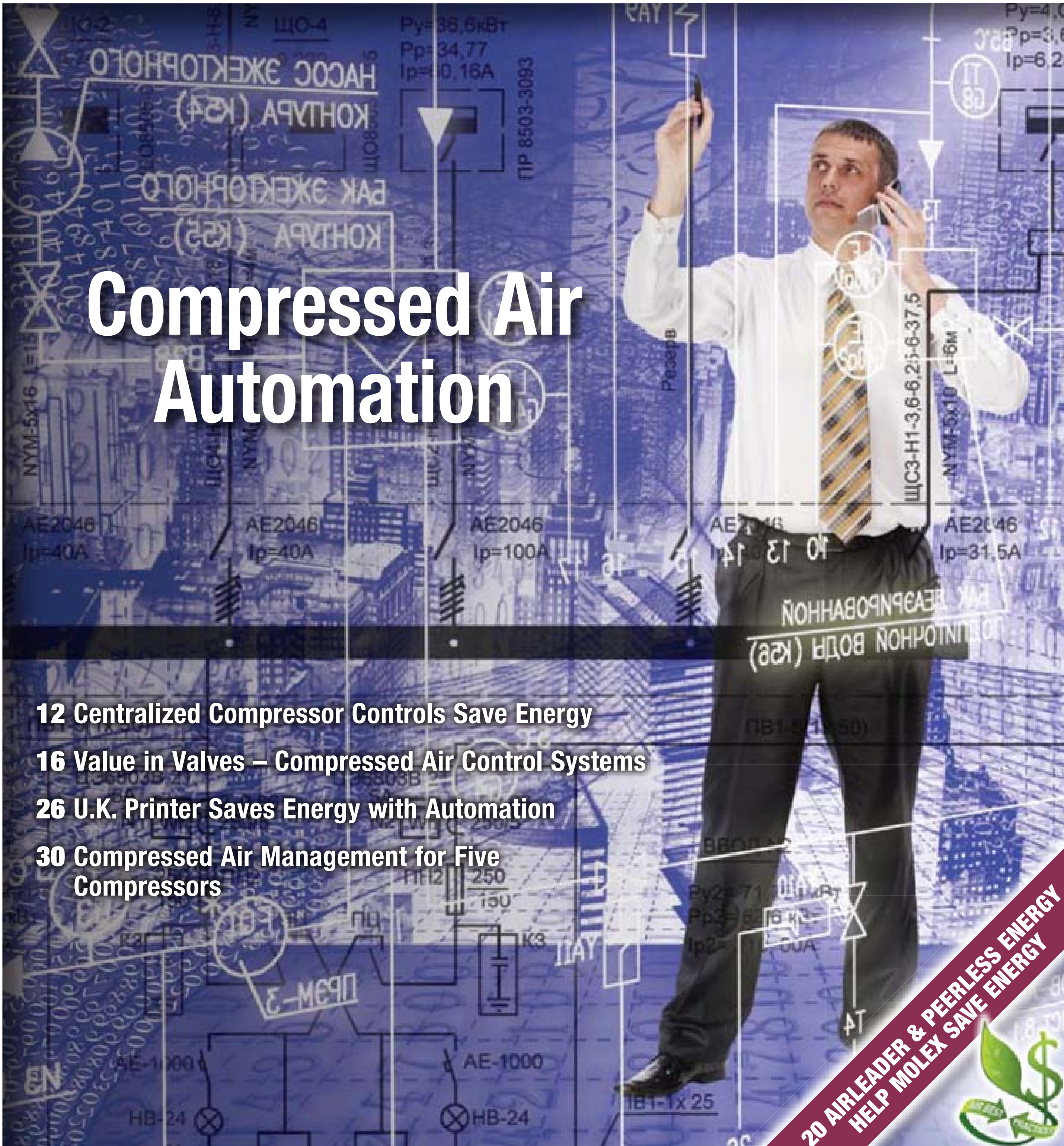
The Magazine for ENERGY EFFICIENCY in Compressed Air, Pneumatics, Blower and Vacuum Systems

COMPRESSED AIR BEST PRACTICES®

airbestpractices.com

August 2012



Compressed Air Automation

Driven by Efficiency
Setting New Milestones in Performance

Hey, I'm Trey, Product Marketing Manager at Atlas Copco Compressors. It's my great pleasure to introduce the next generation of the **GA oil-injected screw compressor range.**

The GA 40-125 horsepower range has been redesigned in line with Atlas Copco's commitment to continuous innovation. Featuring new and improved components that provide unparalleled performance, sustainability, efficiency and reliability, the VSD models deliver up to 35% energy savings, while the premium efficiency fixed speed models offer industry leading Free Air Delivery (FAD).

Visit our dedicated website to learn how this new compressor range can boost your productivity **www.atlascopco.com/drivenbyefficiency** or call **866-688-9611** to learn more about us, our products, and how we have earned and will continue to earn our reputation.

Sustainable Productivity

Atlas Copco

Hitachi SRL Series Oil-Free Air Compressors

Innovation • 100% Oil-Less Design • Superior Sound Quality

SRL Series Simplex
(Single Motor/Single Scroll Configuration)

SRL Series Features

- Patented Labyrinth Lap for extended life and reliability
- World's Largest Unitary Scroll (7.5HP)
- Microprocessor standard with Control Cycle Logic for compressor longevity
- Multi-stage cooling for stable discharge temperatures
- Highest Air Purity
- Environmentally Friendly
- Low cost of operation
- Ultra low sound with standard quiet enclosure
- Space Saving Footprint
- Product Range
  1.5kW — 5.5kW Simplex Units
  7.5kW — 16.5kW Multiplex Units
- Pressure applications up to 145 PSI
- Energy Saving Variable Drive Mode (Multiplex Only)

SRL Series Multiplex
(Multiple Motor/Multiple Scroll Configuration)

Interested to become an Authorized Distributor for Hitachi SRL Series Compressors? See our ad in the Job Market Section.

Hitachi's history of success and proven experience in scroll technologies has enabled Worldwide Innovation of producing the World's First Scroll for air compression. With over 20+ years experience in scroll compression, the SRL Series of Oil Free Compressors represents our alignment of value for the discriminating air user.

Hitachi America, Ltd. / Air Technology Group
6901 Northpark Blvd., Charlotte, NC 28216 Tel: 704.494.3008 x28
www.hitachi-america.us/airtech; airtechinfo@hal.hitachi.com
Hitachi Industrial Equipment Systems Co., Ltd.

HITACHI
Inspire the Next

SUSTAINABLE MANUFACTURING FEATURES

COLUMNS

FROM THE EDITOR | Compressed Air Automation

It's often said that if compressed air was water, we'd get soaked every time we enter the factory due to the air leaks hissing away in the piping overhead. Compressed air continues to be one of the processes with the least visibility in most plants. Few plants view real-time data, on their computers, on the performance of their compressed air system and fewer still have it as a visible management metric. Advances in compressed air master controllers have made this not only possible but a Best Practice that this publication highly recommends.

Our first article this month comes to us from Chris Gordon, from Blackhawk Equipment. A veteran system assessment expert, Chris Gordon details work performed at Ball Corporation's container plants. In one example he shows how the controls on five air compressors were all fighting each other and all ran inefficiently at partial loads. The solution — a master controller.

Paul Humphreys, from Atlas Copco, provides an insightful article on how a compressed air control system can intelligently direct the multiple components, including valves, dryers, and compressors, to operate in the most efficient manner possible.

Peerless Energy and Airleader North America teamed up to help Molex, Inc. save energy in their compressed air system. Jan Hoetzel provides us with an interesting case study of a factory requiring significantly higher compressed air flow. They were able to use compressor automation to supply significantly more compressed air — with a very small increase in energy costs.

Managing multiple air compressors, in the most energy efficient manner, is the goal of most compressed air automation systems. Two case studies provide excellent examples of how this is done. The first, from Nicolas De Deken of EnergAir, is titled, "U.K. Printer Saves Energy with Compressed Air Automation" and the second, from Don van Ormer of Air Power USA, is titled, "A Compressed Air Management System for Five Compressors."

Last but certainly not least, Wayne Perry from Kaeser Compressors and on behalf of the Compressed Air Challenge®, provides us with an excellent checklist on what to look for on supply-side intelligent control systems.

Our mission is to distribute educational and motivational content on the **positive work** being done every day by people, like you, who get their hands dirty and get the job done with profitable energy efficiency projects. We thank the authors above for sharing their knowledge and thank you for your support and for investing in ***Compressed Air Best Practices*®.** BP

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

COMPRESSED AIR, PNEUMATICS, VACUUM & BLOWER INDUSTRY NEWS

Cirmac International is Awarded a Biogas Upgrade Project

Cirmac International, part of the Atlas Copco Group, was recently awarded the project "High efficiency Low Pressure CO_2 Absorber LP Cooab®." The presented solutions will offer environmental friendly and cost efficient upgrading of biogas to higher qualities.

One of the ambitions of the dutch government is to achieve 20% of the energy supply being sustainable in 2020. In this framework the department Energy and Climate of Agentschap.nl*, invited companies to propose projects to make the fermentation chain more effective and efficient.

Although biogas upgrading to green gas has already a high efficiency compared with the production of electricity from biogas, Atlas Copco believes that it is possible to improve this high efficiency.

The goals of the pilot project have been clearly defined: Reduction of the green gas cost price, lower environmental impact by reducing CO_2 emission, reduction of the system energy consumption and efficient biogas upgrading to higher qualities in order to gain Liquified Bio Gas (LBG).

The LP Cooab® technology is based on low pressure reversible chemical absorption, specifically designed to remove CO_2 from biogas. An essential element in this process is the absorption liquid, in this case a special amine composition with Cirmac's trade name 'CO_2 Absorber LP Cooab®'.

"The positive feedback is really motivating." says Horst Wasel, President of Atlas Copco Quality Air Division, "I am convinced that the final results and findings of this project will cope with our high expectations. These technologies will not only strengthen our leading position but also enable us to grow — together with this future oriented market segment."

Cirmac is realizing the project together with Royal Haskoning Consulting, responsible for project management, monitoring plan and market investigation, and with Waterschap Veluwe, a waste water treatment company which supplies the location and biogas for the pilot project.

From being a biogas pioneer in the mid-eighties, Atlas Copco has accumulated extensive knowledge and experience in the field of **biogas upgrading** and **grid injection, natural gas boosting** and **vehicle fueling** by acquiring highly-specialized companies with a worldwide reputation Cirmac, Greenfield and Intermech. Consequently, Atlas Copco has evolved into a fully-grown industrial player in the biogas field.

Cirmac International bv, seated in Apeldoorn, Netherlands, is part of the Atlas Copco group since 2010. The company designs, supplies, maintains, operates and finances complete gas treatment systems since it was founded in 1979 and has very soon developed into a global player in nitrogen generation, gas treatment and the upgrading of biogas into green gas. Cirmac uses advanced gas-separation technologies to promote safety and sustainability.

www.cirmac.nl
www.atlascopco.com

*Agentschap.nl falls under the Dutch Ministry of Economic Affairs, Agriculture and Innovation, and helps Dutch businesses to innovate, by providing finance, advice and contacts.

COAIRE
AIR COMPRESSORS

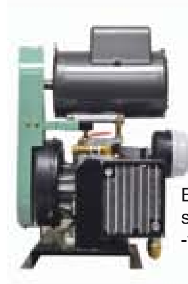
CLEAN AIR IN MOTION™

INDUSTRIAL • HOSPITALS • LABORATORIES • PUBLIC TRANSPORTATION

- Oil-less scroll design for 100% clean air
- Various configurations for OEM applications
- Scroll enclosures up to 50 HP
- Multiplex units are microprocessor controlled
- Compressors can be individually mechanically & electrically isolated
- “D” Series with a built-in refrigerated dryer

OEM PRODUCT OFFERINGS

Base mounted scroll compressors
-horizontal configuration



Base mounted
scroll compressors
-vertical configuration

Oil-less piston air ends
1 through 7.5 hp

As an industry leading manufacturer of oil-less scroll and oil-less piston compressors, we are able to offer the market innovative compressor designs. Whether you require a bare compressor or a 50 hp scroll enclosure, we have the perfect fit for your application. Our products can save on both energy and maintenance costs. All of our products are built in an ISO registered facility. If you require oil-less compressed air, look no further than Coaire.

Interested in becoming a distributor? Call or email us today!

www.coaire.com sales@coaire.com 562-991-3289

COMPRESSED AIR, PNEUMATICS, VACUUM & BLOWER INDUSTRY NEWS

Festo Presents New Research on Energy Savings

The research network "EnEffAH" presented findings on the efficient use of resources in production. On June 25, 2012 Festo presented the most significant findings together with partners from industry and research.

The overall share of electricity consumption in Germany due to industry amounted to around 43% in 2010. Operators derive the greatest energy-savings potential in automated systems from the choice of an optimal technology mix of electrics and pneumatics and from the appropriate matching of drive components. The Research Network for Energy Efficiency in Production in the Field of Drive and Handling Technology (EnEffAH) concluded that in future, these factors could make for energy savings of up to 70% in production. On June 25, 2012 the automation technology provider Festo presented the most significant findings together with partners from industry and research.

Fundamental energy-saving concepts — from the correct matching of drive systems up to optimized operating strategies — are the outcome of four years of research. For this purpose, Festo collaborated in the

"EnEffAH" project with companies and institutes such as Kaeser Kompressoren AG, the Institute for System Dynamics, the Institute for Power Electronics and Electrical Drives of the University of Stuttgart and the Fraunhofer Institute for Systems and Innovation Research.

