



Empowering operators for efficient operations

Many of the functions that have traditionally been performed at an engineering or administrative level are now being handled directly by operators at a power plant where a new control system is expected to improve plant performance, reduce forced outages and extend equipment life, write Bill Conley and Galen George

Maximizing power plant performance and reliability is every plant owner's aspiration.

Experienced plant personnel know that a power plant's performance is determined largely by the performance of the operators. An intuitive control system with the appropriate diagnostic capabilities provides the operator with the tools necessary to be successful.

At Seminole Electric Cooperatives Midulla Generating Station, employees are continually looking for ways to optimize plant performance and reliability.

Seminole Electric Cooperative is one of the largest not-for-profit generation and transmission cooperatives in the US. Its mission is to provide reliable, competitively priced, wholesale electric power to its nine-member distribution electric cooperatives.

Approximately 1.6 million people and

businesses in 42 Florida counties rely on Seminole Member cooperatives for electricity. One of Seminole's primary resources includes the Richard J Midulla Generating Station (MGS).

Located on the Hardee/Polk County line in central Florida, MGS is an 810 MW facility that uses natural gas as its primary fuel. The facility consists of a combined-cycle power plant and five simple-cycle, twin pack, peaking combustion turbines.

In 2006, MGS was the first installation to upgrade its digital plant control system from TXP to the Siemens SPPA-T3000 system as part of an overall programme to improve plant performance and reliability.

More recently, MGS and Siemens added an updated, highly customizable new human machine interface (HMI) to their plant distributed control system (DCS). The new HMI empowers operators to interact more effectively within the plant's DCS, giving them

the ability to recognize and mitigate potential reliability issues. MGS is now beginning to see the benefits of using a modern control system with the appropriate tools, in terms of overall plant performance.

As we all know, the life of a control room operator can be stressful. In the daily business of power plant operations, they are responsible for monitoring thousands of data points and controlling the plant based on their interpretation of this data.

In addition, operators must also record, report and coordinate all of the data necessary to manage the plant as efficiently as possible. Armed with this massive amount of information, operators have to decipher and determine what actions, if any, to take. It continues to be critical to support them with the right tools, targeted information and guidance for sound operation.

As part of the control system upgrade, MGS took a new approach, delving into

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the use of applications focused on not only making the information readily available, but by also providing tools that enable them to focus more on effective proactive plant operation rather than putting out fires. The SPPA-T3000 Cue plant control system enables this approach by helping plant operators ensure the highest reliability and availability in the most intuitive manner possible.

With the upgraded DCS, the visual displays provide the most relevant key performance indicators (KPIs) and sophisticated alarm management tools at the top of each screen. With significantly improved visual reference and organized plant alarm statistical data, operators are now able to quickly and effectively review overall plant and equipment status.

MGS operators have also made great use of the new system's many configurable alarm models. They can easily customize this application, including how system pages are set up, as well as adding and removing elements.

To provide the operators with tools that make their daily activities more effective, MGS chose to implement shift logs and turnovers within the upgraded DCS. By integrating the shift-logs into the SPPA-T3000, the logs automatically populate with events, alarms and other process data, without the need for manual entry.

In addition, MGS decided it would integrate the non-DCS type activities into the electronic logbook. It is collaborating with Siemens to provide a customized format to easily enter these non-DCS events into the electronic log. This will improve the effectiveness of shift-to-shift communications while improving consistency and accuracy.

Due to the ease and intuitiveness of the upgraded controls, the operators at MGS are quickly learning how to use the new features after only a few days of informal on-site training.

Reducing distractions

One of the best ways to improve the effectiveness of operators during transient conditions is by minimizing unnecessary alarms that tend to distract and desensitize.

Alarm management systems in plants have historically been standalone systems. However, with the new operating system, this function is fully integrated into the plant DCS, with no add-ons required. The tool continuously runs in

the background, which makes it much more user-friendly and accessible when compared to an add-on system.

The integrated alarm management

are now inherent parts of the new HMI.

