



Plant Reliability Improvement Critical to Minimizing Impact of Unplanned Outages and Optimizing Scheduled Maintenance

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Situation:

A coal fired electrical power generating plant located in the US, built in the 1980s, most of the plant assets are in good condition. Equipment reliability is of vital importance particularly for those assets which directly impact upon the single generator output. The plant reliability improvement effort is critical to minimizing the impact of unplanned plant outages and to optimizing scheduled maintenance outages. Any unplanned plant outages during peak demand periods can have a significant impact on plant revenue.

Challenge:

Though the plant had achieved performance improvement targets in previous years, a more aggressive and consistent focus on reliability improvement would be required going forward. New objectives included the optimization of scheduled maintenance outages to maximize generator output and a reduction in the overall cost of power generation.

Benchmarking the maintenance cost per MW produced against other coal-fired power generation facilities, it was identified that this plant was more than 25% more costly than average. An assessment of current practices and activities revealed that at least 50% of maintenance work was performed in a reactive manner. This resulted in increased parts and labor costs due both to the inability to properly plan the maintenance work and to the increased degree of damage caused by allowing failing assets to continue operation.

Like many other plants within and outside of the power generation sector, the Power Generation Station would see a significant level of retirement of their experienced maintenance and operations personnel within a 5-10 year period.



Unit outage is every 18 months, turbine outage is every 10 years.



Detailed definition and documentation of asset maintenance and reliability processes and procedures was vital to ensuring that new personnel would be well equipped to support high equipment reliability.

Solution:

In order to achieve the aggressive performance improvement targets and make these improvements sustainable, the Plant Leadership Team decided that it was important to embed the reliability approach throughout their organization. As the first step in this effort, they worked with Ivара to complete a Reliability Assessment of the facility and to put together a Business Case for the reliability effort to be undertaken. This clearly identified their starting point which was vital to assembling a focused plan for improvement.

In order to ensure that the reliability effort was truly owned by plant personnel, a Core Team was trained and coached in the application of reliability practices. The Core Team would ultimately become the internal reliability experts. The leadership team also determined that all Plant personnel would participate in work identification activities. This was done to increase ownership of the reliability effort by all plant people and also to facilitate their reliability education.

CORE TEAM

The Core Team was comprised of 4 individuals assigned to their roles on a full time basis. The team members included a plant operator and plant mechanic. The Core Team were trained in reliability principles, building asset hierarchy, asset criticality analysis, formal work identification facilitation, Ivара EXP Enterprise software functionality and maintenance program implementation in Ivара EXP. Following formal training, Core Team members were coached by a reliability consultant as they gained experience applying their new skills in the development and implementation of the new Asset Care Program for the plant. A key objective of this project was to train and coach the Core Team to become proficient in the delivery of all aspects of the Asset Care Process business model using the Ivара Work Smart[®] methodology.

The leadership team proceeded with a focus on Maintenance Task Analysis as their formal work identification practice. The objective was to have technically valid Asset Care Programs developed implemented using Ivара EXP and being executed for all Plant equipment within a 3 year period.

RELIABILITY ASSESSMENT

The Reliability Assessment highlighted the need for a more consistent business process for maintenance and reliability activities within the plant. The existing organizational structure was very flat and key functions such as maintenance work planning, scheduling and follow up were handled by the person executing the work. As a result they were inconsistently performed. Ivара facilitated a business process design activity to clearly define the process steps, roles and responsibilities of all personnel in supporting the Asset Care effort and the skills necessary to effectively fill their roles.



ASSET CARE BUSINESS PROCESS

The Asset Care business process was designed with participation from Core Team members and representatives of maintenance, operations and support personnel from each key business unit. The business process also defined the interface requirements between the Ivara EXP Enterprise software and the EAM/CMMS, SAP PM.

ONLINE DATA COLLECTION

The Core Team members were trained to implement ODC (Online Data Collection) indicators which would pull data readings from the Plant DCS. Approximately 100 indicators are now collected using ODC on more critical assets including turbine, generator and feed water pumps. The objective of the Core Team in creating ODC indicators was to ensure that the time spent by the operator and maintainer inspecting production assets was truly value added time rather than the simple collection of numbers readily available in the DCS. Some of the ODC indicators are standalone indicators while others are inputs to calculated indicators. For example, the inlet temperature for their bearing component cooling water heat exchanger is collected via ODC and is an input for a calculated indicator that raises an alarm when the temperature differential between input and output reaches the alarm value.

INITIAL AREA

The initial area of the plant selected for program development and implementation was the Power Block – Boiler Area consisting of the main boiler, soot blowing systems, furnace air system, plant fuel oil system, furnace coal system, coal pulverizers, glycol pre-heating system and air heaters.

Over a 6 month period, the Core Team facilitated the reliability strategy development using Ivara methodology Maintenance Task Analysis for this equipment and then built and implemented the corresponding asset care programs in Ivara EXP Enterprise. In addition, they trained the maintenance and operations personnel in the area to perform their new roles within the Asset Care business process including the management of preventive maintenance activities (i.e. inspection routes), the performance of data collection using handheld units, acknowledgement of generated alarms and the management of corrective maintenance activities. In completing the initial area under the coaching guidance of an Ivara Reliability Consultant, the Core Team completed their competency development in delivery of the Asset Care Process business model.



The remaining six areas of the Plant including Turbine/Generator, Power Block – Balance of Plant, SCR/Precip/ID Fans, Material Handling, Liquid Waste Treatment System and Flue Gas Desulfurization were completed over a period of 24 months, 6 months ahead of the original schedule. The Plant now has



over 175 active inspection routes comprised of over 5000 technically valid indicators. Route compliance varies by area but typically averages between 80 and 90 percent. Alarms generated from inspections are acknowledged within 72 hours more than 80 percent of the time.

Results:

When the initial Business Case was developed, specific maintenance cost savings were projected for this project over a 3 year period. These savings were as follows:

A reduction in maintenance costs based on improved labor effectiveness and reductions in overtime, contract labor, material usage and spare parts inventory amounting to:

Year 1	\$ 599,000
Year 2	\$1,199,000
Year 3	\$1,998,000

These projected savings were built into the operating budget for each of the 3 years since the project started and targets were successfully achieved. In 2010, the annual maintenance cost savings of \$1,998,000 was exceeded.

Therefore, in partnering with Ivara, the Power Generating Station was successful in meeting three aggressive improvement targets and is well positioned to sustain this improvement for the long term because Asset Care has become their way of doing business.

About the Ivara EXP / SAP Certified Integration

Ivara EXP is an enterprise system used every day by Maintenance and Operations to care for their assets. Together, SAP PM and Ivara EXP enable a proactive approach to equipment performance management. EXP strengthens the asset care operation by instilling reliability and performance management as a daily process within your organization. EXP makes more effective use of resources and enables Maintenance & Operations to work together to proactively care for equipment. In addition, EXP acts as a centralized repository to capture equipment knowledge and enable you to make fast and accurate business decisions.



Accelerate your SAP PM time-to-value with Ivara EXP.

Ivara is an SAP Partner.
Ivara EXP has a Certified Integration to SAP PM.
For more information, call 1-877-746-3787 or visit www.ivara.com.

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