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May 2016

## Refineries & Chemical Plants

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- 20 Custom-Engineered Instrument Air Dryers for Refineries
- 38 Oversized Dryer Causes Pressure Issues at a Chemical Plant

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# FROM THE EDITOR

## Refineries and Chemical Plants



Every year we dedicate a magazine issue to refineries and chemical plants. I'm always struck by the size, complexity, and zero risk-tolerances of these industries. They also remind me of our energy infrastructure: vital to our independence and well-being as a nation – yet not always viewed in the most positive light. Risks will always exist and must be managed. I'd like to see more attention given to the benefits these industries provide. This issue focuses on how they manage Instrument Air.

Aggreko Rental Solutions is a key provider of Instrument Air in refineries and chemical plants. Providing oil-free and moisture-free compressed air allows these plants to perform turnarounds and respond to fluctuating market demands. I hope you enjoy our interview with Aggreko's Mark Shedd, who has forgotten more about de-coking, cat crackers, vessel purging, reactor cool-downs, de-inventory of spent catalyst..., than I'll ever know.

Atlas Copco has been serving Houston-based energy and chemical industries with custom-engineered, Instrument Air compressor and dryer packages for many years. Ramsaran Palaniappan, Project Engineering Supervisor-Regenerative Desiccant Dryers, provides us with a sampling of the work they've done recently for both a gasification project and an alumina refinery in the Middle East, and chemical plants in Louisiana and Texas.

Many industries self-regulate through the use of trade associations. The Compressed Air & Gas Institute (CAGI) provides this service and is promoting quality assurance through a product performance verification program. In this issue, they provide us with information on their program with refrigerated compressed air dryers.

Project management is often cited, by auditors, as a challenge to the realization of successful energy-savings projects. This month, we feature two excellent articles on this topic written by experienced auditors. Paul Edwards, Compressed Air Consultants, provides us with, "Detailed Design-An Ounce of Design is Worth a Pound of Project," and John Molnar, Rogers Machinery Company, has supplied, "Don't Skip the Most Important Meeting of your Energy Project."

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

### ROD SMITH

Editor

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► Learn to examine the selection criteria wastewater plant design engineers use – by signing up for our free May 26th Webinar titled, "Calculating Aeration Flow and Pressure Requirements", at [www.airbestpractices.com/magazine/webinars](http://www.airbestpractices.com/magazine/webinars).

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## 2016 MEDIA PARTNERS





# INDUSTRY NEWS

## CompressAir Expands into Illinois with Sullair Line

CompressAir, an industrial equipment distributor based in La Porte, Indiana, recently announced an expansion into the Illinois counties of Cook, Kankakee, and Will. Currently, CompressAir represents Sullair, and operates out of two locations—one in La Porte, and the other in Elkhart, Indiana.

“We are proud to carry the Sullair brand into new territories,” said Andrew Crowl, Owner of CompressAir. “We were recognized as Sullair’s Distributor of the Year in 2015 for our territory, which encompasses all of northern Indiana. Our expansion will provide ample opportunity for our highly trained and skilled group of technicians and aggressive young sales team to promote the quality and outstanding service with which CompressAir was formed more than 10 years ago.



CompressAir President Andrew Crowl stands next to a Sullair air compressor.

### About CompressAir

Founded in 1987, CompressAir is an authorized distributor for Sullair Corporation. CompressAir has become a leader in the industry by providing a wide variety of options to help customers reduce operating costs and increase efficiency with their compressed air system. Currently there are 25 employees with a combined total of more than 183 years experience working within the air compressor industry.

Visit [www.compressair.net](http://www.compressair.net)

## Atlas Copco Ranked Top Machinery Company for Sustainability by Global 100

Atlas Copco, a leading provider of sustainable productivity solutions, was recognized as the world’s most sustainable machinery company, with an overall ranking of 34, in the 2016 Global 100 Most Sustainable Corporations in the World index. This is the 10th time that Atlas Copco has appeared in the Global 100 rankings, a list presented on January 21 at the World Economic Forum in Davos, Switzerland.

“Providing customers with the most innovative, energy-efficient, safe and ergonomic products is a key part of our business model,” said Mala Chakraborti, Atlas Copco’s vice president corporate responsibility. “Integrating sustainability in our operations generates great value for both industry and society.”

Atlas Copco’s innovative, energy-saving products include its variable speed compressors, a technology the company pioneered in 1994 that enables compressors to run only at the speed necessary, cutting energy consumption. In 2013, Atlas Copco launched the patented VSD+ technology, which reduces energy use by more than half compared with traditional compressors. This groundbreaking compressor has received an overwhelmingly positive customer response.

Atlas Copco is also listed in the Dow Jones Sustainability Europe Index for 2015-2016 and is ranked number 11 globally in the Newsweek Green Rankings, one of the world’s foremost rankings on corporate responsibility.

The Global 100 Most Sustainable Corporations in the World index measures against key sustainability indicators such as transparency, resource productivity and a range of other social and governance indicators.

For more information, visit <http://global100.org>.

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## INDUSTRY NEWS

### Spectronics Acquires H&I Manufacturing

Spectronics Corporation has announced the acquisition of H&I Manufacturing Inc., a precision machine and job shop located in Bohemia, New York. As part of the purchase agreement, H&I became a new division of Spectronics, and its machinery and personnel were moved into the parent company's 100,000-square-foot manufacturing facility in Westbury.

Kristian Immoor, the former president and owner of H&I, is now the Advanced Manufacturing Foreman of the new division. "I am very excited about this partnership and the opportunity to work with the talented and skilled individuals of Spectronics, and I look forward to our mutual success," Immoor stated.

H&I specializes in CNC milling, turning and honing, as well as sheet metal fabrication. The company works with titanium, 17-4 PH, 15-5 PH and 440C stainless steel, and many other ferrous and non-ferrous materials, including plastics. In addition, H&I is experienced in working with outside vendors to perform heat treating, magnetic particle inspection, penetrant inspection, anodization and passivation, among other processes.

H&I's present machinery, plus the planned acquisition of additional machinery, will boost Spectronics' research and development efforts, along with streamlining the output, quality and dependability of its existing products. H&I's highly advanced machine shop will continue to serve the aerospace, defense, automotive, medical and electronics

industries, as it has been doing for over 25 years. With Spectronics' ISO 9001:2008 quality management certification and AS9100 aerospace certification, which H&I did not previously have, it will be able to further develop and improve upon its services.

"The integration of H&I with Spectronics will create a more efficient, smooth-running manufacturing process," said Jon Cooper, President of Spectronics. "That will allow us to expand our ability to deliver the technologically advanced products that our global customer base has come to expect."

*For more information, visit [www.spectroline.com](http://www.spectroline.com), and [www.bimanufacturing.com](http://www.bimanufacturing.com).*



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The *FAST™ Program* gives designers, OEMs, field service personnel, maintenance personnel, designers, plant engineers, and others anywhere/anytime access to information on products, availability,

and shipping times, enhancing efficiency, productivity, and uptime. The *FAST™ Program* helps lower inventory costs through just-in-time delivery. It reduces time-to-market for prototype and production equipment.

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## INDUSTRY NEWS

create a wish list of products. From the wish list an email with links to selected products and an online shopping basket is generated. Email communication is another productivity enhancer. For example, maintenance personnel can instantly forward product replacement information to the purchasing department for streamlined ordering.

### About Festo

Festo is a leading manufacturer of pneumatic and electromechanical systems, components, and controls for process and industrial automation. For more than 40 years, Festo Corporation has continuously elevated the state of manufacturing with innovations and optimized motion control solutions that deliver higher performing, more profitable automated manufacturing and processing equipment.

A video on the new app is available online. Visit Google Play or the App Store to download the Festo *EAST* mobile app today.

***For more information on all of the products and solutions available from Festo, call Festo at 800-993-3786 and visit <http://www.festo.us>***

### Eleven General Motors Facilities Earn ENERGY STAR Certification

Eleven General Motors facilities have earned ENERGY STAR® certification for superior energy efficiency from the U.S. Environmental Protection Agency (EPA). These buildings, which include seven parts distribution centers, a global headquarters office and three IT innovation office centers, have optimized their buildings to leave a smaller carbon footprint.

To earn ENERGY STAR certification, buildings must perform better in energy efficiency than 75 percent of similar buildings nationwide and meet strict energy efficiency performance levels set by the EPA.



“It makes good business sense to pursue a greener product in every segment of the value chain,” said Al Hildreth, GM’s global energy manager. “This includes the areas that support our business and keep our company running optimally, like our efficient warehouses, IT centers and office buildings.”

GM leads the automotive industry in certified distribution centers. The following Customer Care and Aftersales facilities, which supply automotive parts to dealerships and customers for vehicle repair, achieved certification:

- Customer Care and Aftersales World Headquarters, Grand Blanc, Michigan
- Denver Parts Distribution Center, Colorado
- Fontana Parts Distribution Center, California
- Lansing National Parts Distribution Center, Michigan
- Martinsburg Parts Distribution Center, West Virginia
- Memphis ACDelco Parts Distribution Center, Tennessee

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GM Customer Care and Aftersales World Headquarters in Grand Blanc, Michigan, earned ENERGY STAR certification by implementing a number of energy conservation projects (Image Courtesy of GM).



- Rancho Cucamonga Parts Distribution Center, California
- Willow Run Parts Distribution Center, Michigan

These facilities implemented a number of energy conservation projects. The Grand Blanc facility installed energy-efficient LED lighting, upgraded heating and cooling systems, and engaged employees in a “Bring Your Green to Work” event with local energy utilities to discuss energy-saving ideas for both the home and office.

“This recognition demonstrates the collaborative work by our employees who are focused on saving energy and improving our efficiency,” said Tim Turvey, GM Customer Care and Aftersales global vice president.

Additionally, three new GM IT innovation office centers earned certification:

- The Arizona IT Innovation Center in Chandler uses solar to power 9 percent of its monthly energy use.
- The Georgia IT Innovation Center in Roswell installed an advanced intelligent boiler control to optimize energy efficiency.
- The Austin IT Innovation Center in Texas sets workplace and conference room lighting to operate at 50 percent of maximum output.

These three sites house software developers, project managers, database experts and other IT professionals supporting GM’s business worldwide. All buildings were designed and built following Leadership in Energy and

Environmental Design strategies and practices, and rank an average of 43 percent below the median national average for energy use.

GM is committed to consistently making its global operations more energy efficient. It has earned three consecutive EPA ENERGY STAR® Partner of the Year – Sustained Excellence awards for energy management and leads all companies in the ENERGY STAR® Challenge for Industry. GM was one of the first 13 companies to sign the White House American Business Act on Climate Pledge and has been a Ceres BICEP Climate Declaration signatory since 2013.

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## INDUSTRY NEWS

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### AVENTICS Publishes “Ideal Cushioning” Manual for Air Cylinders

Aventics developed a superior method of adjusting pneumatic cylinder cushions several years ago, and many customers have since enjoyed the benefits. Now a new manual, titled “The ABC’s of Pneumatic Cylinder Cushioning,” is available to instruct a user on how to achieve “Ideal Cushioning.”

Aventics “Ideal Cushioning” is a method to optimize cushioning, leading to reduced shock/vibration, reduced noise, and reduced cycle times. “Ideal Cushioning” means that the

direction of travel of the piston is the same throughout the entire cushioning sequence (i.e. no piston bounce) and that its velocity is exactly zero when it reaches the end of its travel. The sound of end cover contact is negligible, and the total cycle time is optimized. Thus, properly adjusted pneumatic cushioning has positive effects on the working environment and on the total working cycle time. Many OEMs and end users have used this method to greatly increase machinery productivity.

It should be noted that cylinders capable of achieving true “Ideal Cushioning” have both precision pneumatic cushion adjustment and elastic elements for impact cushioning. Many Aventics cylinders, including RTC rodless, and PRA/TRB/ICL ISO 15552 cylinders, are “Ideal Cushioning” capable.

*For more information, visit [www.aventics.com/us](http://www.aventics.com/us).*



*Aventics developed a 12-page manual, titled “The ABC’s of Pneumatic Cylinder Cushioning,” with complete instructions and charts on how to take advantage of “Ideal Cushioning.”*

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# Aggreko Assists Refineries with FLUCTUATING DEMAND

By Roderick Smith, Compressed Air Best Practices® Magazine

*The Aggreko Remote Operating Center provides 24/7 vigilance*

► Compressed Air Best Practices® Magazine spoke with Mark Shedd, Head of Oil-free Air, Aggreko Rental Solutions

**CABP: It's great to talk to you again Mark. Can you remind us why refineries and petrochemical plants require oil-free compressed air?**

It's great to talk with you also. There are two distinct compressed air systems in a refinery or petrochemical environment: plant air and instrument air systems. Instrument air systems are almost always 100% oil-free air compressors on both the permanent and temporary systems. The demand for compressed air purity, in instrument air systems, is so high that the permanent install back-up system is usually nitrogen.

