ENERGY MATTERS

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Issue Focus: Selling an Energy-Efficient Project to Management

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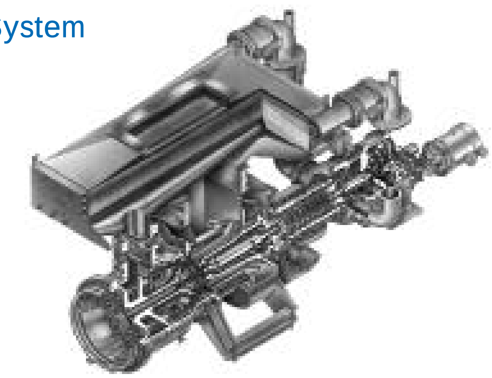
Malden Mills Demonstrates CHP System

Last New Year's Eve, Malden Mills Industries, in Lawrence, Massachusetts, celebrated the start of its long-awaited Combined Heat and Power (CHP) system. Malden had been trying to self-generate electricity and steam since the late 1980s.

When Malden Mills, a manufacturer of the innovative Polartec™ fabric, first presented the Massachusetts environmental department with a plan for a CHP system in 1992, the state rejected the company's request. Even though that system would cut Malden's emissions in half by replacing 1920s era boilers, the state required that the company use an expensive ammonia-based, exhaust-gas, after-treatment technology to meet its new NO_x emissions standards. Malden argued that the state's standards ignored emissions reductions from boiler replacement and higher efficiency on-site electric generation. Malden also was concerned about the safety risk ammonia posed to workers.

After a famous 1995 fire that destroyed three buildings, Malden's CEO pledged to keep all employees, and President Clinton pledged assistance to the company. This led to a partnership between Malden and the Department of Energy's (DOE's) Advanced Turbine Systems (ATS) Program. In 1997, Massachusetts approved a technology demonstration permit for an ultra-low-NO_x CHP system, developed through the ATS program.

The first phase of the partnership was completed with the December startup of two 4.3 MW turbines made by ATS partner, Solar Turbines. Later this year, the company will retrofit the two turbines with a ceramic combustor liner to reduce NO_x by another 40%. The permit requires a 2-year demonstration period to prove that the new liner is durable and meets the state's emissions requirements.



Malden Mills will install the Mercury turbine in the next phase of its CHP demonstration project.

If successful, Malden could begin the third phase by installing the first commercial ATS engine, Solar's *Mercury*, a 4.6 MW CHP system with a 40% simple-cycle electric efficiency and 85% system efficiency. This system would virtually eliminate SO_2 emissions, reduce NO_x emissions by 75%, and cut CO_2 emissions by 25%, compared to the pre-fire system.

DOE teamed with Malden Mills to demonstrate its ATS technology; however the project also demonstrates the barriers companies must overcome to use CHP. With the new CHP Challenge Program, DOE will aggressively promote the energy, environmental, and economic benefits of CHP to federal, state, and local officials. For more information, visit the CHP Challenge Web site at www.oit.doe.gov/chpchallenge/.

Two New Steam Resources Online

Take a look at these new online resources for steam system tools and information.

- A Technical Standards and References List. This list, compiled and reviewed by industry experts for the Steam Challenge, contains 80 titles and summaries of handbooks, specifications and guidelines, articles, and videos. Check out the list at www.oit.doe.gov/steam/.
- Steam Tip Sheets. These four information sheets provide easy-to-apply actions your plant can take to improve steam efficiency, and they highlight potential cost savings. Find the tip sheets at www.oit.doe.gov, or call (800) 862-2086 beginning July 30 to order hard copies.

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Inspect Steam Traps for Efficient System

By Bruce Gorelick, Enercheck Systems, Charlotte, NC, and Alan Bandes, UE Systems, Inc., Elmsford, NY

When it comes to steam traps, plants often ignore them. Complacency about them costs steam users more than they realize. Losses from wasted energy, damaged equipment, misused personnel hours, or poor product quality can be in the hundreds of thousands of dollars.

