

Impending deregulation of the utility industry and increasing competitive pressures present new challenges for utility companies. Originally a single source provider, Southern Company saw the trend toward competition and decided to take a proactive stance. Their goal is to be the most reliable, low cost producer. Ed Holland, President and CEO for Savannah Electric, says "We are evaluating every aspect of our business to be more competitive by reducing costs and improving reliability. Our ongoing objective is to reduce the cost of each kilowatt hour. We recognize that taking advantage of the latest maintenance technology will not only help us lower costs, but will also allow us to better manage our critical equipment resources and lengthen the lives of our power generation assets."



Randy Jones, Routine Maintenance Manager for Southern Company Generation, explains, "We strive to utilize the lowest cost equipment to satisfy the demand at all times. To do this, all plants must be as reliable as possible so that we have the flexibility to operate the plants that satisfy demand at the lowest possible cost. We needed the ability to monitor equipment, determine repair needs in advance, and then plan maintenance only when needed and preferably when demand for electricity was low."

Around 1991, Southern Company deployed a task force to look at all business units and compare the company with the best practices of other utilities and industries. The task force identified 44 key areas covering all aspects of power generation and support functions

in which they felt the company could improve. The task force identified predictive maintenance as one of its top four priorities. To realize maximum benefits, the task force sought a unified approach to predictive maintenance implementations. They recommended standards for the company that have resulted in significant savings and benefits for each plant and for the company as a whole.

As a result of the task force recommendation, Southern Company established a two year pilot program to apply predictive maintenance best practices, investigate technologies, and develop cost-effective implementation approaches. The group selected Entek EMONITOR<sup>®</sup> for Windows (EFW) and

MOTORMONITOR<sup>®</sup> software as the company standards for vibration analysis and motor current signature analysis.

### **From Five Sites to a Company-Wide Implementation**

Today, Southern Company uses Entek's EMONITOR for Windows in 20 sites, 17 of which are connected via a wide area network. Jones adds, "At some sites, we also interface our oil analysis data into the EMONITOR database so that we can analyze all condition-based monitoring information for a piece of equipment on one screen. In this way, we get a complete picture of equipment performance, so that we can diagnose negative trends and identify potential problems."

The wide area network has also allowed Southern Company to implement their condition-based monitoring program very cost effectively. "We have implemented 20 sites for about the cost of four individual, stand-alone plants," estimates Jones. "Not only do we get the benefits of integrating all sites, which facilitates valuable communication, but we also reduce our system costs significantly." Some of the advantages that have already been realized by the multi-site network installation include:

- Lower software/hardware purchase costs
- Sharing equipment across sites when one site has a problem
- Ability to share information between locations
- Using system resources for set-up and analysis assistance
- Consolidated training at reduced costs.

The predictive maintenance pilot plants documented over 100 instances in which information available from predictive maintenance analysis was used to influence maintenance decisions. Holland says, "The general impact of condition-based maintenance is that it makes us more effective at identifying and planning required maintenance." Jones concludes, "During slightly over one year, potential savings and avoided costs of about \$1,000,000 resulted from deferring planned maintenance on healthy machines and from identifying problems in time to schedule repairs and avoid equipment failures."

### Eliminating the Cost and Downtime of Time-Based Maintenance

"Condition-based maintenance has had a significant impact on our philosophy towards preventive maintenance," says Holland. "In the areas where we have implemented condition-based maintenance, we have virtually eliminated the need for time-based maintenance." Jones continues, "Instead, we collect vibration and motor current signature data, take oil

### Southern Company

Southern Company (NYSE: SO) is an international energy company with more than \$38 billion in assets through regional utilities and operations around the world. It is the largest producer of electricity in the United States and one of the world's leading independent power producers. Based in Atlanta, Southern Company is the parent firm of Alabama Power, Georgia Power, Gulf Power, Mississippi Power, and Savannah Electric

Through its Southern Energy subsidiary, Southern Company supplies electricity in 13 countries on four continents and has a growing presence in North America with assets in the Northeast, the Midwest, California and Texas. Southern Company Energy Marketing also provides energy-related marketing, trading and technical services.

Southern LINC offers wireless telecommunications. PowerCall offers security services for homes and businesses. GoodCents certifies energy-efficient goods and services.

