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June/July 2007

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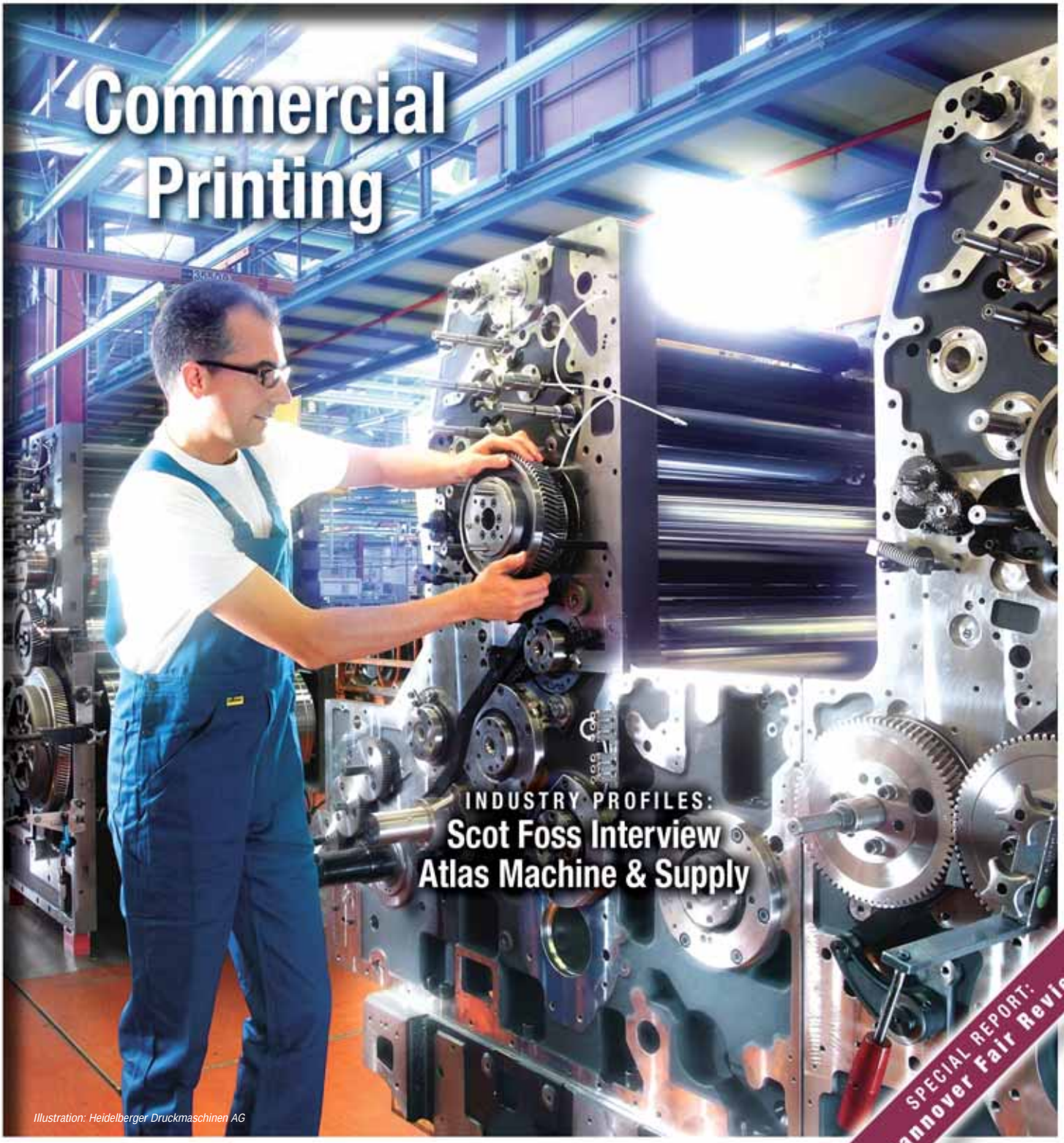

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COMPRESSED AIR INDUSTRY ARTICLES

FROM THE EDITOR

The European Energy Revolution

When I worked and lived in Europe between 1992 and 1999, the focus for compressed air equipment was on kW savings and on space-saving packages. High costs for energy and real estate made it imperative for factories to vigorously address these issues. Eastern Europe was being considered for CE and NATO memberships and Germany was just beginning their tremendous investments into modernizing Eastern Germany.

I returned to Germany this past month for the 2007 Hannover Fair and realized I'd been gone for a long time. What a change! The German export machine is booming. Eastern Europe and Eastern Germany are now the hot spots for international investments and Europe is in the lead. The Hannover Daily Journal reported that Eastern Europe will receive investments of $6 billion USD over the next five years to increase the region's automotive assembly capacity by 3.2 and 4.2 million cars by the year 2013. The new next-frontier geographies are Russia and Turkey.

Energy savings are not measured by kWh anymore in Europe, but rather by CO_2 emission reductions. The Kyoto Accord has all European countries vigorously pursuing their agreed-upon goals of CO_2 reductions. This means that government and utility companies are in place to further motivate industry to save energy and develop new technologies.

I'm glad to see California has joined the Kyoto Accord. Is it a coincidence that the person leading the charge there is European-raised California Governor Arnold Schwarzenegger? As the world's ninth largest economy, California's participation is significant, and I hope they will lead the rest of the U.S. to participate. The U.S. compressed air industry has proven there is a market for higher priced energy-saving air compressors and dryers, and the utility companies have supported it.

The United States, by the way, has declined to participate in the Kyoto Accord because the Bush Administration feels that since India and China do not participate, doing so would place U.S. industry in an uncompetitive position. Why isn't Europe concerned about this? Europe isn't linking low-cost production competitiveness with the opportunity presented by CO_2 reductions.

Europe is ENERGIZED and is inventing tomorrow's industries and products. They are fully focused on technologies for energy saving and alternative energy production. European governments are fully behind the efforts of private industry, and the race is intense within Europe. German companies, for example, manufacture 50% of the world's wind turbines used to generate electricity. German export sales for wind turbines grew by 40% last year and hit 8.2 billion Euros in sales. How's that for jobs? German companies also, by the way, already have 40% of the global solar technology market.

I hope the U.S. joins the energy innovation party soon — full bore with European-scale investments. We're talking but not playing right now. I know the U.S. compressed air industry is already on top of it — so that's a start.

ROD SMITH

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AN INTERVIEW WITH

SCOT FOSS

Compressed Air Best Practices interviewed Mr. Scot Foss. Mr. Foss has been an internationally known compressed air auditor since 1973.

Vacuum systems in commercial printing offer just as many energy-efficiency opportunities as does compressed air (Illustration: Heidelberger Druckmaschinen AG).

Good morning! Where did you grow up and what educational influences did you have?

I grew up in New Jersey and am educated in physics and mechanical engineering. My father had a strong influence on my career direction. Dad was an engineer who worked for the U.S. Totalizator Company. They built toteboards for race tracks which took the bets and were able to figure out the odds. These electro-mechanical totalizers were used before computers came around. Dad was an inventor. He invented the electronic pinball machine and the first commercial applications for the photo-electric cell and the laser beam. He was a civil and electrical engineer and the person who introduced me to compressed air. He encouraged me to go into science. I didn't like it, but I was good at it. He said I should just do it until I liked it. He suggested I work with plant utilities. His feeling was that a plant will always need some one to do the utilities no matter what hardships the facility is facing. He felt that utilities are relatively inflation-proof. I asked him which utility I should work in. He said that too many people understand electricity but that no one had a clue about steam or compressed air. So I decided to work with compressed air. This conversation happened sometime when I was between 9 and 11 years old.

How did you get started in the compressed air industry?

My first compressed air job was working for Volkswagen in Germany. I was in Europe working in German/American industrial relations for the military when I met some business leaders at Volkswagen. These contacts produced a job working in the powerhouse (steam, pumps, compressed air) of a VW automotive assembly plant. I was excited, at the age of twenty-two, to be placed in charge of compressed air. I was excited to be in charge of something! I learned later that no one had wanted responsibility for the compressed air system.

Not knowing politics and wanting to make a difference, I assumed Volkswagen would want to run the compressed air system as efficiently as possible. After studying the system, I came to the conclusion that we were using 20% more power than necessary. I went to my boss and told him so. His reply was, "Did someone complain?" I said no, and he told me to go work on something else.

Later I went back to my boss and told him we could save $600,000 a year on the compressed air system. His response was, "No kidding!" I learned right there and then that I hadn't been communicating with him on his terms. Together we went to upper management and my boss told them we could save energy in the compressed air system. The response was, "So?" I quickly said, "We can save $600,000." The boss asked, "What is the ROI?" My boss and I said we didn't know but that we would find out. Learning was and is a process, not an event.

A few weeks later, after having met with the financial people at work and having been schooled on their financial metrics, we were in front of the boss again. This time we told them they could improve pre-tax profit by $600,000 and had a ROI schedule for them. We were given the green light to execute my first energy-saving project on a compressed air system. This was in 1968.

What did you learn from this experience at Volkswagen?

I learned that I needed to understand how to communicate on other people's terms. Up until then I had always spoken on my terms. In order to talk to decision-makers on their terms, I had to learn more about finance and about how businesses are operated. Most plant managers have their compensation tied to pre-tax profit. They want to reduce operating costs and improve EBITDA. This is called "outside-in communication." I see many people in the compressed air industry thinking from the "inside out." We don't think enough about how to communicate on other's terms.

> "I learned to communicate on other people's terms."

I remember a compressor salesperson told me a story about having been able to meet with the CEO of company. Five minutes into the meeting the CEO interrupted him and said he was ending the meeting. He told the salesperson that he had only two interests and that after five minutes, the salesperson had not even touched upon either one. The CEO's two interests were to reduce re-work and to improve pre-tax margins. The meeting was over. The compressor salesperson told me he had learned to do his homework before a meeting like this, to figure out how to speak on the terms of the other person.

Another example comes from a meeting held at corporate headquarters of a major can company. After a while, the can-company executives asked to take a break. The compressor people waited for 15 minutes, 30 minutes and kept waiting. After one hour, one of them went to the office of one of the can-company executives who had been in the meeting. After being asked why no one had returned to the meeting, this CEO of a major can company said, "You spent 1½ hours talking about yourself — about your company and your machines. You didn't talk to us at all about our business, so you were wasting our time."

AN INTERVIEW WITH SCOT FOSS

How can understanding finance help?

You have to understand what the ROI criteria of the customer is before you get involved. I was alerted to this by a major food corporation. They told me they took ROI very seriously. In many cases, the customer has not set money aside for compressed air efficiency. Often it is discretionary capital. They could lose their jobs if ROI projections on projects are not reached.

Auditors have to take ROI equally seriously. Some compressed air auditors do not understand the term and how it is applied. Did you add depreciation for the required capital to your calculations? There is a dollar per dollar savings going straight to the pre-tax line, and you have to tax the reduction of operating costs. Many project proposals don't deal accurately with depreciation. Each company treats this differently. Do parts of the existing systems still have asset values? If they still have an asset value and you wish to dispose of it, you will have to write it down by taking the asset value and declaring it in the pre-tax profit line. An air compressor with book value of $50,000 in installed cost has to be declared as operating income on the pre-tax line, and you will have to pay corporate taxes of 35 to 41% — so tax is $20,000 with no off-setting revenue. This kind of decision usually goes above the plant manager to a board or a CFO. Find out how the customer does business and what the true financials are before presenting an ROI project.

I once worked with a plant engineering manager for a company in Durham, North Carolina. He had obsolete, inefficient air compressors installed in a powerhouse hole three stories deep. The maintenance costs were extremely high because the parts had become hard to get. The plant engineer told me he couldn't get rid of the air compressors for financial reasons and asked me to meet with the vice president of finance.

I had lunch with the VP of finance, and he told me the air compressors had an asset life of 22 years left because they had depreciated the entire powerhouse as part of the real estate construction project. Real estate is often depreciated over a 42-year period. I explained that the compressor manufacturer had discontinued the air compressors over seven years earlier. This gave them the right to charge considerably more than what is normally charged for similar parts. I told him he had to accelerate the depreciation of the equipment because maintenance costs far exceeded the depreciation expense he would incur by replacing the equipment. He agreed and the project went forward.

What is keeping you busy now?

I still do a little bit of auditing on particularly difficult systems. I spend roughly 10 to12 weeks a year now as a senior auditor for Plant Air Technology. I also continue to organize celebrity golf tournaments which benefit charity. I have been doing this for 27 years now. We have worked with over s600 national celebrities. I have a business card which reads, "Celebrity golf and compressed air systems engineering — one-stop shopping".

> "We have only seen the tip of the iceberg of energy-efficiency opportunities."

Describe the beginnings of your auditing years. What did air systems look like?

I started in the early 1970s with a machine-tool and MRO company in the upper Midwest that wanted to start a compressed air division. We weren't able to get a compressor line, so I started with hand tools, FRL's, and point-of-use equipment. We built it into a $2 million division in 2 to 3 years using the technical principles I had learned in Europe. After all, energy in Europe cost 5 to 7 times that which was in the U.S. at the time. With these products, we were dealing with production engineering and production management people on the plant floor. We did not deal with the facilities and utilities engineering people. This exposure to the production people, early in my career, was beneficial.

The primary focus of industry in 1975 was on reliable equipment and production processes. I spoke to top management and utility people about improving their production processes by improving their compressed air systems.

In those days I thought of an analogy between electricity and compressed air. Voltage fluctuates inversely proportionate to amperage in an electrical system. A 10% fluctuation in electrical voltage would make it very hard to operate a plant. I realized that compressed air pressure fluctuates inversely proportionate to air demand. If air demand volume increases by 5%, pressure decreases by 5%. Fluctuations of air pressure of 20% were very common then and still are now. I thought that it must be equally difficult to run a facility effectively with these fluctuations in the compressed air system. A reduction in pressure of 10%, for example, would cause a hoist to work 14% less efficiently.

Can you give more examples of how unstable air pressure affects productivity?

Sure. A hand grinder might be rated at 80 psi downstream of the FRL and the hose. So the FRL might be adjusted for 90 psi. As pressure goes above 90 psi, the wheel on the grinder begins to speed up and skip on the material. It will also load up with metal, which can damage the wheel as it gets hot. If pressure decreases, the grinder will slow down and won't remove metal and accelerate the breakdown of the abrasive. You want the wheel to travel at a certain surface feet per minute for it to work optimally. You need stable pressure to do that. It isn't possible when air pressure is changing 20% or more. Unstable pressure results in changing out the grinding wheels more often, which involves material costs and low metal-removal efficiency, which represents lost labor man-hours.

