



An Office of Industrial Technologies
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 Energy Efficiency Opportunities for Today
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Issue Focus: The Future of Industrial Energy Efficiency

IN THIS ISSUE

- Seven Companies on Their Way to Improved Plant Performance 1
- Submit Your Proposal to Assess Energy Flow and Steam System Opportunities 2
- Partnering to Save Energy and Money in the Attractions Industry 3
- Industrial Energy Efficiency in the New Millennium: A Perspective 4
- Lights that Shine Forever 5
- Root Cause Failure Analysis on AC Induction Motors 6
- Letters to the Editor 7
- Coming Events 8

Seven Companies on Their Way to Improved Plant Performance

Recently, DOE's Office of Industrial Technologies (OIT) named these seven industrial companies to receive cost-shared funding for plant-wide, energy efficiency assessments that the plants themselves are conducting:

- Alcoa** of Lafayette, Indiana ■ **AMCAST Industrial Corporation** of Wapakoneta, Ohio ■ **Boise Cascade** of International Falls, Minnesota ■ **Caraustar Industries** of Baltimore, Maryland and Rittman, Ohio ■ **Crucible Specialty Metals** of Syracuse, New York ■ **Georgia-Pacific Corporation** of Palatka, Florida ■ **Inland Packaging and Paper** of Rome, Georgia

Through a competitive solicitation held last May, the companies submitted proposals for cost-shared assessments that could lead to substantial energy and cost savings, improved productivity, reduced waste, and enhanced global competitiveness.

OIT will share up to half the costs, or up to \$75,000, with each site to conduct the assessments, which will evaluate energy efficiency opportunities in areas such as:

- Electric motor systems
- Steam systems
- Compressed air systems
- Combined heat and power systems
- Heat exchange networks
- Process modifications
- Adoption of emerging process technology

Each site will gain national recognition for their efforts, and will have access to OIT's emerging technologies tools, and resources.

Comprehensive Approach the Key

Just what made these proposals stand out? OIT's key requirement was that industrial sites take a comprehensive, plant-wide approach to increasing energy efficiency and reducing environmental emissions. Of the 19 proposals considered, the awardees successfully conveyed a plan to adopt best-available and emerging technologies using state-of-the-art tools and information, process engineering techniques, and best practices for operational, plant support, and process systems.

"We were looking for sites that could see the entire spectrum of opportunities within the plant," explains Paul Scheihing of OIT. "What made these proposals stand out is that they described a plant-wide



Alcoa and six other plants will receive cost-shared funding from OIT for plant-wide assessments.

view in methodology and scope of activity, whether it was improving efficiency of plant processes or utilities."

Another important consideration for selection was an expression of commitment to build on previous energy efficiency initiatives and investments. In fact, a common theme emerged among the winning proposals: energy efficiency is an integral part of each company's corporate philosophy or they have an established track record of energy efficiency. Each site's commitment to implementing plant-wide changes was evident in the proposals by the:

- Significant involvement of plant personnel.

(continued on page 2)

BE A MODEL PLANT

If you missed the first solicitation in May, or if you would like to reapply for plant-wide assessment funding, you have a new opportunity. The second request for proposals will be announced in December 1999. To find out more, provide your name, company, and address to Mitch Olszewski by e-mail: zmo@ornl.gov, or fax to (865) 576-0493 (e-mail is preferable).

ENERGY MATTERS

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Seven Companies on Their Way

continued from page 1

- Highly competent teams performing the assessments.
- Interest in using advanced technologies for process improvements.

Models to Follow

The assessments will take place over the next 12 months, and once completed, OIT will compile and publish profiles of each assessment. OIT hopes these compa-

nies will serve as models to others, and that their results, successes, and experiences will encourage other companies to adopt and implement similar activities. "OIT is excited about working with these seven winning plant sites," says Scheihing. "For a few, if not all, of these sites we expect to find a variety of emerging technology opportunities—we hope technologies resulting from the Industries of the Future technology roadmaps."

ABOUT THE AWARDEES

The seven companies to receive cost-shared, plant-wide assessments fall within the scope of OIT's Industries of the Future initiative, which focuses on the country's most energy intensive industries. Working with OIT and partnering with resource and equipment suppliers, engineering firms, and others, these sites are moving toward a strategy to increase their plant energy efficiency and improve environmental performance.