Operators improve energy efficiency by appropriate matching of systems

"The research findings show that the energy efficiency of a system is determined to a large extent by the choice of the appropriate technology mix. This in turn depends on the requirements of the application. It was therefore important to us to make users aware of the individual strengths of the complementary technologies of pneumatics and electrics," explained Dr. Peter Post, Head of Research and Programme Strategy at Festo. The research network developed methods and simulation tools to assist in the planning, design and operation of facilities — including the electrical and pneumatic energy supply chain. This will ensure that the insights can be put into practice. "Well thought-out drive component design offers potential savings of up to 70%," Post emphasized. By means of a tool from the research network, for instance, the properties (dynamic, static) of technical systems can thus be simulated and analyzed; the behavior of a drive system in terms of its energy consumption can also be predicted and the most suitable component for a particular application determined.

Taking an overall view of the energy chain in automation

"Especially in the use of compressed air as an energy medium, the energy- and cost-efficient operation of industrial facilities necessitates a holistic view — from the generation, preparation and distribution of compressed air up to its practical application. For this purpose, the research network has investigated the entire energy chain in automation and developed a tool chain that will help operators to use energy more efficiently," said Post. Along the compressed-air chain, software-based tools have been created that allow the systems to be optimally designed and operated in all areas. For Post, the major challenge is generating compressed air as efficiently

COMPRESSED AIR, PNEUMATICS, VACUUM & BLOWER INDUSTRY NEWS

as possible on the one hand, while optimizing its consumption on the other.

Boosting the efficiency of electric drive systems though energy recovery

The "EnEffAH" network investigated efficiency-optimizing measures for electrical drives for application in start-stop operation. New control and regulation concepts, along with monitoring and diagnostic functions, will ensure the energy-efficient operation of electric drive systems. In addition, the project participants identified a great deal of energy savings potential through methods for the recovery and intermediate storage of energy in this field of application. Energy was recovered, for example, by storing braking energy in an intermediate circuit; in a trial run with a gantry drive unit, the energy savings over conventional operations amounted to 17%.

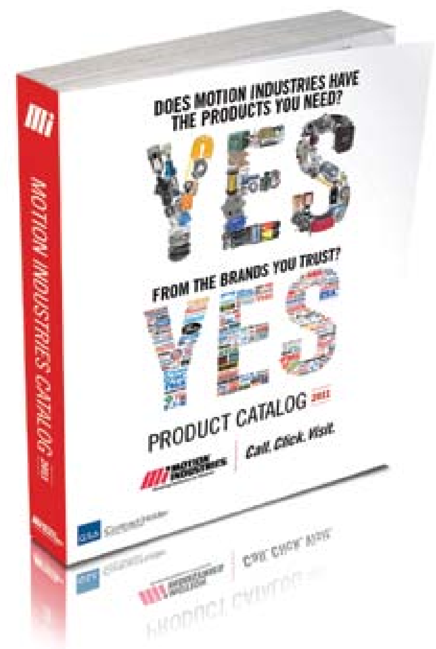
About the project

"EnEffAH" is a cooperative project that was carried out between October 2008 and June 2012 as part of the 5th and 6th Energy Research Programs of the German Federal Government; it was realized with a total expenditure of €2.6 million. The objective of the project was to develop methods, tools and products for ensuring energy-efficient automation in production units, especially in pneumatically and electrically powered handling systems.
www.eneffah.de
www.festo.com/research

MOTION INDUSTRIES CATALOG AVAILABLE ONLINE

Motion Industries, a leading distributor of industrial maintenance, repair, and operation (MRO) replacement parts, has announced that their "YES" printed product catalog can now be ordered online at the company's website www.motionindustries.com.

"Adding the ability to request our print catalog through our website enables us to give our new and existing customers a higher level of service," said Randy Breaux, Motion Industries Senior Vice President of Marketing. "The catalog was created with our customers in mind and includes many of the most popular products purchased every day. Being able to order the catalog from the website makes it



easier for our customers to have access to the information needed to purchase the products they are looking for."

Over 44,000 products covering 20 categories are available in the catalog, searchable by product or manufacturer. A total of 4.8 million items are accessible through Motion Industries' branch network.

With annual sales exceeding $4 billion, Motion Industries is a leading industrial parts distributor of bearings, mechanical power transmission, electrical and industrial automation, hydraulic and industrial hose, hydraulic and pneumatic components, industrial products, safety products, and material handling. Motion Industries has over 500 operations including ten distribution centers throughout North America and serves more than 150,000 customers from the food and beverage, pulp and paper, iron and steel, chemical, mining and aggregate, petrochemical, automotive, wood and lumber, and pharmaceutical industries. www.motionindustries.com

To read more *Industry News* articles, visit www.airbestpractices.com

CENTRALIZED Compressor Controls *Save Tremendous Amounts of Energy*

By Chris Gordon, Blackhawk Equipment Corp.

The Pneu-Logic PL1000 Flexible Sequencer Controls up to Eight Compressors.

It has been my experience that more than 50% of industrial air users don't control their air compressor resources effectively. As a result, a tremendous amount of energy is wasted. When my firm does audits of plant energy consumption, it's not unusual for us to encounter installations with large numbers of independently-controlled compressors that are all running at different pressure settings and different loads. We also encounter compressors that are left running when the factory work cells they power are shut down. When we plot the total energy consumption over a monitoring period for our clients, we can demonstrate the magnitude of the waste, and the picture is often not pretty.

Fortunately, there are technologies available that can stem the waste. When we consolidate the control of a compressor array using a central master controller, so that all the compressors except one are running at either full load or turned off, it's not unusual for a plant to save 20% or more on the energy required to meet its compressed air needs.

How Do Central Controls Work?

The largest advances in compressor control systems have happened over the last 20 years. Before that, the output of a compressor was typically controlled by a mechanical inlet valve that acts to restrict the flow of air through the compressor, and a mechanical pressure switch that turns off the compressor when a manually-set pressure set-point is reached. Using this control scheme, it was easy to have pressure setting and flow differences between compressors and it was not uncommon to have compressors fighting each other to attain different goals. Tuning such a system could be viewed as a "black art" by plant operators. Some systems would add electronic controls, but these were typically replicated for each compressor, and the potential for the different controllers to work at cross purposes with each other still existed.

Centralized electronic control systems are putting an end to the chaos and waste by enforcing a single control strategy that operates each compressor in a performance range where it is most efficient. For example, a fixed-speed rotary screw compressor is -most efficient at full load. In varying load conditions, experience has told us that in general, it makes sense to have at most one single compressor out of the group operating at partial load. This allows other compressors to operate at full load or off.

One type of central controller with special abilities to match supply with demand is a sequencer. A sequencer takes into account the available compressors and cascades their operation to serve the plant's needs. Typically a number of compressors are base-loaded (full-load), then one compressor that is designed to provide variable output will serve as a trim unit.

The PL1000 by Pneu-Logic Corp. of Portland Oregon (Figure 1) is a flexible sequencer that can control up to eight compressors according to a set of rules that are set using a touchscreen interface. The PL1000 makes decisions based on not only the pressure requirement in the system but also calculates the rate of change in system pressure as a leading indicator that additional air is needed. The controller also maintains an alarm history and logs pressure and power data to provide plant operators with a documented history of plant operation.

Within the guidelines discussed above, control strategies can be implemented by central controllers that take even more factors into consideration. For example, the PL4000 by Pneu-Logic goes one step beyond monitoring the rate of change in pressure to monitor flow of air in the lines. Because pneumatic systems actually rely not only on air pressure, but also on air flow to do their work, monitoring both flow and pressure is the best means of responding quickly to changing air needs of the plant. This minimizes the amount of fluctuation in pressure levels, enabling the plant to decrease energy costs by running at lower pressures than would otherwise be required to ensure that demand spikes are met.

The PL4000 also assigns a "readiness score" to each compressor which is factored into the analysis that the controller makes when deciding which compressor to run next. The readiness score helps

A 200 hp VSD Compressor with a PL1000 Controller at Ball Corporation.

CENTRALIZED COMPRESSOR CONTROLS SAVE TREMENDOUS AMOUNTS OF ENERGY

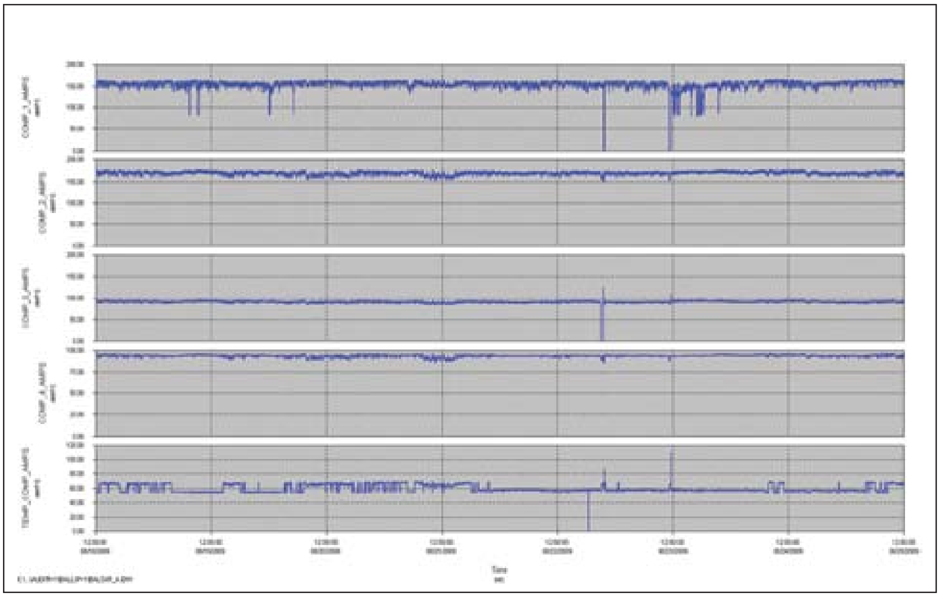


Figure 3. Before the PL1000 controller was installed at the Ball plant in Springdale, AR, the plant's air supply fluctuated widely and all of the plant's five compressors were running at partial load from time to time.

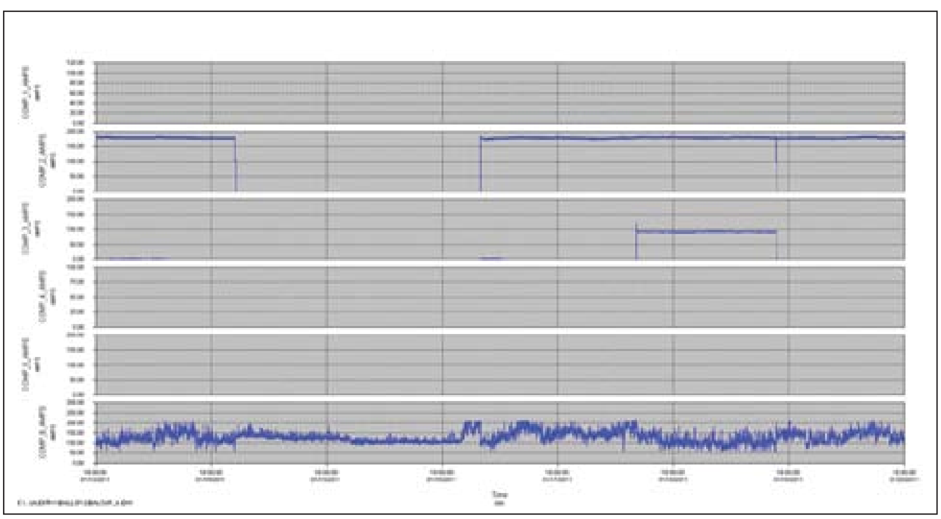


Figure 4. After the Pneu-Logic controller was installed, just three of the plant's compressors (including a new variable-speed compressor) could serve all of the plant's air needs, where five compressors (Figure 3) were required before.

the controller balance the amount of wear on individual compressors and reduces the risk of unscheduled maintenance.

A Real Example Showing The Benefits Of Centralized Control

Some time ago we did an audit of the Springdale, Arkansas manufacturing plant where Ball Corporation makes food cans. The audit showed that compressed air is the most energy intensive area of the plant. Virtually every piece of can making equipment uses compressed air in some manner, and the plant had several production lines that were served by a group of five large compressors.

Figure 3 shows the energy audit data for the five compressors at the Springdale facility. It's clear from the graphs that the system is not running smoothly. All of the compressors are running continuously at some portion of their rated load. They are all acting as trim compressors (partly loaded), and in the process the controls were 'fighting' each other.

To solve the problem, Blackhawk installed a new 200 hp variable-speed compressor with a new Pneu-Logic PL1000 controller and added a 5,000 gal. vertical receiver. We programmed the controller to have all of their compressors running full load/no load with the exception of the variable speed compressor.

The post-project audit showed a marked reduction in energy usage and inefficient usage of the compressors. Figure 4 shows that where in the past five compressors were operated to meet the need, with proper controls,

> "We want to replicate this plan for other locations, too. We have identified three more facilities to tackle in the next phase."
>
> — Doug Barndt, Ball Corp. Energy Manager

the total needs of the plant can be served by just two compressors running at full speed (compressors #2 and #3), plus the trim compressor (#6) running at partial speed.

