SUCCESS STORY

Achieving an Intelligent Oil Movement System

Location:	**Rayong, Thailand**
Order Date:	**2010**
Completion:	**2011**
Industry:	**Refinery**

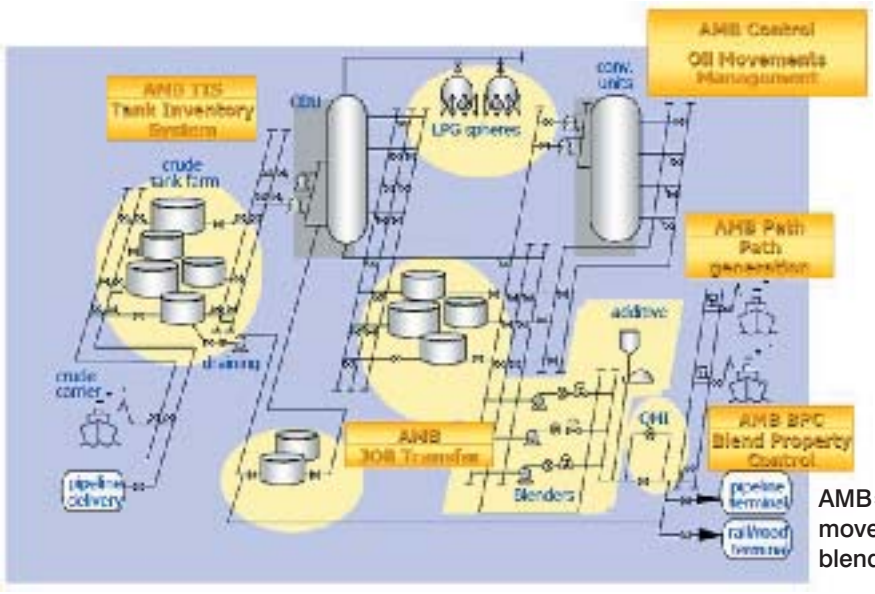
Executive Summary

PTT Aromatics and Refining Public Company Limited (PTTAR) has a refinery (AR1) and two aromatics plants (AR2&3) at the Map Ta Phut Industrial Estate in Rayong, Thailand. These are very large-scale plants, capable of refining 280,000 barrels of oil per day and producing 2.26 million tones of aromatics per year.

An oil movement system (OMS) manages all pipelines, crude oil storage tanks, and LPG storage spheres in the tank farm area and controls the movement of all intermediate components and finished products.

A storage and handling unit receives and handles products from the process units, imported crude oil, imported condensate for AR2&3, imported fuel oil, and export fuel oil, and also delivers products to the jetty, pipeline, road, and rail. Various grades of fuel oil are produced in the storage and handling unit by blending intermediate component products. The blending process has its own quality measurement instrument (QMI) validation system to control the quality of the product blends.

The AR1 refinery recently replaced its legacy DCS with Yokogawa's CENTUM CS 3000 and has been successfully using this to control the oil movement system as well all refinery plant facilities, with no major problems. AR1 is looking now to introduce Yokogawa's APC and Exapilot solutions to improve product quality and production efficiency.



AMB=Advanced movement blending

Overview of PTTAR OMS

The Challenges and the Solutions

1. Challenges

AR1 needed new technology for its refinery and decided to replace its legacy DCS with Yokogawa's CENTUM CS 3000. One key issue with this replacement was the need for there to be no change in the man-machine-interface's graphic displays.
At the same time, the operators needed to stay on top of all movements of materials around the refinery. In addition, PTTAR1 needed to accomplish the following:

1. Address quality complaints
2. Reduce high demurrage costs
3. Reduce quantity giveaway
4. Reduce quality giveaway
5. Eliminate human error
6. Reduce inventory
7. Improve maintenance
8. Improve time management
9. Improve safety

New central control room (CCR)

2. Results of OMS system

The use of Yokogawa's OMS (Oil Movement System) brought the following benefits to AR1:

2-1) Enhanced safety

OMS systems allow for a more intelligent alarming approach that goes beyond the simple detection of high and low levels. When meters are not available, flows can be estimated from inventory changes and used to ensure that maximum loading rates are not exceeded. Excessive tank drainage can be avoided, preventing product loss or contamination. Leak detection methods can be applied.

2-2) Reduced losses

2-2-1) Slopping

Slopping can often occur inadvertently, without any changes in metered flows. This can occur after start-ups or large upsets, when valves may be left cracked open by one shift and remain unnoticed.
Monitoring for changes in slop production rate in the tank area can draw attention to the problem and provide diagnostic aids to identify the source.

2-2-2) Jump over

One advantage of OMS automation is that it brings the discipline to properly document routings, usually in the form of operator graphics. Most systems also have the necessary logic to identify all feasible routings and detect conflicts.

