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Plant Maintenance Optimization Target Enhances Nevada Power's Performance Improvement Program

Plant Maintenance Optimization[EG] Target
Science & Technology Development

"Because of this predictive maintenance project, we're doing a better job of selecting what we should be doing, and how often we do it."

- Bruce Humes
  Nevada Power

BENEFITS

- Nevada Power's Clark/Sunrise/Harry Allen (CSHA) Combustion Turbine Combined-Cycle (CTCC) Complex realized a net saving of $309,000 during the first six months the plant maintenance optimization (PMO) program was in effect.
- Using PMO, energy companies can achieve measurable improvements in equipment reliability and process productivity, reducing production costs.

Challenge

To meet a growing local demand for low-cost electric power, many energy companies are implementing new maintenance strategies to improve equipment reliability, unit availability, and work process flow. The types of maintenance modes in power plants range from reactive to preventive, planned, and then an optimum balance of the three. Optimum maintenance is the lowest-cost maintenance that achieves the desired equipment reliability.

Maintenance strategies in place at Nevada Power's Clark/Sunrise/Harry Allen Complex were largely confined to time-based preventive maintenance, which was under-utilized, and corrective maintenance, which was used aggressively and created a reactive environment. The energy company was interested in developing a condition-based predictive maintenance (PDM) approach. Although some PDM technologies and tools were in place at CSHA, plant personnel felt that the applications of those technologies were not used effectively to guide maintenance decisions. Nevada Power sought EPRI's help to formalize its PDM approach. The energy company wanted to base the program on the integration of all available data necessary to make timely decisions on equipment maintenance.

Response

PMO is achieved through a balanced synergy of three elements: work processes (the steps taken to perform maintenance), work culture (the way people work together), and technology. The most effective work culture provides a highly productive environment for personnel. Technology tools and systems help personnel measure, manage, and perform maintenance in the most cost-effective way, while supporting work processes and culture.

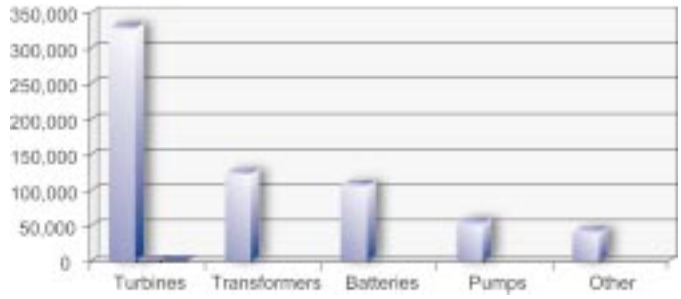
To help Nevada Power establish their new program, the Plant Optimization Target Staff, EPRI Maintenance & Diagnostics Center, EPRI Customer Assistance Center, and EPRI Combustion Turbine Center conducted a PDM and performance-assessment study for 12 CTCC units at CSHA. The project, which began in November 1997, developed a detailed plan and schedule for the development, implementation, and coordination of a PDM program at CSHA and all applicable support organizations. The plan emphasized steps to be taken to develop meaningful and beneficial PDM implementation, performance improvements, and combustion turbine long-term planning and maintenance management programs. The PDM Level-of-awareness training that was conducted required communication and participation from many plant and central support personnel, a critical ingredient for a successful condition-based maintenance program. The project final report listed strengths and areas for improvement at CSHA, supported by a detailed plan for implementing the recommendations. The recommendations included the distribution of existing performance information to all levels of the operations staff, and the awareness and utilization of diagnostic and performance information by data users such as plant operators.

For Nevada Power, the result of more effective information management was improved efficiency of the units and immediate performance gains.

EPRI Perspective

The mission of EPRI's PMO is to lead the industry by developing and demonstrating products and services for improved use of power plant maintenance resources and increased profitability for generation companies. EPRI's PMO integrates the best products and services to customize an improvement plan and execute application to meet company objectives, based on the company's current strengths and weaknesses. These elements include PDM Level-of-awareness training, Streamlined Reliability Centered Maintenance (SRCM) application, Computerized Maintenance Management Systems (CMMS) integration, work culture improvements, and integration with other EPRI technology. The strategy of PMO is continuous improvement; each improvement cycle starts with steps to introduce appropriate technologies, assess plant experience, and implement the product or service. At the end of an improvement cycle, additional steps measure improvement and further reinforce through coaching, training and technical workshops, the product or service.

Calculated Value of Nevada Power's Application



Basis for Benefits

1. In the first six months of the PMO program, Nevada Power estimates a net saving of approximately $309,000 (total savings of $651,000 less costs of $342,000).
2. The largest savings were for turbines ($327,862), transformers ($123,486), batteries ($105,652), and pumps ($52,717).
3. The energy company projects total annual benefits of $600,000 to $900,000 due to PMO, based on current capacity factors. This projected saving consists of reduced overall cost of maintenance and increased electricity sales.

References

- "Plant Maintenance Optimization: Work Management Assessment and Improvement." EPRI Technical Brief TB-108949-R1, September 1997.
- A Guide for Work Process Improvement and Best-In-Class Benchmarking in Fossil Power Plants. EPRI Report TR-107071, March 1997.
- Predictive Maintenance Guidelines. EPRI Reports TR-103374-V2, October 1997 and TR-103374-V3, December 1998.
- Predictive Maintenance Assessment Guidelines. EPRI Report TR-109241, November 1997.

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Interest Categories

- Plant Maintenance Optimization[EG]
- Work Process Improvement Guidelines and Techniques[EG]
- Maintenance Task Selection Guidelines and Technologies[EG]
- Predictive Maintenance Program Development and Diagnostic Tools[EG]
- User Group: O&M Workstation[EG]
- Steam Turbines, Generators, and Balance of Plant
- Hydropower Operations, Relicensing and Environmental Issues
- Combustion Turbine and Combined Cycle O&M

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