

What lies beneath

Jane Lansing, Emerson Process Management, USA, describes the use of an innovative digital technology that can reveal the hidden plant, which in turn can lead to manufacturing gains.

From the 1950s through to the 1990s there was an explosive growth of manufacturing productivity and profitability, fuelled by advances in process instrumentation technology. Pneumatics gave way to electronics. Supervisory computers were added to the mix. DCSs appeared. As a result, control rooms and panels shrunk, wiring became tidier, and process control improved. Updating new instrumentation every 10 - 15 years resulted in more efficient operations and greater process reliability.

Today, manufacturers are looking to procure even more gains from existing facilities and equipment: to reveal hidden plant capacity. Advanced process and asset performance information is the gateway to further improvements. The advanced knowledge of the performance of instrumentation, equipment and machinery, as well as the process, moves plants and businesses from reactive and preventive operating modes to predictive operating modes. The consequent improved return on manufacturing assets (ROA) drives new waves of manufacturing productivity and profitability. The advancements are taking place in the current digital plant era of process automation. New information is adding clarity, revealing the hidden plant.

Predictive asset management

Even with the instrumentation advances of the past, much of the process remained hidden from view. Data for good asset management was not being acquired, and prediction of performance was not possible. Based on a total asset management view, Emerson began pioneering in the early 1990s to develop a pervasive digital architecture to probe and measure every aspect of the process and plant floor. The enabling enterprise management information resided there.

Innovative digital technology applied from the ground up can reveal the hidden plant. The development and introduction of the company's PlantWeb® digital plant architecture is an example. Powered by digital field devices, networked with a digital automation system using digital Foundation™ fieldbus technology and other standard protocols, the architecture touches all plant and process equipment, opening access to the far reaches of the plant.

The PlantWeb® digital plant architecture is set apart from traditional distributed systems in part because the digital technology enables the initial release of diagnostics for predictive asset performance. Intelligent field devices acquire data and perform diagnostics that continuously report device health - such as valve travel and cycle info, plus signature change, transmitter and flowmeter electronics and sensor status, and pH meter electrode status. Literally dozens of new data and diagnostic parameters were presented from what had been single parameter devices. AMS predictive maintenance software provides state-of-the-art HMI for using the information.

This digital plant architecture reveals the process information that drives manufacturing gains now, and continuous gains in the future. PlantWeb users report greater than 30% capital

and engineering savings; 2% gains in operations efficiencies, including improved product quality, greater plant throughput, increased plant availability (achieved both by reducing unplanned shutdowns and reducing the frequency and duration of planned outages); all while enhancing safety and environmental compliance and delivering a 40% improvement in maintenance efficiencies.

Process industry leaders have responded in ever increasing numbers, recognising today's and future advantage of the digital plant architecture. More than 1700 customer plant and plant upgrades and projects around the world utilise PlantWeb digital plant architecture with Foundation™ fieldbus technology, examples of which include:

Shell Philippines Exploration B.V.

Emerson was a key player in the Malampaya project. The open standards incorporated into the PlantWeb architecture and its DeltaV digital automation system allowed the high performance levels set for this project to be reached, and enabled the safe, efficient and reliable operation of both offshore and onshore facilities.

Calcasieu Refining Company

This refinery retrofit was accomplished more quickly, smoothly and economically than conventional DCS or PLC could have achieved. The customer estimates 75% timesavings, and costs for operation and maintenance are substantially lower, while operating capacity has increased. Expected annual return is on

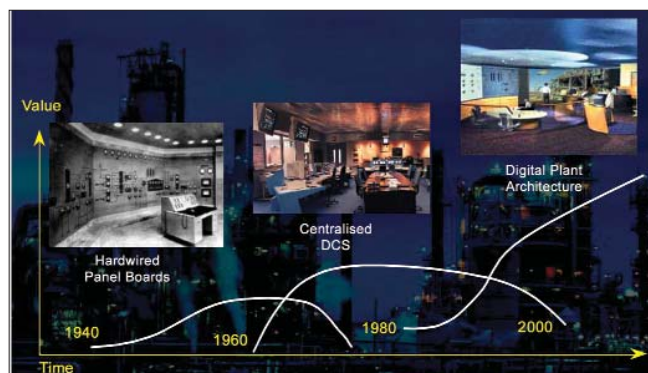


Figure 1. The digital plant era is driving new waves of productivity.

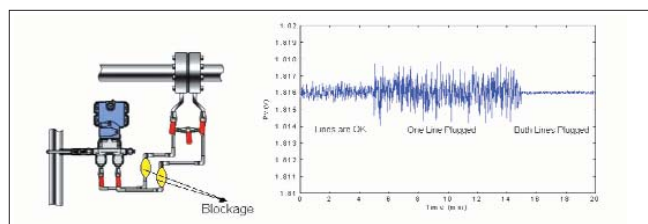


Figure 2. Field device diagnostics report device and process health.