With the new controls, the pressure in the plant is more stable (+/- approximately 3 psi) compared to the old scheme whereby the pressure was being maintained +/- 12 PSI, allowing Ball to reduce the nominal discharge pressure by 10 PSI. The average net savings in horsepower was 112.8 or over 20% of the total horsepower used before the upgrade, resulting in a cost savings of more than $51,000 per year at a rate of $0.064 per KWh. The post upgrade audit revealed that an additional $6,000 could be saved by reducing the pressure in the plant by an additional 6 PSI, which is possible given the benefits of the active control system.

A similar case has played out at the Ball plant in Elgin, Illinois. Like the Springdale facility, Elgin had multiple compressors that were fighting each other under separate controls. Consolidating the compressor controls with a Pneu-Logic PL1000 controller was one factor among many that enabled the Elgin plant to cut energy costs by enough to win the Governor's Sustainability Award.

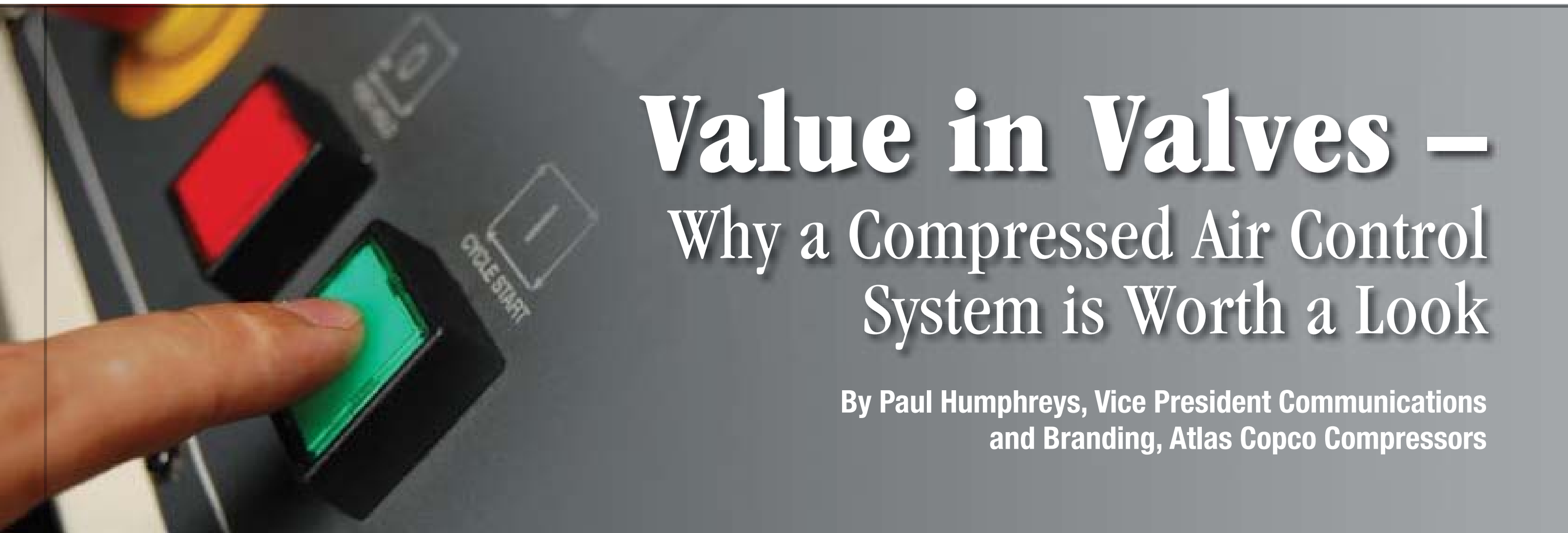
"We want to replicate this plan for other locations, too" said Doug Barndt, Ball Corp. Energy Manager. "We have identified three more facilities to tackle in the next phase."

Further financial impetus to justify projects such as these comes from local utilities' incentives (Ball was able to capture incentive money for both the Springdale and Elgin plant upgrades). "Utility incentives have saved us several million dollars over the years," said Doug Barndt. Ball has 32 manufacturing facilities in the United States and the company's facilities planners subscribe to a database that catalogs incentives.

The Ball Corp. experience is not unique. By taking a new look at the way that compressed air resources are managed, plant operators of all types can benefit through reduced energy consumption and decreased hardware and maintenance costs. BP

For more information contact Chris Gordon by email at CG1@blackhawkequipment.com or by phone at 303-515-2020, www.blackhawkequipment.com

To read more ***System Assessment*** articles, visit www.airbestpractices.com/system-assessments/compressor-controls



Value in Valves – Why a Compressed Air Control System is Worth a Look

By Paul Humphreys, Vice President Communications and Branding, Atlas Copco Compressors

A large multi-service public utility provider was faced with an ongoing problem. The utility, which services 93,000 retail and wholesale customers, employed five oil-free compressors at one power generation facility, but, if they needed to take down Unit 2 at the facility, it almost always pulled Unit 1 down with it, overloading the system's capacity and causing service interruptions.

The utility asked Atlas Copco to review the system, and the team analyzed the facility and suggested a system reconfiguration that implemented an integrated compressor control system. With some minor modifications, the controller began monitoring and directing the system's various components, including dryers and valves, that eliminated system failures, properly dividing operating times among

An Atlas Copco System Assessment at a Public Utility Reduced Pressure From 100 to 84 psi.

compressors and relegating the back-up compressors to exactly that — something that could serve as a redundancy, rather than an over-reliant crutch.

The resulting changes reduced the system's overall pressure load from 100 psi to 85 psi, resulting in a 7% savings that could then be passed along to the utility's customers.

As an additional benefit, the reconfiguration and inclusion of this remote system controller also will extend the life of the system's compressors because its operational hours are now more even and lower. This also helps reduce maintenance costs while also increasing the life expectancy.

Another utility company in the Pacific Northwest experienced similar difficulties. Atlas Copco conducted testing on the system and, coupled with a three-month trial, determined that the company would realize a return on investment for the compressor controllers in only four months. It is safe to say these two utility providers are not alone and did not face a situation that was uniquely theirs.

The Atlas Copco controllers in both scenarios monitored and adjusted the compressor load and deployed a system that altered the compressor mix and selected the adjusted combination to ensure optimal productivity and reduced energy dependency.

This provides a textbook example of ways a compressed air system that is optimized and regulated by integrated controllers can reduce energy and operational costs. By reducing system pressure, an operator is able to regulate the system within a predefined window that optimizes the compressors' performance. Stable pressure levels add to lower energy

Compressor Room Remote Monitoring.

VALUE IN VALVES — WHY A COMPRESSED AIR CONTROL SYSTEM IS WORTH A LOOK

An ES 360 Data Logger used in System Assessments.

consumption and system optimization, particularly with the inclusion of variable speed drive compressors.

An air compressor system controller can open or close valves to alter the system's configuration, shutting down or starting up dryers that, in conjunction with integrated dew point monitors, eliminate moisture to keep the system operating evenly, without pressure drops or spikes that could disrupt service.

Additionally, when a compressed air system knows to distribute the work load equally, rather than cycling up and down independently, maintenance costs are also reduced because the machines all experience simultaneous wear that allows maintenance to be scheduled and performed at regular intervals, across the board, as opposed to intermittently, when the system's parts operate more independently. Maintenance can also be scheduled for the entire system ahead of time, avoiding unexpected interruptions.

Despite stories and case studies that tout the benefits of the use of a more automated compressed air system that is regulated through a series of integrated controllers, reluctance to introduce compressed air sequencing — fueled largely by a fear of not being able to determine the ROI — often remains.

A comprehensive audit or air scan can reveal opportunities to optimize a compressed air system. Using the logged information, a team of compressed air analysts will compile a comprehensive and detailed report, including cost analysis, graphs and the suggested starting points needed to improving the compressed air system. Technology has also made compressor control systems more sophisticated but easier to read and operate than even just 10 years ago.

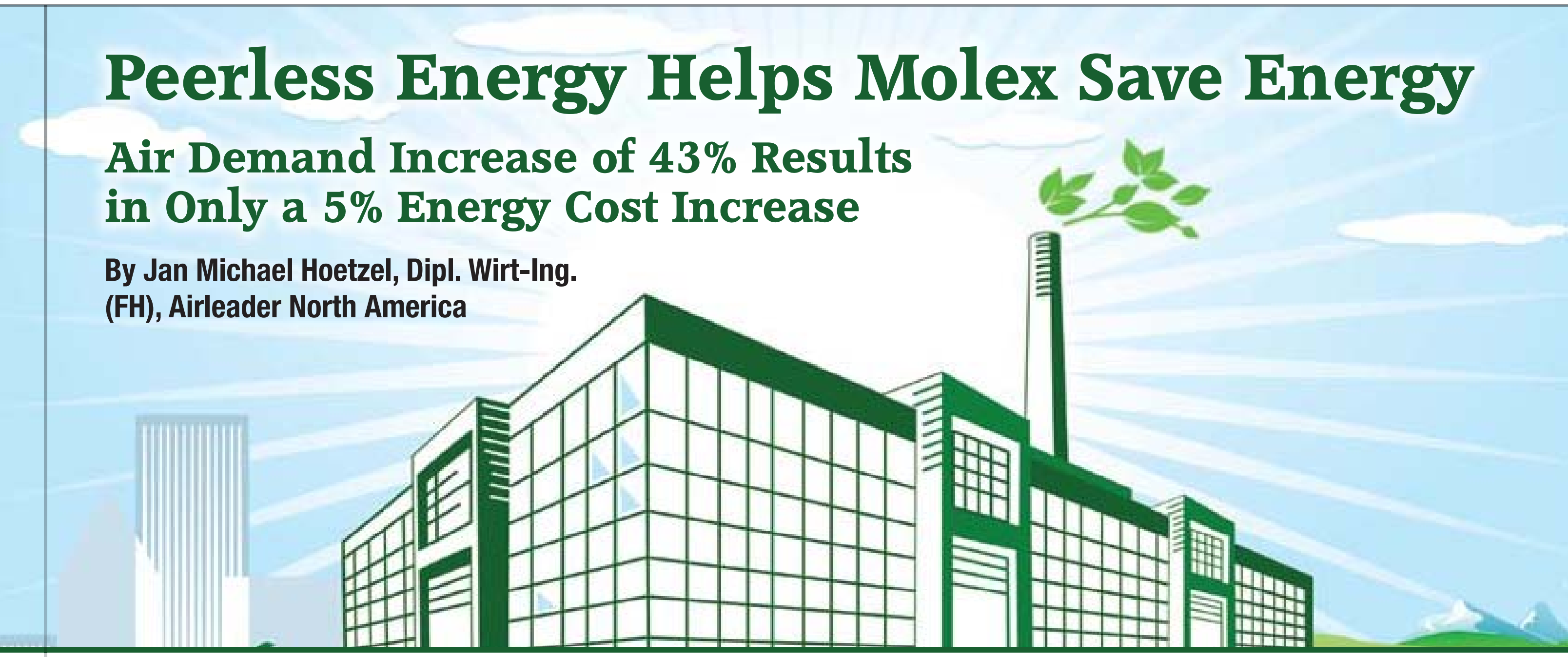
The Department of Energy, in its push to reduce energy dependency, has developed a wealth of information that outlines innovative ways to reduce compressed air system pressure, lowering energy loads — and costs — as a result.

A central controller can monitor, measure, and direct optimal sequencing of a compressed air system's numerous components through a series of valves that direct and redirect air flows through the system's various compressors, dryers and other measurement equipment to produce a dependable and efficient network. Many times, the inclusion of a central control system can reduce energy efficiency by 10%. Applications for mobile phones and tablets can also provide an additional level of real-time remote monitoring and control of one or many compressed air systems from almost any location.

Energy consumption typically represents about 80% of a compressed air system's total life cycle cost. Finding ways to reduce this cost often requires a shift in thinking and recognition of the ways today's advanced technology can enhance a system, reducing energy dependency and the associated costs. Is that worth a look? BP

For more information please contact Paul Humphreys, Atlas Copco, tel: 866-546-3588, email: paul.humphreys@us.atlascopco.com, http://www.atlascopco.us/usus/

To read more ***Technology*** articles, visit
www.airbestpractices.com/technology/compressor-controls



Peerless Energy Helps Molex Save Energy

Air Demand Increase of 43% Results in Only a 5% Energy Cost Increase

By Jan Michael Hoetzel, Dipl. Wirt-Ing. (FH), Airleader North America

Introduction

Compressed air is an expensive medium; yet, many compressed air systems are wastefully managed with minimal system transparency. Capturing essential system performance data and monitoring critical air quality data is not only eye opening, it enables future investments in compressed air systems to be fact-based and traceable.

The self-learning Airleader Master Control enables system performance management, and the web-based monitoring system provides transparency and reporting need required by ISO 50001. It is designed to work with compressed air instrumentation — such as dew point meters, flow sensors, pressure gauges and oil content sensors — all needed to efficiently manage and benchmark compressed air systems.

Airleader North America has the system capability to do web-based online-reviews for the installed systems. When installed, the Master Control collects all data allowing Airleader North America to support its dealer network and end-customers with system simulations for correct compressor sizing, besides other performance and reporting functions.

The Control Gap is Clearly Visible Between 619 and 759 cfm.

An Example: What is a Control Gap?

Compressed air demand is a moving target. Designing a compressed air system based on an audit and a set scfm demand is not desirable. A compressed air system must be efficient at all demand levels. Whether it is during first, second or third shift — on weekends, holidays, breaks, or during machine down time.

