Honeywell

Case Study

Meridian Energy Centralizes Control Room Operations

"The PAM system is a cost effective means of maintaining visibility of the health of assets that are critical to the business, whether they are transformers or any other piece of equipment."

- Neil Gregory, Technology & Process Strategist, Meridian Energy

Challenge

In addition to aging plant infrastructure, Meridian Energy also faced the worldwide phenomenon of experienced engineers and technical staff retiring or choosing to move as the workforce of the new millennium became more mobile. Meridian needed to upgrade plant-wide monitoring and control networks and centralize control room operations.

Solution

Meridian's Generation Improvement Team selected Honeywell to deliver an integrated Plant Asset Management (PAM) system that would provide early warning of deterioration of critical equipment, perform basic analysis and provide predictive capability.

Advantages

The solution provided:

- Real-time alarm and event visualization and analysis, which replaces multiple alarm printers, monitors operations and operator workload, and helps eliminate nuisance alarms
- An interface for implementing the mathematical models used in diagnostics
- Real-time asset monitoring, identifying and prioritizing poor performers
- Flexible data visualization and Key Performance Indicator (KPI) dashboards, enabling better operational decisions by providing web-based access to the PAM system control center.

The 21st Century Challenge

Meridian is the largest state-owned electricity generator in New Zealand, providing around 30% of New Zealand's total generation. Meridian supplies electricity to over 180,000 residential, rural and business customers throughout New Zealand using only renewable resources. Meridian is New Zealand's only supplier of carbon zero certified electricity.

With assets valued at over $4 billion, Meridian takes asset management seriously. As a State-Owned Enterprise (SOE) effectively owned by New Zealanders, Meridian is charged with managing the business in an effective and profitable manner while preserving the capability of their assets for future generations.

To achieve this balance, Meridian has a continuous improvement program in place, using best-practice management and maintenance methodologies in combination with leading-edge technology.

Aging Assets and Changing Workforce

Many of Meridian's assets were commissioned in the 1960s and like many hydro sites of this vintage, they are approaching an age where they require renewal, refurbishment or at least an increased amount of care in order to prevent critical generating

assets being forced out of service or, in the worst-case scenario, suffering an expensive and catastrophic failure.

In addition to an aging plant, Meridian also faced the worldwide phenomenon of experienced engineers and technical staff retiring, or simply choosing, to move as the workforce of the new millennium become more mobile. The difficulty with this, other than obvious recruitment issues, is the loss of the intellectual property those leaving take with them after a lifetime in the industry.

Meridian completed an ambitious five-year program to upgrade plant-wide monitoring and control networks and centralize control room operations in the town of Twizel at the center of the South Island. Meridian's entire plant is now remotely managed from a single location, a solution that partially addressed staffing and accessibility issues but raised new challenges.

A consequence of moving staff away from generation sites and into a central control room was that the experienced staff was no longer at the power stations and was out of physical contact with the equipment in their care.

The most basic and fundamental condition monitoring system available—that based on sight, hearing, smell and touch—was taken out of the maintenance equation. It was recognized that without the deep knowledge and physical presence of experienced staff on the station, powerful diagnostic tools would have to be provided to monitor the plant condition.

"Meridian had some very good systems and processes in place and a wealth of maintenance data", Neil Gregory from the Business Support Team describes this as "data rich, information poor." The flow of raw sensor and alarm data from Meridian's dispersed assets needed to be translated into clear, useful information about the plant's condition and performance.

Meridian's Generation Improvement Team, led by Garth Dibley, began planning a system that would provide early warning of deterioration of critical equipment, perform basic analysis to turn data into information, and provide predictive capability—a Plant Asset Management (PAM) system.

Key to the implementation of such a system was integration with Meridian's existing Computerized Maintenance Management System (IBM® Maximo®) and the existing plant historian. Meridian had invested heavily in these maintenance systems, in terms of both dollars and the time and effort of capturing almost eight years of maintenance history.

Unless the planned system could use this data, the benefits would not be realized for many years. As a Honeywell advanced control engineer puts it, "When two intimately related systems such as a CMMS and a PAM system can't talk to each other, then human intervention is required and this defeats the objective of having a PAM system. That's a classic case of developing an IT system that actually creates more work!"

Meridian undertook an exhaustive tender process and selected Honeywell to deliver an integrated PAM solution. Meridian's PAM is designed around a central control system that plugs into modular adaptors for the systems and software it needs to integrate with. The complete PAM system incorporates custom implementations of Honeywell's products to gather and analyze incoming data, to implement the mathematical models used in the diagnostics and, most importantly, to provide the right information to the right people at the right time (see Figure 1):

- **Alarm Management Software** provides PAM's real-time alarm and event visualization and analysis, replaces multiple alarm printers, monitors operations and operator workload, and provides tools for efficiently eliminating nuisance alarms.
- **Asset Management Software**, an advanced data-analysis and online industrial computing platform designed for troubleshooting difficult process problems and faults, provides an interface for implementing the mathematical models.
- **Control Performance Monitor** continuously monitors assets in real time, identifying and prioritizing poor performers.
- **Operational Insight** provides PAM's flexible data visualization and KPI dashboards, enabling better operational decisions by providing web-based access to the PAM system control center.

