Chrysler Saves $400,000 Stamping Facility Saves 7,900,000 kWh

May 2009

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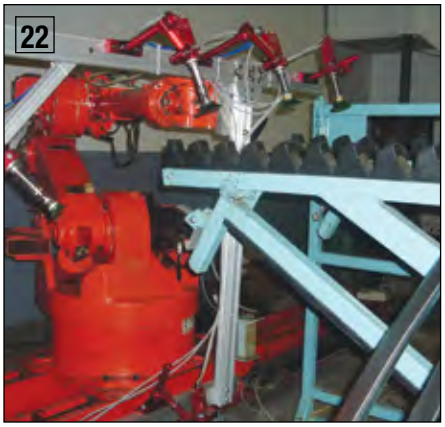
SUSTAINABLE MANUFACTURING FEATURES



COLUMNS

FROM THE EDITOR

The Automotive Industry Will Rebound

The Automotive Assembly industry has seen better days and its effects are felt throughout many sub-industries. I remember the early 1990s when, as a graduate student, many MBA's in the classrooms proclaimed the United States could not build cars competitively. I said I knew we would find a way to compete — because it's too important. I still feel the same way today — we will find a way to compete. My personal opinion is that marketing has convinced their companies that consumers want cupholders rather than high-end engineering and machinery. I think automotive engineers got the U.S. on the map with engineered, high-quality machines, and I hope we go back to that philosophy while meeting the new efficiency demands of today. I for one have already voted for turbo-diesel — speed plus 40 mpg on the highway!

Speaking of efficiency, the System Assessment of the Month, written by Mr. Bill Scales, details the steps he took to help a major automotive stamping facility reduce energy costs by $360,000. The company saw a reduction in energy use of 7,900,000 kWh. A demand-side solution made it possible to simply turn air compressors off.

The Energy Manager Feature describes how Mr. Mike Roberts and his colleagues at SKF are helping their facilities and their customers reduce energy costs. BeyondZero™ Sustainability at SKF provides a goal all employees around the world can understand. Their goal is to have a carbon impact of less than zero in the world by introducing energy-saving technologies and reducing energy-intensity in their own facilities.

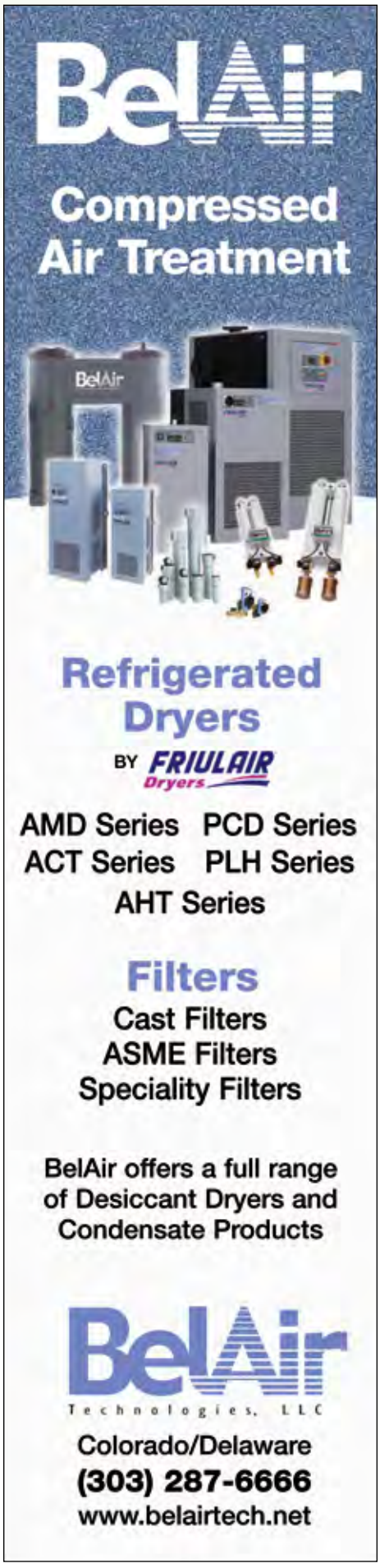
The Energy Rebate Feature, by Mr. Jesse Krivolavek, provides information on the American Recovery & Reinvestment Act of 2009. Government incentive programs for energy efficiency are providing our industry with a tremendous opportunity to implement projects. Knowledge of how to access these funds will be critical. So critical that, in my opinion, market share changes will occur based upon this. Mr. Krivolavek gives us leads on where to start the investigation.

Finally, Mr. Thomas Mort shares with us some basics on what metering products to use to conduct system assessments. Fresh off the airplane from the Czech Republic where he identified energy-saving opportunities for his client to the tune of $1.4 million, Mr. Mort provides a nice menu of recommended instruments to be used.

The automotive stamping plant saved $360,000 and 7,900,000 kWh per year in energy costs

We hope you enjoy this edition and thank you again for your support and for investing in industrial energy efficiency.

ROD SMITH
Editor
rod@airbestpractices.com



SUSTAINABLE MANUFACTURING NEWS

SOURCED FROM THE WEB

Toyota Manufacturing Manages Energy & Greenhouse Gases

The majority of CO_2 emissions associated with our manufacturing facilities is related to our energy usage. Our facilities consume more than $100 million worth of energy annually, resulting in 1.4 million metric tons of CO_2 emissions per year. It is sound business practice to seek ways to reduce the financial and environmental costs of our energy use.

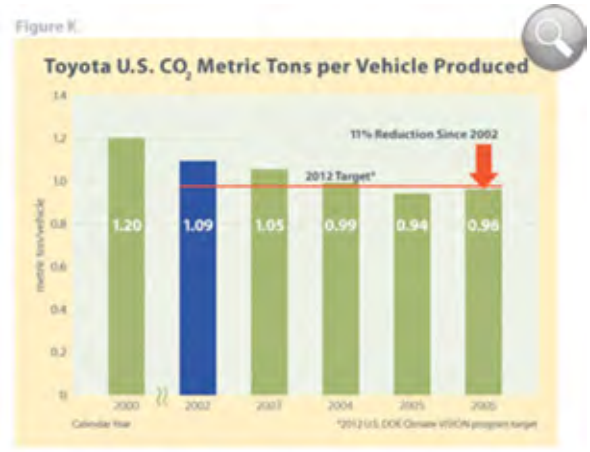
Energy use is the main source of greenhouse gases from our manufacturing plants. Figure K shows our GHG emissions from energy use at our U.S. plants. For Toyota's worldwide production, we are committed to a 20% GHG reduction per sales unit by 2010, against a 2001 baseline. In the U.S., Toyota, along with other members of the Alliance of Automobile Manufacturers, participates in the U.S. Department of Energy Climate VISION program. Member companies have committed to reducing the level of GHGs emitted from manufacturing operations by 10% per vehicle produced by 2012, compared to a 2002 baseline. **We are exceeding this U.S. commitment.** In this first year of our new Action Plan, we increased production at our non-assembly plants in Alabama and West Virginia and expanded our non-assembly plants in Delta, British Columbia and Troy, Missouri. Due to these production increases and facility expansions, our overall energy use per vehicle slightly increased. **Nevertheless, we are still on track to reach our target and continue to implement pilot projects and *kaizens* to reduce energy use.**

Toyota has been an Energy Star® partner since 2003. For the third year in a row, Toyota Motor Engineering and Manufacturing, North America, was awarded the 2007 Energy Star® Award for Sustained Excellence in their U.S. manufacturing operations. In addition, the U.S. EPA recognized Toyota vehicle assembly plants in Indiana, Kentucky and northern California with Energy Star® Plant Awards.

One of the ways we reduce energy use is to pilot energy reduction projects. The projects must have a payback of less than three years and must be able to *yokoten* (be implemented) at other manufacturing plants. These projects can involve either a new technology or a new application of an existing technology.

Implementation of a pilot project is almost complete at our plant in Cambridge, Ontario, that will use waste heat from an air compressor unit to preheat the city water before it is processed by reverse osmosis. The project is planned to improve the efficiency of the reverse osmosis system with an estimated combined electric and natural gas reduction of 5,000 MMBTUs per year and a water reduction of $6 million gallons per year.

Source: www.toyota.com



SUSTAINABLE MANUFACTURING NEWS

Toyota, Ford, General Motors and Nissan

Ford Reduces Global Energy Use

Ford has reduced global energy use by 30% overall, or 19% per vehicle, compared to 2000 levels. In 2007, Ford improved energy efficiency in the United States by 4.5%, resulting in savings of approximately $18 million. We are targeting an additional 3% improvement in energy use in 2008. Since 2000, we have reduced our total facility-related CO_2 emissions by approximately 39%, or 3.6 million metric tons. Ford has set a target to reduce its North American facility GHG emissions by 6% between 2000 and 2010 as part of its Chicago Climate Exchange commitment. The company has also committed to reduce U.S. facility emissions by 10% per vehicle produced between 2002 and 2012, as part of an Alliance of Automotive Manufacturers program.

The Environmental Protection Agency (EPA) again recognized Ford's energy efficiency achievements by awarding us a 2008 Energy Star® Partner of the Year Award in the category of Sustained Excellence, which recognizes Ford's continued leadership and commitment to protecting the environment through energy efficiency. Among the achievements recognized by the award is a 30% improvement in the energy efficiency of U.S. facilities since 2000, equivalent to the amount of energy consumed by 270,000 homes.

In 2006 and 2007, we installed a utility metering and monitoring system. This system collects incoming electricity and natural gas consumption data for all Ford plants in North America to help Ford monitor plant energy use in near-real time and take appropriate actions to reduce consumption and improve the stability of delivered power. Collected data is used to plan cost-effective natural gas purchases, analyze plant non-production shutdowns, generate energy use profiles and monitor power quality.

Ford continues to upgrade and replace infrastructure through the use of energy performance contracts at its plants, commercial buildings and research facilities. In this process, Ford partners with suppliers to replace inefficient equipment, funding the capital investment over time through energy savings. Projects have been implemented in our manufacturing facilities to:

- Upgrade inefficient lighting systems
- Upgrade paint-booth process equipment
- Upgrade compressed air systems
- Significantly reduce the use of steam

ENVIRONMENTAL PERFORMANCE METRIC	2007 GOAL	2007 ACTUAL	2008 GOAL
ENERGY USE			
Facility energy efficiency (global)	3% improvement	5% improvement	3% improvement
Facility energy efficiency (United States)	3% improvement	4.5% improvement	3% improvement
Energy usage	No specific goal; continue use reductions	30% reduction compared to 2000 levels	No specific goal; continue use reductions
EMISSIONS			
VOC emissions from painting at assembly plants	Reduce to 29 g/sq meter	Reduced to 24 g/sq meter	Maintain 24 g/sq meter
WATER USE			
Water use (global)	3% reduction	21% reduction	3% reduction
WASTE PRODUCTION			
Landfill waste	No specific goal	Produced 132 million kg, or 4.6 kg/vehicle produced	5% reduction

Since 2000, Ford has invested more than $200 million in plant and facility upgrades, including about $190 million using performance contracts and $20 million in capital projects. To drive continued progress, we have set targets to improve our facility energy efficiency by 3% globally and 3% in North America each year in 2007 and 2008. We measure energy efficiency using our Energy Efficiency Index*.

** The Index is "normalized" based on an engineering calculation that adjusts for typical variances in weather and vehicle production. The Index was set at 100 for the year 2000 to simplify tracking against energy efficiency targets.*

Source: www.ford.com

In 2007, Ford improved energy efficiency in the United States by 4.5%, resulting in savings of approximately $18 million.

SUSTAINABLE MANUFACTURING NEWS

Toyota, Ford, General Motors and Nissan

In 2007, GM achieved a 26.4% reduction in CO_2 emissions from 2000–2007 and established another five-year target of an additional 8% reduction in CO_2 emissions from 2005–2010.

General Motors Commits to Energy Conservation

General Motors global energy expenditures exceed *one billion* U.S. dollars annually. Both cost and environmental concerns make energy efficiency extremely important to us, and we focus on saving energy at all levels of GM operations. GM's global energy strategy continues to drive energy efficiency across our global operations.

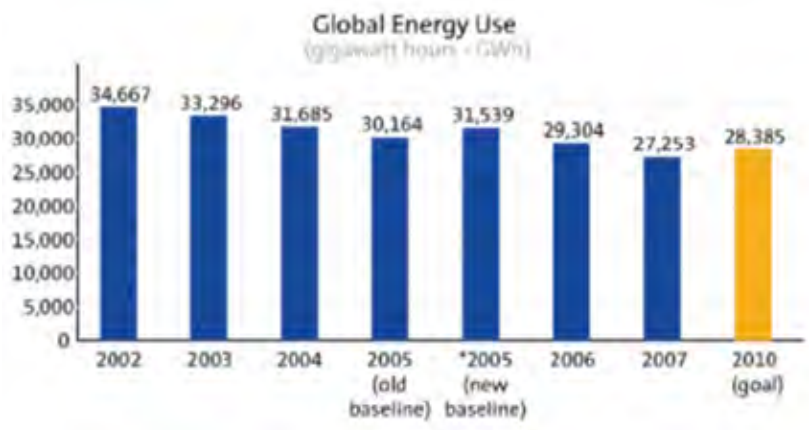
GM's Energy & Utility Services Group (EUSG) executes and coordinates energy policies and programs and manages energy and utility operations at all GM facilities. The EUSG is one of four major Centers of Service in the GM Worldwide Facilities Group (WFG).

In 2007, GM achieved a 26.4% reduction in CO_2 emissions from 2000–2007 and established another five-year target of an additional 8% reduction in CO_2 emissions from 2005–2010. GM's energy goal is based on an absolute reduction in BTUs, while the CO_2 goal is based on an absolute reduction in tons of CO_2 emissions. The only material greenhouse gas (GHG) emission from GM's facilities is CO_2.