Most instrumentation control circuits use compressed air-actuated valves. When the actuator articulates, a tiny orifice will bleed the air down so the spring can overcome the actuator and close the valve or whatever its function may be. Any level of oil carryover, from a flooded compressor air compressor for example, will mix with water vapor, emulsify, then coagulate and finally plug the actuator orifices. When the orifice is clogged, the actuator will no longer function and it cannot relieve a control air circuit.

One of the largest catastrophes in the refining world, where there was a significant explosion, was traced back to an actuator not closing a

valve and chemicals mixing- which shouldn't mix. The contaminated control air circuit did not allow a critical valve to close. This is why, most refiners not only use oil-free air compressors for their Instrument Air – but use their pure nitrogen systems (rather than plant air) as the back-up.

**CABP: What kind of pressure dew point requirements do the refiners have? Is it still -40°F?**

Yes, most applications require a -40°F (-40°C) pressure dew point. There are, however, a good many applications requiring -100°F (-73°C). For example, Aggreko is called in to assist with the pneumatic conveyance in the de-inventorying and re-inventorying of catalyst from a reactor. A lot of this catalyst is hygroscopic, so no detectable moisture in the compressed air stream is allowed.

We use pressure-swing (also known as heatless) desiccant air dryers due to their proven ability to reach and maintain very low dew points. We do not use heated desiccant dryers as they require electrical hook-ups and create greater kW demands.

We recently we had a -128°F (-88°C) pressure dew point requirement because it was part of a catalyst process. For this extremely low dew point, we engineered a solution, which included pre-cooling the compressed air (by chilling it) before it hit the desiccant dryer.



### CABP: What kind of technical support and remote monitoring/control capabilities does Aggreko offer?

Technical support represents a unique thing about Aggreko – we aren't just a rental company. As you know, I've been doing this for 20+ years and have long-standing relationships with all the major refiners. Sometimes, however, we get an inquiry that I can't handle technically and it's amazing to have a full staff of chemical, mechanical, and process engineers in our Process Services team to turn to. These folks can engineer any solution to any problem- similar to the -128°F (-88°C) pressure dewpoint requirement mentioned earlier. We are head and shoulders over most rental companies in engineering capacities.

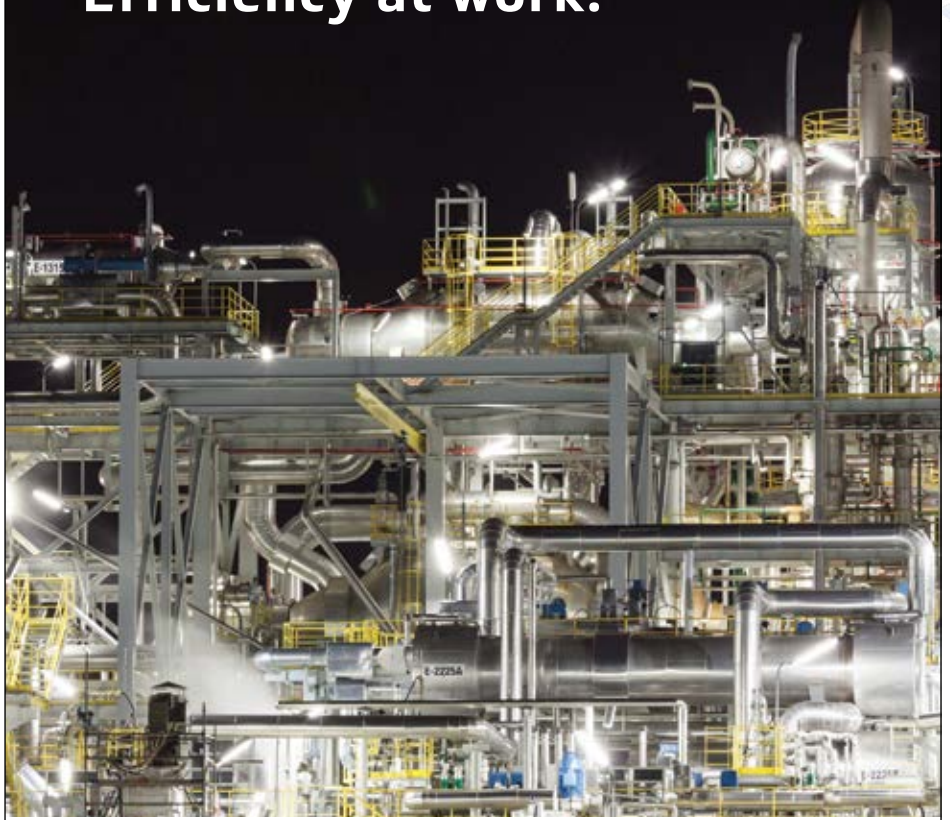
Aggreko has been an industry leader with regards to remote operational control and monitoring. The Remote Operating Center (ROC) is an impressive control room, very similar to a refinery or NASA control room. Staffed by our operators 24 hours per day, they are able to provide constant monitoring and offer live technical support to customers. We also give the customer the ability to remotely monitor our air compressors and cooling solutions from their control room – by tying



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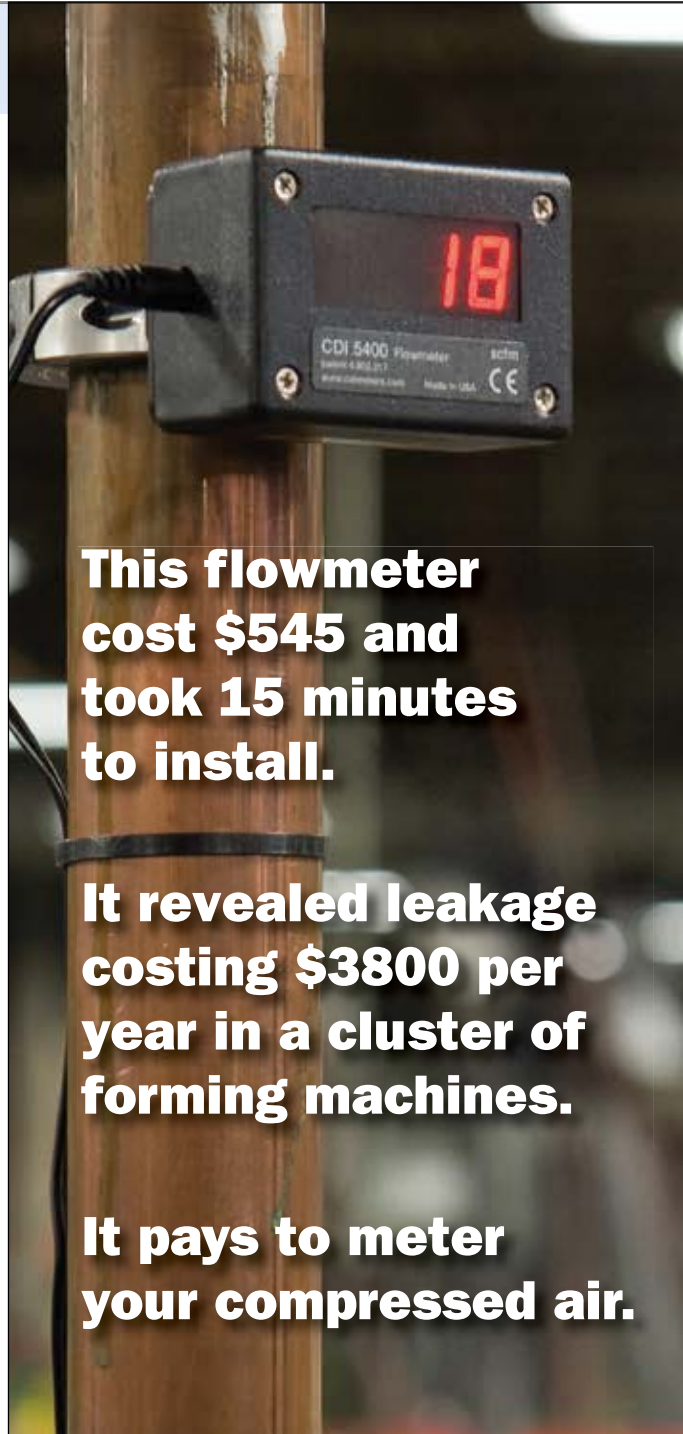
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## AGGREKO ASSISTS REFINERIES WITH FLUCTUATING DEMAND

them into our systems. Due to the critical nature of the applications, remote monitoring is designed to supplement in-person maintenance rounds and procedures – not replace them.

### **CABP: Please describe the catalyst regeneration process and Aggreko's role.**

Oil refineries often face the need for temporary increases in capacity. The most common demand driver is for gasoline, during the summer months. The increased throughput will cause an earlier fatigue of catalyst. The catalyst regeneration process, in an oil refinery, uses compressed air to purge vessels and to regenerate the catalyst. Scheduled and emergency outages, at the refinery, result in temporary demand for “Oil-Free” compressed air in the catalyst regeneration process.

The large, upright vessels, such as distillation columns and vacuum flashers, also require periodic maintenance. These vessels have many trays where moisture will accumulate when opened to atmosphere. The moisture must be removed from the steel towers prior to being put back into service. Hot nitrogen, sometimes produced on-site but more often supplied by trucked-in pumper units, is used to purge the vessels of moisture.

Compressed air is a more cost-effective method of purging the vessels of moisture in any process where the introduction of oxygen does not create a safety hazard. Often, oil-free compressed air can be introduced while workers are present to maintain a positive pressure and minimize the entry of moisture in the repair and inspection phase. This cannot be accomplished with nitrogen as it will create a nitrogen rich environment unsafe to workers. During a turnaround, there are many opportunities to utilize clean Class 0, 100% oil-free compressed air:

- Purging a vessel or confined space to allow access for personnel
- Cool-down of reactors after an initial purge of hydrocarbons-providing quicker access for personnel
- Continuous supply of Class 0, 100% oil free air while personnel are inside a confined space to create an environment which will minimize the required exiting of the vessel and breaks in productivity of personnel.
- De-inventory of spent catalyst, bulk conveyance of new catalyst, conditioning of vessel for hygroscopic catalyst (maintaining RH)
- Conditioning of space during cleaning process of trays and reactor walls to minimize flash rust of exposed metal
- Cost of nitrogen and the logistical hurdles of moving pump trucks in and out of the space during the scheduled outage can be mitigated by doing a single purge with Nitrogen (in an Oxygen sensitive process) and the continuous purge being performed with clean dry compressed air



**CABP: Can you describe how the Main Air Blowers are used and how you supplement their work in de-coking the catalyst in a “cat cracker”?**

Sure. We just completed a 70,000 cfm project for a refiner where they lost a main blower to their cat cracker. We provided this compressed air flow (and the power to run it) in a manner of weeks. In order to regenerate the catalyst in a “cat cracker” vessel, the catalyst must be “de-coked”. “De-coking” is the process where catalyst residue is burned. This can only occur when oxygen is introduced, to increase the temperature of the burn, which then permits the burning of catalyst residue. Oil-free compressed air is used to introduce the required levels of oxygen.

Refineries have main air blowers supplying air to the entire facility. Rental oil-free air is often used to supplement the volume of air required, or to ensure redundancy for the refinery. When ambient temperatures go up and oxygen content goes down, compressed air is fed into the intake of the main air blower. This is a more cost-effective supplementation method, to maintain oxygen levels, than using liquid oxygen.

Refineries have 100% redundancy requirements for their main air blower systems. A refinery cannot produce without the main air blower system so it is therefore a critical application. A shutdown, of course, will cost the refinery millions of dollars per minute. If repairs are needed on the air blower, rental oil-free compressed air will be brought in to replace it during repair. The back-up blowers are thereby maintained in reserve to ensure redundancy.

**CABP: How do you decide whether to use a rotary screw or a centrifugal air compressor?**

More often than not, the main air blower is typically a large steam or gas turbine driven centrifugal unit. If we are addressing an ambient temperature change where the blower

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Gerald “Gerry” Bauer  
President, EccoFab - Rockford, IL

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## AGGREKO ASSISTS REFINERIES WITH FLUCTUATING DEMAND

an no longer provide the required pounds per minute of oxygen, we'll bring in rotary screws to augment up to 6000 cfm. Above 6000 cfm, we will evaluate if we should bring in a centrifugal which has the ability to part-load... if their rates fluctuate then we can fluctuate the augmented demand. This is where our process engineering and customer knowledge makes a huge difference. We work with the client to

forecast oxygen demand and fluctuation rates on this demand to select the best temporary compressed air supply strategy for them.

Aggreko's fleet normally has the capacity to deliver 800,000 to 1 million cfm. To supplement our fleet of oil-free rotary screw air compressors, Aggreko has now developed a contractual relationship with a niche provider

of rental centrifugal air compressor skids. They do the project engineering and we are their sales channel. We now have the largest rental fleet on the market. The 70,000 cfm project mentioned before was provided in a manner of weeks. We can normally provide a turnkey system in no longer than a month-and that's the longest it's ever taken us in my 20+ years.

