

IBM Burlington

Using data to adapt to changing markets



IBM's semiconductor manufacturing plant in Burlington, Vermont, began production of wire relays in 1957. Communication technology has rapidly and continuously evolved since those early days. The always-on nature of our modern lives is enabled, in no small part, by this innovation which brings smaller, faster and cheaper chips to market each year. Today, IBM Burlington produces millions of chips for use in wireless communication devices. Over 50 years since it first opened, the IBM Burlington facility is still there, still producing semiconductors and still evolving.

"I don't care how long you have been running your system. If you look hard enough there's opportunities there — it never goes away."

– Jeff Chapman, Senior Engineer, IBM Burlington

Situation

IBM Burlington's history of transformation and evolution relies on a culture of continuous improvement and employee engagement. In the 1990s, it began using the PI System™ to improve organizational communication. The PI System supported collaboration across the enterprise. Real-time data collection across operations helped IBM Burlington identify early warning signs and quickly react when automated processes throughout their facility began drifting out of tune.

The PI System helped IBM Burlington to achieve high levels of precision and efficiency in its site operations. The PI System provides a historical archive to bring to-

gether operational data from all site support operations; power, water, heating, cooling, air handling, materials handling, chemical, etc. Combining data from these varied systems allowed IBM's engineers to more deeply understand the inter dependencies to insure quality and manage costs. While other companies control costs by using low-cost labor abroad, IBM Burlington relies on innovation. To do so, it needed to arm its employees with the information and tools so they can lead the way.

Solution

For a semiconductor plant, one of the biggest expenses to tackle is water. Semiconductor manufacturing depends on having access to ultrapure deionized (DI) water—and lots of it. In 2010, IBM Burlington was using 3.2 million gallons of water per day. This water use carries with it significant energy, chemical, maintenance and labor costs. Chip manufacturing can't happen without ultrapure water and an outage of the DI plant is very expensive. With ever-present downward pressure of global prices for silicon-based chips, IBM had a strong incentive to improve this costly piece of its operations but the company needed to move cautiously.

Beginning in 2005, IBM Burlington expanded its use of the PI System to focus on all the systems in its facilities that touch water use. Water from the local utility, is treated in the onsite deionization plant and used for semiconductor processing and manufacturing. Then, wastewater is treated and discharged to the local watershed. The PI System collects data from all stages of these processes and reports it in real-time for IBM's operators and engineers, providing a complete picture of how water is used at the plant. Next, IBM used the PI System to analyze and visualize the data so the entire team could understand where and how water was used in the pro-

cess. This also helped them see relationships to other processes such as chemical treatment, energy use, manufacturing efficiency, heating and cooling.

Benefits

The PI System provides the comprehensive data IBM needs to continuously evaluate and evolve their processes while the Burlington culture of relentless improvement and information sharing has ensured that employees are trained on the data and informed. The combination has resulted in far reaching benefits. “You really need to pull all of your data together in order to see the big benefits and progress,” says Senior Engineer Jeff Chapman.

The PI System has helped IBM Burlington validate new processes before trying them out in the real world, where failures could have devastating financial results. Using insights provided by PI System data, IBM Burlington has reduced water usage by 27% while simultaneously increasing manufacturing capability by more than 30%. In addition to direct savings, IBM avoided significant investment in additional water-related infrastructure that, without the efficiency improvements, would have been needed to support the company’s growth.

The PI System has also helped operators identify critical linkages between systems across the enterprise. For example, PI System data helped plant operators discov-

er that they were spending money on heating for water while venting waste heat from manufacturing. The plant was able to eliminate millions per year in natural gas purchases by using that wasted energy from manufacturing to heat water. “Not a week goes by that we don’t dive into PI Trends as we look for more opportunities to save energy and make our water systems more efficient,” Chapman says.

IBM Burlington also uses the PI System to collect local weather data which is combined predictions about dew point and temperature. This predictive data is then analyzed alongside the plant’s historical data models and real-time energy/water usage data. Combining predictive, real-time and historical data has improved energy and water use predictions.

Since the 1990s, the monetary savings have been huge. The company estimates that water and energy reduction efforts have cut \$10 million from yearly expenses. The PI System has also supported the IBM Burlington culture of information sharing and continuous improvement and helped the company thrive in a rapidly changing industry. “When you go after something hard, all these other benefits fall out that weren’t really predicted,” Chapman says.

Business Challenge

- Increased overseas competition required IBM to identify creative cost-saving innovations.
- Expensive water resources are mission-critical for operations.



Solution

- The PI System was expanded to integrated additional internal and external data sources.
- Water use data was linked to manufacturing data sets.



Customer Results

- Water usage reduced by 27%.
- Manufacturing capability increased by 30%.
- \$10 million in direct and indirect annual savings.