Unstable pressure has negative effects on countless applications. It affects torque control on nut-runners and on pneumatic tools used to drive down screws in assembly lines. This creates a lack of repeatability. It can effect bulk-handling applications like moving corn slurry in a tortilla plant. If the air pressure is too high, the corn slurry gets slammed, and the size and consistency can be changed. If pressure is too low, you can't move the material.

In those days, I focused on how compressed air affects the quality of goods and production. This focus on productivity made us unique. We dealt with a higher level of management.

AN INTERVIEW WITH SCOT FOSS

Power Loggers are an ideal tool for conducting energy studies. They can be set up in seconds using flexible current probes and color display. The logger measures most electrical power parameters and harmonics and captures voltage events and enables energy assessments.

When did the focus turn to energy costs?

In 1984 there was a natural gas shortage, which drove the prices up for natural gas. Up until this point, plant maintenance and plant engineers were the primary people making decisions on capital equipment. After this energy crisis, plant managers and operations VPs began making some of these decisions. Compressors started to be treated as commodities because these people did not have time or an interest in features and benefits. Plant engineers and maintenance made recommendations, but the final say became much more of a financial decision.

This was when I decided I needed to do compressed air auditing full-time.

Where are compressed air systems today? Are they improving?

I began auditing compressed air systems in 1978. I can say that awareness has certainly improved, but I feel we have only just begun to see the tip of the iceberg of energy-efficiency opportunities in compressed air systems. Few people truly understand compressed air as a fluid. Compressed air people, OEMs who design in the use of pneumatic components, end users who buy the systems — few understand the physics of compressed air systems. Most have a solid understanding of their individual machines. This is where significant opportunities to improve systems continue to exist.

How should a facility install new tools and machinery into the plant? How should a new piece of process equipment be hooked up correctly into the compressed air system?

Every piece of equipment arrives protecting itself. The OEMs size point-of-use components using rate of flow. Rate of flow is measured in scfm. If you have a dust collector with ¾ inch valves, they may rate its consumption at 300 scfm at 90 psig. They aren't looking at the element of time or frequency of usage. In reality they may be pulsing the unit ⅒ of a second every 10 seconds. That's 1 scf per pulse or 6 scf every minute or 300 scfm rate of flow. You need rate of flow to size the components, but you need volume per incident and frequency to determine the energy required. If you metered this into storage, the actual usage would be actual consumption versus time or, in compressed air terms, one minute. You might feed it into the tank at 6 scfm and feed it out at 300 scfm. Rating the consumption at 300 cfm is incorrect — but this is the way things are done and one reason compressed air supply systems are often grossly over-sized. OEMs rate their equipment based on rate of flow rather than the consumption diversity corrected for on versus off time.

How are the compressed air auditors doing? What are the compressor companies doing to promote energy efficiency?

The compressed air industry is trying to automate the auditing process too much. They want to make it quick and easy. This is hurting the auditing profession and making it appear to be another way to sell equipment. The problem with automating the process is that time is not taken to know what the compressed air equipment is doing. Particularly in the area of compressor controls, I don't think most people are looking at controlling systems. They may understand the individual compressor controls and do a good job of keeping the equipment running. This is what the maintenance people do as well. Most plants have 33% to 50% more capacity on line than is needed but do not understand how to control the system to reduce their energy consumption.

What do you think of using flow meters to understand demand flow in the air system?

A flow meter will not normally provide accurate information regarding the demand in the system for two reasons. One is because they don't auto-calibrate and take into account air density when providing a reading. They are preset to a specific parameter which does not necessarily match the operating variables at the specific facility. The variables of compressed air temperature, pressure and flow affect the reading on a flow meter. Flow meters that compensate for flow and temperature do exist, but most people use pre-calibrated meters, which are less expensive and easier to install. The second reason is that when there is no demand control or expander in the system, a positive rate of flow where supply exceeds demand is measuring supply response. On the other hand, when you have a negative rate of flow where the demand exceeds supply, you are measuring demand. Supply response is skewed by the size of the compressors and can provide an artificially high reading and lead to false information. You would have to trend power, pressure and flow at a minimum and have an educated eye to be able to determine demand from a flow meter.

How should air compressor kW consumption be measured?

People must understand motor efficiency, power factors and service factors for amperage measurements to work. Power never lies, and I recommend measuring it to understand kW consumption. People must also understand the relationship between power and density. Many don't understand density. The relationship between power and density is .91 to 1. This is quite different than the industry rule of thumb of ½% per 1 psig in the supply system.

What type of leak detectors do you recommend?

I like the ultrasonic-type leak detectors that have digital read-outs. I don't like analog read-outs, because it is difficult to see the precise measurement with large minor divisions and establish an exact benchmark value. Leak detectors should also have the capability to block out background noise.

Ultrasonic leak detectors with digital read-outs are effective tools.

AN INTERVIEW WITH SCOT FOSS

Customers fix leaks but don't control demand pressure. Most pressure regulators are left wide open. Artificial demand normally runs between 10 to 20% in a facility. It's like having a balloon with a pin hole in it. The harder you blow on the balloon, the larger the hole gets and the more air escapes. You must control the demand pressure at a lower pressure than the lowest supply pressure to get the benefits of any demand reduction. Fixing leaks is really about fixing the big leaks and controlling the pressure. An average facility should spend no more than four man hours per month benchmarking leaks and finding big leaks to return them to the benchmark level.

A problem with leaks is you can't see them and you can't hear them because of the background noise in a facility. Even small companies have 200 cfm of leaks in a 1000 cfm system. Since they are invisible, many users are oblivious to them. I equate air leaks to water leaks with my clients. One cubic foot of compressed air is the equivalent of 7.48 gallons of water. A leak of 200 cfm of compressed air equates to a leak of 1496 gallons of water. I ask my customers if they would fix a water leak of 1496 gallons per minute! Of course they would. This is another example of learning to communicate with customers from the outside in.

Where are the energy-saving opportunities for commercial printing?

Compressed air represents a significant percentage of the total energy consumed in a facility. The total energy number, however, is medium sized. The average facility will have installed compressors of 200 to 300 horsepower. The exception would be large facilities like Quad Graphics in Wisconsin or the *New York Times* in New Jersey. Most opportunities are in waste reduction in open blowing in the bindery or inserters for improved efficiencies. An interesting point is that the vacuum systems in commercial printing offer just as many energy-efficiency opportunities as does compressed air.

How about in paper and pulp?

This industry has huge opportunities for improvement. One big issue for this industry is a thing called paper breaks. Lighter paper stock such as tissue can break up to 20 times per shift. Heavier paper stock, like for bibles, might break two to three times per shift. As the sheet goes through the paper machine, it often breaks. When the sheet of paper breaks, the idea is to get it re-threaded as fast as possible so the process can resume. There are two re-threading processes to handle a paper break. The manual process uses 300 to 350 horsepower of air compressors to supply the "air showers." These are pipes that hold the paper on the rollers and manual wands. Automatic re-threaders will use 100 horsepower of air compressors.

The opportunity is in how to manage the air demand during paper breaks. In plants with manual air showers, it is typical to see an extra 350 to 700 horsepower air compressor installed, on line, and blowing off to support the paper break from time to time. This added on-board equipment causes it and the rest of the compressors to normally run part loaded.

Off-line, high pressure, peak shaving storage can improve these situations. High pressure here means 175 to 200 psig. You can do this depending upon the number of breaks they have per shift and the recovery time between breaks. You can store 1700 cfm of air off-line, and pump up the storage with a 10–25 hp air compressor. You need to use a PLC to introduce the air into the system and recognize when there is a paper break. It was developed and first applied 15 years ago.

Any comments on plastic blow-molding?

Compressed air can represent 30 to 40% of the energy costs required to operate a plastics blow molding plant. PET processes offer tremendous savings opportunities at the pre-blow — you have to learn to recover this air. It is a double blow. The pre-blow usually starts at 120 psig, while the article pressure is 30 psig. There is a pressure decay of 90 psig. Most machines don't have enough air storage to avoid this differential in pressure. The available storage per blow determines the pressure differential, while the starting pressure determines the article or final pressure. Obviously the article pressure is the important pressure, because this is where the work is performed; however, literally no one considers this and looks only at the starting pressure. If the product is not working correctly, most people will elevate the starting pressure, while missing the root cause, the available storage, which could elevate the article pressure and reduce the starting pressure at the same time. If you can supply the preform at a lower starting pressure, it only makes sense that you can supply this air from another source than the 550 to 615 psig final blow source. This would also allow more time available for storage recovery on the final blow. This could substantially reduce the energy required to make PET containers.

Another opportunity is the final blow on most PET machines. They have a high pressure differential between starting pressure and final blow pressure. Most use 600 to 620 psig entry-air pressure, while article psig is typically between 450 and 475 psig for the final blow on the preform. The differential is normally lost across the filter/regulator supplied with the blow molding machine. If you had clean air to start with and a good regulator, you could supply compressed air at less than 500 psig. These under-sized filters load up quickly with solid particulates and generate ultimately lower article pressures.

Dr. Edwards Demming said, "You are better off being consistently wrong than inconsistently right. At least you can identify the problem contributing to the off quality."

Any variable that contributes to a lack of repeatability is called unassigned cause. You need to get everything possible into the area of assigned cause, including compressed air, if you want to improve quality, reduce rework and make better quality products at or below your current operating cost. The regulators are also undersized for this job. We recommend replacing these point-of-use components with quality in-line central filtration and a demand controller that can control the pressure for the entire system in a 1 psig bandwidth.

This is a typical example of an application where users solve pressure losses by adding more air and higher pressure at the supply end of the system and miss the root cause of the issue. It is difficult to imagine how much money a year is spent unnecessarily on compression and treatment equipment and unnecessary maintenance while the root cause goes undiagnosed. To exacerbate the problem, most OEMs of air-using equipment don't want to look at their own dirty laundry and in turn threaten the user with lost warranty if they don't want to support the design dysfunction.

Lower pressure (100 psig) blow molding systems can be improved with dedicated storage and metered storage. In conjunction with demand controls, this can create consistent and repeatable air pressure, which allows for good product output and excellent quality results. In addition, when you can flat line a blow mold machine with this trickle charge approach, you can also reduce the amount of air that is necessary to produce by more than 50%. There is a lot of waste in this industry at both pressures. Insufficient pressure will create scrap bottles, which must be reground. A facility can make thousands of bottles and package them in the warehouse and then find out they have a quality problem.

Can you comment on food packaging and processing?

In food, compressed air is critical in the application but does not represent a large percentage of the energy costs. The opportunities are in improving the quality of the process. A lot of this centers around understanding what is in the ambient air that is brought into the intake of air compressors.

I received a phone call once from a food processing factory that was using non-lube air compressors but were finding oil in the compressed air downstream in critical applications. They couldn't figure out how this could be possible with a non-lube air compressor. I asked them to check with the PCA (Pollution Control Agency) to get a report on air quality in their area. The engineer phoned me back saying that they had up to 24 ppm of hydrocarbons with up to 30% being condensable. The engineer calculated that the non-lube air compressor was sending up to 6 ppm in condensable hydrocarbons downstream on a normal day — due to the contaminated ambient air.

Many food processing facilities have ammonia and/or refrigeration compressors installed in the vicinity of the air compressors. There can be ammonia and/or refrigeration leaks from these compressors. These contaminants will then find themselves downstream in the compressed air system after they are ingested by the air compressor. This can effect the equipment reliability, the system and lubricant within the equipment.

Compressor intakes on rooftops or the side of buildings can also be problematic. The Coanda Effect is a law of physics where accelerating the velocity of a gas or, in this case, air or wind over a surface increases its attachment to the surface. This means that wind will go across the surface of the roof picking up caustic or acidic effluents and carry these contaminants into the air compressor intakes. At a high enough velocity, the wind with the contaminants can even flow over the end of the building and be picked up from inlets or louvers on the side of the buildings. Few companies other than hospitals do wind pattern testing and air quality testing. Rooftops will have the exhaust pipes of combustion equipment. They will also have water-cooling towers with plumes (moisture coming off the top). During cold days, the fans don't need to run on the cooling towers, so the moisture, which can carry chlorine, can roll or tumble down over the side of the towers. All of these contaminants can be swept into the intake piping for the air compressors. This causes considerable damage to compression

AN INTERVIEW WITH SCOT FOSS

equipment, particularly in heat exchangers within the equipment, where the caustics and acidics are mixed with condensed water to form aggressively damaging contaminants that affect the equipment life.

We once did a gas chromatograph of the inlet air of air compressors at a textile plant. We found sulfur dioxide, and the engineers could not figure out where it came from, since this didn't exist at their plant. It turned out to be from a paper mill a half mile down the street, and the prevailing wind was bringing it to them. They were frustrated! Air ends and coolers are expensive to rebuild or replace, particularly non-lube air ends, and they are extremely vulnerable to these highly caustic and acidic gases. Many OEMs will say the solution to this problem is to put in either stainless steel heat exchangers or a chemical-type inlet filter with activated charcoal or carbon. These can be relatively expensive solutions.

In the case of the stainless steel, the coefficient of heat exchange is poorer than traditional materials, resulting in higher CTDs and lots of water downstream along with higher than normal operating temperatures. It's important to understand that you can solve one problem and create two more in the process.

Another issue is compressor fluids. H1F is a classification for compressor lubrication (FDA approved fluids) for the food industry. H1F is classified relative to its contact with food at less than 1 ppm. But the H1F fluid has a volatility temperature of 178 ˚F. Above this temperature, the lubricant begins to spin off vapor. Vapor will go downstream and be condensed. You can't coalesce vapor. Also, for every +18 ˚F of temperature increase, you half-life the fluid — most of which are PAOs. An 8000-hour fluid becomes a 4000-hour fluid at 196 ˚F — which is quite common for a screw machine. You have to re-cool the compressed air with a down-stream slave cooler to make sure all vapors are condensed and then are exposed to appropriate filtration.

Any thoughts on mining?

I have audited dozens of mining facilities. Underground mining industry opportunities are in the application of using a column of air. A column of air goes straight down into the hole with the weight of the air increasing the air pressure. This is something that few people understand. If you need 90 psig in the hole, you might need to compress at 77 psig at the surface. The industry usually just compresses at greater than 100 psig. Since most mining equipment is not regulated, the result is higher than normal air consumption, which generates waste and higher than normal maintenance on the air equipment.

Leaks are also prevalent in mines. A main reason is that piping is normally grooved pipe with fitting clamps. The problem with this is that most mines have oil aerosols in the air stream. The aerosols will attack the Buna N seals in the grooved pipe applications and create lots of leaks in the piping. A major mine in Canada had 13,000 cubic feet of leaks for this reason. The obvious solution is to shut off the air to the unused drifts, which will reduce the leaks substantially. Another help is to remove the oil aerosols, while another is replacing the seal materials on the fittings. The first two are the only practical solutions to a retrofit situation. The last is a bit late once the horse is out of the barn.