### Temporary Air Compressors Enable Upgrader to Resume Coker Operation

The main air blower, for the furnace at a synthetic crude plant's 85,000 barrel per day coker unit, suffered a mechanical blade failure just prior to a scheduled turnaround. The coker furnace is a forced draft heater utilizing a 158,300 scfm main air blower. Discharge from the blower is used as combustion air in the coker furnace.

A turnaround had been scheduled for the coker, about a week before the failure occurred. However, since it was no longer possible to run the blower, the coker had to shut down prematurely. This was a major concern since it was highly unlikely the repair of the air blower would be completed by the restart date of the coker, resulting in a significant loss of production.

Aggreko provided air compressors that delivered 150,000 scfm of oil-free air, 33 MW of power, 2000 tons of cooling tower capacity, 56 pieces of electrical distribution equipment (transformers/breakers/panels) and low voltage 480 V cable.

Aggreko assigned a senior engineer as project manager and deployed technicians to manage onsite activities, 24 hours a day, at key locations throughout the upgrader. Aggreko, in conjunction with plant personnel, also coordinated mobilization, installation, and commissioning of all phases of the project.



Aggreko supplied 150,000 scfm of oil-free compressed air to supplant a failed main air blower at a synthetic crude plant.

The Aggreko solution allowed the customer to maintain maximum feed rates. The temporary equipment systems operated for 18 days, until it was transferred to the repaired equipment without any service interruptions. The Aggreko solution allowed the customer to maximize feedstocks and averted a potential loss of over \$50M dollars (US).

### CABP: When is the "right" time for temporary vs. permanent install compressed air systems?

That's a great question and what we focus on answering with our clients. It's all about maximizing their use of capital, minimizing energy consumption and being able to react to changes in market demand.

Chemical plants have seen upticks in demand for ammonia production. They contact us for augmentation, because they can't increase their "feed air" fast enough to keep up.

These calls come to us when they recognize they are "feed air limited" to their process. Normally it's a mass flow application. Their engineering staff will say they need "x" amount of pounds per hour of additional oxygen for the process. The feed air is a fuel gas where oxygen is being burned as a fuel to create heat or they are using oxygen on a molecular level to blend with their product.

Our process engineering team will design a temporary solution to meet the oxygen needs. If the market "uptick" opportunity is less than 3 years, they don't want to put in permanent equipment. The lead times to procure new permanent equipment of this volume are also not short – and the chemical plant doesn't want to miss the market opportunity. So, it's normal to use our temporary products to integrate into their permanent install system.

Then, of course, there's always the failure event where they need the immediate response, where we can recreate their



permanent install systems. There was a lot of deferred, maintenance over the past years, and we are now seeing business as a result. Here's a quick list of common situations where we are called in:

- Redundancy for permanent install during unexpected breakdowns
- Augmentation for permanent install to address seasonal inefficiencies or mechanical inefficiencies
- Identifying a market trend for a specific finished product requiring additional capacity
- Curtailing the capacity of the permanent install fixed horsepower machines: right -sizing to demand in a market downturn

#### **CABP: How does Aggreko align its product offering to help clients optimize their supply strategy to match their demand profiles?**

The challenges our clients face is their demand-profiles have huge fluctuations. We have a Certified Air Master working on our engineering team and independent auditors do call us. We will assist them and our customers on the question of how they balance permanent with temporary install equipment to optimize capital and energy use.

As mentioned, we have longstanding relationships with most of the major refineries. We recognize what the market conditions are for them. We know there isn't a big market for benzene right now, for example, and have a client with 5000 horsepower worth of permanent install air compressors which are severely under-loaded. We went in to right-size their supply by offering them a temporary solution matching their load much better.

Our new diesel product has the ability to speed modulate and we are planning to introduce a variable frequency drive into our electric air compressor range in 2017.

We can reconfigure our centrifugal rental fleet to configure the motor to reduce blow-off. We have the ability to change impellers, use two-stages instead of three, and custom-select motors all to help clients match supply up better with demand.

#### **CABP: Temporary cooling solutions with rental chillers and cooling towers is a big part of your business. Is there cross-over with compressed air applications?**

I'm glad you asked that question. There are a lot of interesting things happening here. As you know, with air compressors most of the energy is lost to the heat of compression. We are working on a prototype heat recovery unit. The idea is to equip our standard air compressors with the option to bypass our aftercoolers and reroute the 2<sup>nd</sup> stage 400°F

compressed air to a heat exchanger to be used in the customers process.

Our process engineers currently do a lot of this work, deploying our temporary cooling products, so we have a lot of knowledge on the opportunities here. Right now we are looking at a long-term opportunity with a customer. Again, we aren't a transactional rental company – we are a specialty provider of all things infrastructure to our clients.

#### **CABP: Thank you for your time. BP**

*For more information please contact Mark Shedd, Head of OFA, Aggreko Rental Solutions, tel: 281-412-1811, email: mark.shedd@aggreko.com, www.aggreko.com/northamerica*

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## Measure | Manage | Improve

# Custom-Engineered Instrument AIR DRYERS FOR REFINERIES

By Ramsaran Palaniappan, Project Engineering Supervisor-  
Regenerative Desiccant Dryers, Atlas Copco Compressors

► Atlas Copco has a long history serving the Houston-based energy and chemical industries with custom-engineered packages. The objective of this article is to show just a few examples of the custom applications typically engineered and manufactured in the Atlas Copco Houston operation. Opened in 2012, Atlas Copco Houston produces standard compressed air dryers as well as completely engineered air dryers for all markets. The air flow capacity of the dryers, produced at this location, vary from 5 to 12,750 scfm. This capacity range covers heatless, heated purge and blower purge air dryers. Atlas Copco also builds air compressor skid packages with other air treatment products and receiver tanks at this location.

Compressed air is a very important and safe source of energy used in chemical refineries and in the oil and gas industry. Typically, these industries require regenerative desiccant air dryers to control the



*Instrument air CDE 250+ skid package included a sandstorm protection package. Components included a wet air receiver tank, auxiliary cooler, water separator, duplex air pre and after filters with a nine (9) valve by pass system and a heatless regenerative desiccant air dryers.*



**“This package was designed to withstand one of the harshest environments in the Middle East complete with sandstorm protection to all the equipment.”**

— Ramsaran Palaniappan, Project Engineering Supervisor-Regenerative Desiccant Dryers, Atlas Copco Compressors





The Atlas Copco Houston Engineering and Proposal-Engineering Team

moisture level of the compressed air used with pneumatically controlled devices. This is commonly called "Instrument Air" and usually carries a  $-40^{\circ}\text{F}$  ( $-40^{\circ}\text{C}$ ) pressure dew point specification. It is possible, however, to see dew point specifications down to  $-100^{\circ}\text{F}$  ( $-73^{\circ}\text{C}$ ).

#### Gasification process in the Middle East: Six Instrument Air Dryer Trains for a Class 1 Div 2 Environment

One of the first engineered air dryers was for a major oil and gas company. This project included six (6) instrument air trains for a gasification process in the Middle East. The trains are grouped in three (3) stations where one train is operating and the other train is on standby. This dryer skid package included a wet air receiver tank, auxiliary cooler, water separator, duplex air pre and after filters with a nine (9) valve by pass system and heatless regenerative desiccant air dryers.

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## CUSTOM-ENGINEERED INSTRUMENT AIR DRYERS FOR REFINERIES



*A rear view of the ADE 3350 heated purge desiccant air dryer designed for 7100 cfm inlet*



*A CDE1100+ heatless desiccant dryer skid with duplex pre and after filters and a 9 valve by pass system*



*A 12,700 scfm BDE6000+ blower purge desiccant dryer (currently in production) for an ethane cracker and derivatives chemical plant*

This package was designed to withstand one of the harshest environments in the Middle East complete with sandstorm protection to all the equipment. This package also went into Class I Div 2 environment (considered a hazardous area or harsh operating environment) with NEMA 7 type enclosure and HART protocol instruments. The capacity of each dryer train is 265 scfm @ 138 psig with air quality of  $-400^{\circ}\text{F}$  pressure dew point. This package was string tested with the Atlas Copco Compressors, which were also skid packaged with this project.

### Chemical plant in Texas: 7100 scfm Heated Purge Desiccant Dryer with custom Allen Bradley PLC

The next project was for an olefins and polymer manufacturing chemical plant. This facility had an older compressed air dryer requiring replacement due to its' age and the capacity increase at the facility. This ADE3350 dryer is a heated purge desiccant dryers capable of handling 7100 scfm at the inlet of the dryer.

This dryer package was designed according to the customers' strict specifications; complete with a man way incorporated into the vessels for inspection purposes and custom Allen Bradley PLC system and program to control the dryer. This dryer package was designed for outdoor use with severe duty paint and special instruments suitable for outdoor installation. This package also has pre and after filter package with a bypass system for the entire dryer package.

### Alumina refinery in the Middle East: Heatless desiccant dryer skid with actuated ball valves

One of the recent dryer skid packages that we designed and shipped was for an Alumina refinery in the Middle East. This dryer is a heatless desiccant dryer with duplex pre and after filters and 9 valve by pass system. Normally all dryers are equipped with cycle tested actuated butterfly valves but this project required actuated ball valves as per the customer requirements. Few of the other main customer requirements were the noise level must be maintained below 85 dBA even during blow-off cycle as well as the installation of a vortex enclosure cooler to cool and avoid contamination of the control panel enclosure from dirt. This dryer package is also installed outdoors.

This package also has smart instruments, cable trays for the electrical wires and controlled by Atlas Copco's state of the art monitoring system called Elektronikon®. A sonic nozzle is also part of this package to avoid damage to the desiccant during excessive flow conditions.



**Chemical plant in Louisiana: Blower purge desiccant dryer for 12,700 cfm**

A dryer package, currently in production at Atlas Copco's Houston facility, is a blower purge desiccant dryer BDE6000+ for an ethane cracker and derivatives chemical plant in Louisiana. This dryer's inlet flow capacity is 12,700 scfm and is designed for outdoor use in a Class 1 Div. 2 Gr B, C, D T3 Environment. This dryer comes with 100% redundant inlet and outlet filter packages with zero pressure loss drains, high performance butterfly valves to control tower switching for the large flow rates, a custom programmed PLC and high performance instrumentation.

The regeneration blower is configured for low noise and the package is equipped with flow meters to enable the customer to take full advantage of the turndown capabilities of the dryer. This package can thus easily adapt to continuously changing flow demands, giving the customer more flexibility in operating their instrument air system. The large heater, in this package, has also been rated for the hazardous area class and the control system has multiple layers of control and redundancy in order to ensure a high level of operational safety. This package's footprint is approximately 36 feet long and 14 feet high, on a single skid with a simple lifting scheme.

**Rental Fleet**

Apart from the above-mentioned dryer packages, which are designed for chemical refineries and power plants, the Atlas Copco Houston facility also produces rental air dryers used in pipeline, chemical refineries, power plants and other industries all over the world. Our most common rental dryer model has a 1600 scfm inlet flow capacity and incorporates pneumatic controls. The after-cooler used is also air-controlled. This enables our customers to use our dryers with

no power supply. The frame is designed to allow forklift access on all sides and is a very robust machine used in the harshest conditions. All the material used in this dryer have been selected to maximize service intervals and reduce operating and maintenance costs.

The Atlas Copco- Houston facility has successfully designed and installed many more custom packages worldwide at a wide variety of customer locations. Every package is very unique and special in its own way. We take pride in our team's competence and the equipment which comes from our facility. Atlas Copco is always committed to our sustainable productivity and more importantly our, customers. **BP**

*For more information please contact Ramsaran Palaniappan, Project Engineering Supervisor- Regenerative Desiccant Dryers, Atlas Copco Compressors at tel: 281-594-5027, email: ramsaran.palaniappan@us.atlascopco.com, www.atlascopco.us*



*The rear view of a PHS1600 rental compressed air dryer skid with an air-controlled after-cooler.*

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# DETAILED DESIGN —

## An Ounce of Design is Worth a Pound of Project

By Paul Edwards, Compressed Air Consultants, Inc.

► Insufficient focus at the design phase will kill a project. In one aerospace project, insufficient detail was paid to the physical size of the air compressor. The compressor didn't fit in the allocated space—requiring the extension of the building, and costing tens of thousands of unbudgeted dollars. That had a significant, negative impact on the project return.

In another job, the client had hired an air compressor company to perform an audit from which a good project emerged. The client then asked the compressor company to do the detailed design work. That company didn't have the capability to do the work in house, so they went back to the auditor, whom they had sub-contracted out to do the design work. This auditor was very experienced at

audits and specifying equipment. However, he had come from the compressor side of the business and consequently didn't have much plant engineering experience. The result was that he put together an excellent equipment specification but fell far short on the mechanical and electrical portion. When the client got the documentation, they refused to pay. While the client could go out to bid on the equipment side, there was too much risk associated with the installation, because the specification for the scope of work for the trades was so threadbare.