We commonly see compressed air systems designed with control gaps. Design gaps automatically lead to inefficiencies. To provide an example, look at Figure 1 below. The Variable Speed Drive (VSD) air compressor in this system has an output range between 139-619 scfm and the fixed-speed compressors have an output of 620 scfm. Between 619 scfm and 759 scfm (620 scfm+139 scfm) is a control gap. To utilize the VSD compressor at all demand levels a smaller compressor need to be added.

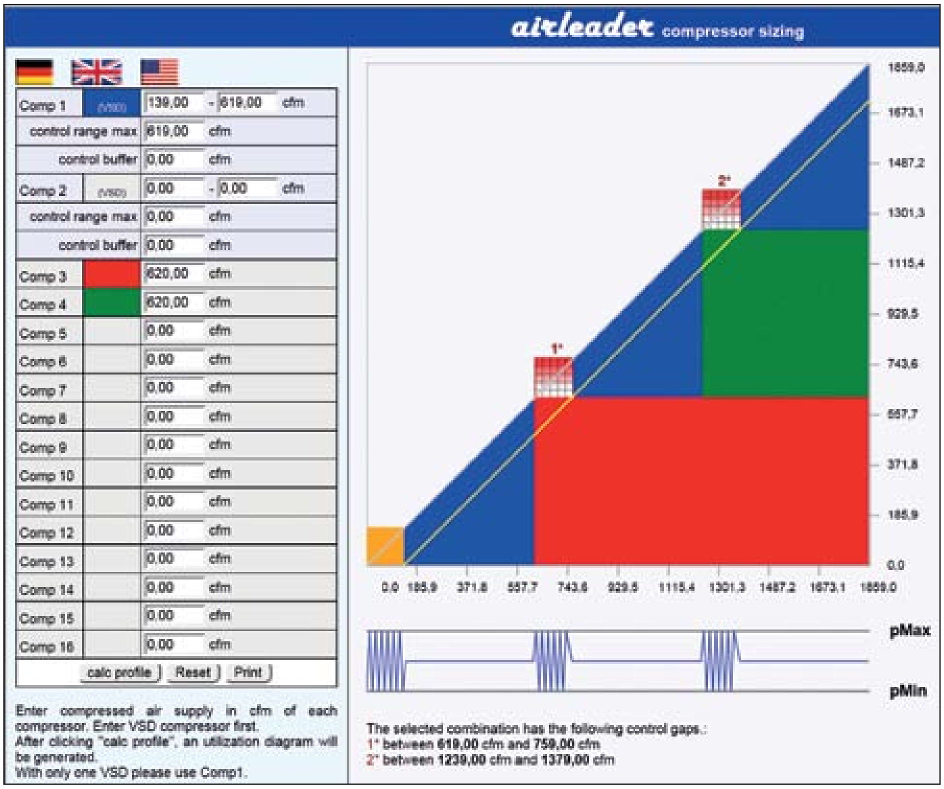
At demands below 600 scfm the VSD compressor trims and the system runs smoothly. Between 8:00a.m. and 9:00a.m. and between 12:30 and 3:00p.m. the system demand is above 800 cfm and one fixed-speed and the VSD compressor providing the compressed air efficiently. It is the time between 7 and 7:30a.m., 12:00p.m. and 12:30p.m. and between 3:00 and 11:00p.m. when the system demand is between 600 and 800 scfm. That is the time the system is operating in the control gap and this represents more than one third of the day.

The additional 310 scfm compressor, here shown on orange, eliminates the control gap. This simulated system can provide compressed air efficiently at all demand levels starting at 139 scfm all the way up to 2,169 scfm. This will substantially reduce the weekly unload hours of the VSD from 29 hours weekly (1,500 hours annually) to almost non and eliminate the weekly 685 load cycles (35,700 annualized) of the VSD compressor.

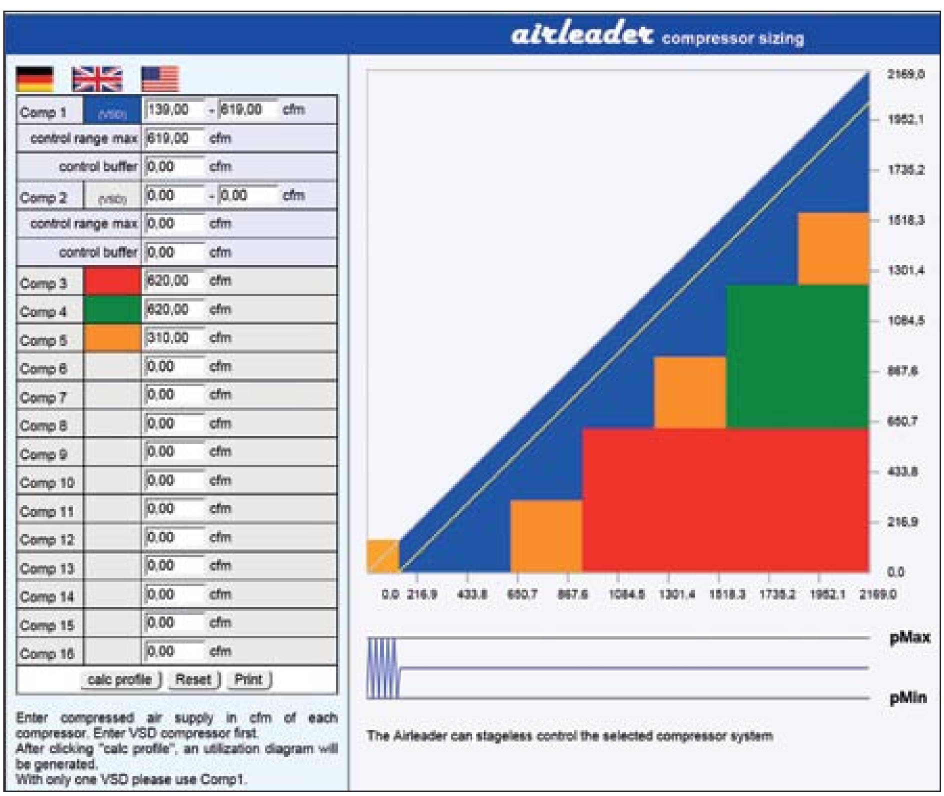
When plants need new air compressors, the Airleader Dealer network and end customers build trust because all equipment recommendations are based on real traceable data and results can be verified using the Airleader Master Control. This article provides an example of how this process worked at Molex Inc. in Lincoln, Nebraska.

PEERLESS ENERGY HELPS MOLEX SAVE ENERGY

Air Demand Increase of 43% Results in Only a 5% Energy Cost Increase



Simulation of the Control Gap of the Current System.



Simulation of the Current System without a Control Gap

Molex Inc. in Lincoln, Nebraska

Molex Inc.'s global commercial products division, located in Lincoln, Nebraska, is engaged in molding, stamping, plating, and assembly of electrical interconnect products. The growing plant is certified to the International Organization for Standardization (ISO) 14001 environmental management system and the Occupation Health and Safety Assessment Series (OHSAS) 18001 health and safety management system. "In 1993, we started out with three relatively small compressors (50-75-100 horsepower) contained within a single equipment room making monitoring and servicing relatively easy," stated Randy Kaup, Molex-Lincoln Facilities Maintenance Supervisor. "By 2005 we had a total of twelve air compressors, ranging in size from 50 hp to 300 horsepower, being high (125 psig) and low (100 psig) pressure machines, in four separate mechanical rooms with some built-in redundancy in the event of a compressor problem."

Growth of the factory meant more and more production machinery requiring compressed air and, like most plants, the production machinery needs varied from one day to the next. "We invariably had more air compressors running than was really necessary; which was a waste of energy and caused wear and tear," continued Kaup. "We were also experiencing occasions when we had mechanical or control problems and didn't know it until departments would call to complain about low air pressure — this necessitated a pressure gauge just outside my office to monitor the line pressure at this end of the building — but this didn't work." This is when Peerless Energy Systems was requested to get involved.

Peerless Energy Systems Conducts an Audit

Peerless Energy Systems, based in Omaha, specializes in engineered solutions for compressed air and vacuum systems. Josh Cohen, from Peerless Energy, is a Senior Sales Engineer and a U.S. DOE-Qualified AirMaster Specialist. "It was time to take a holistic approach on the entire compressed air system at Molex-Lincoln."

The Molex facility was running 3 shifts, 7 days a week and growing steadily. During the audit, Peerless Energy data-logged twelve on-line air compressors totaling over 2,000 horsepower. "We found their average consumption of compressed air was just over 3,300 cubic feet per minute," said Josh Cohen. "At the time of audit, we observed that all the machines were running based on their onboard controls and were set in a pressure cascade that was not very desirable for any type of energy savings." Control scheme issues can be one of the hardest problems to overcome in a compressed air system of this size, especially when there are multiple compressor rooms with multiple compressors and sizes.

The audit findings showed that cross-connecting the compressed air main header so it looped the entire plant together, adding an additional large storage tank (3,000 gallons), and adding a single master controller to the system, would indeed save Molex on their energy bill.

The Airleader Master Controller

"After much research trying to find the right master control system, we were able partner with Airleader and their principle in the United States, Jan Hoetzel" said Cohen. "Jan quickly became a very valuable asset in assisting us with the needed information to help us show our customer just what this master controller could do. Airleader is unlike anything else on the market. With the 8D trending and self-learning abilities it is completely adaptable to any compressor system, and the best part is, it will work with every brand of air compressor on the market, without failure."

Transducers were placed in the plant to monitor compressed air pressure, as well as CT's on the air compressors to measure energy consumption. The Airleader is not limited to controlling and monitoring compressor energy and performance data. Any analog or digital external sensors can be integrated to provide complete system awareness. Typically it starts with a dew point sensor, additional pressure sensors, pressure differential sensors, oil-content, flow sensor or simple drain malfunction e-mail alerts or increasing leakage alerts.

The Master Controller utilized the existing Ethernet network to connect all the compressors in the different rooms with the Airleader Master Controller. This helped save on installation material and speed up

PEERLESS ENERGY HELPS MOLEX SAVE ENERGY

Air Demand Increase of 43% Results in Only a 5% Energy Cost Increase

the installation. "The installation did not take much time. It took longer to pull the networking cable, in the compressor rooms, than to install the equipment within each compressor and the three line pressure sensors," said Molex's Kaup. "Since I had a computer in my office monitoring the facility environment controls already, the Airleader software was loaded onto it so now I can check the status of all compressors on one screen, as well as check air consumption and efficiency. After a few days, Airleader learned our consumption levels and the stops/starts the compressors required. The air compressors only run now fully loaded. If they are not needed to maintain the pressure within the set parameters, Airleader shuts them off, putting them in standby, eliminating the inefficiency of running unloaded."

The Results at Molex-Lincoln

The Master Controller communicates with each compressor using a simple onboard control module. These universal modules work with any compressor brand and model. They start and stop the machines as needed.

The web-based monitoring system provides detailed graphs and performance data, and is the perfect tool to verify the realized savings.

"The system has been running for almost two years now. The unload share of the system is only at one percent," said Peerless Energy's Cohen. "This is remarkable because this system doesn't have a single Variable Speed Drive air compressor. The Master Controller is running the smaller compressors as trim compressors while the larger compressors run at full-load.

Inefficiencies in the air compressors were reduced by over 30%, leading to a yearly savings of nearly $100,000. "While this may not seem like very much, the kWh savings has been substantial. Remember energy rates in Nebraska for a facility of this size average $0.06 per KWh when the demand charge is factored in," said Cohen. "The simple payback time was of just less than a year after it qualified for an energy incentive from the local utility, Lincoln Electric System (LES), which paid for one third of the project."

"The energy cost to produce one million cubic feet of air during the time of the audit was approximately $169.12 and the cost to produce one million cubic feet of air today, with the Airleader system running, is approximately $124.44," said Cohen. "This is a 31% reduction in energy cost if we were to produce the same flow that was observed in the audit. "

With increased production over the past couple years, cfm usage at Molex has continued to increase. "We are in the process of trying to add another compressor to our system. In the meantime, with Airleader continuing to monitor instant status and alert us to any compromises in maintaining air pressure and volume-I feel more confident (in control) that we can support all of our departments compressed air needs," said Molex's Kaup. "Since we have been well served by our investment in Airleader at this facility, Molex recently installed a system in another facility nearby."

The audit data below shows energy costs without Airleader installed and with the original cascade control scheme. The December 2010 data shows the changes in energy consumption since the Airleader system was installed.

Continued Support and Modeling

Airleader has online access to most of our North American installations and provides online support to Dealers and factories to fine-tune the compressed air systems. On a regular basis we are being contacted to evaluate system performance and prepare system simulations. That way we can show the performance on different size compressors before they invest in new compressors.

DATA	FLOW	COST/MONTH	COST/YEAR
Audit data	3,356 scfm	$25,323.08	$303,877.00
Dec. 2010	4,795 scfm	$26,618.00	$319,416.00

*Observed Flow Increase from the audit data to the observed data in December 2010 was 43%, yet the Energy Cost Increase was only 5%.

"The energy cost to produce one million cubic feet of air during the time of the audit was approximately $169.12 and the cost to produce one million cubic feet of air today, with the Airleader system running, is approximately $124.44."

— Josh Cohen, U.S. DOE Qualified Airmaster Specialist, Peerless Energy

This eliminates the risk of investing in an incorrectly-sized air compressor.

Too often we have spoken with client who just got an expensive compressed air audit back but were disappointed and frustrated because they can't understand the graph and calculation tables in the report. They have even more difficulties to review and verify the suggested energy improvements in kWh and $.