Alcoa will assess the furnace operations, maintenance, pumping systems, and plant utilities of its extruded and drawn tube mill.

AMCAST Industrial Corporation has plans to assess all energy systems and address pollution prevention and process improvements at its aluminum metalcasting plant.

Boise Cascade will use Water Pinch technol-

ogy to assess water usage throughout its pulp and paper mill. The company will assess energy cost and product quality issues.

Caraustar Industries plans to assess major end uses of steam, motors, cogeneration, and heat recovery in its paperboard production process.

Crucible Specialty Metals will look at all plant energy use in its specialty bar steel mill, from power and fuel costs to processes.

Georgia-Pacific's assessment of its pulp and paper mill will include the use of Thermal and Water Pinch technology analysis and Power Process Review to examine process heat usage, water usage, and power efficiency.

Inland Paperboard & Packaging will study steam, electrical, and all fuel uses throughout its paperboard mill.

Submit Your Proposal to Assess Energy Flow and Steam System Opportunities

Oak Ridge National Laboratory (ORNL), in support of DOE's Office of Industrial Technologies (OIT) is seeking proposals from qualified consultants and analysis firms to undertake a new national energy assessment consisting of two tasks: an Industrial Energy Flow Assessment and a Steam System Opportunities Assessment. Proposals can be developed for either the Energy Flow Assessment, the Steam Systems Opportunities Assessment, or both tasks.

The Energy Flow Assessment will focus on industries in Standard Industrial Codes (SICs) 20-39, and will:

- Identify and quantify the energy sources and generation technologies that supply heat and power to the U.S. process industry.
- Identify and quantify, by major applications, how the U.S. process industry uses energy.

The Steam System Opportunities Assessment will:

- Develop baseline information on the U.S. process industry's steam system generation and use and opportunities for improvement.
- Identify current steam system design, maintenance, and management practices by the U.S. process industry.
- Develop a methodology for continuous assessments to influence improvements of steam system operations.
- Educate and influence industry and government decision-makers about potential benefits from steam system efficiency improvements.

OIT expects to release the RFP before November 30, 1999, and proposals will be due by March 1, 2000. For more information, contact Tony Wright, ORNL, by fax at (865) 574-2032 or by e-mail: alw@ornl.gov.

Partnering to Save Energy and Money in the Attractions Industry

Last time you were strolling through a theme park, such as Walt Disney World, you probably didn't stop and wonder what is behind the scenes helping systems run. In case you're wondering now, it's electric motor systems. The North Service Area Chiller Plant, owned by the Reedy Creek Improvement District, sends chilled water to Walt Disney World facilities and has over 20,000 HP worth of motors and over 16,000 tons of air conditioning capacity. At the same time those motor systems were helping to ensure that everyone enjoyed their family vacation, they were also wasting valuable energy and money. With help from the University of Florida Energy Extension Service (FEES), RCID improved operations and has saved energy and money at their North Service Area Chiller Plant.

Using DOE's MotorMaster+ (MM+) software as the primary analysis tool, FEES evaluated more than 120 motors at the plant, ranging from 25 to 700 HP, approximately 80 of which are open dripproof (ODP) horizontal, and the remainder vertical hollowshaft (VHS). Applications included all aspects of water pumping—chilled, condenser, hot, and municipal water—as well as air compressors and cooling tower fans. FEES, an Allied Partner, received funding for the in-depth study of RCID's electric motor systems through the Florida Energy Office, a state agency that funds various energy conservation efforts.

Using data from MM+, FEES identified

where motor system upgrades would help reduce energy usage. "One of their chilled water loops, for example, used five 150-HP motors to drive the facility pumps. The five pumps, as a system, operate continuously, with any single motor running from 4000 to 5000 hours per year," says Wendell Porter of FEES. "These motors are over 25 years old, and I know each has been rewound at least once. Our first step was to replace four of the five motors, leaving an old one in place for measurement purposes." For 4 months, FEES monitored an old and a new motor. The results showed a 7 percent improvement (from 88 percent to 95 percent) in motor efficiency.

Paul Allen, Chief Energy Management Engineer for Reedy Creek Energy Services, explains "the MotorMaster program and analysis tools have enabled us to quantify the savings and justify the purchase of more energy-efficient motors."