ENVIRONMENTAL INDICATORS	2006	2007	PERFORMANCE
Energy Use (GWh)	29,304	27,253	Reduced 7%
CO_2 Emissions (metric tons)	10.23 million	9.54 million	Reduced 6.7%
Water Use (cubic meters)	55.3 million	54.5 million	Reduced 1.4%

The difference between GM's CO_2 target and the energy target is due to the various ways electricity is generated. Different generation methods, such as coal, natural gas, nuclear and hydro, have different emission factors for the varying amounts of CO_2 these sources emit. CO_2 emissions from GM's purchased electricity equates to approximately 68% of GM's CO_2 global operations footprint. Therefore, GM continues to implement its global energy strategy with a goal to grow its "green power" purchases. GM voluntarily reports its environmental performance with guidelines developed by the Global Reporting Initiative (GRI). This includes performance metrics associated with GHG emissions.

www.gm.com



Nissan: Reducing CO_2 Emissions

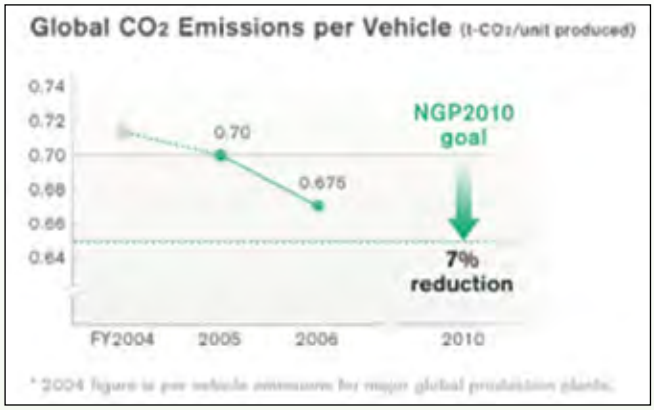
NISSAN MOTOR COMPANY

More efficient usage of energy is essential to reducing carbon dioxide (CO_2) emissions. At Nissan, we are steadily reducing CO_2 emissions by introducing energy-saving equipment and raising efficiency at our production sites worldwide.

The number of automobiles being manufactured worldwide is increasing every year. At Nissan, we believe it is important to use energy more efficiently during production and reduce CO_2 emissions at all of our manufacturing plants around the world. In 2005, we began activities to reduce CO_2 at our overseas production sites. As a result of these efforts, CO_2 emissions from our manufacturing plants were down to about 2.12 million tons in fiscal 2006, a decrease of about 230,000 tons from fiscal 2005. In Japan, CO_2 emissions were 1.03 million tons, a 13% decrease from 2005 (and a 39% decrease from 1990), and we are on course to reach our CO_2 reduction targets set out in the Nissan Green Program 2010.

By 2010 we aim to reduce CO_2 emissions from our plants to 7% lower than 2005 levels (globally, per vehicle). Almost all CO_2 emissions from production processes are caused by the use of fossil fuels for the energy we consume. To produce vehicles using smaller amounts of energy, the Nissan group worldwide is working together to improve technology and devise better operation methods. We will continue to reduce CO_2 by introducing the best methods available wherever we can. We also make use of wind and solar power and other natural energies as suited to local conditions. BP

Source: www.nissan-global.com



THE SYSTEM ASSESSMENT OF THE MONTH

Automotive

BY BILL SCALES P.E., SCALES INDUSTRIAL TECHNOLOGIES

May System Assessment of the Month

Where:	North America
Industry:	Automotive
Issues:	Stamping presses operating at high pressure
Audit Type:	Supply and Demand Side

System Assessment Win/Win Results

Energy Savings per Year:	$360,000
% of Annual Energy Cost:	3.5%
Compressor Cost Avoidance:	$40,000
Reduction in Energy Use:	7,900,000 kWh
Equivalent CO_2 Emissions:	5,633 metric tons
Equivalent CO_2 for Homes:	746 homes
Equivalent CO_2 for Vehicles:	1,032 vehicles

System Overview

This stamping plant is a 2.5 million square-foot facility with over 2,000 employees. At the time of the assessment, the plant was processing approximately 1,600 tons of steel per day into automotive vehicle components and parts. The plant has many large stamping presses that use significant amounts of the plant's compressed air.

Compressed air used by the stamping presses and the plant's other compressed air applications in the assembly area was generated by four large air compressors and was supplied to these end-uses off the main header at 75 psig. These air compressors were a 3,000 horsepower centrifugal, two (2) 2500 hp centrifugals and an 800 hp reciprocating air compressor. The compressed air was then treated by three compressed air drying and filtration systems in the powerhouse. The compressed air was distributed via the main air headers to the stamping pressroom and to the assembly area.

Prior to the modifications, robots used high-pressure compressed air for vacuum venturi cups used to handle parts on various stamping press lines. These robots were served by six 30 hp, rotary-screw satellite air compressors operating at 110 psig with their own in-line compressed air dryers.

System Before Assessment		System After Assessment	
Avg. Production Air Flow:	25,000 scfm	Avg. Production Air Flow:	20,500 scfm
Main Header Pressure:	75 psig	Main Header Pressure:	70 psig
Stamping Press Supply Lines:	110 psig	Stamping Press Supply Lines:	70 psig

800 hp reciprocating compressor taken off-line
Six 30 hp rotary-screw compressors removed

Setting the Baseline

A project team composed of plant management, production engineers and technical staff from the local utility company evaluated the plant's compressed air system and generated a strategy to improve the system's efficiency and performance. The team discovered that compressed air was being lost due to a high leakage rate in both the stamping press counterbalance cylinders and other end-use applications. In addition, the team determined that the vacuum venturi cups in some robot press lines would operate satisfactorily when supplied with air at 70 psig versus 110 psig.

In order to reduce the air being lost from the leaks in the system, the team decided to implement a comprehensive leak management program. In addition, the team decided to find a way to supply the robots with air from the main header, eliminating the need for the high-pressure satellite compressors.

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THE SYSTEM ASSESSMENT OF THE MONTH

Automotive

"In this case, assumptions regarding the pressure level for the venturis to produce the vacuum required for operating the robots resulted in unnecessary equipment being purchased and installed."

— Bill Scales

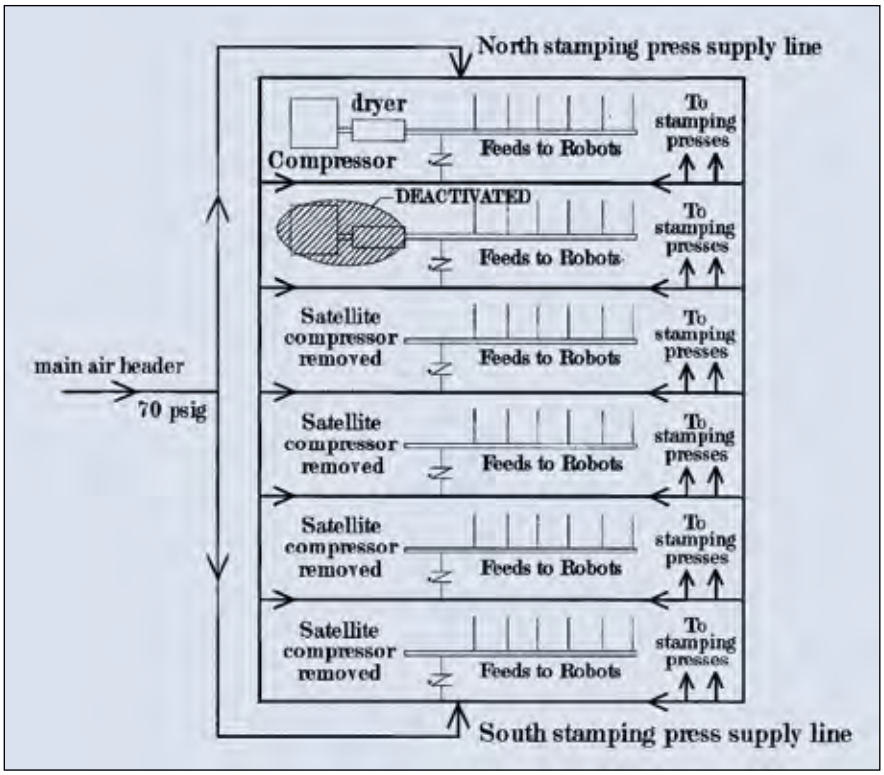
Project Implementation

Establishing and implementing the leak management component of the project took about six months to perform. First, a leak detection/correction team was formed. The team identified and corrected the compressed air leaks throughout the system. The packing and seals on the counterbalance cylinders were a major source of leaks and were replaced.

The team noticed that the system was using flow measuring orifice plates and replaced them with pitot tubes. These devices are more efficient because the pressure drop across them is lower. It was possible to lower the compressor discharge pressure settings and the average main header pressure went from 75 psig to 70 psig. The system pressure in this plant was originally 87 psig but was reduced incrementally during the prior six months as a result of an audit performed at a "sister" plant.

Lowering compressed air system pressure by adjusting compressor set points can save substantial amounts of energy. For systems in the 100 psig range, a rule of thumb is that for every 2 psi drop in average system pressure, energy consumption will be reduced 1%.

This change not only reduced the amount of energy that was required to produce the compressed air but also reduced artificial demand, which contributed to lower compressed air and energy consumption. Artificial demand is defined as the excess air required by a system's unregulated uses because the system is being operated at a pressure in excess of production's true requirements. When average system pressure is reduced, artificial demand is lowered resulting in less demand for air.



Review of the design characteristics of the robot's vacuum cup requirements determined that they would operate satisfactorily with the pressure available from the main header (about 70 psig). Five of the robots already had a supply line from the main header in parallel with the discharge piping from the high-pressure satellite compressor. These five were reconfigured to receive air from the main header.

Project Results

The leak management program and actions to reduce pressure drop allowed the production facility to both reduce compressed air needs and reduce the pressure being supplied. As a result, the average standard cubic feet per minute (scfm) of compressed air supply declined by 18%, from 25,000 scfm to 20,500 scfm. The plant was able to take an 800 hp reciprocating compressor (10% of their capacity) off line and was able to operate the remaining compressors more efficiently at lower pressure. The aggregate annual energy savings were 7,900,000 kWh and the project reduced the plant's annual energy costs by $360,000 or more than 3.5%. About $40,000 was saved in avoided costs since the planned purchase of new satellite compressors was cancelled. Also, since one less compressor was operating, the plant was able to spend less on maintenance and gained backup compressor capacity reducing the chance of downtime.

Lessons Learned

High-pressure air should only be used when absolutely necessary. In this case, assumptions regarding the pressure level for the venturis to produce the vacuum required for operating the robots resulted in unnecessary equipment being purchased and installed. Had the robots been valid high-pressure applications, the satellite compressors would have been an efficient solution. Instead, it was found that the robots could operate satisfactorily at the plant's normal pressure level.

Another important lesson is that leak detection and correction programs need to be ongoing efforts. Air leaks continue to occur, so leak management programs need to be continuous efforts and are very important in maintaining the efficiency, reliability, stability and cost effectiveness of any compressed air system. BP

For more information please contact Bill Scales, Scales Industrial Technologies, tel: 516-248-9096, www.scalesair.com

THE ENERGY MANAGER

BeyondZero™ Sustainability at SKF

BY ROD SMITH, COMPRESSED AIR BEST PRACTICES®

Compressed Air Best Practices® interviewed Mike Roberts. Mr. Roberts is the Program Manager, Energy & Sustainability, for SKF.

How does SKF define sustainability?

We define sustainability as "SKF Care." SKF Care is a guiding principle for everyone at SKF. It has four dimensions — Business Care, Environmental Care, Employee Care and Community Care. Business Care's goals are to achieve a strong financial performance. Environmental Care focuses on reducing our impact on the environment — ours and our customers. Employee Care is about a safe, rewarding and respectful working environment for our employees. Community Care focuses on playing an active and positive role in the communities in which we operate. I look at sustainability as making decisions that our grandchildren won't regret.

What does BeyondZero™ mean?

The BeyondZero™ initiative was launched in 2005 to challenge the limitations of conventional environmental targets and become the role model for sustainability in the industry. Many environmental targets aim to reduce negative environmental impacts to "zero" net CO_2 emissions. BeyondZero™ aims to help our customers and external partners become more energy efficient and, in combination with our internal efforts, to reduce negative environmental impacts so as to go beyond the zero target.

Photo Courtesy of SKF: An Angular Contact Ball Bearing.

Another way to say this, with respect to CO_2 emissions, is that if you take SKF's global CO_2 footprint and compare it to the CO_2 reductions that our customers receive by working with our products and services the result will be a positive number — BeyondZero™. This message has been very well communicated globally to all employees and managers to guide their actions. It is a simple but powerful concept which can be easily translated and understood in our operations around the world.

Please describe SKF.

SKF was founded in 1907 and was already well established around the world by 1920. Today, SKF is represented directly in more than 130 countries and operates more than 100 manufacturing facilities around the globe. We are supported by close to 15,000 distributor locations.

In 2008, the number of first filings of patent applications was 179. In addition to our world-class product offerings, SKF can also deliver application solutions tailor-made for our customers and based in our five areas of core technical competence:

1. Bearings and bearing units
2. Seals
3. Mechatronics
4. Services
5. Lubrication Systems

SKF has supplied products, services and solutions to customers in all major industry sectors. We combine our technical expertise, global sales and service networks and intimate knowledge of our customers' industries to deliver integrated application solutions that help our customers become more effective and successful. We call this "Knowledge Engineering."

We have three customer-focused divisions at SKF, which deliver the tailor-made technologies to more than 40 customer segments. The divisions are Automotive, Industrial and Service. Customer segments include automotive, wind energy, railway, machine tool, medical, food & beverage, mining and metals, chemical, HPI and paper industries.

Photo Courtesy of SKF: Needle Roller Bearing.

