

# A “Real-Time” Operations Intelligence Solution Dramatically Contributes to the Bottom-Line at ChevronTexaco’s El Segundo Refinery



## manufacturing EXECUTION SYSTEMS

To support this vision, refinery personnel are empowered with the most current operational information — when they need it, where they need it, and in the form most useful to them.

### A New Vision

In their quest to become a world-class refinery, the leadership team at ChevronTexaco’s El Segundo (California.) refinery initiated a new strategy in 2001. The Refinery Manager explained the overall business challenge involved:

*“We are a 24-hour business in a world market.”*

The refinery competes on a worldwide basis using raw materials and manufacturing products that are commodities. This permits an advantage to those in the marketplace who can perform and execute to the highest productivity levels. And if this isn’t enough, the refinery operates in one of the toughest environmental control zones in the world. Competing and making a profit in this environment requires a visionary approach to operating the refinery.

The essence of this vision includes:

- Be a Best-in-Class refinery as evidenced by first quartile Solomon Index performance indices
- Employ an involved and empowered workforce able to identify and solve problems impacting refinery performance
- Be a good neighbor
- Prevent injuries to refinery employees and others
- Protect the environment

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## Background

Over the last decade, refining oil for the U.S. gasoline market hasn't been easy. Environmental concerns have imposed controls and process changes whose costs have squeezed profit margins. Meanwhile, the vagaries of the economy have increased uncertainties in the marketplace, and changing political considerations have impacted global crude supplies. Finally, new hyper-marts have come on-scene, purchasing and importing offshore refined gasoline at prices that domestic refiners have found difficult to meet. This puts more pressure on domestic refiners to reduce costs.

El Segundo refinery management determined that to effectively compete in this market, it would have to concentrate its efforts on continuously improving overall performance. They initiated this vision by first changing traditional management behaviors. Rather than having management direct every employee action, the new behaviors would encourage the workforce to meet new goals by enabling:

- Creativity
- Initiative
- Participation

This resulted in the formation of various cross-functional teams chartered with improving operations. One of these teams, focused on operations reliability, identified the need to have more plant real-time information available throughout the refinery. They believed this to be one of the critical elements to achieving the new business strategy.

*"The drive for competitiveness demands less staff, increased responsibilities, less boundaries and pushes decision-making down. Chevron expects operators to manage the process, environment and equipment." — IT Manager*

Already, in 1999, ChevronTexaco corporate IT had initiated a search for a solution that would provide increased real-time operational intelligence. They sought a capable solution based on easy-to-use web technologies that would require minimal traditional IT involvement and ongoing support. This search turned up XHQ, an Operations Intelligence Platform developed by Siemens.

XHQ was evaluated to determine if it met the above needs, and initial indications were that it did. XHQ was selected for a pilot at the El Segundo refinery. This pilot proved successful.

El Segundo built upon this success, initiating a project team led by people taken from the business units. This team trained in the new technologies and began working with the business units to implement the solution in phases. Although IT supported the project team with system skills, efforts here were minimal as compared to a traditional IT-driven project.

As the outcome of this process, supporting the strategy ChevronTexaco management had laid out, El Segundo implemented a real-time operations intelligence system designed to provide operational details and key performance metrics throughout the refinery.

## SIMATIC IT XHQ

Siemens XHQ is an integrated Operations Intelligence Platform. Broadly applicable across all levels of the enterprise, XHQ enables real-time performance monitoring and decision support, which drive improved business performance.

In operation, XHQ aggregates, relates and presents, in real-time, operations data drawn from disparate sources within the enterprise. Accessed via a browser, wireless device or corporate portal, the dynamic graphical representation XHQ affords is personalized to an individual's specific data needs. Easy to implement and use, XHQ allows each user to create the "data view" they require without help from IT staff. As the enterprise grows or its needs change, users can easily "evolve" XHQ and meet the new challenges.

In addition, XHQ employs a virtual cache for data management, which minimizes bandwidth use and back-end loading. This keeps network performance high. The solution's impact on source applications is negligible, and as it resides on servers positioned between users and backoffice systems, maintenance and associated costs are minimal.