Also part of the company are Southern Nuclear which provides services to Southern Company's nuclear power plants and Southern Company Energy Solutions which markets energy-related services.

#### Southern Company Facts:

- Generated 166.3 billion kilowatt-hours of electricity in 1999 at its five U.S. electric utilities: Alabama Power, Georgia Power, Gulf Power, Mississippi Power and Savannah Electric. Other subsidiaries.
- Operated nearly 50,000 megawatts of electric generating capacity worldwide. In the United States, operated more than 43,000 megawatts, the most of any U.S. electric utility.
- Supplied energy to a 120,000-square-mile service territory spanning most of Georgia and Alabama, southeastern Mississippi, and the panhandle region of Florida - an area with a population of about 12 million.
- Reported net income for 1999 of \$1.276 billion on revenues of \$11.585 billion, with a return on average common equity of 13.43 percent.
- Has a substantial portion of its common stock - about 10 percent - held by employees.
- Is a leader in environmental research, including electric vehicle development. Southern Company has invested more than \$4 billion in environmental technologies and pollution prevention this decade alone.
- Employs more than 25,000 people in the United States. Worldwide, employs more than 31,000 people.

samples, perform infrared scans, record bearing temperatures and other operating parameters, and make a visual inspection. If the equipment is running fine, then we don't perform any work. If a problem is detected, we plan and schedule the required maintenance. This saves us a lot of money and time." Holland reiterates, "We can't afford to engage in overkill. We no longer shut a unit down for maintenance when we don't need to." In one case, time-based preventive maintenance has been eliminated for major plant fans. Technicians now rely on vibration, oil, motor current, and

temperature condition based monitoring techniques to determine which fans, gearboxes and motors to maintain. In one planned plant outage, this resulted in a savings of 340 man-hours, because the fans did not have to be individually inspected for potential repairs. This reduced maintenance hours on these fans by 54 percent as a result of condition-based monitoring technology. Jones states, "That's a tremendous savings in man-hours and wear and tear on perfectly good bearings compared to our traditional time-based processes."

### Reducing Costs and Improving Reliability

Holland describes the challenge to the utility industry to do more with less. "Our company, like the rest of the industry, has seen the need to reduce personnel and costs considerably to meet the predictions of a more competitive environment.

Our condition-based maintenance processes allow us to run the business more effectively and with fewer people." Jones quantifies the staff levels, "In one of our plants, we have reduced staffing levels by 30% over a five year period. We are performing the same amount of work, if not more, but we are able to do it with fewer people. These reductions are fairly typical for many of our plants. Condition-based maintenance techniques allow us to continue to operate and maintain our plants effectively in an increasingly competitive market."

***Jones cites a few examples where condition-based maintenance has paid off.***

### Oil Changes Reduced

At a single plant, Southern Company has realized savings of \$70,000 on oil changes in six months. All changes are now performed based on the condition of the lubricant and the machine. Oil analysis is performed on site using a desktop analyzer, which yields quick and accurate results.

### Rapid Return on Investment

During its first year of operation, the predictive maintenance team at one plant documented over \$400,000 in maintenance deferrals and failure avoidance. This was slightly more than enough to offset the salaries and overhead for the predictive maintenance team personnel, as well as the program start-up costs of analyzers, hardware, software, and computers. In future years, benefits are expected to be even greater.

### Equipment Efficiency Improved

Following an upward trend in axial vibration, the service water pump alignment was checked. Laser alignment took less than 1.5 hours. In addition to reducing vibration and improving equipment operation, the electrical requirements of the motor were reduced, resulting in an annual station electrical savings of 15% (\$4,000).

### Improved Communication Adds to Success

Jones describes, "While each plant has implemented their predictive maintenance program in the way that works best for them, the cooperation between plants has allowed our predictive maintenance processes to be successful in a way that we don't think would have otherwise been possible. We have seen greatly increased benefits through the efficient use and sharing of company resources to reduce costs and increase effectiveness." Another benefit achieved by unified efforts is effective training. "Since most locations are using common software, hardware, and processes, we have enough interest to host in-house training courses on many predictive maintenance subjects," notes Jones. "We tailor the classes to our issues and topics and also save money

on travel and expenses. Information is beginning to flow in multiple directions, instead of communication of exceptions. The idea is, if one part of our company knows something that will make us more effective, then every part should know."