THE ENERGY MANAGER

BeyondZero™ Sustainability at SKF

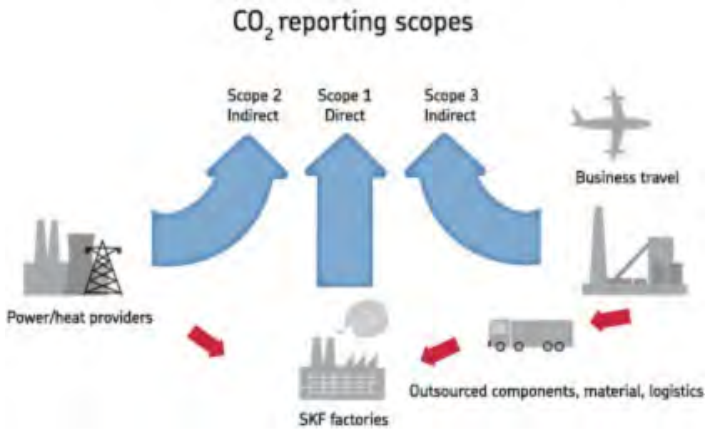
"Compressed air is the most consistent significant energy consumer in our worldwide facilities."

— Mike Roberts, SKF

How is BeyondZero™ reducing CO_2 emissions at SKF factories?

SKF has voluntarily publicly reported CO_2 emissions resulting from manufacturing operations since 2002. The first CO_2 emission reduction target was a 10% reduction by 2007 (compared with 2002). This target was successfully accomplished by 2005 with a 13% reduction in CO_2 emissions, even though production volume increased.

A new target was established in 2006 to achieve an annual minimum reduction of 5% in CO_2 emissions irrespective of production volume increases. In 2008, SKF reached an absolute reduction of 50,000 tons of CO_2 emissions or 9.1% compared to the 2007 total surpassing the target by some four percentage points. It is worth noting that the total Group's CO_2 emissions from Q1 to Q3 2008 were reduced by more than 5% compared to the same quarters of 2007, despite higher production volumes. It is also worth noting that these are net or over-all CO_2 numbers and goals — not intensity ratios.



What actions are being taken to reduce direct emissions at SKF?

SKF focuses on energy intensity and carbon intensity in our efforts to reduce our direct emissions of CO_2. Energy intensity works on reducing the energy used at our own facilities. Carbon intensity refers to the CO_2 emissions generated by our power suppliers.

All SKF sites with significant energy use (more than 0.2 GWh per year) have a designated energy coordinator who is responsible for running energy-saving activities at the site. An energy management training scheme, aimed specifically at the site energy coordinators, was rolled out throughout SKF in 2008 to provide the knowledge and resources required to deploy effective energy management at SKF.

We are now very focused on the cost reduction benefits of our energy intensity efforts. Realizing that we have a significant need for compressed air in every plant worldwide and that compressed air is one of the most consistent consumers of energy across our facilities, we are focusing on optimizing our compressed air systems. Some plants have a big HVAC load, some a large thermal load and some a significant pumping load — but every plant has a significant compressed air load.

How are you addressing compressed air related savings opportunities?

We have more than 100 factories and facilities in 130 countries. Our "Best Practice Factories" have adopted comprehensive compressed air monitoring and analysis programs. Compressed air is significant and measurable in every one of our plants and is something we focus on. While most factories have addressed compressed air in different ways, in a number of our plants, the potential remains for significant energy savings in compressed air.

In our "Best Practices" plants, there is a dedicated PLC-based automated compressor control system automating and monitoring the system. It is a continuous monitoring system allowing them to analyze and trend things like:

- Energy consumption/cost per unit of compressed air
- Unit of compressed air consumed per unit of production output
- Compressed air cost per unit of output

As a first step, we focus on surveying the demand side of the system and start with air leaks. Not all of our plants operate 24/7. When production is not operating, we can measure compressed air consumption by data logging air compressor energy consumption. This is the best way to identify the magnitude of overall facility leaks. We then focus our activities on looking for leaks using leak detectors. We prefer using the flow meters with thermal-dispersion and mass-flow technology.

We also look at ways to reduce system pressure. We start as far away as possible from the compressor in most demanding applications. We look at receivers, and we look at distribution/piping. We are well aware of the "dirty thirty" — which is the last thirty feet of piping before an application where so many issues can be identified. Sometimes it's a red hose with shut-off valves that don't work or old, leaky connections.

Inappropriate uses of compressed air are also reviewed. We look to see what demand-side pneumatics can be converted to mechatronics. Mechatronics is the appropriate replacement of pneumatic devices with electro-mechanical devices. The important word here is appropriate. Even though the energy cost of mechatronics can be 10% of the cost of pneumatics, there are many applications where pneumatic devices are the best choice. Only when a facility has a good handle on the demand side of the system do we begin to look at the supply side.

THE ENERGY MANAGER

BeyondZero™ Sustainability at SKF

SKF Quick Facts

Global
Employees: 44,800
Sales: $7+ Billion (USD)
110 factories

U.S.
Employees: 4,360
Sales: $1.4+ Billion (USD)
19 factories

What is the function of your group within SKF?

We are the Energy and Sustainability Management (ESM) team. We are part of the SKF Reliability Systems group within the Service Division. We help both SKF facilities and SKF customers develop processes to manage energy and to identify energy savings. We have developed the Client Needs Analysis — Energy & Sustainability (CNA-ES) tool to begin the process of comprehensive energy management.

Please describe the SKF Client Needs Analysis — Energy & Sustainability (CNA-ES)

The CNA-ES tool came from the successful tradition established at SKF by use of the CNA-AM (Asset Management) process. The CNA-AM process focused on monitoring and advanced maintenance of rotating equipment. Clients have been using SKF bearings for optimal asset performance for over 100 years. Condition monitoring and asset efficiency is the key element in our SKF Reliability Systems offerings. When we first focused on analyzing vibration, the goal was mechanical reliability. Our people realized that reliability and energy efficiency are just two sides of the same coin and that led us to the development of the CNA-ES process.

The CNA-ES tool is a consultative process made up of a series of 40 questions. The questions are delivered in four segments with 10 questions in each facet. Working with SKF, they help a facility conduct a structured investigation of their energy and sustainability practices. The four segments are:

- Energy and Environmental Management
- Energy Efficiency Tools
- Energy-Efficient Operations
- Environmental Controls

We discuss the 40 questions with a team of people from the production facility. Managers from the maintenance, operations, financial and environmental groups all come together in the room. We bring an SKF account manager who knows their business, a CNA-ES facilitator and a manager from our Energy & Sustainability group.

What are the four segments of the CNA-ES tool?

The first segment of the CNA-ES tool is a general review of energy and environmental practices at the facility. This examines how a facility is organized, e.g. is there an energy policy and an energy champion at the facility? One classic situation we encountered was when the plant manager was asked, "do you have a written energy policy?" The plant manager said "absolutely," and the maintenance manager responded, "we do?" While the answer was "yes," the lesson was that the program had not been effectively communicated.

The second segment of the CNA-ES tool examines the techniques being used to manage energy. Is energy consumption monitored and tracked for different processes in the facility?

Segment three digs into whether specific processes have been optimized with energy reductions. One of the simplest things people can do is understand when they can turn off equipment. If the major piece of equipment "A" is shut down, can you shut down the auxiliary systems too? We often find that the auxiliary machines are normally kept running and consuming electricity. Routine operating procedures usually discuss start-up processes. We don't often see operating procedures that deal with what to do during production interruptions. During facet three, we take answers to these questions and benchmark them to other production facilities where we've previously asked these questions.

Segment four relates to environmental controls. How do they measure and manage effluent emissions and lubricant disposal? Do they measure CO_2 emissions, and how do they do it? Do they use GRI guidelines? Having a firm (and written) environmental policy with a clear understanding and philosophy behind it is important.

What is the biggest challenge for energy efficiency?

Energy awareness is the largest opportunity discovered by CNA-ES process. Energy awareness all throughout the plant is the main issue. That perhaps is missed more than anything. It's similar to where Plant Safety was many years ago. Plant Safety has gone through generations of change and evolution. Now most operations begin every meeting with a Safety Minute. Safety is visible to every employee today, and it has become a normal part of everyone's jobs. We predict the same evolution will happen with Energy Awareness and management in every company over the coming years.

What can all companies do to drive awareness to the shop floor?

Posters and banners, without substance, are not enough. You must educate plant personnel and give them measurement data showing the result of their efforts. You do this with a continuing educational effort.

We have developed "Shop Floor Awareness" cards. Employees can use them in a crew meeting to have an "Energy Minute" and to talk about energy. They are flash cards that talk about the basics of how energy enters the facility, what it is used for and what it costs.

Then we get into pumping systems, compressed air and leak detection. ODR (Operator Driven Reliability) is a program where operators can take greater responsibility for the health and efficiency of their equipment. They can also take responsibility for energy costs; they know best where the connections are that leak. It is important that you then IMMEDIATELY fix the leaks or the operator will say, "why should I bother to find the leaks if they don't get fixed."

Another area is pumping systems. We try to get each facility to look at the system rather than just its components, such as the presence of a premium efficient motor on a pump. We want to look more at the application. You can have the world's most efficient pump but if you can turn it off it will use less energy!

Thank you for your insights. BP

For more information, contact Rod Smith, Compressed Air Best Practices®, email: rod@airbestpractices.com, www.airbestpractices.com

"We define sustainability as 'SKF Care.' SKF Care is a guiding principle for everyone at SKF. It has four dimensions — Business Care, Environmental Care, Employee Care and Community Care."

— Mike Roberts, SKF

THE TECHNOLOGY PROVIDER

Automotive Stamping Study at Chrysler Finds New Vacuum Technology, Elicits Potential Annual Savings of $400,000 per Plant

BY JOSEF KARBASSI, BUSINESS UNIT MANAGER, AUTOMOTIVE INDUSTRY, PIAB

Summary

A recent comparative vacuum technology study performed by Dr. Kingman Yee, as part of a Chrysler[1] Summer Intern Professors Program, found that air consumption could be reduced by 98% when equipping a robot's end-of-arm tooling with COAX® technology and a Vacustat™ check valve. The study also estimated that if Chrysler were to replace its older, outdated vacuum systems, the company could experience an annual savings in air consumption costs of $418,300 per stamping plant (based on the use of 2,000 suction cups; does not include replacement costs).

Background

As with most of today's global companies, Chrysler is constantly challenged to increase output while decreasing manufacturing costs. Additionally, the company prides itself on its commitment to sustainability and is always looking for new ways to use natural resources in a way that people's current needs are fulfilled without imposing limitations on the life-style of future generations.

Chrysler has been able to significantly improve cost-efficiency through the increased use of robotic technology, particularly for automating material handling of sheet metal during automotive stamping applications, which involve moving sheet metal through a press or series of presses and forming it into a panel or other automotive part.

As with all robotic applications, tooling is critical to the productivity. When handling metal pieces in automotive stamping applications it is particularly vital to have flexible tooling because changes in size occur each time the vehicle model or car part changes. In the case of sheet metal stamping applications, vacuum is used to pick up the metal sheet and transport it to the next destination. Robots, with their ability to use a variety of end-of-arm tools [EOAT], provide the high-speed "pick and place" ability needed to meet ever-increasing demands on manufacturers for flexibility and productivity, replacing other slower and potentially error-ridden methods.

[1] At the time the study was conducted, Chrysler was known as DaimlerChrysler.

Challenge: Improve Robotic Efficiency

In order to further improve robotic system performance and thus, productivity, Dr. Kingman Yee, as part of a Chrysler Summer Intern Professors Program, researched manufacturing processes that would lower the costs of the company's material handling applications at its automotive plants in Michigan.

The challenge was to lower the costs of material handling applications by decreasing air consumption, reducing downtime and improving the performance and cycle time of robots and other equipment using suction cups to lift and transport parts.

Dr. Kingman Yee, as part of a Chrysler Summer Intern Professors Program, researched manufacturing processes that would lower the cost of material handling applications.

Solution: PIAB COAX Technology Reduces Energy Consumption and Increases Performance

One of the vacuum systems tested in the study was COAX®, a new multistage ejector technology from PIAB, based on a multi-stage concept for creating vacuum with compressed air. By integrating the internal components of a multi-stage vacuum pump into a vacuum cartridge, COAX allows for a smaller, more efficient, more reliable and highly flexible technology.

In side-by-side comparisons with competitive vacuum ejectors and suction cups, Professor Yee found that the patented multi-stage design of the COAX vacuum generators uses only 1.1 scfm of compressed air per cycle, up to 78% lower than the less efficient single-stage vacuum generators from other vendors.

More significantly, PIAB's COAX technology can be equipped with a Vacustat™ check valve, which shuts off the supply of compressed air when proper suction is reached. If the vacuum level drops due to leakage, the pump will turn on briefly to return the vacuum to the desired level. Dr. Yee reports that simply by installing this Vacustat device, compressed air consumption can be reduced by an additional 98%.

As a result, the cost to Chrysler for the electricity to produce the compressed air for a single suction cup is $0.56 per year, compared to at least $61.66 per year per suction cup for the latest systems available from the other vendors (based on an electricity cost of $0.07/kWh). For a typical automotive stamping plant employing 2,000 suction cups, the savings is $122,200 per year. If Chrysler were to replace *older,* outdated models still widely used, Professor Yee estimates that the annual savings will be $418,300 for that typical stamping plant. (This figure is based on the use of 2,000 suction cups does not include replacement costs.)

The modular construction of the COAX system facilitates quick and easy maintenance, repair and replacement of the vacuum components and suction cups. For the comparative systems, the entire vacuum assembly and its suction cups must be removed or replaced if it malfunctions. This process causes significant downtime, which can be detrimental to the productivity of the entire plant.

PIAB's COAX® multistage ejectors achieved an evacuation flow rate of 85 scfh and produced a holding force of 100 lbs, which is 25% higher than competitors' solutions used in the study.

THE TECHNOLOGY PROVIDER

Automotive Stamping Study at Chrysler Finds New Vacuum Technology, Elicits Potential Annual Savings of $400,000 per Plant

"The multi-stage design of the COAX ejectors enhances material handling performance by producing superior vacuum flow and responding almost immediately when compressed air is applied," said Yee.