Figure 1 shows the four steps in a compressed air system improvement project. The analysis, or audit, provides a big picture plan on what needs to be done to achieve the economic objectives of the project. The implementation

or project phase is where that plan is physically executed.

What lies in between analysis and implementation is an often overlooked or inadequately addressed step—design. “Detailed Design” or “Detailed Engineering” is nothing more than the conversion of action items in an audit report to scopes of work for the various trades, as well as specifications for the equipment. There can also be a basis-of-design document describing the objectives of the project and the underlying assumptions.

Detailed design provides rich detail on the mechanical and electrical side. An example of the written portion of an actual project detailed the following information (generalized for publication purposes):



**“What lies in between analysis and implementation is an often overlooked or inadequately addressed step — design.”**

— Paul Edwards, Compressed Air Consultants, Inc.



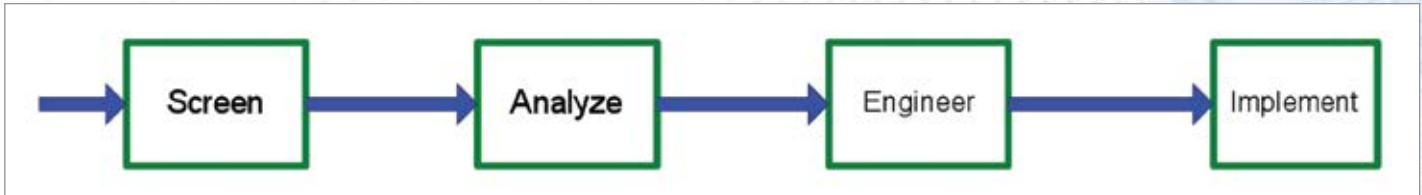


Figure 1: The four steps of a compressed air system improvement

- **Communication Wiring Between the Pack House PLC, the 75-hp Pack House, and D Air Compressors:** Run a new 1-inch galvanized rigid conduit from the Pack House PLC to the 75-hp Brand Y air compressor located outside of the Pack House. The approximate run is 50 feet. Run Device Net cable in the 1-inch conduit from the Pack House PLC to the 75-hp Pack House air compressor control panel. Mount the Device Net I/O (provided by the compressor automation vendor). Termination of the Device Net cable to the I/O block will be completed by the compressor automation vendor.
- Run a 1-inch rigid galvanized conduit from the 75-hp Brand Z compressor to the closest low voltage cable tray located by the Load Out area. The approximate conduit run is 54 feet. At Compressor D, run a 1-inch conduit from the existing overhead cable tray to the control panel located on the West side of Air Compressor D. The approximate conduit is 45 feet. A Device Net cable can now be run between the 75-hp Pack House air compressor and Air Compressor A. The approximate run is 250 feet. Install a Device Net I/O block in Compressor D, provided by others.

Additionally, Figure 2, which was also supplied during the design phase, showed the overall strategy of how the equipment would communicate with each other and the control room.

The winning electrical contractor said: “The reason my price was as low as it was is that

I knew exactly what I needed to do and had to put minimal fudge factor into it.” The contractor did a fantastic job and finished the job on time with zero cost overruns.

### The Four Main Values of Detailed Design

Audits by design are there to deliver a big picture. Knowing that the devil is in the details, performing the detailed engineering can be the step that makes or breaks the project. There are four main values of detailed design:

1. **Detailed Design Reduces Installation and Performance Risk:** The design phase allows the plant to get into the nitty-gritty to increase the certainty that the project will meet projections. It is highly probable that modifications to the original audit plan will occur. In most cases, they are minor. However, if something major should come along, such as insufficient electrical capacity at the bucket, the detailed design allows the plant to make a business decision on what to

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## DETAILED DESIGN — AN OUNCE OF DESIGN IS WORTH A POUND OF PROJECT

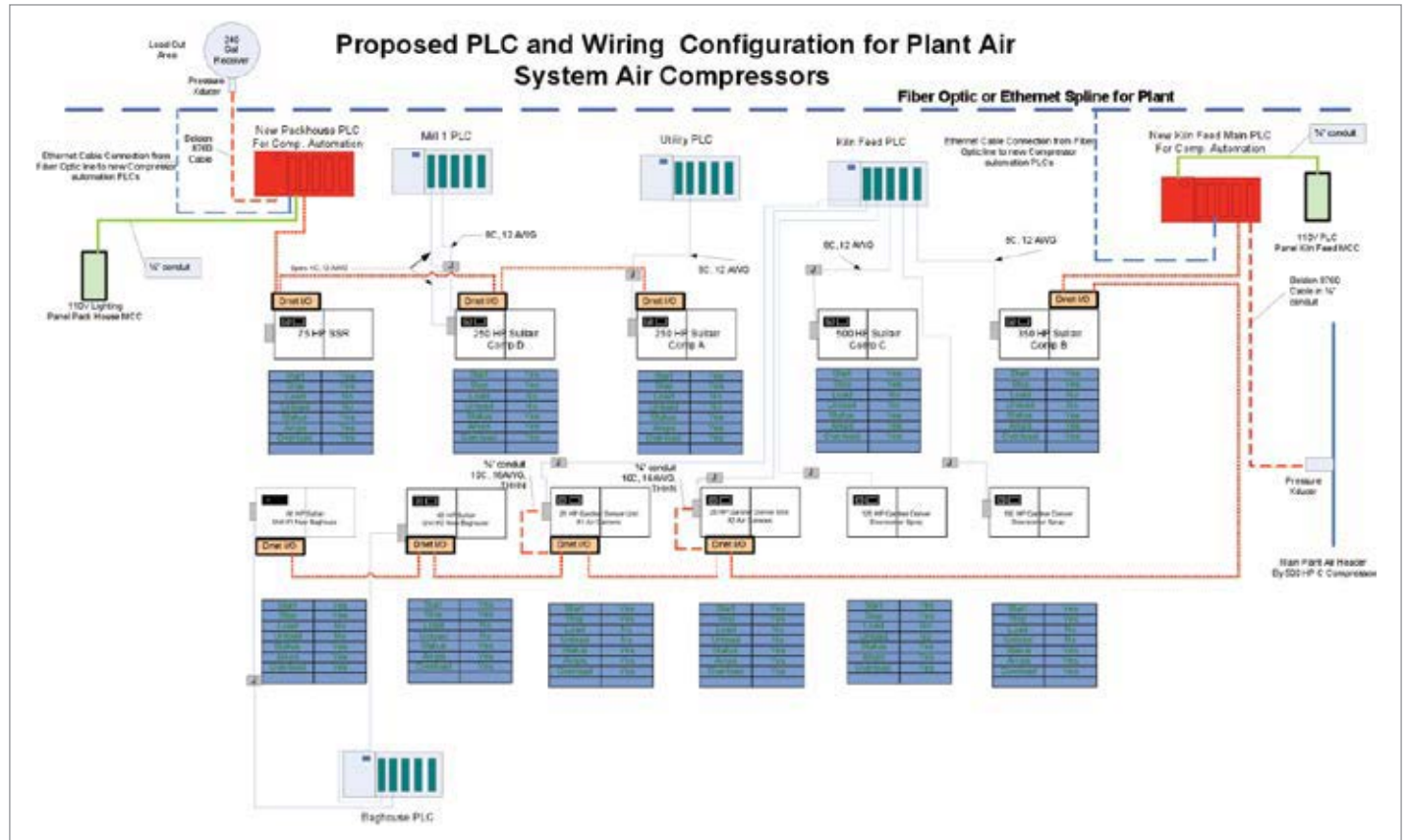


Figure 2: Supplied during the design phase, this schematic illustrates how communication between the equipment would be achieved.

do next, rather than just implement a project that won't meet return.

The detailed design work can confirm the cost of the project prior to the company committing its capital dollars to the project. By doing the design in detail rather than on the fly, there will be fewer change orders. Detailed design also confirms the original projected savings and cost, which then increases the certainty that the project will perform as anticipated. This reduces the performance risk.

**2. Project Costs Are Driven Down Through Detailed Design:** The more precise the instructions are for the contractors, the smaller the safety factors they have to put in their bids. As the quality of the scope of equipment

and works increase, it becomes easier to invite more bidders, as there are fewer questions and less hand-holding required. A greater number of vendors increases the pressure on price, which ultimately improves the ROI portion of the equation.

It should be noted that many air compressor companies have installation crews. However, what is often not known is that the installation crews often cost the same as a service tech—not a tradesperson. The difference in cost per hour can be double. By writing up the scope of work for the trades, rather than just handing it over to a compressor company, pricing pressure is maintained. While it may be convenient to have compressor companies install

the equipment, it can cause havoc for the project ROI.

**3. Detailed Design Allows Outsourcing of the Project Management:** In this day and age, quite a few companies lack the resources immediately available to do a project in a timely fashion. Often, the project will sit on a shelf for a year or two until resources are allocated. Consider a project that saves \$240,000 per year. Every month the plant doesn't implement costs, the company loses \$20,000.

In addition, without detailed design work, someone within the company has to oversee the contractor, and keep a very watchful eye on everything that happens during the installation. With



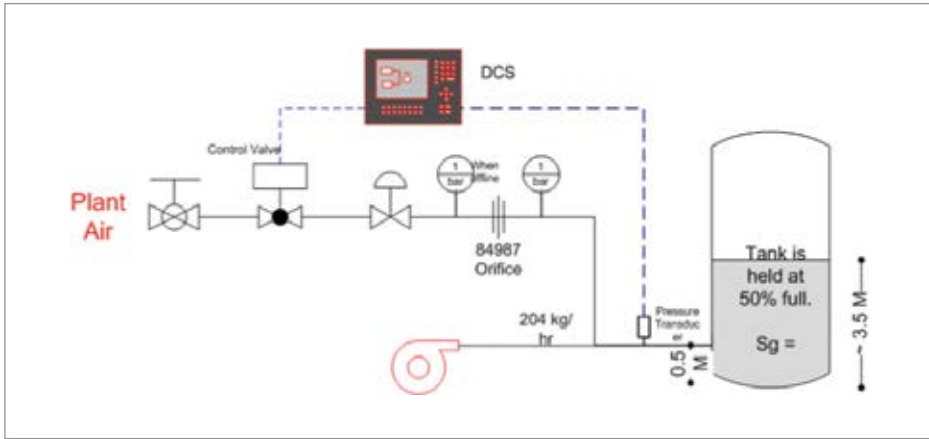


Figure 3: This schematic shows a proposed improvement to a sparging system.

the detailed design work, the plant can often afford to outsource the project management or the entire project. And speaking from experience, when skilled subcontractors are chosen and good communication is maintained, the project manager may have to spend only 50 percent of this time on site—further keeping costs down and driving project ROI up.

- The Value of Detailed Design Increases with the Size and Complexity of the Project:** The value of detailed design is a function of the size and complexity of a project. If a plant is installing a 100-scfm refrigerated air dryer, the design portion can be done on the back of a napkin. However, if the plant is installing a 3000 scfm heat-of-compression dryer, the cost of a miss is commensurately larger.

**Examining Other Examples**

While the biggest potential headaches are on the supply side, detailed design can be done on the demand and distribution side of a compressed air system as well. Consider the general description and picture (Figure 3) for an improvement to a sparging system.

Action	Capital	Installation
Install oil-free, positive displacement blower to feed air to the CSM sparge. Back up with high-pressure system. Investigate DCS to take signal from pressure transducer and control feed valve.	\$8,000	\$6,000

The odds are high that implementing the aforementioned action item without further engineering would result in a cost overrun, delay in the project, or underwhelming performance of the process or the savings. Contrast this with a simpler application in which the detailed engineering is provided for installing a spring-loaded valve to a viewport on a kiln cooler, as shown in the following chart.

Item	Description
57.1	Install a 0.75-inch precision regulator and 0.75-inch spring return valve on the main feed line to the viewport lens.
57.2	Install a parallel 0.25-inch line with a brass needle valve in parallel to the main feed line. Set the needle valve to maintain a positive pressure of 10 inches of water column to the viewport.

While the second is a far simpler installation, the scope of work should be crystal clear to both the mechanical contractor and the project manager, leaving no ambiguity of the task at hand.

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## DETAILED DESIGN — AN OUNCE OF DESIGN IS WORTH A POUND OF PROJECT



Item 33.



Item 34.



Item 35.

An example from the mechanical portion of detailed design work could look something like the following.

### ➤ Item 33.

Install new cross tie piping and valve labeled (1M) between the existing 1-inch header from the Mill Compressor System to the existing 3-inch dry loop header for the Pack House. Downtime required.

### ➤ Item 34.

Remove existing abandoned 3-inch piping (Old Pack House Loop), and reuse the existing 3-inch hangers. Install new 3-inch butterfly valves labeled (14M and 15M), and install new 3-inch sch. 40 piping to complete and re-commission the Pack House loop system. Downtime required for valve installation only.

