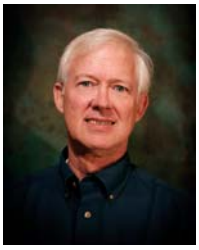
OSIsoft, Inc.
PI System Case Study

Arkema Chemicals achieves significant ROI with OSIsoft's PI System; cost savings in the first six years add up to more than $2.4 million at one plant



"I don't know of any other software that can positively impact every important business driver — environmental, safety, quality and ROI."

Dwight Stoffel, Arkema

The phase separator at the Arkema Chemicals plant in Calvert City, Kentucky did not appear to be properly forming a separation layer during the production process, and it looked like the quarter-million-dollar unit would have to be replaced. Elsewhere in the plant, a production unit was chewing through pumps at an alarming rate, generating a half-milliondollar bill for repair parts every year. Employees at the plant knew that the key to solving these problems could be found in the data locked away in their process control systems, and that a system to manage operations in real time was a necessity. For this, the company implemented OSIsoft's PI System, and the results have exceeded expectations by a wide margin. Within the first six years, Arkema's Calvert City plant alone realized more than $1.8 million in onetime savings and recurring annual savings of $590,000. And, what started as a plant-level project quickly turned into an enterprise-wide solution. Also instrumental to the enterprise-wide standardization of the PI System was the success of the many PI implementations in European plants, concentrated primarily in France.

The PI System helps Arkema increase revenues, reduce costs, avoid large expenditures, and redirect resources into more lucrative projects. Safety, environmental responsibility, customer satisfaction and many intangible benefits provide significant return. Arkema's experience demonstrates how PI can quickly pay for itself many times over and become an indispensable tool for increased profits and increased performance.

Overview

Country or Region: Philadelphia, PA

Industry: Chemicals

Business Situation

Arkema wanted to optimize operations, increase revenues, reduce repair costs and large expenditures, and direct resources into the most lucrative projects. To do this, they needed an integrated, enterprise-wide infrastructure with tools to help employees access, visualize, and share data and applications.

Solution

The PI System offered the most in data connectivity and reach; the development environment for applications put the power into peoples' hands to locate and solve problems every day; the fact that the Platform is built on standard Microsoft technology ensured ease of use, streamlined collaboration, and a long-term, cutting-edge migration path.

Benefits

- Global, collaborative PI System infrastructure
- $2.4 million cost savings in just one plant
- Reduced travel, maintenance, personnel hours/costs
- Avoided capital expenditures ($1.8mm)
- Automated data entry/reporting ($250,000/yr)
- Improved product yield, quality
- Higher customer satisfaction
- New safety/health standards
- More efficient compliance and permit processes

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Arkema

Arkema is a diversified chemicals manufacturer headquartered in Paris, France. The creation of Arkema reorganizes the chemical businesses of its former parent company, Total, within a more flexible and reactive operating structure, allowing the new company to respond more effectively and efficiently to market expectations. Arkema consolidates vinyl products, industrial chemicals and performance products.

From the global perspective, in 2003 Arkema had 61,000 employees with sales of €17.2 billion. Arkema Chemicals, Inc., the North American subsidiary, in 2003 had 2,600 employees at 17 manufacturing facilities with sales of $1.5 billion. Arkema's Calvert City plant produces Forane® refrigerants that are used in car air conditioning units and blended to make other refrigerants, as well as Kynar® polymers.

PI System becomes the global standard

Dwight Stoffel, principal plant electrical instrumentation engineer at Arkema's Calvert City, Kentucky plant, knew that he needed to capture and analyze real-time process data in order to optimize operations. Several data extraction projects had proven that this data was not only instrumental in troubleshooting problems with equipment, but would also allow the plant to lower costs by improving processes. Unfortunately, the required data was locked in the plant's distributed control systems, which only store about a week's worth of data, so there was no way to easily access or view it long term. There was no way to share the data with others throughout the company or to combine it with data from other systems for analysis. With so many different systems and no way to harvest the valuable data inside, Stoffel knew his plant — and even the entire company — needed a standard that would let people have quick, easy access to the data and approach operations management from the same perspective.

Stoffel looked at OSIsoft's PI System data archiving engine, among other solutions, and quickly decided that OSIsoft® best met the Calvert City plant's needs. He was impressed that the Platform integrated easily with all of the global systems in the company. Added benefits were that the PI System is built with standard Microsoft technologies, has user-friendly client packages, and uses a compression method that retains the fidelity of archived data and allows for years of online data storage.

Since the early 1990s, Arkema facilities in Europe had been using the PI System for real-time performance management with growing success, especially in the area of batch process optimization. While Stoffel was first discovering the many benefits of using the PI infrastructure, Arkema's France-based plants were installing more and more PI Systems in advanced control groups to solve specific problems with specific PI applications, and to help users troubleshoot and manage processes. In Europe, the Platform was only being used for basic process control. Back in the US, it took Stoffel a very short period of time to realize that the PI System is an infrastructure — not just a package — for much more than basic process control. The Platform can be used to optimize areas of environmental, safety, quality, and ROI across the board. It was not only an infrastructure to build PI applications to solve problems, but a platform that provided a basis for decision-making and enterprise-wide collaboration of best practices.