The COAX ejectors achieve an evacuation flow rate of 85 scfh and produce a holding force of 100 lbs, which is 25% higher than the competitors' solutions, according to Yee. The quicker response and better vacuum flow means the suction cups grab quicker and hold stronger, resulting in a faster process cycle time and higher productivity.

Dr. Yee's study also reports that the PIAB vacuum solution improves the work environment by decreasing noise. The COAX ejector is appreciably quieter both during load and no-load conditions. Moreover, the Vacustat check valve significantly lowers noise and practically eliminates the "hiss" associated with typical suction cup systems.

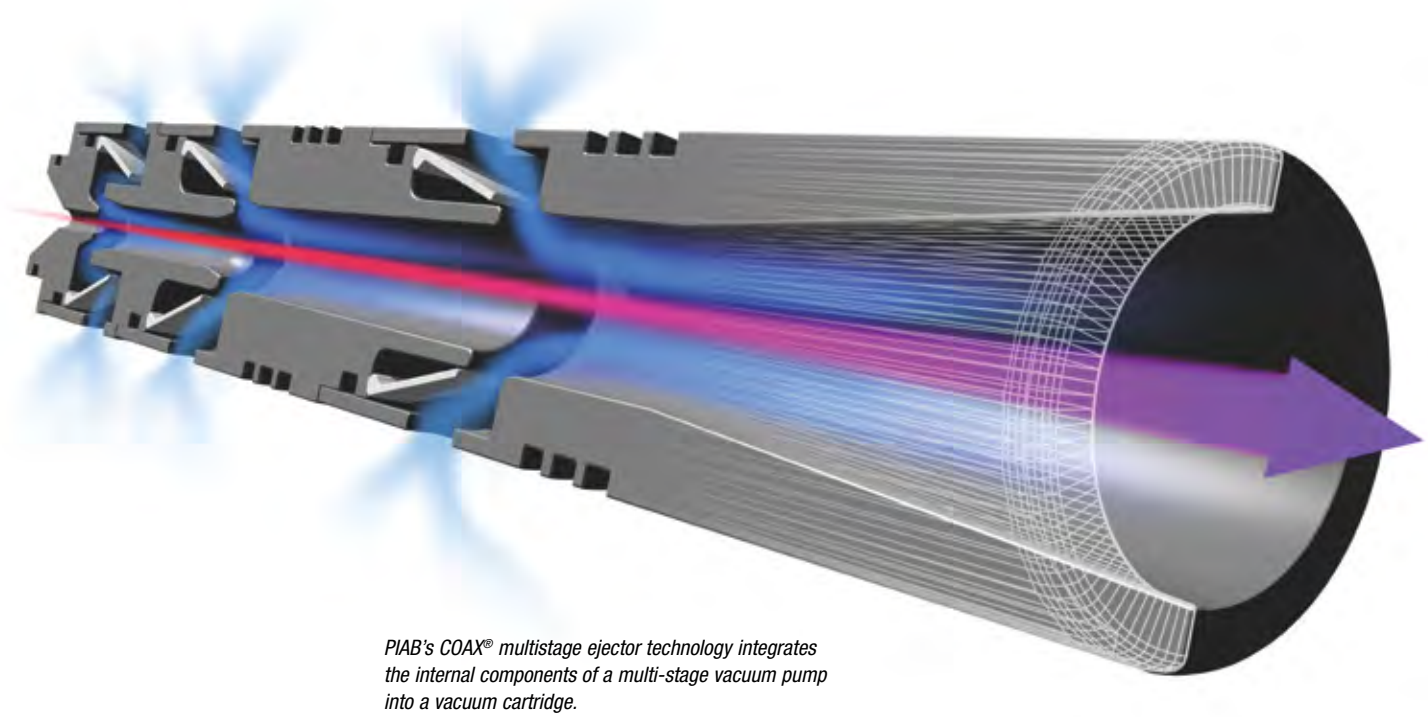
"Because of the numerous advantages and significant cost savings in air consumption offered by the PIAB vacuum system," Dr. Yee's report concludes, "it is recommended that the PIAB system be increasingly incorporated into Chrysler's plants." BP

About Kingman Yee, Ph.D.

Dr. Yee is an Associate Professor of Mechanical Engineering at Lawrence Technological University (LTU) in Southfield, Michigan. Dr. Yee holds a Ph.D. in Chemical Engineering with a specialization in the study of electrodeposition processes in flow batteries used in electrical vehicles and load leveling. Prior to joining LTU, Dr. Yee worked at BASF Inmont Automotive Coatings and General Motors Research Laboratories and has performed research in manufacturing laboratories in Singapore. He also consults at Chrysler Corporation, researching and implementing cost-saving innovations in manufacturing.

About PIAB

For more information about PIAB vacuum solutions for a diverse range of applications, visit www.piab.com.



PIAB's COAX® multistage ejector technology integrates the internal components of a multi-stage vacuum pump into a vacuum cartridge.

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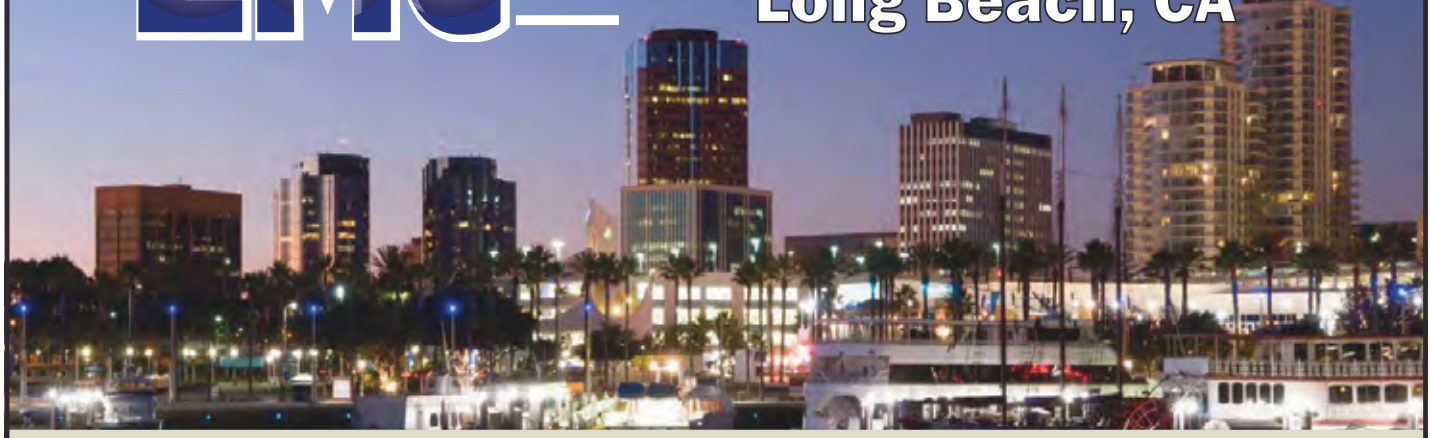

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ENERGY REBATES

Opportunities from the American Recovery & Reinvestment Act of 2009

BY JESSE KRIVOLAVEK, PRESIDENT, IVS, INC.

Let's say someone were to tape 100 dollar bills together to make a string. The string of 100-dollar bills allocated to **energy funding** from the *American Recovery and Reinvestment Act of 2009* would go from New York to Hawaii 10 times — and then some.

Energy efficiency rebates and financial incentives have been available for several years, but the recent changes in funding will provide new opportunities for compressed air and vacuum end-users, distributors and equipment manufacturers. Given the current state of the United States economy and the rate of legislative change, understanding and being up-to-date on these opportunities will become vital for surviving the economic down turn. The proverbial cheese has moved and most companies should no longer (at least for the next few years) expect to see capital funded projects unless they are subsidized by energy efficiency funding.

The **majority** of the $61.8 billion funding in the *A.R.R. Act of 2009* will be invested in programs for weatherization assistance, Energy Star®, government buildings, public transportation, smart-grid technology, renewable energy and many others. This article will just focus on the *A.R.R. Act of 2009's* impact on rebate and grant funding available to companies that use and sell equipment in the industrial sector for compressed air and vacuum. This article will (1) summarize the *A.R.R. Act of 2009;* (2) review the past, present and future of energy efficiency grants and rebates; and (3) suggest steps companies can take to benefit from these new opportunities.

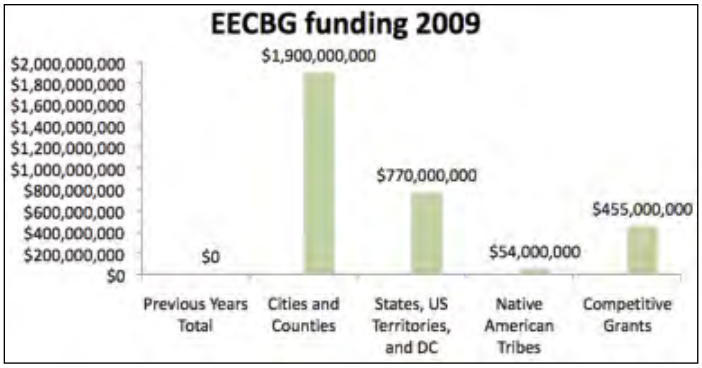
The A.R.R. Act of 2009 Summary

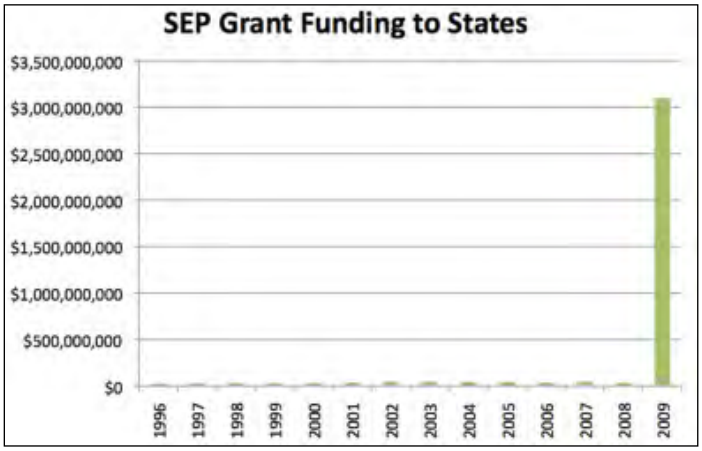
The purpose of the energy portion of the *A.R.R. Act of 2009* is to support jobs, cut energy bills and increase energy independence. What does the *A.R.R. Act of 2009* mean for the "Average Joe" manufacturing facility, distributor or equipment manufacturer? Essentially, it will equal rebates and grants to pay for energy studies (audits) and improved efficiency equipment upgrades (projects or implementations). Out of the total **$61.8 billion** in energy funding, the funding that can potentially end up in rebates and grants will come from the **$16.8 billion** that has been allocated to the Department of Energy — EERE (Energy Efficiency and Renewable Energy). The funds for EERE programs and initiatives have just increased nearly ten-fold from $1.7 billion received in fiscal year 2008 to $16.8 billion for 2009. It is important to note that most of the money is designed to go to residential and commercial applications, but a relatively enormous amount of money will become available to the industrial sector (which is over 1/3 of the US energy consumption) primarily through energy reducing utility rebates.

Now of this $16.8 billion for the EERE, the Act stipulates that **$3.2 billion** will go toward Energy Efficiency and Conservation Block Grants (EECBG). These Block Grants were established in the *Energy Independence and Security Act of 2007* but were not previously funded to this magnitude. The act also stipulates that **$3.1 billion** of EERE funds will go to the State Energy Programs (SEP) for additional grants that do not need to be matched with state funds. The act only allows such grants for states that intend to adopt strict building energy codes and intend to provide utility incentives for energy efficiency measures. The two places you'll find money for your energy efficiency project:

- EECBG — Energy Efficiency Conservation Block Grants
- SEP — State Energy Programs

On March 26, 2009, the US DOE announced the exact funding distributions to states, cities, counties and tribal governments of the $3.2 billion for EECBG from the *A.R.R. Act of 2009.* They also detailed the distribution amounts for the SEP programs. Each individual state, county, city and tribal distribution can be researched at http://www.energy.gov/recovery/index.htm. The following graphs illustrate the increase from prior funding for these two programs:





"The purpose of the energy portion of the A.R.R. Act of 2009 is to support jobs, cut energy bills and increase energy independence."

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ENERGY REBATES

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It is important to note that in the industrial sector, you will probably not get funding directly from these programs but indirectly from various state and local channels these programs will fund.

The four metrics that will determine the approval of these projects include energy usage reduction, cost reduction, emission reduction and the newly required metric of job creation. Quantification units for the four metrics will vary depending upon the type of study or project, but any company receiving this funding must be prepared to report back measured versus calculated savings.

Before one can develop a plan to benefit from the *A.R.R. Act of 2009* through energy efficiency funding, it is necessary to understand the past, present and future of energy efficiency rebates and grants.

Energy Efficiency Rebates and Grants: Past, Present and Future

Rebates and Grants in the Past

Many states and utilities have been operating aggressive energy-reduction incentive programs. Most of these programs focused on the residential sector but commercial and industrial programs have expanded. These programs were primarily focused in regions that have high utility costs like California, Texas, Florida and the Northeast. Additional aggressive energy-reducing incentive programs have been active in states that have progressive energy savings goals, environmentally proactive policy makers or have adopted Energy Efficiency Resource Standards (EERS) like the Northwest, Minnesota, Iowa, Wisconsin and Colorado (my apology for any left off this list). Most of the Southeast and the Midwest (as well as some other areas) have had relatively low utility costs and historically have had fewer incentive programs. Where available, these energy-reducing incentive programs have been used as a sales tool by various manufacturers and equipment suppliers for justifying the cost of new capital projects through ROI and simple payback calculations. They have also been used by end-user reliability engineers, continuous improvement engineers and project managers to upgrade equipment and invest in new technologies through the same means.

It is also important to note that energy efficiency alliances like the American Council for an Energy-Efficient Economy (ACEEE) have been leaders in guiding energy policy and developing efficiency programs for utility, state and federal entities since as far back as 1980. This means national and regional energy efficiency alliances have and will continue to directly drive the details of the rebate and grant programs for the states and utilities that have underdeveloped programs.