Phase I of the RCID motor efficiency study resulted in the replacement of the following seven motors at the chiller plant and one motor at the Magic Kingdom, totaling 1425 HP:

- Four of the five existing 150-HP chiller pumps.
- Two 250-HP condenser water pump motors.



With the help of MotorMaster+, FEES evaluated more than 120 motors to identify savings opportunities.

- One 125-HP cooling tower fan. A variable-speed drive (VSD) was also added to this new motor.
- One of three 200-HP motors serving as part of the Magic Kingdom's vacuum waste collection system.

Porter calculates that energy savings for all motors except the cooling tower fan motor exceed 300,000 kWh per year and demand has been reduced by approximately 60 kW. The cooling tower fan motor and VSD allow better chiller control. Preliminary data shows that compressor demand might be reduced as much as 100 kW.

Under Phase II, FEES personnel are using MM+ to survey and create a database of nearly 150 motors, totaling more than 20,000 HP. These include pump motors at Disney's Contemporary Resort chilled water plant and motors in the EPCOT Central Energy Plant.

"FEES has been great in helping us put together a motor management program," acknowledges Paul Allen. "We're planning a multi-year effort to phase-in energy-efficient electric motors. A capital spending plan has just been approved for this purpose."

You don't have to serve the Magic Kingdom to reap the benefits that RCID has; other facilities can save money and improve productivity by looking at their motor systems. "...More money is wasted by inefficient motors than by anything else you can think of," Porter concedes. "Motors aren't flashy, they just sit in the corner and hum. People need to know how much energy and money they can save just by changing out motors. And of course, by looking at overall systems you can often help them discover additional economies."



Motor system upgrades reduce energy usage at RCID's chiller plant.

Industrial Energy Efficiency in the New Millennium: A Perspective

Think back a few years to when The Year 2000 seemed too remote to consider, except, of course, that it made an intriguing setting for science fiction drama. These days, as we hurry toward the new century—and a new millennium, besides—it seems everyone everywhere dares to imagine the possibilities of the new era. We now realize the same future that once seemed “way out there,” is nearly *here*, and we wonder what it will be like.

Since its beginning, DOE's Office of Industrial Technologies has focused on what the future will be like for industry. The question has always been, “How will industry become more efficient, more productive, and more competitive?” Today, on the verge of the 21st century, the time is right for an exchange of ideas about the future of industrial energy efficiency. In that spirit, *Energy Matters* posed this question on the topic to our own panel of industry experts:

How do you see industrial energy efficiency markets, services and technology products changing in the next 20 years, and what technological breakthrough do you think will have the most significant impact on industrial energy efficiency?

We invited responses from *Energy Matters'* Editorial Board members—because they represent the broad industrial spectrum we serve—and from an OIT Program Manager and other industry experts. Here is who they are and the changes they foresee within the sphere of industrial energy efficiency.

Floyd Barwig, Iowa Energy Center

Industrial energy efficiency markets will be significantly affected by utility industry restructuring. A range of new products and services will proliferate, allowing industries to rethink how they procure energy, energy using equipment, and energy-related operations and maintenance services.

Distributed generation (fuel cells, microturbines, etc.) and distributed energy storage (superconducting magnetic electric storage, flywheels, chemical storage, etc.) are the technologies to watch.

Rob Boteler, US Electrical Motors

The future of global energy conservation must move forward by addressing the age and efficiency of the installed base of equipment in today's buildings and factories. Industries must begin replacing engines, motors, transformers, gears, and drives from 10, 20, or 30 years ago with new technologies rather than repairing and continuing to operate older, low-efficiency technologies.

Lynda Butek, representing the Electrical Apparatus Service Association

Regulations will focus on systems rather than components, and all products will be required to meet efficiency levels. Integration of systems components will maximize efficiency. Industry as much as government will drive efficiency improvements. We'll see smaller incremental efficiency gains with

motors and a greater emphasis on improved efficiency of downstream equipment.

Adjustable speed drives (ASDs) will be more widely used in production equipment as they become cheaper, smaller, and more sophisticated. Computer controlled ASDs will optimize processes and minimize energy consumption, not just on individual machines, but plant-wide. Computers will also measure and correlate production output to energy consumption. Smart motors will predict their own failures, which could eliminate downtime.

Don Casada, Oak Ridge National Laboratory

Need energy reductions?

