

Petro Rabigh

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Yadukulatilakam Ramaswamy,
Senior Director,
Invensys Operations Management

Invensys Operations Management Solution Supports Petro Rabigh

by Invensys Operations Management

Goals

- Implement a Plant Information Management (PIM) System fully integrated with SAP and other applications in advance of commissioning the expansion of the original refinery;
- Improve performance management by tightly integrating control systems with production and corporate business functions;
- Maintain system safety, plus optimize production quantity and quality at a competitive cost.

Challenges

- The integration needed to seamlessly unite a wide variety of business functions;
- Business and Operations Management systems had to be synchronized to have a single version of truth across the enterprise;
- Changing market dynamics required a robust platform to be flexible and agile to react quickly;
- The project required a global team with multidisciplinary skills to ensure successful delivery.

Solutions and Products

- InFusion Enterprise Control System with a number of Invensys and Third Party solutions.

Results

- The Invensys solution covers the entire refinery and petrochemical complex comprising 23 plants;
- Best-in-class applications from several vendors, including Invensys and SAP, were integrated through the InFusion Integration Infrastructure;
- Setup, configuration and testing of the applications and KPIs were smooth due to the flexibility of the InFusion environment;
- The enterprise receives continuous, accurate performance feedback, which is driving consistent execution of business processes.

Rabigh, Saudi Arabia – Since 2005, this port city on the Red Sea has been home to a major refinery. The Petro Rabigh complex supplies chemicals that, when processed, become products such as plastics, detergents, lubricants, resins, anti-freeze, paint, clothing, shampoo, glue, insulation, household appliances, candles, and thousands of others. These products make life better for Saudi Arabian citizens, and are also exported to Europe and Asia.

Petro Rabigh is one of the largest fully integrated oil refinery and petrochemical production facilities in the region and it is the largest integrated refinery in the World built in a single time. It is comprised of 23 plants that produce 18.4 million tons per annum (mpta) of petroleum-based products and 2.4 mpta of ethylene and propylene-based derivatives.

When management decided to expand the facilities, they set a goal of commissioning the plants with integrated operation management and business systems by 2009.

Improving Performance Management

The objective of the PIM (Plant Information Management) System Project was to integrate the disparate functional systems in the complex to improve management of the plant's operations. In its original iteration, production and corporate business functions were separated, which did not give executives the overall visibility and access to data that would help them make informed decisions about production levels, supply, demand, use of resources and personnel allocation.

To meet this goal and respond to the pressures of a changing global economy, Petro Rabigh required a system that would unite planning, scheduling, operations management, production accounting and other tasks. Ideally the new platform would enable various plants to share information and communicate. The plant level systems had to be integrated with the business system, namely, SAP.

Choosing the Right Solution, Assembling a Talented Team

The InFusion Enterprise Control System (ECS) was a natural fit. Designed on open, industry-standard technologies, the solution would be able to

synchronize information from multiple systems and applications. Plus it was proven to unite them within a single environment that would provide consolidated and contextualized data in real time, versatile object templates for repeatability, and other capabilities that provide ease of operation and reduced total cost of ownership.

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And when it came to the people who would deliver the solution, Petro Rabigh and Invensys met the challenges together. A diverse, global team was assembled, including application engineers, process engineers and project development and management experts from Invensys Middle East, Europe, India and North America.

The Invensys Netherlands group was the hub for the senior technical team and also hosted the Factory Acceptance Test for the solution. And finally, the development team worked from the Invensys offices in Dubai (UAE), as the system migrated toward commissioning.

To maximize efficiency and minimize travel costs, much of the work was accomplished via remote network connections.

"The multi-disciplined environment helped our engineers contribute from across the globe. This increased efficiency and minimized cost while the centralized database ensures that maintenance effort and cost will be reduced," said Eva Hachem, Lead Engineer, Invensys Operations Management.



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Flexibility and Functionality

The Invensys InFusion platform integrates components to form the foundation of the PIM System:

- Laboratory Information Management System (LIMS) – Organizes multiple processes into one database where analytical data is entered, stored and managed. Lab results are supplied to the other PIM system applications;
- Operators Logbook – This application integrates with InFusion to collect real-time data, manage operations and personnel scheduling, plus visualize production orders, handle KPIs, sample results, downtime and mass balance error events;
- Mass and Energy Balance – This application provides hourly and daily reporting for reconciled production data. It supplies data from InFusion for KPI calculations and interface with SAP;
- KPI – Key Performance Indicator data are computed in InFusion environment. Calculated results are stored and made available enterprise-wide;
- Downtime Monitoring – Stops, starts and runtime data are collected and stored by InFusion and reported to the Logbook;
- Oil Movement and Management – Tankfarm management and oil movement are handled by this part of the system, including inventory, order management, optimization of oil blends, batch tracking, and other functions;
- Alarm Management – The critical data from the monitoring of events and alarms can be viewed from the unified PIM viewer interface;
- Planning and Scheduling – Long, medium and short-term plans are generated using LP models and broken down into daily schedules, production targets and operating instructions. Shift and resource requirements that will maximize output are generated and production and performance are measured.

During design and testing, the flexibility of the InFusion system enabled concurrent design efforts while ensuring that project milestones were met and proper testing was performed.

“By harnessing these capabilities under a single, integrated environment, the Invensys solution provides Petro Rabigh significant improvement in the management of our complex and substantial financial savings into the future,” said Ramaswamy.

Efficient to Build

System engineers reviewed the design specifications and created spreadsheets to develop layouts and KPI templates. Tags were used to define standard incidences for each template, which were simply imported into the InFusion environment.

Much of this work was drag-and-drop, since InFusion allowed engineers to inherit tag instances and replicate redundant attributes. The attributes were pulled into InFusion using .csv files, saving data entry time and errors.

Moreover, User Defined Attributes (UDA) extended the platform’s functionality by enabling the addition and customization of the parameters of the KPI configurations. Extensions and advanced scripting capabilities aided in the design and development of the system.

Easy to Use

In the new solution, operators view and control all of the applications within the PIM system via a web-based, unified user interface. The environment enables trending and planning for maintenance and updates.

Plus engineers and management can generate reports which can be displayed in real time or stored in familiar applications like Microsoft® Word or Excel® documents, Adobe® PDF, HTML and others.

Updates are straightforward. InFusion’s object-oriented framework means that the system can be easily modified with just a few commands. Changes can be made onsite or remotely deployed.

“Invensys is no newcomer to global sized projects, yet bringing the best people and technologies together was quite unique. The decision was made to center the team in the Invensys Advances Application Services Division, located in the Netherlands where the applications developers, programmers, and managers could collaborate and communicate. Location and collaboration were key to project success,” said Patrick Murray, Principal Engineering Consultant, Invensys Operations Management. Accuracy of data sharing is also improved. Formerly, passing information between

different areas of the complex – such as transferring statistics from PLC/SCADA to production control (ERP) – was manual, redundant and fraught with opportunities for error. Now, the integrated systems share the correct data securely, which enables management to gain useful insights.

“The InFusion integration capability is humongous. There’s no single application we could not plug in, not a single requirement we missed. It was thrilling seeing it grow to what it is today,” remarked Hachem.

Integrating People and Technology for Success

The Invensys leaders for this assignment acknowledge an extensive list of relationships and resources that made the Petro Rabigh effort such an achievement: a visionary and supportive customer, collaborative partners and dedicated employees. Pulling together their energies around an innovative solution has resulted in a best-in-class result. This complex integration is fulfilling the desire to bring advanced applications together to meet and exceed customer demands.

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