The multi-site network installation is also providing substantial benefits. Jones describes, "Since we can easily share information between locations, it is very simple to set-up a new machine if there is a similar machine at another plant. We have also found it useful for two or more people at different company locations to be able to work together in solving a difficult problem. With the network installation, technicians from various plants can look at the same data as they discuss possible causes and solutions over the phone."

Holland describes, "As we refine our approaches, we are helping Southern Company to continue to successfully face new challenges. In a time of deregulation and increased competition, the advantages to Southern Company and its employees are obvious. For us — Job security is reliable low cost energy."

## Condition-Based Maintenance Results

- \$1,000,000 savings and avoided costs across five-site pilot program
- Reduced planned outage maintenance hours 54%
- Reduced costs of oil changes by \$70,000 in 6 months
- Saved over \$400,000 in maintenance deferrals and avoided failures in first year (achieving a 12-month payback)
- Vibration analysis saved 15% (\$4,000) annual electric charge for one 200 HP service water pump
- Reduced system costs by using a wide area network implementation
- Reduced start-up and training costs
- Improved communication and equipment trouble shooting across plants

## ENTEK PROFESSIONAL SERVICES

### Customer Support

Our people are our product. We are very fortunate to have an outstanding staff of support professionals who are committed to the success of our customers – YOUR success! Our staff has a wide variety of experience and education, including mechanical, industrial and electrical engineering; PC, database and operating system technologies; customer service; chemistry; and electronics. Technical proficiency is a requirement for providing you with knowledgeable and accurate answers, but our commitment to serving our customers in a friendly, caring, professional and timely manner is what will help maximize your return on investment.

### ESAFE

ESAFE is a comprehensive offering of services and product updates to ensure the success of your long-term success in operating a condition-monitoring program. Entek is committed to standing behind its products to ensure that you are successful in reaching your equipment reliability goals. Because Entek is fully committed to customer support, your investment in ESAFE will guarantee peace of mind, allowing you to focus on getting your job done. Participating in the ESAFE program assures you of on-going support, product up-dates, information exchange and more! Each customer is unique, which is why we offer a flexible range of ESAFE packages -Bronze, Silver, Gold and Platinum – allowing you to select a specific level of service to meet your particular needs.

### Field Service

Implementing an effective condition-monitoring program is critical to your success in meeting the equipment reliability, productivity and business goals of your plant and company. A strong commitment to implementing the program is necessary to achieve your objectives, and if you have this it is certain you will succeed. The real question is, how quickly will you have a program that is delivering powerful results and are you doing it the best way possible using all the capabilities and efficiencies of your products? Entek's field service engineers are experienced in starting up and running successful condition monitoring programs and helping existing programs improve. They have seen what works and what doesn't. They are also experts in Entek products and different condition monitoring technologies. This expertise can help you reach your condition monitoring goals and see results sooner.

### Repair Centers

When your equipment is in need of repair, you want a reliable repair center that is quick, convenient, and cost effective. Entek offers factory in-house repair, service, and calibration for our entire range of products - even products no longer part of our current line. As the original equipment manufacturer (OEM), we are the most knowledgeable and the most qualified to service our products. Supported by more than 150 combined years of technical service experience, our repair technicians provide the highest quality service for your Entek hardware.

### Entek Educational Services

The best tools, when used by unskilled craftsmen, will still result in unsatisfactory results. This is true in many aspects of life, but especially in the application of Condition Monitoring techniques and technologies in today's demanding plant environments. Yes, you need to be equipped with the best tools, but you must also receive the proper training to get the maximum benefit from your investment in a successful Condition Monitoring or Reliability program.

Experience, knowledge and quality are the foundation of Entek's training seminars. Technology training is available as well as product training courses; all presented by the most qualified instructors to meet your needs. Choose from on-site seminars and classroom training conducted all over the world to help you gain the maximum benefit from your machinery reliability investment.

### Reliability Online (ROL)

Reliability Online is a unique service designed to provide results with minimum investment in equipment training and personnel. Reliability Online takes advantage of either the Internet / e-mail and a central group of highly skilled condition monitoring engineers to give you the best possible condition monitoring program.

Reach us now at [www.rockwellautomation.com](http://www.rockwellautomation.com) or [www.entek.com](http://www.entek.com)

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