Forget the sophistic.

Most important actions

Are commonly simplistic.

New technologies? I've no picks;

Some may help a mite,

But keep focus on these basics,

If you would win the fight:

Slip by Friction's hellish entropyrise,

Cut that liar, Superfluity.

Who most welcomes their demise?

Our old pal, Efficiency.

But who'll devise the battle plan,

And what is it they'll do?

You alone can answer, friend;

For the leader is good old you.

(See Don's related article on page 5.)

Keith Davidson, Onsite Sycom Energy

The coming millennium will value natural resources at a premium and will “incentivize” environmental stewardship. The industrial sector will move sharply toward waste minimization, process opti-

mization and efficient energy use. Combined Heat and Power (CHP) will become a “no-brainer” for industrial plants with a heat load. With advances to CHP technologies, controls, and grid communication software, CHP will provide economic, environmental and reliability benefits to industrial users, society, and the distribution grid as a whole.

Chris Hunter, Johnson & Johnson, Worldwide Engineering Services

The way people live and do business will change radically as we begin to harness the power of the Internet Age in the next two decades. The most significant technological breakthrough in industrial energy efficiency will come through new, faster, paper-thin microchips that can be embedded anywhere. Every piece of equipment, every motor, even every light bulb will not only be “smart”, but will have an IP address. This will create within each facility a digital nervous system that will foster a level of understanding and control of energy consumption few to date have ever dreamed of.

Peter Garforth, Owens Corning

Market liberalization is forcing utilities to extend their offerings to include tailored energy services packages for industrial customers. We will see a blurring of these interests, with multidisciplinary service companies investing in customers' energy assets, upgrading them, and being paid from the productivity they create. Industrial customers will increasingly outsource energy management to reduce overall energy costs in their production processes.

No single technology will be the “game-changer.” The real change will be tailoring solutions to give industrial customers maximum productivity using all available technology. Information technology will link supply and demand systems; distributed generation will find increased application; and innovative manufacturing processes will reduce energy waste.

Rick Payton, Rockwell Automation/Reliance Electric

Products and processes will benefit significantly from the digital age. Information on both the operation of energy-converting products and the processes they are a part of will enable energy consumers to tune

(continued on page 5)

continued from page 4

and purchase components to minimize energy consumption while maximizing process production. In fact, some day these products might even tune themselves.

In addition, materials technology will continue to develop. New developments over the next 20 years will have the same impact on industry as 100 years worth of past developments, thanks to information and tools now and soon to be available.

Paul Scheihing, DOE Office of Industrial Technologies

Industrial customers will increasingly demand system-based solutions from their suppliers to maximize their limited capital resources. Innovative supplier/customer partnerships that seek plant-wide productivity opportunities using life-cycle costing principles will become commonplace. This

new emphasis will more strongly link the benefits derived from total asset management, energy efficiency, and maintenance best practices, while helping corporations improve energy efficiency and reduce greenhouse gas emissions.

Howard Snyder, Weirton Steel

I see Utilities Automation as being an integral part of industrial plants in the future. This entails complete computer control of power houses, boiler houses, gas blending stations, and water pump houses. Currently, decision making on how to operate these facilities is done manually by established procedures and guidelines.

With modern instrumentation and control loops, the decisions can be based on precise, calculated equations with feedback to fine tune for continuous maximized efficiencies.

Editor's Note. So when does the 3rd millennium actually begin? Some say 2000, some say 2001. We recognize there is some debate over this technicality. Energy Matters might be a little early in ringing in the new millennium, but as we see it, it is never too early to be thinking about the future of energy efficiency.

TAKE PART IN OUR FUTURIST FORUM

Now that you've heard from others with a stake in the future of industrial energy efficiency, let us know what you think. Consider the two-part question presented on page 4 and submit your ideas (in 100 words or less) to the **Energy Matters Extra Futurist Forum** www.motor.doe.gov/emextra. Or mail or fax your ideas as a Letter to Editor (see page 7 for contact information). We will publish some of your ideas in future issues of Energy Matters.