## The Solution Implementation

A team consisting of several members of the user community, a representative of the plant IT group and representatives Siemens Global Services created most of the XHQ solution content. Leadership and direction provided by the plant IT Manager, the Refinery Focused Operations Manager and others were also critical to the project.

The solution work started in late 1998 and today it serves up to 1200 local users on a 24 hours/day, 7 days/week basis. Over 1000 different visualizations were created against over 500 business and operational components. In addition to all process operations data and histories, the solution incorporates over 45 different sets of relational data.

## The Results

For the past two years, ChevronTexaco's El Segundo refinery has reported dramatic year-over-year results. This puts the refinery on-target to achieving management's overall vision.

A recently completed Business Value Assessment study found that the present implementation of XHQ, combined with the newly empowered workforce, contributed dramatically to these results. Table 1 on the next page reflects the actual results achieved at El Segundo.

| Business Improvement Category           | Multi-Year Average |
|---|--------------------|
| Reduced Operating Expenses              | 8%                 |
| Increased Facility Utilization          | 8.5%               |
| Increased Operational Availability      | 2.5%               |
| Increased High Value Product Production | 10.5%              |
| Reduced Environmental Incidents         | 18%                |
| Reduced OSHA Recordable Injury Rate     | 39%                |

The business value assessment process found that many improvement categories overlapped in their benefit contributions. Most of these, though important in other business aspects, basically contributed to reduction of overall operating expenses.

For this reason, only two business improvement categories were selected to calculate business benefits, as they provide separate and straightforward benefits:

- Reduced Operating Expenses
- Increased HVP (High-Value Product) Production

*The XHQ implementation resulted in a calculated internal rate of return (IRR) of 339% in realized business value.*

The study also established that (1) merging senior management's initiative to increase productivity with (2) the new capability to access, view and act upon information from disparate sources, provided dramatic business unit increases in:

- Overall efficiency
- Utilization
- Profitability

XHQ enabled these results, due to the increased focus it affords on critical issues within the refinery's overall operation.

The XHQ implementation resulted in a calculated internal rate of return (IRR) of 339% in realized business value (corporate taxes are not included in IRR). Additional potential benefits identified provided an additional 150% to 200% IRR.

The stated IRRs were based on an initial Year 1 investment plus on going support and development. The investment/benefit model was set up for a 5-year period and included the following costs:

- XHQ License
- Implementation Services
- Internal Developers
- Project Management
- IT Support
- Hardware Purchases
- Software Upgrades and Support
- Developer Training
- User Training

*"We can see problems quicker . . ." — Operations Coordinator*

*"During an upset our teams can monitor the situation in all aspects without having to be in the control room ... [and] all people will be operating off the same data (source)."*— Operations Supervisor

### Study Findings

The Business Value Assessment study reveals several valuable findings concerning the XHQ implementation that are important to consider:

#### *The "Sweet Spot" for Real-Time Operations Intelligence*

El Segundo's XHQ implementation demonstrates that operations personnel derive the solution's major realized benefits, as they need to access a large number of operational applications located in various systems across the refinery. In fact, the findings support the conclusion that the more complex the business environment, the greater the benefits that can be derived via XHQ.

XHQ provides a refinery-wide view of real-time data and supports drill-down capabilities to information formally provided only by other systems (Historian or Maintenance, for example). Those who need to look across the refinery can without having to log onto different systems, each having a different and complex mode of accessing data.

- Planning and Scheduling
- Monitoring and Trouble Shooting

As XHQ accesses information found in many different systems through one common graphical interface, people at all levels — planning and coordination, supervisors, process engineers, operators — find that they are able to identify and address problems. In fact, they can now anticipate problems much more quickly. El Segundo personnel cite XHQ capabilities as leading

*"It (XHQ) provides at least a 10% -15% improvement in anticipating (process) problems." — Unit Supervisor*

### XHQ Provides Real-Time Operations Intelligence

One of the major benefits of XHQ is its ability to enable users to examine what is happening across the refinery. The system provides quick and easy access to a myriad of systems (and their relevant data) that support crucial real-time business decisions. Specifically, XHQ:

- Enables management and employees to focus on the metrics used to run the refinery.
- Is easy to use and non-intrusive (web browser-based).
- Enables broader process knowledge at all levels in operations.
- Enhances troubleshooting and communication.
- Can access information anywhere in the refinery; sources of information are not limited.
- Supports operations training.
- Provides users with a common source of data and can be integrated as required.

