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

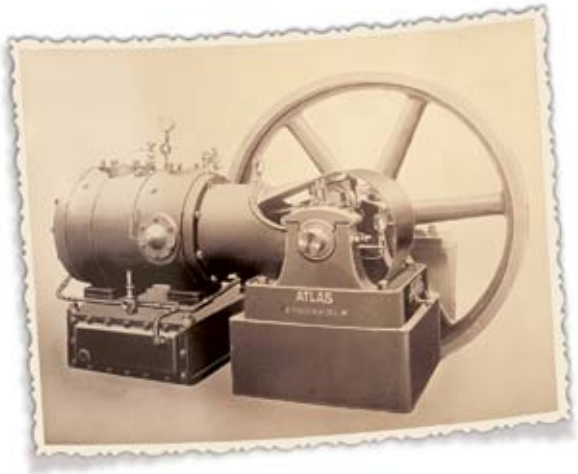
COMPRESSED AIR BEST PRACTICES

airbestpractices.com

March 2013

Food Packaging

It's our birthday, celebrate with us



One of our earliest models – the LV5A compressor

This year, Atlas Copco is celebrating 140 years of global innovation. Technology sure has changed during this time and the pace of innovation will never slow at Atlas Copco. We have been very humbled by some of our recent accolades, but we know they were only possible due to working with so many great customers across the world.

During the last two years, Atlas Copco was again recognized among the top 100 sustainable companies in the world and continues to be a member of the Dow Jones Sustainability World Index. We have also been recognized by Forbes, Thomson-Reuters, and Newsweek for our commitment to innovation and sustainability.

So what is the best way to celebrate this key milestone in our history? Simply, we want to say thank you to the customers that made it possible. We look forward to serving you far into the future and invite you to be part of the celebration @ facebook.com/atlascopcousa.

Sustainable Productivity

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Atlas Copco

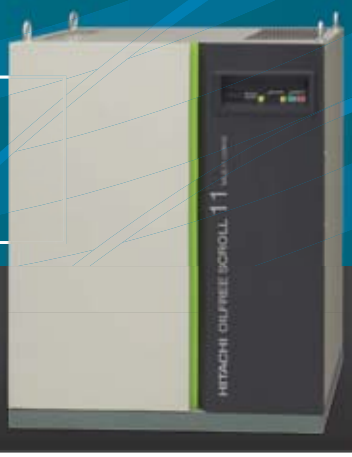
THE *NEXT* GENERATION OF OIL-FREE COMPRESSED AIR

Hitachi continues to innovate newer and more efficient compressed air technologies. This innovation enables our expansion of the DSP Series Oil-Free Compressors to the DSP *Next* Generation. The DSP *Next* Series is a continuation of our focus towards environmentally friendly and energy conscious products.

The DSP *Next* Series contains rotors with a revised profile resulting in greater efficiency. Hitachi patents for thermally compensated non-contact rotor profile with 1st and 2nd stage stainless rotors and Hitachi HX Series PTFE Free Coatings are the foundation for the increased efficiency and high reliability. Standard on Hitachi DSP Series and DSP *Next* Series compressors.

Gearcase oil mists are not vented to atmosphere, but recaptured, using Hitachi's patented oil mist remover. Oil mists are recycled, saving maintenance oil, eliminating possibility of emissions into the environment, and ensuring purity of air compression. Standard on Hitachi DSP Series and DSP *Next* Series compressors.

Hitachi SRL Series: The Oil-free design of Hitachi Scroll compressors contains absolutely no oil. This results in an Oil-Free compressor that has zero harmful emissions to the environment. With industry leading sound levels (48-61 dBa), the SRL Series can be placed in most any setting within the workplace.



Hitachi compressors are designed with market leading technology for increased customer satisfaction. Innovation of compression, air quality, protection of process, longevity of design, and efficiency of application all combine to provide an unparalleled sum of value for the discriminating air user.

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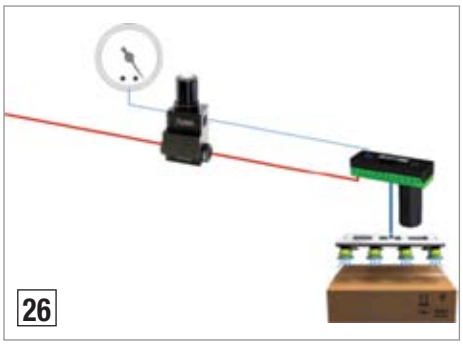
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FROM THE EDITOR | Food Packaging

When I think of the food packaging industry, I think of a highly automated plant with no tolerances for downtime. Profits come from high-volume production levels of relatively low-margin commoditized products. Production equipment, therefore, must be high-speed, reliable, and at a reasonable price. This explains why the energy cost of pneumatic components, on production equipment, has not been of primary concern to the companies buying the machines.

Food factories are realizing they can have a "Win/Win" scenario. Reliability, speed, and cost don't have to be sacrificed for energy efficiency. Don Van Ormer provides us with an interesting system assessment story at a meat packaging plant, where they reduced compressed air flow demand by almost 1,000 scfm. The chief culprits were leaks on pneumatic fittings and blow-off air applications. Simple payback was 2 months!

Case erectors keep showing up on my radar screen as machines using more compressed air than necessary. Josef Karbassi, from PIAB, shares his companies' deep insights here with an article titled, "Handling Corrugated Cardboard with Optimized Pressure-Regulation of Air-Driven Vacuum Pumps."

Atlas Copco is celebrating their 140-year Anniversary and we have written an article documenting the significant investments the Company has made in the United States since 2008. The investments are all the more significant when one takes into account the economic distress this market has experienced during this five year period.

Ingersoll Rand provides us with an interesting read on why end users are "Transitioning to Oil-Free Compressed Air." The article explores the benefits of oil-free air compressors.

Speaking of transitions, the engineering firm A3-USA, informs us that Membrane Bioreactors are gaining ground as a preferred industrial wastewater treatment method. Blowers providing 7-8 psig air support MBR's and we hope you enjoy an article about an installation of rotary screw blowers at a bottling plant.

We thank the authors above for sharing their knowledge and thank you for your support and for investing in ***Compressed Air Best Practices®***. BP

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* The cover illustration was provided by PIAB USA.

COMPRESSED AIR, PNEUMATICS, VACUUM & BLOWER INDUSTRY NEWS

ELGI Equipments Acquires Patton's Inc.

ELGI Equipments Ltd. has acquired Patton's Inc. (www.pattonsinc.com). In a letter to customers posted on the company web site, Patton's CEO John C. Patton states, "This change will allow Patton's Inc. to become the only air compressor company to offer a Factory Lifetime Airend Warranty." Patton's has been in business for over 65 years and operates compressed air system sales and services branches in the southeast.

Air compressor industry veteran, Gary Valvo, has been appointed President of ELGI U.S.. ELGI was established, in 1960 in India, as a reciprocating compressor manufacturing company. The ELGI web site states that the company today manufactures reciprocating, screw, centrifugal, and oil-free air compressors ranging from 0.75 HP to 1500 HP (www.elgi.com).

Festo Names Powermatic Associates its Newest Distributor

Festo announces the addition of Powermatic Associates, Pleasanton, Calif., to its distribution team. Powermatic will offer the full range of Festo pneumatic and automation products in northern California and the Reno, Nevada area.

In business since 1972, Powermatic Associates is an employee-owned company that provides products, technology, and engineering assistance to its customers in a wide variety of industries. Products include panels, sensors, motion controls, bus systems, and automation control.

"We are very excited to add such a strong organization to our sales team," said Craig Tomita, district sales manager, Festo. "Powermatic Associates expertise matches nicely with our products, giving customers the highest quality in both service and electric and pneumatic motion systems."

For more information on Festo, call 800-993-3786 and visit www.festo.com/us. Powermatic Associates can be reached at 800-966-8513 or sales@powermatic.net.

Atlas Copco Cited Among World's Most Sustainable Companies

Atlas Copco ranks 18th among the 2013 Global 100 Most Sustainable Companies — a list presented on Jan. 23 at the World Economic Forum in Davos, Switzerland. This is the seventh time that Atlas Copco has appeared in the Global 100 rankings.

"Sustainability lies at the heart of Atlas Copco's innovative products and employee mindset," said Jim Levitt, president, Atlas Copco North America LLC. "Next month we are celebrating our 140th anniversary. As a company with a long and cherished history, we know that being socially and environmentally responsible is not only the right thing to do, but is critical for developing and growing our business in a profitable way."

Along with being named in this exclusive list, Atlas Copco AB is also a member of the Dow Jones World Sustainability Index and over the

"As a company with a long and cherished history, we know that being socially and environmentally responsible is not only the right thing to do, but is critical for developing and growing our business in a profitable way."

— Jim Levitt, president, Atlas Copco North America LLC.

last two years has been recognized by *Forbes, Thomson-Reuters* and *Newsweek,* among others, for its commitment to innovation and sustainability. Atlas Copco sustainability initiatives, both globally and in the U.S., include:

- Boosting customer energy efficiency by at least 20 percent between 2010 and 2020 by continuously designing and developing more efficient products.
- Membership by Atlas Copco Compressors with the U.S. Green Building Council.
- An initiative between Atlas Copco Secoroc and the U.S. Department of Energy, as part of President Obama's challenge to generate 80 percent of U.S. electricity from clean energy sources by 2035, to develop a down-the-hole (DTH) hammer design capable of low-cost, high-production drilling in the high temperatures of deep geothermal wells.
- Reducing Atlas Copco's water consumption and promoting clean drinking water in countries in need. The employee run Water for All organization will pass $200,000 in donations in the U.S. in 2013.
- Increasing employee diversity in both nationality and gender.

The Global 100 list is based on a selection of 4,000 developed and emerging market companies, which are measured against key performance indicators such as revenues in relation to consumption of energy and water. **Atlas Copco** in North America operates 109 locations and employs more than 4,500 people in the United States. The North American market contributed $2.4B in revenue in 2011 or approximately one-fifth of the company's overall revenue. For more information, visit http://global100.org or visit www.atlascopco.com.

COMPRESSED AIR, PNEUMATICS, VACUUM & BLOWER INDUSTRY NEWS

SME Receives U.S. DOE Grant for Energy Conservation

The Society of Manufacturing Engineers (SME) has been granted $292,000 from the U.S. Department of Energy to partner SME Student Chapters with existing Industrial Assessment Centers (IAC) at universities nationwide.

IAC assessments focus on industrial energy conservation techniques through energy audits and assessments of manufacturers. This grant broadens the program to assess manufacturing processes for energy savings.

Starting this year, SME will partner with six universities, incrementally expanding the program over the next three and a half years. In total, SME will partner with all 24 IACs participating in the DOE program, providing invaluable hands-on industry experience for future manufacturing professionals.

"SME's student members are the future manufacturing workforce, and engaging them with the IACs across the country will provide them with critical skills and training while producing real cost savings for small to mid-sized manufacturers." said Joe LaRussa, director of membership. "This program typifies how SME, industry and government can collaborate to strengthen manufacturing as a critical component of the U.S. economy."

University-based IACs across the country provide students with critical skills and training to conduct energy assessments in a broad range of facilities. SME faculty advisors will work directly with IAC directors to guide the students during the assessment process.

Since 1981, the IACs have performed nearly 15,000 assessments containing more than 117,000 recommendations. Industry assessments have resulted in energy savings of saved 530 trillion Btu (British thermal units) or more than $5.6 billion. Visit www1.eere.energy.gov/manufacturing or www.sme.org

Gardner Denver Appoints Vincent Trupiano President of Industrial Products Group

Gardner Denver, Inc. announced that Vincent Trupiano has been appointed Vice President, Gardner Denver, Inc. and President, Industrial Products Group (IPG), effective immediately. In his new position, Mr. Trupiano has full responsibility for the company's global Industrial Products Group, reporting directly to Michael M. Larsen, President, Chief Executive Officer and Chief Financial Officer. Mr. Trupiano joined Gardner Denver in 2010 as the Vice President and General Manager of the Nash business and succeeds Brian L. Cunkelman, who resigned to pursue other opportunities.

