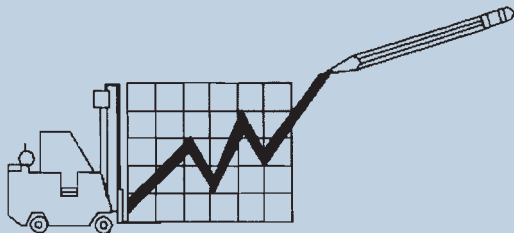




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# PEMID

*Plant Engineering & Maintenance Division Newsletter*

*Stacey Swisher-Harnetty, PE, Editor*

*Spring 2001*

## Chair's Message



Stacey S.-Harnetty

**S**pring and early summer are usually very busy times for a plant, reliability or maintenance engineer or technician; good weather and production planning often produce excellent timing for

equipment modification, plant cleaning and repair work. During these hectic times, I always wonder if our current methods are the latest and greatest out there: things like personal protective equipment, preventive and predictive maintenance systems, reliability techniques, repair procedures, valve specifications, and more. Are we using the best gloves for a particular application? Do we know about the latest in predictive technology? Have others had success with streamlined root cause failure analysis? Do on-site vendor pump repair shops really save you money? What new research has been done on valve packing? What is a reasonable ratio of planned to emergency work for continuous production versus batch?

How does one keep a facility running well and continue to improve productivity and reliability? Whether you work in a manufacturing facility, a utility, a repair service shop, or in training and education, the issues are similar. The Plant Engineering and Maintenance Division

*(continued on page 5)*

## The Basics Must Come First

**T**here are a number of advancements in technology that are helping to drive maintenance processes to even higher platforms, RCM, TPM, PdM, RCFA, etc. Clearly the masses are beginning to appreciate the value that can be added in the proper monitoring and caring for assets. It has been this author's experience that all too often attempts are made to implement world class maintenance processes using one or more of these advanced techniques before the basic maintenance process is in place. What is presented below may be entirely too elementary for a number of readers, however, based upon recent experience and requests, many may find just what is needed: a simple and concise explanation of the major components in a successful basic maintenance process. As a point of credibility, the author has very recently implemented these basic elements and realized a drop in maintenance costs as a percentage of asset value (RAV) from 3% to 1.5%. At the same time there was an increase in stream time to 98%.

### Prioritization

Deciding what to do first is clearly an issue for all of us in our daily lives. It is simply amazing how much of an improvement can be realized by taking the time to adequately answer this question for a maintenance process as well. Unfortunately, it is equally amazing at

how often this goes ignored. Prioritization systems have proven successful in reducing 'emergency' work from over 30% to less than 5%.

It is imperative that affected personnel come to an agreement on the importance of each major piece of equipment. This may sound like a daunting task, but if it is attacked methodically it can be done in a very reasonable time period. And, since this is truly the cornerstone of the process, an attempt will be made here to offer specific suggestions for how to get going.

The starting point for developing an equipment priority document is to assign people who can objectively identify the impact of equipment malfunction to the operation, and therefore the business. This impact needs to consider several situations: installed spares, safety risk, environmental impact, generation of off-spec material, and loss of production are some of the major situations. This impact needs to be agreed upon by all involved personnel (operations, maintenance, safety, environmental, engineering, etc.).

A simple way to present this information is to put it in a matrix format. On the left side of the document list the equipment in order of descending importance and assign a factor between 0 and 10 to each piece. Across the top of the document list the business situations from left to right in descending order of importance and assign a factor between 0 and 10 to each situation. By multiplying the factors, each piece of equipment can be given a rating for the situation. Priorities can be assigned based upon this rating.

*(continued on page 2)*

## The Basics Must Come First

(continued from page 1)

For example: 80 - 100 can be priority 1; 60 - 79 can be priority 2; 40 - 59 can be priority 3. Each priority should be given an acceptable time frame to complete. For example: priority 1 must be done within 24 hours; priority 2 within 3 days; priority 3 within 14 days.