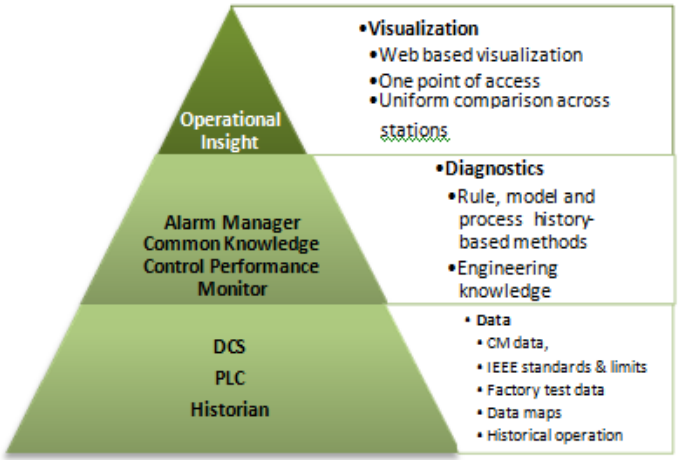

Figure 1: Platform Integration

Plant assets provide the system with their condition information, the results of many on- and offline automated and semi-automated tests. Plant data is analyzed with mathematical asset models, classified and collated with business logic, and plant dashboards are updated showing condition and predicted days to failure. In the case a non-normal condition is detected or predicted, an email is automatically sent to the right people, recommending specific action to be taken—the whole process works in concert with the existing CMMS. This workflow is illustrated in Figure 2.

Current and Long-term Benefit

"To date," says Meridian engineer Mark Williams, 'the biggest success that has come out of PAM is a substantially increased visibility of transformer condition. Prior to the PAM implementation, transformer condition monitoring data relied on individuals to enter the test results into Maximo and then others to analyze that data and publicize the results in sufficient detail to flag any health issues in a timely fashion."

"Have any changes in staff, either in Meridian, the maintenance contractor or the laboratory providing the results, and a test result could easily be missed or analysis deferred." One of Honeywell's advanced control engineers elaborates the difficulties with paper-based, manually collected data: "Manual tests are prone to human error, and if tests and inspections are not linked directly into the CMMS, then it is difficult to track any missed or inaccurate manual measurements. The end result is that manually recorded results can very easily go out of date and eventually you may be relying on old data to interpret the condition of a transformer."

Now, all unit transformer CM data goes to one place—PAM—which automatically analyzes the raw data and, in a short time frame, notifies appropriate people via email with the results of that analysis and any recommended remedial action attached to the email.

"It is also worth noting," says Williams, "that in developing the PAM models, specialist expertise has been utilized to improve Meridian's transformer condition monitoring program and job plans have been substantially upgraded. The tests we carry out use international standards; in the case of transformers, IEEE standards and industry best practice."

These best-practice testing and monitoring procedures are made possible by PAM's integration with the plant's existing Maximo maintenance management system and engineering knowledge of the equipment.

Meridian's Neil Gregory explains the value extracted from the PAM system in the very short time it was commissioned. "We really didn't and still don't expect PAM to pick up catastrophic conditions on a daily basis," says Meridian's Technology and Process Strategist, "but we do expect and get very early warning of changes in condition which we would not get without the system. Of course, some of these changes could be significant and if undetected, may go on to have catastrophic consequences."

A Solution to a Worldwide Problem

There are numerous examples of transformer failures as the worldwide fleet of transformers approaches the latter part of their designed life.

According to Gregory, asset owners have three basic choices:

- Replacement of the asset based on age, risking the loss of several years of useful remnant life
- Replace on failure, an unacceptable option for such large critical assets such as transformers
- Take better care of the assets now and realize maximum benefits into the future.

"In the big picture," says Gregory, "the PAM system is a cost-effective means of maintaining visibility of the health of assets that are critical to the business, whether this be transformers or any other piece of equipment."

"Personally, I think it's worth emphasizing (and I do at every opportunity) that PAM is a decision support tool that's here for the long haul, and the benefits and value we will get from the system will only increase over time as more and more data is entered. Imagine the value PAM will be providing 10 years from now—I can!"

Figure 2: Sequence of Events

For More Information
Learn more about Honeywell's alarm management solutions at our website www.honeywellprocess.com/software or contact your Honeywell account manager.

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