Present Rebates and Grants

We all know the present US economy is scary (especially the manufacturing sector), but the opportunity for energy efficiency rebates and grants has never been greater. With the overall US economy experiencing such massive pain, most manufacturing capital project budgets are now fractions of what they were during better economic times (if they even exist). Therefore, external funding from energy efficiency incentives will be one of the only drivers for new projects for almost every industry. Unfortunately, many states are not organizationally prepared for the new budgets and the price of energy is going up.

Currently, many individual states and utilities are scrambling to prepare for the huge influx of funding. An example is Texas, which has just been allocated an FY2009 SEP budget of $218,782,000, which is up from $1,858,000 in FY2008. Creating the turmoil is the fear that if the money is not traceably spent on reducing energy, reducing costs, lowering emissions and creating jobs, then it will not be replenished in future budgets (use it wisely or lose it).

Energy costs are currently rising on an annual basis. The latest summarized information on electric costs is available on the Energy Information Administration website (www.eia.doe.gov). The following tables from the EIA illustrate the latest electrical retail pricing trends:

AVERAGE RETAIL PRICE (CENTS/KWH) — U.S. TOTAL			
ULTIMATE CUSTOMER	**DEC-08**	**DEC-07**	**% CHANGE**
Residential	10.99	10.33	6.4%
Commercial	9.94	9.42	5.5%
Industrial	6.89	6.26	10.1%
Transportation	11.21	9.19	22.0%
All Sectors	**9.64**	**8.91**	**8.2%**

AVERAGE RETAIL PRICE (CENTS/KWH) BY CENSUS DIVISION			
	ALL SECTORS		
CENSUS DIVISION	**DEC-08**	**DEC-07**	**% CHANGE**
New England	16.14	14.79	9.1%
Middle Atlantic	12.42	12.05	3.1%
East North Central	8.68	7.83	10.9%
West North Central	6.88	6.43	7.0%
South Atlantic	9.63	8.58	12.2%
East South Central	8.25	6.93	19.0%
West South Central	9.71	8.94	8.6%
Mountain	7.65	7.37	3.8%
Pacific Contiguous	10.27	10.05	2.2%
Pacific Noncontiguous	20.96	20.85	0.5%
U.S. Total	**9.64**	**8.91**	**8.2%**

Future of Rebates and Grants

All future energy rebate and grant opportunities will be guided by funding distribution programs, increasing energy prices, efforts towards US energy independence, environmental responsibility and policies based on the threat of global warming. As the requirements from these drivers change, the requirements of the rebates and grants will change.

The distribution of the current funding will be different in each state. Some states will have state, county or city run rebate and grant programs, while some states will allocate the funding to the utilities for distribution. The states and utility companies that do not currently have large energy efficiency incentive programs will quickly have to develop programs to ensure the funding is tracked, recorded and eventually reported back to the federal government. This is the channel where funding for industrial sector projects will come.

As energy efficiency money is distributed, regional energy efficiency alliances, end-user energy engineers, energy auditors and suppliers of energy efficient products will be asked to drive new programs for state and utilities that have underdeveloped industrial programs. Many rebates and grants will require energy studies to be completed by non-bias parties in order to qualify for funding. In these cases, the energy auditor cannot benefit from the implementation of any recommendations. Equipment manufacturers, distributors and representatives will not qualify to conduct *these specific* energy studies and will be well served maintaining relationships with independent auditors. It will also infuse a rapid growth of businesses to meet the independent requirements.

In addition, currently proposed federal legislation for nationalized Energy Efficiency Resource Standards (EERS) are likely to require retail electrical companies to attain 15% in electrical savings. This will be accomplished through energy-reducing incentive programs, grid improvements and renewable energy programs. The US electrical grid (which was initially designed in the 1950s) will require significant changes and updates to accommodate the restructuring of the power generation industry from renewable sources like solar, wind and geothermal. However, the real opportunity for industrial companies will be in the energy-reducing incentive programs.

The final driver in the future of energy efficiency rebates and grants will be if the rate of energy price increases. New proposed carbon emission standards (if nationalized) or "Cap and Trade Programs" could drive up the cost of electricity very quickly, especially for markets served by coal fired power plants. The following is a list of states that rely on coal as their number one source of electricity:

Alabama	Georgia	Maryland	Montana	Ohio	Virginia
Arizona	Indiana	Michigan	Nebraska	Oklahoma	West Virginia
Arkansas	Iowa	Minnesota	New Mexico	Pennsylvania	Wisconsin
Colorado	Kansas	Mississippi	North Carolina	Tennessee	Wyoming
Delaware	Kentucky	Missouri	North Dakota	Utah	

As energy prices increase, opportunities for subsidized energy-reducing projects should increase as well and may become vital for large industrial energy consumers.

"The US electrical grid (which was initially designed in the 1950s) will require significant changes and updates to accommodate the restructuring of the power generation industry from renewable sources like solar, wind and geothermal."

— Jesse Krivolavek, President, IVS, Inc.

ENERGY REBATES

Opportunities from the American Recovery & Reinvestment Act of 2009

Five Steps to Prepare for the Rebates and Grants:

The first step is to keep informed on the local funding programs (know your channel). The exact distribution paths have not been decided and because of the rate of change, by the time this article is published, new programs and opportunities will be available. Below is a good set of online resources for keeping up to date on energy efficiency opportunities:

US-State Recovery and Reinvestment Map — www.energy.gov/recovery/index.htm

US-DOE-EERE — www.eere.energy.gov

ACEEE — www.aceee.org

DSIRE — www.dsireusa.org

The second step is to develop relationships and a set of contacts within the different tiers of the funding distribution that will provide the rebates and grants for your industrial sector. Examples include state energy offices, state energy programs and local utilities. The more familiar you become with the distribution channel, the easier it will be to comply with funding requirements and application processes. The third step is to contact (and get involved with) your regional energy efficiency alliance. This will compliment the first two steps by helping keep you informed on changes and providing you with networking opportunities within the funding distribution channel. The fourth step is to internally devise a strategic plan to quickly take advantage of opportunities as they become available. This should include planning energy efficient projects for 2009. Be prepared to implement a project as soon as funding becomes available. The final step is to continue reading Compressed Air Best Practices® magazine for updates on the rebate and grant opportunities as well as examples of successful rebate or grant funded projects.

Conclusion

Hopefully, you have gotten excited about the opportunities presented by the A.R.R Act of 2009 for the companies that use, sell and produce equipment for compressed air and vacuum. This magnitude of assisted funding for energy studies and equipment improvements has never before been available. Although the funding distribution details have yet to be hashed out, the companies that understand the past, present and future of the rebates and grants and take proactive steps to create energy efficient projects will not only find the missing cheese but will contribute to US energy independence, environmental responsibility and US jobs. BP

About the Author:

Jesse Krivolavek is the founder of Independent Vacuum Solutions, Inc. IVS is an energy efficiency solutions company focused on vacuum technology. Jesse has been providing solutions to the industrial and medical sectors for over 10 years. For more information, please visit www.independentvacuumsolutions.com or email Jesse at krivo@vacsolver.com.

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"The funds for EERE programs and initiatives have just increased nearly ten-fold from $1.7 billion received in fiscal year 2008 to $16.8 billion for 2009."

— Jesse Krivolavek, President, IVS, Inc.

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SEVEN SUSTAINABILITY PROJECTS FOR INDUSTRIAL ENERGY SAVINGS

Project #5: Metering

BY THOMAS MORT, CEM

Overview and Preface

Reducing energy costs and pollution emissions involves many areas within an industrial facility. My studies have found seven (7) key (or common) areas where low-cost, practical projects can be implemented. Combined, these projects provide savings exceeding 10% of the annual energy spend with an average payback of less than one year.

Preface: Metering is an area that many industrial facilities fall very short on. Everyone has heard the saying, "You can't control what you can't measure." I've added to this, "Measured data is of little use without qualified analysis."

I am just completing a detailed study of a large plant located in Novy, Jicin, Czech Republic. This plant has more than 30 buildings, four large manufacturing halls, a central heating boiler plant and miles of steam and compressed air distribution lines. Without metering, this project would have taken months of measurements and even then there would be many estimations. A few years ago, the plant had installed metering to measure the energy into each of the main production halls and to the air compressors and gas boilers. They had hourly data available that could be trended, compared to weather and analyzed against production levels. With this information and a week of on-site assessments, we were able to identify and define more than $1.4 million of energy-saving projects totaling 15% of their total energy spend.

Seven Key Sustainability Projects

1. Lighting
2. Demand Control
3. HVAC Optimization
4. Compressed Air
5. Metering
6. Heat Recovery
7. Project Implementation and Funding

In this month's article I would like to describe what I believe are some key metering devices and measurements that each facility should have to effectively manage their energy usage.

The Big Picture

Starting with the big picture, there should be an organized data table of the monthly energy usage, cost, production measures and weather data. This simple table below has proven to be a very useful way to organize this data. It allows you to look at year over year, month to month comparisons and to see a lot of data on one page. Production measures can be anything from direct labor hours, parts produced, pounds produced or dollar sales. Some plants use a more detailed level by using dollar sales minus the cost of material or in other terms the value add.

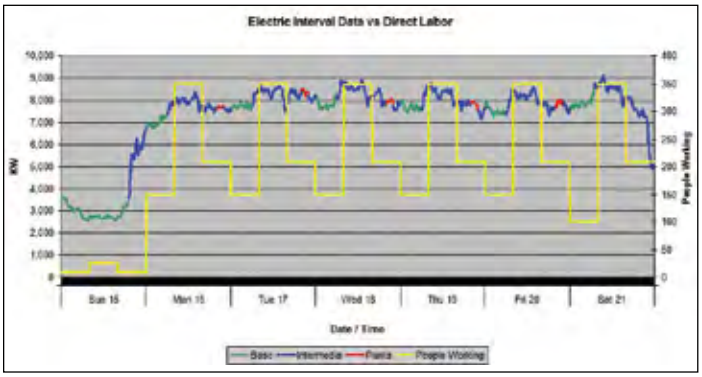
Facility Name		On Peak	Off Peak	Demand	On Peak Hrs
		$.052/kwh	$.041/kwh	$12.50/kw	7 7 M F
	Year	30	28	31	30
Name	Unit	January	February	March	April
Electricity	kwh	650795	611347	686879	677383
Electricity	kw	1542	1552	1575	1605
Electricity	$/kwh	$0.102	$0.102	$0.102	$0.102
Electricity	$	66381	62357	70062	69093
Natural Gas	mmbtu	7200	7340	7301	5660
Natural Gas	$/mmbtu	9.80	9.80	9.80	9.80
Natural Gas	$	70562	71932	71552	55464
Water	mgal	755	760	730	770
Water	$/mgal	1.1	1.1	1.1	1.1
Water	$	830.5	836	803	847
Sewer	mgal	755	760	730	770
Sewer	$/mgal	2.1	2.1	2.1	2.1
Sewer	$	1585.5	1596	1533	1617
Weather					
Heating	HDD	1048	1167	1043	594
Cooling	CDD	0	0	0	0
Productivity	$ sales				
Productivity	# parts (mills)				
Productivity	hours open				
Productivity	direct labor hrs	16800	15680	17360	16800
Productivity	other				

Utility Report.

Interval Data

The second level of metering and one of the most important to begin the detailed analysis necessary to identify projects and to validate the results is interval data. Interval data for electricity would be 15- or 30-minute electric demand or energy measurements. Most often this is available directly from the utility company. In some cases you would need to pay a monthly cost for using the service and the electric company may need to install a different type of meter. You may also have to provide a telephone line to the meter. I have found this to be the most valuable tool to-date in identifying, quantifying, and verifying project results. The data is most useful if it can be read by a computer in close to real time. Our memories are not always so good, so if you are looking at one-month old data, it may be difficult to remember exactly what event caused the change on the graph.

If you cannot get the data from the utility company, I have found a supplier who makes a relatively low-cost solution that allows you to collect interval data from the electric meter and then even add additional data measures which are then sent to a computer for real time monitoring. (www.kwhtools.com)

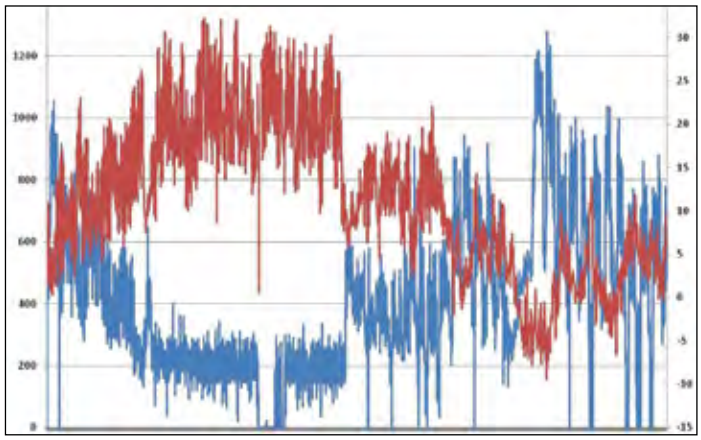


Interval Data with Production.

Here is a graph from interval data that I've collected from a factory. I've taken the data and color-coded it to show the different tariff rates. The color red represents the highest cost electricity and therefore is the area we begin analyzing to determine how to reduce the use during this period. Production levels are overlaid with the interval data. This measurement is an excellent management tool for Monday morning staff meetings. Targets are set in relations to production levels and then the targets are reviewed during the meeting to make corrections or set new targets.

Natural Gas

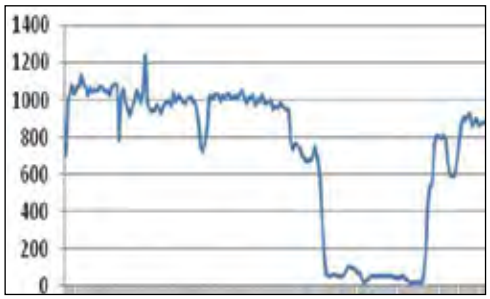
The next level of measurement is for plants that use a significant amount of natural gas. Many gas suppliers are now able to provide interval data, sometimes hourly but most often daily. Using gas interval data along with daily weather data a very useful correlation can be developed. It can be quickly determined how sensitive the facility is to outside temperature changes by noting changes in the gas usage. Plants with large exhaust systems or rapid air changes will see gas usage rise very quickly when the temperature drops.