Lights that Shine Forever

By Don Casada, Oak Ridge National Laboratory

Choosing the Champions of Energy

After I agreed to *Energy Matters'* request to write a retrospective/prospective article consistent with the end of the millennium theme, I journeyed back in time, considering important historical figures and contributions in the energy technology arena. Giants like Newton, Faraday, Maxwell, Carnot, Joule, Thomson, Tesla, Bernoulli, Watt, Otto, Diesel, Carrier, Edison, and Fermi came to mind, along with the fundamental understandings, discoveries, and technologies they enabled.

I started narrowing selections with a focus on periods of time. What I found really surprised me, and changed my entire thought process.

As I tabulated people and events by 50-year periods, starting with Isaac Newton, my primary challenge was making a top selection in each period—there were so many to choose from. But when I got to the last half of the 20th century, my dilemma was reversed—I couldn't pick one at all.

So I wandered the Web in want of wisdom, not limiting myself to energy areas—rather just looking at important historical figures and events. I serendipitously tripped (a common means of scientific and technological advances) across a couple of

well-known, mid-millennial figures that I'd never associated with energy technology. After a little reflection, I was convinced that these men and their contributions, viewed properly, were not only illustrative of the most important historical technological developments, but, if we've a lick of sense and will heed their advice, point the way to a better future.

My first pick is Johannes Gutenberg, the inventor of the printing press. The Gutenberg press was a dominant factor in both the timing and location of industrial energy technology development. Previously, printed material was prohibitively expensive for all but the extremely wealthy who could afford to pay for manual transcriptions. That changed within a generation.

The printing press dramatically changed societal and political structures, but let's focus on its technology implications. Broad exchange and critique is always important in validating or rejecting new ideas. Isaac Newton may have been just as inspired without the printing press. But there is no doubt that the extent and speed of his impact on others would have been dramatically reduced to a linear slope of advancement instead of the actual geometric growth.

Gutenberg's press is the epitome of enabling technology. It represents the classical physics of Newton and Maxwell,

Tesla's motor, and Otto's engine.

Now let's stir the pot a bit. The second person is Martin Luther.

WHAT?!

Now I realize you may think I'm way out in left field, but I'm really just playing my position.

Martin Luther took quite ancient information and looked at it in a new light. Unsettled by what he saw, he searched further. And after much internal struggling, he came to his eureka.¹ He saw that both the authority and responsibility to make things right were in the hands of the individual, not an institutional structure. More importantly, he acted on his new understanding, even at the risk of his life, when he brought his new way of thinking to management's door.

Luther represents the person who is willing to not only come around to a new way of thinking, but to believe in it strongly enough to act upon it. He helps us see that if we would find "true treasures" (from his famous 95 theses), we needn't indulge our ego-driven inclination to sophisticated solutions, but rather choose the humble, the simple, the common.

Energy of Less Esteem

But what about the future? Take a look at the question posed on page 4 of *Energy* (continued on page 7)



Root Cause Failure Analysis On AC Induction Motors

By John M. Machelor,
Motor/Drives Systems
Specialist in support of

DOE's Industries of the Future, MACRO
International Inc.



This is the sixth and final article by Mr. Machelor on the subject of Root Cause Failure Analysis. This article concludes the discussion of motor

bearing failures. Refer to previous Energy Matters' articles authored by Mr. Machelor for more information on root cause failure analysis.

Enclosures

Just as motor enclosures vary from open to totally enclosed, so too bearings are available from open to sealed. **Open bearings** have no shields or seals between the inner and outer races, so the inner components of the bearing (rotating elements, retainers, grease) are exposed to outside elements. As a result, motors with open bearings are best maintained in a plant with a routine preventive maintenance program. The open bearing must be **periodically** lubricated with the correct **amount** and **type** of grease. In addition, the open bearing is very susceptible to contamination and moisture. Even with a preventive maintenance program in place, mistakes can occur in servicing open bearings with the result being premature bearing failures. Common mistakes include:

- **Under (or no) greasing** resulting in friction between the rotating elements/retainer/races causing excessive heating and metal wear.
- **Over greasing** also resulting in excessive heating of the bearing plus contamination of the motor's windings with grease overspill.
- **Use of the wrong grease** can result in rapid degradation of the grease and subsequent bearing failure. Greases are specially formulated to be used in certain types of bearings and under certain application conditions taking into account parameters like speed, load, environment, etc.

- **Mixing incompatible greases** can create a lethal (to the bearing) mixture that can quickly corrode/contaminate the bearing. In some cases, the grease mixture disintegrates into a liquid, which drains out of the bearing leaving it with essentially no lubricant.