Fortunately, much of these potential losses can be averted by a vigilant steam management system that includes steam trap surveys. Once a maintenance engineer can see what is going on, he or she can take corrective actions, which can add substantially to a company's bottom line as "found money."

When a Trap Fails

Most traps fail in the open mode. When this occurs, a boiler works harder to produce energy. This can create high backpressure to the condensate system, which inhibits discharge capacities of some traps and affects steam quality.

A closed trap produces condensate backup in the steam space. The equipment will not produce the intended heat.

Excluding design problems, two of the most common causes of trap failure are oversizing and dirt. Oversizing causes traps to work too hard. In some cases this can result in blowing of live steam. Dirt is always created in a steam system. Excessive buildup causes plugging or prevents a valve from closing.

Trap Failure Affects Equipment

When blocked or plugged steam traps cause a backup of condensate in a steam main, the condensate is carried with the steam. It lowers steam quality and increases the potential for waterhammer. Energy is wasted and equipment can be destroyed.

Condensate in a system causes valves to become wire-drawn and unable to hold temperatures as required. Little beads of water in a steam line can eventually cut any small orifices the steam normally passes through. Wire-drawing eventually cuts enough of the metal in a valve seat to prevent adequate closure, producing system leakage.

Testing Methods

Before testing a steam trap, be familiar with its function, review typical types of traps, and know various pressures within the system. This helps avoid misdiagnosis and allows proper interpretation of trap conditions.

Testing traps can include acoustic techniques.

The three categories of online trap inspection are visual, thermal, and acoustic. Visual inspection depends on a release valve situated downstream of certain traps. Thermal inspection relies on upstream/downstream temperature variations in a trap. Acoustic techniques require an inspector to listen to and detect steam trap operations and malfunction.

Recordkeeping

It is one thing to just inspect traps, another to be able to determine costs, efficiencies, inefficiencies, and trouble spots. Traps should be tagged and mapped to assure that all traps are maintained.

There are many ways to systematize data and to keep records. Rather than "reinventing the wheel," take advantage of commercially available software packages that can help successfully implement a good steam management system.

In-House Survey Ideal

Ideally, trained in-house inspectors will conduct surveys and routinely inspect steam traps. Professional services can also conduct surveys and issue reports without involving in-house staff. Or, an expert can be brought in to set up a program and train personnel.

In summary, any plant with a steam trap system should set up a comprehensive survey program. Whether it has 50 traps or 5,000 traps, substantial savings can be generated in energy, equipment, personnel hours, and product by keeping on top of the system.

For more information contact Bruce Gorelick at (704) 841-9550 or Alan Bandes at (800) 223-1325.

Guest Column

Making a More Compelling Energy Efficiency Case to Management by Quantifying Non-Energy Benefits

By Miriam Pye, American Council for an Energy-Efficient Economy and Aimee McKane, Motor Challenge Program, Lawrence Berkeley National Laboratory

Making a compelling case to management begins with a profit motive. Energy efficiency is generally not a primary driver in industrial decision making. Your company's chief executive officer (CEO) and chief financial officer (CFO) are probably much more interested in approaches in which the impact on profit is more apparent, such as productivity enhancements. However, experience shows that an energy efficiency project's non-energy benefits often exceed the value of energy savings. Therefore, your case to management should help them view energy savings more correctly, as part of the total benefits, rather than the focus of the results.

Quantifying the total benefits of energy efficiency projects can help your company understand the financial opportunities of investments in energy-efficient technologies. Whether their perspective is that energy efficiency is a byproduct of productivity gains, or that productivity gains are a byproduct of energy efficiency, generally productivity gains motivate management to take action.

Quantify All Costs and Benefits

Regardless of whether energy efficiency is the driver or the byproduct of a project, management must understand all costs and benefits associated with an investment in efficiency to make decisions that enhance shareholder value. Start by quantifying projected benefits beyond energy savings, which might include:

- Increased productivity
- Reduced costs of environmental compliance
- Reduced production costs
- Reduced waste disposal costs
- Improved product quality
- Improved capacity utilization
- Improved reliability
- Improved worker safety

While estimating energy and non-energy benefits, it is also critical to estimate all incremental costs, including indirect costs. To gain credibility with managers, quantify both the upside and the downside potential of proposed projects. For example, many projects require process line shutdown during implementation, causing production losses.