- Can be configured so that information views support specific job roles, including drilldown capabilities into equipment, process values, lab, maintenance, logs, energy utilization, environmental monitoring, management metrics.

*"We now have more 'eyes' looking at a problem."  
— Operations Coordinator*

### **Critical Success Factors**

Based on El Segundo's successful implementation of XHQ, five factors have been identified that are considered critical to that success:

#### *CSF 1: Senior Management Commitment*

The most outstanding characteristic of the El Segundo study is the vigor with which senior management supports the project. The Refinery Manager sees the project as important, stating publicly that it is key in achieving his vision for the refinery. He has a monitor in his office where XHQ actively displays an overview of the refinery, allowing him to monitor real-time refinery metrics.

Additionally, management has committed senior, able, responsible business people. Without this commitment and the funding to go along with it, this project would not be successful today.

#### *CSF 2: Business Needs (Requirements) Drive Product Capabilities*

The process industry is full of example IT projects that failed because application capabilities implemented didn't adequately match business needs. Consequently, these applications weren't used, as they didn't provide the results promised.

XHQ is an application that fits El Segundo's business needs very well. As stated earlier, competitive pressures are driving changes in the way work is performed in the refinery. Decision-making is being pushed down to the people who do the work. This, in turn, necessitates providing these workers with more timely and relevant information from various system sources existing within the business. XHQ's ability to quickly and easily access information contained in various custom applications, then present it to the business user in an easily understood format makes it an application that fits this business need.

#### *CSF 3: Ownership/Lead by Business Groups*

In many failed IT projects, the systems fail to provide the benefits advertised or needed. The Gartner Group estimates that as many as 25% of IT projects fail to meet expectations. At El Segundo, this was recognized as a

priority and users were empowered to make the project happen. Consequently, they took ownership of the project and led its implementation. This wasn't just another IT project.

The enthusiasm and excitement that El Segundo's personnel feel about the technology and project is clear and unmistakable. They call it the system "by the users and for the users," and they mean it. The system belongs to the business and is led by the business. Refinery employees see it as part of their job and they will not allow it to fail.

#### *CSF 4: Expectations Realistically Established*

At El Segundo the project team spent time with refinery personnel talking about XHQ's capability to connect to the systems that are important to them. They began early on to formulate expectations without overpromising the system's capabilities. Expectations were then realistically set and managed. (This is especially important for new technologies. When it comes to introducing these, the rule of "No Surprises" is a good one to follow.)

#### *CSF 5: Match Implementation to Culture*

It is critical that project implementation strategies and approach match the culture where the technology is to be introduced. El Segundo has long had a culture that encourages employees to be innovative and empowers them to make things happen. A participative approach to problem solving is the norm in El Segundo's culture.

A traditional IT-led project, based on a strict line and staff organizational approach, would not have yielded the magnitude of results seen today at El Segundo. IT supported the project effort and provided expertise where it was required. We believe this is a trend that will become the foundation for implementing future successful technology projects.

### **Summary**

The management initiative at ChevronTexaco's El Segundo refinery — enabled with the highly capable Siemens SIMATIC IT XHQ real-time operations intelligence solution — is achieving the facility's business vision of becoming a world-class refiner. Compelling business results have already been realized using XHQ and more are planned, making this solution a serious consideration for any major business enterprise looking to reach that next level of overall productivity.

*"Everyone is aware of our key metrics and we all monitor how we are performing. We are all part of the same team and we share in success together." — Operations Supervisor*

## Conclusion

Real-time operations intelligence is critical to achieving significant business improvement. Siemens SIMATIC IT XHQ has proven to efficiently and cost effectively provide this capability by basing their solution on easy-to-use and implement web-based technologies. This solution applies to any business with complex operational requirements.

Another major international oil company backed up these findings. At the 2002 XHQ Conference, the company outlined its continuing commitment to rollout XHQ to all of its refineries worldwide. Positive results concerning the use of XHQ in other business segments, such as food and beverage, automotive, and chemical industries, were also reported during this conference.

## About The Authors

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