Pulp and paper, mining and foundries are very parochial industries. A lot of information is passed on from generation to generation and across companies. Knowledge is a continuum. This can be good and can be bad. They will share information and do the wrong thing over and over again. This has occurred a lot with compressed air systems.

How about Foundries?

Foundries are the most parochial of all of these industries. In the early 1970s, automatic blow-molding was developed. There were two major air-using processes: one was to use air to transport the chemical sand to the blow molder. The other process was to automatically force the wet sand into the cope and drag to form the mold. Due to this innovation, the foundry industry went from 200 to 300 horsepower of air compressors per plant to 400 to 900 horsepower on average. I got involved with the American Foundry Society and made many presentations on using dedicated air storage to reduce air consumption. We found you could reduce the energy costs by 40 to 50%. This was significant because compressed air represented 20 to 25% of the total energy costs. It is unfortunate, but this work was last done in the early to mid-1970s.

How are air compressor maintenance practices?

I believe they focus too much on keeping the equipment running. Standard maintenance does not include touching drain valves or the compressor controls to optimize the system. Maintenance also doesn't look regularly at safety issues. On a regular basis you have to test and re-calibrate safety relief valves per OSHA 29CFR1910. This should be done on the air compressors, air dryers and filters. The term "regular and normal maintenance" means every two years but preferably once a year. Maintenance should check safety shutdowns on machines as well. It is also not unusual to find that no one has checked the controls or the set up or profile since the installation of the equipment. This can account for a substantial amount of unnecessary equipment and operating cost.

How are the utility companies doing? Do enough participate with rebates and incentives for compressed air efficiency projects?

Wisconsin's utility is the most aggressive and does a wonderful job. One of the first to get involved was PG&E (Pacific Gas & Electric). Southern California with Dr. Babu Josef and Manitoba Hydro with Rob Armstrong and Ron Marshall are examples of utilities that have established in-house expertise with compressed air systems. They know how to establish baselines and are demanding on the ROIs of projects being properly delivered.

Some utilities have soured on the concept because they don't understand compressed air technology. This made them vulnerable to poorly done audits with poorly executed ROIs. Synergy (the parent of Cincinnati Electric) pioneered some projects with energy rebates but didn't have good ROI experiences.

How can utility companies be encouraged to increase their participation with incentives and rebates?

Improve the quality of the auditing and the project implementations so that they have more positive ROI experiences with their customers. This is only possible through improving the action plans. It is effortful to create energy bins and figure out kW savings and peak. An action plan can also be difficult to create and to execute. Too many plans are shopping lists of equipment to buy. A customer wants a chronological project plan with action items. You need to produce an action plan where the customer is excited about "running for the money."In compressed air, you cannot buy the solution — you have to apply the solution.

Demand controllers are a good example of this. I developed the first demand controller in 1988. Few people understand how to apply them to realize energy savings. Since most people are able to get them to provide stable air pressures, no one has complained. With the commoditization of auditing, many "auditors" have limited knowledge of what they are doing. This has soured a lot of customers on auditing as a resolution to reduced operating cost, improved reliability and better quality products going out the back door.

What role can machinery OEMs and pneumatic product manufacturers play to reduce energy costs?

They need to make their products function at pressures below 90 psig. When industrialized America turned into the war machine in WWII, the Department of Defense selected 90 psig as the standard pressure for stating performance. Industry is still set at 90 psig.

There is no reason for this. One of the nicest things about compressed air is that you can select the pressures to do whatever you want to do. OEM equipment can easily work at 70 psig rather than 90 psig. One must work closer with plant engineers to replace 90 psig components with ones that work at 70 psig. In many plants, changing out a few pneumatic components can easily reap huge rewards relative to reducing operating cost.

When sizing equipment, they also need to look at the duration of time air is used. This can reduce air consumption by more than 50%. They need to truly understand air consumption rates relative to use time versus available recovery time. Right now, most supply systems are over-sized due to exaggerated air pneumatic component consumption figures on most pieces of OEM equipment.

They should also remember that any time a process can be done without using compressed air, it is in the user's best interest. In terms of wired-to-work efficiency on a 95% efficient electric motor, 100% electrical input gives you 95% energy out on the shaft of the electrical motor. A perfect air system provides 11% work at the point of use, while more typical is 6%. Despite the numerous benefits to compressed air-using equipment, it is always wise to consider other alternatives.

Thank you, Mr. Foss, for your insights.

For more information please contact Scot Foss, Senior Auditor, Plant Air Technology, email: airsagas@aol.com, tel: 704-844-6666, www.plantair.com

"You can't buy the solution — you have to apply the solution."

PNEUMATICS, BLOWERS AND VACUUM PERMIT AUTOMATION at HEIDELBERG

BY ROD SMITH

I walked into the building, eager to learn about new printing technology, and I was greeted by a pleasant lounge/lobby — which held my attention for one second and lost it. The reason was that all I could see was the ultra-modern Heidelberg printing presses behind the glass wall spanning 180 degrees in front of me. An operator calmly monitored the silver-cabineted press, while paper flew into the press faster than I could see. Expectations more than fulfilled, I knew I had arrived at the U.S. headquarters of the world's largest sheet-fed printing press manufacturer — Heidelberg USA.

The objective of the visit was to learn more about Heidelberg's newest sheet-fed printing press technology, the XL 105 Speedmaster. More specifically, I wanted to find out how compressed air (at low and high pressures) and vacuum work together in this new printing press to support the pneumatic systems that allow high-speed automation to occur.

Shawn McDougall and Steven Arndt (left to right) in the training center at the headquarters of Heidelberg USA in Kennesaw, Georgia.

Sheets move from the sheet feeder (far right) through the offset printing units on a Heidelberg XL 105 Speedmaster (Illustration: Heidelberger Druckmaschinen AG).

Heidelberg owns a 40% global market share of the sheet-fed printing press market, and the XL 105 Speedmaster represents their latest advancement in the technology.

"The XL 105 Speedmaster is the world's fastest sheet-fed printing press. It is capable of printing 18,000 forty-inch sheets of paper per hour," affirms **Steven Arndt**, Heidelberg USA's accessory engineering manager.

Pneumatics in Sheet-Fed Printing Presses

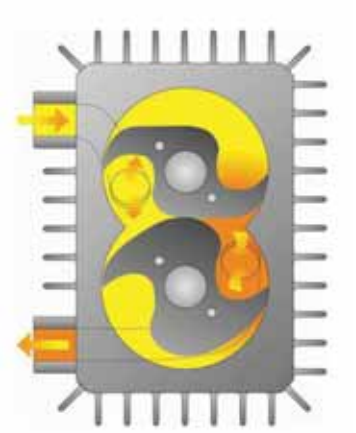
Sheet-fed printing presses print on single sheets of paper and are normally used for very high quality printing jobs with relatively lower volumes. Examples are high quality magazines, annual reports, and labels. This is in contrast to web presses, which are easily identifiable by the large rolls of paper fed into the machine. Web presses are normally used for high-speed and high-volume applications, which don't require the same level of quality, such as newsstand magazines and newspapers. A web press can deliver 30,000 to 70,000 impressions per hour but won't deliver the same quality level as a sheet-fed press. Heidelberg is focused strictly on the sheet-fed printing press industry.

A sheet-fed printing press begins the work in the sheet feeder. The sheets are then placed upon a suction belt to move them into position to enter the offset printing units. The printing unit is where images are offset onto the paper. There can be six printing units for different ink colors and a coating unit on these Speedmaster XL 105 printing presses. The paper is then moved to the stacking area. Pneumatic actuators, valves, pistons and intensifiers automate this process. The pneumatic components come from **Festo** and **Bosch Rexroth**. They are powered by a 50 to 100 psig compressed air system (using an integrated air compressor), a low-pressure air system (using a blower) and a vacuum system (using a combination compressor/vacuum pump).

PNEUMATICS, BLOWERS AND VACUUM PERMIT AUTOMATION AT HEIDELBERG

The suction head of the sheet feeder with both lifting suckers and a horizontal blow port.

Busch Merlin vacuum pump used for the sheet feeder.



Vacuum and pressure are produced in independent oil-free pumping chambers.

The Airstar® Vacuum and Blower System Automates the Sheet Feeder

The Preset Plus Feeder on the XL 105 Speedmaster is a wonderful example of how pressurized air and vacuum can work together. High volumes of air at low pressure are blown onto the stack of forty-inch sheets to separate them. A portion of this air is ionized air (air with an electrical charge), removing static from the papers so they don't stick together. The paper is lifted using vacuum-powered lifting suckers and is attached to the suction head. The sheet of paper is then pushed horizontally by the high volume/low pressure air onto the feed tape of the suction belt.

The Heidelberg Airstar® system provides customers with the vacuum and blower equipment they need to run the printing press. The equipment is packaged in a single, central cabinet integrated into the electronics and automation program of the Speedmaster.

"There was a time when customers used their own systems to support the presses", says **Steven Arndt.** "The system integration, reliability and energy-saving benefits of using the Airstar® system have made this the way people go."

A Busch Merlin combination pressure/vacuum rotary claw pump was selected by Heidelberg to provide both high volume/low pressure air and vacuum to the sheet feeder system. The air-cooled unit uses two non-contacting claws to trap a volume of air at the inlet and convey it to the exhaust, where it is compressed and discharged. Vacuum and pressure are produced in independent pumping chambers, which are completely oil-free and are very tolerant of paper dust in the ambient air.

"Printers appreciate the Merlin's extreme reliability, longevity and cost savings resulting from the use of non-contacting rotors,"says **Troy Bridges of Busch Inc**.

Smaller motors can be used because the rotors are friction free and therefore consume less energy than other similar sized pumps. The smaller size also makes the unit compact for integration into the Heidelberg printing press.

The sheet goes from the feed tape and is sucked onto the suction belt. Belt pressure and suction are regulated on the suction belt. Three gauges monitor pressures for the belt, side guides and propelling rollers. There is a pneumatic side-lay used to stop and position (called "registering") the sheet onto head stops, where the suction belt releases the sheet onto the propelling rollers that will take the sheet into the print unit.

The feed tape and the suction belt

The Airstar® System then provides for "sheet travel." High volume/low pressure air provides an air blanket with venturi guides on which the sheet of paper travels through the print units. The speed-controlled blowers, built by **Siemens**, use pulse-width modulation to save energy under reduced load conditions. These systems will supply low pressure/high volume air to the five-inch diameter air-supply manifold running the length of the print unit.

Heidelberg's Scrollstar® System for Compressed Air

Heidelberg also provides a complete compressed air supply package in a single cabinet to power the pneumatics which help run the printing press. The package is called the Scrollstar because it features an oil-less scroll compressor supplied by **Atlas Copco**.

"The SF4 scroll compressor is very quiet, with a 52 to 57 dba rating, and being oil-less, it eliminates the potential to introduce contamination into the printing process," says **Mike Moses**, a product manager at Atlas Copco USA.

The package runs off a controller, which also communicates with the entire control system of the printing press. The compressor cycles between 7.8 bar and 9.8 bar. Maximum pressure is 10 bar. The product supplies 9.1 cfm at 7.8 bar and 8.8 cfm at 10 bar.

A major benefit offered by the scroll compressor is that there are very few pulsations. The scroll provides a very even flow of air to the press. Sheet-fed printing places a dot of ink on top of another dot of ink to achieve a specific color. A press cannot have vibrations due to uneven air pressure. Stable air pressure with no pulsations provides smooth and even strokes of all the pneumatic pistons in the application rollers, which are engaging the impression cylinders.

PNEUMATICS, BLOWERS AND VACUUM PERMIT AUTOMATION AT HEIDELBERG

Heidelberg Scrollstar® System featuring an Atlas Copco scroll compressor with an integrated refrigerated dryer.

The air-cooled, scroll air compressor has an integrated refrigerated air dryer complete with a mechanical condensate separator which uses a timed solenoid drain valve to extract the moisture from the air. The system achieves a pressure dew point of 36 ˚F and is set to issue a high dew point temperature alarm at 59 ˚F.

Pneumatics Help Automate the Print Unit

Compressed air and pneumatics seem to be everywhere on the print unit. Large actuator blocks are responsible for multiple functions within the unit. The printing plate is the image carrier. It is an aluminum plate with a thickness of 1/12,000th of an inch. These printing plates used to be changed manually. This process took a high level of skill to position manually in precisely the right position and also took a lot of time. The process is now automated using pneumatics, which has increased accuracy and productivity.

The auto advance feature for printing plates uses pneumatics (Illustration: Heidelberger Druckmaschinen AG).

The movement and positioning of ink rollers and cylinders in the print unit are also automated through the use of pneumatics. Air pistons are used in the print unit to lock out and control the movement of the inking rollers. The pistons activate and deactivate gripper systems. Another air piston is used to position the blanket cylinder. This system works together with a servo-drive and provides an automated response to paper thickness.

The ink dispensing unit uses pneumatics to release ink on demand. The dispensing container is pressurized between 2 and 6.5 bar (depending upon the viscosity of the ink) and releases a small air volume to release the ink. When finished releasing, a pneumatic valve is closed. An in-line varnish with low viscosity requires significantly less air pressure. Another example is the ink-move agitators used on presses using UV inks. These types of inks are stiff. A pneumatically powered ink agitator is used to keep the ink up against the ink fountain roller and to keep it evenly mixed. The air pressure is normally fixed at 4 bar.

Many other applications use compressed air to automate the process. An intensifier uses 6 bar air pressure to produce 90 bar hydraulic pressure (called a hydraulic amplifier). This system automates the process of converting the machine when a sheet needs to be flipped over to print on two sides. This process used to be manual and very time consuming.

The Wash Star solvent collection facility is another application. Pneumatics offer higher safety levels when working with solvents. Compressed air repositions an eight-position pneumatic valve and also controls the direction of the solvents. This pneumatic system collects the solvents and rinses out the pans to make sure no debris is left over.

Prinect Communication & Technical Service

The Speedmaster XL 105 is offered with the Prinect Workflow Management System. The Production Solutions module links prepress, pressroom and finishing, so that data created in prepress can be used for presetting presses, quality measurement systems, cutters, folders and saddlestitchers. This speeds up all processes considerably.

