

Energy Matters



INDUSTRIAL TECHNOLOGIES PROGRAM

Fall 2003

ISSUE FOCUS:

How Does It Work?
Absorption Chillers

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Compressed Air System Optimization Saves Energy and Improves Production at Forging Plant

The Interstate Forging unit of Citation Corporation implemented a compressed air system improvement project at its Milwaukee, Wisconsin, forging plant.

The project enabled the plant to maintain an adequate and stable pressure level using fewer compressors, which led to improved product quality and reduced production down time. The project also yielded annual compressed air energy savings of 820,000 kilowatt-hours (kWh) and \$45,000, plus better maintenance scheduling.

With a total project cost of \$67,000, the plant achieved a simple payback of 1.5 years. In addition, the project's success established that no need existed to buy a new compressor. This resulted in avoided capital costs of roughly \$60,000 for a new 200-horsepower (hp) unit.

Compressed air is vital to Interstate Forging's production process because it supports grinding and pressing applications as well as the drop-forge hammers necessary to manufacture various parts. The forging hammers are the most important compressed air application, and require a consistent pressure level of 95 pounds per square inch gauge (psig) to achieve reliable production. Prior to the project, plant operators tried to maintain a system pressure of 100 psig by running five compressors totaling 900 hp that generated up to 3,500

- Saves \$45,000 annually
- Saves 820,000 kWh annually
- Improves system performance
- Improves product quality
- Reduces production down time
- Avoids a \$60,000 capital cost
- Achieves a simple payback of 1.5 years

standard cubic feet per minute (scfm) at a discharge pressure of 105 psig.

Despite operating all five compressors and using a 2,500-gallon storage receiver, the system pressure fluctuated between 85 and 100 psig. The pressure fluctuations caused the drop-forge hammers to operate erratically, reducing product quality and increasing cycle time. Convinced that additional compressors were necessary, plant management brought in DOE Allied Partner Pneumatech/ConservAir to review the compressed air system. Pneumatech/ConservAir was to determine how much additional capacity was needed to eliminate the pressure fluctuations and improve the system's performance.

However, Pneumatech/ConservAir found that the plant could establish and maintain the required system pressure by operating

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New specifications make it easier to select an energy efficient motor. See page 6.



A leak repair program at Citation Corporation's Interstate Forging plant in Milwaukee, Wisconsin, has lowered artificial compressed air demand by almost 600 scfm.



**U.S. Department of Energy
Energy Efficiency
and Renewable Energy**

Bringing you a prosperous future where energy is clean abundant, reliable, and affordable

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For new subscriptions, go to www.oit.doe.gov/bestpractices/explore_library/energy_matters.shtml

For address/subscription changes, please contact the editor.

Compressed Air System Optimization Saves Energy *continued from page 1*

fewer compressors. The hammers' intermittent air demand and insufficient compressed air storage were the main causes of the pressure fluctuations at points of use.

Another problem was an air leakage rate of about 20% of system output. Most of the air leaked from counterbalance cylinders in the hammers, from point-of-use applications, and from some of the system's distribution piping. The air leakage created artificial air demand, which made the compressors work harder to generate the needed air volume.

Following the system review, plant personnel implemented a system-level project designed to allow the compressed air system to function effectively without the need to purchase additional compressors. The first measure was to stabilize system pressure at the lowest level that met production requirements. To do this, plant personnel installed a pressure/flow controller (P/FL) to separate the demand side of the system from the supply side. In addition, they installed 5,000 gallons of compressed air storage capacity just upstream of the P/FL. Compressed air was set to flow into the storage receivers at 100 psig and to be released into the main header at 95 psig +/- 1 psig.

Next, plant personnel initiated an innovative leak detection and repair campaign. In addition to finding and repairing the largest leaks in the distribution piping, plant personnel redesigned the shaft seals on the counterbalance cylinders so that repairing

leaks on those cylinders could be accomplished without having to disassemble the cylinders. This redesign greatly simplified the task of repairing leaks on those pieces of equipment. It was also decided to repair leaks daily instead of waiting until semi-annual maintenance shutdowns.

