

Remote monitoring and diagnostic centres – the new wave?

by Gerhard Greeff, Bytes Systems Integration

With the process engineering skills shortage, a number of big multi-site corporates are looking at technology to assist where keeping on-site experience have failed. South Africa is facing a major skills shortage, especially within the process engineering environment. Major mining, manufacturing and utility companies that have geographically spread manufacturing sites and plants are struggling to keep their specialist skills, especially in remote and rural locations.

In the past, it was not uncommon for companies to have one or more process specialists on each manufacturing site. These days, big companies are struggling to keep even one specialist for every three manufacturing plants. Where manufacturing facilities are located close together, this is not a major problem, but for companies with geographically spread facilities, it becomes a major headache.

With less specialist process skills on site, it becomes more difficult to identify and resolve process problems on a daily basis, let alone concentrate on optimizing processes. Process engineers and operations personnel just don't have the time to dig through tons of data to diagnose plant problems. Enterprise Manufacturing Intelligence (EMI) solutions have helped some companies identify areas of concern and this has assisted some in deriving benefit at a business level. The issue with the typical EMI solution is that it is normally aimed at the Operations Management level and not at process engineer.

In the last couple of years, major companies have started taking steps to resolve these problems. With the advent of more reliable wide area networks and web-accessible technology, some companies have implemented or are actively pursuing implementation of remote monitoring and diagnostic centres. These centres may use EMI technology, but their focus is totally different.

They are built for process engineers and their focus is on real-time process data.

Companies that have implemented these centres have gathered some of their best and most experienced process engineers in one place. These engineers use their experience and skills to look at process trends with the intent of identifying and diagnosing process problems. They also use their tools to look at ways to increase process efficiencies and optimise plant performance. They do this using simulation and other expert system technology combined with real-time process data, engineering skills and process experience.

In a number of these centres, companies have also started to make use of predictive technology to not only look at process performance, but also at equipment health. This early anomaly detection and failure prediction technology assists them in identifying equipment health issues on major equipment before critical failures or breakdowns occur.

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Different centres make use of different architectural concepts and technologies, but they have a number of things in common:

- All have a suitable network infrastructure that connects the different sites to each other and/or the centre.
- They have implemented a common integration framework and a standardised plant model at a plant control and EMI level. This is needed to ensure that plants are monitored, measured and compared in the same way.
- They use as base a real-time data historian that collects real-time process data from the different sites into a common database. This ensures that critical data is available at the centre for quick retrieval and analysis.
- They use a common tool for data visualisation of the real-time and EMI data. This eliminates the need for centre resources to learn and become familiar with any number of

visualisation tools in order for them to build analysis and diagnostic displays, trends and reports.

- They have implemented one or more relational database to collect event-based or transactional data to be used in combination with real-time data during optimisation initiatives.
- They make use of simulation or expert systems to assist in efficiency improvement and performance enhancement initiatives.
- They assist plants in fault-finding and problem solving when unplanned events occur with the view of implementing procedures or systems preventing the same issues recurring in future.
- They have no ability to control the plant remotely and are only involved in an advisory capacity. In this way, plant control is still the responsibility of the specific site, clearly ring-fencing areas of responsibility.

These centres have a number of advantages over similar on-site engineering offices. They reduce the number of specialised and experienced process engineering skills on site required for research and development. The centre resources do not get bogged down with daily operational issues and can focus on the effective and efficient operation of the plants. They can spend time building process simulation models for efficiency optimization to compare against actual plant performance.

As the engineers in these centres have a view over multiple sites, they also have the benefit of being able to compare real-time process performance between sites. They advise operations managers and plant operators when they notice process deficiencies or poor performance so that the plant can react in a suitable manner. They are also able to advise the plant operators as to the best corrective action to take.

As they have no control or operational responsibility, they can assist with fault-

finding and problem solving activities at the same time that the plant engineers are busy repairing breakdowns and getting the plant up and running. If they find the problem, they can also advise the engineers on site as to the best way to resolve the problem or the fastest way to start up the plant again.

Other companies have developed this concept even further as they combine the monitoring and diagnostic centre with a crisis control centre. At these centres, they not only host the real-time process tools but also the company EMI tools. During crises that require senior management intervention, they congregate at the centre where they have both business related and process related information close at hand. They can make critical decisions based on current plant data and then view in real-time the outcome of their decisions.

In summary there are numerous benefits and positive spin-offs (direct and indirect) to this type of implementation:

- Contains and efficient management of process Intellectual Property (IP) and expertise costs.
- Reduces the randomness of decision making at operational level and enables faster, more intelligent decision making and more mature approach to cost effective operations management and maintenance.
- Makes for synergy of approach, ensuring the enforcement of best practice approach, methodologies and standardisation within operations.
- Quicker and more cost effective start-up of new production lines associated with the centre.
- Encourages spontaneous growth of IP skills from a central nucleus and assists with skills retention.
- Enables management and non technical personnel to view operations from an independently empowered position (you don't rely on somebody else or at a formal meeting to be informed).
- It breaks down islands of knowledge and makes for transparent information sharing.
- Is conducive to internal enthusiasm and interest in the business and has associated and motivational

benefits encouraging buy-in to other programmes within the business

- Creates a centre of excellence and is conducive to energised collateral participation from other areas in the business, especially management
- Has internal and external marketing benefits and is conducive to engaging clients and suppliers on a different level.
- Increases the maturity of the business and alignment of thinking.
- Can better provide for evaluation and proofing of new technology that can assist operations.

This development of remote monitoring and diagnostic centres has proved beneficial for a number of big companies. Other big companies are investigating and motivating similar implementations as they have realised the potential benefits that can be derived from such a centre.

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