2-2-3) Routing errors

The issuance of an alarm when there is a change in the tank level will cause an operator to check whether the product movement was unplanned or whether there is some other cause, such as someone simply forgetting to enter the movement plan. By continuously reconciling source and destination inventories with tank to tank transfers, it is possible to detect whether product is wrongly leaving or entering the transfer. Reconciling change in inventory against integrated process flow meters will detect if product rundowns have been misrouted.

2-2-4) Oil losses

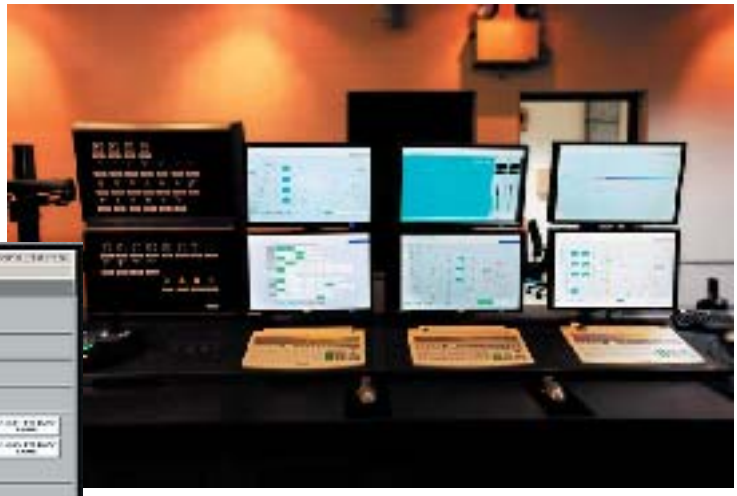
A major potential source of oil loss is the overestimation of imports and underestimation of exports. Within OMS systems, many measurements can be cross-validated. Loading meters are automatically checked against tank levels. Statistical methods can be applied to check and calibrate meters.

2-2-5) Blending

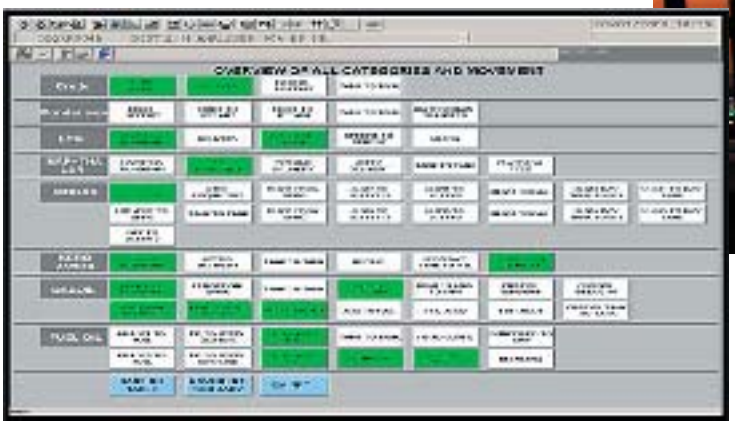
Reduction of giveaway
Minimization of re-blending
Minimization of valuable component consumption
Reduction in the use of intermediate tanks

2-3) Inventory utilization

Careful analysis has shown that when a tank farm is automated, it is possible to make optimal use of existing inventory and also to expand refinery operations without increasing the number of tanks.



New OMS in the CCR



Rundown and delivery operations

Operators can observe and monitor movements throughout the plant. Green indicates a safely running operation.

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Customer Satisfaction

Chalongchai Banglap, the Refinery Senior Process Control Engineer, said, “The system allows operators to clearly see the plant’s status and know what is going on. With this OMS, our operators can take quick action whenever an action is needed. Our plant is now very safely operated without any losses of raw materials or products. We are very pleased with the performance of Yokogawa’s CENTUM CS 3000 and the related package software. Yokogawa is one of our best partners.”
Mr. Banglap went on to say “We appreciate the concept and the following features and benefits of Yokogawa’s OMS:

1. The modular approach towards a total solution
2. Improved safety
3. Improved profitability
4. Improved information management
5. The user friendly interface
6. The open, state-of-the-art system architecture.”

Chalongchai Banglap
Refinery senior
process engineer

Operations handled by the PTTAR OMS

1. Rundown and delivery operations
   a. Crude receipt and CDU feed
   b. LPG rundown and delivery
   c. Naphtha and TOPS tank operation
   d. MOGAS component rundown and product delivery
   e. KERO/AVTUR rundown, transfer, and product delivery
   f. GO component rundown, component transfer, and product delivery
   g. FO component rundown, product delivery, and FO import
   h. Waxy distillate tank operation
2. Blending operations
   a. Fuel oil blending
   b. Gas oil blending
3. Tank information system
   a. Tank gross/net volume
   b. Mass and status calculation

Safe operation

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