Once the necessary infrastructure was in place, it took a mere three days to get the PI software installed and running at the Calvert City plant. Now, the PI System provides a common point of view with the necessary decision points and easy access to disparate sources of information. When all decision points are brought into one view, important information from individual systems such as LIMS, DCS, and other applications are easier to access. The Platform provides a unified infrastructure that is easy to learn and use. According to Stoffel, "It's a complex system, but when it comes down to actually using it and maintaining it, it's not difficult at all."

People in virtually every department use several of the PI System client tools, including ProcessBook™ (for graphical visualization, trending, and analysis), and DataLink™ (for Excel-based reporting). "Personnel in maintenance, logistics, engineering, the laboratory, accounting, process technology and operations all have access to PI information, and they all use it in one way or another to do their jobs better and optimize processes," says Stoffel.

PI System applications are shared worldwide

With the anticipated spread of PI throughout Arkema, and the ease of using OSIsoft's client tools to write custom applications using Visual Basic for Applications, it was inevitable that more and more plants and departments would develop their own applications. To leverage the PI System infrastructure and the many in-house applications that were being developed, Arkema formed the PI Global Support Team, led by Michelle Barlow, to provide the company with IT services and support for the Pi System, and to distribute PI applications throughout the enterprise.

This Global Support Team is a group within the global IT organization comprised of highly trained and specialized experts, not only in PI, but also in specific domains, to foster the implementation of PI in sites around the world. This "virtual team" spends most of their time on managing the PI infrastructure, topics and support and in doing so, enables specialists across the company to spend more time working in their area of expertise and less time on IT and application building. Clearly, the PI System is key in managing and improving processes. The PI infrastructure permeates the work and culture of the entire Arkema Calvert City facility.

The PI System is for everyone

PI is used pervasively within the company to continuously improve processes. The ability to get the necessary data to every desktop for better analysis and decision making allows everyone to save time and leverage information. At Calvert City, all departments use the PI System in some way, including:

Logistics: monitor product transfers, loading and inventory; view boiler operation remotely

Lab: cross check between lab analysis and online analyzers; provide easy multi-component reports for Operations

Maintenance: troubleshoot equipment (refrigeration, pumps, compressors, instrumentation, control, electrical)

Management: monitor plant-wide operations from the desktop in real time; devote more time to management and problem solving

Process Technology: analyze data for improvements, de-bottlenecking and new processes

Accounting: troubleshoot physical inventory issues; compare SAP inventory to PI inventory

Purchasing: monitor raw material inventory and usage to reduce costs; improved raw material purchase scheduling

Health, Environment, Safety: incident investigation; permit renewal; reduce hazardous substance handling; monitor/document regulation compliance; interface to real-time release modeling software; interface to environmental management system software

Engineering: use PI data to design projects and support other departments

Operations: process troubleshooting; automate real-time production, batch and asset utilization reports

While it's clear that the PI System helps Arkema realize ROI in virtually every area of operation, over the years the company has realized that the benefits fall into five primary categories: increased revenue, reduced costs, avoided costs, redirected costs, and intangible benefits.

Increasing revenues

Optimized production can drive increased revenues. At the King of Prussia R&D center in Pennsylvania, an engineer has developed an integrated application using ProcessBook and DataLink that advises operators to set correct feed rates. An online material balance is used to predict compositions and guide the operator on how to keep things on the optimal track. This keeps the process in balance, reduces upsets, and thereby increases the amount of product produced. Also at the King of Prussia R&D center, Research and Development personnel are using PI data to study ways to extend catalyst life and other improvements. Data-hungry applications are being used to study process optimization.

Higher quality can also improve product revenues. At the Calvert City plant, the high-purity specification requires tight control of a distillation column. If specifications are not met, the product can't be shipped and yield goes down, resulting in a decrease of revenue. At one point, problems with the column were threatening on-time shipments of product. It was first thought that the problem was with the packing, but later determined that the control valve was malfunctioning. Plans were made to replace the valve the next regular maintenance interval but results from PI showed that the valve needed to be replaced immediately. Without this data and analysis, the failure of a valve could have resulted in an emergency shut-down, which means missed shipments, higher costs and unhappy customers.

During this episode, PI Profile, a PI System client package that monitors sheet products or columns and displays surface data, was used to determine that even after the valve was replaced, the temperature control point should be relocated lower in the column. Now that the control point is properly positioned, high purity product is more consistently produced. Without PI, finding the proper control point would have been, at best, a time-consuming trial and error procedure. Because the problem was solved quickly, shipment dates were met.

The PI System reduces costs at Calvert City by more than $500,000 annually

There are many ways to reduce costs: cut down on travel and maintenance costs, improve yields, or ensure that there are appropriate raw materials for the process. Arkema cut costs in multiple ways, resulting in savings of over $500,000 each year at the Calvert City plant.

Reduced travel costs: PI lets consultants, engineers, remotely located subject matter experts and managers get the data they need without having to drive or fly to the site. For example, a newly "PI trained" project engineer began work on a spray dryer upgrade project. The engineer quickly realized that the consultant hired for the design work on the project did not need to come onsite to get the data — it could all be supplied directly from the PI System. Situations similar to this occur frequently at Arkema, resulting in a significant savings in travel.