This compressed air system project yielded important energy savings, improved system performance, and enhanced productivity. Currently, the plant operates effectively with three 200-hp compressors, whereas before the project it was unable to meet its air demand while operating five compressors totaling 900-hp at full capacity. The system pressure has been stabilized and lowered to 95 psig, and the remaining compressors (one 200-hp and one 100-hp unit) now serve as back-up compressors. The stable air supply has reduced production down time and improved product quality.

The leak repair effort has reduced artificial demand by almost 600 scfm, lowering the average system flow rate. The system's average air demand has declined from between 3,000 and 3,500 scfm to between 2,400 and 2,600 scfm.

Many BestPractices resources are specific to compressed air systems. These include publications, software tools, and training information. Most can be downloaded at www.oit.doe.gov/bestpractices/compressed_air/, while others can be ordered from the OIT Clearinghouse by calling 1-800-862-2086. ●

Millwater Pumping System Optimization Improves Efficiency and Saves Energy at an Automotive Glass Plant

In 2001, the Visteon automotive glass plant in Nashville, Tennessee, renovated its millwater pumping system. The system had been designed in the early 1960s and met the plant's pumping requirements at the time. Over time, however, the plant's manufacturing efficiency improved, resulting in a lower demand for process cooling water. This meant the millwater pumping system became oversized for the plant's needs.

The renovation project involved retrofitting the system's large, aging pumps with smaller units fitted with variable speed drives (VSDs) to better match the system's output with the plant's demand. The project's implementation greatly improved the system's efficiency and reduced the plant's water use,

resulting in important savings in energy and treatment chemicals. In addition, the project improved plant safety by eliminating an electrical hazard on the pump barge. The project's total cost was \$350,000 and the total annual savings were \$280,000, resulting in a simple payback of 15 months.

Aging and improperly configured industrial pumping systems can waste energy and cause high maintenance and operating costs. Demand requirements will also shift. Recognizing and adjusting the output capacities of industrial motor systems in response to changing demand patterns can save energy and improve productivity. In the case of the

(continued on page 5) ►

How Does It Work? Absorption Chillers

Absorption chillers use heat instead of mechanical energy to provide cooling. A thermal compressor consists of an absorber, a generator, a pump, and a throttling device, and replaces the mechanical vapor compressor.

In the chiller, refrigerant vapor from the evaporator is absorbed by a solution mixture in the absorber. This solution is then pumped to the generator. There the refrigerant reevaporizes using a waste steam heat source. The refrigerant-depleted solution then returns to the absorber via a throttling device. The two most common refrigerant/absorbent mixtures used in absorption chillers are water/lithium bromide and ammonia/water.

Compared with mechanical chillers, absorption chillers have a low coefficient of performance (COP = chiller load/heat input). However, absorption chillers can substantially reduce operating costs because they are powered by low-grade waste heat. Vapor compression chillers, by contrast, must be motor- or engine-driven.

Low-pressure, steam-driven absorption chillers are available in capacities ranging from 100 to 1,500 tons. Absorption chillers

come in two commercially available designs: single-effect and double-effect. Single-effect machines provide a thermal COP of 0.7 and require about 18 pounds of 15-pound-per-square-inch-gauge (psig) steam per ton-hour of cooling. Double-effect machines are about 40% more efficient, but require a higher grade of thermal input, using about 10 pounds of 100- to 150-psig steam per ton-hour.

A single-effect absorption machine means all condensing heat cools and condenses in the condenser. From there it is released to the cooling water. A double-effect machine adopts a higher heat efficiency of condensation and divides the generator into a high-temperature and a low-temperature generator.

Is It Right for You?

Absorption cooling may be worth considering if your site requires cooling, and if at least one of the following applies:

- You have a combined heat and power (CHP) unit and cannot use all of the available heat, or if you are considering a new CHP plant
- Waste heat is available
- A low-cost source of fuels is available

- Your boiler efficiency is low due to a poor load factor
- Your site has an electrical load limit that will be expensive to upgrade
- Your site needs more cooling, but has an electrical load limitation that is expensive to overcome, and you have an adequate supply of heat.