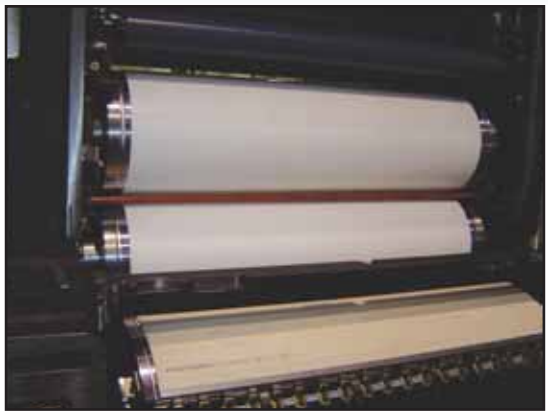
This includes the settings for the compressed air, blowers and vacuum systems. An operator will enter variables like sheet thickness, and the machine will automatically set the correct pressures for the air compressor, the suction pressures for sheet-feed, the blow volumes for sheet transfer and so on. The Prinect system has a memory, so once a job is programmed with all of its settings, it can be re-run as many times as desired. This improves set-up times and improves repeatability.

Remote technical service is also becoming a norm for supporting customers. The Prinect system hooks the customer's press into Heidelberg USA's service headquarters staff. When a problem occurs, the service group on staff is able to remote diagnose a large percentage of issues. This results in a phone call to the customer with advice on how to solve the problem. Heidelberg personnel told me this has dramatically reduced customer downtime and service costs involved with traveling to a customer site.

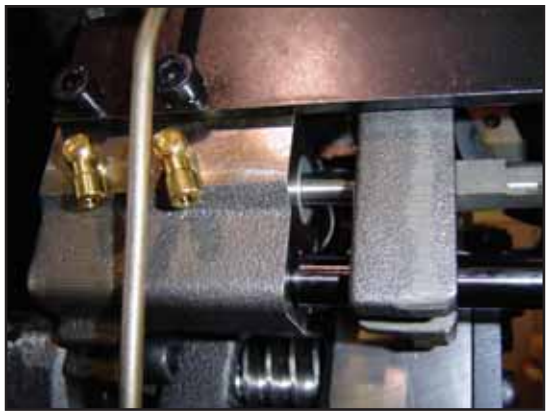
Training

The Heidelberg facility, located just outside of Atlanta, is a dream for hands-on people.

"We do customer demonstrations and conduct our Print Media Academy right here on the shop floor," says Shawn McDougall, the director of technical support for sheetfed offset presses at Heidelberg USA. "Our salespeople will bring in a customer. The customer will bring in an actual job, and we will run it for him on our Speedmaster XL 105s right here. The customer is able to see an actual run of an actual job. We also have a three-year service-training program here to develop future service technicians for



The printing plate cylinder (top) offsets the image onto the rubber blanket cylinder (middle) located above the impression cylinder (bottom). The paper sheet travels between the rubber blanket cylinder and the impression cylinder.



Pneumatic piston controls the position of the blanket cylinder.

The ink dispensing unit uses pneumatics.

PNEUMATICS, BLOWERS AND VACUUM PERMIT AUTOMATION AT HEIDELBERG

With a global market share for sheetfed offset printing machines of more than 40% Heidelberger Druckmaschinen AG (Heidelberg) is the world's leading solution provider for commercial and industrial customers in the print media industry. Headquartered in Heidelberg, Germany, the company focuses on the entire process and value chain for popular format classes in the sheetfed offset and flexographic printing sectors. Apart from printing presses, the product portfolio includes plate imaging devices and finishing equipment, as well as software components designed to integrate all print manufacturing processes.

With development and production sites in six countries and some 250 sales offices worldwide, the company offers services to more than 200,000 customers around the globe. Heidelberg generates 85% of global sales through company-owned sales offices and well above 80% outside of Germany. In fiscal year 2005/2006, the Heidelberg Press, Postpress and Financial Services division achieved sales of 3.586 billion Euro and net profit of 135 million Euro. As of March 31, 2006, the group employed 18,716 staff worldwide.

During a May 2007 press event marking the 50th anniversary of the Heidelberger Druckmaschinen AG (Heidelberg) Wiesloch-Walldorf site, Dr. Jürgen Rautert, director for engineering and manufacturing at the company, stressed that the Wiesloch-Walldorf plant has stood and will continue to stand for quality mechanical engineering and cutting-edge technology in the printing press industry.

Heidelberg is currently manufacturing around 65 printing units each day at its Wiesloch-Walldorf plant, which employs some 6,500 staff. Since its opening in 1957, the company has invested over one billion Euro in the site. The continuous expansion of the site, which has grown from 385,000 square meters to approximately 860,000 square meters today, has been driven by the technological development of new products and by the ongoing expansion of production capacity.

"The over 400,000 high-quality and reliable printing units delivered by the Wiesloch-Walldorf plant have played a major role in helping Heidelberg achieve and assert its leading position on the world markets," added Dr. Rautert.

Heidelberg's Wiesloch-Walldorf Plant in Germany celebrates its 50th anniversary (Illustration: Heidelberger Druckmaschinen AG).

Shawn McDougall in Heidelberg USA's training center.

our printing presses. There is a real shortage of qualified personnel in the market, so we develop our own service technicians," continued Mr. McDougall.

The Print Media Academy also attracts the service and production personnel of Heidelberg customers from all over the country.

The enthusiasm I encountered at Heidelberg USA was something special. They loved their technology and were passionate about the company. Veteran employees were pointed out to me, and the junior employees had only been there for 15 years. Knowledge and expertise are clearly valued at this company. It is reflected in the people and the products. The high quality is also reflected in their knowledge of using compressed air, vacuum and blowers. The integrated systems, which communicate well with the rest of the printing machine, reflect state-of-the art integration practices and the use of the highest quality components.

As I drove away, I found myself wishing I was in the printing business — so I could work with Heidelberg people and products!

For more information, please contact Rod Smith, Compressed Air Best Practices Magazine, tel: 251-680-9154, email: rod@airbestpractices.com

HOT OFF THE PRESS!

ENERGY SAVINGS DRIVES PRINTER TO UPGRADE COMPRESSOR

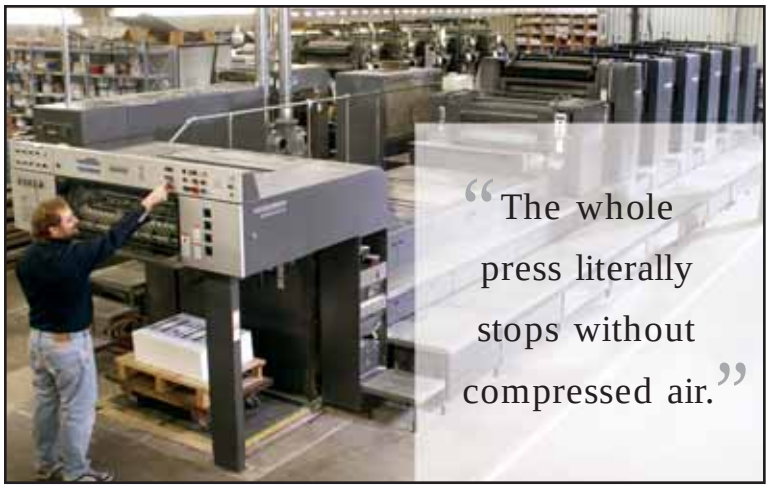
BY JENNIFER TREMBLAY

A commercial printer is a custom manufacturing business — in essence, a job shop. Nothing is off-the-shelf. Every piece is made to order. Customers are deadline oriented and price conscious. It's a highly competitive marketplace, and increasingly a printer's success depends on satisfying customers so well that they choose one company as the sole source for print. That's a tall order.

"Growing a successful commercial printing business requires insight into why a client awards work." So says Kevin Kervick, owner of Bassette Company, a commercial printer that has been doing business in Springfield, Massachusetts, since 1898. "It's not because we're a printer. Other printers have the same machinery we have. We get paper and ink from many of the same sources. The end result is typically the same — something in print. But we sell — and our clients buy — much more than print."

Kervick says his goal is to reduce the time, costs and grief associated with acquiring print. "By approaching the entire print supply chain as a process, we help our clients cut costs and improve efficiency in the management of their print purchases. Consistently following through on this approach offers our clients added value and gives Bassette an important point of differentiation that keeps customers coming back — ideally as their sole source for print."

HOT OFF THE PRESS: ENERGY SAVINGS DRIVES PRINTER TO UPGRADE COMPRESSOR



Printer as Manufacturer

A commercial printer's manufacturing operation starts with prepress activities such as plate making. Next it moves through printing presses, where up to six colors of ink are applied to paper, and then continues through the bindery, where printed pages are assembled into finished publications. Throughout Bassette's operation, compressed air is an essential resource.

"Every department in our manufacturing operation relies on compressed air," according to Jeffrey C. Scott, vice president of manufacturing at Bassette. "Compressed air is part of the printing process from the earliest stages. In the prepress department, our plate making machine uses air to open and close its main door and to insert and remove the plates."

Printing typically requires paper, and Scott explains that Bassette maintains an extensive inventory of paper on site to address customer needs quickly. "The paper must be stored within specific levels of temperature and humidity," says Scott. "Our humidification system uses compressed air to force water through misting nozzles. From the floor level, it looks a lot like a fire sprinkler system, but the special-purpose nozzles spray an ultra-fine mist that dissipates rapidly. Sensors keep the humidity level within a narrow range."

Plates and paper come together in a printing press, and compressed air controls the point of contact. "Our printing presses won't move without proper air pressure," says Scott.

"Compressed air engages the printing press's roller system, feeder, coater and pumps. The whole press literally stops without compressed air. Pressure that maintains the precise degree of contact between the back cylinder and impression cylinder relies on compressed air. If the pressure is off, the ink won't transfer properly. Too much pressure and the ink is squished across the paper, too little pressure and it doesn't transfer at all. A reliable source of clean, dry air is crucial to manage that point of contact."

Another resource for printing — water — is delivered to the plates pneumatically. How does water figure into offset printing?

"Oil and water don't mix," Scott explains, "and ink is oil based. A printing plate is designed to leave a thin layer of water where you don't want the ink to go. In simple terms, the ink goes where the water isn't."

After paper is printed, the pages are sent to the bindery, where they are assembled into finished magazines, brochures or books. The KleenStick™ machine uses compressed air to apply adhesive onto paper — for example, to glue a pocket folder together. On the stitcher, which staples books together and trims finished edges, compressed air is used to expel paper waste, which is then accumulated for recycling. The shrink wrapper, which packages finished pieces into neat bundles for distribution and storage, is pneumatic as well.

The System for "House Air"

For 12 years, Bassette has supplied compressed air for use throughout the plant ("house air") with a 30 horsepower Atlas Copco GA22 air compressor system. "This compressor has been a champ," says Kervick. "I can't think of any service or maintenance problem we've had with it at all. It's an integral part of the operation. If the air goes down, a lot of our manufacturing would stop. Fortunately, in all the years we've had that unit, it's never gone down even once. It never occurred to us that we should be looking at replacing it."

> "Energy Alliance arranged for us to get rebates for reducing our consumption of electricity."

In fact, it was the electric utility's idea. In 2005, Bassette was approached by Energy Alliance about upgrading lighting in the plant to improve energy efficiency. "It's almost always a smart decision to invest in more energy-efficient equipment," Kervick says. "Energy Alliance brought in our power utility and arranged for us to get rebates for reducing our consumption of electricity."

As a result, Bassette upgraded lighting throughout the entire factory, installed a new plate setter, and provided employees with Kaizen training focused on improving efficiency with large machines. During their energy audit, the utility identified the air compressor as an additional source of electricity savings through upgrading.

Kervick admits he was hesitant to replace a piece of equipment that was long since paid for and had never malfunctioned. He wanted proof. Gerry Carney, sales engineer from Atlas Copco New England Compressor Center, provided it.

Carney installed monitoring equipment on Bassette's existing Atlas Copco compressor to track electrical consumption. "Their 30 horsepower Atlas Copco compressor had served them reliably over the years," Carney explains, "however, their production demand, coupled with the ever escalating cost of electricity in New England, suggested there could be a better way to control cost."

Analysis of the results showed that the increase in energy efficiency offered by a new compressed air system would result in annual electricity savings of $7,600.

"The monitoring data made it clear that purchasing and installing a new compressor was the smart decision," says Kervick. "When we realized we would be replacing a piece of equipment that had been rock solid, there was no discussion about who would supply the new unit. It would be another Atlas Copco."

HOT OFF THE PRESS: ENERGY SAVINGS DRIVES PRINTER TO UPGRADE COMPRESSOR

Carney recommended a 40 horsepower Atlas Copco GA30VSDAFF WorkPlace Air System equipped with energy-saving variable speed drive and a built-in refrigerant dryer, all neatly contained within a single compressor enclosure.

Atlas Copco's VSD compressors — which match the production of compressed air to the demand — are so energy efficient that Western Massachusetts Electric Company offers customers a financial incentive to upgrade from older compressors. In this case, Western Mass Electric offered Bassette a $9,600 rebate. That is in addition to the estimated $7,600 in annual electricity cost savings from switching to VSD technology.

"Payback on our investment will be less than 18 months," says Kervick. "That's a no-brainer."

Carney points out an added benefit of upgrading. "Atlas Copco's new product warranty covers all parts and labor, except consumables, for five years. This is by far the best warranty in the industry."

Preparing for Surge Business

Bassette's new compressor system provides the ideal balance between daily operating efficiency and the ability to handle excess capacity from what Kervick calls surge business.

"In the print business, large blocks of business often come in at once," says Kervick. "You never know when surge will happen, but when it does you're faced with the challenge of meeting the needs and demands of multiple high priority jobs."

To ensure those demands can be met, Bassette chooses to maintain a functional level of excess capacity. "High-end printing presses like our Heidelberg SpeedMasters are long-lived pieces of equipment which are typically depreciated long before their useful life has passed," Kervick explains. "The failure of many commercial printers has also created a glut of used equipment, so we couldn't expect to get much by selling our older presses. For a small investment, we can keep some older presses in good working condition and our staff cross-trained. That way, when surge business arrives, we can prevent bottlenecks and keep clients satisfied."

With this strategy in mind, Bassette has chosen to keep its older model Atlas Copco compressor as a backup. "It's never given us a problem of any kind," says Kervick. "Given that great experience, we're keeping it online in case we ever need it. Compressed air is just too critical to be without."

For more information, please contact Jennifer Tremblay, Atlas Copco, tel: 413-493-7217, email: Jennifer.Tremblay@us.atlascopco.com

The F.A. Bassette Company

The F.A. Bassette Company was founded in 1898 by business partners F.A. Bassette and William C. Lawton, who began their printing operation in the Elektron building in Springfield, Massachusetts. Today, under the leadership of owner Kevin Kervick, Bassette Company is a growing business that does much more than put ink on paper.