### ➤ Item 35.

Remove existing 2-inch gate valve (13M) in the conveyor house between the Mill Compressor System and the Pack House Compressor System. Install a 4-inch by 3-inch concentric reducer and any piping required to tie the system together. Downtime required.

### Detailed Design for Better Projects

An ounce of design is worth a pound of project. Detailed design can cost as much as the audit—but skipping the step will decrease the overall project return for projects of medium or high complexity. That would be due to a potential increase in capital costs, a decrease in the savings, or some significant miss during the installation process.

Cost can further be driven down by having a larger pool of bidders, while giving them a clear and precise understanding of the expectations of their work for the project. It can even allow for a faster implementation through outsourcing, since the plant would have less babysitting to do. That speed of implementation can help the plant realize money it would have lost by the delay in implementation, creating a net profitability through outsourcing when needed. **BP**

For more information, contact Paul Edwards, tel: (704) 376-2600, email: paul.edwards@loweraircost.com, or visit [www.lowercostair.com/web](http://www.lowercostair.com/web).

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# Don't Skip the Most Important Meeting of Your Energy Project

By John Molnar, Rogers Machinery Company

► In many parts of the country—and especially the Pacific Northwest—interest has surged in completing energy-saving compressed air system upgrades. The financial assistance from incentive programs, combined with the falling costs of efficiency-increasing technology, has made these projects very attractive to all those involved. The benefits for society, power companies and customers are immense.

With the surge in energy-saving projects, there has also been a boom in utility energy outreach programs and energy auditors. It seems every business has been approached by an eager salesman, or an energy expert, wanting to save energy by replacing old equipment. They might extol, “The power company will even help pay for it! All you need to do is help fill out this survey, and let us hook up some metering

equipment.” A while later, a report shows up with energy savings, cash incentives, and a good payback to replace or upgrade your compressed air system.

While the process seems simple, projects can easily go awry—or never happen at all—if every customer expectation is not discovered and satisfied. When approached with an energy-saving project proposal, one mill manager stated, “I’ve done so many projects to save energy, I should be selling power back to the electric company! People come in here and promise the moon—I buy it, and then something happens and somehow the new system does not perform as expected.”

Apparently, the person he worked with previously did not completely understand the mill manager’s expectations—or the savings

were overestimated. Taking an extra step during the planning stages of a project can minimize implementation problems and help projects run far more smoothly. The extra step is a meeting between the auditor, vendor, incenting organization, and the end user.

## Getting the Energy-Saving Project Rolling

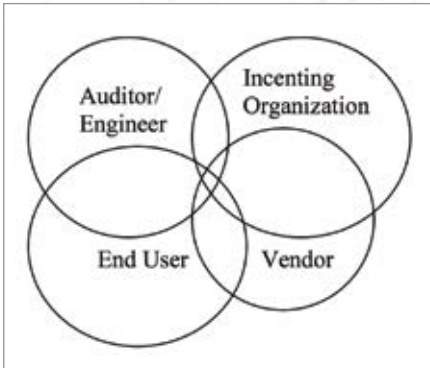
Since the opportunity does not come around often, it’s critical to get the project right at the rare moment when the end user’s engineering, accounting, maintenance and purchasing departments all agree it’s a good idea to spend money to save money. Typically, for a project to get started, a salesperson, engineer, or power company representative performs a quick, free, scoping walkthrough. Using a combination of checklists, rules



“Taking an extra step during the planning stages of a project can minimize implementation problems and help projects run far more smoothly. The extra step is a meeting between the auditor, vendor, incenting organization, and the end user.”

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A meeting between the auditor, incenting organization, vendor, and end user can help maximize the benefits of any energy-saving project.

of thumb and experience, they can quickly identify potential energy savings and qualify the site for further study.

For the next step, an energy engineer or auditor is brought in to collect data and

prepare a report detailing options for system improvements. In the standard engineering model, it's fully up to the customer to get the project permitted, installed and implemented. Changes to the report are difficult, because the energy auditor has already been paid and is on to a new job. Sometimes, the customer will incur additional costs for project management and system integration services. In other cases, vendors have their own energy auditing staff to perform evaluations. These audits tend to be more sales oriented. Having the salesman of the preferred brand involved ensures installation and integration plans can be made early in the project, ensuring compatibility and proper estimation of installation costs. In other cases, the utility or incenting organization performs their own energy audits.

## Going Beyond Prescriptive Measures to Ensure Energy Savings

As discussed earlier, incentivizing organizations have prescriptive measures for common efficiency improvements, such as replacing incandescent lights for LEDs or upgrading to premium HVAC equipment. The more complicated projects are usually referred to as “custom projects” or “engineering track projects.” Because these systems are more complex, rules of thumb or simple energy calculator tools do not provide enough accuracy or confidence for predicting savings. For example, a mill with five air compressors in two separate rooms running two shifts of production, along with a graveyard cleanup shift, would warrant a detailed energy report.

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## DON'T SKIP THE MOST IMPORTANT MEETING OF YOUR ENERGY PROJECT



Figure 1: Using CTs is an effective method for recording kW.



Figure 2: Downloading performance metrics from the data loggers provides helpful charts for the end user.

In order to properly estimate savings and incentives, data loggers are used to record operating parameters, such as power, pressures and flow on each air compressor for several weeks of typical operation (Figure 1). Then the power consumption and compressed air demands are calculated along with other system performance metrics, and they are presented in a series of graphs. As shown in Figure 3, charting performance metrics and

sharing them in a meeting can be a powerful tool in helping the customer understand their compressed air demands. Consequently, the customer can make the best decision regarding improvements to the system, and determine the best way to achieve the desired energy savings.

Next, a simulation is run to accurately estimate the energy savings using energy-efficient equipment at the previously recorded flow demands. Finally, an economic analysis is presented as a simple payback based on total project cost minus incentive divided by the savings.

### Downside of the Standard Engineering Model

Once the data is collected and existing system performance has been determined, an experienced energy audit engineer will have opinions on the best way to run the system and the best choices for new equipment. It's easy to put together a couple options, include some budgetary pricing, send the report to the customer and move on to the next job.

Regardless of who provided the initial energy audit, the extra, often overlooked step is going back on site to show the customer the preliminary data and start an additional conversation. The discussion might start with the auditor asking several questions, such as: "Here's what we see in this data, what do you see?" or "Here's how we think we can improve your system, what other factors (new warranties, expanding demands, installation requirements) besides energy should be considered in the upgrade?"

The "sweet spot" of a successful energy project is the brainstorming meeting when the initial data is spread out on the table, allowing all those involved to come up with the best solution. Saving energy through the installation of new equipment or upgrading existing equipment is the goal of everyone involved,

but to look at the underlying motivation of involved parties can draw a better understanding of how to collaborate and get more projects to happen. The additional meeting has unique benefits for each party involved.

### Increasing Feedback Between the Energy Auditor and End User

The preliminary energy project presentation gives the energy auditor a chance to suggest ideas to the customer and listen to immediate feedback before writing the final report. Writing a report to include every viable option is great in theory, but presenting more than a few well-considered options is not very practical.

Consequently, the customer gets an improved, more focused energy report, because it contains only viable options they want to consider. They can discuss and consider non-energy factors directly affecting the installation of the new equipment, such as available space, available electrical service, noise concerns, reliability, remote sensors and communication/integration requirements. Besides saving energy, the customer also wants to factor in expansion plans, improve production processes, decrease equipment downtime (planned and unplanned), and decrease their maintenance. They are also under great pressure to keep capital costs within budget and meet payback and ROI requirements.

### Communication Between End User and Compressed Air Vendor

The vendor obviously wants to sell equipment, but it is beneficial to be given the opportunity to discuss installation details, budgetary costs and project timeline issues as early as possible. This assures a smoother implementation and ongoing operating and system efficiency.

For example, a control system sequencer to load and unload multiple air compressors may look good to an energy auditor for potentially



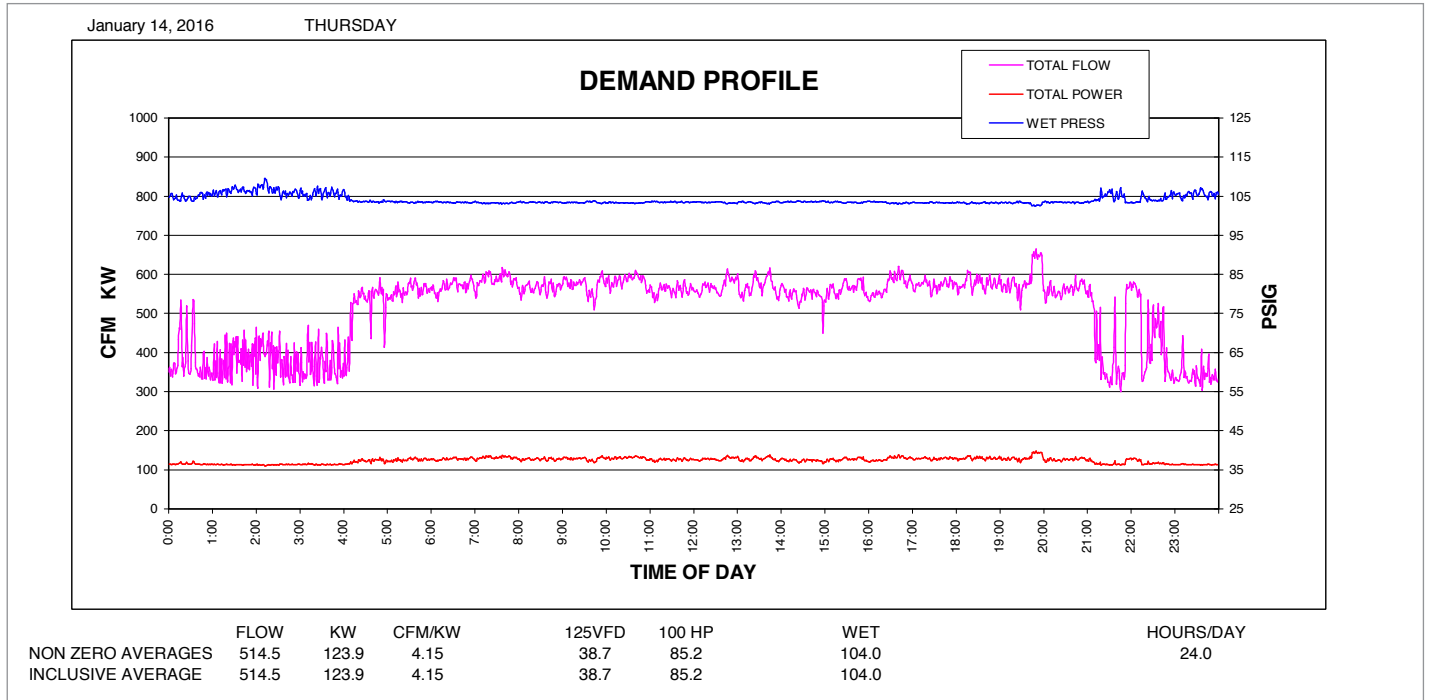


Figure 3: This chart shows the total power, total flow and pressure for a single day. The first shift started around 4:00 am, and the second shift stopped around 9:00 pm with additional demands for cleanup and maintenance.

saving a lot of energy with a small capital outlay, which is attractive to the end user. However, if the compressor vendor isn't brought in early to verify the air compressors' compatibility with the control scheme, the end user might be surprised to learn the sequencer option wasn't viable. Also, if the customer is weary of integrating old air compressors to a new PLC controller, a sequencer and load/unload conversion would not be chosen anyway.

Other considerations might include moving existing air compressors to backup, or using the cost of downtime to help with financial calculations. The best efficiency projects increase efficiency over a broad range of flows, so the new compressed air system should be designed with future projections of increases or decreases in demands.

Additionally, a new operating procedure should be discussed initially and put in place in order to run the new compressed air system at optimal efficiency. If it's too

complicated, or only one operator knows how to run the system, system efficiency will suffer. The system must be simple enough for multiple operators to start and stop, yet robust enough to handle the abuse of an industrial environment. The original audit report doesn't need all the details, but it does need enough information for the site to prepare the proper integration. In addition, the vendor needs enough information to provide the proper programming, training and start-up services.

### Extra Effort Pays Dividends in Energy Savings

A little extra work in the middle of the project to conduct a roundtable meeting can help cut through the clutter and provide the best solution sooner in the process. The final decision of what to purchase and install is up to the end user, but preventing confusing reports and implementing successful, smoothly flowing energy projects is beneficial to everyone.

### About Rogers Machinery

Established in 1949, Rogers Machinery Company, Inc. has grown into a regional and national industrial equipment supplier, providing energy audits, engineering, consultation, and quality products, including compressed air systems, vacuum systems, and blower and pump systems.

With the corporate headquarters located in Portland, Oregon, and over 200 employees in seven branch offices across the Pacific Northwest, including Idaho, Montana, Utah, Rogers Machinery strives to support customers with complete parts, service and repair departments to maintain equipment longevity and performance.