Use Financial Analyses

The financial analysis of an efficiency project is the basis for making the investment decision. This can range in sophistication from a simple payback (investment/annual net savings) or rate of return (average annual net savings/total investment) to more accurate calculations, such as net present value (NPV) or internal rate of return (IRR), which take into account the time value of money. Regardless of which calculation is used, *the most important part of a financial analysis is the estimation of total incremental project costs and benefits.*

As the positive correlation between energy efficiency and productivity becomes more widely understood, businesses will be more motivated to invest in (1) energy-efficient technologies that have productivity benefits and (2) productivity technologies that have energy efficiency benefits.

Cite Examples

Business case studies have been developed with financial analyses for several DOE Motor Challenge Showcase Demonstration projects. The case summarized below shows how one industry has implemented a project with significant benefits beyond energy savings. Such an example could be presented to your CEO or CFO to fully explain a project's potential financial ramifications.

When you, as an efficiency advocate in the company, understand the business decision-making perspective and can communicate with management using financial and strategic arguments, your case for energy efficiency is greatly strengthened. Making business sense of energy efficiency reduces its perceived risk to management, which may, in turn, reduce the hurdle rate (or payback period) that a company

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Aluminum Smelter Improves Dust Collection Systems

A Business Case Study

Background

In 1995, Alcoa (then Alumax), an aluminum refiner, decided to improve the energy efficiency of its four pot line dust collection systems at its Mt. Holly, South Carolina, plant. The company considered two options: one to install variable frequency drive (VFD) controls on the four-fan system; and one to modify the existing system with a three-fan, variable inlet valve (VIV) controlled system.

Decision

Based on a review of the options and a recommendation from Motor Challenge, the company proceeded with the three-fan VIV system. Compared to the VFD proposal, it required no capital investment, was the most efficient, and would reduce system energy costs by $103,700 per year. The project involved opening the VIVs wider to reduce pressure loss. This increased fan efficiency and allowed for one fan in each of the four systems to be shut down. The system operated in this configuration for 2½ years, until the fourth fan was required to accommodate a 7%-8% increase in production.

Benefits

As a result of this project, Alcoa achieved several benefits:

- *Energy savings resulted from shutting down one fan in each of four systems.*
- *Potential to increase aluminum production by more than 500,000 pounds/year by redirecting electricity Alcoa committed to purchasing from its utility. Energy savings from operation of the dust collection system could be used for production.*
- *Emissions reductions of 1%-2% resulted from lower flow rates.*
- *Life of the dust collection bags extended by at least 10% also resulted from lower flow rates.*
- *Potential to save hours of downtime—the fourth fan can be used as a spare if needed.*
- *Modifications can be easily replicated at other Alcoa sites.*

Total Value Added

Initial Costs (consulting fees):	*$5,000*
Potential Incremental Annual Revenue	*$375,000*
Annual Profit Potential:	
Estimated profit on incremental revenue	*$75,000 (assumes 20% marginal profit)*
Energy savings	*$103,700 (3,346 MWh saved x $0.031/kWh)*
Reduction in Dust Collection Bags	*$123,500 (10% x 16,896 bags x $73.08/bag)*
Labor	*$10,000 (est'd 10% time savings x $48/hr (fully loaded) x 2,080 hrs/yr)*
Total savings	*$312,200/yr*

Hard Sell

Reprinted from Building Operating Management *magazine, November 1997 issue, with permission.*

The CFO is often an energy upgrade's worst enemy. Here's a four-step plan to change that.

Step 1: Understand Your CFO

If you are ready to take on your CFO, it is vital that you understand their way of thinking and that perspective on corporate life. You must put on your sales hat and promote your project in the best possible light, while at the same time viewing the project from the same perspective as your CFO.