Assure product specifications: In the past slurry delivered to the Calvert City plant via pipeline had fluctuating concentrations of solids, but there were few incentives for the vendor to supply the specified product. The result was that excess product went to waste or a more expensive substitute was sometimes required. A process engineer used ProcessBook trends in meetings with the supplier to show that the product was inconsistent. The supplier has now invested in improved process equipment and a renegotiation of the contract has resulted in a one-time $50,000 adjustment in Arkema's favor. After just two months, usage of the material was reduced, resulting in annual savings of $100,000.

Equipment maintenance: The largest cost reductions at Calvert City are the result of a pump maintenance program. Annual pump maintenance costs were huge — $500,000 a year in repairing and replacing pumps, many of which were requiring premature replacement or a major rebuild. To determine why these pumps were failing, an engineer developed an application using ProcessBook and DataLink that monitors at least 117 pump motor currents and detects "nervous"currents. When a problem is detected, plant operators are paged with a code that specifies the pump that needs attention. Links are provided to a troubleshooting sheet that displays graphical trends relevant to the pump's performance. Clogged suction strainers, low tank levels and other problems can now be remedied before the pump is severely damaged.

According to Stoffel, the key is getting timely alarms to the dedicated engineer 24x7, whether at work or at home. Documented annual pump repair savings in 2001 exceeded $350,000 for the parts alone, not including labor. Additionally, some of the pumps' original piping and associated equipment design features were found to be sub-optimal and have been redesigned for better performance. This fixed root causes and has eliminated many of the recurring issues.

The PI System helps Arkema avoid spending millions in capital outlays

When capital decisions are based on facts, avoided costs can add up to millions of dollars saved. Arkema can easily point to more than $1.4 million saved by making informed decisions based on PI.

In the first week after the PI System was implemented, the plant's staff believed a new phase separator equipped with a device, which provided a density profile of the vessel's contents, was not operating correctly because the expected degree of separation was not indicated by the instrument. However, PI's measurement caught periods of acceptable separation, which convinced people that the instrument did work. The next theory was that the separator was undersized so plans were progressing toward replacing the "undersized" unit, with a conservative cost estimate of $250,000. Once again, the team looked to PI to validate their assumption that the separator was undersized and with minimal analysis, determined that sizing was not the problem and that other, much less expensive, modifications would solve the problem. Stoffel feels that this incident alone was well worth the investment in the PI System.

The PI System helped Calvert City reduce estimated project cost when it was determined that a proposed increase in production capacity would exceed a refrigeration unit's nominal capacity. Since a larger unit would require a $1.2 million investment, engineers looked to historical PI data, which showed that the current machine could handle the increased production. PI is now used to monitor loads and unit performance on the existing unit.

Redirecting costs to more valuable projects

Management is not bashful about using the old cliché "You've just got to work smarter, not harder." the PI System lets Arkema redirect fixed costs into areas where more value is generated for the company. For example, the automation of reports that once required manual input of data allows employees to devote more time to management, engineering and other key responsibilities that generate higher value for the company.

Another case of "working smarter, not harder" is when Arkema Calvert City was trying to obtain a permit renewal and modification for a hazardous waste incinerator. This process requires a human health risk assessment by the Environmental Protection Agency (EPA). Part of this assessment involves determining the percentage of time Arkema's incinerator is in upset condition in comparison to EPA's default of 20 percent. The incinerator is tightly interlocked with automatic shutdowns when permit conditions are exceeded, which Arkema believed to be much less than 20 percent of the time.

To document and analyze the cause for each trip, an application was developed in the DataLink client that showed the upset time was much less than 1 percent, which had a very positive impact on the permit process. However, EPA wanted Arkema to provide evidence of this claim. With such tight interlocking, more than 100 trips occur each month. Without the PI System, manually analyzing these trips would have been far too time consuming, and Arkema would have been required to accept EPA's default percentage.

Benefits beyond measure

Intangible returns often result in huge benefits that can be hard to quantify as a number, but are vital to the operation, reputation, well-being and future of the company. What is customer satisfaction worth by not missing a shipment? What is improved plant safety worth? What is the faster approval of an environmental permit worth?

The availability of operational information on the business desktop leads to many unheralded savings. Regular use of the PI System in troubleshooting and investigating process improvements becomes so natural that successes are not documented. PI has become a valuable tool in incident investigation since incidents are historically traced using accurate information. Root causes become evident when data shows abnormal operation. Facts lead to solutions that help avoid future problems.

For example, the logistics department is not only responsible for unloading raw materials and loading finished product, but also for boiler operations and tank performance plant wide. The Calvert City site is large and logistics personnel have duties from one end of the site to the other. With PI, there is now secure access to all necessary information, which has improved the ability to manage responsibilities from the desktop.

Of course, beyond the hard savings that the Calvert City plant achieves using OSIsoft's PI System, there is one added benefit that for Stoffel, at least, may be priceless. "This is one piece of software," the veteran engineer says, "that I've heard no complaints about!"