"Vince has a proven track record of delivering strong operational results and his leadership skills, global operations experience and engineering expertise make him ideally suited to take on this new role," said Mr. Larsen. "I am confident that Vince will seamlessly transition into his new role and lead IPG to deliver continued growth. Since joining the Company, Vince has played a key role in Gardner Denver's success and we look forward to his ongoing contributions, including the IPG restructuring, which is continuing as planned." Mr. Larsen added, "We also thank Brian for the role he has played at Gardner Denver over the past two years and wish him the best in his future endeavors."

Gardner Denver also announced that the Company's fourth quarter 2012 adjusted diluted earnings per share is anticipated to be above the high end of the previously announced range of $1.22 to $1.32.

Mr. Trupiano joined Gardner Denver in 2010 from Dresser-Rand where he was General Manager of the Turbo Compression Division. Prior to joining Dresser-Rand, Mr. Trupiano spent more than 20 years in a variety of operational and business leadership roles of increasing responsibility with United Technologies Corporation and Ford Motor Company. Mr. Trupiano holds a Bachelor of Science degree in Mechanical Engineering from Michigan State University and a Master of Business Administration from the University of Michigan.

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THE SYSTEM ASSESSMENT

Meat Packager Reduces Compressed Air Demand

By Don van Ormer, Air Power USA

Introduction

This meat processing and packaging factory spent an estimated $203,640 annually on energy to operate the compressed air system at their Midwestern facility. Based on the air system operating 8,760 hours per year, the group of projects recommended below could reduce these energy costs by an estimated $107,522 or 47% of current use. In addition, these projects will decrease compressor maintenance costs. Estimated costs for completing the recommended projects total $21,900. This figure represents a simple payback period of 2 months.

The system assessment found demand-side reduction opportunities using compressed air dryer purge controls (that had been turned off), repairing compressed air leaks, and reducing blow-off air consumption by 734 cfm. This blow-off air reduction project delivered the majority of the energy savings, providing 1,209,999 kWh in annual savings adding up to almost $72,599.

The Existing Compressed Air Installation

This Midwestern plant is a large (500,000 sq ft) meat processing plant with twenty packaging lines and nine palletizers. The compressed air system is supplied from three separate rooms with seven individual lubricant-cooled, single and 2-stage rotary screw compressors. The plant has four blower purge desiccant dryers designed to deliver a -40°F pressure dewpoint.

Compressor Room #1 has four rotary screw air compressors. All of the units are 125 psig rated discharge designs, except the Gardner Denver EBQ which a 100 psig design.

- Gardner Denver model VST55-90, 2-stage variable speed

> "This blow-off air reduction project delivered the majority of the energy savings, providing 1,209,999 kWh in annual savings adding up to almost $72,599."
>
> — Don van Ormer, Air Power USA

drive, lubricated air cooled, rotary screw compressor, 125-hp class producing 622 acfm at full load.

- Gardner Denver model EBQ99 single-stage lubricated rotary screw, air cooled compressor, 125-hp class producing 630 acfm at full load. Currently it is running load/no load control.
- Kaeser model DS241 single-stage belt driven, 180-hp class lubricated rotary screw compressor producing 724 acfm at full load. Operating in load/no load standard control.
- Ingersoll-Rand model EP50SE single-stage, air cooled, lubricated rotary screw compressor, 50-hp class producing 198 acfm.

Compressor Room #2 has two Ingersoll-Rand model EP125 single-stage, air cooled, 125-hp class rotary screw compressors producing 563 acfm at full load pressure of 125 psig. Compressor Room #3 has a Gardner Denver model EBP, 100-hp class single-stage air cooled, rotary screw compressor producing 440 acfm at full load.

The two most effective ways to run air compressors are at "Full Load" and "Off." The two most common control methods used for rotary screw compressors are **modulation** and **on-line/off-line.** Modulation is relatively efficient at higher loads, but less efficient at lower loads.

The current system has 2-step control on the Gardner Denver unit #20 and Kaeser unit #17. The

THE SYSTEM ASSESSMENT | Meat Packager Reduces Compressed Air Demand

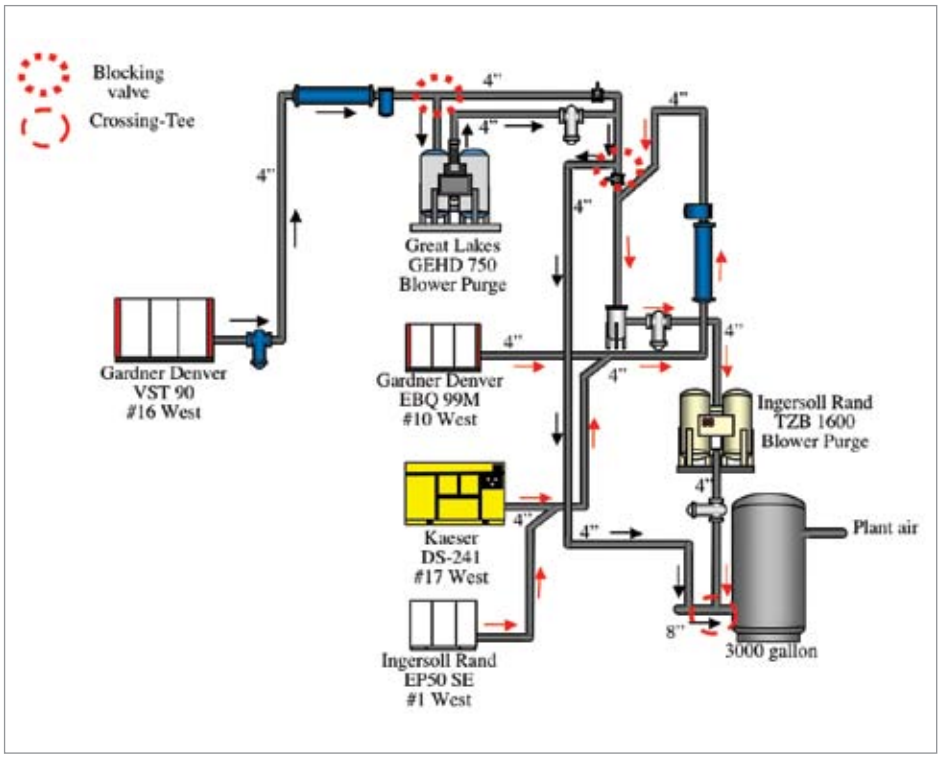


Figure 1. Compressor Room #1

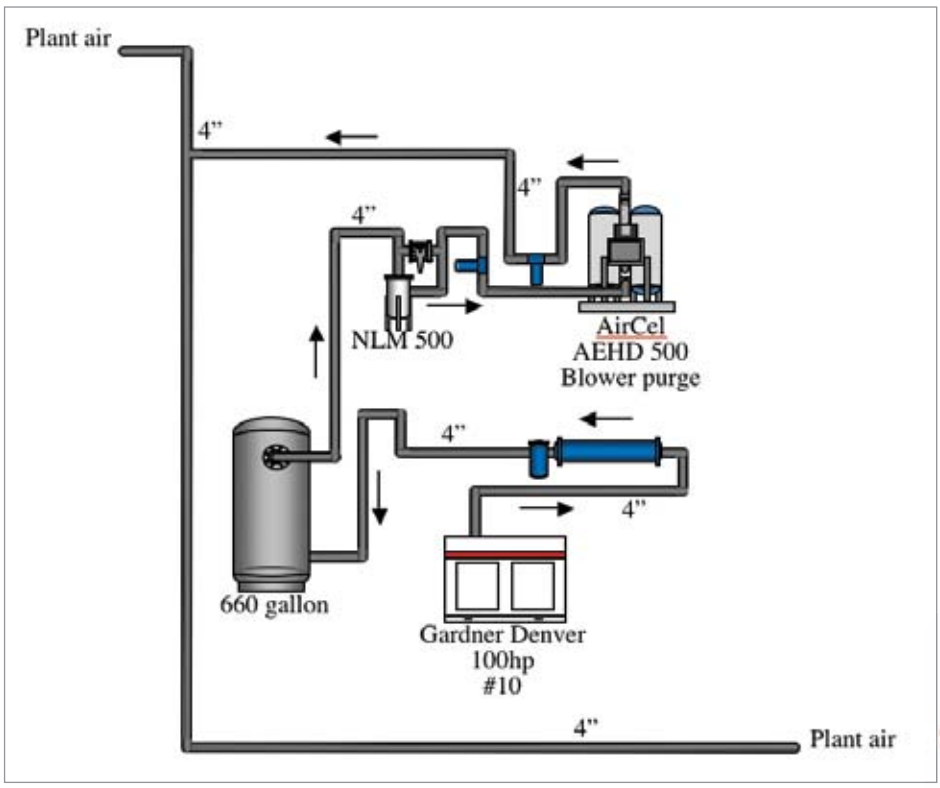


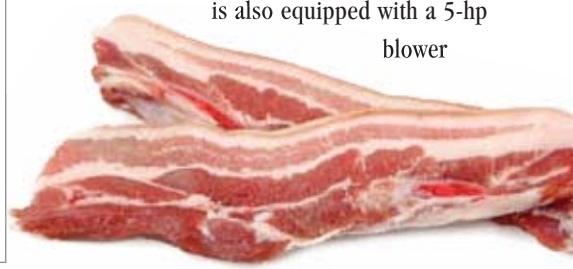
Figure 2. Compressor Room #3

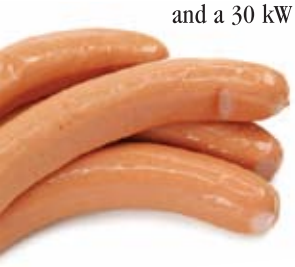
Ingersoll-Rand compressor units #11 and #12 have modulation and automatic control selection, and the Gardner Denver unit #16 is a variable speed drive. All the compressors are controlled by a central CAM controller. The current units have capacity controls capable of translating "less air used" into a comparable reduction in electric cost. These controls will work effectively with the current piping and air receiver storage situation.

There are four main dryers in the system. In Compressor Room #1, there is a Great Lakes model GEHD-750 external heat, blower purge dryer rated for 750 scfm. It has a 5-hp blower and a 24 kW heater. Currently, it is operating using purge air for regeneration with blower cooling. It is using 15% of its rated flow for three hours and the blower for one hour. It does not have a dewpoint demand controller installed.

The other dryer, in Compressor Room #1, is an Ingersoll-Rand model TZB1600 external heat blower purge dryer rated for 1,600 scfm. It has a 7.5-hp blower and a 30 kW heater. Purge control is installed but it is running on timer mode. This dryer is using purge air for cooling which is 15% for one hour of cooling.

Compressor Room #2 has a Sahara model BP1690 external heat blower purge dryer rated for 1,690 scfm. A dewpoint demand controller is installed and utilized. This dryer is also equipped with a 5-hp blower





and a 30 kW heater. It is using purge air for cooling and the blower air for regeneration.

Compressor Room #3 has an AirCel model AEHD500 external heat blower purge dryer rated for 500 scfm. The dryer is equipped with a dewpoint demand controller and a 9 kW heater and 7.5-hp blower. The dewpoint demand controller is not working.