A key trait to first understand is that a person doesn't become a CFO for taking large risks. For this type of personality, it is best to present, in a detailed and rational format, the many benefits of implementing a project. You should, therefore, attempt to answer the following key questions that a CFO typically asks when reviewing a request for funds for a project:

- What is the timeline of cash flows invested in and returned from the project?
- What are the payback and return on investment of the project?
- How certain are the total costs, projected revenues, and projected expenses?
- What could go wrong, and what are the possible solutions and mitigating factors?
- What are the non-financial/non-quantifiable impacts of this project on the organization?
- How does the project compare to other projects using the parameters just described?
- What are the ramifications (short- and long-term) of various funding options (e.g., cash, debt, pay from performance/service contract, etc.)?

Make every attempt to answer these questions systematically. If information is not readily available in-house, and you are working with an energy services company (ESCO), enlist the support of your ESCO.

Step 2: Understand Your Company's Budgeting Process

As part of your preparation, you should learn as much as you can about your company's budgeting process. If budgeting and financial issues are a challenge for you, there are very useful reference books and courses available from your bookstore or the American Management Association with titles like "Finance for the Non-Financial Manager."

Sell your energy project's benefits and explain risks to your CFO.

Don't hesitate to ask as many questions as it takes for you to understand the philosophy and reasoning behind the budgeting process. An annual budget is, in many ways, the CFO's bible. While a CFO is not motivated to allocate additional capital for non-essential projects, every budget has some room to replace one project with another. Your goal, therefore, is to make your project stand out from the other options in order to get the CFO's attention. One option is to develop alternatives for funding the project without affecting the annual budget.

Step 3: Understand Your Project's Financing Options

Researching the current financing marketplace may enable you to bring to your CFO some innovative options for your project's financing. This is another area where your ESCO may be able to provide information and guidance.

Keep in mind that each option has pros and cons depending on your company's financial philosophy. Some companies do not like debt while others can't have enough of it. Some firms take educated risks while others prefer to pay upon performance. The more options on the table, the higher the likelihood of structuring a solution.

Let's assume that your CFO likes the concept of your project but is stalling on deciding how to pay for it. Plan a three-pronged attack of cash, loan, and project finance. If you do an outstanding job of reaffirming the benefits of your project, it is possible that your CFO will give in, exercise the simplest option and pay for it from internal funds.

When a CFO strongly believes that cash is better applied to other corporate uses than energy projects, one alternative is to borrow from a bank or leasing company. You should be knowledgeable regarding your company's average cost of debt. The use of debt to finance a project, as with the use of internal funds, has a major financial impact on the budgeting process. Also, many companies have limitations on how much debt they can take on.

If a lease option is evaluated, there are two main types of leases to consider: operating and capital. A capital lease is considered a debt by your company while an operating lease can be structured as "off-balance sheet." This means that the lease does not appear on your company's financial statements (balance sheet) as a debt obligation.

The hurdles are fewer and lower if the method for paying for a project can be shifted from a debt obligation to an operating expense (similar to a utility bill or a service contract). Project financing (or performance contracting) often achieves this objective and is a structure that is fast gaining popularity throughout the United States.

Step 4: Put It in Writing

Once you have gathered all of the information necessary to present your energy project to your CFO, the main thrust of your attack should be a cover memorandum with supporting documentation organized in an easily scannable and readable format. This memorandum to your CFO is the most important component of your project proposal and should be an executive summary that does the following.

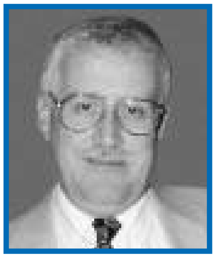
- Explains the benefits of your project.
- Answers your CFO's key questions, as described above in Step 1.
- Creates a sense of urgency by quantifying the high costs of not moving forward with your project.

Maximize the number of benefits and carefully explain the risks in order to achieve the best results.

For more information, contact Marcia O'Carroll, ABB Energy Capital: phone (617) 574-1128; e-mail: marcia.o'carroll@energycapital.com.

Root Cause Failure Analysis On AC Induction Motors

By John M. Machelor, Motor/Drives Systems Specialist, Motor Challenge Program, MACRO International, Inc.