For more information, contact John Molnar, tel: (503) 639-6151, email: john.molnar@rogers-machinery.com, or visit www.rogers-machinery.com.

To read more about **System Assessments**, please visit [www.airbestpractices.com/system-assessments](http://www.airbestpractices.com/system-assessments).

# REFRIGERATED DRYERS

## Tested by the CAGI Performance Verification Program

By Rick Stasyshan for the  
Compressed Air and Gas Institute

► Compressed Air Best Practices® (CABP) Magazine and the Compressed Air and Gas Institute (CAGI) cooperate to provide readers with educational materials, updates on standards and information on other CAGI initiatives. CABP recently caught up with Rick Stasyshan, Technical Director for the Compressed Air and Gas Institute (CAGI) to provide readers with some insights into the benefits of CAGI's Verified Performance Program for refrigerated compressed air dryers.

**CABP: We understand the expansion of the CAGI Verification Program started several years ago with refrigerated compressed air dryers. Why start there?**

**CAGI:** Removal of water from compressed air systems is a fundamental requirement of a well-designed compressed air system. Excess water can reduce product quality, increase maintenance costs, and reduce productive life of equipment. End users, distributors, and specifying engineers must be certain that the actual performance of their compressed air dryers matches their expected performance, as deficient dryer performance will negatively affect financial and operational performance.

There are several ways to remove excess water from compressed air systems, with one of the most popular being refrigerated compressed air dryers. Refrigerated dryers remove water from compressed air by cooling the compressed air, condensing the water vapor in the compressed air, and removing it from the system. With the popularity of this type of dryer, it was logical to start here.

**CABP: Many of our readers focus on air compressor performance. Why should consideration also be given to the refrigerated dryer?**

**CAGI:** As with most equipment, purchasers of refrigerated compressed air dryers face an initial purchase price as well as ongoing operational expenses, which typically exceed the initial purchase price by a wide margin over time. These expenses include the power



Products participating in the CAGI Refrigerated Dryer Performance Verification Program feature the appropriate label on the cabinet.



to run the dryer and pressure drop that arises as the compressed air flows through the dryer. Understanding the dryer performance will make the overall system efficiency better managed and understood.

**CABP: So can we assume there is an industry standard established to measure and report the performance?**

**CAGI:** Reputable manufacturers of compressed air dryers rate their equipment to the ISO 7183 standard, *Compressed Air Dryers — Specifications and Testing*. The ISO 7183 standard provides a uniform means of testing dryers to determine the critical performance parameters of outlet pressure, dew point, and flow (also referred to as capacity or size), as well as the power consumption and pressure drop ratings that affect the ongoing costs of operating compressed air dryers.

The Air Drying and Filtration Section of CAGI recognizes the need for purchasers, specifying engineers, and users of refrigerated dryers to receive accurate performance data, including flow, power consumption, dew point, and pressure drop ratings. The section members agreed to publish ratings in accordance with ISO 7183. CAGI member companies also publish Refrigerated Dryer Performance Data Sheets which are posted on their product websites with quick links via the CAGI website ([www.cagi.org](http://www.cagi.org)). The data sheets provide nice performance comparisons for the equipment purchasers.

**CABP: Will there be Performance Verification on these products like there is for air compressors?**

**CAGI:** There already is. Many members took the additional step of developing and participating in a performance verification program through which individual participating company performance, published on standard

CAGI datasheets, is verified by a third party test lab. Visit the CAGI website, <http://www.cagi.org/performance-verification/>, for more information about the performance verification program, datasheets, and a list of participating companies.

Someone who purchases a dryer from a company participating in the CAGI Performance Verification Program can be assured the performance of the purchased unit will match their expectations.

**CABP: But what about dryers that are produced by manufacturers that do not participate in the CAGI performance verification program?**

**CAGI:** That thought was thoroughly discussed. CAGI decided to purchase and test a unit from such a company.

The unit was purchased directly by Intertek, the same third party test lab that CAGI uses to administer its performance verification programs, and the unit was shipped directly to the test lab. Intertek obtained performance claims from product brochures on the manufacturer's website. The lab tested the unit to the ISO 7183 standard, using the same requirements that apply to units tested in the CAGI program. Table 1 shows the results, copied from the official test report generated by the lab.

**CABP: Can you elaborate on what this means to a purchaser?**

**CAGI:** End users that purchase this dryer model based on the claims of the manufacturer would have far more water in their systems than they were promised by the manufacturer. The difference in dew point is significant and


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# REFRIGERATED DRYERS TESTED BY THE CAGI PERFORMANCE VERIFICATION PROGRAM

TABLE 1

PERFORMANCE ITEM	CLAIMED PERFORMANCE	ACTUAL PERFORMANCE	DIFFERENCE	RESULT**
Outlet Pressure Dewpoint	35.00°F	49.60°F	+14.6 Δ°F	Fail
Pressure Drop	3.2 psi Δ	5.00 psi Δ	+ 1.80 psi	Fail
Power Consumption*	1.15 kW/100 cfm	1.01 kW/100 cfm	88.21%	Pass

\*Specific Power Input at Full Flow, kW/100 CFM

\*\*Considering Allowable Tolerance in Standard, Result if Manufacturer was Participant in CAGI Performance Verification Program.

could result in potential damage to end user equipment and facilities; i.e. pneumatic tools, piping, etc., and a negative impact on work product or manufacturing quality. The increased pressure drop through the dryer would reduce system pressure, leading users to increase air compressor operating pressure to compensate, thereby increasing power consumption of the air compressor.

The performance of this 200 CFM dryer is disappointing when compared to the manufacturer's claimed performance, but imagine extrapolation of these deficiencies to larger dryers. For example, assuming similar failures in a 1000 CFM dryer, an additional 5.3 gallons of water would be introduced into the compressed air system per day. Economic losses due to additional pressure drop (above claimed performance) alone would be approximately \$1,300 per year at \$.07/KWH.

A distributor who sold this dryer to customers would have a lot of explaining to do, as poor product, potentially damaged production equipment and facilities, excess corrosion, and decreased profitability most likely would damage the distributor / customer relationship. Continued reliance on such dryers could lead to a distributor's reputation and expertise being questioned in the market.

## **CABP: Who can participate in CAGI's program? Do you have to be a member and how is a Participating Manufacturer recognized for participation?**

**CAGI:** Participation is voluntary and is open to all manufacturers, whether they are a CAGI member or not. Any manufacturer of Refrigerated Compressed Air Dryers from 200-1000 SCFM is invited to participate.

Participating manufacturers and the results of the verification tests will be posted on the CAGI website. Participating Manufacturers that pass the verification program test procedures will be allowed to utilize the CAGI Program Verification Seal on the models' specification sheets, in its product literature, and a decal placed on the product itself. This is the Participant's public representation that the stated refrigerated dryer performance and efficiencies have been verified by an independent laboratory.

## **CABP: How does the Independent Verification process work?**

**CAGI:** On a regular basis the administrator will select and test samples of the equipment to verify that they meet the Manufacturers' certified published performance ratings. Two units will be tested annually per participant. The units will be selected by the program administrator from manufacturer or distributor available stock. If a tested unit does not pass, the manufacturer has the option to have a second unit, which was previously chosen by the administrator tested. If this unit also fails, the manufacturer must re-rate the unit based on the test results within 30 days or be ejected from the Verification program.

## **CABP: Our feedback on the CAGI compressor data and verification program has been favorable and we look forward to input from CAGI on this program. Do you have any closing thoughts?**

**CAGI:** The CAGI Refrigerated Dryer Performance Verification Program has been operating for several years now, and manufacturers have had ample opportunity to join the program. With the number of products tested and verified, we determined the timing was right to provide further market education on the program and the resulting benefits. The users of the refrigerated dryer products deserve to get the performance they are promised when buying a compressed air dryer. As a compressed air dryer user, a distributor, and/or compressed air system assessor, by purchasing a refrigerated dryer only from participants in the CAGI Performance Verification Program, you can be assured of getting published performance.



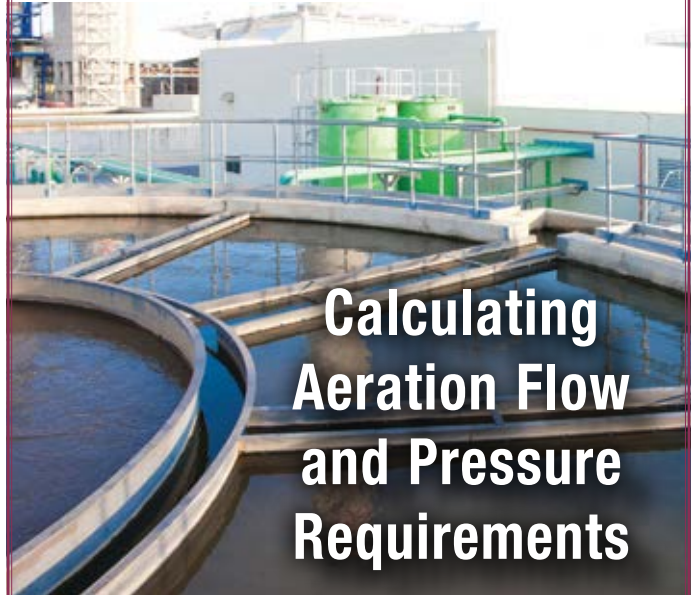
**“Participation is voluntary and is open to all manufacturers, whether they are a CAGI member or not. Any manufacturer of Refrigerated Compressed Air Dryers from 200-1000 SCFM is invited to participate.”**

— Rick Stasyshan for the Compressed Air and Gas Institute



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**DRYER DATA SHEET**  
Refrigerant Dryers

MODEL DATA			
1	Manufacturer		
2	Date		
3	Model Number		
4	Cycling/Non-Cycling		
5	Refrigerant Type		
6	Air/Water Cooled		
7	Voltage		
DESCRIPTION	FULL FLOW	10% FLOW	UNITS
8	Tested Flow		scfm <sup>b</sup>
9	Outlet Pressure Dewpoint		°F
10	Pressure Drop		psi(d)
11	Total Dryer Input Power		kW
12	Specific Package Power <sup>c</sup>		kW/100 scfm

- Notes:
- a. Dryer ratings at the following inlet conditions to the dryer (as per ISO 7183, Table 2, Option A2):
    - Inlet Compressed Air Temperature: 100°F (38°C)
    - Inlet Compressed Air Pressure: 100 psig (7 Bar)
    - Max. Ambient Air Temperature: 100°F (38°C)
    - Inlet Compressed Air Relative Humidity: 100% (Saturated)
  - b. SCFM defined as the volume of free air in cubic feet per minute measured at 14.5 psia (1.0 Bar), 68°F (20°C) temperature and 6% R.H. (9 WVP).
  - c. (Total Dryer Input Power/tested flow) x 100



This form was developed by the Compressed Air and Gas Institute for the use of its members. CAGI has not independently verified the reported data. Consult the CAGI website, [www.cagi.org](http://www.cagi.org), for a list of participants in the third party verification program.

Form Number REP 010 Rev 8 1-01

**CABP: Where can readers learn more about this and other CAGI programs?**

**CAGI:** For more detailed information about CAGI's Data Sheet Performance and Verification Programs or answers to any of your compressed air questions, please contact the Compressed Air and Gas Institute. The Compressed Air and Gas Institute is the united voice of the compressed air industry, serving as the unbiased authority on technical, educational, promotional, and other matters that affect compressed air and gas equipment suppliers and their customers. CAGI educational resources include e-learning coursework on the *SmartSite*, selection guides, videos and the *Compressed Air & Gas Handbook*. **BP**

For more information, contact the Compressed Air & Gas Institute, tel: 216-241-7333, email: [cagi@cagi.org](mailto:cagi@cagi.org), or visit [www.cagi.org](http://www.cagi.org)

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# OVERSIZED DRYER CAUSES PRESSURE ISSUES AT A CHEMICAL PLANT

By Ron Marshall for the Compressed Air Challenge®



▶ A Canadian chemical plant installed a large heated blower-purge style compressed air dryer, years ago, to condition the instrument air system against freezing temperatures. The dryer selected was oversized for the connected air compressors and had unused on-board energy savings features. A compressed air assessment revealed the site air compressors and compressed air dryers were running inefficiently and causing in-plant pressure problems. Repairs to a compressed air dryer and the replacement of aging air compressors

and dryers has reduced compressed air energy costs by 31 percent.

## Background

The plant is located in a geographical area subject to freezing temperatures reaching  $-40^{\circ}\text{F}$  in the winter months. Two systems of outdoor compressed air lines feed instrument air and general plant air to various compressed air demands in a very large complex. The general plant air is considered non-critical and is supplied through a back-pressure valve which

chokes off the plant air if the instrument air pressure falls below critical levels.