### Planning

With a prioritization system in place, planning the work can be done according to the assigned priority. An effective planning process must focus on the basics: materials, timing, specific skills and tools required, available people. Each facility will need to evaluate whether the people who will be actually doing the work can determine these items or if a dedicated planner would be more effective. It would be impractical to delineate the details of the planning process here. It is value-added to note that if this step in the basics is skipped, the overall effectiveness of the process will be compromised. Stated simply, it does no good to isolate, safely prepare and turn over a piece of equipment to someone who does not have the necessary tools, parts or knowledge to properly care for the equipment.

### Scheduling

With prioritizing and planning in place, the scheduling truly becomes a simple task. The key element of successful planning and scheduling includes communicating the schedule to the equipment owner and the service personnel in advance. The advantages of scheduling are realized in less time wasted waiting on equipment release and parts arrival. In the scheduling process, a 'no change' time zone should be established. This is done to further discourage 'emergencies' which are sometimes an issue. It is even more advantageous if the scheduling is done several days or weeks in advance. When this can be done successfully, the financial benefits are not far behind.

### Implementation and Documentation

To be successful in this area requires maintaining skill level in all service personnel through training and experience. A well-trained and motivated technician can effectively work through oversights, mistakes or unpredictable issues in the previous steps. Additionally, they will be able to clearly document their findings for future reference. Implementation and documentation is the final step in an effective basic maintenance process. It is also, the beginning step in a more advanced maintenance process.



## Burning Tube Holes

During the investigation of a problem with a fire tube boiler that appeared to be damaged as a result of thermal shock or fire cycling I encountered another situation. That particular boiler had been repaired in February and was down again for more cracks in the tubes in October. The boiler has a 1 inch thick rear tube sheet and all failures are occurring in the tube ends, which are seal welded, at the beginning of the second pass. Most of the cracks were parallel with the tube and appeared to be only in the tube where it was contained in the tube sheet. In only two cases had the cracks extended into the tube sheet itself.

After considerable investigation into the plant's operation I discovered the modulating control was set within the range of the cycling control such that the boiler was regularly starting, driving to high fire, modulating back down to low fire, then cycling off. I attributed the failures to that operation before a repeat visit to the plant to discuss the problems with everyone concerned where I saw another problem.

The contractor performing the repair had burned the tubes out of the tube sheet. In the process he had cut grooves in the sides of the tube holes that were as much as three-sixteenths of an inch deep. I commented that the grooves would have to be repaired by an authorized (R stamp) organization but also had to ask myself if perhaps that was the reason for the second failure.

Now I can theorize that the contractor left similar grooves in place as a result of the repair in February and that resulted in caustic concentrations and tube cracking, not thermal shock or rapid cycling of the burner.

Regrettably I did not observe, nor have anyone else observe, the condition of the tube sheets as the tubes were removed. Primarily because I did not believe anyone would cut deep gouges in the tubesheet, then install a tube without repairing the gouge.

I would appreciate anyone that has had experience with this problem contact me at KHeselon@cs.com or through my web site at www.keh-ee.com.

Sam Black  
Samdon@quixnet.net

## Power Distribution System Modeling For Plant Engineering and Maintenance

Power distribution systems in today's plants must maintain stable and continuous power service under dynamic load conditions and dynamic utility conditions. Plant engineers must make decisions about modifying the plant power distribution system to accommodate relocation and/or the addition of loads. The process of determining the impact of such changes and evaluating the advantages and disadvantages of multiple power distribution scenarios can be greatly simplified by utilizing power system analysis software.

Power system analysis software allows users to develop a model of a power system in a graphical environment similar to a standard single-line diagram. This model can then be used to perform various electrical calculations to determine how the system will operate under a number of situations. Calculation capabilities that are normally included in such software are load flow analysis, short-circuit analysis, harmonic analysis, transient stability analysis, motor-starting analysis and protective device coordination. The following paragraphs provide a summary of each type of analysis and the benefits they offer to plant engineers.