This is the fifth in a series of articles by Mr. Machelor. In the May 1999 issue, John began his discussion of mechanical motor failures by addressing the components most likely to fail—the bearings. This article continues the investigation of bearing failures and their root causes.

We began our discussion of bearing failures in the last issue by looking at vibration-related bearing wear. Specifically, we examined a wear pattern called "false brinelling," which occurs in non-rotating bearings, and we identified a number of possible root causes. There are also some conditions that cause excessive vibration/stress in rotating bearings of the motor or the driven equipment. The three most common conditions encountered in the field are misalignment, imbalance, and soft foot. Each of these can result in excessive wear on the races and rotating elements of the bearings, followed by premature, if not catastrophic, failure. Let's examine each one.

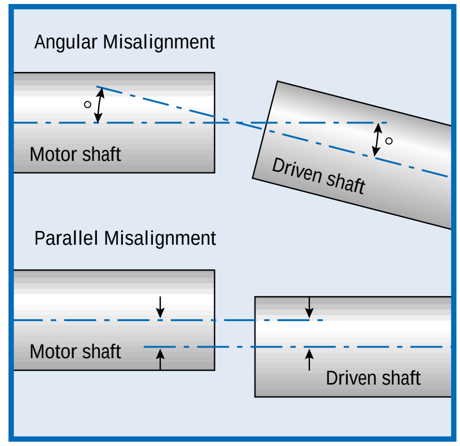
Misalignment: The illustration at right shows the two most common types of misalignment, angular and parallel. Angular misalignment occurs when the axial centerlines of the two shafts being connected (normally the motor and the load) are angularly displaced. Parallel misalignment occurs when the shafts are displaced linearly, even though the axes of the two shafts are parallel. Often, when these conditions are not recognized (or are ignored), the two shafts are "forced-coupled." In either case, the result is excessive vibration, as first one shaft and then the other attempts in vain to return to its normal unstressed position.

The good news is misalignment can be easily avoided at a relatively low cost. Laser alignment has largely replaced the old "dial indicator" method of alignment, and it is much more precise. A growing number of reputable firms are marketing laser alignment equipment. Companies whose maintenance departments have established Reliability Based Maintenance (RBM) programs routinely have a full-time maintenance person (or team) doing laser alignment as part of their preventative maintenance arsenal. The payback from this approach is well worth the investment in manpower and equipment.

Imbalance: This condition can occur in any component of a motor system's rotating assembly. Most components of the system (motor, coupling, pump, fan, etc.) come from the manufacturer already meeting the manufacturer's balance specification. Or, for an additional charge, most manufacturers can balance their component to meet a buyer's more precise balance specification.

Most newly installed motor systems are well balanced, although it is still a good idea to check out such systems using vibration analysis. Imbalance problems usually develop gradually in running systems with the main trouble makers being motor cooling fans, couplings, and driven equipment such as pumps and blowers.

- Cooling fans. Over time, these shaft-mounted fans can become clogged with dirt, debris, and various other contaminants. Corrosion can occur, resulting in cracked or missing fan blades. I have seen cases where the whole fan is missing with only its mounting hub left on the shaft! A routine maintenance/inspection program is imperative to identify these types of problems in their early stages and to take corrective actions.
- Couplings. Imbalanced couplings result from eccentric boring, missing bolts and nuts, missing set screws, and even improperly sized shaft keys. Imbalanced couplings are very common but are often overlooked.
- Pumps. With pumps, imbalance results from a number of sources. A progressively worsening mechanical imbalance may be caused by uneven wear or corrosion. Pump rotors are particularly susceptible to corrosion and erosion from sources such as the liquid being pumped and abrasive contaminants in the liquid.
- Blowers. These experience the same problems as motor cooling fans but are often mounted inside the ducts of air handling systems, hidden from view. Drive motor bearings routinely fail because of vibration transmitted from an imbalanced blower. But the blowers themselves, being hard to get at, often have no routine maintenance or inspection performed on them, and so they can remain out of balance for years!



Two common types of misalignment.