The idea is to have a system that can document each improvement measure, step by step. Another goal was to have a system that is easily understood by non-compressed air experts.

The Airleader Master Control with integrated web-based monitoring version 3.9 is the solution. The concept is easy. The Airleader Master Control will be installed and used as a data logger for a period of time, days or weeks. The recordings from the base line and the recordings at any time in the future can be reported via the software or downloaded to be formatted — based on individual requirements. The data is recorded in one second intervals and stored as 10 second averages. Data can be aggregated into 1, 5, 10, 15-minute or hourly averages.

Recently, a utility showed interest in having a master control that can be used for baseline data logging to make system improvements traceable. Each energy-saving improvement measure can now be implemented and verified based on measured data. Here some examples:

- Leak repairs can be verified in reduction of cfm and reported in kWh and $
- Pressure reduction can be verified in both kWh and cfm reduction
- Zero air-loss drains can be verified in cfm reduction
- Performance improvement due to the Airleader controller can be verified:
  - kWh reduction in load/unload, motor starts/load cycle reduction, flow reduction, pressure reduction
- Replacing compressed air use with blower use can be verified by cfm reduction
- Installing energy efficient nozzles can be verified by cfm reduction

Conclusion

Installing the Airleader Master Controller is only the first step in improving a compressed air system. With the web-based monitoring package, the compressed air system becomes transparent and easy to understand. Paybacks for future investments can be calculated and verified. Start to report the most expensive utility in your building. Fulfill requirements for the ISO 50001 energy management system — hassle free and with minimal time efforts. BP

For more information, please contact:

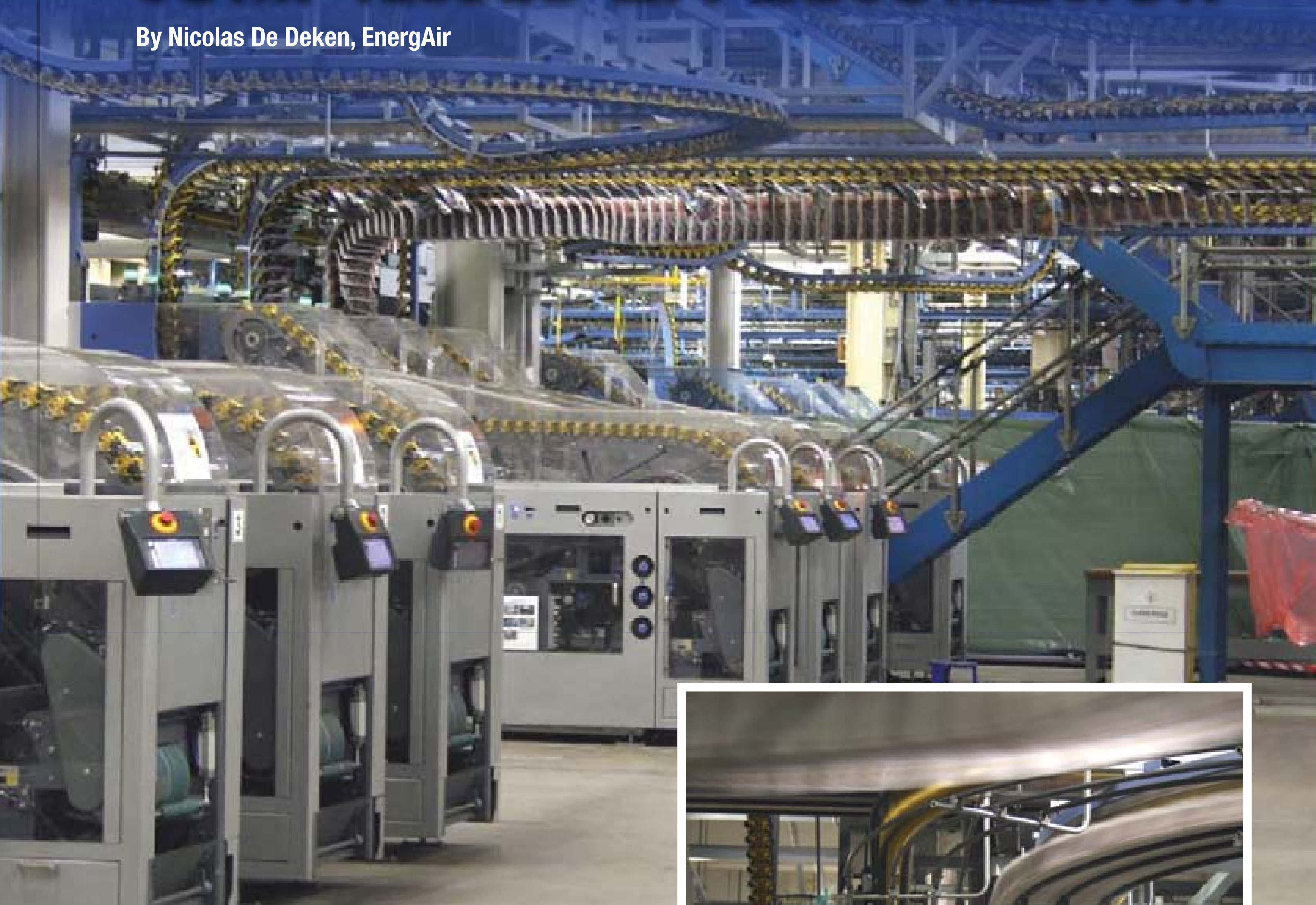
Jan Michael Hoetzel, Dipl. Wirt-Ing. (FH), Owner and Principal of SIGA Development LLC, Airleader Distributor North America, email: info@airleader, tel: 616-828-0716, www.airleader.us

Josh Cohen, U.S. DOE Qualified Airmaster Specialist, Peerless Energy Systems, tel: 402-345-8311, jcohen@peerlessenergy.com

To read more ***Technology*** articles, visit www.airbestpractices.com/technology/compressor-controls

U.K. Printer Saves Energy with Compressed Air Automation

By Nicolas De Deken, EnergAir



The Trinity Mirror Group print works on Oldham is one of the UK's largest newspaper printers. The nine presses in the facility produce around 1 million papers every day, including the Independent, the Daily Mirror and a range of local, regional and sports titles. Printing on this scale does not come cheap in energy terms, however. The plant's annual electricity bill is in the order of £1.5 million. With energy prices on the rise, and a strong desire to improve environmental performance and reduce its carbon footprint, the plant's management has recently embarked on a project to cut energy use substantially.

Kieran Flemming is commercial manager at the Trinity Mirror plant. He is responsible for equipment and facilities and has spearheaded the energy

> "Since the installation of the EnergAir system, the effect on Trinity Mirror's energy consumption has been dramatic. Measurements taken at the site before and after the installation show that the electricity consumed by the compressed air installation has dropped by 46%, translating into a saving of more than £115,000 per annum."
>
> — Kieran Flemming, Commercial Manager, Trinity Mirror

saving campaign over the past 12 months. "Our first step was to introduce a sub metering system so we could see exactly what equipment was accounting for the bulk of our energy costs," he recalls. "Examining the data collected with the new meters made one fact immediately clear – nearly one third of the electricity used at the site was consumed by its compressed air plant. This put to rest a common misconception that the process itself accounted for the bulk of energy costs where in actual fact it accounted for approximately 23%."

Independent energy consultant David Jeffs of Energy Matters, who was working with Kieran on the energy saving project, recommended that he call in compressed air specialists Maziak to review the installation and see if there was opportunity for savings to be made.

The compressor installation providing this air was relatively recent, having been installed in 2004, and included some relatively sophisticated control. One of the four compressors was driven by a 180 kW variable speed drive (VSD), allowing it to better match energy consumption to demand.

The other three compressors were fixed speed 160 kW units. Unfortunately, the installed configuration of the units was not making the most efficient use of their capabilities. The standard control configuration meant that the variable speed compressor was always the lead unit. During times of low demand, this compressor could adjust its flow rate and energy consumption effectively, but as demand rose and the other compressors were switched on, control effectiveness was substantially reduced.

Maziak's recommendation was the replacement of the existing OEM compressor control unit with a Metacentre intelligent control system from Energair. The Metacentre system constantly monitors pressure and demand in the system and, using software that 'learns' from previous events, makes decisions about the optimum combination of compressors to use in order to maximize overall system efficiency. By dynamically changing the lead compressor in the Trinity Mirror installation, the Metacentre control can ensure that the VSD unit is always able to fine tune air production to meet current demand, while minimizing the number of costly on-off events undertaken by the other compressors in the suite.

Working with Maziak, Kieran and his team made a number of other changes to the plant's

U.K. PRINTER SAVES ENERGY WITH COMPRESSED AIR AUTOMATION

compressed air installation. "This is a large plant, and some of the compressed air travels more than 600m from the compressor house to its point of use," explains Kieran. "This causes a substantial pressure drop, meaning we had to supply compressed air to the plant at 9 bar in order to be sure of delivering a consistent 7 bar regardless of demand."

By adding an intelligent flow control valve to the facility's existing compressed air accumulator system, the team has been able to reduce delivery pressure to 7.2 bar. During times of peak demand, air is released from the accumulators to maintain system pressure without needing to request additional compressor capacity.

"As the compressors are optimized to supply 9 bar, they continuously supply the accumulator system at this pressure but the flow control valve gives us the ability to maintain a consistent 7.2 bar to the production facility. The energy savings from this system are substantial and a secondary benefit is that we have reduced our compressor utilisation by 50%. This effectively gives us two standby compressors at all times and has also led to significantly reduced maintenance costs."

Since the installation of the Energair system, the effect on Trinity Mirror's energy consumption has been dramatic. Measurements taken at the site before and after the installation show that the electricity consumed by the compressed air installation has dropped by 46%, translating into a saving of more than £115,000 per annum.

"Compressed air is central to a large print works like Trinity Mirror. Air provides the force that presses the print cylinders onto the paper in the giant web printing machines, ensuring a good image on the page. A wide range of ancillary equipment, including folding and stacking machines and materials handling equipment also relies on pneumatic power."

— Nicolas De Deken, EnergAir

The site has recently won ISO14001 accreditation for its environmental and energy saving activities and special mention was made in the auditor's report on the sustained energy savings. "The new installation has exceeded all our expectations in terms of energy savings," says Kieran. "We originally anticipated a payback period for our investment of 15 months. In fact it has paid for itself in less than six and has also delivered significantly reduced maintenance costs. Our electricity prices rose quite substantially at the beginning of this year, but thanks to this work, our bills have stayed pretty much the same."

The smooth operation of the new system results in fewer big electrical events as large compressors switch on and off, it is also good for the plant's power quality as measured by the site's power factor. "We were getting to the point where we needed to consider installing costly power factor correction equipment to reduce our effect on the national grid and avoid expensive distribution charges" notes Kieran, "The new installation has dramatically improved our power factor and taken us out of the problem zone for power quality and eliminates the need to carry out power factor correction."

Together with other changes, including the installation of better heating controls, low energy lighting and variable speed drives on various electric machines, Kieran and his team have successfully cut overall energy use at the site by more than 15% in the last year. "We are well ahead of our corporate targets for efficiency improvement and we are reaping the benefit of larger than expected savings in energy costs, so we are delighted with the progress of the project so far," concludes Kieran.

Anyone interested in how much energy can be saved on a given site, (with any combination of compressors and duty cycles), by a new Metacentre system can find out instantly by using EnergAir's online calculator at www.energair.com. The calculator will also allow users to print-off a detailed and accurate report. BP

For more information contact Nicolas De Deken, EnergAir, email: nicolas.de.deken@energair.com, tel: 855-289-9317, www.energair.com

To read more ***System Assessment*** articles, visit www.airbestpractices.com/system-assessments/compressor-controls

A Compressed Air Management System for Five Compressors

By Don van Ormer, Air Power USA

Introduction

This building products factory spent an estimated $240,000 annually on energy to operate the compressed air system at their Midwestern facility. This figure will increase as electric rates rise from their current average of 7.8 cents per kWh. The set of projects recommended, by the system assessment, reduced these energy costs by an estimated $104,336 or 43% of current use. Project costs totalled $73,000, representing a simple payback period of 8 months.

The system assessment included installing a central compressed air management system. This project delivered the majority of the energy savings, providing 1,165,077 kWh in annual savings adding up to almost $91,000. The project also included some demand-side and storage projects. Due to article length constraints, we will focus on the installation of the compressed air management system.