In short, absorption cooling may fit when a source of free or low-cost heat is available, or if objections exist to using conventional refrigeration. Essentially, the low-cost heat source displaces higher-cost electricity in a conventional chiller.

In Practice

In a plant where low-pressure steam is currently being vented to the atmosphere, a mechanical chiller with a COP of 4.0 is used 4,000 hours a year to produce an average 300 tons of refrigeration. The plant's cost of electricity is \$0.05 a kilowatt-hour. An absorption unit requiring 5,400 lbs/hr of 15-psig steam could replace the mechanical chiller, providing annual electrical cost savings of:

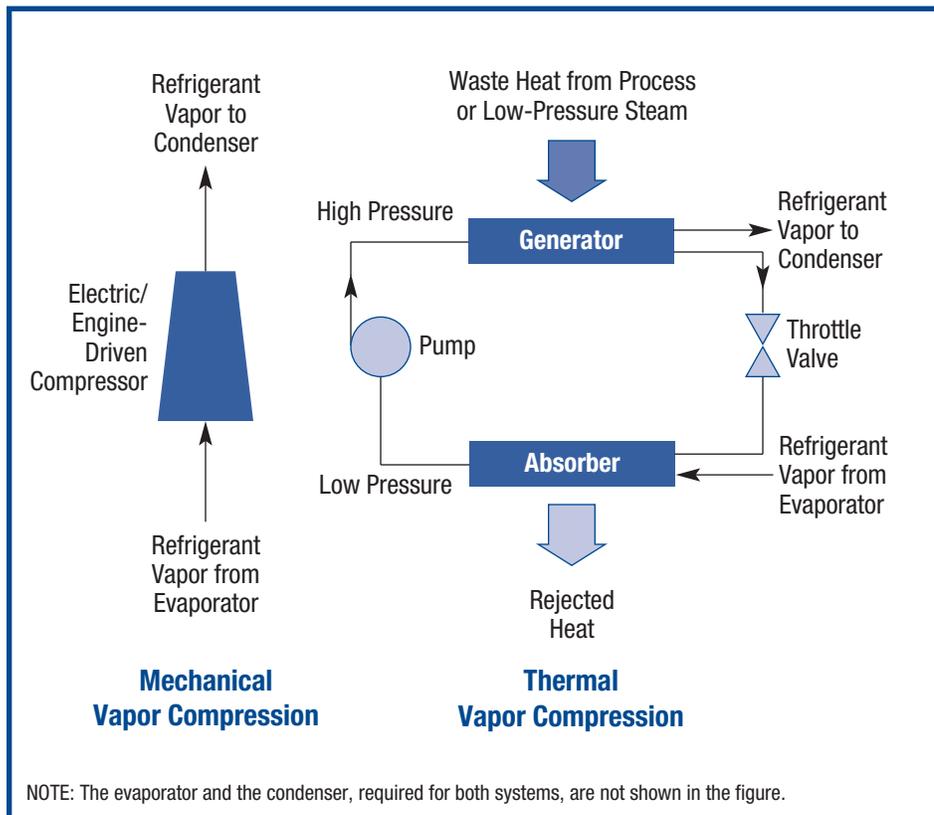
$$\begin{aligned} \text{Annual Savings} &= 300 \text{ tons} \times \\ &(12,000 \text{ Btu/ton} / 4.0) \times 4,000 \text{ hrs/yr} \\ &\times \$0.05/\text{kWh} \times \text{kWh}/3,413 \text{ Btu} = \$52,740 \end{aligned}$$

Actions You Can Take

Determine the cost-effectiveness of displacing a portion of your cooling load with a waste steam absorption chiller by taking the following steps:

- Conduct a plant survey to identify sources and availability of waste steam
- Determine cooling load requirements and the cost of meeting those requirements with existing mechanical chillers or new installations
- Obtain installed cost quotes for a waste steam absorption chiller
- Conduct a life cycle cost analysis to determine if the waste steam absorption chiller meets your company's cost-effectiveness criteria.