- Load-flow analysis is utilized to determine the impact of adding new loads on the system or determining how efficiently an existing system operates. The analysis provides information on transformer loading, cable loading, and voltage levels throughout the system. This analysis also calculates the operating power factor of the existing system and how it may be affected by the addition of new loads. This information is important to the utility serving the site and is useful in determining operating costs of the power system if power factor penalties are likely. It is also used to determine whether power factor correction capacitors need to be added to the power system
- Short-circuit analysis is performed to determine the available fault current levels at each bus in the system for three-phase, line-line, and line-ground faults. These values are then compared to the interrupting ratings of existing equipment to ensure that they are rated to withstand the levels of fault current that could be present on the power system. The available short-circuit capacity of the utility serving the site can be entered into the model to ensure that the fault current values represent actual levels that could be obtained.

- Harmonic analysis is performed on a power system to determine how harmonic currents propagate through the system, and the impact they will have on system voltages and equipment on the system. The harmonic profile of nonlinear loads that serve as harmonic sources can be obtained by measurement and entered into the model. If measuring harmonic sources is not possible, most software packages have a database of typical harmonic profiles of sources that can be entered into the model.
- Transient stability analysis is performed on a power system to determine how the system will respond to events such as surges, switching events, and/or generator failures. This analysis provides insight on how to make the system more robust and the impact that modifications will have on continuity.
- Protective device coordination is performed to ensure that equipment and personnel are adequately protected during fault events. The coordination of devices is also required so that protective devices can be selectively coordinated to prevent faults at low voltage levels from tripping devices at main substations and affecting the power in other parts of the system.
- Motor starting analysis is performed to determine system conditions during the starting of large motors that can greatly affect voltage levels throughout the power system. The information obtained from this analysis is also useful when selecting the types of starters needed for new equipment.

Another benefit of having the plant power system modeled and available for use at any time is the ability to utilize the model to investigate events that occur on the power system, determine their root cause, and determine the best course of action to prevent recurrences. Power system analysis software provides tools that can be invaluable in this type of forensic investigation. For instance, if a fault occurs on a plant power system and results in some equipment damage, the software is utilized to calculate the fault current magnitudes present during the fault event. This information is then used to determine if the protective devices on the system operated and if equipment failures were due to improper ratings or lack of adequate protection.

Plants that have an engineering staff with electrical expertise should consider becoming proficient in the use of power system analysis software to take advantage of the broad range of capabilities that are offered. If such engineering staff is not available there are organizations that offer power engineering consulting services to perform these types of analyses on plant power systems. These services can be obtained in a number of ways.

- A qualified engineering firm could be hired to perform a survey of the existing electrical system, create a system model, and perform some or all of the analyses outlined above. Then the plant engineering staff could purchase the same software analysis package utilized by the engineer and require that the project deliverables include the model created during the project along with training on how to utilize the software. This provides the plant engineering staff the tools needed to design and maintain the power system and the model needed to develop "what-if" scenarios for future modifications to the power system.
- If plant-engineering staff is not available to maintain the system model or if funding is not available to purchase and maintain the power system analysis software, a long-term alliance can be established with a qualified engineering firm to perform such services. The engineer can perform a survey of the plant power system, create a model, and perform some initial analyses. Then the engineer can maintain possession of the system model and be on call to perform investigation of scenarios for future modifications to the power system. This also provides the plant-engineering staff with additional technical personnel that are familiar with their system and can assist in forensic investigations if they are required.

Regardless of which method is chosen, developing a plant power system model that can be revised and analyzed provides substantial long-term operating, maintenance, and financial benefits to the plant engineer.