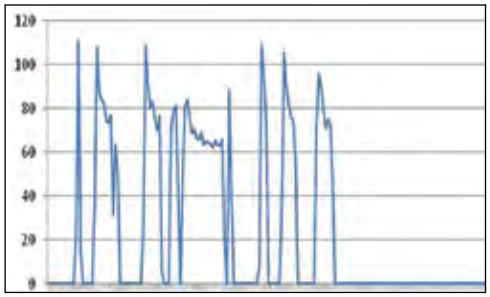
Gas vs Temperature.

If your facility has multiple buildings of a significant size, then besides having interval metering for electric and gas at the main entrance meter, the same should be set up for each of the other main buildings. This is referred to as sub-metering.

SEVEN SUSTAINABILITY PROJECTS FOR INDUSTRIAL ENERGY SAVINGS



Sub metered building.



Gas usage for a small furnace.

Photo of a small furnace.

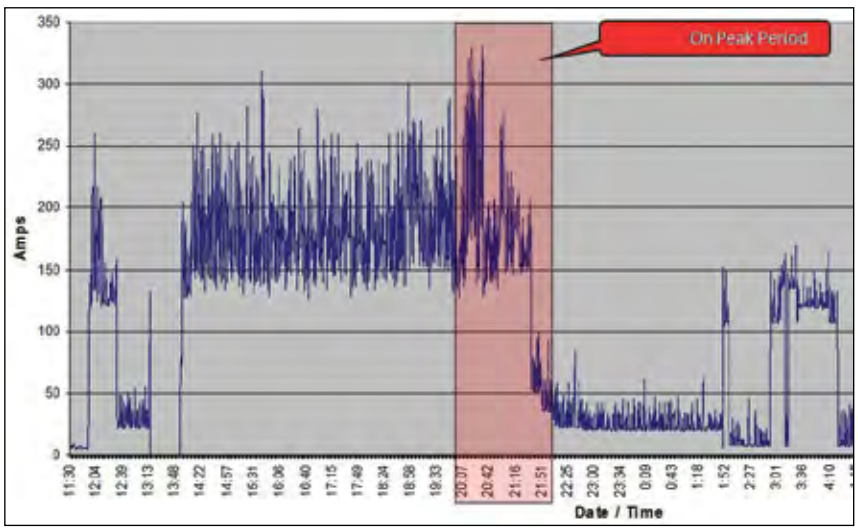
Sub-metering with Data Loggers

There are many ways to sub-meter. I will focus on a low-cost method that I have been using for the last 10 years with great success. I have been using small data logging devices called Hobos and have distributed thousands of these devices in plants around the world. (Refer to www.microdaq.com)

The small data logger (Hobo) can measure light, relative humidity, temperature and also one additional probe such as a current transformer. For around $250 USD, I can measure four different items either separately or at the same time. It seems every month new items are being developed that can work with this data logger. I like having one device with one program that I can use.

Hobo data logger and current transformer.

My primary use of these devices has been to measure electric current. I use the data logger along with a current transformer to measure one phase of a motor or heating circuit. The batteries in the data loggers last for about a year, so I install the units and take the readings monthly or more often if I am studying a piece of equipment. The data loggers can take inputs from 4–20 mA signals, pulse signals and 0–5 Volts allowing for a good variety of potential inputs.



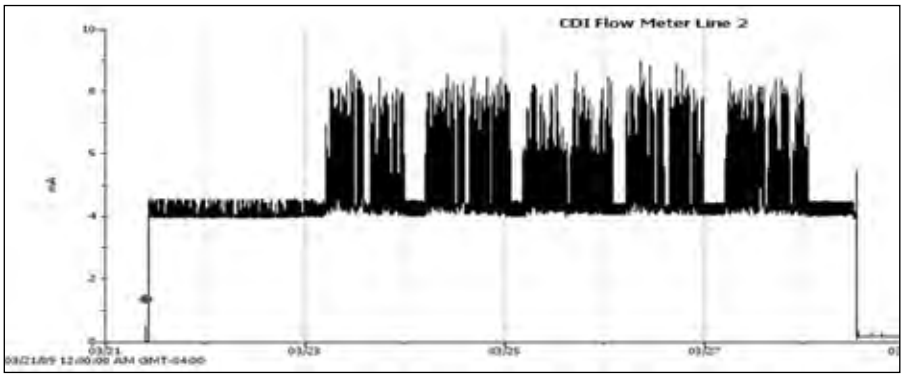
Hobo meter graph.

Items to sub-meter on a continuous basis include main energy using buildings (electric and gas), air compressors, chillers and large steam or hot water boilers.

I use data loggers to analyze individual machines as well as sets of similar machines. Nearly half of all the savings that have been identified by attendees of my workshops have been identified and quantified by these data loggers.

I've found a new device for measuring compressed air flow to a piece of equipment using the data logger to graph the data over time. Recently, this device has helped to avoid buying the wrong sized air compressor for a production line. We installed the device on an operating line and monitored the flow for a full week. From the data, we were able to determine the correct amount of air that was needed. Since this device was easy to install and remove, we are now performing a similar test at another plant. (reference: www.cdimeters.com)

Compressed Air Flow Meter.

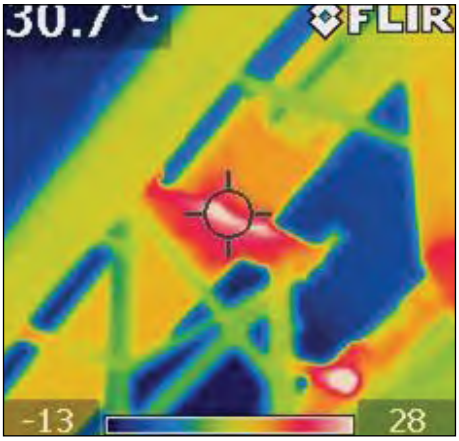


Compressed Air Flow meter graph.

Thermal Image Camera.

Another measurement device I have recently began using is a thermal imaging camera. I had no idea what I was missing out on until I begun using this device. The price has come down significantly, and with this $3,000 camera (reference: www.extech.com) I have been able to enhance plant audits and maybe more importantly, provide stronger evidence to plant management on their need to change. It is very hard to argue against a picture that shows cold air coming into a negative pressure building, an exhaust fan left on when the heating system is running or heating units blasting away in a warehouse with the door open and no one in the area. This device provides a method to quickly scan a large area and identify motors that are left running and hot water heating systems that are not fully isolated.

Steam Distribution Piping.



Steam Distribution piping thermal Image.

"...we were able to identify and define more than $1.4 million of energy-saving projects totaling 15% of their total energy spend."

— Thomas Mort, CEM

SEVEN SUSTAINABILITY PROJECTS FOR INDUSTRIAL ENERGY SAVINGS

I've recently put together a toolbox containing a set of useful measurement devices for analyzing a plant. The box includes 21 data loggers with current transformers, three data loggers with occupancy sensors, four simple data loggers that measure when a motor is on or off, a hand-held light meter and the thermal imaging camera. I found a great shipping box that protects all of the items even in with the rough airline baggage handling. (Reference: www.techtoolsupply.com) Some clients that have been renting the box now want their own, and they are sharing it among their other plants. It costs about $8,500 for the total set but has become an invaluable tool for metering, identifying and quantifying energy cost reduction projects.

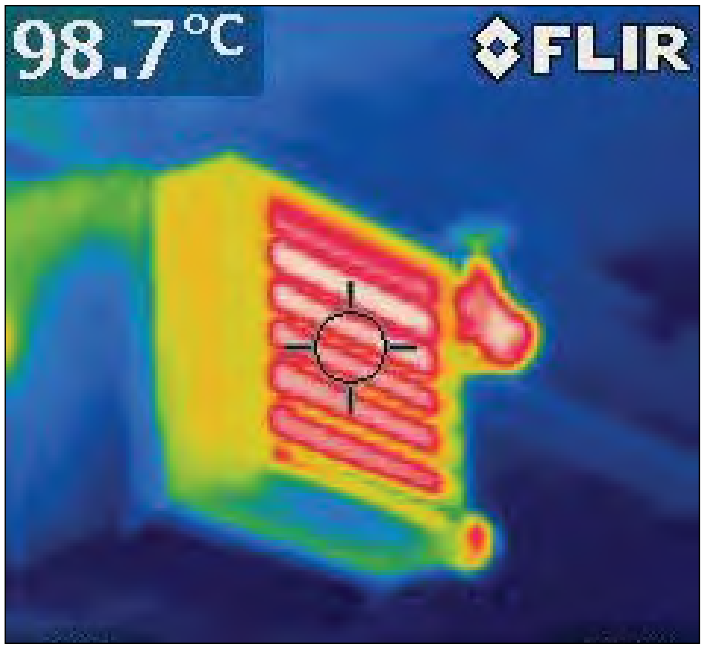
Metering Tool Box.

Summary

In this article, I did not delve into calculations for savings but focused primarily on useful tools I have found to enhance the projects that were discussed in previous issues and will be discussed in future issues. My suggestion is not to wait until you can get an approval for a plant wide integrated metering system. Begin with the basic measures described above and enhance it with some portable metering. Identify and implement good measurable energy projects, show the savings and use this to support projects for a more automated system. BP

For more information, please contact Thomas Mort, CEM, Thomas Mort Consulting, tel: 210-858-8454, email: tcmort@savingwithenergy.com, www.savingwithenergy.com

Heater on with door open.



Heater on with door open thermal image.

PERSONAL PRODUCTIVITY

Five Tips for Sustainable, Organic Growth

BY DAN ADAMS

Tip #1: Find out what your customers *really* want — not what *you* want them to want.

Profitable, sustainable organic growth starts when you have a deeper understanding of customers' needs than your competitors. If someone tells you otherwise, be careful; they might be misguided in other areas as well. When some clients begin using advanced methods to interview customers, they are *usually* surprised by what customers want. This means they had been planning on developing a product that interested *them,* not their customers.

The average hit rate for products under development is 1 in 4! Companies are not using the right techniques to unearth true customer wants and needs, and no one can afford to introduce failed products these days.

Tip #2: Conduct customer interviews remotely. (It's more effective than you think.)

Jetting around to interview customers is understandably unpopular when travel restrictions are all the rage. Consider the web conference-based customer interview, using a service such as Live Meeting, WebEx or GoToMeeting. Is this as effective as a face-to-face interview? Well, no, but it *is* better than no interview at all — and there are some benefits to interviewing customers remotely. For example, you can have more people "from your side" in remote customer interviews than is comfortable or practical in a face-to-face interview, and if the customer's key buying influences — manufacturing, technical, marketing and so forth — are located in different facilities, it's much easier to have them all "at the meeting."

Tip #3: Get *everyone* listening to the voice of the customer.

Some large firms keep a small staff of highly trained VOC (voice of the customer) experts poised for action. These folks parachute into a project as dawn streaks the morning sky, interview your customers for you and hand you a report of "what the customer wants."

This is a flawed model. Most businesses chalk up thousands of face-to-face customer meetings during the course of a year as sales reps, technical service reps and others go about their normal duties — so why not train *these* people to become VOC experts?

These people have already gained the customer's trust, they know the customer's language and there's no extra travel cost. Best of all, you'll develop a reputation among customers as "that supplier who really listens to us." Now that's how to protect today and position for tomorrow. Keep that handful of experts, but let them become trainers and coaches for the masses, not primary interviewers.

PERSONAL PRODUCTIVITY

FIVE TIPS FOR SUSTAINABLE, ORGANIC GROWTH

Tip #4: Use OPK (other people's knowledge).

We have a lot of very smart clients, yet many are stuck in the past in important areas. Why? First, more work is being required of fewer employees. Most of us want two things out of our jobs — to contribute and to learn — but in today's pressure cooker, there is little time to learn and apply fresh thinking.

Second, useful knowledge is exploding. Each year, mankind generates enough new information to fill half-a-million Libraries of Congress. Who can keep up? Fortunately, we harried businesspeople have access to exciting new tools to help us process and use the information. Let's say you want to get better at a growth practice such as consultative selling, acquisition integration or product launch. You can learn a lot using three approaches:

1) Search for books on Amazon.com

2) Google for subject matter experts. Many will gladly share their knowledge — via white paper or web conference — in hopes that you'll become a client

3) Tap into associations such as www.APQC.org and www.ISBM.org for great benchmarking and shared learning

Tip #5: Bring your training in-house.

How many announcements do you get per week for conferences in San Diego or Orlando? These conferences are at the "intersection of interest": 1) revenue for the hosting organization, 2) publicity for sponsoring vendors and 3) learning for attendees — all in a pleasant environment.

In some cases, the attendee returns to your company, shares what s/he learned with colleagues and things change for the better. More often, though, the conference materials stay stuffed in a bag and nothing changes. That's too bad because these affairs often cost $3,000–$5,000 per person with travel costs.

Compare that to private, in-house training where the trainer comes to you. This may cost $1,000–$2,000 per person. Beyond lower costs, there are big advantages. One, the training can be customized for your company and industry. Two, everyone learns the same new language and methods at the same time, which greatly improves implementation. Three, the business leader can hold attendees accountable and drive change with a solid post-workshop follow-up plan.

Summary

Here's the best part about aggressively moving forward with your small-budget growth plans — your competitors probably *won't* do the same. So when the economy picks back up, you'll be ahead of them by leaps and bounds.

