

**RtPM APPLICATIONS
DISCUSSED HERE**

Automated Report Generation
Baseline "Best Practices"
Cost Tracking
Data Historian
Manufacturing Intelligence Data
Material Balance Tracking
Operating Documentation
Operating Efficiencies
Plant Performance Overviews
Process Monitoring/Optimization
Production Monitoring/Analysis
Production Plan/Actual Data
Quality Monitoring/Analysis
Remote Condition Monitoring
Root Cause Analysis



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Dennis Lawless
CITGO CCR's Information Analyst
and PI Administrator

**Real-time information drives
productivity higher at CITGO'S
Corpus Christi Refinery**

Storyline by Dennis Lawless

The Corpus Christi Refinery (CCR) of the CITGO enterprise was dealing with all too common issues — an out-of-date historian that was substandard for collecting vital process and operations data, and an inevitable upgrade if operations were to be optimized. Although the current system helped the company view, measure and report production levels, it was difficult to ensure efficient operation and utilization. Reconfiguring the old system would be ineffective and prohibitively expensive. It was estimated that it would take seven to ten employees and a half-a-million dollars to replace the database's functionality.

In early 1997, CITGO CCR accepted the initiative to acquire a Y2K-compliant infrastructure that delivered not only the real-time data needed to monitor and analyze conditions more efficiently, but one that provided rich desktop tools to continuously improve processes and establish best practices. For this, the company turned to OSIsoft's Real-time Performance Management (RtPM) Platform. The Microsoft-based platform was easy to implement and use, speeding information to every person for better analysis and decision making.

Today, RtPM has enabled the company to achieve higher productivity, increased efficiency and cost savings. With all departments now converted from paper to electronic reporting, data is easily acquired and shared for better decision-making. Complete and unified information, including reliable calculations, is stored in one location, giving everyone in the company access to a "single page" view of the business. It's the one version of the real-time and historical performance the company counts on to run profitable operations.

The CITGO Petroleum Corporation

manufactures a variety of grades of gasoline and high-quality lubricants. In addition, the company sells bulk petrochemicals and solvents to other U.S. manufacturers for the production of finished goods and is the largest asphalt refiner on the East Coast.



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The Corpus Christi refinery is one of two base refineries that primarily process Venezuelan crude oil. A sister plant in Lake Charles, La., refines similar blends of heavy crude oils.

In addition to Venezuelan crude, CITGO purchases crude from the spot market and processes it to make gasoline products and heavy-end products such as asphalt. Lighter products transfer into the gasoline blending or petrochemical units, in which CITGO produces Benzene, Xylene, Cumene and similar products. For CITGO and any other refinery, the market for these products generally moves in lock-step with the price of crude.

Replacing CITGO’s UNIX historian

As with many refiners, CITGO’s production levels were often known, measured and reported, but the refinery found it difficult to reach maximum potential. Prior to 1997, product losses were measured through the use of an outdated historian, and spreadsheets and weekly/monthly reports were generated by a proprietary database. All too often, opportunities to correct losses were not realized soon enough. Management resolved to reduce these losses wherever possible and use more strategic tools and methods to optimize refinery operations.

In early 1997, CITGO realized that an upgrade to its system was inevitable for several reasons. First, the existing database was not Y2K compliant; therefore no data would be collected after 1999. Second, to compensate for this loss of information, the company would need to hire an additional seven to ten employees. These employees would be responsible for the yield system, operations information, neural networks and expert systems, environmental information, and calculations that the older system had handled each day. In pre-1999 valuation, this would cost nearly half-a-million dollars. Finally, the company needed a system that would allow for the quick and easy storage, access, and analysis of process data for improved decision making and increased productivity.

The largest concerns surrounding the upgrade were the replacement of the historian with a Y2K compliant system, the cost of the total project, platform compatibility, and system-wide data delivery. Together, these factors led CITGO to choose OSIsoft for its long-term technology partner and to implement the Real-time Performance Management (RtPM) Platform.