If you are a steam system owner, you can join the ranks of industry leaders who have improved productivity and increased profits by using BestPractices tools for your facility. To learn more, visit www.oit.doe.gov/bestpractices/steam/. ●



Comparison of mechanical and thermal vapor compression systems.

New Plant-Wide Assessment Product for Managers and Decision-Makers

DOE's BestPractices has just released a new series of case study summaries, highlighting the bottom-line savings that companies have actually achieved through plant-wide assessments. If you are an industrial manager or financial decision maker, the results presented in these summaries may provide possible in your company.

On average, the findings from a single assessment can be replicated multiple times—often 10 times or more—at other facilities with equivalent systems and energy use. For a relatively low initial investment, companies that participate in assessments can realize a minimum of \$1 million in savings annually from diminished energy costs, reduced waste, and increased productivity—usually with a payback of less than 18 months. Annual savings opportunities identified through recent plant-wide energy assessments range from just under \$1 million to more than \$50 million. Projects frequently can be replicated across industries.

Through a competitive solicitation process, DOE provides cost-shared plant-wide assessments, or PWAs, which have helped companies identify millions of dollars in savings, improve energy efficiency and energy use, and increase productivity. DOE also develops technical case studies that describe the technical side of the assessments in detail. However, the new PWA summaries specifically describe the money, energy, and emissions that can be saved through assessments.

Download the PWA summaries from the BestPractices Plant-Wide Assessment Case Studies Web site at www.oit.doe.gov/bestpractices/Case_Studies_pwa.shtml. Or go to Management Case Studies at www.oit.doe.gov/bestpractices/Case_Studies_corp.shtml. You can also order hard copies of the PWA summaries through the Clearinghouse, via Clearinghouse@ee.doe.gov or call 800-862-2086 to place your order. ●

Industrial Motor System Optimization Projects in the U.S.: An Impact Study

Aimee T. McKane, Program Manager, LBL; Dr. Mitch Olszewski, Group Leader, ORNL; Robert B. Lung, Senior Associate, Resource Dynamics

An impact study using data from DOE case studies was presented at the 2003 American Council for an Energy Efficiency Economy (ACEEE) Summer Study in Rye, New York.

The impact study estimated the effect of motor system optimization projects on industrial competitiveness, and showed how the benefits of such projects are delivered to industry. The study's data came from 41 separate projects on industrial motor systems implemented in the U.S. between 1995 and 2001. The study summed the aggregate project costs and energy savings from all 41 projects and calculated for each project the net present value (NPV), the internal rate of return (IRR), and the simple payback, as well as for all projects aggregated together.

The results showed positive values for each of the metrics applied to the data. For example, the aggregate project costs for all 41 projects was \$16.8 million and the aggregate savings was \$7.4 million and 106 million kilowatt-hours. Using these figures, NPV for the baseline analysis was \$39.6 million. This easily exceeded the aggregate project cost. The aggregate IRR was positive at 41% and the simple payback was 2.3 years.

Two of the 41 projects were implemented to improve process reliability rather than save energy and their project costs were much

higher than their energy savings. When these two projects were removed from the study sample, the NPV became \$40.5 million, the aggregate IRR was 46%, and the simple payback was 2.1 years.

In addition to energy savings, many of the projects in the study yielded important non-energy benefits. These included maintenance savings, increased or improved production, lower emissions, reduced purchases of ancillary products, plant safety, and avoided equipment purchases. In addition, some firms received rebates or incentive payments for implementing their projects, increasing their attractiveness.

The study also examined some of the reasons why the projects were implemented and made some rough estimates of possible energy savings throughout U.S. industry. Five separate goals drove all 41 projects, but most of the projects (almost three quarters) were done for one of two reasons: either to realize estimated energy savings, or to increase motor system effectiveness. Using two separate calculations of aggregate energy consumption by motor systems in U.S. industry, the study extrapolated a range of potential energy savings that could be achieved depending on how many industrial plants in the U.S. were to take on motor system improvement projects of similar quality.