Soft Foot: This condition involves the mounting of the motor and/or the driven equipment to its mounting base. It results when one of (typically) four mounting feet is poorly mounted to its base surface. This can be the result of:

- A gap between the bottom of the motor/equipment foot and the base mounting surface caused by poor machining of one or both surfaces. In this case, either the mounting bolt may have too few shims to fill the gap, or the mounting bolt may have been tightened down on too few (or no) shims, forcing the mounting foot down onto the mounting surface. This puts extreme strain on the mounting foot, which often cracks or breaks off altogether and makes the situation even worse (three-point mounting).
- A missing or loose mounting bolt with various causes like human error, corrosion, fatigue failure, etc.

In either case, the result is excessive vibration of the component involved. As any imbalance in the rotating elements passes over the "soft foot," the support structure deflects, adding to the vibration level.

The next article will continue our investigation of AC induction motor bearing failures.

Readers are welcome to send questions, comments, or suggestions to John Machelor at:
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Performance Optimization Tips

Field Measurements in Pumping Systems—Practicalities and Pitfalls

By Don Casada, Motor Challenge Program, Oak Ridge National Laboratory

Note: This article is the second in a series dealing with practical considerations and pitfalls of field measurements needed to understand pumping systems.

Pump Head

Head, as a general term, is a measure of the relative hydraulic energy per unit weight of the fluid, and is usually expressed in units of feet in the United States and meters elsewhere. Although other energy components, such as heat, may represent a significant portion of the overall energy possessed by a fluid in a pumping system, the portions of the fluid system energy that are important from a fluid movement standpoint are pressure, elevation, and velocity. The total head associated with these three components, in respective order, is:

$$H_{tot} = \frac{P}{\rho} + z + \frac{V^2}{2g}$$

where H_{tot} is total head, P is gauge pressure, ρ is fluid density, z is elevation, V is fluid velocity, and g is gravitational constant.

For incompressible fluids, the useful work per unit weight performed by a pump is simply the difference between the suction and the discharge heads, or:

$$\text{Pump head} = \left[\left(\frac{P_d - P_s}{\rho}\right) + (z_d - z_s) + \left(\frac{V_d^2 - V_s^2}{2g}\right)\right]$$

where the subscripts *d* and *s* refer to discharge and suction conditions, respectively.

In order to understand pump performance in the field, you must account for these elements of head.

Some practical considerations involving the pressure component of head were discussed in the May 1999 issue of *Energy Matters.* In this issue, the elevation component will be discussed.

Elevation

The elevation head, in the context of pump measurements, is simply the difference in elevation between the pump suction and discharge reference points, where pressure measurements are made. Elevation is usually a fairly straightforward term to measure, and can be done accurately with nothing more sophisticated than a pocket tape measure; but there are sometimes complicating factors to be considered. To illustrate, let's use the example shown in Figure 1, which shows a pump with pressure gauges connected by short instrument tap stubs to the suction and discharge piping (instrument isolation valves are not shown).

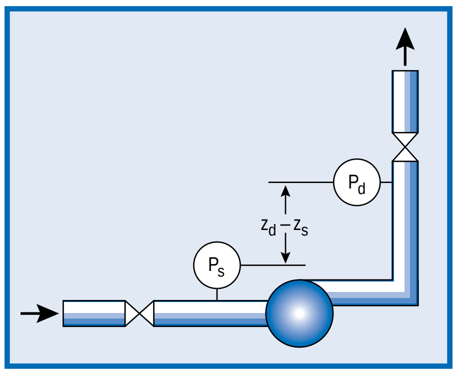

Figure 1. Pump with short pipe stub pressure taps and local gauges.

The elevation difference between the discharge and suction reference points—the pressure gauges—is simply $z_d - z_s$. From a practical standpoint, the elevation difference is usually determined by reference to some third elevation, such as floor level or pump datum elevation (defined in Reference 1).

But, what if the pressure gauges are configured as shown in Figure 2, where an instrument tube run is used to allow suction and discharge pressure gauges to be conveniently located next to each other (e.g., when the gauges or transducers are located in a common instrument rack)? The same rules are still applicable, and ideally the elevation head difference would be zero—provided the instrument tubing is completely filled with process fluid.