The reasons were many for standardizing on the RtPM Platform. The platform is an open, integrated infrastructure. It collects and delivers the data that people need to more fully understand and analyze processes. Information can be easily shared across all departments and people use the dynamic, interactive environment to continuously improve processes and establish best practices. Most importantly, with the RtPM Platform, people in every job can manage performance proactively and in real time.

Production improvements mean real dollars saved

Although the CITGO Corpus Christi refinery was a profitable operation before the implementation of RtPM, it became clear to management that there was still ample room for improvement.

Operators, console leads and engineers use this Xylene Recovery display in ProcessBook. It tells the user what needs be adjusted to improve the process and the dollars associated (KPIs), and gives the current percent of recovery, current production and loss values per stream, including totals. Decision makers get the real numbers that can't be ignored for managing percent recovery and dollars/year.





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There were gaps in the process through which high-value product slipped into other areas and was blended off as a lower-value product. Cutting these incremental losses, even by fractional amounts, could mean real dollars saved at the end of the day. Since the RtPM implementation, CITGO CCR has changed the emphasis of reporting plant information to one of relating production numbers into dollars-per-day values. This gives the entire company a benchmark to work from, and a way to continue improving and honing processes to increase savings.

“Workers know exactly what’s happening in a process and realize the value they can add by doing their part to improve higher value yields,” says Dennis Lawless, CITGO CCR’s Information Analyst and PI Administrator. “It is now possible for them to determine the amount they must produce until closure. If we’re losing a certain number of barrels or a percentage of the product, we can make a change in the process, and watch benefits accrue in real-time and real dollars. To date, we have seen a marked improvement in our closure efforts. We probably save greater than \$1,000 dollars per day in higher value yields.”

The CITGO refinery never stops operating. The RtPM Platform gives all personnel visibility into operations to better manage operations, day and night. It’s all about meeting the needs of the end user, who might be a plant manager who moves all over the refinery, an offsite worker who demands instant information at 3:00 a.m. to fix a problem, or various groups within the company that are seeking quality data. With RtPM data on every desktop, and even available remotely, the information is there whenever it’s needed.





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“There’s not a part of the Corpus Christi operation that’s not connected to, or touched by, the RtPM Platform” says Lawless. “Having all of the data at our fingertips, plus the RtPM desktop tools, has enabled the distribution of information into more business units. We’re able to do more and make better decisions based on more available information. We get the same or higher productivity using fewer people and less overhead.”

The right information to the right person at the right time

Making real-time and historical data available to users has proven invaluable to the Corpus Christi refinery. In order to increase productivity, the company focuses its efforts on getting data to the people who need it, in time for them to make a positive impact.

According to Lawless, “It’s all about meeting the needs of the end user. That end user might be a plant manager who moves all over the refinery, an off-site worker who demands instant information at 3:00 a.m. to fix a problem, or various groups within the company that are seeking quality data. All of these people need real-time data to effectively do their jobs. With RtPM data on every desktop, and even available remotely, the information is there whenever it’s needed, which is really all the time. Additionally, we continue to identify areas where we can convert to electronic data and put that into the RtPM Platform.”

To CITGO CCR, history is invaluable. A key factor in helping the Corpus Christi refinery run its business objectively is knowing that historical data is accessible and consistent.

“Placing all of our calculations in the RtPM Platform has helped us achieve one universal set of numbers for each event we analyze. Now, if we want to run an analysis, we just open up a PI spreadsheet or trend and populate the data in a fraction of the time it used to take, even if we’re looking back over many years,” says Lawless. “Management gets one number that is consistent, and like the ERP system, the RtPM Platform keeps this set of numbers in front of everybody.”



