

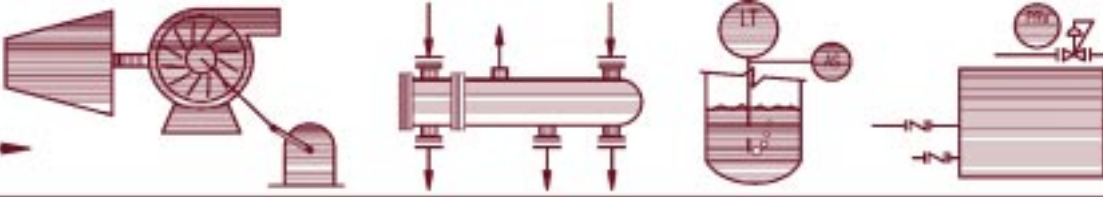
ENERGY SOURCE

A Newsletter published by

ESI

The Steam and Power *SPECIAL FORCES*®

Summer 2004



💡 Watt's Up 💡

By: Jackson A. Brown, P.E., Manager- Mechanical Engineering, ESI

Perhaps a better heading would be “The Cost of a Watt’s Up”. It has been obvious for some time that the US has been on a collision course with a major energy crisis. Unfortunately, this time we cannot reflect on the past ups and corresponding downs in the energy cost arena. This time, it will be an upward trend for a while to come, thus placing our economy in a precarious position.

There are several initial steps we can all take to positively impact energy consumption. Probably the most important is to educate ourselves. Today, with all the information available on-line, in books, and in trade magazines, it is easy to become energy savvy. For example, I just read an article in a trade magazine which related pump wear (specifically the wear rings) to loss in pumping efficiency. In many pump applications, just a few thousandths wear resulted in a 4-5% loss in pump efficiency. Another article indicated that many plants lose as much as 50% of their compressed air to pipe leaks, equipment leaks, desiccant air dryers, etc. A trade magazine had a review of a voltage-regulating device which reduces power consumption by preventing higher than necessary voltage in a system. I am not saying that you should believe everything that you read, but many times the information is food for thought and for further investigation. Another important item to remember is that even small changes in our homes can greatly impact energy consumption. If every household in the United States (approximately 110 million) were to replace a single 60 watt incandescent bulb with a 15 watt fluorescent bulb, the total energy saved every hour would be approximately 5000 megawatt hours, or the equivalent capacity of a very large coal-fired utility power plant.

There are several items you should investigate in your boiler plant to conserve energy. Following is a list of a few suggestions along with an appropriate action item for each.

Boilers- Over the years, many articles have appeared in the *ENERGY SOURCE* pertaining to boiler efficiency, but to summarize, it is very important to keep the combustion process properly adjusted and the heat transfer surfaces clean. *Action Item-* Locate the original boiler performance data, take current data and compare the two (flue gas temperatures, fuel input versus steam input, etc.), and/or bring in an expert to conduct an ASME short-form efficiency test.

Pumps- How efficiently are your pumps operating? Inefficient operation can result from several factors:

- Pump wear – excessive clearances in a pump’s wear rings or impeller wear/erosion can drastically affect a pump’s operating efficiency.
- Poor initial pump selection – over-estimating system pressure losses, flow requirements, etc., as well as applying overly conservative sizing margins can lead to a pump operating outside of its proper operating range. This will result in inefficient operation and potential damage to the pump.
- Changes in system operating conditions – this can result in the same problems as a poorly selected pump.

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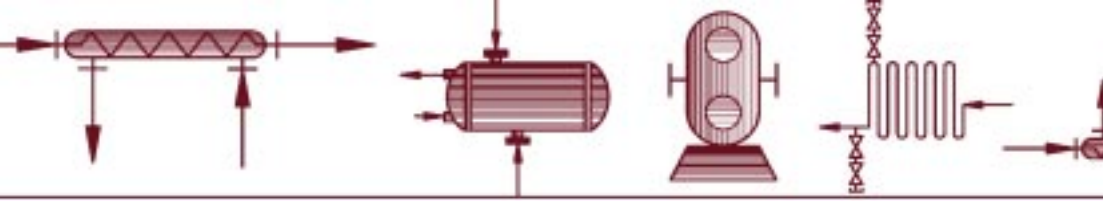
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ESI is the Steam and Power *SPECIAL FORCES*® providing clients with innovative, cost-effective, and environmentally-friendly solutions.

If you have any suggestions or comments about the newsletter feel free to call us at 770-427-6200 or e-mail us at energysource@esitenn.com.