*Steve Walker, P.E.  
Lockwood Greene*

## THE SMARRO AWARD 2000

*Introducing Charles L. Bailey and  
Donald E. Bently*

The 2000 Smarro Award was awarded to not one but two prestigious gentlemen who have made strides in the plant engineering industry. Co-recipient Charles L. Bailey has spent 33 years serving in various positions with the Eastman Chemical Company. His early years involved working in both development and engineering staff positions for the company's Refrigeration & Services Department as well as the Power Department of the Power & Services Division at the Tennessee Eastman facility. A culmination of his experience and knowledge has led him to hold the current title of Vice President. His current responsibilities include overseeing 7,000 employees, eleven manufacturing units and 350 products, just to



*From left to right:*

**Dennis McDonald** - Senior Vice President, Reed Exhibitions Co.  
**John Mitchell** - Chair, Plant Engineering & Maintenance Division  
**Charles Bailey** (Recipient) - Vice President, Floor Global Services  
**Donald Bently** (Recipient) - Chairman & CEO, Bently Nevada,  
**Warren DeVries** - Board of Governors, ASME

name a few. Mr. Bailey has made a firm mark in the plant engineering field.

Also being honored along with Mr. Bailey is Donald E. Bently. Being the founder, owner, CEO and Chairman of the Board for Bently Nevada Corporation and serving as President of Bently Rotor Dynamics Research surely keep Mr. Bently very busy. Some of his achievements include his global recognition as an authority on rotor dynamics and machinery vibration monitoring and diagnostics, author or co-author on over 140 papers on the aforementioned subjects and holder of two patents. His active research of rotor dynamics, his prodigious capacity for invention and imagination, and his business acumen have resulted in significant theoretical and practical contributions into the field of machinery instrumentation, reliability and maintenance. The Plant Engineering & Maintenance division congratulates both gentlemen for their achievements.

## MANAGEMENT BY COMMITMENT

One of the tricks of the trade in managing engineering and maintenance projects is to make sure that spending does not exceed budget (assuming the budget is realistic - a different trick of the trade). Accountants can provide very precise reports of how much money has been spent after the invoices have been received and processed. But because invoice payments are often not made until a month or more after the goods are received or the work is done, the stellar project manager needs to know the amount of financial commitments that are outstanding at all times during the course of the project.

A commitment can be a purchase order for delivery of goods, a contract for services, or a knowledge of an imminent payment due, such as a building permit or inspection fee. One proven means to

track commitments is to set up a database in which to log the commitments. A convenient way to organize the database is to follow the format of the project budget. In effect, this allows the project manager to break up a large project into smaller sub-projects in logical categories such as site work, building, equipment, electrical, plumbing, and engineering.

At the point of authorizing a purchase or start of construction labor, the commitment is entered in the database with an identifier such as purchase order number, contract number or some other code that will allow the commitment to be easily found when the billing for the item or work finally arrives. At the time the invoice is approved, the original commitment is reviewed and updated to include exact freight cost, tax, unforeseen changes, or discounts. The formula is simply: Available Budget = Total Budget - Commitments Using commitments rather than cash flow to manage a project avoids the surprise of finding a project is over budget after there is no means left to correct a problem. The database, whether in Excel, Lotus, Quattro Pro, Access, or some other form, provides a simple means of reporting project progress at any time without spending hours adding up columns of numbers. The database can also be useful in tracking contract change orders and payment requests to avoid duplicate payments.

I am personally using an Access database that combines the work of eight project and process engineers. Individual projects are identified with a unique project number. Status reports can be generated at any time for any project, the combined projects of any engineer, the combined projects of the entire department, projects for particular customer, or the commitments made over any specified period of time to a particular vendor or contractor. As a result, closing projects is a simple process; historical information is readily available for use in estimating new project budgets; and management of over sixty concurrent active projects in various stages of execution is routine rather than laced with moments of panic spaced by periods of high anxiety.