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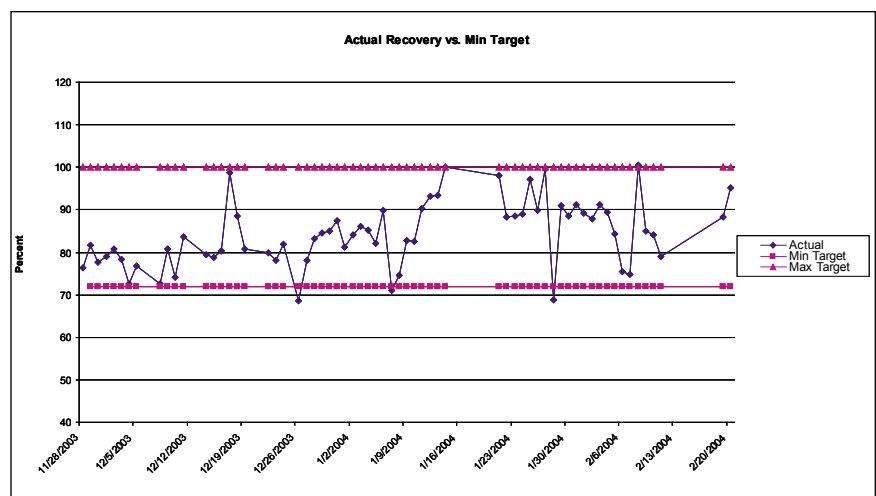
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Seamless integration gives everyone a complete view

Another early benefit CITGO realized from the early RtPM implementations was the ability to integrate operations information with data from systems in other departments. The company expanded the original PI System from being a plant historian to encompassing additional databases operating throughout the company, such as those in accounting, engineering, maintenance, lab, tank gauging, environmental, and safety, as well as information from our third-party cogeneration unit. The RtPM Platform is integrated and well-connected with other systems in the CITGO network, allowing managers and other staff members at the Tulsa, Okla. corporate headquarters to view performance metrics in Corpus Christi.

“Now, every effort is made at CCR to ensure that new systems interface with the RtPM Platform,” says Lawless. “Both information availability and the amount of data that can be stored and retrieved efficiently is dramatically higher since implementing RtPM. The staff is able to analyze problems more quickly and stay on top of issues.”

This Excel-based chart shows the ROI indication of Xylene Recovery in percent over time, which is the key figure in determining how well this portion of the refinery is performing. The data is tied to the margin pricing which helps in figuring the total dollars of benefit.





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The RtPM Platform is the standard of choice

“Microsoft, with its Office Suite and .NET environment, has opened the door for collaboration at levels unseen before now,” says Lawless. “The fact that the RtPM Platform is based on Microsoft technology makes both a solid, long-term choice.”

“The RtPM Platform gives us visibility into operations and helps us manage processes. The PI System engine has proved to be extremely fast and reliable. People really like to build their own performance management displays and work with multi-layered applications using ProcessBook and the DataLink Excel add-in.”

“The RtPM Platform has far exceeded any goals that were set,” states Lawless. “Once we migrated over to the Windows 2000 server and ran PI3.3, the integration between different systems and various types of data was even more seamless. We’ve always subscribed to OSIsoft’s Software Reliance Program and have benefited with consistent upgrades and new releases. Obviously, OSIsoft doesn’t provide all of the software we need for our entire business, so of course we buy from other vendors. But when we do, those vendors must be compliant with the RtPM Platform. It’s a long-term deal with OSIsoft.”

CITGO realizes many benefits with the RtPM Platform, including:

- Speed of information to every person
- Smooth, simple integration
- Ease of use
- Standard, Microsoft-based platform
- Immediate return in increased efficiency and cost savings



“There are three basic criteria for running a refinery — safety, operational effectiveness (efficiency), and regulatory compliance. Our job is to make sure the refinery observes the highest safety standards, operates efficiently to achieve maximum return on investment, and complies with all federal, state and local regulations and guidelines to protect our neighbors and the environment. The RtPM Platform helps the CITGO Corpus Christi Refinery in reaching this level of operational excellence.”

Robert Kent
General Manager of Technical Services
CITGO Corpus Christi Refinery

Real-world, real-time success

The RtPM benefits and savings presented here, as well as the superiority of OSIsoft products, are actual matters of record at the CITGO Corpus Christi Refinery. To find out how your own company could become a real-world success story like this one, email casestudy@osisoft.com. Explore the power of RtPM at www.osisoft.com/rtpm.



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