Deanna White
Managing Editor

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- Old inefficient pump motors – many older motors, which most plants tend to have rebuilt again and again, operate very inefficiently compared to today's high efficiency models.
- Unnecessary continuous pumped liquid recirculation – using a minimum flow orifice to insure pump minimum flow has been a common practice in the past. Using an auto-recirculation flow control valve can eliminate this waste.
- Flow throttling control valves – many valve-throttled flow control applications are compatible with a variable speed pump, thus eliminating significant wasted energy and costs.

Action Item- By taking detailed pump operating data (TDH, motor amps, flow rate, etc.) and comparing it to the pump curves as well as reassessing the system design and pump application, the need and justification for changes can be accurately assessed. Often the savings associated with even a small increase in system efficiency can pay for modifications in just a few years.

Deaerator- Excessive venting of steam, damaged or inadequate insulation, and leaking relief valves are all energy wasters, resulting in operating inefficiency and wasted expenditures. *Action Item-* Review the deaerator set-up procedures for vent steam adjustment or consult with a knowledgeable water treatment specialist. Check heat losses using outer skin temperature and programs available from insulation suppliers. Optical pyrometers for easily checking temperatures are available at many supply houses for \$100 or less.

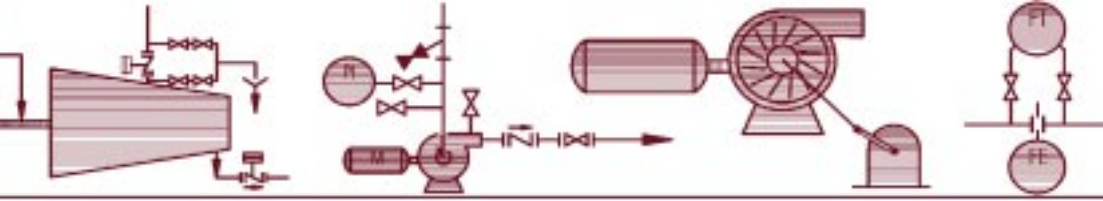
Compressed Air Systems- Leaks, improper use of instrument air (where plant air would work), and inefficient air dryers are the most prevalent sources of waste. *Action Item-* Directional sensitive listening devices are available for quickly locating air leaks (especially those difficult to get to). For accessible areas, a simple soap bubble leak test can be used. Also, since most desiccant air dryers purge 10-15% of the air which goes through them for desiccant regeneration, closely scrutinize the instrument air system for users which could utilize plant air instead. The control set-up of the dryer should also be checked and adjusted to prevent excessive regeneration.

Utility Water Systems- Many plants waste large amounts of utility water every day. The main culprits are constant flows where intermittent flows will work or improper flow adjustments. *Action Item-* Do not use cooling water like it is free. Besides wasting a valuable natural resource, there are costs involved. Review and shut off or readjust water consumers (sample coolers, bearing cooling, etc.).

Steam Systems- Steam leaks (pipe joints, valve packing, steam traps, etc.) and damaged or inadequate insulation represent a significant energy loss in most plants. *Action Item-* Leaky traps (not shutting off the steam after condensate discharge) is probably one of the most common steam wasters. Although most plants are aware of this problem, many do not have a regular trap inspection program. By using the previously mentioned optical pyrometer and checking the pipe surface temperature downstream of the trap, leaky traps can be located and replaced or repaired.

Electrical- The obvious areas of over-lighting and inefficient lighting should be on the agenda at every plant. Beyond that, there is the previously mentioned high efficiency motor substitution along with examining operating procedures and voltage regulation. *Action Item-* Use a digital voltage regulator to eliminate over voltage. By maintaining a minimum required voltage, the power consumed by some devices (mainly resistive loads) can also be minimized.

This article briefly touches on a few of the many energy-saving opportunities. Good luck evaluating your plant. If you need any assistance in this area, please call the Steam & Power *SPECIAL FORCES*® today. ESI could evaluate your steam or power generating facility and recommend any appropriate changes along with the corresponding capital cost and estimated savings.



Do Your Project Needs Hit the Sweet Spot of Your Engineering Partner?