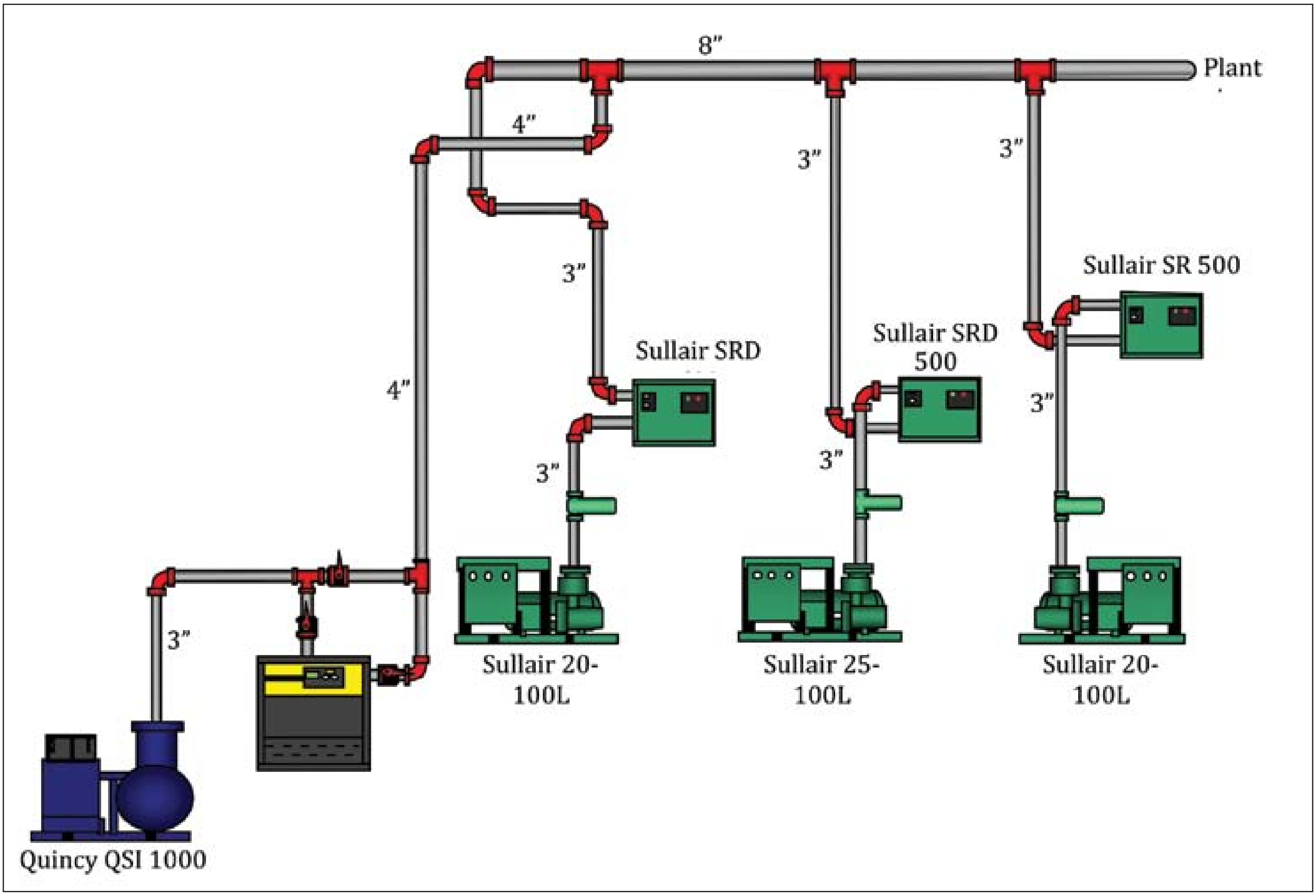


Figure 1. Current Compressed Air System: Main Compressor Room.

The Existing Compressed Air Installation

The main compressed air system consists of three Sullair 20-100L, single-stage, lubricated, water-cooled rotary screw compressors. Each draws 110 bhp and produces 500 cfm at full load. They are rated for 100 psig discharge pressure.

The primary compressor, a Quincy QSI1000 that was acquired from a sister plant closing, is a 200 hp class (211 bhp) producing 1,014 cfm at full load. It is also a single-stage, lubricated rotary screw. It runs as "base load" with the Sullair units and the Kaeser compressor is used as trim units. The three Sullair units and the Quincy compressor are located in the Main Compressor Room.

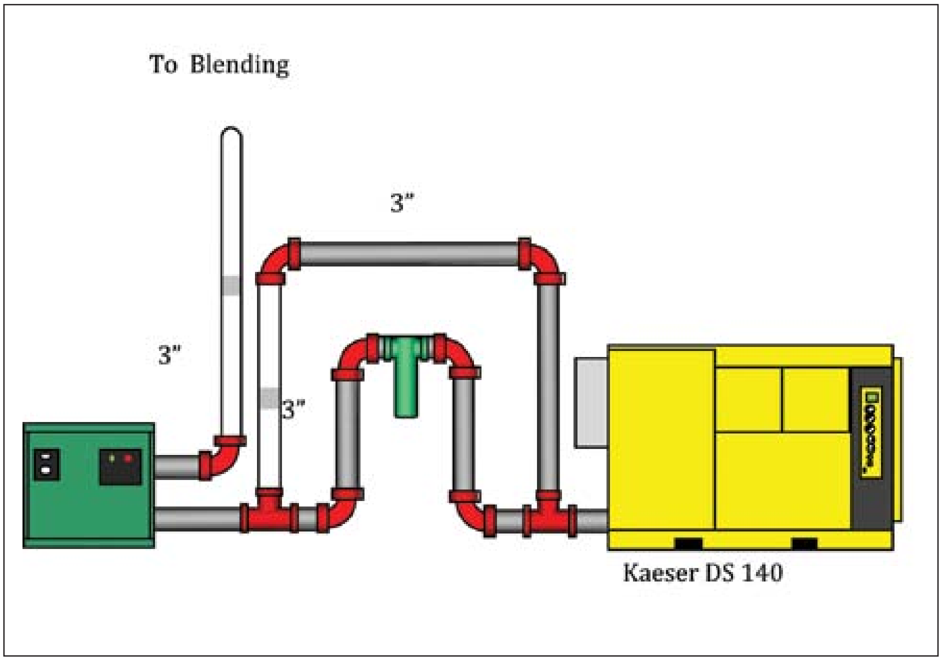


Figure 2. Current Compressed Air System: Blend and Regrind Area.

A COMPRESSED AIR MANAGEMENT SYSTEM FOR FIVE COMPRESSORS

Figure 3. Main Compressor Room Metering Data.

There is a Kaeser DS140 compressor located in between the Blending and Regrind areas. It was installed to alleviate the low pressure sometimes experienced in the Blending area.

The Kaeser is a 100 hp (122 bhp), single-stage, lubricated rotary screw producing 543 cfm at full load and is equipped with auto start/stop. The Kaeser was placed in this Blend and Regrind area to supply air to the Blend process when the pressure fell to an inadequate level to that area.

TABLE 1. KEY AIR SYSTEM CHARACTERISTICS — CURRENT SYSTEM*			
MEASURE	**7 LINES**	**14 LINES**	**TOTAL**
Average System Flow	720 cfm	1,440 cfm	NA
Avg Compressor Discharge Pressure	102 psig	102 psig	NA
Average System Pressure	97 psig	97 psig	NA
Input Electric Power	295 kW	375 kW	NA
Operating Hours of Air System	4,380 hrs	4,380 hrs	8,760 hrs
Specific Power	2.44 cfm/kW	3.84 cfm/kW	NA
Electric Cost for Air /Unit of Flow	$139.97 /cfm/yr	$88.96 /cfm/yr	$228.93 /cfm/yr
Electric Cost for Air /Unit of Pressure	$403.13 /psig/yr	$512.46 /psig/yr	$915.59 /psig/yr
Ann'l Elec Cost for Compressed Air	$100,783 /year	$128,115 /year	$228,898 /year

*Based upon on a blended electric rate of $0.078 per kWh and 8,760 hours/year.

All the compressors are controlled manually with the exception of the Kaeser unit. With that in mind, multiple units are running at part load "just in case something happens." This practice, which may be necessary to keep the plant running, prevents the whole system from running efficiently, costing significant energy dollars to be wasted.

Each compressor is paired with a similarly sized refrigerated dryer. The Sullair units and the Kaeser unit have Sullair refrigerated dryers and the Quincy unit has a Zeks heat-sink dryer.

Establishing the Energy Baseline

Three units were running during the system assessment — along with seven production lines. During the visit, production changed from six to seven lines with no noticeable change in compressor load.

The full load kW of the Quincy unit at 100 psig discharge pressure is 169 kW, while the full load kW of the Sullair units is 89 kW at 100 psig discharge pressure. The individual kW lines indicate that the Quincy was running at an average of 134 kW or at 80% power. Sullair Unit #1 was running at 72 kW or 80% power and the Sullair Unit #2 was at 84 kW or 94% power.

During the morning one day, at approximately 9:00 am, the two Sullair Units #1 and #2 were shut off to see what the effect would be on the Quincy unit and on the entire system. During this test, the Quincy unit loaded in further and the plant did not experience any long-term pressure shortage. This test indicates that all three compressors were running at part load.

Annual plant electric costs for compressed air production, as operating today, are $228,898 per year. If the electric costs of $11,184 associated with operating ancillary equipment such as refrigerated dryers are included the total electric costs for operating the air system are $240,082 per year. These estimates are based upon a blended electric rate of $0.078 /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 740 acfm during low production to 1,440 acfm during high production. The system pressure runs from 97 to 95 psig in the headers during production.

TABLE 2. COMPRESSOR USE PROFILE — CURRENT SYSTEM

		FULL LOAD		ACTUAL ELEC DEMAND		ACTUAL AIR FLOW	
UNIT #	COMPRESSOR: MANUFACTURER/MODEL	DEMAND (KW)	AIR FLOW (ACFM)	% OF FULL KW	ACTUAL KW	% OF FULL FLOW	ACTUAL ACFM
7 Lines: Operating at 102 psig discharge pressure for 4,380 hours							
1	Sullair 20-100L (Unit #1)	89	500	80%	72	35%	175
2	Sullair 20-100L (Unit #2)	89	500	94%	84	32%	160
3	Sullair 20-100L (Unit #3)	89	500	OFF			
4	Quincy QSI1000 (Unit #4)	169	1,014	73%	134	38%	385
5	Kaeser (Unit #5)	99	543	OFF			
			TOTAL (Actual):		295 kW		720 acfm
14 Lines: Operating at 102 psig discharge pressure and 4,380 hours							
1	Sullair 20-100L (Unit #1)	89	500	83%	73.8	48%	243
2	Sullair 20-100L (Unit #2)	89	500	83%	73.8	48%	243
3	Sullair 20-100L (Unit #3)	89	500	83%	73.8	48%	243
4	Quincy QSI1000 (Unit #4)	169	1,014	91%	153.7	70%	709
5	Kaeser (Unit #5)	99	543	OFF			
			TOTAL (Actual):		375 kW		1,440 acfm

A COMPRESSED AIR MANAGEMENT SYSTEM FOR FIVE COMPRESSORS

According to plant personnel, production is seasonal with higher production during the middle of the year and lower production during the rest of the year. Each production level averages six months. Also, the compressor load for the 14 lines was estimated based on input from plant personnel. Each compressor load was estimated using the same information provided by personnel.

The Proposed Compressed Air System

The overall strategy for improving the air system is based upon operating each compressor efficiently and shutting off unnecessary units. This can be accomplished by installing a high-quality central control system.

TABLE 3. COMPRESSOR USE PROFILE — PROPOSED SYSTEM

UNIT #	COMPRESSOR: MANUFACTURER/MODEL	FULL LOAD		ACTUAL ELEC DEMAND		ACTUAL AIR FLOW	
		DEMAND (KW)	AIR FLOW (ACFM)	% OF FULL KW	ACTUAL KW	% OF FULL FLOW	ACTUAL ACFM
7 Lines: Operating at 102 psig discharge pressure for 4,380 hours							
1	Sullair 20-100L (Unit #1)	89 x .96	500	OFF			
2	Sullair 20-100L (Unit #2)	89 x .96	500				
3	Sullair 20-100L (Unit #3)	89 x .96	500				
4	Quincy QSI1000 (Unit #4)	169 x .96	1,014	88%	136	60%	609
5	Kaeser (Unit #5)	99 x .96	543	OFF			
			TOTAL (Actual):		**136 kW**		**609 acfm**
14 Lines: Operating at 102 psig discharge pressure and 4,380 hours							
1	Sullair 20-100L (Unit #1)	89 x .96	500	OFF			
2	Sullair 20-100L (Unit #2)	89 x .96	500				
3	Sullair 20-100L (Unit #3)	89 x .96	500	89%	72.6	63%	315
4	Quincy QSI1000 (Unit #4)	169 x .96	1,014	100%	156	100%	1,014
5	Kaeser (Unit #5)	99 x .96	543	OFF			
			TOTAL (Actual):		**228.6 kW**		**1,329 acfm**

A COMPRESSED AIR MANAGEMENT SYSTEM FOR FIVE COMPRESSORS

TABLE 4. SUMMARY OF KEY COMPRESSED AIR SYSTEM PARAMETERS AND PROJECTED SAVINGS

	CURRENT SYSTEM		PROPOSED SYSTEM (REDUCED DEMAND)	
SYSTEM COMPARISON	7 LINES	14 LINES	7 LINES	14 LINES
Average Flow (cfm)	720	1,440	609	1,329
Compressor Discharge Pressure (psig)	102	102	92	92
Average System Pressure (psig)	97	97	90	90
Electric Cost per cfm	$139.97 /cfm/yr	$88,96 /cfm/yr	$76.79 /cfm/yr	$58.26 /cfm/yr
Electric Cost per psig	$403.13 /psig/yr	$512.46 /psig/yr	$194.04 /psig/yr	$324.69 /psig/yr

PROJECTED ENERGY COST SAVINGS FOR PROPOSED SYSTEM

AIR SYSTEM COMPONENT	ANNUAL ELECTRIC COST OF CURRENT SYSTEM	ANNUAL ELECTRIC COST PROPOSED SYSTEM	ANTICIPATED ANNUAL SAVINGS	ESTIMATED PROJECT COST
Compressor System Operations	$228,898	$124,562	$104,336	
Ancillary Air Equipment (dryers, etc.)	$11,184	$11,184	$0	$73,100
Total Compressed Air System	$240,082	$135,746	$104,336	

The two most effective ways to run air compressors are at "Full Load" and "Off."