*Randall B. Mattison, P.E.  
Director,  
Engineering & Facility Maintenance  
Email: mattisonr1@asme.org*

## METERS AND INFORMATION TO MANAGE

Meters, especially electric meters, serve as a valuable information resource for plant engineering and maintenance. By tracking usage and demand, equipment can be investigated before failure.

### Some examples:

By tracking usage with the main meter, an ice cream manufacturer "found" compressor problems because of power spikes during morning start up. These spikes were wasting electricity, money and could impact production. The result was better maintained equipment along with a 10% dollar saving in electricity.

A hospital tracked its gas meter usage to find a constant use was due to a "back up" boiler. Investigation led to the fact that the "back up boiler" wasn't necessary. A procedure to emergency start the "back up" if necessary, resulted in a savings of \$10,000 per year in gas.

A water treatment system had most of their usage during the work day. In their case, electricity had a premium of 25% cost during the work day. The rescheduling of discretionary work to the third shift saved \$50,000 per year.

An office building tracked electricity and gas meters daily with manual readings. Management realized that night time usage, when no one was present, was wasteful. A simple system was installed to turn off lights and systems not needed during inactive times. The result was a new system with less than one year pay-back that saved 20% of electricity and gas.

Another office building heated with steam. By monitoring the steam meter, checking usage, they found a steam leak in the garage that had been existing for a year. Savings (and embarrassment) were significant.

One large water user used their meter information to check daily consumption. A leak was noticed within one day, that would otherwise not be discovered until the bill came in - three months forward.

### SUMMARY

Electric meters, gas meters, water meters - all offer information for a plant manager, a maintenance manager to improve maintenance with savings. It may be manual readings once a shift, once per day, or "real time" with computerized readings. Recording meter information with the incentive to analyze works! The results are an improved bottom line, better maintained equipment, with plant (building) engineers in charge.

*John Herbel, President  
Hebeler Energy Solutions, Inc.*

## PROCESS PLANT RELIABILITY CONFERENCE 2000

Having heard many good comments about the Process Plant Reliability Conference (the Ninth), I am pleased to report that they were accurate. I attended this ASME sponsored conf, from 10/24 to 10/26. ASME Fellow Heinz Bloch PE was the Founder and guiding

spirit for this exceptional industry oriented conf for the past ten years! At the beginning of the Conference, 10/23-10/24, four 2-day courses and one single day course, were taught by Industry/consulting experts. There were 175 persons registered, (some for both courses and conf) with 51 from outside the USA. I met several members of ASME.

On Wed. 10/25 The Main Conference began, 18 papers were scheduled. All papers had been personally reviewed, critiqued and commented on by Bloch before they were accepted as worthy of the Conference. I suspect, that single handed, Bloch has raised the professional standards of papers for that industry. He is ably, thoroughly supported by BJ Lowe of Clarion Technical Conference, an assistant and by close-attention-to-detail meeting/planner specialist (Ayers Travel). Both Bloch and Lowe warmly praised the help of Edison Aulestia on staff.

Bloch has earned respect and a unique position in having a clear vision of future developments, as an industry journal columnist and contributor that is widely read and as a consultant of choice in solving industry problems. He is a standard bearer and leader who, through dogged pursuit of excellence raised the standards of process industry maintenance and reliability.

The Process Plant Reliability Conference is a jewel in supporting industry and being wanted by industry. It truly "does the work of the Society." However, It could do a lot more. ASME's support is fairly minor, consisting mostly of advertising the conference through its own media.

ASME has something of great value that could be much more. We owe a great debt of gratitude to ASME Fellow Heinz Bloch PE for his vision, professionalism, hard work, determination to succeed and most importantly for making much of the USA process industry world class.