Shielded bearings are somewhat better than fully open bearings. They are available with one shield (single-shielded), usually positioned on the side of the bearing facing the inside of the bearing housing. The double-shielded bearing has shields on both sides of the bearing. Shielded bearings offer somewhat more protection against outside elements, like contamination and moisture, than do open bearings, but in general, they suffer from the same limitations.

Sealed bearings are the best choice of the three enclosure types. They are sealed on both sides to keep out contamination and moisture, and they are lubricated for life, thus having none of the problems associated with regreasing. Thus, these bearings are virtually maintenance free! Sealed bearings are more costly, but considering the potential reliability problems avoided by their use, they are well worth the investment. Payback times are typically measured in days or weeks, not months or years. The combination of sealed bearings and quality shaft seals on a severe duty motor is hard to beat.

Bearing Considerations During Motor Repair

Whenever a motor is sent out for cleaning or repair, the bearings are almost always replaced. During bearing replacement, several common mistakes can occur:

- New bearings are sometimes removed from their shipping containers and left on the repair bench for an extended time before being installed in the motor. During this time, the bearing can accumulate contaminants (metal chips, dirt, moisture, chemicals). Open bearings are most susceptible to this situation, but it is poor repair practice for any bearing. If it is not possible to install a new bearing quickly, then leave it in its container or cover it.

- Sometimes old bearings are removed from, or new bearings are installed on, the motor shaft by pulling axially on the **outer** race of the bearing. This procedure is a sure-fire way to damage new bearings. Pulling a bearing onto a shaft by the outer race puts tremendous axial stress on the contact areas of the outer race, rolling elements, and inner race. Such an installed bearing will usually fail within a matter of days. Always install new bearings per the manufacturer's specifications, and only apply **controlled** heat to a bearing as a last resort.
- New bearings come with tolerances which define the acceptable **interference fit** allowed between the outer race and bearing housing and between the inner race and shaft diameter. These tolerances must be met! Too tight a fit and the bearing can become stressed and deformed. Too loose a fit and the bearing can spin, either the inner race on the shaft or the outer race in the bearing housing. Either condition will lead to catastrophic bearing failure.

Bearing Misapplications

The two most common mechanical designs of the standard AC induction motor are the TS shaft and the T shaft.

- The **TS design** is for coupled service where the main mechanical load is applied parallel (axially) to the motor shaft. Typical loads of this type include pumps and fans. The rear (drive-end) bearing is typically a ball bearing. While the ball bearing can handle some perpendicular (radial) loading, its radial load capacity should not be exceeded. In my experience, I have seen numerous rear ball bearing failures where a TS design was being used on a heavy radial load application in error.
- The **T design** is for service where the main mechanical load is applied perpendicularly (radially) to the motor shaft. A typical load of this type is a belted application with the belt running off of a shaft-mounted pulley. T designs use rear ball bearings in smaller HP ratings and rear roller bearings in larger

(continued on page 7)

continued from page 6

HP ratings where the radial loads exceed the capacity of ball bearings. The ball-bearing T design can be used with a radial or an axial type of load. Problems occur where the roller-bearing T design is used with an axial load because roller bearings are designed to run with at least some radial load. When the load is strictly axial, the roller bearing is subject to noise, overheating, and premature failure.

Each of the abnormal conditions discussed in this article can lead to premature or catastrophic bearing failure. When two or more exist at the same time, the bearing will only fail that much sooner.

Readers are welcome to send questions, comments, or suggestions to John Machelor by phone (540) 639-4271; fax (540) 639-4272; or e-mail: jmachelo@macoint.com or macrojmm@aol.com.



Letters to the Editor

Energy Matters *welcomes your typewritten letters and e-mails. Please include your full name, address, association, and phone number, and limit comments to 200 words. Address correspondence to:*

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We publish letters of interest to our readers on related technical topics, comments, or criticisms/corrections of a technical nature. Preference is given to letters relating to articles that appeared in the previous two issues. Letters may be edited for clarity, length, and style.

To the Editor:

I just received my copy of the September/October Energy Matters and was delighted to read Don Casada's article on pumping systems. I am a process engineer

from Y-12 Development and have been working for Enriched Uranium Operations (EUO) for several years. In EUO, I see a lot of opportunities to apply what you are writing about.