Capacity controls are methods of restricting the output air flow delivered to the system while the unit is running. This is always a compromise and is never as efficient as full load on a specific power (cfm/hp) basis.

Rotary Screw Air Compressor Controls

The two most common control methods used for rotary screw compressors are **modulation** and **on-line/off-line.** Modulation is relatively efficient at higher loads, but less efficient at lower loads.

On-line/off-line controls are very efficient for loads below 60% when properly applied with adequate time for blow down. There are several other control types e.g., "variable displacement" (75% to 100% load) and "variable speed drive" (25% to 75% load) that have very efficient turn down from when applied correctly. Two-stage, oil-free, rotary screws generally are not applied with modulation. As a result they use either two-step (full-load/no-load) or VSD capacity controls.

These controls must be installed correctly to operate efficiently. Piping and storage should be available close to the unit with no measurable pressure loss at full load to allow the signal to closely match the air requirements. The current system has modulation controls on the Quincy unit and on the Sullair units and two-step control on the Kaeser compressor.

The current units have capacity controls capable of translating "less air used" into a comparable reduction in electric cost. These controls will work effectively with the current piping and air receiver storage situation.

Central Monitoring and Air Management Control System

We recommend installing a compressed air system central monitoring and control for multiple units. These systems of PC hardware and Windows®-based software will allow your personnel to effectively monitor, operate, and sequence your compressed air system from any PC on your computer network. Your monitoring system should be able to monitor and record system flow and pressure and interface with the local on-board unit control system as it stands or is modified. These systems provide information and trending data to maximize system efficiency, reduce maintenance costs, and minimize unscheduled downtime. They can be set to alert personnel via a cell phone or email of a compressor warning, alarm, or shut down condition to ensure prompt attention to an emergency situation.

This type of monitoring software typically analyzes the sensed operating condition and brings the compressor on- or off-line, as required, to best handle the demand. They should ***not*** operate on a fixed sequence cycle. This ensures that one unit runs at part load and all others are at full load or off.

The monitoring function is not a direct energy issue but does help you retain the efficiencies your air system program has obtained. A well-applied monitoring system can become an operating part of a full central compressed air management control system.

Conclusion

This building products factory spent an estimated $240,000 annually on energy to operate the compressed air system at their Midwestern facility. The set of projects recommended, by the system assessment, reduced these energy costs by an estimated $104,336 or 43% of current use. Project costs totaled $73,000, representing a simple payback period of 8 months. BP

For more information contact Don van Ormer, Air Power USA, tel: 740-862-4112, email: don@airpowerusainc.com, www.airpowerusainc.com

To read more ***System Assessment*** articles, visit www.airbestpractices.com/system-assessments/compressor-controls

OPTIMIZING THE SUPPLY SIDE WITH INTELLIGENT CONTROLS

By Wayne Perry, Kaeser Compressors for the Compressed Air Challenge®

"I don't understand. I attended the Compressed Air Challenge Fundamentals and Advanced courses. I read every article and book I could find on improving the efficiency of compressed air systems. I developed great ideas about how to reduce my compressed air consumption. We fixed leaks, "right-sized" filters to reduce pressure drop, changed piping, moved some processes to shifts that used less compressed air, bought low consumption nozzles and educated our entire workforce. We did all of this work and I still have six out of six compressors running. Reducing my air consumption does not appear to have reduced my air production!"

This is not an uncommon scenario. Major improvements to the demand side of a compressed air system can often fail to yield the desired results on the supply side. Both sides of the system require action to see energy costs reduced. Additionally, future changes to either side of the system will require that the entire system be "re-tuned". A good place to start is to have the compressor service provider make certain that all compressor controls are properly set, and that the complete control system of each compressor is functioning properly. With the demand side addressed and the supply side operating as designed, the next step is to tie all of the supply side components into an integrated controller that can minimize run times, maximize savings, maintain constant plant air pressure and provide a constant feedback of data concerning the entire system.

Integrated Controllers

Ten or fifteen years ago, such an integrated controller would have cost $25,000 to over $50,000. It would have required a program written for the individual application and changes to the compressed air system would have required a rewrite of the program. All of this was expensive, but worth the cost on large systems. Today, the cost for an integrated controller has dropped considerably. Lower cost electronics, experience and competition have all worked to provide controllers that are superior

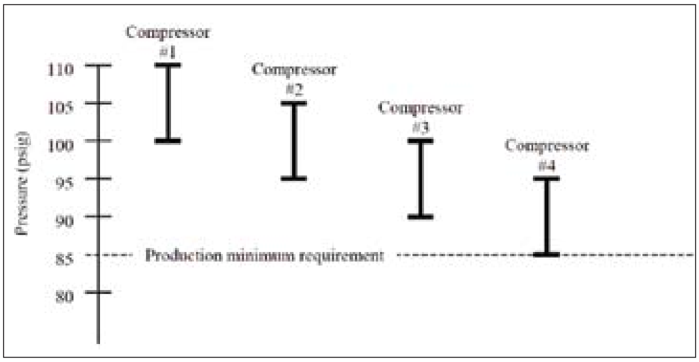


Figure 1: A cascaded pressure band arrangement may result in higher costs.

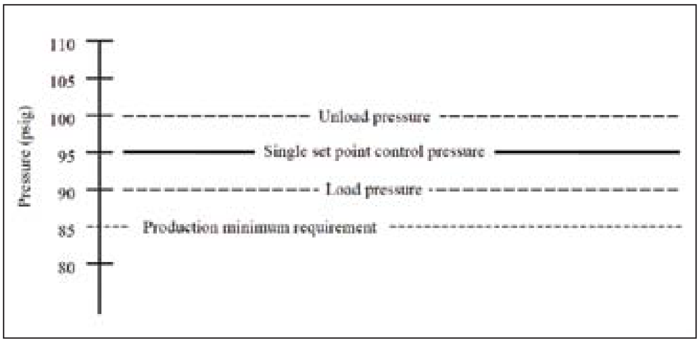


Figure 2: A compressor controller can keep the system at a lower pressure, reducing costs.

THE ONE EVENT TO SEE THE MOST SPECTACULAR METAL FABRICATION TECHNOLOGY. FABTECH 2012.

Experience the ultimate thrill of FABTECH 2012—a place where you can see and compare cutting-edge equipment and technology in action. Check out all the new products, network with industry pros and find solutions to work smarter and be more competitive. There's nothing else like it!

FABTECH
AWS WELDING CCAI FMA SME PMA METALFORM

North America's Largest Metal Forming, Fabricating, Welding and Finishing Event

November 12-14, 2012 | Las Vegas Convention Center
REGISTER NOW at fabtechexpo.com

Scan this code to watch an exciting preview of FABTECH.

Follow us:

Cosponsors: AWS FMA SME PMA CCAI

OPTIMIZING THE SUPPLY SIDE WITH INTELLIGENT CONTROLS

CAC® Qualified Instructor Profile

Wayne Perry
Kaeser Corporation
511 Sigma Drive
Fredericksburg, VA 22408
540-898-5500
fax: 540-898-5520
wayne.perry@kaeser.com

KNOW PRESSURE COMPRESSED AIR CHALLENGE

Wayne Perry is a L1 Certified CAC Instructor and has 25 years' experience in all aspects of the compressed air business. He is currently Technical Director for Kaeser Compressors, Inc., the U.S. subsidiary of Kaeser Kompressoren GMBH.

Mr. Perry is Kaeser Compressor's representative to Compressed Air and Gas Institute (CAGI),a former chairman and current member of the Energy Awareness Committee, and Vice-Chairman of the Rotary Positive Section, which develops standards and performance reporting for rotary screw compressors.

As a UNIDO Compressed Air Expert and member of the International Team of Experts to the China Motor System Energy Conservation Program, Mr. Perry developed and taught a curriculum to prepare Chinese engineers to conduct compressed air system assessments, develop energy efficiency projects, and train factory personnel.

to previous generations and packed with more features. Payback in energy savings can be as little as a few months or less.

Today's integrated controllers can control a properly designed system to within 1 or 2 psig. Gone are the cascading controls that required a 15 to 25 psig control range. Controlling in a tight pressure band allows the compressors to operate at lower pressures and saves energy. Remember, every 2 psig reduction in compressor pressure results in a 1% reduction in the power required. Reducing the system pressure also reduces the volume of air consumed by unregulated uses. Unregulated uses include things like blow-off nozzles and leaks. A simple orifice chart can be used to estimate the reduction in demand.

Remote Monitoring and Integration of System Components

Remote monitoring capabilities, with controllers, are very useful for plants. Several current generation controllers act as web servers. This allows plant operating personnel to connect the controller to the company's internal intranet and monitor the compressed air system from any computer that has a web browser. Many have modems, as well, allowing monitoring from outside the facility.

Full integration of all components in the air system, not just the air compressors, is important. Filters, dryers and drains are available with contacts that allow remote alarms. Pick a controller that allows these components to be tied in together. Problems in one part of the system may be the result of a failure of one of these components. Problem solving is much easier if all of the information is readily available.

Data Requirements from a Controller

There should be a screen that provides an "at-a-glance" display of the current system status and current service and alarm messages. Using internet terminology, this would be the controller's home page. It should display the operating status of each of the compressors and have links to the other displays on the server.

Look for controls that include a message history display. Message histories can act as the system's black box that records events that might lead up to a sudden drop in pressure or the shutdown of some component in the system. Troubleshooting can be greatly enhanced by knowing exactly what was happening right up to the time an event took place.

There should be a display that allows the operators to look at all of the individual

Fundamentals of Compressed Air Systems WE (web-edition)

Learn about the high cost of compressed air and how to optimize your system by signing up for our *Fundamentals of Compressed Air Systems WE* (web-edition) coming September 10th. Or try one of our many in-person seminars being held in the coming months at locations across the country. Visit www.compressedairchallenge.org for more information.

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

settings of all of the components in the system. This display should also show the control settings of the controller itself. If there is too much data to display on one screen, the controller should have links to the other screens that show additional system settings. It is much easier to point and click than to scroll down through 25 pages of information. Having these settings easily available allows current control schemes to be evaluated and changed if there have been changes in either the supply side or the demand side of the system. If production has increased, a process been moved to a different shift or a new compressor purchased, the control scheme should be reevaluated and possibly changed to optimize the efficiency of the compressed air system.

It is also important that a controller have the ability to provide data displayed as a graph

- Current system pressure and a selectable history — Showing the system pressure over time as a graph can be a great benefit when trying to optimize the supply side controls. Having real-time graphing, as well as the ability to pull up a day's worth, or a week's worth, or even a year's worth of data as a graph makes it easy to identify how changes to either side of the system affect the pressure. Regular evaluation of this data can avoid production problems

- Current air delivery of all of the compressors and each compressor, with a history — As with the pressure, graphing the air delivery to the system can help operators optimize the supply side. If one compressor turns on only briefly and is then off for an extended period, the sequence of compressors might be changed to have a smaller compressor handle that particular load. Another possible solution might be to add storage to help the system ride through the event without having to turn on a compressor at all. Operators will only know this if they can look at historical data. Having the data in a graph form is the easiest way to review system performance

- Current and historic specific power consumption — Again, being able to look at the specific power consumption of each compressor can allow operators to shuffle their sequences to have the most efficient machines running and the least efficient machines as standby

Operating Cost Data and Outbound Calling

Since the software in the controller is monitoring all of the power and flow conditions, the next step is an analysis module that allows operators to track their actual costs associated with running the air system. With a screen that allows the input of power costs, including seasonal or daily changes in power costs, the controller can calculate how much money is spent to supply electricity to the system. Improvements to the system can be easily documented without having to have separate power metering to the compressors. Some controllers even allow operators to enter other maintenance costs and display the total cost of the air system in table and graph forms.

Another neat feature of some of the latest controllers is a call-out function. Equipped with a modem, they can call or fax trouble messages to either plant maintenance personnel on call or to the plant's service provider. With a laptop computer and a phone line, the person notified can dial into the controller and take a look at the entire system.

OPTIMIZING THE SUPPLY SIDE WITH INTELLIGENT CONTROLS

If it is the middle of the night, the information provided to the service technician can allow him/her to decide whether the problem requires immediate attention or can wait until morning. It also allows remote troubleshooting so the service provider can be certain to have the correct parts when they arrive on site.

Fifteen years ago, compressor controllers consisted of a box with a few remote pressure switches, a timer or two and some lights to indicate that compressors were supposed to be running. If operators wanted more information, they had to go to each compressor and write down the temperature and pressure. That was about all of the data they could gather. Today's sophisticated integrated controllers actual manage the compressed air system. As with any good manager, they also provide reports and data to help others make correct decisions relating to the compressed air system. BP

To read more *Technology* articles, visit www.airbestpractices.com/technology/compressor-controls

RESOURCES FOR ENERGY ENGINEERS

TECHNOLOGY PICKS

EnergAir Launches Auditing System

EnergAir has introduced SCADAR™; a new **air auditing equipment** solution. It provides data collection of current, volts, power, pressure, temperature, flow, dew point, etc. The system tracks current, volts, pressure and temperature with a battery-powered, 4-10mA data logger. Wireless transfer of data between loggers and the SCADAR™ cloud computing environment. No PC software required. Ability to quickly chart, graph, analyze and prepare professional audit reports through user-friendly online tools 24 hours a day. Advanced simulation tools allow users to quantify the energy, cost and CO_2 savings potential of using Metacentre™ Master control systems and alternative compressor arrangements (e.g. replacing fixed speed with variable speed air compressors.