*Alfred Kurzenhauser  
Board of Governors  
ASME*

## PROCESS PLANT RELIABILITY CONFERENCE 2001

November 5-8, 2001, Radisson Hobby Airport Hotel, Houston, Texas

Some of the topics being covered at this year's event will be:

- Reliability Strategy and Execution - Case Studies
- Reliability Process and Methodology
- Equipment Assessment and Life Extension
- The Financial Side of Reliability
- Reliability Practices in Action

For further information on this venue contact BJ Lowe at [bjlowe@clarion.org](mailto:bjlowe@clarion.org) or visit the PEMD webpage [www.asme.org/divisions/plant/conf99.html](http://www.asme.org/divisions/plant/conf99.html)

## The Basics Must Come First

(continued from page 1)

(PEMD) would like to assist the engineers who make it happen. We focus on manufacturing: systems, equipment, processes and facilities. Through creative problem solving, the goal is to make continuous improvement in costs, quality, safety, processes and operations. It's quite a responsibility if you're one of the people with the charge to accomplish this goal for your facility.

PEMD would like to build an organization with on-line resources for the busy

engineer and provide professional development opportunities based on your needs. To do this, we need your participation, whether it's just providing input to surveys, publishing or presenting a paper on your latest technology break-through, or serving in a leadership capacity on our executive committee.

I've often wondered how others are managing their parts inventory control program, what their strategy is on off-hours maintenance, and what cost effective ways they've found to implement new reliability techniques...won't you join me in forming a much-needed resource

for the working problem solver?

If you're interested in participating in PEMD activities, please contact:

Stacey Swisher Harnetty  
Maintenance Supervisor, Eastman  
Chemical Company  
swishers@asme.org  
(423) 229-1108  
or  
Edison Aulestia  
ASME Senior Program Manager, Engineering Programs  
aulestia@asme.org  
(212) 591- 7159



## Co-Located with ASME TURBO EXPO

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### New Horizons for Global Power

Widely regarded as the power industry's most technically acclaimed event, the **International Joint Power Generation Conference & Exposition** is a forum for power generation professionals who know that growth and profits come from staying technically current and on top of industry trends. The co-location with **ASME TURBO EXPO**, an event dedicated to gas turbines, will give authors and presenters a huge power generation audience.

### Two Conferences for the Price of One

Register for IJPGC 2001 and attend - at no extra expense - all ASME TURBO EXPO technical sessions, user symposia, and other events including a joint exposition that features the latest products from hundreds of companies.

### IJPGC is Sponsored by:

The American Society of Mechanical Engineers (ASME)  
Power, Fuels and Combustion Technologies & Nuclear Engineering Divisions

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### Sponsoring Publications:

ME Magazine, Maintenance Technology, Pollution Equipment News, Cooling Tower Institute, Turbo Machinery International, World Cogeneration International and Magellan Power Publications

## PLANT ENGINEERING & MAINTENANCE PROGRAM AT IJPGC

| PAPER DESCRIPTION   | AUTHOR(S)   | AFFILIATION   |
|---|---|---|
| On Line Measurement of Pulverized Coal  | David J. Early  | Air Monitor Corporation                               |
| Real Time Prognostic Condition Based Maintenance for Power Generation Systems   | William Matzelevich   | Arete Associates                                      |
| Creating a Successful Corporate Maintenance Council   | S. Bradley Peterson   | Strategic Asset Management Inc.                       |
| Selecting an Optimum Solution to Fireside Boiler Tube Failures/Life Cycle Management  | Michael Welch   | Welding Services Inc.                                 |
| Metallurgical and Operational Risk Assessment of a Valve Replacement Operation Involving Liquid Nitrogen Pipe Freezing/Thermal Flux Monitoring Technique in a Hydroelectric Power Plant | D. Gagnon,<br>P. Nguyen-Duy,<br>P. Nguyen,<br>R. Beauchemin,<br>S. Godin, R. Adam | IREQ, Hydro Quebec Research Institute                 |
| e-Maintenance   | J. Lee  | Rockwell Automation/University of Wisconsin-Milwaukee |

# Towards Better Reliability Management

Reliability is like safety —everybody is in favor of it, but not everybody practices it. Safety professionals know that solid achievement rests on the need to change an existing culture, replacing it with a radically different one. Cultural changes do not come easy.