The overriding study conclusion is that motor system optimization is an underrated

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TABLE 1. A RECENT STUDY CONCLUDES THAT MOTOR SYSTEM OPTIMIZATION IS AN UNDERRATED SOURCE OF PRODUCTIVITY

Aggregate Data	N = 41	Without Outliers (N = 39)
Total costs	\$16,772,740	\$15,072,740
Total savings	\$7,401,700	\$7,303,700
Median cost	\$240,000	\$188,000
Median savings	\$115,000	\$108,000
kWh	106,483,517	104,544,517
Simple payback	2.27	2.06
CRR	41%	46%
PV	\$56,344,762	\$55,598,746
NPV 5-year	\$13,913,292	\$15,207,003
NPV 10-year	\$39,572,022	\$40,526,006
NPV 15-year	\$61,975,378	\$58,200,783

Chemical Maker Uses Plant-Wide Assessments to Identify Big Energy Savings

Rohm and Haas Company is one of the world's largest manufacturers of specialty chemicals. Its chemicals are used in many industries, including the paint and coating industry, electronics, household products, water treatment, adhesives, and plastics.

As an Industrial Technologies Program Allied Partner, Rohm and Haas has benefited from its relationship with DOE's Office of Energy Efficiency and Renewable Energy. Highlighting that relationship, Rohm and Haas has conducted two plant-wide assessment (PWA) projects in recent years in Tennessee and Texas, with funds from DOE.

Rohm and Haas first conducted a plant-wide energy assessment at its Knoxville, Tennessee, facility, then replicated the assessment methodology at plants in LaMirada, California, and Louisville, Kentucky. The assessment team identified annual energy savings of nearly 47,000 million British thermal units (MMBtu) in steam and fuel, and 11,000 megawatt-hours (MWh) in electricity at the Knoxville plant. Annual cost savings were estimated at almost \$1.5 million. When the company replicated the assessment at LaMirada and Louisville, the combined additional cost savings were more than \$500,000 annually. Combined annual energy savings were about 23,000 MMBtu and 6,000 MWh for the two plants.

Following the Knoxville PWA's completion in mid-2002, Rohm and Haas implemented projects that cut its energy consumption by \$300,000 per year, including 30 billion Btu/year in fuel savings, and 1,600 MWh/year of electrical power savings. Additional projects that the company said will more than double these initial benefits are in various stages of planning and implementation.

At its largest facility in Houston, energy saving projects identified through the initial and subsequently replicated PWAs have led to more than \$18.5 million in annual cost savings, and 4.25 trillion Btu/year combined fuel and power savings.

"Rohm and Haas continues to conduct PWAs to identify and implement energy and efficiency savings at our facilities around the world, and we look forward to working with the DOE in the future," said Ray Baker, Engineering Technical Center at Rohm and Haas.



Rohm and Haas' Knoxville, Tennessee plant, where annual natural gas energy savings of 47,000 MMBtu were identified.

Looking for Opportunities

The assessment team looked for energy conservation opportunities at the Knoxville plant. As part of its work, the team completed an energy use analysis that identified current and future needs, developed energy reduction options for the site, and established an energy reduction plan.

The assessment team also looked at a number of plant systems, including electrical, fuel oil, natural gas, steam, cooling, compressed air, water, and thermal oxidation. Productivity gains, environmental benefits, and labor savings were also identified. The assessment team used a water pinch analysis to identify opportunities to recycle water streams and to reduce water flow and sewer discharge by roughly 20 percent. One nonenergy benefit was reducing environmental impacts by reducing nitrogen oxide emissions at the boiler house.