Yes, there is great economic uncertainty now, but we can say with confidence that this downturn — like all others before it — will end. So while your competitors are completely immersed in hand wringing, why not focus some percentage of your energy on the eventual upturn? Thinking in new ways may do more for your future growth than spending-as-usual would have. BP

About the Author:

Dan Adams, president of Advanced Industrial Marketing, Inc., is passionate about B2B new product development. In over 30 years working within and with major B2B corporations, he has explored every aspect of product development, building New Product Blueprinting from the ground up. He is a chemical engineer and holder of many patents and innovation awards, including a listing in the National Inventors Hall of Fame.

About the Book:

New Product Blueprinting: The Handbook for B2B Organic Growth (AIM Press, 2008, ISBN: 978-0-9801123-4-4, $35.00) is available at bookstores nationwide and from major online booksellers.

For more information, visit www.newproductblueprinting.com.

"Here's the best part about aggressively moving forward with your small-budget growth plans — your competitors probably won't do the same. So when the economy picks back up, you'll be ahead of them by leaps and bounds."

— Dan Adams

RESOURCES FOR ENERGY ENGINEERS

TRAINING CALENDAR

TITLE	SPONSOR(S)	LOCATION	DATE	INFORMATION
Compressed Air Challenge® Fundamentals of Compressed Air	Northwest Energy Efficiency Alliance, Pacific Power, Consumers Power, Energy Trust of Oregon, BPA, Northwest Food Processors, WSU	Albany, OR	5/7/09	tel: 888-720-6823 www.compressedairchallenge.org
Compressed Air Challenge® Fundamentals of Compressed Air	focus on energy™ Wisconsin	Brookfield, WI Green Bay, WI Eau Claire, WI	5/12/09 5/13/09 5/14/09	tel: 800-762-7077 www.focusonenergy.com/training
Energy Management	Atlas Copco	Seattle, WA	5/20/09	tel: 206-244-3818 (Rawleigh)
Compressed Air Challenge® Advanced Mgmt. of Compressed Air Systems	Sacramento Utility District, DOE EERE	Sacramento, CA	5/27/09	Paul Gillaspy tel: 916-732-5375 pgillas@smud.org www.compressedairchallenge.org
Compressed Air Challenge® Fundamentals of Compressed Air	PNM, DOE EERE	Albuquerque, NM	9/10/09	Carmen Chico tel: 505-241-4404 Carmen.Chico@pnm.com www.compressedairchallenge.org

Editor's Note: If you conduct compressed air system training and would like to post it in this area, please email your info to rod@airbestpractices.com.

PRODUCT PICKS

Oil-Free Centrifugal Compressor for Power Market

FS-Elliott offers centrifugal compressor models from 900 to 18,000 cfm (25 to 510 m3/min) and 250 to 3500 hp (186 to 2610 kW), with custom configurations available for special needs. The company, within the last five years, has provided more than 60 air compressor packages for power generation stations located around the globe. "Our engineers have taken decades of experience and applied it to this superior industrial design package," says Ronald L. Stewart, Chief Executive Officer, FS-Elliott. The features include a superior package design for ease-of-maintenance, state-of-the-art aerodynamics to enhance plant operations, leading edge control solutions ensuring flexible operation and a robust mechanical design that increases reliability. These oil-free centrifugal compressors are routinely required to operate for several years of uninterrupted operation while maximizing efficiency and minimizing unplanned downtime.

FS-ELLIOTT
www.fs-elliott.com

PRODUCT PICKS

Variable Speed Drive Compressor

The Atlas Copco GA315 VSD is a single-stage 390 horsepower rotary screw compressor range directly driven by a variable speed drive electric motor. The compressor delivers pulsation-free air at up to 1,810 cfm. By continuously matching the speed of the drive motor to the air net pressure, the compressor optimizes energy consumption and reduces the operating pressure bands. Depending upon the fluctuations in air demand, Atlas Copco GA VSD compressors cut the cost of the compressed air energy usage by up to 35%.

The range is available as air-cooled or water-cooled. A full feature version is also available with a refrigerant dryer integrated in the bodywork. A dryer bypass is installed as standard on the full feature version. The GA315 VSD has an integrated VSD dryer as well.

Atlas Copco
www.atlascopco.com

Quick-Ship Blower Packages

With Kaeser's Quick-Ship blower line, you get the blower you need, when you need it! These Com-Pak Plus rotary lobe blower packages range from 5–200 hp with flows from 60–2,295 scfm.

Quick-Ship blower packages include optimized and proprietary tri-lobe Omega Plus profile and a generously sized motor along with silencers, instrumentation and valves. All maintenance points, including the automatic belt tensioning device, oil drains and filter elements, are accessible through the wide-opening canopy on the front. All power and process connections are at the rear allowing multiple units to be mounted side-by-side with no need for additional access clearance. The standard sound dampening enclosure lowers typical noise levels to 75 dB(A) or less. An integral ventilation fan provides efficient cooling, even under extreme load conditions. Need it now? No problem! Most units can be shipped in one working day.

Kaeser Compressors
Tel: 800-777-7873
www.kaeser.com/omega

RESOURCES FOR ENERGY ENGINEERS

PRODUCT PICKS

New Stainless Steel Air Knife Resists Corrosion

EXAIR's new Type 316 Stainless Steel Super Air Knife™ offers an efficient way to create an air barrier, blow-off, clean and dry in highly corrosive environments. The high-volume, high-velocity air stream is ideal for blocking harmful vapors and fumes on plating operations, blowing corrosive chemicals off parts, drying pharmaceutical products and cooling hot materials such as molten glass, castings and molded parts.

The Type 316 Stainless Steel Super Air Knife ejects a small amount of compressed air through a thin slotted nozzle. This uniform sheet of high-velocity air immediately pulls in surrounding room air and amplifies it at a ratio of 40:1. Air consumption is 1/3 that of typical blow-offs, and the noise level is extremely quiet at 69 dBA. It can withstand temperatures up to 800°F (427°C) and has no moving parts to wear out. Compressed air inlets are located on each end and the bottom for easy hookup.

The Type 316 Stainless Steel Super Air Knife can be mounted end-to-end without dead spots and is perfect for mounting in tight places. There are many stock lengths from 3" to 54" and unlimited system lengths on special order. Prices start at $375.

EXAIR Corporation
Phone: (800) 903-9247
Fax: (513) 671-3363
E-mail: techelp@exair.com
www.exair.com/316sak.htm

New High-Friction Suction Cups

To help automotive and white goods, manufacturers improve production speed and eliminate bottlenecks. PIAB is launching its DURAFLEX® Friction Cups, a new line of suction cups providing the ultimate grip on oily and wet surfaces. The special grip pattern enables operators to safely and reliably move slippery metal goods without slowing production lines. This latest offering allows manufacturers to reduce product droppage and lower scrap rates.

The DURAFLEX® Friction Cups feature a rough cleat surface and sharp cleat edges and channels. This design creates greater friction and a stronger hold compared to traditional traction suction cups. Normal cup abrasion resulting from handling oily sheets does not degrade the shear force performance of PIAB's friction cups over time. The added durability of the cups extends use life for long-term reliability.

PIAB's DURAFLEX® Friction Cups maintain their hold on heavy and slippery sheets during accelerations and de-accelerations, especially in the instance of emergency stoppages. All parts are maintained in the proper position to facilitate applications such as stamping, reducing scrapped products and improving overall line sustainability. Made of DURAFLEX® polyurethane, PIAB's Friction Cups will not break or crack after exposure to ultraviolet light, heat or ozone, which is an issue with cups comprised of rubber compounds.

To prevent damage to the surface of thin metal sheets common in automotive and large appliance applications, PIAB's DURAFLEX® Friction Cups feature a dual-hardness design and soft cup body. Lower vacuum force is needed to seal the cups to part surfaces for gentler handling. The soft lip of PIAB's friction cups also molds easily to curved surfaces for less vacuum leakage and stronger grip. The cups operate between temperatures of 10 to 40ºC.

PIAB
www.piab.com

LITERATURE & SERVICES PICKS

The G3 Sustainability Guidelines

Global Reporting Initiative™
www.globalreporting.org

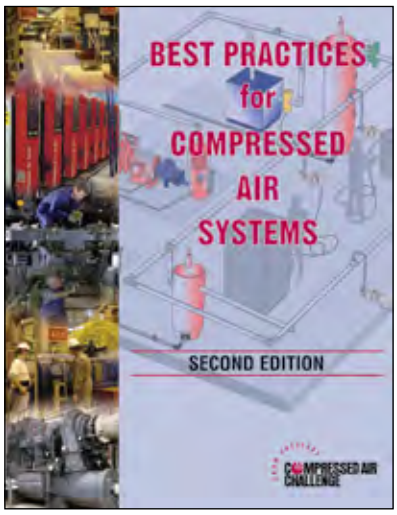
The G3 Guidelines are the cornerstone of the GRI Sustainability Reporting Framework. In line with the GRI vision, it is recommended they be used as the basis for all of an organization's annual reporting. The Guidelines outline core content for reporting and are relevant to all organizations regardless of size, sector or location. They are the foundation upon which all other GRI reporting guidance is based. The G3 Guidelines outline a disclosure framework that organizations can voluntarily, flexibly and incrementally adopt. The flexibility of the G3 format allows organizations to plot a path for continual improvement of their sustainability reporting practices.

Download the G3 Guidelines and the rest of the Sustainability Reporting Framework at www.globalreporting.org

New Edition of "Best Practices for Compressed Air Systems®" from the Compressed Air Challenge®

Compressed Air Challenge®
www.compressedairchallenge.org

The Compressed Air Challenge® has released the second edition of their authoritative "Best Practices for Compressed Air Systems®."* The Best Practices manual provides tools needed to reduce operating costs associated with compressed air and to improve the reliability of the entire system. The 325-page manual addresses the improvement opportunities from air entering the compressor inlet filter, through the compressor and to storage, treatment, distribution and end uses, both appropriate and potentially inappropriate. Numerous examples of how to efficiently control existing and new multiple compressor systems are provided in one of the many appendices.



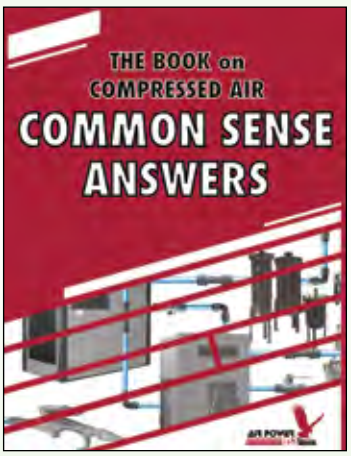
The Best Practices manual created by the Compressed Air Challenge® begins with the considerations for analyzing existing systems or designing new ones. The reader can determine how to use measurements to audit their own system, how to calculate the cost of compressed air and even how to interpret electric utility bills. Best practice recommendations for selection, installation, maintenance and operation of all the equipment are included in each section.

**The Best Practices for Compressed Air Systems® manual is a product of the Compressed Air Challenge®, co-authored by Bill Scales and David McCulloch and is not associated with Compressed Air Best Practices® Magazine.*

RESOURCES FOR ENERGY ENGINEERS

LITERATURE & SERVICES PICKS

The Book on Compressed Air Common Sense Answers



NEW! Providing practical solutions to the everyday issues facing plant staff who operate and maintain plant air systems and the engineering staff who design and evaluate air systems. Real life experiences flow throughout covering common problems and opportunities that touch all industries. New electronic, energy-saving products are reviewed in detail, and it is explained how they can be applied through the complete air system, from the compressor room to the shipping dock. Savings calculation methods and measurement protocols are identified. Features an "Ask the Experts" section that answers questions posed by real users to Air Power USA staff. (Red book, hardcover. 1st edition — 2009)

Black/white print copy $85.00 US
Color print copy $105.00 US
To purchase, call Air Power USA at (740) 862-4112 or visit www.airpowerusainc.com

Free Compressed Air System Health Checks

Atlas Copco is offering no-cost compressed air system health checks. "Some estimates indicate that poorly designed and maintained compressed air systems in the United States account for up to $3.2 billion in wasted utility payments every year," said Paul Humphreys, Vice President of Communications and Branding, Atlas Copco Compressors, LLC. "Our new program, called 'Walk the Line,' is a no-cost compressed air system health check designed to help a facility's technical staff recognize areas where energy and operational costs are lost and, more importantly, identify ways to reverse this costly trend."

A careful examination of a facility's compressed air system will likely reveal several opportunities for reducing a plant's energy draw. By optimizing compressed air systems, companies can see significant energy savings, resulting in lower operating costs and a minimized impact on the environment. "Atlas Copco compressed air experts walk production lines every day in hundreds of facilities across North America and the world searching for ways to save companies money," added Humphreys. "We conduct these system health checks for Atlas Copco customers, as well as companies running other compressor brands; the results range from a list of simple fixes to the recommendation of an in-depth system audit."

Solutions to compressed air system issues can range from the uncomplicated, sealing leaks and decreasing pressure drops, to the more sophisticated, re-piping and compressor change recommendations. These solutions can result in potentially significant savings. To request a free compressed air system health check, contact Paul Humphreys at **paul.humphreys@atlascopco.com** or your local Atlas Copco representative. More information about Atlas Copco's "Walk the Line" program can be found online: **http://www.atlascopco.us/usus/Aboutus/sales/compressors_generators/walk_the_line.asp.**

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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 on April 3, 2009.

APRIL 3, 2009 PRICE PERFORMANCE	SYMBOL	LAST PRICE	1 MONTH	6 MONTHS	12 MONTHS
Parker-Hannifin	PH	$38.55	30.6%	-22.3%	-48.0%
Ingersoll Rand	IR	$16.54	31.6%	-41.9%	-65.1%
Gardner Denver	GDI	$26.01	39.3%	-15.3%	-35.7%
United Technologies	UTX	$45.63	21.1%	-16.4%	-35.5%
Donaldson	DCI	$29.95	30.0%	-21.6%	-27.4%
EnPro Industries	NPO	$18.71	24.5%	-46.5%	-46.2%
SPX Corp	SPW	$52.27	21.7%	-19.5%	-53.6%

MINNEAPOLIS (Feb. 25, 2009) — Donaldson Company, Inc. (NYSE: DCI) announced second quarter FY09 diluted earnings per share ("EPS") of $0.43, up from $0.42 last year. Net income was $33.8 million, compared to $34.1 million last year. Sales were $460.6 million, down from $511.8 million in the second quarter of FY08.