By: William L. Reeves, P.E., President, ESI

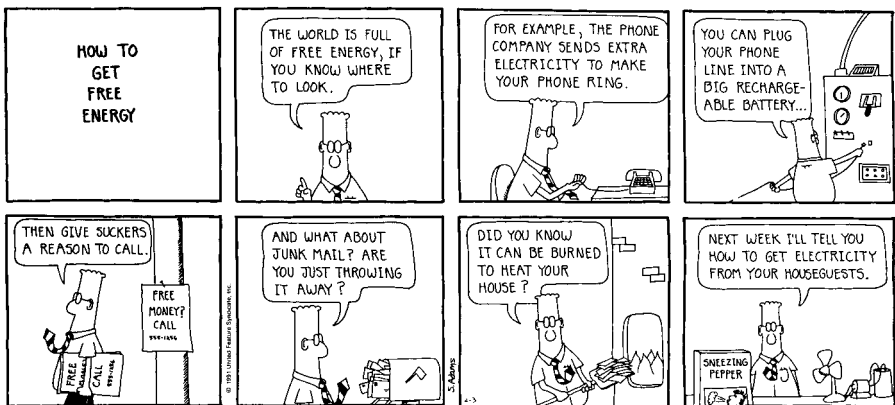


Everyone who has ever played golf knows that when the “sweet spot” of the club head impacts the ball, the feel, distance, and overall results of the shot are very different from an off center hit. The golfer knows at the instant of impact that the shot will be the best that could be expected. Every organization has a “sweet spot”; i.e., the type of project and project requirements that are well suited for the organization. These are the type of projects that can be executed while achieving better than average results.

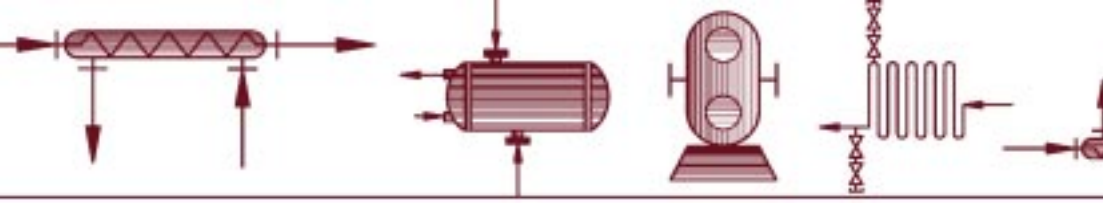
In this current world of globalization, consolidation, and mergers of mega companies, it has become increasingly important for every company to assess the effectiveness and viability of its suppliers and partnerships. Are your specific project needs hitting the “sweet spot” of your suppliers and partners? Regardless of how a company’s marketing materials spin their message, the bottom line is that no single organization can be the best at everything. A large sophisticated organization with comprehensive and integrated project management tools is absolutely necessary to perform the EPC of a several hundred million dollar utility power station. However, the complexity and costs associated with this type of organizational capability become a debilitating liability when a customer simply needs to design and install a new water treatment or compressed air system.

ESI recently had the opportunity to perform several engineering projects for Owensboro Municipal Utilities (OMU). OMU had been utilizing a large well-known utility A&E firm that has the capability and experience to design complete new power stations. OMU recognized that large organizations are often not the most effective and low cost when performing smaller and relatively simpler engineering projects. For example, work that requires multiple design groups in a large firm can often be performed more efficiently by a single person in a small firm. In smaller firms, the lead engineer is actively involved doing the work instead of fighting for resources or coordinating design groups or design reviews. OMU issued an RFQ and ESI was awarded all the engineering for the installation of a Selective Non-Catalytic Reduction (SNCR) system on the 290 MW coal-fired Unit #2 at the Elmer Smith Station located in Owensboro, Kentucky. Besides having a more cost effective approach to the work, ESI had more experience with SNCR systems and the steam distribution piping system design than others. On the project,

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ESI exceeded OMU's expectations regarding cost, performance, and customer service. On more than one occasion, OMU made the statement "we are happy to have an engineer on board that is cost effective and gives us a high quality product."

Over the course of the following year, ESI was asked by OMU to perform engineering on a T&M basis for numerous other projects. This was not only a demonstration of their satisfaction with ESI, but a testimony to their trust and confidence in ESI as well. These projects included:

- Sizing and specifying ammonia pumps
- All design, engineering, and equipment specifications for a complete compressed air system expansion
- Reengineering of the overfire air nozzles due to overheating on one unit
- Balance of plant design engineering and equipment specifications for a separated overfire air system and the addition of auxiliary natural gas burners to one unit

One of the primary ingredients to our success with OMU is our total EPC background which allows ESI to develop accurate total cost budgets. Our EPC project experience, which includes start-up and commissioning services, also demands attention to scope interfaces and minor details that is uncharacteristic with companies that provide engineering-only services. Another main factor was the skilled experienced personnel that had plant experience and familiarity as well as design expertise. Having one person fill several traditional roles was certainly a plus. However, the bottom line to our success was primarily because the OMU size and type projects were right in ESI's sweet spot.