The company's approach to growth is rooted in what Kervick calls the ManageSmart™ system of print procurement. The goal is to become the sole source of printing for his clients by reducing the time, costs and grief associated with acquiring print. By approaching the entire print supply chain as a process, his team is able to help clients cut costs and improve efficiency in the management of their print purchases.

www.bassette.com

AUDITING A PRINTING FACILITY

BY JASON SCARBERRY, DIRECTOR OF ENGINEERING
ATLAS MACHINE & SUPPLY INC.

Illustration: MAN Roland Druckmaschinen AG.

On October 13, 2006, Atlas Machine and Supply Inc. performed a Level II (supply side only) compressed air survey for a commercial printing company in Kentucky. This article provides the reader with a view of small portions of the completed 57-page air survey. The portions below are part of the information covered in the system overview, demand overview and executive summary portions of the air survey.

I. SYSTEM OVERVIEW

The compressed air system at this commercial printer consists of three main compressed air generation stations that all feed a common 4" looped header.

The main mechanical room consists of three compressors each with a dedicated filter and dryer feeding into a common 1060-gallon dry-side receiver tank and then to the plant in a 6" main header. The main compressor online in this room is a 155 horsepower Alup variable-speed rotary screw (compressor #1). There are also two standby 100 horsepower Gardner Denver rotary screw compressors in this room (compressors #2 and #3), which are left on automatic mode. These units automatically start on low air pressure and run inlet modulation control until pressure is satisfied, at which time they unload, time out and shut down.

The next compressor room consists of a single 288 horsepower Alup variable-speed rotary screw compressor (compressor #4). This unit feeds through a dedicated coalescing pre-filter and refrigerated air dryer and into the plant via a 4" dry header.

The last compressor station in the plant is located in the bindery area and consists of a 250 horsepower Gardner Denver rotary screw (compressor #5). This compressor feeds through a dedicated coalescing pre-filter and refrigerated air dryer and then into the plant via a 4" dry header.

AUDITING A PRINTING FACILITY

Equipment Inventory

Compressor	Model	BHP	PSIG	ICFM	Cooling	Control Type	Status
#1 Alup	SCD150	155	110	706	Air	VSD	ONLINE
#2 Gardner Denver	ECPQMF	105.5	100	490	Air	I/M	STDBY
#3 Gardner Denver	ECPQMF	105.5	100	490	Air	I/M	STDBY
#4 Alup	SCD280	248	110	1100	Air	VSD	ONLINE
#5 Gardner Denver	EAU99G	275	125	1100	Air	V/D	ONLINE
Totals		889		3886			
	Scfm @ 95 deg F, 90% RH, and 14.5 psia			3497.4			

Control Type Key - I/M = Inlet Modulation - V/D = Variable Displacement - L/NL = Load No Load - VSD = Variable Speed

Dryer	Model	Type	Refrig	kW	Flow	Cooling Type	Status
#1 Gardner Denver	7000104	Refr	R-22	9.16	1000	AIR	ONLINE
#2 AirCel	AR-500	Refr	134a	6.70	500	AIR	ONLINE
#3 AirCel	AR-500	Refr	134a	6.70	500	AIR	ONLINE
#4 Dominick Hunter	CRD-1000	Refr	407-C	5.66	1000	AIR	ONLINE
#5 Gardner Denver	RDS1250A	Refr	R-22	8.60	1250	AIR	ONLINE

Filter	Model	Type	Location	PSID	Flow	Drain	Status
#1 Gardner Denver	7000342	Coal	Pre-Filter	n/a	1000	part open BV	ONLINE
#2 Pioneer	CS600D	Coal	Pre-Filter	n/a	600	1/4 x 7s x 30m	ONLINE
#3 Pioneer	CS600D	Coal	Pre-Filter	n/a	600	1/4 x 7s x 30m	ONLINE
#4 Dominick Hunter	AO0620G	Coal	Pre-Filter	n/a	1314	Demand	ONLINE
#5 Gardner Denver	FSH1250C	Coal	Pre-Filter	n/a	1250	1/2 x 10s x 0.5m	ONLINE

Filter Type Key - Coal = Coalescing - Part = Particulate

Receiver	Mfg	Gal	CF	WP	Location	Drain	Side
One	Penway	1060	142	150	Main	1/2 x 2s x 5m	Dry

Operating & Utility Overview

The plant operates two production shifts Monday through Friday with a maintenance shift in between according to the following schedule:

First Shift .....7:00A.M.–3:00P.M.
Second Shift.....3:00P.M.–11:00P.M.
Maint. Shift.....11:00P.M.–7:00A.M.

Some Saturday and Sunday production may occur in either the press room, the bindery or both as necessary to fill orders.

ELECTRIC DATA

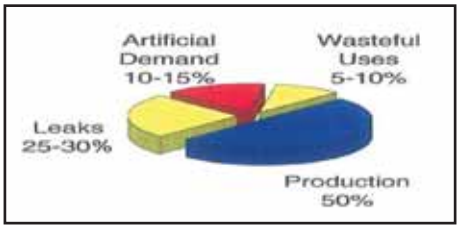
Provider .....E. ON
Blended Rate $0.05/kWH

II. Demand Profile and Issues

Primary Applications for Compressed Air

In industry it is typical for 50% of the compressed air generated to be wasted as shown in the figure at right. This system optimization plan will focus on reducing or eliminating these waste constituents, thereby reducing the cost to generate pneumatic power and increasing the reserve capacity of the existing system. The following is a listing of the main compressed air demands in use at the printing facility.

- Air Blow Off
- Cylinder Actuation
- Ink Drum Mixers
- Ink Pumps
- Ink Tank Air Padding



Flow and pressure transducers were inserted into the three main compressed air lines feeding the plant, and data was recorded from these probes for the next seven days. A dew point monitor was also installed in the main air loop, and dew point readings were recorded every 15 minutes for the seven-day period.

Compressed Air System Audit
Numerical Summary of Data Collected

Demand Summary:

	Total Flow scfm	250 hp Flow scfm	288 hp Flow scfm	Mech Rm Flow scfm	250 hp Pressure psig	288 hp Pressure psig	Mech Rm Pressure psig	Pressure Dew Pt deg F
Min	950	905	563	386	88	87	88	34.1
Max	3767	1279	1093	1612	108	108	108	50.2
Avg	2575	1089	869	617	100	100	100	41.5
Range	2817	374	530	1226	20	21	20	16.2

Demand sampled at 5 second intervals from 10:47 am 10/13/2006 - 9:30 am 10/20/2006
Dew point sampled at 5 second intervals for same time span

Load/Time Analysis:

Load Range (scfm)	% Time @ Load
3200-3767	1.0%
3100-3200	1.4%
3000-3100	4.3%
2900-3000	11.3%
2800-2900	12.7%
2700-2800	13.4%
2600-2700	9.2%
2500-2600	5.2%
2400-2500	4.0%
2300-2400	2.5%
2200-2300	3.1%
2100-2200	1.4%
2000-2100	0.6%
1900-2000	0.4%
950-1900	2.3%
Off	27.2%

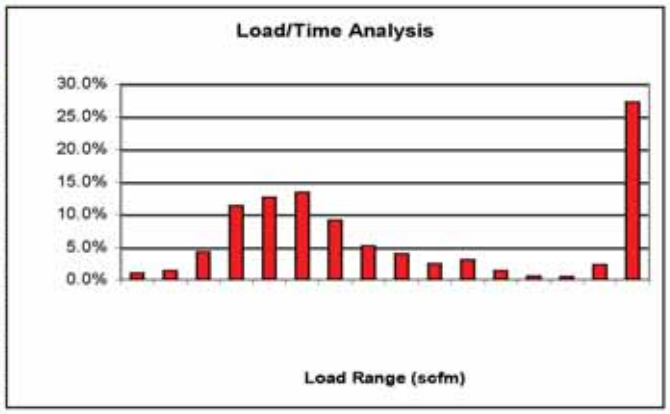


Table and Chart display the percentage of time that the compressors are subjected to the indicated demand level

Pressure/Time Analysis:

Pressure Range (psig)	% Time @ Pressure
106-108	0.2%
104-106	2.5%
102-104	10.5%
100-102	23.5%
98-100	28.2%
96-98	5.3%
94-96	2.4%
88-94	0.1%
Off	27.4%

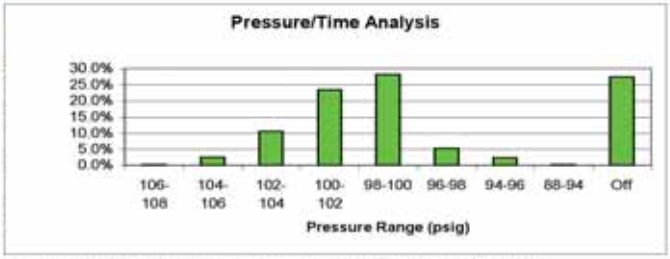


Table and Chart display the percentage of time that the header pressure was measured at the specified level

INPUTS		
Peak Demand	3200	scfm
Avg Dynamic Efficiency	4.90	scfm/kW
Cost/kWH	0.052	$/kWH
Operating Hours/Year	6360	hrs/year
Current Leak Rate	960	scfm

	% of Peak Demand	Leak Rate (cfm)	Annual Cost of Leaks	Potential cfm Savings	Potential Annual Savings
Current	30%	960	$64,794	0	$0
DOE Target Upper Limit	15%	480	$32,397	480	$32,397
DOE Target Lower Limit	10%	320	$21,598	640	$43,196

Compressed Air Leaks

The plant leak load was measured and recorded at 960 scfm. This represents 30% of the peak production demand of 3200 scfm. The **U.S. Department of Energy Compressed Air Challenge** has found, on average, that a typical plant leak load is usually in the range of 25%. It also suggests that through regular routine leak detection, tagging and repair programs, leak loads can be maintained in the 10 to 15% range of their peak production demands. The following table compares the plants measured leak/non-production load against the DOE recommended levels.

It is recommended that the plant implement a routine leak detection, tagging, reporting and repair program as part of on going compressor maintenance. The use of an ultrasonic leak detector can make quick work of finding these expensive problems.

Highest Pressure Requirement

In the case of this commercial printing facility, the highest pressure requirement in the plant is from the Man Roland printing presses at press numbers 14, 15 and 16. These presses use a series two 1" diameter x 3" stroke, double acting cylinders per unit (13 units per press) which require 101 to 145 psig. These cylinders only actuate an estimated one time per hour and represent a very small percentage of the 2500 scfm average plant production demand.

1" x 3" cylinder volume = 0.001363 ft^3

Compression ratio =
(110 psig + 14.5 psig)/14.5 psig = 8.6:1

Compressed air consumed per stoke =
8.6 x 0.001363 ft^3 = 0.0117 ft^3

2 strokes/60 minutes = 0.0333 strokes per minute

0.0117 ft^3 x 0.0333 stroke/min =
0.00039 cfm per cylinder

0.00039 cfm/cyl x 2 cylinders/unit x 13 units/press x 3 presses = 0.03 cfm total

However, these cylinders require the entire plant air system to operate at elevated pressure levels. The next highest pressure requirement in the plant is 80 psig.

AUDITING A PRINTING FACILITY

Operating the compressors at elevated pressure results in two adverse energy consumption phenomena:

1) For a positive displacement compressor, every 2 psig increase in the discharge pressure requires an additional 1% bhp input at the shaft. At a minimum, the 250 hp Gardner Denver compressor could be base loaded and operated at a drawn down pressure of 85 psig. This would result in energy savings of:

   261.25 current flbhp @ 115 psig – 222 flbhp @ 85 psig draw down = 39.25 bhp savings

   39.25 bhp x 0.746/0.936 meff = 31.3 kW

   31.3 kW x 6360 hrs/yr x $0.052/kWH = $10,351 annual energy savings

2) Increased levels of artificial demand consumption in the plant.This is defined as demand that is created at all leaks and unregulated points of use by supplying compressed air at higher than required use pressures. A given leak will discharge more cfm at 100 psig than it will at 80 psig.

NOTE: According to an orifice chart, the cfm savings ratio is 0.89% for every psig reduced. This ratio would apply if no regulators were used in the plant. Therefore a 0.5% per psig is used as a conservative estimate of potential artificial demand reduction in a commercial printing plant such as this.

Estimated Savings:

2575 scfm avg demand x (100 psig avg pressure – 85 psig proposed pressure) x 0.5%/psig = 193 scfm savings

193 scfm/5.00 scfm/kW x 6360 hrs/yr $0.052/kWH = $12,765 annual energy savings

Recommendations on Demand Issues

Control the plant header to 80 psig as required by 99.9% of the production. Treat the high pressure requirements of the Man Roland cylinders using point-of-use air amplifiers which will jack up the 80 psig plant pressure to 160 psig before stalling.

These amplifiers are mounted on a small point-of-use receiver tank. The higher pressure 160 psig air can then be regulated out of this tank to these cylinders at a constant 110 psig.

It is recommended that one amplifier be installed per pressline (14,15 and 16) at $920 each. This project would have an ROI of:

3 x $920/$12,765 = 2.6 months

III. EXECUTIVE SUMMARY

Flow and pressure transducers were inserted into the three main compressed air lines feeding the plant and data was recorded from these probes for the next seven days. A dew point monitor was also installed in the main air loop, and dew point readings were recorded every 15 minutes for the seven day period.

Throughout the survey period, the large 250 horsepower Gardner Denver remained fairly constantly loaded. The two variable-speed compressors were typically able to keep up with the trim load. During extreme peak demand periods (approximately 44% of the time), one of the 100 horsepower Gardner Denver compressors was required to trim. And during a very irregular demand spike (2.4% of the time), the second 100 horsepower was also online, with the plant running 100% of its generating capacity.

At the onset of the audit (Friday, 10/13/2006) production was very light with only a few presses and binders operating. Demand averaged between 2200 and 2500 scfm during this light production period. The dew point averaged 35 ˚F to 40 ˚F.

At the start of production Monday morning (10/16/2006), production ramped up to average between 2700 and 3000 scfm. On Thursday evening, demand increased even more to 3000 and 3200 scfm, which continued for the duration of the audit. Production dew points ranged from 35 ˚F to 40 ˚F, averaging 40 ˚F.

The system control strategy is fairly well maximized, given the mix of available equipment and storage, as well as the required 100 psig of pressure at presses 14, 15 and 16. In fact, the overall time-weighted average dynamic efficiency for the system is 4.9 scfm/kW, compared to the 5.17 scfm/kW peak for all compressors operating at their design pressures. The following table summarizes the recorded range of system dynamic efficiency compared to the 100% benchmark. Thus, the system operates from 76–96% efficient, but on average is 95% efficient.

	Dyn Eff scfm/kW	100% Ref Efficency	% Ref Eff
Min	3.92	5.17	76%
Max	4.97	5.17	96%
Avg	4.90	5.17	95%

However, analysis of some basic demand requirements revealed two primary opportunities to improve on this ratio.