Establishing the Energy Baseline

Annual plant electric costs for compressed air production, as operating today, are $230,640 per year. These estimates are based upon a blended electric rate of $0.06 /kWh. The air

TABLE 1: COMPRESSOR USE PROFILE – CURRENT SYSTEM

UNIT #	COMPRESSOR: MANUFACTURER/MODEL	FULL LOAD		ACTUAL ELEC DEMAND		ACTUAL AIR FLOW	
		DEMAND (KW)	AIR FLOW (ACFM)	% OF FULL KW	ACTUAL KW	% OF FULL FLOW	ACTUAL ACFM
Production: Operating at 107 psig discharge pressure for 5,616 hours							
1	IR PE 50 SE	43	198	Off			
10	GD EBP 99 125 HP	105	630	57%	73 x .82 =60	38 x .82 =31%	195
11	IR EP 125	107	563	Off			
12	IR EP 125	107	563	100%	107	100%	563
16	GD VST55-90	114	622	93%	106	91%	566
17	Kaeser DS 241	138	724	100%	140	100%	724
21	GD EBQ	78	540	99%	77	99%	534
			TOTAL (Actual):		**490 kW**		**2,582 acfm**
Production: Operating at 110 psig discharge pressure and 3,144 hours							
1	IR PE 50 SE	43	198	Off			
10	GD EBP 99 125 HP	105	630				
11	IR EP 125	107	563				
12	IR EP 125	107	563	100	108	100	563
16	GD VST55-90	114	622	51	58	49	305
17	Kaeser DS 241	138	724	92	127	73	528
21	GD EBQ	78	540	100	78	94	507
			TOTAL (Actual):		**371 kW**		**1,903 acfm**

THE SYSTEM ASSESSMENT | Meat Packager Reduces Compressed Air Demand

TABLE 2: PARTIAL LEAK LIST

NO	LOCATION	DESCRIPTION	EST SIZE	EST CFM	COMMENTS
1	Bowls Robot	Push pull fitting thread connection	Small	2	
2	STP in	Trap drain	Small	2	
3	CIP Turkey cooker	Quick disconnect on air drop	Small	2	
4	STP Chiller	Union connection	Small	2	
5	Room 218	Quick disconnect	Small	2	Approach conveyor #2
6	Wexxar case erector #8	Push pull fitting	Large	10	Underneath conveyor
7	P2 FAB Poly Clip 4	Quick disconnect	Small	2	
8	P2 FAB Metal Detector 85	Quick disconnect	Medium	7	
9	P2 FAB Metal Detector 71	Quick disconnect	Small	3	
10	P2 FAB Metal Detector 72	Quick disconnect	Small	2	
11	P2 FAB Brechteen Netter	Lubricator diaphragm seal	Small	2	
12	P2 FAB Near Clipper 9	Fitting connection	Small	2	on hose drop
13	P3 Beef Raw	Quick disconnect connection	Small	2	Dumper termination
14	P3 Beef Raw	Push pull fitting	Small	2	Beef trim table 2

system operates 8,760 hours per year. The load profile or air demand of this system is relatively stable during all shifts. Overall system flow ranges from 2,554 acfm during production to 1,903 acfm during sanitation. The system pressure runs from 96 to 100 psig in the headers during production. Production is 16 hours per day, 6 days a week; sanitation is 8 hours per day, 6 days a week; and non-production is on Sunday.

Demand Reduction Projects — Managing Dryer Purge Air

The overall strategy for improving the air system is based on reducing the purge air requirements of the desiccant dryers, managing compressed air leaks, and reducing blow-off air use.

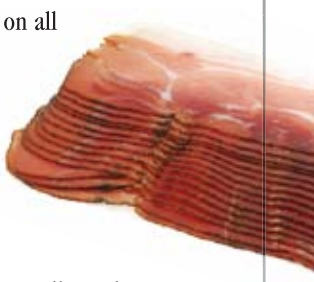
TABLE 3: VENTURI INDUCER NOZZLES IN PLACE OF OPEN BLOW

LOCATION	QTY	TYPE / SIZE	ESTIMATED CURRENT CFM USAGE	UTILIZATION %	NET AVG CFM	RECOMMEND VENTURI NOZZLE	NEW AVG NET CFM EACH	NET AVG CFM USAGE	TIMED W / PROCESS – REDUCTION PERCENTAGE	EST NET AVG CFM SAVED
Breast Pack Bag Open	2	1" Venturi	8 x 2	90	14.4	—	14.4	—	20	3
Breast Pack Cryovac 8600-4	16	Blue Lechler	16 x 16	90	230	8 – 48008	7x8=56	50	60	210
Breast Pack Video Jet	2	Blue Lechler	16 x 2	50	16	1 – 48008	1 x 7	3.5	Current	12.5
Breast Bake Cryovac 8600-7	16	¼" Tube	20 x 16 (two at a time for 2 seconds)	0.66 x .9	24	8 – 48008	1 x 7	4	Current	20
Breast Pack Approach Convey #2	2	1" Venturi	16	90	14.4	—	—	—	20	3
Bologna	1	1" Venturi	8	90	7.2	—	7.2	—	20	3
Pack Bag Open BM Convey	2	1" Venturi	8 x 2	90	14.4	—	14.4	—	20	3
Cryovac 8600-8	16	¼" Tube	20 x 16 (two at a time for 2 seconds)	0.66 x .9	24	8 – 48008	1 x 7	4	Current	20

There are four main dryers in the system. In Compressor Room #1 is a Great Lakes model GEHD-750 external heat, blower purge dryer rated for 750 scfm. It has a 5-hp blower and a 24 kW heater. Currently, it is operating using purge air for regeneration with blower cooling. It is using 15% of its rated flow for three hours and the blower for one hour. It does not have a dewpoint demand controller installed and can only run on timer.

The other dryer in Compressor Room #1 is a Ingersoll-Rand model TZB1600 external heat blower purge dryer rated for 1,600 scfm. It has a 7.5-hp blower and a 30 kW heater. Purge control is installed but is it running on timer mode. This dryer is using purge air for cooling which is 15% purge for one hour of cooling. The dewpoint demand controller is inoperative and needs to be replaced.

Compressor Room #2 has a Sahara model BP1690 external heat blower purge dryer rated for 1,690 scfm. A dewpoint demand controller is installed and utilized. This dryer is also equipped with a 5-hp blower and a 30 kW heater. Compressor Room #3 has an AirCel model AEHD500 external heat blower purge dryer rated for 500 scfm. Equipped with a dewpoint demand controller and a 9 kW heater and 7.5-hp blower.



Purge air can be reduced on all the dryers and all, except one, have the controls needed to do this — they just aren't being used. A project example is to utilize the dewpoint demand control on the Ingersoll-Rand TZB1600 dryer. Currently, the dryer is set to timer mode (which will switch every four hours). Due to the partial load conditions, the plant should utilize the dew point demand controller to operate. This will allow the blower and heater to shut off until the drying tower needs to be regenerated. Using the demand control feature will reduce purge air requirements in half at fifty percent loads. The

Continued on page 40.

THE TECHNOLOGY PROVIDER

Sustainable Productivity at Atlas Copco

The story of Atlas Copco's 140-year commitment to innovation

By Rod Smith, Compressed Air Best Practices®

When thinking about innovation during the past century, the mind immediately wanders to consumer-facing brands that make products that are experienced by users — like a mobile computer and videophone that fits in our hands or the technology applications through which almost all modern business is conducted.

One company that has a profound influence on how these well known innovative companies manufacture products, is Atlas Copco. As the company celebrates its 140th anniversary in 2013, it is reflecting on its own innovations and adaptions — products, service and market expansion — that have placed it in a position as a world-leading supplier of compressed air solutions, construction and mining equipment, power tools and assembly systems with a principal focus on "sustainable productivity."

One of the best places to search to determine if a company is living up to their marketing promises — specifically in regards to innovation — is their annual report.

Atlas Copco's 2011 annual report cites a separate line item for research and development at approximately $278 million (USD) — which equates to more than two percent of the company's revenues. This is a primary reason the company has been

Atlas Copco Compressors Product Company in Houston processes and distributes customer orders across North and South America. Opened in 2012, this state-of-the-art facility produces a wide range of standard and customized air compressors, dryers and skid packages.

recognized the past few years by Forbes, Thomson-Reuters and Newsweek, among others for its commitment to innovation. Also in 2011, the Patent Board of Global Industrial Equipment Manufacturers recognized Atlas Copco for the quality of their patent portfolio — placing the company 13th on their global list.

This commitment to research and development didn't begin recently; it has been ingrained in the company's culture from the beginning.

A Brief History

Atlas Copco was founded in Sweden in 1873 as a manufacturer of railroad rolling stock (a burgeoning industry at the time in need of a local manufacturer in Sweden). At the turn of the century the company diversified its offerings into riveting and chipping hammers and drills intended for metalworking in the manufacturing industry. While ramping up production of these tools, Atlas Copco began building and servicing their own air compressors. And in 1904, Atlas Copco invented the piston compressor as a solution to their own manufacturing challenges and shortly thereafter began producing and marketing the new technology. The company's air compressor business expanded greatly during the years leading up to World War I, as manufacturers and the construction industry realized a greater need for compressed air.

Atlas Copco began U.S. operations in 1950 with the opening of offices in San Francisco and New York. Through the middle of the last century, Atlas Copco developed new tools with increasingly improved performance and

Atlas Copco USA

Revenue: $2.8 billion (USD) in 2012

People: approximately 4,700

Locations: 109

Acquisitions since 2007: 19

THE TECHNOLOGY PROVIDER | Sustainable Productivity at Atlas Copco

precision to meet the needs of the quickly growing automotive and aviation industries.

Ushering in a new era of compressed air efficiency and opportunities, the company delivered its first screw compressor in 1955. In 1967, Atlas Copco introduced both the world's first mobile screw compressor that produced oil-free compressed air and the oil-free, stationary, Z Series. With these developments, new opportunities were created for pneumatics in the medical care and food industries. And, in 1994 Atlas Copco unveiled the first economical to manufacture variable speed drive compressor — leading the way for the industry's movement into more sustainable technologies.

During the past fifteen years, Atlas Copco introduced the world's first Class Zero (ISO 8573-1 CLASS 0 - 2010) oil free compressor, revolutionary screw blower technology that is on average 30 percent more efficient that traditional lobe blowers and the world's first compressor designed to reuse 100 percent of its required energy input as hot water within the manufacturing process. And in 2011, the company unveiled the most energy-efficient oil-free compressor ever built — the ZH 350+, a high-speed 3-stage turbo centrifugal compressor.

But, the company's innovations haven't been solely based in compressed air. Through the years, Atlas Copco made significant investments and advancements in mining tool technology — from lightweight handheld drills to a hydraulic rock drill, the COP 1038 — the predecessor of many of today's rock drills — and manufacturing industry tools designed for performance and ergonomics. Along the way, the company even aided in the discovery of a species of dinosaur, Atlascopcosaurus, meaning "Atlas Copco lizard," a genus of herbivorous basal euornithopod dinosaur from the Early Cretaceous period of the present Australia.

Atlas Copco has leveraged these technological advancements to foster rapid growth during the past two decades. And today, Atlas Copco's North America activities account for one-fifth of the company's total revenues — making the United States the company's single largest market.

The Growth of the Brand in the United States

"If we go back 20 years, we often had customers ask — who is Atlas Copco?" said Kurt Lang, chief operating officer at Air Technologies, one of the world's largest

The 96,000 square-foot Atlas Copco facility in Houston is a competency center for Engineered Products and is home to four unique Business Units: Atlas Copco Systems Houston, which produces a wide range of standard and customized compressor skid packages; Greenfield Compression, which produces high-pressure compressor packages along with Natural Gas Vehicle dispensers; and the production site for a wide range of standard and customized air dyers and air treatment products.

The Atlas Copco ZH 350+ is a highly energy-efficient high-speed 3-stage turbo oil-free compressor. Designed for pharmaceutical, electronics, aviation, automotive and other industries that rely on high-quality, 100% oil-free air, the ZH 350+ is the most energy-efficient oil-free compressor ever built at Atlas Copco.

independent compressor distributors and service centers and a 33-year partner of Atlas Copco Compressors. "Today, it very rarely comes up, the brand awareness has grown to the point that most clients know Atlas Copco is the most purchased rotary screw compressor in the world."

Yet, no company grows quickly without some pains.