This discussion naturally begs the question "How do I determine the best partnering fit for my engineering needs?" Although there is no simple answer to such a complicated issue, there are certain parameters that will probably give you an indication of the potential success or failure you might experience in a partnering relationship. Following are some of the key questions that should be asked when considering an engineering partner.

Is the project size a good match for the company?

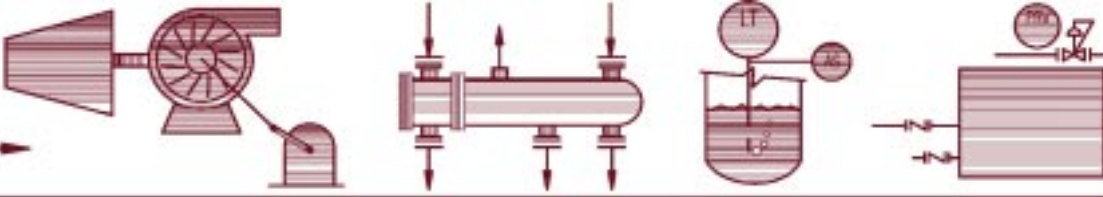
A full scale war requires the resources and capabilities of the entire United States Military. The chance of success rescuing a few hostages has been demonstrated to be much higher when executed by a small group of Special Forces. So it is with projects. Assess your project needs and estimate the total cost and number of manhours that might be required. If you need 1000 manhours of engineering which only equates to a half a man year, which company is going to pay more attention to the success and customer satisfaction on this size project, the 500 man organization or the 50 man organization?

Are the project requirements aligned with the company resources and experience?

A relatively smaller organization will have relatively less bureaucracy and overhead than a much larger organization. This should translate into better pricing and productivity, provided that the organization is not overwhelmed by the requirements of the project because it is too large for them.

Are their management and project control systems a suitable fit for your project requirements? Is the company going to assign as team members, people with the proper experience and expertise to execute your project needs? Publishing a list of dozens of individuals with a wealth of experience is meaningless unless those people are specifically working on your project. Ask for the resumes of the team members that will be full or part time dedicated to your project, not simply members of the organization. Your overall project success will be directly related to the experience, commitment, and behavior of the specific team members assigned to your project.

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Project Needs... *Continued from Page 4*

Can the company point to similar successfully completed projects?

Nothing teaches like experience, so having already dealt with some of the problems and issues of a particular type project can yield a distinct advantage. However, if a company has not performed the exact type of project you require, assess the types of projects that have been completed in the past and determine if the same skills and type expertise can be applied to your project requirements. If so, and provided the project references check out, the chances are good that this team will be successful on a new project endeavor which requires the same skill sets.

What level of management review and awareness is your project going to receive?

There is no secret that the higher up in the organization you are dealing, the higher the probability of your expectations being met. A \$200,000 project will draw more interest in success from upper management of a \$10-15 million annual revenue company than a \$100-\$150 million company. Personal commitment and involvement from upper management significantly increases your chances of success. Talk to the upper management of your prospective engineering company to make sure that your project truly has their interest.

What do the project references have to say about the company and team members?

Call the references on similar type projects and more importantly, projects with the same team member involvement as your prospective team. Most references are reluctant to say negative things about people or companies, so second-generation questions are generally more effective. For example, instead of asking "How was Jim to work with?" ask instead "If I was to talk to other members of your team and asked them how Jim was to work with, what would they say?" This type of second-generation question will generally invoke a more accurate response because you have excused the reference as a potentially indicting party if there was a negative experience. Rest assured that their response would truly be their assessment, not the assessment of other team members. Generally, if a reference is non-committal giving only a satisfactory recommendation, the reference probably had some issues that need to be explored.

Does the company culture fit yours?

People and companies alike prefer to do business with people and companies that think like they do and value the same things. Projects will have a higher degree of success when the values and expectations of both the vendor and customer are aligned. If you can be brutally honest about your culture and expectations, you will have a better chance of identifying those same qualities in a prospective partner that will translate to success. Here again, discussion with a company's upper management will provide valuable insight to you regarding what is truly important to that company. The company will generally be a mirror image of the upper management. Therefore, it is important to assess whether upper management is serious about commitments and is customer focused.

In closing, if you are less than totally satisfied with your partnership or relationship with your consulting engineer, ESI would be happy to provide a proposal for a project you are considering. We would welcome the opportunity to help you decide if our company culture and capabilities fit with your requirements. Please feel free to contact Bill Reeves at 770-427-6200 or info@esitenn.com to discuss your particular needs.

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