I would very much like to see the first two articles in this pumping systems series. Are they available online?

Mick Calfee
Lockheed Martin Energy Systems Y-12 Plant
Oak Ridge, TN

Editor's Response:

*Mr. Calfee and another reader inquired about obtaining the first two articles in Don Casada's series on pumping systems. These appeared in the May and July 1999 issues of Energy Matters, and yes, they are available online. Find all of Don's (and John Machelor's) articles in **Energy Matters Extra** at www.motor.doe.gov/emextra. To see back issues of the entire newsletter online, go to www.motor.doe.gov, or call the OIT Clearinghouse at 800-862-2086 for copies.*

Lights that Shine Forever

continued from page 5

Matters. Doesn't it imply the want of the silver bullet, the knight in shining armor, or an energy champion? I couldn't think of either a hero or a major industrial energy breakthrough in the last 50 years, so how could I project one in the future? Well, I can't, but Gutenberg and Luther already did.

Consider our present circumstance: our principal energy components, such as motors, pumps, and turbines have been on an efficiency plateau for years. In the big picture, there have been relatively minor improvements. And when we find 100-HP electric motor efficiencies, for example, approaching 96%, it is clear that future improvements will be modest. Yet amazing resources, human energy, and attention continue to be invested in search of almost infinitesimal improvements of individual components.

But the opportunity to improve energy efficiency at the system level is as great as it has ever been in many applications, and is easily an order of magnitude greater than that of any individual component. Artificial losses, leaks, mismatched and oversized equipment are examples of system-level

opportunities. Why aren't we pursuing them?

One answer is because there's no glory in it. There's no magic, just simple truth. There's no requirement for intellectual insight, just common sense. Innovations aren't in order, just the application of centuries-old knowledge. In short, these opportunities aren't high and mighty; they are meek and lowly.

How can we change things?

Guided by Gutenberg, we improve the transfer of information to and among the masses:

- 1) Ensure operators are grounded in fundamentals so that they don't operate systems using incantations passed down through generations; rather they understand what they are doing, and why.
- 2) Take advantage of new communication methods, like digital computers, to provide operators continuously updated measures of overall system efficiency and operating costs so they can make informed decisions.
- 3) Actively solicit operator advice when designing new systems or modifying existing ones.

Listening to Luther, we look at things in a new light:

- 1) Acknowledge that the simple things are "true treasures," and treat them as such.
- 2) Eliminate indulgences. Turn equipment off that doesn't need to be running. If a system runs fine at 60 psig, don't run it at 80 psig.
- 3) Empower the individuals who keep things running—operators, mechanics, electricians, et al. Encourage the folks who see old things in new ways and then act on their new insights to improve operations. And be sure to reward them more than the hired guns who recommend without risk.

¹ I know, wrong millennium, but we're talking discovery here, so excuse my literary license.

PLAY THE ENERGY CHAMPION NAME GAME

*Can you name a few of the energy champions of last millennium? How about 25 of them? Check out **Energy Matters Extra** at www.motor.doe.gov/emextra to search for the names of your favorite historical figures hidden within "a little ditty" by Don Casada. Hint: read betwixt and between the lines. Guess all or most, and **your name could appear in the next issue of Energy Matters.***

Coming Events

UNDERSTANDING PUMP SYSTEMS/PSAT WORKSHOPS

The following session presents the fundamentals of optimizing industrial and municipal pump systems. The workshops will present case studies and will focus on Pump System Assessment Tool (PSAT).

- December 14 in Tempe, AZ
- January 26 in Eugene, OR
- January 27 in Novi, MI
- January 27 in Vancouver, WA

Call Anna Maksimova at (360) 754-1097, ext.100 for more information.

ADJUSTABLE SPEED DRIVE APPLICATION WORKSHOPS

These workshops address the fundamentals of ASDs and demonstrate the ASDMaster software.

- January 27 in Eugene, OR

Call Anna Maksimova at (360) 754-1097, ext.100 for more information.

IMPROVED FACILITY PERFORMANCE THROUGH ENHANCED STEAM SYSTEMS

- January through June 2000 (cities/dates TBD) in WI

Call Steve Nelson or Doug Presny at (608) 238-4601 for more information.



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INFORMATION CLEARINGHOUSE

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

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