1) The plant non-production leak load was recorded on 10/14/2006. This demand was 960 scfm with absolutely no product being made. This represents a fairly typical production facility leak load of 30%. However, the *U.S. Department of Energy Compressed Air Challenge* suggests 10 to 15% of peak production is a reasonable goal with regular leak detection and repair programs. This represents a possible savings of $32,000 to $43,000 per year for this printing facility.

2) Currently the compressors are required to generate air at 105 to 115 psig to satisfy a very static load (small cfm requirement) at the Man Roland cylinders of presses 14, 15 and 16. This demand, which totals less than 0.1 cfm of compressed air, requires the total system to operate at a higher pressure. This costs 1% online bhp for every 2 psig increase in discharge pressure at the compressor, and increases the artificial demand load by an estimated 193 scfm (costing over $12,000 per year).

By supporting the high pressure requirement of these presses with localized tank-mounted 2:1 air amplifiers, the air pressure in the primary network can be lowered to a constant 80 psig. By installing an additional 2200 gallons of receiver capacity on the trim side to work in conjunction with the existing 1060-gallon tank and controlling the air pressure to the plant through an intermediate pressure/flow controller, the plant pressure is stabilized plus or minus 1 psig about the user set point, and artificial demand is minimized.

Since the plant is currently undergoing an expansion slated to add 250 scfm of compressed air demand to the system, and during current peak demands the plant is consuming 100% of its compressed air generating capacity, two options exist:

1) Add additional compressor horsepower to the base side of the system, which would allow for an even higher dynamic efficiency and provide additional growth capacity and 100% on-site back-up redundancy.

2) Tackle the plant leak load, install point-of-use boosters on Man Roland presses 14, 15 and 16 and add additional controlled storage to the trim side, which would allow the system to operate at 80 psig. This has a combined value of 600+ to 800+ of currently non-value compressed air consumption. This is the equivalent of 150 to 200 horsepower worth of compressor or a $40,000 to $50,000 cost avoidance.

Assuming demand remains the same (no change from current as measured), two solutions have been presented and are summarized as follows:

Solution 1 — Utilizing the existing 250 horsepower compressor as a base and adding controlled storage to the trim along with the boosters for presses 14, 15 and 16, the plant could be operated at 80 psig.

Solution 2 — Installing a second 250 horsepower base-side air compressor, the plant would run 500 horsepower of base load air compressor and only the SCD280 variable speed as trim. By shifting the bulk of the online horsepower to the base side from the trim side, the majority of the air is made at the lower base pressure, and the dynamic efficiency is higher (scfm/kW).

The following table summarizes the performance of these two solutions against the current case.

Model	Energy Cost	Maint Cost	Cooling Water Cost *	Total Cost	Savings over Current	Dyn Eff (scfm/kW)	% Eff Gain	First Cost	ROI (yrs)	Mo. Positive Cash Flow
Current	$ 198,918	$ 17,229	$ -	$ 216,147	n/a	4.9	n/a	n/a	n/a	n/a
Option 1	$ 167,656	$ 16,027	$ -	$ 183,683	$ 32,464	5.48	12%	$ 17,569	0.5	$ 2,361
Option 2	$ 149,065	$ 16,539	$ -	$ 165,604	$ 50,543	5.82	19%	$105,049	2.1	$ 2,156

For more information please contact Mr. Jason Scarberry, Atlas Machine & Supply, tel: 513-874-9337, email: jascarberry@atlasmachine.com

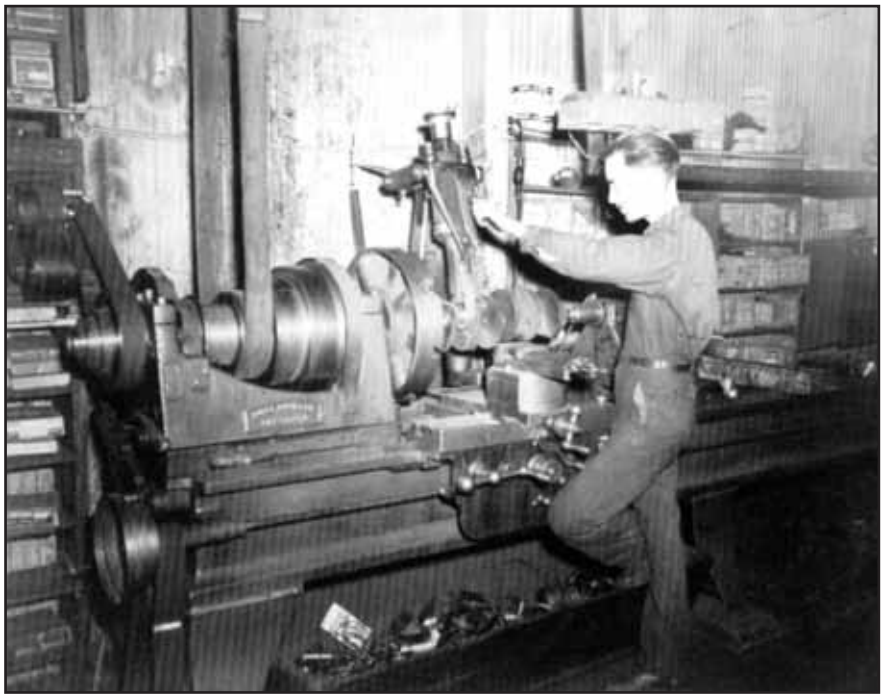
100 Years of Responsive

Compressed Air Best Practices interviewed Rich Gimmel (President), Chris Wesley (VP Sales & Marketing) and Jason Scarberry (Director of Engineering) of the Atlas Machine Company.

Congratulations on the 100 year anniversary of Atlas Machine!

Thank you! We are excited that the fourth generation of the ownership family is starting work next week at Atlas Machine. Less than 1½% of family-owned businesses make it to the fourth generation. My grandfather (the grandfather of Rich Gimmel) began working for Atlas Machine in 1910 as chief engineer. He bought the company in 1925 from the person who founded the company in 1907. The company survived the Great Depression only because they had been very conservative and had no debt. My grandfather's bank went under, and they lost all the family's resources except for the company. They simply went to work and step by step rebuilt the business.

We are very proud of the efforts of all our employees, over the years, who have made reaching the 100 year anniversary possible. We are also very proud of the long-term relationships we have with our customers and our vendors. We recently received an order from a customer who has been with us since the 1940s. We have also worked with many equipment vendors, like Gardner Denver, since the 1940s.



Machining solutions since 1907.

How did Atlas Machine get started?

Atlas Machine started as a manufacturer of elevators in a small building in downtown Louisville. The company evolved into an automotive machine shop by 1915. We then entered a phase where we got more involved with industrial machinery and industrial machining. We began by doing repair and rebuild work on the big industrial reciprocating air compressors which were the standard in those days. We were focused on service and repair, but in the 1940s we signed on with Gardner Denver just in case someone wanted to buy an air compressor!

Solutions

When and why did Atlas Machine make air compressors a focus?

Atlas Machine has always focused on reducing the lifecycle costs of equipment in industrial facilities. That is how our machining division has prospered and why we got involved with servicing and selling air compressors in the 1940s. We continue to do that today — we focus on taking the cost out of compressed air systems in industrial facilities. We can rebuild compressors instead of resell compressors. We can also provide comprehensive energy audits. The emphasis has always been on lifecycle costs.

In 1985, the Company established a formal compressed air division. We made a strategic acquisition, in 1989, of an air compressor sales and service company, based in Dayton, Ohio, called Scott Industrial Inc. The manager of Scott Industrial's compressor division, Bernie Jacobson, was brought in to run the compressed air division for the newly combined companies. Bernie was an icon in the compressed air industry and a real leader and a great sales manager. As a B-24 bomber pilot who had been shot down twice over the Pacific and in one case been the only survivor, Bernie had those unique qualities of a natural leader. Bernie's marketing prowess and leadership skills played an important role in taking Atlas Machine to where it is today in the compressed air markets of southern Ohio, southern Indiana and Kentucky.

Atlas Machine headquarters in Louisville.

100 YEARS OF RESPONSIVE SOLUTIONS

How is Atlas Machine structured?

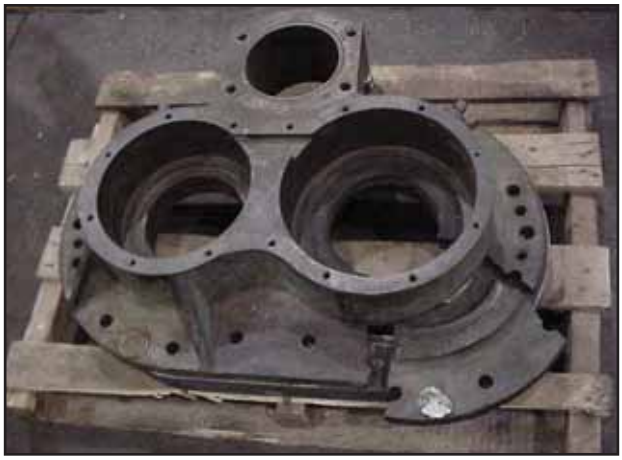
The company is a little unique in that it has a machining division to go along with the industrial products division. The machining division traces back to our origins as a machine shop and continues to differentiate Atlas Machine and provide extra value to our customers. Our machine shop can fully rebuild or re-machine air ends or air end housings. This can save our customers significant dollars versus them having to buy a new air compressor or a new air end.

The industrial products division provides sales engineering and service for a range of products including compressed air systems, pumps, cooling systems, generators, vacuum and blowers. The company has a long history with compressed air systems, but we added pumps three years ago and it has been beneficial. It has taken an investment for sales and service to get comfortable with pumps, but we have seen a lot of benefit come from the investment. Our industrial products division sells Atlas Machine as the primary product because at the end of the day, a customer needs to know who they are working with.

Please describe the relationship Atlas Machine creates with customers.

We have over 3,000 customers. They come from diversified industries. We take a longer view of things, in particular our business relationships. One of our customers made their first purchase from us in 1926. We provide a critically important utility — compressed air. Cost of repair is just a fraction of the cost of loss of production. In this way, we are an industrial fire department that can respond quickly to industrial problems.

When you get right down to it, most major brands of air compressors are high quality products, which will function well if applied and installed correctly. An operations manager must look closely at the local sales and service company to determine what kind of performance he will ultimately get from his compressed air system. The selection his company makes of the compressor service provider will determine if an appropriate compressed air system is designed, installed correctly and appropriately maintained for his factory. This is why Atlas Machine stands for long-term relationships which build value for the customer. This philosophy has worked well now for many years.



Cracked air end housing plate.

New air end housing plate made by Atlas Machine.

> "One of our customers made their first purchase from us in 1926."

How does sales support so many product lines?

We choose vendors and hire sales engineers who are very strong technically. We work with vendors who supply technical people to provide training, technical support and expertise to our company. Atlas Machine has internal technology experts who assist with the "really tough issues."

Fostering communication within our sales force has been very beneficial. Sales people regularly ride with one another in different territories to learn from one another. We also hold conference calls every two weeks to discuss technology issues or things we are seeing in the market. Once a quarter, we assemble the whole sales force for training sessions. It is interesting because through this commitment to communication, we see big differences within our market. In Ohio, for example, cold calling is not accepted, while in Kentucky you are welcomed as an important visitor.

The biggest advantage of having so many products to sell is that you can offer solutions to most issues/problems a customer might have. This allows the customer to benefit from working with the Atlas Machine process. If we were just selling air compressors and the customer was up-to-date with his equipment, there wouldn't be a reason for us to work together.

What are the primary industries Atlas Machine serves and at what percentage of capacity do they run?

The industries we serve vary widely. In a given day, one of our sales engineers might visit food, chemical and automotive assembly plants. Compressed air is used in a vast market. It is very interesting to see all the applications for compressed air — it's all over the map. A service technician may visit a foundry in the morning and a pharmaceutical plant in the afternoon.

All facilities are unique as to how many shifts they run and what percentage of load they are placing on the compressed air system.

How can factories reduce energy costs associated with compressed air?

One of the biggest opportunities is to manage leaks in the compressed air system. This has been widely publicized by the Department of Energy's Compressed Air Challenge and is a simple truth. A very rough estimate we make is that 30% of the factories we visit do not run production on weekends or at night. The compressed air systems, however, continue to run during these non-production hours due to compressed air leaks in the system creating artificial demand.

The piping installation trailer provides an on-site workshop.

100 YEARS OF RESPONSIVE SOLUTIONS

100 Years

How does Atlas Machine help customers identify and address energy-saving opportunities?

We offer customers three levels of assessments of their compressed air systems. Our first level is simply a walkthrough of their facility. We do this at no charge and get a feel for obvious opportunities. You can often hear the hissing of compressed air leaks in a facility. You can also spot inappropriate uses of compressed air — such as drying products with compressed air.

Our second level focuses on the supply side of the compressed air system. This is now what we consider a comprehensive audit. We assess the compressors, the compressor control strategy, the air treatment equipment and the storage and piping system. We will spend a week measuring compressed air demand levels and air quality levels. We always include weekends in this measurement period so we can understand the potential low-load dynamics of this period as well. A common opportunity here is that factories run modulating compressors at a constant pressure. We introduce flow control and storage solutions to help them run more efficiently.

The third-level audit focuses on the demand side of the system. We interview the customers and do an in-depth analysis of what they are using compressed air for. We will identify inappropriate uses and take actual measurements of how much air is being consumed for these applications. We will then propose alternatives which will reduce the overall energy costs. We will also do leak audits, and the result is normally a reduction of the overall air compressor horsepower required to run the facility.

For both Level 2 and Level 3 audits, we provide customers with a 100-page binder analyzing their system and providing recommendations on how to reduce energy costs. Our engineering department writes these customized reports over a one- to two-week period — after the one-week on-site assessment is completed.

How do you take baseline measurements?

We measure air flow to understand air demand. We do this by hot-tapping the pipe with a thermal mass flow meter. It's easy to use and accurate for the pressures we deal with between 80 and 150 psig. We don't use amp-clamps with data loggers. If you just measure power, you might not know the service factors. We do use amp-clamps to verify performance curves and to verify if the air compressor is unloading.

What other measurements do you do?

We do dewpoint monitoring, leak audits and pressure measurements. For dewpoint measurement, we use a hand-held dewpoint meter with a probe you can insert into the compressed air pipe. This area of business is increasing. The Compressed Air Challenge and the Compressed Air & Gas Institute (CAGI) have improved awareness in industry of the need to understand their compressed air systems. A leaky water pipe gets fixed right away, but a big air leak isn't visible, and so it hasn't been a high priority historically. This is starting to change.