The following energy efficiency projects were identified at the Knoxville plant:

- Increase efficiency at the steam generation facility
- Improve steam system maintenance, including traps, heaters, and steam header insulation
- Recover low-level preheated water
- Upgrade process systems
- Optimize refrigerated water flow
- Optimize refrigerated water temperature
- Substitute cooling tower water for refrigerated water in winter
- Optimize cooling towers, including controls, pumps, and repairs
- Optimize compressed air operations and manage leaks, including a high-efficiency consolidated compressed air

system, compressed air conservation projects, an air leak program, maintenance improvements, and pump replacement.

The projects identified for the Knoxville plant were assessed for possible implementation at the LaMirada and Louisville plants.

To learn more about the plant-wide assessment program, contact Grace Ordaz of the Department of Energy's Industrial Technologies Program by phone at 202-586-8350 or by e-mail at grace.ordaz@ee.doe.gov. For technical details about the assessments, visit www.oit.doe.gov/bestpractices/plant_wide_assessments.shtml, or contact Bob Leach of the Oak Ridge National Laboratory by phone at 865-576-0361 or by e-mail at leachre@ornl.gov. ●

Millwater Pumping System

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Nashville glass plant, replacing aging, fixed-output pumps with smaller units fitted with VSDs created an optimally sized pumping system that was able to effectively vary output in response to demand. Reconfiguring the system led to important savings in energy, maintenance, and purchases of water treatment chemicals.

Many BestPractices resources are specific to motor systems. These include publications, software tools, and training information. Most can be downloaded at www.oit.doe.gov/bestpractices/motors, while others can be ordered from the OIT Clearinghouse by calling 1-800-862-2086. ●

New NEMA Guidelines Help Users Specify Use of Premium Efficiency Motors

The National Electrical Manufacturers Association (NEMA) is a leading trade association that develops standards and specifications for electrical equipment. In 2001 NEMA launched the NEMA Premium Motor Program, details of which are available online at www.nema.org/index_nema.cfm/1018.

The program also provides a way to readily identify premium efficiency three-phase motors with the NEMA Premium brand, and allows NEMA and the participating motor manufacturers to promote the increased reliability and energy efficiency benefits that premium motors can provide to U.S. businesses and industry.

As part of its effort, NEMA recently published information to help users and system designers specify NEMA Premium motors. The document, "General Specification for Consultants, Industrial and Municipal: NEMA Premium Efficiency Electric Motors (600 Volts or Less)" is available through NEMA.

The specification is intended to outline minimum requirements for three-phase AC induction motors used in municipal and industrial applications, that operate on 600 volts or less, are rated 500 horsepower (hp) or less, operate more than 2,000 hours a year, and run at more than 75% of full load.

The NEMA Premium energy efficiency motors program provides highly energy efficient products that meet the needs and applications of users and original equipment manufacturers based on a consensus definition of "premium efficiency." These products are also certified to use the NEMA Premium logo.

Manufacturers Offering NEMA Premium Motors

A.O. Smith Electrical Products
 Baldor Electric Co.
 Emerson Motors
 GE Motors
 Leeson Electric
 Lincoln Motors
 Marathon Electric
 RAM Industries
 Rockwell Automation
 Siemens
 Sterling Electric
 TECO-Westinghouse
 Toshiba International
 WEG Electric Motors

Source: NEMA

NEMA Premium-labeled electric motors help buyers optimize motor system efficiencies, reduce electrical power consumption and costs, and improve system reliability.

The NEMA Premium program has won endorsement from its membership, which represents more than 80% of all motors sold in America. DOE's support includes joint promotional activities to expand market penetration. NEMA has received the support and endorsement of the Hydraulic Institute and the Electrical Apparatus Service

Association. The Consortium for Energy Efficiency has aligned its motor efficiency guidelines with NEMA Premium.

The popular MotorMaster+ software program, available through the Industrial Technologies Program, makes it easy for you to identify and select NEMA Premium motors. The software highlights NEMA technical material, which establishes NEMA Premium full-load efficiency levels. The NEMA standard "bars" are incorporated into the software's list module. That means when motors are listed in descending order of full-load efficiency, both the NEMA standard for NEMA Premium Motors and Energy Efficient motors appear. The MotorMaster+ software also identifies the new NEMA Premium Efficiency medium voltage motor standards. These standards are for 2,300- and 4,000-volt motors with horsepower ratings between 250 and 500 hp.