"When I was selling Atlas Copco compressors for an Atlas Copco distributor in the Tennessee region, the only pushback we received was about repair and replacement time and from misconceptions about the amount of business Atlas Copco conducted in the U.S. market," said Steven Green, now director of operations at Plains All American Pipeline, a leader in oil transportation and storage headquartered in Houston. "If a manufacturer took the time to compare the products — lifespan, energy requirements, reliability — we could always provide them with the perfect machine for their operations."

As a sales engineer, Green focused on selling Atlas Copco compressed air and maintenance packages in the early 2000s. He recalls that the ergonomic features of the machines pleasantly surprised customers, but what customers were most impressed by was the machines' efficiency.

"As far as I'm concerned, efficiency started with Atlas Copco and everyone else followed suit," added Green. "The key differentiator was the initiative from Atlas Copco to get

THE TECHNOLOGY PROVIDER | Sustainable Productivity at Atlas Copco

U.S. Investments 2008-2012

2008

✓ Increased the production capacity at the 187,000 sq.-ft. Atlas Copco Compressors manufacturing plant in Rock Hill, S.C

✓ Opened a new distribution center in Rock Hill, S.C., as part of their commitment to work to ensure a 24-hour delivery of in-stock parts to customers across North America.

✓ Launched a national emergency service hotline that provides their customers in the United States with a single, toll-free resource for compressor related emergency service needs.

2009

✓ Opened the Atlas Copco Air Academy in Rock Hill, S.C. This facility is dedicated to training customers, distributors and employees from all across the U.S.

✓ Created a centralized Customer Service Response Center in order to provide U.S. customers with a seamless process for communicating with the company and its numerous subsidiaries nationwide.

2010

✓ Opened a 131,000 sq.-ft. National Distribution Center in Charlotte, N.C., ensuring next day delivery on a wide range of spare parts and accessories; added more than 10 million U.S. dollars of stock. The facility has since been expanded to more than 150,000 sq.-ft.

2011

✓ Opened the Atlas Copco Origin-Air facility in Charlotte, N.C. Origin-Air is a world class overhaul facility dedicated to the refurbishment of air elements and valves in the U.S.

2012

✓ Atlas Copco Business Services expanded into a new custom-fitted facility in Rock Hill, S.C., marking the company's fourth major capital investment in the metropolitan Charlotte area.

✓ The new Atlas Copco Compressors Product Company in Houston became fully operational, processing and distributing customer orders across North and South America. This state-of-the-art facility produces a wide range of standard and customized air compressors, dryers and skid packages.

out and assess the situation and provide the customer with a real equipment solution — not just take an order."

Atlas Copco took all of this feedback from the market and set out to make changes and investments in how they operate in order to serve their customers better.

"Our number one goal is taking the best possible care of our customers," said Paul Humphreys, vice president of communication and branding for Atlas Copco Compressors. "Everything we do in product innovation — performance, efficiency, sustainability, reliability — is all focused on helping our customers improve the performance of their facilities, but to do that we have to connect with our customers' needs."

To really understand their strengths and weaknesses in serving their customers, Atlas Copco invested several million dollars into an ongoing comprehensive customer loyalty program, based on the customer loyalty metric (Net Promoter Score or NPS) introduced by Fred Reichfeld in his book, "The Ultimate Question." A Net Promoter score is a grade of customer satisfaction — where on a scale of 1-10, 9-10 are deemed promoters, 7-8 are labeled passive and 1-6 are qualified as detractors. Atlas Copco strives to make every customer a promoter.

"If you ask any Atlas Copco employee what NPS means they will say, 'It's how well we are taking care of the customer,'" said Humphreys. "Every employee is engaged with the program and familiar with the scores and the details that come with it, but surveying 10,000 global customers a month and reporting the results is just part of the process — the key is acting on the intelligence and that's what we've done."

Atlas Copco technician performing regular maintenance on an Atlas Copco air compressor.

Atlas Copco Compressors Investments in the U.S. since 2008

During the past five years, Atlas Copco Compressors has made significant investments and taken purposeful actions to build better customer relationships around the world and specifically in the United States.

In 2008, Atlas Copco increased production capacity at their 187,000 sq.-ft. Atlas Copco Compressors manufacturing plant in Rock Hill, S.C. and opened a new distribution center in Rock Hill, part of their commitment to ensure a 24-hour delivery of in-stock parts to customers across North America.

In 2009, Atlas Copco opened the Atlas Copco Air Academy, a state of the art training facility for employees, customers, distributors and partners, and created a U.S. Customer Service Response Center to provide customers with a seamless process for communicating with the company and its numerous subsidiaries nationwide. Then, in 2010 the company opened a now 150,000 sq.-ft. national distribution center in Charlotte, N.C.. The facility ships replacement parts and equipment the same day as the order in almost all scenarios — providing replacement parts to customers in less than 24 hours.

In 2011 Atlas Copco opened the Origin-Air facility in Charlotte, N.C. Origin-Air is a world class overhaul facility dedicated to the refurbishment of air elements and valves in the U.S.

Also in 2011, Atlas Copco Group expanded from three business units to four by adding Construction Technique, which includes divisions for portable compressors and generators, road construction equipment and construction tools. Atlas Copco now conducts financial reporting under the new structure — Compressor Technique, Industrial Technique, Mining and Rock Excavation Technique and Construction Technique. And

Continued on page 42.

THE TECHNOLOGY PROVIDER

Transitioning to Oil-Free Compressed Air

By Vipul Mistry, Product Portfolio Manager Oil-Free Rotary, and Todd Stelzer, Strategic Account Manager, Ingersoll Rand

In today's manufacturing environment, companies continually look for ways to reduce operating costs, eliminate contamination risks and minimize environmental footprints. Transitioning to a cost-effective oil-free air system providing ISO 8573-1 Class 0 certified air quality is one way to achieve these objectives.

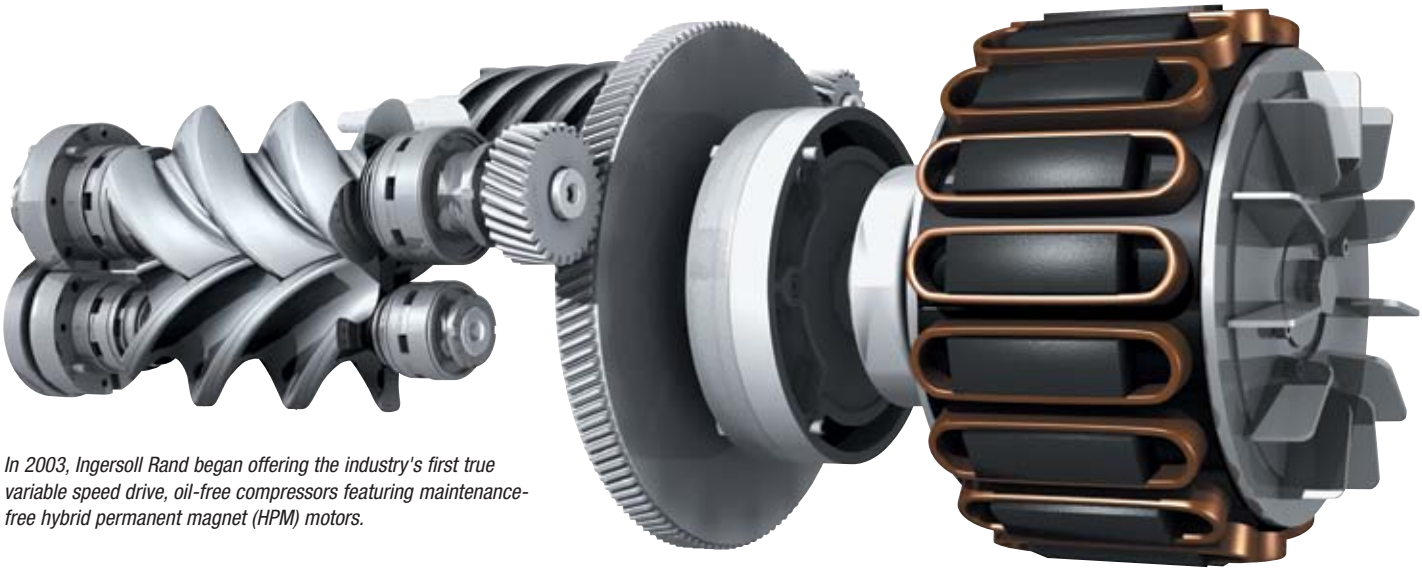
Compressed air quality is measured by the amount of solid particulates, water and oil content in one cubic foot (cu. ft.) of compressed air. Many of these contaminants are introduced from the air surrounding the installation site that is drawn into the system at the beginning of the compression process. The relative humidity, type of compressor and air treatment and filtration system can also affect air quality. Minimum air quality requirements vary by industrial application; the most stringent standards apply to manufacturers whose end products, packaging or critical instrumentation come in direct contact with compressed air.

In 1991, the International Standards Organization (ISO) established air quality and testing guidelines. The ISO created five classes to categorize air purity levels that must be provided by compressed air systems. Air quality Classes 1 through 5 dictate the acceptable amount of particulates and moisture contained in 1 cu. ft. of compressed air, but do not regulate oil content.

ISO raised the bar in 2010 and added a stringent new Class 0 air quality standard that addressed oil content. ISO 8573-1:2010 states that compressed air must contain less than 0.01 milligram per cubic meter (mg/m^3) of liquid oil, oil aerosol or oil vapor per cubic meter (m^3) to meet Class 0 certification standards.

Benefits of Oil-Free Air

Many centrifugal and rotary screw compressors have the technology to supply Class 0 certified oil-free air. It is important to note that Class 0 certified oil-free is different than virtually oil-free air. Some manufacturers use contact-cooled oil-flooded systems in conjunction with a coalescing filter to improve air quality. This virtually oil-free



In 2003, Ingersoll Rand began offering the industry's first true variable speed drive, oil-free compressors featuring maintenance-free hybrid permanent magnet (HPM) motors.

ISO 8573-1:2001 Air Quality Classes

Quality Class	SOLIDS: Max Number of Particles Per m³ 0.1 – 0.5 micron	0.5 – 1 micron	1 – 5 micron	WATER: Pressure Dew Point °F	°C	OIL & OIL VAPOR mg/m³	Quality Class
0	As specified by the end-user or manufacturer, and more stringent than Class 1						0
1	100	1	0	-100	-70	0.01	1
2	100,000	1,000	10	-40	-40	0.1	2
3	—	10,000	500	-4	-20	1	3
4	—	—	1,000	37.4	3	5	4
5	—	—	20,000	44.6	7	—	5
6	—	—	—	50	10	—	6

ISO 9573-1:2001 Class 0 defines air quality for critical applications in the food and beverage, automotive, pharmaceutical, chemical and utility provider industries.

technology cannot deliver the same results as a Class 0 certified centrifugal or rotary screw compressor. The plant manager should confirm that the compressor has received Class 0 certification from a third-party auditor to ensure 100 percent oil-free air.

Further if a filter fails, virtually oil-free systems are at higher risk for product contamination and unscheduled downtime. Filters also cause pressure drops as the compressed air moves through the system, making it inherently less efficient than an oil-free compressor.

The oil-free Nirvana air compressor from Ingersoll Rand features a variable speed drive to lower operating costs and increase operating efficiency.

THE TECHNOLOGY PROVIDER | Transitioning to Oil-Free Compressed Air

The transition to oil-free air in a production facility may seem like a sizeable investment; however, minimal maintenance requirements increase uptime and productivity, and a properly configured oil-free system lowers energy consumption while significantly increasing ROI. These cost-saving opportunities can help fund the system retrofit and should be factored into the compressor's overall lifecycle cost.