But there is a potential pitfall that did not exist for the arrangement shown in Figure 1. It is associated with an improperly vented instrument line—a situation that can easily creep in unnoticed, particularly when maintenance is performed.

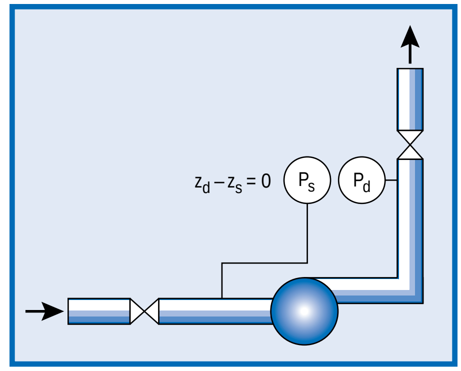

Figure 2. Instrument tubing to provide adjacent suction and discharge pressure gauges.

Let's assume the pump develops a problem that requires disassembly to make the repair. A lockout/tagout procedure is performed, the suction and discharge isolation valves are closed, and the pump casing drain plug is opened to drain fluid from the casing and adjacent pipe sections, which incidentally includes the instrument tubing. After the maintenance work is completed, the normal procedure would be for operators to open the suction and discharge valves and complete a system fill and vent process using system high-point vents (not shown). After completing the fill and vent, the system would once again be available for process service.

It is common operator practice to simply ignore instrument tubing when conducting fill and vent procedures (these lines "belong" to instrument technicians). In the case of the system shown in Figure 1, that is not a practical concern, as the instrument stubs are short. However, when the system shown in Figure 2 is filled, the air pocket left in the suction gauge instrument line from the draining process will be compressed (assuming the suction pressure is greater than atmospheric), and the actual liquid level will be different than the gauge elevation.

For moderate- and high-pressure connections, this is usually not an important concern because the air pocket will be significantly compressed in volume, and the trapped air will also be more likely to escape around fittings. Over time, the escaping air results in the instrument tubing becoming liquid-filled. Further, an error of a few feet in high-head systems would be a relatively insignificant factor. But for low-pressure systems using low-head

(continued on page 7)

continued from page 6

pumps, the air will be less likely to be driven from the system, and the error associated with a few feet of compressed air will be much more significant in calculating the pump head. It should be noted that the extent of error attributable to unvented instrument lines depends on the physical layout of the tubing run, and it is generally not practical to adjust for the effect of unvented lines.

In situations where instrument tubing is used to make pressure (or flow, for that matter) measurements, it is helpful to have a permanently installed vent petcock at the gauge to ensure the instrument line is completely filled.

The potential for the instrument line draining problem can be minimized by a loop seal or "pig tail" between the pressure gauge and the pipe connection, as in Figure 3. Pig tails can also buffer the pressure gauge from high process temperatures.

Figure 3. Elevated pressure gauge with loop seal.

The ASME standard for pressure measurements (2) discusses the importance of ensuring that instrument lines contain what is intended—whether gas or liquid. Although it is a lengthy document that is quite involved in some sections, many portions provide useful, practical guidance for folks involved in field measurements.

Comments/questions welcome by e-mail: a85@ornl.gov.

References
1) ANSI/Hydraulic Institute Standard 1.6-1994, Centrifugal Pump Test.
2) ASME/ANSI PTC 19.2-1987, Pressure Measurement.

Correction Note: In the May issue, Don Casada's equation for hydraulic power was misprinted. The factor 3690 should have read 3960. Energy Matters regrets the misprint and thanks Mr. Peter Stech of KSB Inc. for bringing it to our attention.

Letters to the Editor

Energy Matters *welcomes comments from readers by postal mail or e-mail. Comments should be typewritten and must include the author's full name, address, association, and phone number. Limit comments to 200 words. Address correspondence to:*
Michelle Mallory, Letters to the Editor
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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.

Is MM+ is Y2K compliant?