The development of lasting reliability improvements is almost certain to require similar changes in the prevailing mind-sets. These changes are being resisted because the implementation of reliability improvement measures costs money and the resulting bottom-line cost savings are not as immediately evident as, say, laying off 15% of your work force. The trouble is, of course, that savings due to reduced payrolls are typically short-lived, whereas savings due to tangible improvements in reliability performance are generally more permanent.

All too often, future savings realized through improved equipment reliability are not being calculated because accurate data are either not available or difficult to obtain. That need not be the case, because a competent consulting engineer may have data that closely approximate your situation. Use of these data may well allow you to work up a solid cost justification which management would find difficult to ignore.

Cost justifications are typically based on anticipated savings in maintenance labor and materials cost, and also the value of avoided downtime. However, other cost savings exist and should be considered. These include the financial value of assigning employees now no longer busy with remedial tasks to the performance of proactive failure avoidance tasks elsewhere in the plant.

A well thought-out cost justification would also include the value of avoided fire damage. One refinery statistic indicates that one out of every 1000 pump failures results in a \$1,300,000 fire. Hence, if a well-planned pump reliability improvement program were to increase the mean-time-between-failures (MTBF) at your plant from previously 2.5 years to the 7.5 years now actually achieved at some US refineries, imagine how much money you could easily justify spending to achieve these results!

But, there are still many misconceptions about the value of reliability, or the relationship between maintenance effort and reliability results. For instance, many engineers would think that higher maintenance outlays produce higher equipment reliability. Industry statistics show otherwise. The plants with the highest maintenance outlays are also the least

reliable. Exploring the reasons will have to be postponed until another time.

A number of texts explain what the leading companies are doing (see ISBN 0-88415-661-3). The common thread among the leaders is that they both empower and enable key individuals to effect change. The common thread among the less profitable companies is that they sometimes empower without enabling, use able individuals but refuse to empower them, or practice wishful thinking and neither empower nor enable their reliability professionals.

That leaves us with the question: What can you personally do to become a successful reliability professional and, if you are a manager, how can you train and retain individuals that are interested in becoming reliability/maintenance professionals? Here are the key elements:

- Develop and agree upon a well-defined role statement
- Perform and insist on cost justifications based on life cycle cost calculations
- Consider rotational assignments for your professional employees
- Institute cooperation, communication and consideration among the three groups that will influence equipment reliability: Operations, maintenance and technical
- Before empowering, enable!
- Teach and insist on the execution of a structured and repeatable failure analysis and troubleshooting approach
- Have a firm, well thought-out, mutually acceptable training plan. Modify it only by mutual consent between manager and employee

Likewise, how do you establish a culture similar to safety? Just as you subscribe to the notion that all accidents are preventable, adopt the belief that all failures are preventable and that repeat failures are unacceptable! Remember four basic concepts, four indispensable ingredients that will lead to success:

- Give clear direction and support; do so consistently, not sporadically.
- Provide adequate and appropriate training.
- Give due recognition and tangible reward.
- Treat your employees with empathy.

Try this formula and enjoy your success!

*Heinz P. Bloch, P.E.  
hpbloch@juno.com*

## Division Sponsored Activities

- International Joint Power Generation Conference and Exhibition, June 4-7, 2001, Ernest Morial Convention Center, New Orleans, LA

**For more information Visit the web site:** [www.asme.org/conf/ijpgc01](http://www.asme.org/conf/ijpgc01)

- Process Plant Reliability Conference, November 5-8, 2001, Radisson Hobby Airport Hotel, Houston, Texas

**For more information Visit the web site:** [www.asme.org/divisions/plant/conf99.html](http://www.asme.org/divisions/plant/conf99.html)

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