These two new alarm classes provide proactive warnings before a limit is reached. They do this by analyzing the data at the



analysis (AMA) software provides operators with both specific and statistical data for each alarm condition, providing the information needed to continuously improve alarm functionality. Over time, heavy volumes of nuisance alarms can distract operators. All distractions – alarms, phone calls, radio communication and more – add up over time, and tend to reduce focus on efficient and reliable operation of the plant.

The AMA system application provides statistical analysis for alarm frequency, type and distribution. MGS operators are able to easily identify opportunities for improvement and provide the needed information to initiate the management of change process. Ultimately, this provides opportunities to reduce the number of 'nuisance' or unnecessary alarms, without risking equipment damage.

Integrating diagnostic cues

Working with Siemens as the pilot for the new SPPA-T3000 Cue system, MGS was able to take alarm customization to the next level. In addition to the standard alarm enhancements, the new HMI provides the ability for operators to create new alarm classes specifically designed to enhance their ability to proactively manage plant upsets. With Siemens' help, MGS created two new alarm classes, Trip Warning and Trip Stop, that

system and equipment level rather than relying on a single instrument.

This provides an early indication of conditions that are likely to lead to a trip. In addition, with a click of the mouse, a display opens with the relevant control windows, trends, detailed descriptions of the detected issue and instructions the operator can use to avoid reaching the point where a plant trip is required.

In addition to the new alarms, the system includes integrated component diagnostic modelling software that continuously runs in the background. Once a model is built, the system continuously monitors performance of critical plant equipment and compares it to the expected performance based on empirical limits and learned behaviour.

As the model tracks changes within the equipment limits, the potential equipment failure or performance problem is alarmed and again, with a click of the mouse, a display opens with the relevant control windows, trends, detailed descriptions of the detected issue and instructions the operator can use to avoid reaching the point where plant reliability is impacted.

As part of the pilot project, Siemens built custom models for much of the major equipment in the plant, such as the boiler feed pumps. The new system also allows

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plant personnel to build their own customized models that work specifically for unique issues that may arise within the plant.

Using these diagnostics engineering tools, MGS was able to add a custom model for a unique plant situation. Recently they had an issue with algae plugging their closed cycle cooling heat exchanger, requiring immediate corrective actions. After the heat exchanger was returned to service, an operator concerned that all the algae had not been removed built his own custom model for the heat exchanger. Using this model, he was able to easily confirm that the heat exchanger was operating at optimal performance levels. As a result, they now have a model that will also alert operations of future algae problems long before they become an issue.

While alarm management, electronic logs and equipment modelling technologies already exist, by integrating them into one control system, they have never been more user-friendly or readily available to the operator 'on demand'. The tools to effectively operate and monitor the plant are now in one place, and there when the operator needs them.

Many of the functions that have traditionally been performed at an

engineering or administrative level are now being handled directly by operators. The new SPPA-T3000 Cue system upgrade now makes it easy for even the most traditional operators to feel comfortable using the intuitive tools digging through symptoms and diagnosing problems.

An added value to this upgrade is that the system allows plants to tap into their own internal talent for a more customized approach that empowers operators to proactively run the plant as opposed to keeping the plant running.

Measuring success

When measuring success, MGS looks at specific KPIs aimed towards safety, environmental compliance, reliability and efficiency.

By offering tools that provide operators with an easy means for truly understanding problems with the plant and process, rather than just addressing symptoms, operators can focus on maintaining safe, reliable and efficient plant operations.

Also, by predicting issues before they cause damage, MGS can minimize repair time and cost of equipment through scheduled

maintenance.

MGS has been able to increase operator effectiveness and efficiency through technology. Its operators are now empowered to do more than they have ever been able to do before, with much less effort and stress. And with the predictability of the new upgraded control system, MGS operators are able to perform tasks that were – up until now – out of their hands.

The ongoing goal at MGS is continuous improvement and, from a performance standpoint, to run as economically as possible. The more economically the plant runs, the more value it can provide to its customers. If the newly-upgraded operating system can prevent one failure, it will more than pay for itself. The plant is predicting that its newly-upgraded control system will enable operators to improve plant performance, reduce forced outages and extend the life of the equipment.

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