Compressed air production equipment is located in a central powerhouse. At the time of the initial compressed air assessment, four air compressors were installed and running with sizes ranging from 125 hp to 200 hp. Two 200 hp air compressors, rated at 750 cfm, had poppet-valve variable displacement control and were placed on a 3,000 cfm heated blower-purge desiccant compressed air dryer. One



“Repairs to a compressed air dryer and the replacement of aging air compressors and dryers has reduced compressed air energy costs by 31 percent.”

— Ron Marshall for the Compressed Air Challenge®



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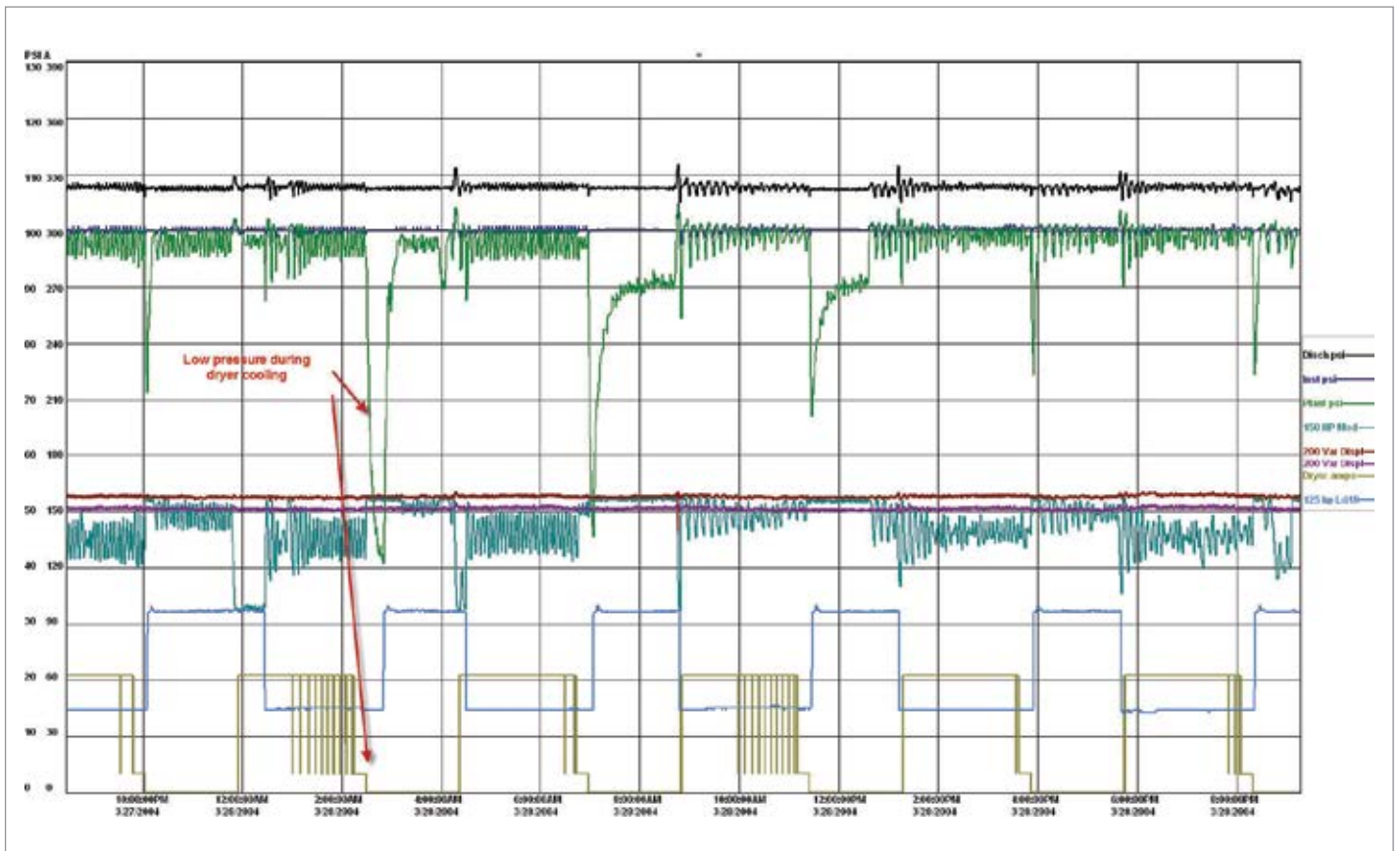


Figure 1: As-found pressure profile showed problems during dryer cooling.

## OVERSIZED DRYER CAUSES PRESSURE ISSUES AT A CHEMICAL PLANT

older style 150 hp air compressor, rated at 600 cfm, ran in modulation mode with a separate 650 cfm heatless desiccant style dryer. A fourth very old 125 hp reciprocating air compressor was placed on an aging silica gel heated dryer.

Data loggers were placed on the system to determine baseline parameters for compressed air pressure, power and flow (Figure 1). The logging revealed the following:

- Poor pressure control of the general plant compressed air system
- High flow events every four hours causing a 100 hp compressor to start
- Blower-purge dryer heater loading was higher than expected
- Inefficient modulation control of trim compressor
- High pressure differentials across air dryer and filters



Figure 2: Hose selection and poor connection practices cause poor air tool performance

### Heated Blower-Purge Dryer Issues

It was quite obvious, from the pressure and amp profiles, that the heated blower-purge compressed air dryer was causing some sort of high demand event leading to low pressure in the plant air system. This appeared exactly every four hours and was in line with the cooling cycle of the dryer, which starts right after the final blower cycle. When the cooling cycle starts, the main compressors all went to full load, and the pressure in the plant air system dropped to extremely low levels. This event caused the reciprocating compressor to be run solely to support dryer purge but with significant periods of unloaded run time.

Most heated blower-purge style dryers work on a four-hour cycle, with one tower drying while the other is being regenerated. The regeneration cycle directs atmospheric air through electric heaters, then through the desiccant bed being regenerated to drive off the water captured in the bed. Once the heating cycle is complete, usually ending when a heat spike signals all the desiccant has reached a critical temperature, the heaters are turned off and atmospheric air is allowed to cool the desiccant for a period of time, in this case 15 minutes. Too much atmospheric air-cooling would allow ambient moisture to prematurely saturate the desiccant. Since the 15-minute time period is not enough time to fully cool the desiccant, some other method of cooling is required. If the desiccant is not cooled to a critical temperature, a dew point spike will develop when the dryer switches sides because hot desiccant will not capture water vapor. The extra-cooling is provided by passing already-dried compressed air through the desiccant bed for a period of time.

The normally rated flow for compressed air cooling purge in these dryers is 2% of the dryer nameplate, however, this two percent is the average over the complete 4 hour cycle. Typical cooling cycle duration is one hour out of 4 hours making the flow during the actual one hour cooling cycle about 8% of the dryer nameplate rating, in this case the expected flow was 240 cfm. Typically some sort of temperature control detects when the desiccant has been cooled satisfactorily which turns off the purge to save energy.

Often these dryers have onboard dew point controls that delay the regeneration until such time as the desiccant is fully saturated. Detecting this condition, a dew point sensor will then initiate a delayed regeneration cycle saving significant energy if the dryer is lightly loaded. This 3,000 cfm rated dryer was loaded at less than 50 percent capacity



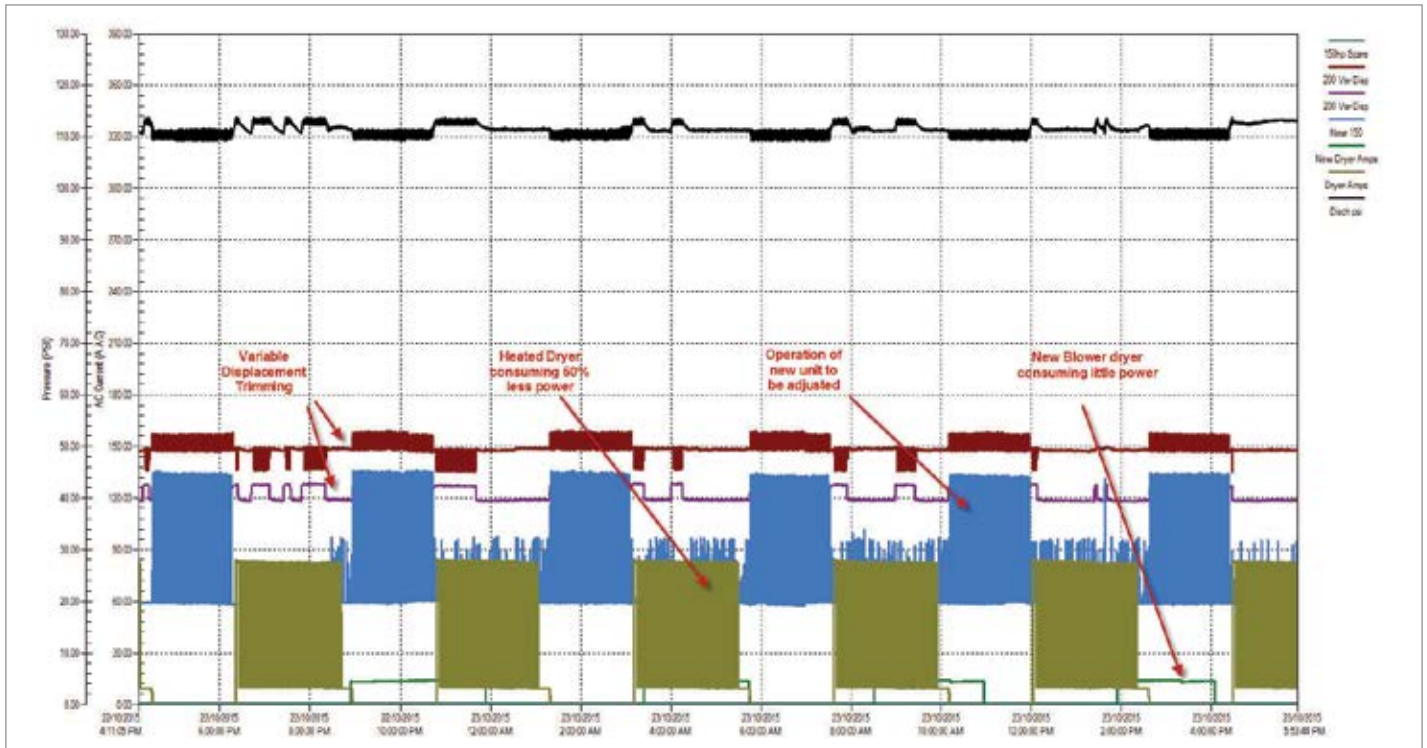


Figure 3: Plant pressure and off-hours flow was greatly improved after the system changes

and winter ambient conditions had inlet air temperatures well below the rating of the dryer. A well-controlled dryer of this style should have been consuming 50% less energy than it actual.

Unfortunately, the existing dryer had three issues causing abnormal operation and higher energy consumption:

1. The cooling purge setting had been altered at some point in the past. The adjustment of the cooling purge on this dryer was simply a cracked open ball valve. Previously a tag on the valve had specified the proper cooling pressure adjustment, but the tag had fallen off. Previous maintenance personnel had fully opened the valve causing excessive flow estimated at over 500 cfm. This excess cooling purge falsely loaded the dryer causing
2. The programming of the PLC that controlled the dryer was less than optimum. Instead of cutting the cooling flow off after an hour, the control program allowed the flow to continue for the remainder of the cycle, in this case almost two hours. This extra flow further false loaded the dryer.
3. The dew point control had failed in the past and was obsolete. A new sensor was installed but it wasn't connected to the dryer control, therefore could not be used to save energy. As a result the dryer was placed in fixed cycle mode causing unnecessary purge cycles that consumed compressed air and additional heater and blower power.

extra heater energy to be required during regeneration, and an extra compressor.

The pressure differential across the dryer, accounting for almost 10 psi even at only 50 percent of dryer capacity, was traced to an extra redundant inlet filter. It was recommended to eliminate or better-maintain this filter to reduce pressure drop.

### Air Compressor Control

The air compressor control was set up so that a modulating compressor was acting as a trim unit, with two other main compressors as base units. The two 200 hp compressors, however, had very efficient electronically-controlled variable capacity capability, but this wasn't being used. The two units could be tied together so they could work in tandem as excellent trim units.

The reciprocating compressor was required to constantly operate to feed the excessive

## OVERSIZED DRYER CAUSES PRESSURE ISSUES AT A CHEMICAL PLANT



Figure 4: A new compressed air dryer has a closed cycle cooling circuit using no compressed air

dryer cooling flow. Since this flow occurred for slightly less than 2 hours, every four hours, the compressor spent over 50 percent of the time running unloaded. Problems were detected in the compressor pressure controller, the unit failed to consistently load when low pressure was detected, causing deep low-pressure occurrences in the pressure profile every four hours.

It turned out that once the dryer cooling purge adjustment was corrected the reciprocating

compressor was not needed. The plant set out to replace the inefficient modulating compressor with something more efficient.