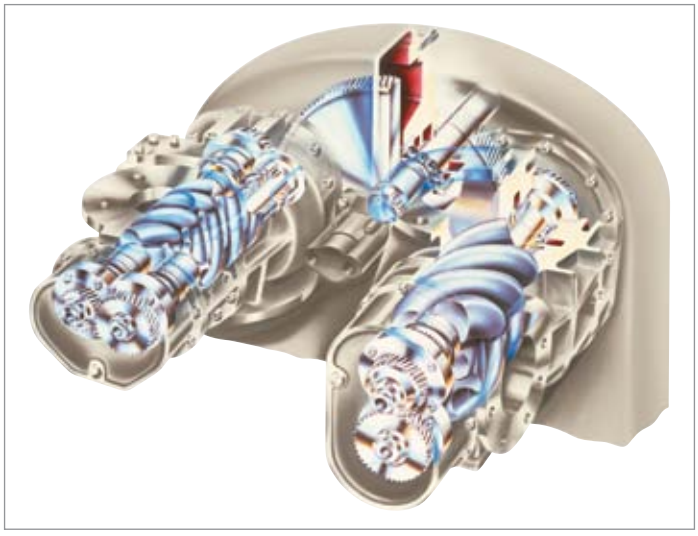
Maintenance and Energy Savings

Regular maintenance is critical in keeping compressed air systems running reliably and efficiently. A true oil-free compressor does not have oil in the compression module which minimizes downstream filtration requirements and pressure drops, and translates directly into energy savings. This also eliminates the need to replace air filters frequently, which reduces maintenance and inventory costs.

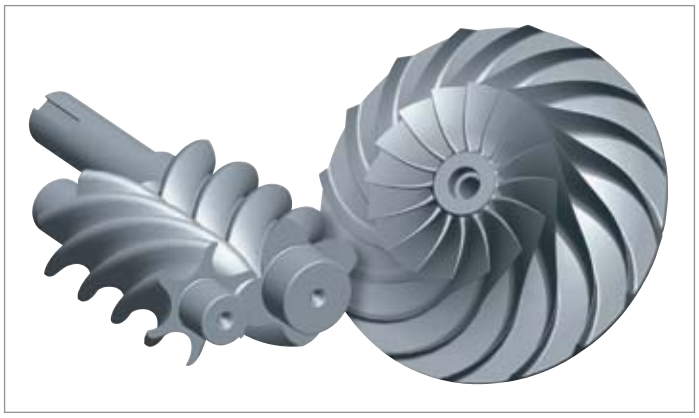
Energy consumption can account for up to 90 percent of the total lifecycle cost of an air compressor. Oil-free air compressors coupled with variable speed drives, heat of compression (HOC) dryers and an updated compressor control system can reduce energy demands and provide optimal flex efficiency for food and beverage manufacturers. As a result, one food and beverage manufacturer that installed an Ingersoll Rand oil-free air system increased its energy savings by 34 percent and reduced emissions by more than 460 tons of CO_2 per year.

Increase Sustainability

Compressed air systems can produce large amounts of condensate depending upon the relative humidity of the climate. In an oil-flooded compressor, the condensate contains lubricant contaminants that need to be disposed of according to environmental regulations. While oil-water separators exist to remove contaminants more efficiently, oil-free air compressors completely eliminate this issue. Condensate from oil-free systems is easily disposed of reducing maintenance costs and the company's environmental footprint.



The two-stage compression module features precision-machined rotors and gearing, advanced UltraCoat rotor protection, anti-friction bearings, stainless-steel air seals, and a unique oil seal design to ensure years of reliable, trouble-free operation.



Ingersoll Rand oil-free rotary screw and centrifugal air compressors were vigorously tested by TUV Rheinland, a global-leader in independent testing and assessment services, and earned ISO 9573-1:2001 Class 0 certification, guaranteeing 100% oil-free air.

Prevent Contamination

There is a risk of oil contamination any time compressed air comes in contact with an end-product. Contaminants can harm the quality of the end-product, cause recalls and stop production at the plant. These risks can harm the company's reputation and profits or worse — the end-user.

Class 0 certified air compressors are safer because oil is never introduced to the production area giving the plant freedom from compressor-created contaminants. Operators should test air quality and end-products frequently to ensure the system is functioning correctly. Oil-free air compressors eliminate the need for downstream testing making them a reliable solution for critical processing applications.

Proactively Move to Oil-Free Air

While there are very few government regulations regarding oil-free air, many multi-national manufacturers are voluntarily moving to oil-free systems to reduce the risk of contamination and protect vital equipment. The transition to oil-free air is critical for food and beverage, automotive, chemical, and pharmaceutical manufacturers and power utility providers.

Manufacturers considering a move to oil-free air should conduct a plant-wide system assessment to define demand patterns and supply capacity before making any major modifications. A certified air audit team can analyze the plant air compressor's supply, demand and distribution components to determine the entire system's efficiency and effectiveness.

During the evaluation period, an auditor visits the plant during each shift to observe how compressed air supply and demand fluctuates throughout the day. The auditor will start by checking the supply side's air treatment equipment, filtration, dryers, coolers, drains, piping, network pressure control and storage, and automated system controls. Next, the auditor will check the average pressure range, artificial demand and potential leaks on the demand side. The auditor should also define the limitations of the compressed air system and make recommendations for managing the plant's compressed air usage.

At the end of the investigation, the auditor will compile a report assessing the system's overall reliability, air quality, operating costs and environmental impact. The report should include a proposed action plan and outline the projected cost and energy savings, if the entire plan is implemented.

If a system assessment determines it is beneficial for a manufacturer to transition to oil-free air, the operations manager should contact a licensed distributor to specify the best Class 0 certified compressor for the application. BP

To learn more about the Class 0 certified air solutions used in food and beverage applications, visit ingersollrandproducts.com/am-en/solutions/oil-free or contact the authors; Vipul Mistry, product portfolio manager — oil free rotary, Ingersoll Rand, Vipul_Mistry@irco.com and Todd Stelzer, strategic account manager, Ingersoll Rand, Todd_Stelzer@irco.com.

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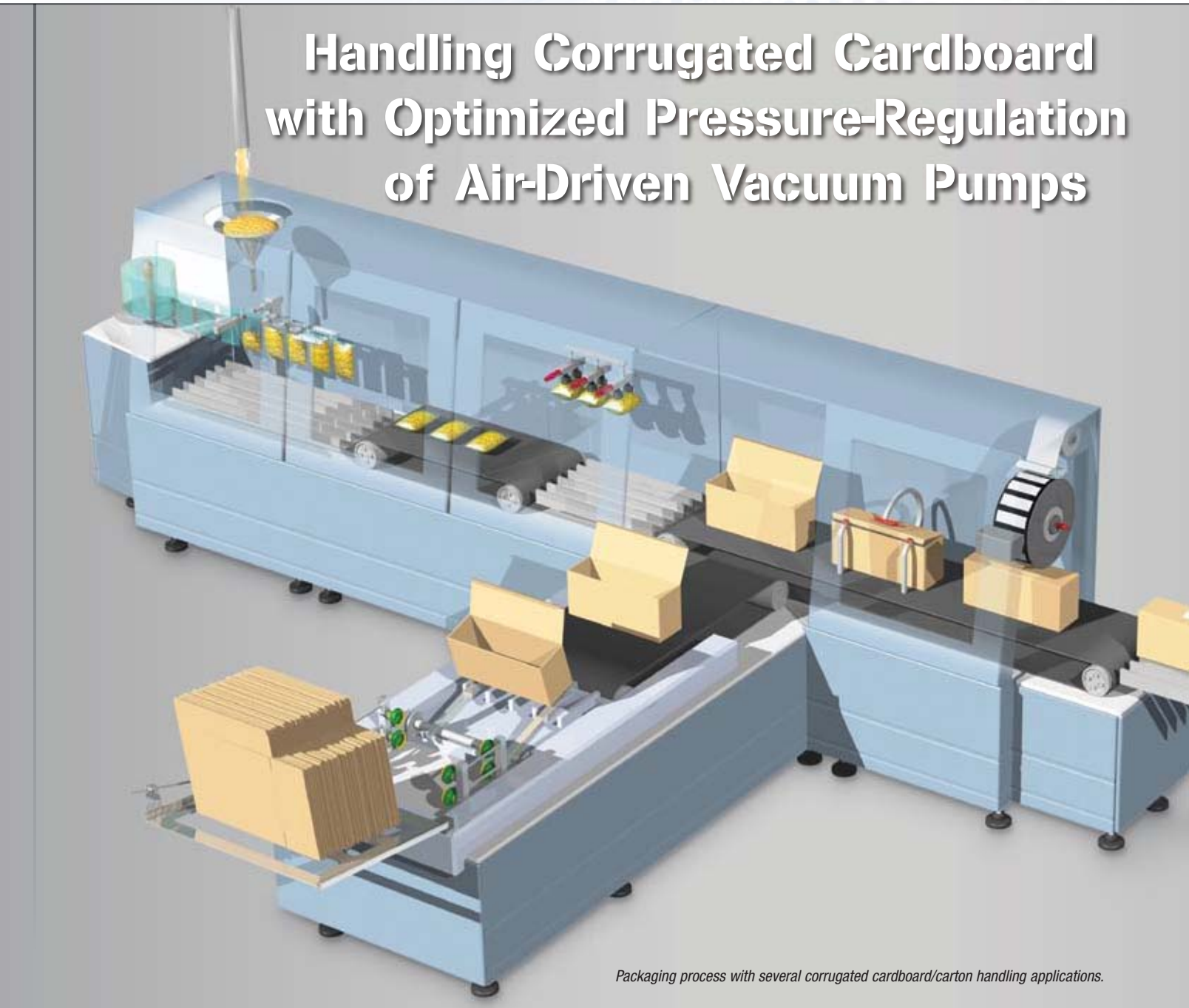
Handling Corrugated Cardboard with Optimized Pressure-Regulation of Air-Driven Vacuum Pumps



Packaging process with several corrugated cardboard/carton handling applications.

➤ Using suction cups and air-driven vacuum pumps is a preferable gripping and handling method of corrugated cardboard materials and boxes in carton-machines like case/carton erectors and rotary cartoners. Robot based applications, like palletizing and de-palletizing, are other examples where the best practice technology for gripping and handling is by suction cups and air-driven vacuum pumps.

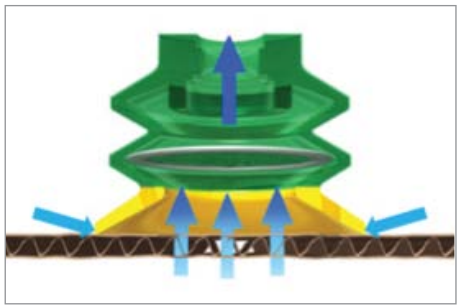
Plant Vacuum Systems are not Energy Optimized and Compensate for Worst-Case Scenarios

Corrugated cardboard is a porous material and the rate of flow of air through the material will vary, even within a well-defined quality. When using suction cups, the air leakage will also depend on how well the suction cup lip will seal over the corrugated surface, which can vary from cycle to cycle (carton to carton).

By Josef Karbassi, Division Manager
Automation, PIAB AB

When designing a vacuum handling system for corrugated carton material, the conventional principle is to dimension for the worst case scenario in terms of leakage, to have enough gripping force in every cycle. The compromise will be that the system is "oversized" (=extra money spent on energy to produce vacuum flow) for most of the cycles. A field-test on a carton erecting machine, during 2012 at a global food company making chocolates, showed that the system was

HANDLING CORRUGATED CARDBOARD WITH OPTIMIZED PRESSURE-REGULATION



Vacuum leakage when a cup is applied to a corrugated cardboard comes from the porous material and corrugated surface.

oversized up to 43% (energy consumption) to handle "outliers" of leakage variations on the cardboard material.

What if the flow capacity and thereby the energy consumption of an air driven vacuum pump could be automatically adjusted according to the quality of the cardboard for each cycle/sample?

Damage on Cardboard Surface from Cups Due to High Vacuum Pressure

Suction cups provide a gentle gripping solution versus other methods and will not damage the surface of the cardboard if properly used. The possible gripping/lifting force from suction cups is, for most cardboard handling applications, more than enough. The gripping force can be controlled by the size of the cup and the vacuum pressure. Damage on the first layers of floated paper on the cardboard surface, from suction cups, is related to the vacuum pressure. So there is a balance between lifting/handling force and possible damages to the surface which is hard to fine-tune for each cycle/sample. Quite often needlessly high vacuum pressure is used to achieve sufficient suction force rather than sufficiently large cups. That increases the risk for cardboard surface damage, when vacuum pressure increases in the cup result from much lower than expected/average leakage flow, in a specific cycle.