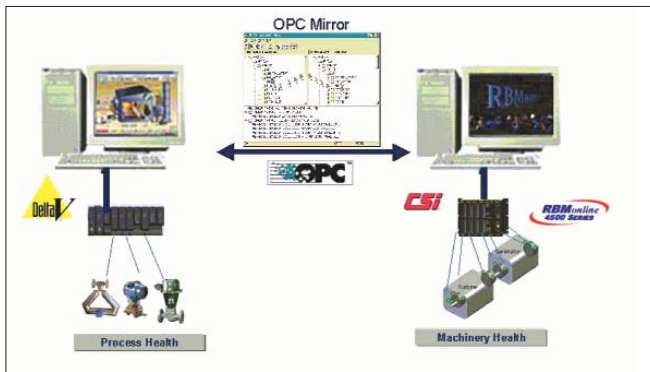


Figure 3. PlantWeb digital plant architecture integrates predictive asset intelligence to improve plant availability.

the order of 80% for the one million dollar automation investment.

British Petroleum

Emerson's *e-fficiency*[®] equipment performance monitoring solution at various BP facilities is producing these predictive results:

- Pinpointing poor equipment performance resulting in corrective maintenance activity that increased production by over US\$ 3 million/yr.
- Optimisation of maintenance activities leading to fewer equipment downtimes and accelerated production of more than US\$ 1.5 million/yr.

Predictive asset management expands

With the PlantWeb[®] digital plant architecture fully launched and widely used, continuous developments are ongoing toward enabling users and their businesses to 'see' more of the process. Today, advanced diagnostic applications are being introduced to further predict device health and process status. Expansion efforts are broadening the available range of Foundation[™] Fieldbus and HART[®] devices. Industry leaders are riding the crest of growing industry standards acceptance by interfacing and capturing health data from the field devices of a majority of the world's leading automation suppliers.

This digital architecture is also increasing its value by revealing the performance status of plant equipment. Condition monitoring of plant assets includes rotating machinery and static equipment. Reliability based maintenance software supports equipment monitoring, data management, data analysis and effective reporting of results for predictive maintenance programs supported by CMMS packages. Plant operations receives this machinery health information integrated with the process health information, providing a comprehensive predictive maintenance and asset optimisation view (Figure 3).

Additionally, a proven Internet-based service is currently available that delivers information about performance of plant equipment. Customers send equipment and process data from their plants via the Internet to performance monitoring software and services, where rigorous model based technology generates comparison of current performance versus the as-purchased signature of performance. The Internet provides easy and secure access to this new, previously 'hidden' data. Process manufacturing customers or supplier service experts use the information to predict best maintenance timing and thus maximise asset utilisation.

Delivery of predictive asset information from the process

has expanded as the condition and performance monitoring complement the intelligent instrument capabilities to answer questions such as:

- Is the plant equipment in good working order?
- What is the nature of any developing faults?
- How quickly is the machine condition deteriorating?
- Can I make it to the next scheduled outage?

The use of digital, predictive technology keeps widening. The number of new manufacturing projects and upgrades committed to the technology grew dramatically in 2002, despite a generally negative business climate: evidence of the faith that the process control industry is placing in this technology as a source of increasing the efficiency of existing plants. Recent new projects awarded to the PlantWeb architecture include Shell committing US\$ 32 million for major automation projects to be used in critical applications at its Deer Park Refinery; Shanghai SECCO Petrochemicals awarding a US\$ 30 million project to automate its 10 plant petrochemical facility; and the European chemicals manufacturer, Brunner Mond (UK), choosing the PlantWeb architecture as a future standard for DCS replacement.

Increased efficiency

Once a hidden plant is discovered, the new and more revealing process information ignites the imaginations of industry managers. They foresee the integration of such information with higher level management systems as providing the knowledge to maximise asset performance and enable the enterprise to compete more vigorously in the worldwide marketplace.

The vision of leaders is that new waves of plant improvement are available by evolving streamlined applications of information, and ubiquitous delivery anywhere and everywhere. Leaders are moving forward on this course. Emerson has introduced PlantWeb Alerts, and has provided browser, PDA and business systems access to critical process information.

PlantWeb Alerts is an information based software application that prioritises measurement or final control deterioration or fault conditions and selectively warns maintenance personnel and operators, plus provides remedial guidance. Maintenance receives information to correctly identify and fix current or predicted problems, while operations personnel receive the information only if it could affect plant operation.

Secure Internet browser access is provided for access and interaction with the process control and asset management functions of the company's digital plant architecture. The delivery of predictive, maintenance and failure alerts enables operations and maintenance personnel and suppliers to collaborate on and plan the most effective, timely actions.

Unique information delivery applications are being developed that move process data into SAP and other plant management applications. The initial suite of these applications focuses on moving alerts, alarms and events to the business systems. The overall scope of developments will integrate the process/plant floor (increasingly exposed by digital plant architecture) with corporate level maintenance, materials and production management.

Conclusion

Process information 'hidden' in plants is the key to manufacturing improvements. PlantWeb exposes and accesses the valuable data and uses it to deliver significant capital, engineering, operations and maintenance efficiencies. It uses the data and diagnostics to support predictive asset optimisation, and to provide a foundation for continuous future manufacturing improvements.