The NEMA specification may be purchased for \$31.00 by contacting Global Engineering Documents at 800-854-7179 (within the U.S.), +1 303-397-7956 (international), 303-397-2740 (fax), or on the Internet at www.global.ihs.com. The specifications may be viewed on the Internet by visiting www.nema.org/r/std/pm600spec/.

To download a free copy of MotorMaster+ 4.0, visit <http://mm3.energy.wsu.edu/mmplus/default.stm>, or call the Industrial Technologies Program Clearinghouse at 800-862-2086. ●

TABLE 1: SELECTED NOMINAL EFFICIENCIES FOR NEMA PREMIUM INDUCTION MOTORS RATED 600 VOLTS OR LESS (RANDOM WOUND)

Horsepower	Open Drip-Proof			Enclosed Fan-Cooled		
	6-pole	4-pole	2-pole	6-pole	4-pole	2-pole
1	82.5	85.5	77.0	82.5	85.5	77.0
5	89.5	89.5	86.5	89.5	89.5	88.5
10	91.7	91.7	89.5	91.0	91.7	90.2
20	92.4	93.0	91.0	91.7	93.0	91.0
25	93.0	93.6	91.7	93.0	93.6	91.7
50	94.1	94.5	93.0	94.1	94.5	93.0
100	95.0	95.4	93.6	95.0	95.4	94.1
250	95.4	95.8	95.0	95.8	96.2	95.8
500	96.2	96.2	95.8	95.8	96.2	95.8

For more information about the NEMA Premium efficiency electric motor program, go to www.nema.org/premiummotors.

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Use These Web Tools to Enhance Your Plant's Energy Efficiency

Industrial manufacturers seeking to gain a competitive edge now have a new resource full of rapid solutions for cutting energy costs. The U.S. Department of Energy has launched a new Web site, Energy Savers for Industry Plant Managers and Engineers. This site offers a wide array of tips, practices, information, and software tools, which, when put to work, can have immediate savings impacts on energy use in your facilities.

Features of the site include:

- 20 ways to save energy now on combustion, steam, and process heating systems
- Case studies of other manufacturers who have successfully implemented energy saving programs and projects
- Steps to develop an energy management action plan
- Software tools to identify energy saving opportunities in industrial systems
- Information on plant energy assessments and technical assistance

A second, equally valuable tool for industry, government, and educators, is the Industrial Assessment Center (IAC) Database. This database is a collection of recommendations for improvements and modifications to facilities to increase energy efficiency and productivity made by IACs across the country since 1984. The database contains over 83,000 recommendations from more than 11,000 assessments, searchable by industry, key word, and recommendation type. The database has undergone major changes recently to improve both the quality and type of data available, as well as the presentation and accessibility of this data.

The Energy Savers for Industry Plant Managers and Engineers Web site is available at www.energysavers.gov/industry. Access to the newly improved IAC Database is available at <http://iac.rutgers.edu/database/>. ●

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ENERGY MATTERS EXTRA

The Fall issue of Energy Matters Extra provides news about recent awardees of DOE matching funds for plant-wide energy efficiency assessments. You can also get more in-depth information about the plant-wide assessments conducted at Rohm and Haas, Visteon, and Citation facilities. Plus, find out how Qualified Specialists can help you get the most out of DOE software tools to improve your plant's system efficiency. In addition, learn about the enhanced Industrial Assessment Center Database, which offers ways to improve and modify industrial facilities to increase energy efficiency and productivity. Learn about all these subjects and more by logging on to www.oit.doe.gov/bestpractices/energymatters/emextra/. ●

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Optimization Projects *continued from page 4*

source of productivity. Although it was not identified as a primary driver, many of the 41 projects were performed in response to production problems. Once the projects were complete, those production problems eased and plants began to notice energy savings. Improvements in production occurred in 34% of the plants included in this study. While many plant operators could not quantify the production impact of their project, they recognized that production increased or that product quality improved because the production equipment operated more effectively after the project was completed. Instead of re-allocating resources, motor system improvements cause the specific systems to use fewer resources (namely, energy) while allowing for a desired production level or standard of quality. Because of this, such projects increase industrial competitiveness and productivity.