For the six-month period, diluted EPS was $1.03, an increase of 8% from $0.95 last year. Net income increased 6% to $81.8 million versus $77.4 million last year. Sales were $1.034 billion, about equal to the $1.037 billion in FY08.

"Although we had a good start to FY09 with our first quarter, we had forecast a deteriorating global economic environment. Unfortunately, the global recession hit us quickly and hard in our second quarter," said Bill Cook, Chairman, President and CEO. "The drop in our sales volume was widespread, particularly in our Engine Products segment. We did see continued strong sales in our aerospace and defense, retrofit emissions and gas turbine businesses, which helped to offset the weaknesses in our other end markets. Conditions were also generally weak internationally, as local currency sales decreased 14% in Asia and 7% in Europe, while sales in the Americas were flat compared to last year."

WALL STREET WATCH

"The rapid drop in sales volumes caused under absorption of fixed manufacturing and operating expenses. In addition to our continued focus on operating expense controls and product cost reductions, we completed restructuring actions within many of our businesses as we balanced our staffing with our customers' current order levels. Consequently, we have already reduced our global workforce by approximately 1,850 temporary, contract and regular employees since the beginning of this fiscal year and incurred $4.3 million of restructuring costs during the current quarter. As a result of the combination of the under absorption of fixed costs and our restructuring related expenses, our operating margin in the second quarter was 6% and below last years margin of 9.9%.

"On a more positive note, our balance sheet remains strong, and we expect to continue generating excess-free cash flow to fund our operations. For the six-month period, we have generated $70.6 million in free cash flow, a $52.6 million increase over the prior year.

"In order to further balance our business with current business conditions, we are planning additional restructuring actions in our third quarter. We expect the combination of our restructuring actions to date together with those still planned will generate approximately $85 million of ongoing annualized cost savings when completed.

FY09 Outlook

Industrial Products: We now forecast full year sales to decrease 10 to 15%, inclusive of the impact of foreign currency translation.

Our Industrial Filtration Solutions sales are projected to decrease 10 to 15%. We expect the rapidly weakening global manufacturing environment to be partially offset by the growing demand for our new products, such as Torit® PowerCore.

While we anticipate full-year unit volume to be flat in our gas turbine business, we forecast our full-year gas turbine filter sales to decrease 2 to 7 % due to the impact of foreign currency translation.

Special applications products' sales are projected to decrease 15 to 20% due to weak conditions in the hard disk drive market.

Other:

We forecast total company sales to be between $1.9 and $2.0 billion, or down 10 to 15% for the year. Foreign currency translation is expected to account for about 40% of this decrease.

Due to our lower sales outlook, we believe that under absorption of fixed costs will continue and as a result have reduced our full-year operating margin guidance to between 9.5 to 10%.

With the reduction in our outlook due to the combination of exchange rates and weaker customer demand, we now forecast our full-year FY09 EPS to be between $1.70 and $1.90.

HARTFORD, Conn. — United Technologies Corp. (NYSE: UTX) President and Chief Executive Officer Louis R. Chênevert announced $600 million of additional restructuring actions for 2009 and now expects restructuring for the year to total $750 million. These actions will result in global employment reductions of 11,600, primarily from overhead and SG&A reductions throughout UTC. Additional hourly workforce adjustments may occur during 2009 based on market driven production volume changes. The expanded restructuring responds to anticipated 2009 revenues $2.7 billion below the company's December guidance due to contracting markets worldwide.

Earnings per share guidance is being revised to a range of $4.00 to $4.50, including $0.30 to $0.40 for the $750 million of total 2009 restructuring costs net of anticipated one-time gains of $200 million to $350 million. Consistent with prior guidance, the earnings per share range excludes the impact of acquisition-related costs, if any, resulting from the adoption of SFAS 141(R). The revised revenue guidance of approximately $55 billion also includes $1 billion from the first-time adoption of EITF Issue No. 07-1, which covers revenues associated with engine collaboration agreements. **The company continues to expect 2009 cash flow from operations less capital expenditures equal to or in excess of net income.**

"The outlook for commercial aerospace and global construction markets has continued to deteriorate since UTC's December investor meeting, and the economic recovery previously anticipated in the second half of 2009 now appears unlikely," said Chênevert. "These expanded restructuring actions are required to protect UTC profitability and are expected to position the company for resumed earnings growth in 2010. In 2008, UTC anticipated slowing economies for 2009, although not at the severity which has since developed. Savings from 2008 and 2009 restructuring and other 2009 actions will result in total cost reductions exceeding $1 billion in 2009. Employment reductions will total approximately 18,000 or slightly more than 8% over the two years. These difficult actions will allow us to continue outperforming peers."

UTC also revised share repurchase guidance for the year to $1 billion from $2 billion while preserving the usual acquisitions placeholder of $2 billion. "We want to be in a position to take advantage of strategically attractive opportunities that may arise in the current market conditions. UTC's strong balance sheet and operating cash flows enable us to do this," Chênevert added.

CHARLOTTE, NC (February 25, 2009) — SPX Corporation (NYSE:SPW) today reported results for the fourth quarter and year ended December 31, 2008:

Full-Year 2008 Highlights:

Revenues increased 28.0% to $5.85 billion from $4.58 billion in 2007. Organic revenue growth was 6.2%, while completed acquisitions and the impact of currency fluctuations increased reported revenues by 20.3% and 1.5%, respectively.

Segment income and margins were $801.6 million and 13.7%, compared with $606.2 million and 13.2% in 2007.

Diluted net income per share from continuing operations was $4.68, compared with $5.23 in 2007. The primary driver of the decrease was the Q4 non-cash impairment charge of $119.4 million, net of tax, noted previously. For the full year, this charge equates to a charge of $2.21 per share.

Adjusted net income per share from continuing operations was $6.53, as compared to the company's guidance of $6.40 to $6.50, and $4.85 in 2007. The primary driver of the improvement over 2007 was increased segment income.

Net cash from continuing operations was $404.7 million, compared with $411.1 million in 2007. Free cash flow from continuing operations was $288.3 million, compared with $328.5 million in 2007. The primary driver of the decline in free cash flow was increased capital expenditures in 2008 to support the continued growth of the company.

Chris Kearney, Chairman, President and CEO said, "2008 was a very strong year for SPX. We continued to deliver growth and improvement across the company, reduced our debt and leverage statistics, improved our processes and enhanced our talent base around the world. We also made substantial strategic progress, monetizing non-core assets and initiating the integration of our APV acquisition.

"However, global economic conditions changed drastically in the final months of the year, and we were not immune to these events. We experienced backlog declines in the fourth quarter and were required to record an impairment charge to the asset value of one of our businesses. The first quarter of 2009 continues to be difficult for our customers, and we are anticipating that trend will continue throughout the year. Nevertheless, we remain squarely focused on managing the company through these difficult conditions, and our strong liquidity will enable us to be flexible in executing on our long term strategy for growth," Kearney concluded.

Financial Highlights — Continuing Operations

Flow Technology — Revenues for the fourth quarter of 2008 were $479.1 million compared to $310.5 million in the fourth quarter of 2007, an increase of $168.6 million, or 54.3%. The increase was due primarily to the acquisition of APV and organic revenue growth of 3.4%. The organic revenue growth related primarily to strong sales into the power, oil and gas markets, as well as pricing improvements and new product introductions. The impact of currency fluctuations decreased revenues by 8.4% from the same quarter a year ago.

Segment income was $71.2 million, or 14.9% of revenues, in the fourth quarter of 2008 compared to $50.8 million, or 16.4% of revenues, in the fourth quarter of 2007. The increase in segment income was due primarily to the APV acquisition, as well as the strong level of organic growth. The decline in segment margins was also due to the APV acquisition, which currently operates at margins below the rest of the segment, offset partially by margin expansion in the remainder of the segment.

Test and Measurement — Revenues for the fourth quarter of 2008 were $250.3 million compared to $315.0 million in the fourth quarter of 2007, a decrease of $64.7 million, or 20.5%. Organic revenues declined 17.1%, due primarily to lower North American aftermarket and dealer equipment tool volumes. The impact of currency fluctuations decreased revenues by 4.3% from the same quarter a year ago.

Segment income was $18.0 million, or 7.2% of revenues, in the fourth quarter of 2008 compared to $40.9 million, or 13.0% of revenues, in the fourth quarter of 2007. The decline in segment income and margins was due primarily to the organic revenue decline noted above.

Thermal Equipment and Services — Revenues for the fourth quarter of 2008 were $497.1 million compared to $437.6 million in the fourth quarter of 2007, an increase of $59.5 million, or 13.6%. Organic revenues increased 16.9% in the quarter, driven by continued strength in global power equipment sales as well as timing of large project revenues. The impact of currency fluctuations decreased reported revenues by 3.3% from the same quarter a year ago.

Segment income was $70.0 million, or 14.1% of revenues, in the fourth quarter of 2008 compared to $52.3 million, or 12.0% of revenues, in the fourth quarter of 2007. The increase in segment income and margins was due primarily to the organic growth noted above, as well as improved project mix in 2008.

WALL STREET WATCH

Industrial Products and Services — Revenues for the fourth quarter of 2008 were $281.2 million compared to $226.5 million in the fourth quarter of 2007, an increase of $54.7 million, or 24.2%. The increase was due primarily to organic revenue growth of 25.0%, related largely to increased sales of domestic power transformers and crystal growing equipment. The impact of currency fluctuations decreased revenues by 0.8% from the same quarter a year ago.

Segment income was $67.3 million, or 23.9% of revenues, in the fourth quarter of 2008 compared to $49.8 million, or 22.0% of revenues, in the fourth quarter of 2007. The increase in segment income and margins was driven largely by the organic growth noted above, in addition to manufacturing efficiencies achieved from continuous improvement initiatives across the segment.

CHARLOTTE, N.C., Feb. 12 /PRNewswire-FirstCall — EnPro Industries, Inc. (NYSE: NPO) reported financial results for the full year of 2008.

The company's sales for the year reached $1.17 billion, a 13% increase over 2007, while net income improved to $53.5 million, or $2.54 a share, from $40.2 million, or $1.80 a share, in 2007. Before asbestos-related expenses and other selected items, the company earned $4.29 a share in 2008 compared to $3.75 a share in 2007. Net income on this basis was $90.3 million in 2008 compared to $83.8 million in 2007.

For the fourth quarter of the year, sales improved by 5% over the fourth quarter of 2007, reaching $289.3 million compared to $275.6 million a year ago. Net income in the fourth quarter improved to $6.1 million, or $0.30 a share, from $1.8 million, or $0.08 a share, in the fourth quarter of 2007. The improvement was primarily the result of lower asbestos-related expenses compared to the fourth quarter of 2007 when the company took a non-cash charge to reflect an adjustment to the estimate of the liability. Before asbestos-related expenses and other selected items, the company earned $0.80 a share in the fourth quarter of 2008 compared to $0.93 a share in the fourth quarter of 2007. Net income on this basis was $16.3 million in the fourth quarter of 2008 compared to $20.4 in the fourth quarter of 2007.

"The past year was one of both accomplishment and challenge," said Steve Macadam, President and CEO. "Over the course of the year, we completed a number of acquisitions, repurchased shares and continued to make capital investments to support our growth. We also encountered growing uncertainty in our markets and increasing pressure on costs and pricing,

all of which had a significant effect on our fourth quarter results. The productivity improvements we have achieved over the past several years combined with our continuing efforts to reduce and control costs will help us deal with the current environment. However, we are clearly in challenging times that call for us to remain vigilant to ensure we are positioned for growth and success in the future."

Full Year Results

Acquisitions and organic growth contributed 11% of the company's 13% total sales growth in 2008. Foreign exchange rates, which were favorable through much of the year, contributed 2%. Organic growth benefited from industrial demand in the U.S. and Europe, especially in the first half of the year, higher demand from oil, gas and power generation markets and increased shipments of diesel engines to U.S. Navy shipbuilding programs.

Earnings before interest, taxes, depreciation, amortization, asbestos-related expenses and other selected items (EBITDAA) increased 10% in 2008 to $189.6 million. As a percentage of sales, these earnings declined to 16.2% from 16.7% in 2007 primarily because of weaker markets, higher material costs and pricing pressure in the company's Engineered Products segment.

Fourth Quarter Results

The Engineered Products segment reported a 4% decrease in sales from the fourth quarter of 2007. However, before the effect of foreign exchange, sales in the segment increased 1%, reflecting the benefits of acquisitions at Compressor Products International and Quincy Compressor and increased volumes at Quincy. However, sales at GGB Bearing Technology declined as factory shutdowns severely reduced demand from automotive markets and as industrial demand softened.

($MILLIONS)		
QUARTER ENDED	12/31/08	12/31/07
Sales	$115.2	$119.4
EBITDA	$13.5	$20.7
EBITDA Margin	11.7%	17.3%

The segment's EBITDA declined about 35% and EBITDA margins fell to 11.7%. Results weakened as operations in the segment experienced inflationary cost increases, particularly for materials, that were only partially recovered by price increases. The segment's results were also affected by decreased volumes at GGB due to automotive facility shutdowns and weaker industrial demand in the U.S. and Europe.

The company completed 2008 with a cash balance of $76.3 million compared to $129.2 million at the end of 2007. The balance at the end of 2008 is after net spending during the year of $43.4 million for eight acquisitions and $69.2 million for the repurchase of 1.95 million shares of the company's common stock.

"We enter 2009 with a high level of uncertainty about how the year will unfold," said Macadam. "Short lead times for most of our products give us a very limited view of the future, which is made even more difficult to predict by the deterioration of many of our markets in recent months. Curtailed demand for many of our products leads us to expect weak results in the first half of 2009, especially in the first quarter, and full-year results below those we reported in 2008. In light of these circumstances, we have taken a number of steps to lower production costs and reduce spending, and we will continue to bring our expenses in line with the conditions of our markets," Macadam continued. BP

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