Thank you, Atlas Machine, for your insights.

For more information, please contact Chris Wesley, Atlas Machine, tel:513-874-9337, email: cpwesly@atlasmachine.com

Wall Street Watch

BY COMPRESSED AIR BEST PRACTICES

The intent of this column is to provide industry watchers with publicly-held information on publicly-held companies involved with the sub-industry of compressed air. It is not the intent of the column to provide any opinions or recommendations related to stock valuations. All information in this column was gathered during the trading day of May 14, 2007.

Ingersoll Rand (NYSE:IR) announced on April 27, 2007 first quarter diluted earnings of $0.70 per share vs. earnings of $0.73 during the same time period in 2006. The Industrial Technologies segment, which includes the compressed air systems business, reported that total revenues in the first quarter increased by approximately 10% to $485 million. Strength in industrial and process markets for complete air compressor units and increased revenues from the aftermarket business continued to benefit Air Solutions, with improved activity in all major geographic regions. Productivity Solutions revenues also increased as expanding activity in traditional industrial, fluid and material handling markets outside of North America and growth of recurring revenues offset sluggish domestic revenues. First-quarter operating margins for Industrial Technologies of 13.3% were flat compared with last year, resulting from higher volumes, improved pricing and productivity savings, offset by increased investment spending, higher material costs and unfavorable product mix.

"Our first-quarter 2007 performance demonstrated the benefits of our transformed business portfolio, which is characterized by significantly improved product, market and geographic diversity, compared with our previous reliance on capital-intense, heavy machinery businesses," said **Herbert L. Henkel**, chairman, president and chief executive officer. "We offset several sluggish domestic markets with strong revenue growth from international operations and recurring revenues. As we expected when we began our transformation in 2000, we are better positioned to withstand isolated market downturns, and our continuing focus on innovation and operational excellence will sustain our ability to grow and deliver solid financial results."

The company's revenues increased by 6% to $2,668.1 million compared with revenues of $2,523.2 million for the 2006 first quarter. Currency had a 2% favorable impact on year-over-year revenue gains. First-quarter domestic revenues declined slightly, primarily due to lower Bobcat results, while revenues from international operations increased by approximately 18%. Total recurring revenues, which include revenues from parts, service, rental, attachments and used equipment, increased by 12% compared with the first quarter of 2006 and accounted for 22% of total revenues.

Operating income was $299.9 million for the first quarter of 2007 compared with $317.3 million the first quarter of 2006. First-quarter operating margins were 11.2% compared with 12.6% last year.

On April 30, Ingersoll Rand announced that it had completed the sale of its Road Development business unit to AB Volvo in all countries except India, which is expected to close shortly, for cash proceeds of approximately $1.3 billion. The Road Development business unit manufactures and sells asphalt paving equipment, compaction equipment, milling machines and construction-related material handling equipment.

"The sale of the Road Development business reflects our strategy to transition away from capital-intense, heavy-machinery businesses and improves the company's efforts to achieve aggressive financial objectives consistently over the long term," said Henkel. "Overall, the sale will generate net cash proceeds of approximately $1.05 billion for Ingersoll Rand. We will use the proceeds of this sale, in conjunction with our strong cash flow, to supplement our organic growth with acquisitions that extend our product lines, expand our geographic markets and enhance our recurring revenue streams, as well as to increase our share repurchase activity."

WALL STREET WATCH

APRIL 17, 2007 PRICE PERFORMANCE	SYMBOL	LAST PRICE	1 MONTH	6 MONTHS	12 MONTHS
Parker-Hannifin	PH	$95.29	8.8%	13.0%	16.2%
Ingersoll Rand	IR	$46.61	4.2%	23.0%	-0.5%
Gardner Denver	GDI	$39.35	8.6%	8.0%	3.8%
United Technologies	UTX	$68.25	4.9%	4.0%	5.2%
Donaldson	DCI	$36.18	4.4%	-2.2%	12.6%
EnPro Industries	NPO	$39.81	7.2%	15.6%	6.1%
SPX Corp.	SPW	$79.41	13.4%	29.2%	45.1%

Atlas Copco (ATLKY:OTC) reported on May 26, first quarter 2007 results with record earnings and accelerated growth. Atlas Copco is a Swedish company and reports figures in millions of Swedish Krona. (May 14 exchange rate quote was $1USD=6.8 SEK or 1 SEK=$0.146USD).

- Focused growth strategy delivers double-digit growth in all regions
  - 24% organic order growth
  - 20th consecutive quarter with organic growth
- Revenues reached MSEK 13 390
- Operating profit was MSEK 2 541, a margin of 19.0%
- Profit before tax increased 22% to MSEK 2 477
- Profit for the period was MSEK 1 826
- Profit from continuing operations increased 21% to MSEK 1 773
- Basic and diluted earnings per share were SEK 2.98
- Basic earnings per share from continuing operations were SEK 2.89
- Operating cash flow for continuing operations was MSEK 845
- Acquisition of Dynapac, expanded the presence in the road development market

The Compressor Technique business area consists of six divisions in the following product areas: industrial compressors, compressed air treatment products, portable compressors and generators, gas and process compressors, as well as specialty rental. Highlights were:

- Orders grew 17% from 7 091 MSEK to 8 325 MSEK
- Revenues grew 17% from 5 789 MSEK to 6 794 MSEK
- Operating profit grew 21% from 1 195 MSEK to 1 440 MSEK. Operating profit also increased as a percentage of revenues from 20.6% to 21.2%
- Return on capital employed went from 71% to 69%
- Strong growth continued, supported by improved market presence and penetration
- Operating profit margin at 21.2%, in spite of negative currency effect
- Acquisition of Greenfield strengthens presence in growing CNG market segment

Order volumes for stationary industrial compressors continued to grow, supported by favorable demand, further strengthening presence and penetration in new and existing segments. The favorable investment climate remained within all major customer segments and contributed to strong demand. Investments for general capacity increases and investments for energy savings were important drivers for equipment sales, which grew more than 20% organically. The aftermarket business for industrial compressors continued to grow at a steady high pace.

Compressed air treatment products like medical air equipment, filters and dryers also recorded very high growth. Geographically, all regions without exception were strong. The growth rate was particularly good in Eastern Europe, North and South America and India.

Parker Hannifin Corporation (NYSE: PH), reported on May 3, an increase of 3% in total orders for the month of April compared to the same month a year ago. Orders are calculated as a percentage increase over the prior year using a daily average. The company derives orders from a wide variety of global end markets which the company serves directly and through a network of thousands of distributor locations.

In addition, Parker reported the following orders by operating segment:

- Orders decreased 4% in the Industrial North America segment versus April a year ago
- Orders increased 11% in the Industrial International segment versus April a year ago
- Orders increased 8% in the Aerospace segment on a rolling 12 month average basis
- Orders increased 1% in the Climate and Industrial Controls segment versus April a year ago

Fiscal Year 2007 Third Quarter Results

Parker announced on April 24, sales for the third quarter of fiscal year 2007 were $2.8 billion, up 11.3%, as compared to sales of $2.5 billion from the same period last year. Earnings per diluted share from continuing operations in the third quarter of fiscal year 2007 were $1.78, an increase of 21.9% over the $1.46 posted in the same period a year ago. This quarter's earnings per diluted share included a gain of 5 cents from the sale of real estate.

"By executing our Win Strategy, our employees delivered another record quarter," said Chairman, CEO and President **Don Washkewicz**. "Their continued performance gives us confidence that fiscal year 2007 will end on a very positive note."

Third Quarter Segment Results

- In the Industrial North American segment, third quarter operating income decreased 10.8% from the prior year to $146.8 million on sales of $1.0 billion
- In the Industrial International segment, third quarter operating income increased 42.0% over the prior year to $140.5 million on sales of $1.0 billion
- In the Aerospace segment, third quarter operating income increased 21.6 percent over the prior year to $66.2 million, on sales of $436.5 million
- In the Climate & Industrial Controls segment, third quarter operating income decreased 19.0% from the prior year to $19.2 million on sales of $278.1 million
- Total operating margin across all segments in the third quarter was 13.4% versus 13.7% in the same period a year ago

Fiscal Year to Date Results

For the first nine months of fiscal year 2007, sales were $7.8 billion, up 15.9%, as compared to sales of $6.8 billion from the same period last year. Earnings per diluted share from continuing operations for the first nine months of fiscal year 2007 were $5.17, up 38.6% from the $3.73 reported in the same period in the prior year. Cash flow from operations for fiscal year 2007 to date reached $536.9 million.

WALL STREET WATCH

"Our ability to generate strong cash flows allows for great flexibility in optimizing shareholder returns," said Washkewicz. "For example, cash was used since the beginning of the third quarter to acquire **Airtek**, a strategic fit for our filtration business; SSD Drives India, which expands our global automation technology platform; Rectus AG, complementing our global fluid handling business; and Rayco Technologies, an Asian-based producer of elastomer seals for precision markets. Together, these acquisitions have annual revenues of approximately $166 million. We also made an additional $50 million discretionary contribution to our North American retirement plan in the third quarter.

"This quarter's financial performance keeps us on track to once again exceed our annual profitable growth goal of 10%," said Washkewicz. "Just as importantly, we continue to grow the company in a very balanced way. Of the quarter's 11% sales growth, approximately 5% was derived organically, 4% came via acquisitions and 2% was due to the favorable impact of foreign currency."

Washkewicz added, "We're especially pleased at the results coming from our Industrial International segment. The hard work we've done on our European initiatives in recent years, including consolidation of inventory, synchronization of the sales force and acceleration of low cost manufacturing, has led to sustained and measurable progress in our margins. The Win Strategy initiatives relating to pricing, lean and procurement also continue to drive our success. The clear outcome is that the size and mix of our Industrial International business is more diverse and more profitable than it was during previous business cycles. These factors should allow Parker's overall performance to remain strong despite potential near term slowing in some of our North American markets."

United Technologies Corp. (NYSE:UTX) reported on April 18, first quarter 2007 earnings per share of $0.82 and net income of $819 million, up 8% and 7%, respectively, over the year ago first quarter. As previously disclosed, results for the current quarter include a $0.07 per share impact for the previously announced Otis European Union Commission fine, net of related reserves, restructuring charges and one-time favorable items. Earnings per share excluding these items were $0.89, 17% above the year ago period. UTC is the parent company of **Sullair Corporation**.

First quarter consolidated revenues increased 16% to $12.3 billion, reflecting 10% organic growth including a better compare at Sikorsky following the strike last year. Foreign currency translation increased revenues by 3% and earnings by $0.03 per share in the quarter.

"Although we regret the first quarter Otis European Commission matter, we have had an excellent start to 2007," said **George David**, UTC's chairman and chief executive officer. "Commercial aerospace markets remain strong, and Sikorsky's shipments have stepped up from last year's lower rates. Apart from the well reported North American housing market, commercial and residential construction demand worldwide remains strong. Otis's first quarter orders for new elevators were up 27% from a year ago and have compounded at 14% annually over the last three years. Comparably, Carrier's commercial air conditioning revenues were up 13% in the quarter and 12% annually over the three years. Accordingly, we confirm our prior guidance for 2007 earnings per share in the range of $4.05 to $4.20 for the year," he added.

Cash flow from operations was $453 million and capital expenditures were $208 million for the quarter. Share repurchase totaled $500 million for the first three months of the year.

Gardner Denver, Inc. (NYSE: GDI) announced on April 25, that revenues and net income for the three months ended March 31, were $441.4 million and $42.8 million, respectively, exceeding the previous records achieved in the three-month period ended December 31, 2006. Diluted earnings per share for the three months ended March 31 were $0.80, 40% higher than the comparable period of 2006. The improved financial performance for the first quarter of 2007 is primarily attributable to the incremental flow-through profitability of organic revenue growth, operational improvements, including the benefits from acquisition integration, and a lower effective tax rate. The company's profitability in the first three months of 2007 also contributed to the generation of approximately $36.7 million of cash flow from operating activities, the highest ever posted in the first quarter by the company.

"Manufacturing capacity utilization rates in the U.S. have remained above 80% for each of the first three months of 2007, which has historically indicated a favorable demand environment for industrial equipment such as compressors and blowers. We expect the industrial production rate of growth to slow in the U.S. throughout 2007, offset somewhat by increasing demand in the U.S. for environmental applications," said **Ross J. Centanni**, chairman, president and CEO. "The Asian markets are expected to remain strong and we continue to see growing industrial demand in Europe. As a result of these growth expectations, my outlook is positive for the Compressor and Vacuum Products segment in the second and third quarters of 2007 and cautiously optimistic for the fourth quarter of the year."

Revenues increased $42.1 million (11%) to $441.4 million for the three months ended March 31, compared to the same period of 2006. The Compressor and Vacuum Products segment revenues increased 6% for the three-month period of 2007 compared to the previous year, driven by favorable changes in currency exchange rates and organic growth in most product lines except mobile blowers. Fluid Transfer Products segment revenues increased 27% for the three months ended March 31, 2007, compared to the same period of 2006. Revenue growth was primarily related to increased volume in drilling and well servicing pumps, resulting from incremental production output, supply chain improvements and price increases.

Compressor and Vacuum Products orders of $367.5 million for the three-month period ended March 31 were $33.8 million (10%) higher than the same period of the previous year due to organic growth and favorable changes in exchange rates. Backlog in this reportable segment was 22% higher than on March 31, 2006, and 9% higher than on December 31, 2006.

Net income for the three months ended March 31 increased $12.3 million (40%) to $42.8 million, compared to $30.5 million in same period of 2006. Diluted earnings per share for the three-month period of 2007 were $0.80, 40% higher than the comparable period of the previous year as a result of the increased net income. Segment operating earnings as a percentage of revenues (segment operating margin) for the Compressor and Vacuum Products segment were 11.5% in the three months ended March 31, compared with 11.2% in the same period of 2006.

EnPro Industries (NYSE:NPO) reported on May 3 continued improvement in sales, segment profits and segment profit margins during the first quarter of 2007 as the company's results in each of those areas exceeded the record highs set in the first quarter of 2006. EnPro is the parent company of **Quincy Compressor**. Net income in the first quarter of 2007 was $12.3 million, or $0.56 a share, a decline from 2006, when net income was $14.8 million, or $0.69 a share. However, net income in 2007 was reduced by asbestos-related expenses of $12.9 million before tax, compared to $4.9 million before tax a year ago.