The ACEEE hosted more than 250 attendees at the 2003 Summer Study. For more information, please visit www.aceee.org. To obtain a copy of the impact study please e-mail Robert B. Lung at rbl@rdcnet.com or call 703-356-1300 x211. ●

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About the Office of Energy Efficiency and Renewable Energy

A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. By investing in technology breakthroughs today, our nation can look forward to a more resilient economy and secure future.

Far-reaching technology changes will be essential to America's energy future. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a portfolio of energy technologies that will:

- Conserve energy in the residential, commercial, industrial, government, and transportation sectors
- Increase and diversify energy supply, with a focus on renewable domestic sources
- Upgrade our national energy infrastructure
- Facilitate the emergence of hydrogen technologies as a vital new "energy carrier."

The Opportunities

Biomass Program

Using domestic, plant-derived resources to meet our fuel, power, and chemical needs

Building Technologies Program

Homes, schools, and businesses that use less energy, cost less to operate, and ultimately, generate as much power as they use

Distributed Energy & Electric Reliability Program

A more reliable energy infrastructure and reduced need for new power plants

Federal Energy Management Program

Leading by example, saving energy and taxpayer dollars in federal facilities

FreedomCAR & Vehicle Technologies Program

Less dependence on foreign oil, and eventual transition to an emissions-free, petroleum-free vehicle

Geothermal Technologies Program

Tapping the earth's energy to meet our heat and power needs

Hydrogen, Fuel Cells & Infrastructure Technologies Program

Paving the way toward a hydrogen economy and net-zero carbon energy future

Industrial Technologies Program

Boosting the productivity and competitiveness of U.S. industry through improvements in energy and environmental performance

Solar Energy Technology Program

Utilizing the sun's natural energy to generate electricity and provide water and space heating

Weatherization & Intergovernmental Program

Accelerating the use of today's best energy-efficient and renewable technologies in homes, communities, and businesses

Wind & Hydropower Technologies Program

Harnessing America's abundant natural resources for clean power generation

To learn more, visit www.eere.energy.gov

Coming Events

FUNDAMENTALS OF COMPRESSED AIR SYSTEMS, NORTHBORO, MA

■ Dec 03, 2003

For more information, contact Marcia Lemire at 800-787-1706

STEAM SYSTEM AWARENESS WORKSHOP, GREENSBORO, NC

■ Feb 18, 2004

For information, contact David Godfrey at david.godfrey@ee.doe.gov or call 404-562-0568

NATIONAL INSULATION TRAINING PROGRAM, HOUSTON, TX

■ Mar 4-5, 2004

For more information, visit www.insulation.org/training, or call the NIA office at 703-683-6422 ext. 13

PROCESS HEATING ASSESSMENT (END USER), CHARLOTTE, NC

■ Mar 24, 2004

For information, contact Harmohindar Singh at singh@ncat.edu or call 336-334-3566 ext. 26

Best Practices

The Industrial Technologies Program's BestPractices initiative and its *Energy Matters* newsletter introduce industrial end users to emerging technologies and well-proven, cost-saving opportunities in motor, steam, compressed air, and other plant-wide systems.



INFORMATION CLEARINGHOUSE

Do you have questions about using energy-efficient process and utility systems in your industrial facility? Call the Industrial Technologies Program's Information Clearinghouse for answers, Monday through Friday 9:00 a.m. to 8:00 p.m. (EST).

HOTLINE: 800-862-2086

Fax: 360-586-8303, or access our homepage at www.oit.doe.gov/clearinghouse.

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- David Godfrey, Atlanta, GA, 404-562-0568
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