What if a fixed/constant vacuum level could be guaranteed independent of cardboard quality in each cycle? That would avoid making damage/marks and still secure sufficient vacuum pressure to maintain maximum production speed.

Huge Energy and Cost Savings Occur when Reducing Vacuum Pressure without Compromising on Lifting Capacity

The lifting force (F) from a suction cup is defined by two factors:

(1) $F\ (N) = A \times P$

F = Force in Newton (N)

A = Suction cup area (m^2) => For a circular suction cup app: $(\pi * Diam^2)/4$

P = Vacuum pressure ($Pa = N/m^2$)

By formula (1) and the fact the Area is a "square" unit, it is clear that the force will be increased or decreased more by changing the suction cup area versus changing the vacuum pressure. So a small decrease in vacuum pressure will not affect the force much.

An example:

A cup with suction cup Ø40mm will reduce lifting force by app 15 % if vacuum pressure is reduced from 65 -kPa [19.2 -inHg] to 55 -kPa [16.2- inHg]. On the other hand - going from a Ø40 mm to a Ø50 mm cup at 55 -kPa [16.2-inHg] will increase the force with >35%.

Simple conclusion — use as low of a vacuum pressure as possible and as large of a suction cup as possible

Typical marks/damages from cups on a corrugated cardboard box.

Lowering vacuum pressure on leaking materials will affect the energy consumption of air driven pumps tremendously. The ability to remove air-leakage from a vacuum pump goes down drastically when vacuum pressure

> "Simple conclusion — use as low of a vacuum pressure as possible and as large of a suction cup as possible."
>
> — Josef Karbassi, Division Manager Automation, PIAB AB

OF AIR-DRIVEN VACUUM PUMPS

is deep. This is valid for all kind of vacuum pumps, not just air-driven.

An example: The air/energy saving will be in the range 25-30% if vacuum pressure can be reduced from 65 -kPa [19.2 -inHg] to 55 -kPa [16.2- inHg] on a corrugated material/box with diameter 50mm cups. In a normal sized application, that runs 2000 h per year, it can mean >€100 ($125] in saved cost of energy per year (exact cost saving depends on local cost per kWh).

Traditional Regulating of Air-driven Vacuum Pumps

Traditionally the feed pressure adjustment for air-driven vacuum pumps is made by a manual controlled air pressure regulator. The air regulator will regulate high pressure supply lines and give a set/regulated constant air pressure to a device, for instance an air driven pump, independent of air pressure flow. In previous sections we have proved that for corrugated cardboard handling applications with vacuum and cups, it would be most economical, energy efficient and gentle (no marks/damages) if the feed pressure to the air-driven pump could vary from cycle to cycle to keep the vacuum level constant. With a manual controlled regulator it would require a full-time person adjusting the feed pressure by hand for each cycle — makes no sense in any industrial, emerging or under-developing country!!

A traditional air-regulator.

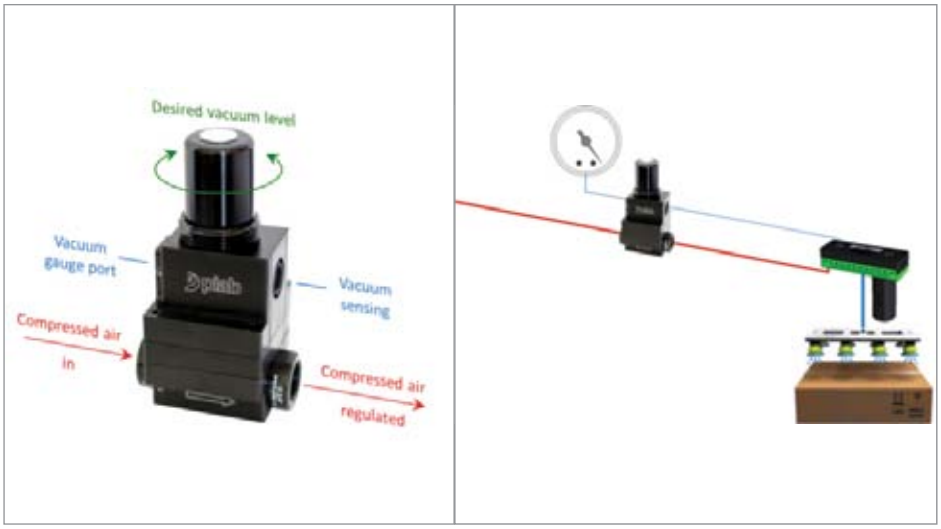
A New Regulating Solution with Great Advantages — "Constant Vacuum" Pressure Regulators

piSAVE optimize is a new type of air pressure regulator tailor made for air-driven vacuum pumps/ejectors. Instead of manually adjusting a constant air pressure for the vacuum pump/ejector, the operator can manually adjust and set a constant vacuum level. The regulator will sense vacuum from the pump/system on a sensing port and regulate to maintain a constant vacuum level by increasing or decreasing the air pressure to the vacuum pump momentarily. Initially it starts with full pressure until the set vacuum level is reached in order to have full force and pick-up speed when suction cups are applied to the surface.

An analogy can be made with radiators/heaters to better understand the benefit with a vacuum controlled regulator for air-driven pumps versus a traditional regulator. On an old

HANDLING CORRUGATED CARDBOARD WITH OPTIMIZED PRESSURE-REGULATION

style heater/radiator, the fluid flow (=heating capacity) was manually adjusted by a person using a rotating knob. When the temperature in the room increased or decreased due to changes in outdoor temperature, the knob for fluid-flow had to be adjusted manually by a person — time consuming and irritating…In a modern system the desired indoor temperature is set one time and the radiator's fluid flow (=heating capacity) is automatically adjusted to maintain the set room temperature.



piSAVE optimize, a constant vacuum pressure regulator for air-driven pumps/ejectors.

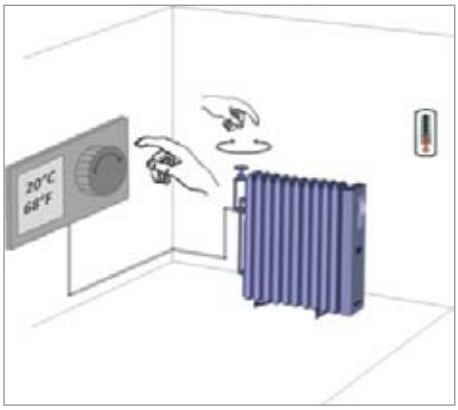
The same thing goes for a vacuum system handling corrugated cardboard. We have understood that constant vacuum pressure is best from all perspectives and that can be achieved by adjusting the feed pressure to the air driven vacuum pump, but with a traditional air regulator it is too time consuming to manually adjust the regulator, cycle by cycle. With piSAVE optimize that is done automatically. The desired vacuum pressure is set one time at an optimized level.

Summary

A constant and as low vacuum pressure as possible (optimized) in a system for handling corrugated cardboard will:

- Eliminate risk for damage/ marks on the surface
- Reduce energy consumption by up to 30-50% per case packer (in this example). It will mean > €100 ($125) [> 1000 kWh] per year in cost [energy] savings for a typical handling application like a case packer machine. Some facilities can have 50 machines so the energy savings add up.

An oversized vacuum system for handling corrugated cardboard is an effect of varying leakage from cycle to cycle (carton to carton) to handle worst case samples. It will create unnecessary deep vacuum pressure (extra energy usage) for most cycles/samples and risk for damage to surface.



Radiator analogy.

> "With a traditional air regulator it is too time consuming to manually adjust the regulator, cycle by cycle. With piSAVE optimize that is done automatically."
>
> — Josef Karbassi, Division Manager Automation, PIAB AB

OF AIR-DRIVEN VACUUM PUMPS

A constant vacuum level for materials like corrugated cardboard, with a large leakage variation (both through and over surface) cycle by cycle, can now easily be achieved by using a new type of vacuum controlled air pressure regulator. Piab offers the piSAVE optimize with that feature.

piSAVE optimize has an operation range for set vacuum level from 25 -kPa [7.4 -inHg] to 70-kPa [20.7 -inHg].

It can work with any air driven pump/ejector that has an air-consumption from app 100Nl/min [3.5 scfm] to 900 Nl/min [31.8 scfm] at recommended feed pressure. If smaller ejectors are used, one piSAVE optimize can to be used for two or more small ejectors. The piSAVE optimize can be used with single-stage air-driven vacuum pumps/ejectors as well as multistage vacuum pumps/ejectors. The technology doesn't matter. piSAVE optimize is a tailor-made and best choice pressure regulator for air-driven pumps.

Beside the positive energy saving effect from an environmental perspective, for new installations the low difference in price versus a traditional air regulator will pay off in a few months. Updating an old system, which already has a regulator, will typically pay off in less than a year in a suction cup handling application for corrugated cardboard. BP

For more information contact Mike Tuohey, PIAB, mike.tuohey@piab.com, (800) 321-7422, www.piab.com

To read more ***Vacuum Technology*** articles, visit www.airbestpractices.com/technology/vacuum

Screw Blowers and Membrane Bioreactor Treat Wastewater at a Bottling Plant

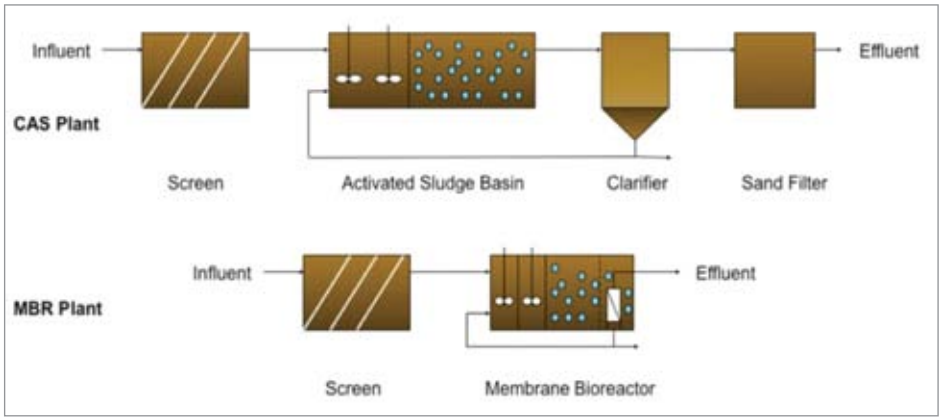
By Richard Stukey

Membrane Bioreactor Systems

The right ingredients and processes are essential for manufacturing flavorful beverages that contribute to the company's bottom line. But what happens to all those other "ingredients" that aren't part of the recipe? Cleaning up those unwanted ingredients from bottling plant wastewater can consume large amounts energy, time and money — and become a distraction from the company's primary goal of manufacturing beverages.

Treating wastewater in an energy efficient and cost-effective manner is no longer a problem at a bottling plant, where A3-USA — a leading company in the application of environmental technology — designed a Membrane Bioreactor (MBR)-Plate UF wastewater treatment system.

MBR systems use low-pressure submerged membranes that combine an activated sludge process with membranes, with pores <0.1µm that are that are directly submerged in the



Compartmentalized Activated Sludge (CAS) Plant Compared to a Membrane BioReactor (MBR) Plant.

> "Most of the time, blowers at wastewater treatment plants are not running at full capacity. They are usually running at around 30 percent of capacity."
>
> — John Conover, Atlas Copco

sludge. The sludge is separated from the liquid as it passes through the membrane pores and remains in the biological reactor — along with bacteria, viruses and pathogens.