"Once again, our businesses performed extremely well in the first quarter," said **Ernie Schaub**, president and chief executive officer. "We benefited from healthy markets, operational efficiencies and acquisitions we completed last year to get 2007 off to a very strong start." Some of the highlighted numbers were:

- Sales increase 8% to $247.3 million. Each of the company's segments reported sales increases in the first quarter of 2007, reflecting continued high levels of demand
- Segment profits improve by 10% to $42.2 million or 17.1% of sales
- Earnings of $0.56 a share reflect a reduction of $0.36 a share after tax for asbestos-related expense. Before asbestos-related expense and other selected items, earnings increased 12% to $0.95 a share

SPECIAL REPORT:

BY ROD SMITH

Mr. Emmanuel Perez of CTA.

Mr. Erwin Ruppelt of Kaeser Compressor.

The Hannover Fair is stronger than ever. There were 230,000 visitors to the 2007 Hannover Fair, held in April in Hannover, Germany. Show officials were happy to say that attendance had increased by 10% over the prior fair. The rate of international participation among exhibitors was very strong. Out of the 6,400 exhibitors, 3,222 came from abroad — from 68 countries. This put the international turnout at over 50% — the highest figure in the 60-year history of the Hannover Fair.

The Compressed Air and Vacuum Hall "ComVac Halle" was filled with new technologies and old friends. What a nice combination! I had a number of flashbacks (stand set-ups, old distributors, old competitors, and yes — the Oktoberfest Hall) as I walked the aisles. It was great to see the booths larger than ever and the overall feeling was that of a dynamic industry which is strong and growing.

As a many-time exhibitor and first-time visitor, I sported my new "Press Badge" humorously and was on the look-out for new booths and new technologies. It's impossible to write about everything I saw (I spent two full days in the ComVac Halle and didn't see every booth!), and I didn't even go to the other exhibit halls — but here goes.

The first booth I saw when I entered the ComVac Halle was the booth of **CTA**. CTA is a French dryer, filter and chiller manufacturer with plants in Lyon, France, and Thailand. I found it interesting that all CTA dryers are shipped with a dew point performance verification letter from Bureau Veritas. The president of CTA, Mr. **Emmanuel Perez** said, "Buyers don't have a way of distinguishing quality air dryers from others. We believe that ongoing performance verification testing by third parties is the only way to provide buyers with this assurance."

THE 2007 HANNOVER FAIR REVIEW

Always the largest booth at Hannover, **Kaeser's** booth this year was no different. Energy-saving equipment, including new DSD Series rotary screw models, was everywhere. Mr. **Erwin Ruppelt**, Kaeser's manager of consulting engineers, said that since they began measuring the energy-saving effectiveness of their equipment in 2000, "Kaeser system solutions have saved our customers 23.8 TWh — the equivalent of 15 megatons of CO_2 emissions." Along with many rotary screw compressors, the booth also introduced the new Com-paK Plus Series of rotary blowers capable of pressures up to 1000 mbar and of vacuum to 500 mbar. Kaeser USA had, as always, a large group visiting the show led by Mr. **Reiner Mueller**.

New Bauer K24 range of high pressure compressors.

High pressure compressors and dryers were well represented. **Bauer** Compressor had their new K24 range of high pressure air compressors on display. The product line provides pressures from 900 to 5000 psi for air flows of 70 to 206 cfm. **Sauer** was also present with a full line of high pressure air compressors, including a complete line of H-Series helium compressor modules. **BEKO** had on display their Drypoint AC HP high pressure desiccant air dryer. This dryer delivers dew points of -40 ˚F or -100 ˚F for air pressures between 100 bar (1500 psi) and 420 bar (6200 psi).

An innovative combination refrigerated/heated desiccant air dryer was on display at the **SPX** Dehydration & Process Filtration booth. The general idea is that you use the refrigerated dryer in the summer and the heated desiccant air dryer in the winter. "The new HybriDryer™ combines demand-matched energy savings and a choice of dew points to maximize your year-round energy efficiency," said Mr. **Ingo Radisch**, general manager of SPX in Germany. The SPX booth had a large display of **Hankison**, **delair** and **Pneumatic Products** technologies.

Mr. Ingo Radisch of SPX Dehydration & Process Filtration.

SPECIAL REPORT: THE 2007 HANNOVER FAIR REVIEW

Zander PURGAS filters and adsorbers for technical gases.

The new BEKO MEDBAC and OILCONTROL products.

The domnick hunter breathing air purification packages.

You don't get thirsty or hungry at the booths of the Hannover Fair. Some booths even have outstanding kitchens! **BEKO** was no exception, and I enjoyed a nice Bockwurst at their stand with a true German bier. Food aside, one of the new technologies was a new generation of ÖWAMAT® oil-water separators. A new filter cartridge technology containing no activated carbon is now used to separate oil from the condensate. "The new technology is lighter to change out and provides improved performance," said **Tilo Fruth**, vice president of BEKO USA. The other big news was the introduction of a new OILCONTROL product able to measure and record residual oil contents of up to 0.001 mg/m^3 in compressed air. I was impressed that this could become a "distributor product" and start providing end users with visibility to oil content in their air stream. Another new product was the MEDBAC, a monitoring system for breathable air supply such as those used in hospitals. The MEDBAC can monitor oxygen, carbon dioxide, carbon monoxide, water vapor, oil vapor, sulphur dioxide and nitrous gases to comply with Pharmacopoeia medical standards. These new products are the first results of the newly created **BEKO Instruments Company**, as announced in February 2007 by the chairman of BEKO, Mr. **Berthold Koch**.

The ability to filter and purify technical gases, such as compressed natural gas (CNG), was on display at the **Zander** (a division of **Parker**) booth. The PURGAS product line of technical gas filters and adsorbers showed Zander's commitment to the natural gas market. A member of the ENGVA (European Natural Gas Vehicle Association), I learned about Zander's involvement in providing low water dew points in CNG. Per Zander's product information, tax relief is granted in Germany to CNG motor vehicle fleet operators, and the single most important safety requirement for CNG is a low dew point temperature. For this reason, natural gas vehicle (NGV) fueling stations in Europe use the PURGAS products.

Another large **Parker** company, **domnick hunter**, had a big booth, and what caught my eye was their filtration packages for breathing air. These breathing air packages use activated carbon filters to eliminate oil vapors and odors and are used in ambients where no carbon monoxide is present. Combined with pre-filters and regulators, these are some slick packages.

Atlas Copco displayed its multi-brand strategy at Hannover. There were separate booths for Atlas Copco, **MARK/Ceccato**, **Worthington**, and **ALUP**. The Atlas Copco brand was only present at the Atlas Copco booth. The other booths truly represented the independent business units their brands represent, as explained to me by Mr. **Herman Matthyssen**, vice president of multibrands in the Atlas Copco Industrial Air Division. I find the strategy a remarkable accomplishment in technology and sales channel differentiation — all aimed at optimally serving the needs of different customers and markets.

New electronic zero air-loss condensate drains were on display at the **Jorc** Industrial booth. Mr. Jan de Bie walked me through their newest designs incorporating programming capabilities and DIN electrical connections. They were also excited about the new AIR-SAVER® product designed to be installed on the air outlet of a receiver tank. The product will automatically shut off the air receiver from the air compressors at the end of a production day. In this manner, the receiver tank feeds the air leaks demanding air overnight when the plant is not in operation — and the air compressors don't have to turn on — thus saving energy and air.

Fast Italian motorcycles and new rotary vane air compressors and generators were on display at the **Mattei** booth. Mr. **Vincenzo Greco** showed me their new technologies, which use two rotary vane airends off of one electric motor. The result is greater cfm output per kW and lower maintenance costs. Known for their compact models under 50 horsepower here in the U.S., Mattei in Europe also sells large rotary vane air compressors up to 250 kW.

There were so many other booths. **Gardner Denver** had a booth with their air compressors and blower products. **MTA**, as always, had their full line of compressed air dryers and cooling systems on display. **Solberg** had their filter/silencers on display to support their efforts to grow international business. **Friulair** displayed their refrigerated air dryers and other compressed air treatment products. **Aerzen** had a big booth with blowers using rotary screw compressors. They spoke of their strengths in water treatment, food, power generation, chemical/plastics and cement markets. **Mikropor**, an up-and-coming dryer company from Turkey, had an impressive booth with refrigerated dryers using plate heat exchangers.

The ALUP booth displayed new rotary screw air compressors.

Mr. Jan de Bie of Jorc Industrial holding an AIR-SAVER®.

Mattei rotary vane air compressors and generators.

SPECIAL REPORT: THE 2007 HANNOVER FAIR REVIEW

BOGE celebrates its 100 year anniversary.

Mr. Hannu Heinonen and Mr. Karl-Heinz Gilfert of FuSheng.

Prevost from France displayed their full range of compressed air treatment products, piping and fittings for compressed air systems. Prevost has always impressed me with their product designs. **Donaldson** had a large booth with their **ultrafilter** brand products featuring innovative differential pressure indicators on the filters on display. A U.K. company called **LeekSeek** introduced a leakage management system at their booth. Another U.K. company, **John Guest**, had their plastic piping systems on display. There was a Korean company called **ACE Corporation** with a mechanical zero air-loss condensate drain. A new air treatment company called **ultra.air** was present with filter media offering "nano-filtration technology" used on pleated elements. **Ingersoll Rand** had a significant booth promoting the IR brand as we see it here in the U.S. In the past, acquired brands like EcoAir had been promoted by IR at Hannover. **BOGE** Compressor had a big booth and held a big party (which I missed, unfortunately) to celebrate their 100 year anniversary.

I would suggest to anyone planning to visit the Hannover Fair in April 2009 (the next one for compressed air and vacuum) to allow more than the two full days I allowed. **FuSheng**, the parent of **FS-Elliott** turbocompressors and of **Curtis Toledo**, had a nice booth at the show with the turbos and new rotary screw compressors on display. **Samsung** had lubricated and oil-free air compressors on display with oil-free models between 125 and 175 horsepower. **Mann+Hummel** showed their industrial filtration products, including compressor intake filters. **Renner**, a German manufacturer of rotary screw compressors, displayed some innovative packaging of shop-air rotary screw compressors with integrated connections and hoses for pneumatic tools. **Condor** displayed pressure control products, and **OMI** and **KSI** showed the compressed air treatment products they manufacture out of Italy and Germany, respectively.

After having worked the show five times over the years, this was my first time just visiting it. As mentioned, two days were not enough for me to get out of the ComVac Halle. I would have liked to have visited the pneumatics hall and the motor technology hall. I would have also enjoyed listening to the symposiums on today's energy markets and where the future is headed. Did you know that Germany dominates the market for wind turbine manufacturing?

If you are looking for a contact name at some of these companies, let me know. I returned with a stack of business cards. Also, I'm going back to Hannover in 2009 — this time for more than two days. I'm thinking of organizing an "American Expedition." Give me a call if interested!

For more information, contact Rod Smith, tel: 251-680-9154, email: rod@airbestpractices.com

INDUSTRY NEWS

Press Releases

IMMEDIATE AVAILABILITY!

Quick-Ship blower packages from 5 to 200 hp

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Kaeser Compressors, Inc. announces its new Quick-Ship package blower series. Kaeser now stocks a full range of Com-paK Plus rotary lobe blower packages in 5–200 hp. Available for immediate delivery, most units can be shipped in one working day.

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Need it now? Whether it's a new installation or a replacement unit, Kaeser has the solution. For more information on the Quick-Ship series, call today 800-777-7873 or visit www.kaeser.com/omega.

INDUSTRY NEWS

FROST & SULLIVAN ACKNOWLEDGES HITACHI AMERICA'S CONSTANT COMMITMENT TO IMPROVING TECHNOLOGY IN THE VARIABLE SPEED DRIVES MARKET

HITACHI

Palo Alto, Calif. — April 25, 2007 — *Frost & Sullivan* selected Hitachi America, Ltd. as the recipient of the 2007 *Frost & Sullivan* Award for Excellence in Technology & Product Value in the variable speed drives market.

The company has an unmatched ability to pioneer vector control technology and build solutions to enable customers to achieve operational excellence.

With innovation being a key differentiator in an intensely competitive market, Hitachi has shown an outstanding ability to transform its process and product knowledge into newer solutions and technologies.

The company's relentless technology development has helped create a robust product line, which has enabled customers to minimize costs and maximize profitability.

An upshot of Hitachi's R&D efforts is the radical "Intelligent Sensorless Vector Control," introduced in the SJ200 series of inverters, which can overcome the complicated auto-tuning process to achieve optimal performance. The SJ200 provides unparalleled simplicity and flexibility.

"Hitachi has demonstrated diligence in integrating various technologies into value-enhancing solutions to exceed customer expectations," says *Frost & Sullivan* Team Leader Shibu S L. "It is focusing on changing its flexible business model into a keen customer-focused R&D culture across geographic boundaries."

The company is known for its immensely practical and economical products such as the SJ300-EL series of inverters. The company's foresight has also resulted in the creation of specialized, fully tunable sigmoid acceleration and deceleration function for elevator controls.

Strategically, Hitachi is likely to continue investing in products that offer better energy savings to its global customer base. This value addition is provided in the L300P series of inverters, which have delivered better control, enhanced energy savings, and a guaranteed uptime.

Hitachi has shown an aptitude to look beyond the immediate and exhibit strong commitment toward exceeding customer expectations. The new and full-featured L200 Series micro variable speed drives have enhanced flexibility and one of the smallest footprints available and also have excellent easy-to-use/maintain features.

"Hitachi has shown distinct competence in translating its extensive processes knowledge and vertical industry expertise into products that deliver superior customer value at a reduced cost of ownership," notes Shibu. "The company's wide array of value-enhancing solutions by pioneering vector control technological innovations has helped customers achieve operational excellence."

For more information, please contact Ms. Michelle Cio, tel: 914-524-6615, email: michelle.cio@hal.hitachi.com

2007 FROST & SULLIVAN
North American Variable Speed Drives Excellence in Technology & Product Value of the Year Award

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The BEKO range of reliable performance products includes all aspects of economical, safe and ecologically responsible compressed air use. With their unique and diverse capabilities, all of the product families meet the demands of tomorrow's advancements today, from individual components right up to those of complete large-scale systems.

Being that every system, no matter how large or small, is made up of individual components, only components that are designed to work with each other, and are suited to rigorous applications and conditions can fulfill their performance expectations in a reliable and environmentally friendly way.

BEKO does more than manufacture phenomenal products, we are a complete solutions provider. Ranging from analysis of the problem, to specification, installation support, maintenance resolutions and comprehensive customer service, the BEKO know-how for compressed air use is customer oriented with a global focus.

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Each drop of condensate in the compressed air system involves risks, and these risks can kill cost accounting and profitability at any time. Superior condensate management can only be achieved through the use of reliable and technologically advanced products like those offered by **BEKO** Technologies. With over one million installations of **BEKOMAT®** condensate drains, the numbers simply speak for themselves. **ÖWAMAT®** oil-water separators set the industrial standard for condensate treatment.

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