### System Improvements

The following system improvements were recommended (although not all are yet implemented):

- Adjustment of the heated dryer cooling purge and replacement of the dew point control

- Replacement of the modulating air compressor and heatless dryer
- Implementation of a coordinated air compressor control system
- Replacement/maintenance/modification to dryer inlet and outlet filters

The reciprocating air compressor was decommissioned and removed and a new air compressor installed. The dryer selected for the new compressor is a heated blower-purge dryer properly matched for the capacity of the compressor. This dryer is designed for closed cycle cooling, rather than compressed air, to pull down desiccant temperatures before dryer switchover and the dryer has dew point controlled switching saving power during light moisture loading. No coordinated compressor control was installed at this time but the two variable displacement compressors are set up to be used as trim capacity. Some better coordination is planned in the future to eliminate unloaded run time of the new air compressor.

In all, system improvements (mainly improvements to dryer control) have saved 1,183,000 kWh per year equivalent to \$118,000 in electrical savings at 10 cents per kWh for a reduction of 31 percent. There is a further savings potential of about 500,000 kWh if further changes to the air compressor controls are implemented. This project is being considered for the future. **BP**

For more information about the Compressed Air Challenge, contact Ron Marshall, email: [info@compressedairchallenge.org](mailto:info@compressedairchallenge.org)

### Best Practices for Compressed Air Systems Second Edition



#### Learn more about optimizing compressed air systems

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

To read more **Compressed Air Treatment System Assessment** articles, please visit <http://www.airbestpractices.com/system-assessments/air-treatment-n2>



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# RESOURCES FOR ENERGY ENGINEERS

## TECHNOLOGY PICKS

### Sullair Titanium Alloy Impellers Allow for Longer Life, Reduced Wear

Sullair recently made its line of centrifugal air compressors available through its distribution channels in the Americas, allowing the company to serve new markets and applications. Both the T-series and the f-series offer 100 percent oil-free air, a highly efficient design to reduce energy usage, and horizontal split design gearbox, allowing easy access to all moving parts and simplifying maintenance. Additionally, both series feature titanium alloy impellers, which allow for a longer life and reduced wear.

Titanium impellers, standard in Sullair centrifugal air compressors, are based on 150 years of technological development. The impellers have been developed using the latest theories in thermodynamics to achieve the greatest efficiency, for any given air flow and pressure combination. Computational Fluid Dynamics utilized in the design analysis was based on rotational machinery data from a variety of installations and applications. This results in a customized design



*Sullair T-series centrifugal air compressors have models ranging from 175 to 2,300 hp, producing flows from 553 to 11,772 cfm. f-series air compressors are available in both packaged and non-packaged options — offering flow rates up to 140,000 cfm.*

for each application, in a variety of industries, including steel mills, petrochemical, chemical, oil and gas, air separation and automotive.

Sullair titanium quality ensures the impellers are among the strongest in the industry and free from corrosion and wear. Long life and reduced wear of these quality components are also enhanced with the Sullair design, which does not allow contact between the impellers and the scroll.

T-series compressors come in complete packages, with models ranging from 175 to 2,300 hp, producing flows from 553 to 11,772 cfm. f-series air compressors are available in both packaged and non-packaged options — custom designed to meet the user's specific needs and available from single stage up to four stages, offering flow rates up to 140,000 cfm. For more information, contact your Sullair Area Sales Manager.

#### About Sullair

Since 1965, Sullair has been developing and manufacturing air compressors with proven reliability, durability and longevity. Sullair offers complete compressed air solutions for customers ranging from road construction contractors to large manufacturing plants. Beyond air compressors, Sullair provides a full line of aftermarket solutions and air treatment products for optimal air compressor performance. Sullair has manufacturing capabilities in Michigan City, Indiana; Shenzhen and Suzhou, China; Mahindra World City, India; as well as a JV (IHI-Sullair) based in Suzhou. For more information, visit [www.sullair.com](http://www.sullair.com).

#### About Accudyne

Accudyne Industries is the parent company of Sullair, and a global provider of precision-engineered, process-critical and technologically advanced flow control systems and industrial compressors that deliver consistently high performance and give confidence to the mission of its customers in the most important industries and harshest environments around the world. Today, Accudyne is powered by ~3,000 employees at 15 manufacturing facilities, supporting a broad range of industries in more than 150 countries. For more information, visit [www.accudyneindustries.com](http://www.accudyneindustries.com).



## TECHNOLOGY PICKS

### VPFlowScope In-Line Receives UL Approval

The VPFlowScope in-line has been approved by UL, a global independent safety science company. With the VPFlowScope in-line, the entire portfolio of flow meters from VPInstruments is UL approved.



*The UL approved VPFlowScope in-line is compact, accurate, while installing and programming is easy. The instrument is available in three different dimensions/measuring ranges.*

The UL approval is for electric safety, which means that the product—when used in combination with a Class II power supply—complies with basic safety requirements. In some states, UL approval is a requirement, and some customers require the classification for fire insurance reasons.

Since the introduction of the first VPFlowScope in 2007, the VPFlowScope product line has enabled numerous companies to reduce the energy costs of their compressed air installation. The probe can be used for monitoring compressed air and technical gas consumption, leakage, machine and tool testing, flow measurement in nitrogen generators.

The three-in-one VPFlowScope in-line features a Thermabridge® flowsensor, a solid-state pressure sensor, and a temperature sensor. The flow sensor measures bi-directionally, meaning that flows are measured in both directions. This is useful in situations involving back flow of air or gas, and it serves as a good indicator for situations in which bi-directional flow is not desired. The internal

memory (flash) can store up to 2 million measuring values, which subsequently form the basis for further analyses, by which savings can be detected, realized and maintained.

The VPFlowScope in-line is easily integrated into the compressed air or gas piping, and is available for 0.5-inch, 1-inch, and 2-inch pipe diameters. The 0.5-inch version is suitable for a measuring flow ranges between 0 and 80 m<sup>3</sup>/hour. The 1-inch version has a range of 0 to 250 m<sup>3</sup>/hour. The largest version measures up to 1000 m<sup>3</sup>/hour. The temperature range runs to 60°C. The VPFlowScope in-line also comes with RS485, 4..20 mA, Modbus RTU, Pulse and USB outputs for connecting a laptop, or adding it to a network.

*For more information, visit [www.vpinstruments.com](http://www.vpinstruments.com).*

### Kaeser Announces New Flow Controller

Kaeser Compressors, Inc. recently announced the latest addition to their award-winning controls product line—the Kaeser Flow Controller (KFC). Available for system capacities from 250 to 18,000 scfm, the KFC creates more effective storage by accumulating compressed air in receivers and only delivering the compressed air that is needed for production.

The KFC responds rapidly to fluctuating demand and actively maintains constant system pressure downstream. More stable air pressure helps eliminate artificial demand and substantially reduces air losses through leaks.



*Kaeser's new flow controller is available for compressed air systems from 250 to 18,000 scfm.*

## RESOURCES FOR ENERGY ENGINEERS

### TECHNOLOGY PICKS

Further, stored compressed air can be used to satisfy air demand spikes without pressure drop at the point of use, resulting in higher production rates, reduced maintenance costs, and significant energy savings. Plus, the KFC can be installed very easily in new or existing systems without reconfiguring existing piping.

*For more information, visit [www.us.kaeser.com](http://www.us.kaeser.com).*

#### Edgetech Instruments Introduces the SENTRY Compressed Air Monitor and Alarm

The new Edgetech Instruments SENTRY compressed air monitor and alarm senses both the dew point and pressure in industrial compressed air systems. The SENTRY has two alarm functions giving visible and audible indications if the compressed air dew point increases or pressure decreases beyond user configurable set points.

The SENTRY uses a Smart Multi-Sense Probe that continuously monitors dew point and pressure. The probe is inserted directly into the pressurized compressed air stream giving immediate alarms if a system leak or failure of an air dryer or compressor occurs. A highly visible strobe light and highly audible pulsing sound alarm activate if the air system goes out of predetermined ranges.

The SENTRY is an easy to install, turnkey alarm device, ideal for industrial compressed air system monitoring and control, alerting personnel to upset conditions quickly and reliably.



*The new Edgetech Instruments SENTRY compressed air monitor and alarm senses both the dew point and pressure in industrial compressed air systems.*

Edgetech Instruments designs and manufactures accurate and reliable absolute humidity hygrometers, relative humidity transmitters, humidity probes, moisture analyzers, relative humidity calibrators, dew point generators and oxygen measurement instrumentation. Edgetech products are manufactured and calibrated to the highest industry standards in a modern facility located in Hudson, Massachusetts. All calibrations are traceable to NIST.

**For more information: tel: 508-263-5900, E: [h2o@edgetechinstruments.com](mailto:h2o@edgetechinstruments.com), [www.edgetechinstruments.com](http://www.edgetechinstruments.com)**

#### Comairco Offers Mobile, All-Weather Compressed Air Stations

Comairco Equipment LTD (Comairco), a leading provider of compressed air equipment and services, has developed a durable, portable, exterior compressor station, or All Weather Air (AWA) package, that allows customers to save on space, and reduce noise levels and energy costs, regardless of weather conditions.

Comairco's all-inclusive, compact compressor station is customizable to each customer's industrial needs and can be installed almost anywhere. The AWA package offers a solution to many challenges, including space constraints, potentially hazardous noise indoors, and the higher energy consumption of diesel-driven compressors.

"We took into account our customers' feedback when engineering this unique compressor package design," said Karine Ouellette, marketing coordinator for Comairco. "We're pleased to bring them a proven, durable solution to limited indoor facility space for equipment. This is a great option for businesses who need to create additional space inside because it costs much less than expanding a building and they can avoid municipal taxes."

The AWA package's steel construction and insulated interior gives it durability in the harshest of weather conditions and provides significant sound reduction. Featuring proven Sullair air compressors, the exterior packages offer customers' a reduction in operating costs up to eight times less than a diesel compressor and peace of mind knowing they are receiving the highest quality equipment.

"As a proud Sullair distributor for more than 40 years, we stand behind the quality and durability of our Sullair products," added Ouellette. "When developing this new offering, we felt strongly about including them in our standard packages."

"We're excited to be a part of Comairco's new AWA package offering," said Stefan Brosick, vice president of marketing and sales for Sullair. "It's always inspiring to see innovative uses for our products."

Because every project is unique, the AWA outdoor mobile station is available with a multitude of different options and configurations to suit customers' specific needs. Learn more by visiting <http://www.comairco.com/wp-content/uploads/2015/05/AWA-en.pdf> or call 1-800-463-8780.



**TECHNOLOGY PICKS**

**About Comairco Equipment LTD**

Since 1972, Comairco Equipment has been providing superior compressed air equipment and services. As a Sullair distributor for over 40 years, Comairco supports its customers with 17 locations in Canada and the United States, including a team of over 65 factory certified service technicians. Our commitment to service, combined with a superior product offering, distinguishes Comairco from its competition. In short, as a customer of Comairco, your priorities are our priorities.



*The Comairco AWA package features proven Sullair air compressors and offers customers a reduction in operating costs of up to eight times less than a diesel compressor*

**About Sullair**

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

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### Sustainable Energy Savings with Compressed Air Best Practices®

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

*“We’re in 75 to 80 locations. We’ve done literally hundreds of compressed air modifications, changes, upgrades and audits.”*

— William Gerald, CEM, Chief Energy Engineer, CalPortland  
(feature article in August 2015 Issue)

*“Compressed air is essential to any manufacturing process, particularly in the automotive industry, and it accounts for about 23 percent of total energy costs at our powertrain facility.”*

— Mike Clemmer, Director/Plant Manager-Paint & Plastics, Nissan North America (feature article in October 2015 Issue)

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

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

*“Each of our 10 production plants has an Energy Coordinator who is part of the corporate energy team.”*

— Michael Jones, Corporate Energy Team Leader, Intertape Polymer Group  
(feature article in July 2014 Issue)

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## Keep It Under Control!

*Kaeser puts automotive supplier in the driver's seat of compressed air efficiency*

### PROBLEM:

A Tier 1 automotive seating and electrical supplier was interested in taking advantage of local utility rebate incentives. For their compressed air needs, they had been relying on four compressors manufactured in the 1980's, inherited from a sister plant. Each unit operated in modulation control and was manually switched on and off, leaving the units continually fighting each other, resulting in wasted energy, fluctuating pressure, and increased maintenance costs.

### SOLUTION:

Kaeser performed a complete Air Demand Analysis (ADA) to identify the plant's current compressed air needs and to develop a plan for implementing the most energy efficient solution possible. Additionally, Kaeser recommended a Sigma Air Manager (SAM) master controller to properly control the system and ensure the most energy efficient combination of units would be selected to meet current plant demand.

### RESULT:

Thanks to better controls and adding an energy efficient variable frequency drive compressor, the customer was able to reduce their annual maximum power consumption by 865,440 kWh—the equivalent of removing 100 homes from the power grid for one year—all without compromising stable system pressure. With the older compressors relegated to back-up, annual maintenance costs have been reduced from \$37,000 to \$18,000. Less maintenance also means less downtime, for increased productivity.



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