As it does in the other wastewater treatment plants it operates, A-3 USA ensures that the design and operation of the system is taken care of from design, selection of equipment, and smooth operation of the system. "We take care of everything including supports, railings and electrical — everything except the installation of equipment," noted A-3 project manager Jens Sonntag, adding that they will also help oversee the work of contractors who install the compressors, aeration systems, blowers, membrane tanks and other equipment.

The Atlas Copco ZS 18 is a 25 horsepower oil-free positive displacement rotary screw blower featuring a state of the art oil-free screw element, integrated gearbox and TEFC IP55 motor.

The Right Amount of Low-Pressure 7-8 PSIG Air

Blower technology is a vital part of the wastewater treatment process, using the most efficient airflow pressure, between 7-8 psig, to keep the wastewater moving. Low-pressure 7 psig air also creates a cross pattern of air bubbles that clear the membrane from fine particle buildup, with pores as small as 0.1um that allow the membranes to remove those particles from the treated water.

"Each project is a little different — particularly a retrofit like this project," Sonntag said. "In the case of this project we had limitations on space and total load, since the amount of power to the entire building was only 400 amps. So we really had to squeeze the equipment into that space and take

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SCREW BLOWERS AND MEMBRANE BIOREACTOR TREAT WASTEWATER AT A BOTTLING PLANT

those (electrical and other) limitations into consideration."

One of the keys to that efficient design is calculating the right amount of air to use to clean the membrane with the cross pattern of bubbles. Because the bacteria need oxygen, large amounts of air are blown in the aeration tanks, as well as into the cleaning membrane in MBR systems like the one used at the bottling plant. Aeration devices are located at the bottom of membrane modules. Flow of air across the membranes creates a shear force that limits build-up on the membrane surface, and the membranes are also cleaned chemically on a periodic basis (every month or two months).

In the case of the bottling plant, the calculations resulted in the installation of two large blowers of 125 hp each, and one smaller blower of 25hp for cleaning the membrane. The electrical limitations meant that only one of the larger blowers can be operated at a time, along with the smaller blower.

Calculating the right amount of air to use in the membrane tank is one of the keys to efficient, cost-effective operation. Using too much low-pressure air wastes energy, while too little air "is likely to corrupt the process," according to Sonntag. Calculations must take into account the amount and density of the biomass, how much oxygen is needed to process the biomass, oxygen requirements replenishing oxygen demands for the biomass-eating "bugs," and other factors such as excess capacity. The result of those calculations is the optimal requirement for blowers — in this case, the two larger blowers and one smaller unit.

This custom piping solution delivers 7-8 psig air to four biological treatment processes.

There is a high demand for oxygen at manufacturing plants, and beverage plants have a 30:1 factor in terms of those needs. Compared to a municipal plant's 0.05 MGD, a similarly sized system at a bottling plant requires 1.5 MGD.

Blower Selection Criteria

In designing the bottling plant, A-3 USA looked at several factors in selecting blowers. They wanted blowers that would give the lowest cost over the life cycle, rather than simply choosing the equipment with the lowest upfront cost. Reliability and energy savings weighed heavily into their decision.

> "Using too much low-pressure air wastes energy, while too little air is likely to corrupt the process."
>
> — Jens Sonntag, A3-USA

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SCREW BLOWERS AND MEMBRANE BIOREACTOR TREAT WASTEWATER AT A BOTTLING PLANT

For the bottling plant project, A-3 USA chose blowers from Atlas Copco for several reasons, including reliability and energy efficiency. The "screw technology" blowers from Atlas Copco set this beverage plant apart in terms of efficiency, saving around 30 percent of the compressed air compared to conventional lobe compressors. In addition, the Atlas Copco screw technology blowers provide increased reliability, using an integrated gearbox and oil-free system, all integrated into a "plug-and-run" solution.

The big issues for most clients who operate wastewater treatment plants are "noise, reliability and cost effectiveness," noted John Conover, Product Manager, Atlas Copco Compressors LLC. "Our blowers provide wide operating efficiency across our whole range of blowers."

Conover said that "most of the time, blowers at wastewater treatment plants are not running at full capacity. They are usually running at around 30 percent of capacity. Screw technology blowers do much better at maintaining energy efficiency both at maximum bio-loading, and when they are turned down to meet more normal loading demands, there is no sacrifice in efficiency at either the high end or the low end of those demands."

Bottling plants aren't the only type of manufacturing operation that can benefit from the energy savings, reduced noise, and increased reliability that Atlas Copco screw technology blowers provide. Many industries use air blowers for their processes and, according to the United States Environmental Protection Agency, those blowers "typically represent up to 70 percent of the total electricity costs." In both manufacturing and municipal wastewater treatment plants, millions of bacteria feed on organic waste, breaking it up into carbon dioxide, nitrogen gas and water.

A Dissolved Floatation System (DFS) must often be added to the process to eliminate oil and grease in treating wastewater from manufacturing plants.

Screw Blower Technology

New technology from Atlas Copco sets the bottling plant apart in terms of efficiency. The innovative screw technology reduces compressor energy cost by an average of 30 percent over conventional lobe compressors, and was delivered to the site in a "ready-to-run package. "

Conover noted that the lifecycle cost of operating the Atlas Copco blowers played a big part in the decision by A-3 USA to use Atlas Copco blowers and other equipment on this project. "It's not just the upfront cost," he said, "but how much it is going to cost for oil, energy and labor — and the intangibles, like whether a trained technician will always be available less than an hour away. All of these factors, including those intangibles, have to be included in the (decision-making) spreadsheet. "Conover's final comment was, "The good news for our customers is that we do *all* of these things very well."

SCREW BLOWERS AND MEMBRANE BIOREACTOR TREAT WASTEWATER AT A BOTTLING PLANT

About A3-USA

A3-GmbH is located in Gelsenkirchen, Germany and has constructed reliable membrane modules and plants for municipal, commercial and industrial customers since 2000. A3-GmbH is part owned by Envitec, one of the largest Biogas plant manufacturers in Europe.

A3-USA is a privately held company located in Pittsburgh, Pennsylvania that engineers, constructs, delivers, and commissions membrane plants in the United States. A3-USA is the sole distributor of A3-GmbH's ultrafiltration plate membranes and nrw Anlagentechnik GmbH's CONTEC coarse & fine screens for the North American market. In 2007, a joint venture was established with Harliss Specialities, a Pittsburgh-based manufacturing shop with 50 years experience in manufacturing process related equipment for clients such BP and Sunoco. In the Western United States, A3-USA is represented by A3 Northwest, with offices in Bend and Portland, OR.

In recent years, Membrane Bioreactor plants using low-pressure submerged membranes have become more cost effective and the state of the art technology for treating wastewater. The combination of an activated sludge process and membrane technology removes carbon, phosphorous, nitrogen, certain toxins (carcinogenic, mutagenous, and hormonally active) and bio-accumulative micro-contaminants.

www.A3-usa.com

Industrial Food Processing MBR

Membrane Bioreactor (MBR) Benefits

MBR systems are used in a large variety of applications and benefit in a number of ways of conventional systems, including:

- Operation at higher MLSS (Mixed Liquid Suspended Solids) more robust process
- Compact foot print that works well in tight spaces like the one at the bottling plant
- Lower waste sludge production and less dewatering
- Fully automated operation for easier operation and less operator attention
- Easy upgrade and expansion by adding membrane modules
- Sludge generated from the process requires less dewatering
- Disinfection is reduced or eliminated
- Provides consistent, superior effluent quality independent of flow variations (heavy rain), floating sludge, etc.
- Effluent is recyclable, subject to state and local water quality requirements — a big plus particularly in areas where water resources are scarce.

At the bottling plant, environmental solutions provider A3-USA is taking on a challenge that most manufacturers would rather leave to someone else: ensuring that the ingredients they *don't* want in their products are cleaned from wastewater in an energy-efficient and cost-effective manner. BP

For more information visit www.atlascopco.com or www.a3-usa.com

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THE SYSTEM ASSESSMENT | Meat Packager Reduces Compressed Air Demand

Continued from page 15.

TABLE 4: COMPRESSOR USE PROFILE – PROPOSED SYSTEM

UNIT #	COMPRESSOR: MANUFACTURER/MODEL	FULL LOAD		ACTUAL ELEC DEMAND		ACTUAL AIR FLOW	
		DEMAND (KW)	AIR FLOW (ACFM)	% OF FULL KW	ACTUAL KW	% OF FULL FLOW	ACTUAL ACFM
Production: Operating at 100 psig discharge pressure for 5,616 hours							
1	IR PE 50 SE	43	198	Off			
10	GD EBP 99 125 HP	105	630				
11	IR EP 125	107	563				
12	IR EP 125	107	563	100%	107	100%	563
16	GD VST55-90	114	622	35%	40	33%	208
17	DS 241	138	724	100%	138	100%	724
21	GD EBQ	78	540	Off			
			TOTAL (Actual):		**285 kW**		**1,495 acfm**
Production: Operating at 100 psig discharge pressure and 3,144 hours							
1	IR PE 50 SE	43	198	68%	29	46%	92
10	GD EBP 99 125 HP	105	630	Off			
11	IR EP 125	107	563				
12	IR EP 125	107	563				
16	GD VST55-90	114	622				
17	DS 241	138	724	100%	138	100%	724
21	GD EBQ	78	540	Off			
			TOTAL (Actual):		**167 kW**		**816 acfm**

only dewpoint demand control that is being utilized on the Sahara dryer.

Other Specific Dryer Actions	Savings
Utilize blower cooling on Ingersoll-Rand TZB dryer	60 acfm
Utilize blower cooling and regeneration on Great Lakes dryer	85 acfm
Utilize dew point demand on IR TZB dryer	$7,384 / yr
Install a dew point demand on Great Lakes dryer and activate	$2,440 / yr
Install replacement dew point demand on AirCel dryer	$2,956 / yr

Compressed Air Leaks

A partial survey of compressed air leaks was conducted at the plant and 54 leaks were identified, quantified, tagged, and logged. Potential savings totaled 150 cfm for the 54 leaks that were identified.

TABLE 5: SUMMARY OF KEY COMPRESSED AIR SYSTEM PARAMETERS AND PROJECTED SAVINGS

SYSTEM COMPARISON	CURRENT SYSTEM		PROPOSED SYSTEM	
	PRODUCTION	SANITATION / WEEKENDS	PRODUCTION	SANITATION / WEEKENDS
Average Flow (cfm)	2,582	1,903	1,495	816
Compressor Discharge Pressure (psig)	107	110	107	110
Average System Pressure (psig)	99	100	99	100
Electric Cost per cfm	$56.84 /cfm/yr	$44.07 /cfm/yr	$57.09 /cfm/yr	$46.27 /cfm/yr
Electric Cost per psig	$733.82 /psig/yr	$419.37 /psig/yr	$426.81 /psig/yr	$188.77 /psig/yr
Electric Demand	490 kW	371 kW	285 kW	167 kW
Annual Electric Cost	$146,765	$83,875	$85,363	$37,755
	$230,640 /yr		$123,118 /yr	

We recommend an ultrasonic leak locator be used to identify and quantify the compressed air leaks.

Shutting off or valving off the air supply to these leaks when the area is idle would save significant energy use from leaks. Reducing the overall system pressure would also reduce the impact of the leaks, when air to the machine cannot be shut off. Repairing the leaks can save additional energy. The savings estimates associated with a leak management program are based on the unloading controls of the compressors being able to effectively translate less air flow demand into lower cost.

Last December, plant personnel conducted an intensive leak management program. During that time a significant number of leaks were identified and repaired.

During the audit site visit, significantly fewer leaks were found than expected in a facility of this size.

Number of leaks	54 leaks
Estimated air flow reduction	150 cfm
Recoverable savings	$98.91 /cfm yr
Annual electric cost savings	$14,836 /year
Total project cost	$5,400

Open Blows

Turbulent compressed air blasts straight out of the pipe or tube. It not only wastes huge amounts of compressed air, but also violates OSHA noise and dead ended pressure requirements. Air jets and air flow-inducing nozzles used in place of open blows can reduce noise level, lower compressed air use, and most often improve blow-off operation in both productivity and quality.