Some readers have asked via e-mail, and we are happy to respond—yes! MotorMaster+ uses full data in all entry fields. Dates are only used to organize maintenance or energy action records chronologically or to determine motor age. Records you have created will not be affected on January 1, 2000.

How have you applied information from this newsletter on the job? Send us an e-mail at motorline@energy.wsu.edu.

Water/Wastewater Forum Targets Energy Efficiency

You already know that energy costs make up a large part of every industrial or municipal water/wastewater system budget. But did you know that even modest changes in equipment and operation could yield large financial rewards?

Attend the 1999 Energy Efficiency Forum for the Water & Wastewater Industry, August 29-31, 1999, in San Diego, CA, to find out about cutting edge ideas to lower energy costs in water and wastewater operations. Cosponsored by the DOE's Motor Challenge Program, the Electric Power Research Institute and *Water-World Magazine*, the forum brings you workable solutions for improving the energy efficiency of your industrial and municipal systems.

Motor Challenge follows up on last year's successful "Pump Optimization Workshop," which focused specifically on fresh water and wastewater facilities. This year's workshop focuses on plant measurements using software called PSAT—Pump System Assessment Tool.

Plan to attend this forum if you:

- Manage or operate a municipal or industrial water or wastewater system.
- Regulate water and wastewater operations.
- Provide engineering consulting services for water and wastewater systems.
- Work in the electric power industry.

Take this opportunity to hear case studies describing how utilities have saved energy and money, and learn about the latest research in energy saving systems and technologies. See new products that can help you cut energy costs while maintaining water quality goals.

For more information, contact Laura Boland at (918) 831-9179, or visit the Web site at www.waterworld.com.

Guest Column

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requires of an energy efficiency investment. There are no guarantees that management will implement energy efficiency projects even if they make sense from a financial perspective. Other investments or projects may have greater financial returns than energy efficiency projects, capital may be unavailable, or certain projects may not fit with a company's strategic plan. However, if advocates do not make business sense of energy efficiency, it may continue to be perceived by many business people as a warm and fuzzy, but costly and unnecessary extravagance.

The most effective way to get management's attention may be to characterize energy efficiency as "efficiency" or "productivity," which have always had positive connotations in the business community.

This article is taken from Proceedings from the 1999 ACEEE Summer Study on Energy Efficiency in Industry. *Washington, D.C.: American Council for an Energy-Efficient Economy.*

Contact Aimee McKane at (202) 484-0892, or e-mail atmckane@lbl.gov.

Coming Events

Council of Industrial Boiler Owners' Industrial Energy Systems Forum II

This forum promotes safe, reliable, and cost-effective practices in design, operation, and maintenance of industrial energy, steam, and power systems. The forum will address considerations from owners, operators, managers, manufacturers, and developers of industrial energy systems.

- July 21-22 in Cleveland, OH

Call Bob Bessette at (703) 250-9042 for more information.

Energy Efficiency Forum for Water/Wastewater Facilities

The goal of this forum is to help managers and operations personnel of municipal and industrial systems find workable energy management solutions.

- August 29-31 in San Diego, CA

Call Laura Boland at (918) 831-9179 for more information.

Understanding Pump Systems/PSAT Workshops

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

- August 29 in San Diego, CA
- September and October (date TBD) in Sacramento, CA
- September and October (date/city TBD) in MI
- September and October (date/city TBD) in CA
- October 4 and 5 in Westchester or Brooklyn, NY

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.

- September (date TBD) in Reading, PA
- September (date TBD) in Pittsburgh, PA

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

Fundamentals of Compressed Air Systems

These 1-day Compressed Air Systems training seminars are targeted to plant engineers and maintenance personnel who are responsible for ensuring optimum performance of compressed air systems.

- July 13 in Cleveland, OH
- September 10 in Atlanta, GA
- September 22 in Salt Lake City, UT
- September 23 in Knoxville, TN

For information or a registration form, call (800) 862-2086.

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Information Clearinghouse

Do you have questions about using energy-efficient electric motor systems? Call the OIT Challenge Programs 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.motor.doe.gov

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