Founded in 1999, EnergAir is the system design and installation division of CMC NV, the world's leading compressed air and vacuum-pump controls company.

Contact: Nicolas De Deken
EnergAir Solutions Inc.
Tel. (855) 289 9317
E-mail : sales@energair.com
www.energair.com

Atlas Copco Expands GX Compressor Range

Atlas Copco Compressors has expanded its GX 2-11 range with the new 10 horsepower GX 7 EP. Generating 29.2 cfm, the GX 7 EP combines a compact design with Atlas Copco's proven oil-injected screw element and load/unload regulation, providing small industries and workshops with economical and reliable performance.

"The new GX 7 EP provides users the reliability of Atlas Copco's oil-injected screw element, low energy consumption and a small footprint," said Robert Eshelman, Vice President Industrial Air for Atlas Copco Compressors, LLC. "This is the perfect solution for anyone who needs a quiet, highly efficient compressor with limited installation space."

With a compact footprint and low noise emission, the GX 7 EP is designed for installation directly into the workplace. Additionally, the entire line of GX compressors discharges cooling air from the top, which permits placement in a corner or against a wall. Available in floor- or tank-mounted variants, the GX 7 EP features an optional integrated dryer that saves additional space and installation costs.

With the addition of the GX 7 EP to the newly expanded GX 2-11 range, the GX family now provides customers with two GX 7 options catering to different applications. The GX 7 EL is optimized for applications demanding larger air flow and longer duty cycles by delivering higher air flows, different pressure variants and the Elektronikon® control system.

Contact Atlas Copco
www.atlascopco.com

Chicago Pneumatic Debuts CP Nano Series Compressors

Chicago Pneumatic announced the introduction of the new CP Nano Series rotary screw air compressor, built for high-efficiency, continuous operation and reduced operating costs in a compact, workspace-saving design.

The CP Nano Series includes five models ranging from 3–15 hp to meet the demands of a wide range of automotive and light industrial applications. Designed to work continuously 24/7 when needed,

RESOURCES FOR ENERGY ENGINEERS

TECHNOLOGY PICKS

the CP Nano provides stable air output at 125 psig or 150 psig standard with high-efficiency airends/elements that produce drier, cooler air — up to 80% cooler than from a comparable piston compressor. It also features load/no-load operation with timed shutdown (CPN 5.0-7.5 single phase, CPN 10-15) to enhance durability and conserve energy.

"The CP Nano Series provides customers with an advanced, high-quality rotary screw compressor that has the capacity for continuous operation in a heavy-duty environment like much larger, more expensive compressors," said Ellen Steck, President, Chicago Pneumatic. "Yet its reduced footprint, energy efficiency and longer maintenance intervals make the CP Nano Series' overall cost of ownership among the most affordable of any compressor on the market."

Each compressor's compact dimensions take up less workspace compared to equivalent-power piston compressors. The CP Nano is also engineered with the air intake, air outlet and air cooling on the same side, making installation and ducting easier and less expensive.

When outfitted with an optional integrated refrigerant dryer, the CP Nano produces air that is stored in the receiver before entering the dryer. This design uses less energy and reduces maintenance, load on the dryer and pressure pulsations in the network.

"When we were designing the CP Nano, we worked from our customers' viewpoints to ensure we thought of everything to make the experience of owning and using the CP Nano as beneficial as possible," Steck said. "For instance, all of the CP Nano's key maintenance components — belts, air filters and oil filters — are placed on one side for easy access and service. And with no wearing parts and longer maintenance intervals, the CP Nano reduces operating costs compared to an equivalent-power piston compressor."

Like all CP rotary screw compressors, the CP Nano Series is backed by a CP Secure 5-year warranty with no contracts or service agreements necessary. (Authorized start-up required.)

Contact Chicago Pneumatic
www.cp.com

New Pneumatic Slide from Festo

Festo's new microslide DGSC is a real spatial miracle. At only 8mm wide, this pneumatic slide is ideal for installation in small spaces such as in the production of electronics and small parts assembly. But the space-saving design does not impair precision. On the contrary, its positioning accuracy is just 0.01mm due to the preloaded ball bearing cage guide. Its areas of application range from handling operations in Automatic Test Equipment (ATE) systems and simultaneous loading/unloading of multiple chips or ICs in and out of the test process, to attaching small screws and marking printed circuit boards with a data matrix code.

The microslide is especially efficient. For example, depending on the type and location of use no setting is required, except for advancing the end position of the work piece. This stroke compensation is made possible by a spring integrated between the piston rod and the yoke. The pneumatic slide has low breakaway torque and travels jerk-free starting at a pressure of 15 psi. Parts can thus be safely picked up and put down without getting lost.

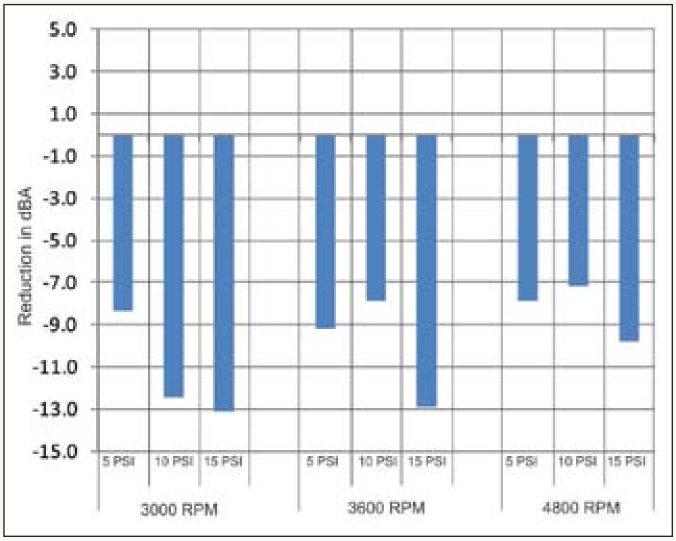
In addition, mechanical interfaces simplify the integration in the machine environment and save money as well. Various mounting and air-connection variants enable the DGSC to be easily adapted to its installation situation. The compact dimensions of the DGSC allow multiple slides to be installed next to each other when the grid dimension is narrow.

Contact Festo
Tel: 800-993-3786
www.festo.com

TECHNOLOGY PICKS

Tuthill QX Blower Achieves Sound Reduction

Along with its MD and Kinney brands, Tuthill Vacuum & Blower Systems has been supplying products to its customers for over 100 years. "One of the challenges is finding out the true wants and needs of the customer" explains Craig Keeling, Market Manager for Tuthill. "Tuthill uses a process called Voice of the Customer (VOC) to understand how we can develop better products and services for their target markets." Positive displacement (PD) blowers have been around for over 100 years and the basic technology hasn't changed much. An outcome of the VOC process has been the Qx™ series positive displacement blower and the Qube™ blower package.



The working environment in many industrial facilities is noisy. Some positive displacement blowers can have a sound pressure level of over 100 decibels (dBA). Tuthill has addressed this by incorporating a patented noise reduction feature into its Qx series of blowers used in the Qube blower package. The new integral silencer design results in an average 10 dBA reduction of noise pressure across the rpm and pressure range of operation. During the Qx design, other customer wants, such as improved efficiency, were focused on by improving internal component profiles and reducing the amount of slip. Slip is a way to judge a blower's performance and is directly affected by clearances. Optimizing the PD design gives the Qx blower one of the highest available PD pressure ratings in the industry at 18 psig.

Most companies address excessive noise by adding sound attenuated enclosures and external accessory silencers. Tuthill Qube blower packages do not even require an external discharge silencer because of the already low noise generated from the Qx blower inside. In eliminating the external silencer, the result is a lower cost product, a smaller footprint and improved efficiency due to the reduction in air flow restriction. It also removes the possible contamination and corrosion that comes with having an external silencer.

The noise reduction feature also serves a dual purpose for the QX blower. Its unique design reduces the pulsations in air flow that are inherent of most PD blowers. This dampening affect results in less shock on downstream equipment. Less shock means longer life and fewer service issues ideal for the Plastics industry.

Contact Tuthill Vacuum & Blower Systems
http://vacuum.tuthill.com

Phymetrix Launches New Dewpoint Analyzer for Instrument Air

Phymetrix announces the commercialization of a new low cost analyzer designed to measure the dewpoint in compressed air. The Phymetrix DewPatrol utilizes a sensing technology able to withstand harsh environments, including chemical impurities, compressor oil, liquid water slugs, and ambient humidity.

Phymetrix DewPatrol is designed specifically for dewpoint / moisture measurement in Compressed Air and Instrument Air Systems. DewPatrol provides reliability and accuracy in a compact (4.1"W x 5.7"H x 4.1"D) complete sampling system for portable or on-line use, in an IP65 (NEMA 12/13) ABS enclosure. Dew point can be measured at pressure, anywhere in the supply or demand sides of the air system from -166 °Fdp all the way up to saturation.

Simple connection to the air system using the existing quick connect, allowing installation directly on the compressed air pipe or hose. The swiveling inlet port adjusts for comfortable viewing under all installation conditions. Alternatively DewPatrol can be permanently installed using its 1/4"NPT inlet port. Automatic pressure compensation calculations can be provided with an optional pressure sensor. For permanent installations there is an optional Audio and Visual alert when a set dew point is exceeded.

Integral sampling system including inlet flow control valve, flow meter, particulate filter, coalescing filter (glass 360° view) demister with drain valve, and convenient swiveling quick connect inlet port, all in a handheld package. The portable version has a rechargeable

RESOURCES FOR ENERGY ENGINEERS

TECHNOLOGY PICKS

battery and is provided with a wall transformer and cable to recharge the analyzer. The on-line permanent installation model is provided with an AC power cord. DewPatrol is capable of logging the measurement data and downloading it to a MS-Windows PC.

DewPatrol is the newest addition to the line of technologically advanced moisture sensing instruments designed and manufactured in the USA by Phymetrix Inc.

Contact Phymetrix
Deborah Bedrossian
Tel: 1-631-627-3950
Deborah@Phymetrix.com
www.phymetrix.com

COMPRESSED AIR BEST PRACTICES®
www.airbestpractices.com

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

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

A Publication of: Smith Onandia Communications LLC
217 Deer Meadow Drive
Pittsburgh, PA 15241

Compressed Air Best Practices® is published monthly by Smith Onandia Communications LLC., 217 Deer Meadow Drive, Pittsburgh, PA 15241. Phone 412-980-9902, email patricia@airbestpractices.com. Compressed Air Best Practices® is a trademark of Smith Onandia Communications, LLC. Publisher cannot be held liable for non-delivery due to circumstances beyond its control. No refunds. Standard postage is paid at 233 Jefferson Street, Greenfield, Ohio 45123. Canadian and international distribution: IMEX International Mail Express, 1842 Brummel Drive, Elk Grove Village, IL 60007. POSTMASTER: Send address changes to Compressed Air Best Practices,® 217 Deer Meadow Drive, Pittsburgh, PA 15241. SUBSCRIPTIONS: Qualified reader subscriptions are accepted from compressed air professionals, plant managers, plant engineers, service and maintenance managers, operations managers, auditors, and energy engineers in manufacturing plants and engineering/consulting firms in the U.S. To apply for qualified reader subscriptions, please fill in the reader response cards herein and mail or fax or go to www.airbestpractices.com. To non-qualified subscribers subscriptions are $65 in Canada and $95 for other countries. When available, extra copies of back issues are $4 plus shipping. Contact Patricia Smith for subscription information at Tel: 412-980-9902 or email: patricia@airbestpractices.com. REPRINTS: Reprints are available on a custom basis, contact Patricia Smith for a price quotation at Tel: 412-980-9902 or email: patricia@airbestpractices.com.

THE MARKETPLACE

JOBS

COMPRESSION LEASING SERVICES, INC.

DENVER BRANCH MANAGER

Required experience of 5-7 years in sales management. Strong understanding of customer dynamics and requirements. Experience with budgets, supervision, project management, and driving sales teams.

Send resumes to:
Joi Hill, HR Manager
Compression Leasing Services
jhill@compressionleasing.com
www.compressionleasing.com

SERVICE MANAGER

We are an established Ohio Compressed Air Distributor with many years of growth and success. We are currently looking for a Corporate Service Manager to operate and run our Service department of 15 Technicians and 3 support staff employees. We offer a very competitive and incentivized salary/benefit package.

Required Qualifications

- Proven track record of managing all aspects of customer care
- Dedication to Customer Service and support
- Organizing and Managing skills to manage technicians and service support staff
- Field and Field Service experience in Compressed Air
- Computer proficiency with MS-Office products and ability to learn service management software.

Responsibilities

- Increase efficiency and profitability in both Service and Parts departments
- Organize and Manage Service Schedules
- Troubleshoot and Pre-qualify Service issues via telephone
- Occasional in field service calls
- Implementation of routine customer follow up for satisfaction evaluation and future service retention
- Grow service work from existing equipment customers.

Please submit your resume and salary requirements to rod@airbestpractices.com.

Compensation will be based upon experience.

HITACHI
Inspire the Next

HITACHI SCROLL DISTRIBUTION OPPORTUNITY

Interested to become a partner with Hitachi for 1.5–16.5kW Oil-Less Scroll Units?

Please contact us at
airtechinfo@hal.hitachi.com
or call 704-494-3008 x28

To learn more about our products visit
www.hitachi-america.us/airtech

TECHNOLOGY

THE MARKETPLACE

TECHNOLOGY