Air amplifiers have amplification ratios up to 25:1. Using 10 cfm of compressed air can supply up to 250 cfm of blow-off air to the process and generate a savings of a 15 cfm compressed air per 1/4-inch blow off. Savings may be available using 1/8-inch lines, but the cost effectiveness will not be as great. The capital cost for the amplifiers is relatively low.

The system assessment identified many locations where 100 psig compressed air was being used for blow-off. This demand reduction project is to replace high pressure air blow offs listed with venturi nozzles as listed in Table 10.

Estimated high pressure air used currently	939 cfm
Estimated high pressure air used after installation of venturi nozzles	205 cfm
Estimated compressed air savings with venturi nozzles	734 cfm
Value of air reduction	$98.91 /cfm yr
Total electrical energy cost recovery by installing venturi nozzles to reduce blow	$72,599 /yr
Cost of nozzles and installation	$4,000

Conclusion

This meat packaging and processing factory spent an estimated $230,640 annually on energy to operate the compressed air system at their Midwestern facility. The set of projects recommended, by the system assessment, reduced these energy costs by an estimated $107,522 or 47% of current use. Project costs totaled $21,900 representing a simple payback period of 2 months. BP

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

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

"The set of projects recommended, by the system assessment, reduced these energy costs by an estimated $107,522 or 47% of current use."

— Don van Ormer, Air Power USA

THE TECHNOLOGY PROVIDER | Sustainable Productivity at Atlas Copco

Continued from page 21.

Atlas Copco Compressors manufactures, markets, and services oil-free and oil-injected stationary air compressors, air treatment equipment and air management systems, including local manufacturing of select products.

specific to compressors, the company opened a Quality Air Division with a special focus on the products that can improve air quality and subsequently the customers' end products.

"Because of the company's global and broad industry perspectives, we can create different kinds of customer solutions — regardless of where they come from," said Lang. "But, the most important thing I've seen Atlas Copco do better than the competition is their absolute commitment to the air compressor business overall and their constant and relentless improvement of products."

During the time period from 2008-2012, the company has made several acquisitions, including local distributors in key markets across the country, all in order to be closer to their customers. As part of the initiative, Atlas Copco launched a new distributor program and is currently working with more local partners than ever before.

Also in 2012, the new Atlas Copco Compressors Product Company in Houston became fully operational, processing and distributing customer orders across North and South America. This state-of-the-art facility produces a wide range of standard and customized air compressors, dryers and skid packages.

"Building the best possible team to take care of the customer is the number one philosophy behind our distributor strategy," said Humphreys. "Having local experts backed up by the support of the global Atlas Copco organization results in the best solutions for our customers."

Atlas Copco evaluates every area of the U.S. depending on the unique circumstances in that region — they directly manage customer relationships, have purchased local distributors and work with both exclusive and multiple distribution points.

"The key thing is Atlas Copco listens; when there is a challenge, we can have a conversation and work out a solution based on what is the best thing to do for the customer," said Lang. "We're both committed to taking care of the customer and finding solutions together."

"Sustainable Productivity"

In 2010, Atlas Copco rolled out their new brand promise: "committed to sustainable productivity." Atlas Copco's Sustainability Report is a yearly report prepared since 2001 in accordance with the Global Reporting Initiative (GRI) guidelines. This initiative has placed Atlas Copco on a list among the Global

> **"The best way we can celebrate our anniversary is to thank all of our customers who have made our success possible.**
>
> **— Paul Humphreys, Vice President of Communication and Branding for Atlas Copco Compressors**

100 Most Sustainable Companies in the world seven times in the past eight years and made the company a mainstay member of the Dow Jones World Sustainability Index.

Atlas Copco sustainability initiatives, both globally and in the U.S., include:

- Boosting customer energy efficiency by at least 20 percent between 2010 and 2020 by continuously designing and developing more efficient products.
- Decreasing CO_2 emissions from operations by 20 percent in relation to cost of sales by 2020 (using 2010 as the base year).
- Membership by Atlas Copco Compressors with the U.S. Green Building Council.
- An initiative between Atlas Copco Secoroc and the U.S. Department of Energy, as part of President Obama's challenge to generate 80 percent of U.S. electricity from clean energy sources by 2035, to develop a down-the-hole (DTH) hammer design capable of low-cost, high-production drilling in the high temperatures of deep geothermal wells.
- Reducing Atlas Copco's water consumption and promoting clean drinking water in countries in need. Their employee run Water for All organization will pass $200,000 in donations in the U.S. in 2013.
- Increasing employee diversity in both nationality and gender.

The Atlas Copco Compressors Air Academy at their North American headquarters in Rock Hill, S.C., provides extensive training on all Atlas Copco product categories for employees, partners, distributors and associated companies.

While much has changed since 1873, one thing has remained constant — Atlas Copco's commitment to developing leading-edge technology and serving its customers. It's a combination that has served the company well for 140 years.

"The best way we can celebrate our anniversary is to thank all of our customers who have made our success possible," said Humphreys. "We plan to roll out numerous programs this year as a direct thank you to our customers; we'll be announcing details on our website in March." BP

For more information visit www.atlascopco.com

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RESOURCES FOR ENERGY ENGINEERS

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Kaeser Expands Com-paK™ Blower Product Offering

Kaeser has expanded its Com-paK™ blower product offering with the redesign of the BBC and FBC models to cover 3 hp to 175 hp. As with our previous models, the fully integrated BBC and FBC units arrive onsite ready for use and include a full complement of sensors, starters/drive, and an onboard controller. These units are designed, built and tested to meet international and domestic performance and safety standards, and are available in both STC (wye-delta start) and OFC (Variable Frequency Drive) versions.

Further enhancements to these models include the Sigma Control 2™ with Omega Control software. In addition to monitoring all onboard sensors, the Sigma Control 2 features expanded communication features. The expansive communications capabilities of the Sigma Control 2, with an Ethernet port and built-in Web-server, enable remote access and seamless integration into plant control/monitoring systems such as Kaeser's Sigma Air Manager (SAM). ModBus, Profibus, Profinet, and Devicenet industrial communication interfaces are available.

Kaeser Compressors
Tel: 877-596-7138
www.kaesernews.com/FBC

New BOGE Duotherm Heat Recovery System

The BOGE DUOTHERM allows more than 70 percent of the used energy, of an air compressor, to be recovered in the form of heat. The key element of this system is a generously dimensioned plate heat exchanger which can be easily connected by a few minor adjustments to the oil system of the compressor and the service and process water network — significantly increasing the energy efficiency of the compressed air station and protecting the environment at the same time.

"Increasing energy costs and a growing awareness of environmental issues made a number of users of compressed air stations realize that the enormous potential of the compressor waste heat should be prevented from dissipating unused into the atmosphere. With the use of BOGE DUOTHERM alone, energy costs can be reduced by

TECHNOLOGY PICKS

more than 70 percent. The compressor can thus be transformed into an energy saving machine with a sharp rise in overall efficiency", explains Dieter Richter, Head of the BOGE Development Center.

The DUOTHERM system is available in five versions suitable for oil injection cooled screw compressors from 10 hp to 150 hp. It is easy to install and, due to its compact design, it requires minimal space in order to sustainably improve the compressor's energy efficiency. Prior to installing the BOGE DUOTHERM a heat requirement assessment should be carried out for the area in which the heat recovery system is to be used.

BOGE Compressors
http://www.boge.us/duotherm

20-Year Warranty for Teseo Piping

TESEO srl, specializing in the design, production and sale of aluminum piping and fittings for the construction of distribution plants for compressed air, vacuum, nitrogen and other fluids under pressure, modular manifolds for machinery and pneumatic panels, accessories such as benches, trolleys and swiveling arms for the installation of production and assembly lines, has announced the extension of the warranty for the replacement of defective parts in their compressed air distribution systems to **20 years.**

"The extension of the warranty period to a timeframe that is more than twice as long as our competitors is clear evidence of the quality and reliability of our solutions — said Gianfranco Guzzoni, founder and general manager of TESEO. As the world's first manufacturer of modular aluminum systems, we decided to reaffirm our leadership by extending the warranty period for the replacement of defective parts from 24 months to 20 years. Furthermore, we are the only ones who can prove this, as our initial installations date back to the early Nineties".

For those who decide to purchase a TESEO compressed air distribution system, the warranty extension to 20 years is an additional benefit, combined with the significant energy saving offered by these solutions compared to other types of piping on the market. Saving depends on a number of factors: smooth extruded profiles for lower friction, no leaks through the O-rings that connect TESEO profiles, modularity for lower modification costs, aluminum as construction materials not subject to oxidizing and corrosion. Furthermore, energy saving is a priority factor that the company takes into consideration ever since the design phase. Starting from basic information provided by the customer, the TESEO technical department can develop a project and deliver a 3D view and performance calculation, with a constant focus on energy efficiency. For all of these reasons, purchasing a modular aluminum system by TESEO implies a higher initial investment but provides great cost effectiveness in the long run.

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ProAir 2200 Air Quality Monitor

The ProAir 2200 is a microprocessor-based compressed air line monitor designed for use in chemical and industrial processes, aerospace, laboratory, medical and pharmaceutical applications. The system can be custom configured for monitoring any combination of up to four parameters: VOCs, Dew Point, Oxygen and CO, or a number of other target gases including CO_2, Cl2, etc. The instrument has a user-friendly interface for all maintenance and operational functions. The ProAir 2200 has five user programmable relays which enable the instrument to be used as an alarm monitor, or for control functions with relays set at predetermined action points, such as, for controlling oxygen or the dew point, etc. of compressed air.

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Siemens Launches New Sinamics V20 Drive for Compressor Systems

Siemens introduced today its new single-axis Sinamics V20 drive for basic applications featuring short commissioning times, easy operation and excellent cost and energy benefits. The Sinamics V20 comes in four frame sizes covering the performance range from 1/6–20hp and is used to operate pumps, fans, compressors and conveyor systems, and is also used for simple drive tasks in the processing and handling industries.

This compact drive can be connected directly in-line and mounted as a push-through installation in addition to the conventional wall-mounting method. Since no further modules or add-on options are required for operation, the installation time is minimized. Additionally, the integrated Basic Operator Panel (BOP) enables trouble-free on-site commissioning and operation. Besides the universal serial interfaces that allow for easy connection to Simatic PLC controllers, a Modbus interface is also included for communication with third-party controls. Pre-built connection and application macros are used for facilitating application-specific settings. For units with power ratings higher than 10hp, a braking resistor can be connected directly to integrated braking chopper.

Operation of the new Sinamics V20 drive is just as easy as its commissioning. Parameters that have been optimized for one application can easily be transferred to other units using SD or MMC cards via the BOP interface or the battery-operated Parameter Loader — even without powering up the drive. The current firmware can be easily loaded as well.

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

The demand-driven regulation of the motor speed also provides increased energy savings even for basic applications. The Sinamics V20 is equipped with an energy-optimized control mode (ECO-mode) for increased energy efficiency. ECO-mode automatically adapts the magnetic flux in the motor to the optimum operating point. In addition, the DC link coupling enables efficient energy utilization of drives grouped together. Further, the Sinamics V20 can be set to

TECHNOLOGY PICKS

hibernation mode, which prolongs the service life of the motor and also reduces system component wear (i.e. pumps). Additionally, by displaying real-time energy consumption on the operator panel display, the operator always has the drive's energy and cost efficiencies in focus at all times.

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"Retrofitting the 8 case packing machines with 3-position valves reduced our idle cfm from 80 to 15 cfm – on each case packer. With the right air compressor controls allowing the electric motors to turn down, the annual energy savings from one case packer paid for the whole project."

– Gregory Rhames, Asset Reliability Manager/Site Energy Manager, Verallia Glass, Jan/Feb 2012 Edition of Compressed Air Best Practices®

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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. The Compressed Air Best Practices® Editorial Advisory Board guides our mission to help create more energy saving projects.

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