PTT Aromatics and Refining Public Company Limited builds World Class Petrochemical Plant using Emerson's PlantWeb® Digital Architecture with FOUNDATION fieldbus™ Technology

RESULTS

- 40% reduction in number of system cabinets & hence control room size
- 20% reduction in pre-commissioning time
- 1.5% reduction in control variability leading to product quality improvement
- Achieve 300 ms fast loops control response time using Control-in-the-Field

APPLICATION

Manufacturer and distributor of Aromatics i.e. Benzene, Paraxylene, Orthoxylene, Toluene and Mixed Xylenes. Other petroleum products from the production process include Light Naptha, Raffinate, Liquified Petroleum Gas, Condensate Residue, and Heavy Aromatics. These products are used as raw materials in various industries.

CUSTOMER

PTT Aromatics and Refining Public Company Limited (PTTAR) is Thailand's largest integrated aromatics refinery. It covers four business categories: petroleum refining and supply of refined petroleum products, manufacturing and sale of Aromatics products, intermediate products and joint venture business.

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CHALLENGE

PTTAR targets to be a part in driving the Thai economy and creating a sustainable growth for Thailand's energy and petrochemical industry on international level. To meet this goal, PTTAR decided to build a world class Reformer and Aromatics Complex II Plant in 2005 to produce high quality products at a competitive price level. The plant had to be constructed quickly and hence project schedule was tight.

SOLUTION

PTTAR chose to use cutting-edge technology to have a diverse choice of feedstock for the highest benefits at a low cost compared to other players in the global market. In the field of Automation also, PTTAR trusted Emerson's PlantWeb Digital Architecture with FOUNDATION fieldbus technology which leverages the maximum benefits of latest technologies, including intelligent field devices and Asset Management Software.

The project scope of supply included:

- DeltaV™ Process Automation System
- Rosemount® Pressure transmitters (3051 series), Temperature transmitters(3144), Magnetic Flow meters(8742C), Micro Motion® Coriolis Flow meters (2700 Series) - All FOUNDATION fieldbus type
- 752 Fieldbus Remote Indicators
- Rosemount FOUNDATION fieldbus pH and Conductivity Analyzers (5081 series)
- Fisher® Valves with FOUNDATION fieldbus Digital Valve Controllers (DVC6000f series)
- AMS™ Suite Software with Valve-link Snap On
- DeltaV Analyze software package (for alarms)

Compared to their previous petrochemical plant with similar capacity using conventional 4 – 20 mA signals, Emerson's PlantWeb Architecture with FOUNDATION fieldbus technology was able to reduce the number of system and marshalling cabinets by about 40% due to less number of I/O cards and marshalling terminals. This gave a reduction in footprint size of system cabinets in the control room by 25%. In addition, installation work was made faster with less number of cables, cable trays, junction boxes and terminations.

"Our aim is to construct a world class petrochemical plant in Asia and produce high quality products at a lower cost of production. We evaluated thoroughly and are convinced that FOUNDATION fieldbus technology together with intelligent field devices and Asset Management System are the right combination. The plant is operating to our satisfaction and we are happy that we made the right selection of Emerson's PlantWeb architecture with FOUNDATION fieldbus technology."

Umpol Vingvorn
Instrument & Electrical Division Manager,
PTT Aromatics and Refining
Public Company Limited

In the previous project, PTTAR often had to spend considerable time for the troubleshooting of field instruments during plant commissioning and sometimes it slowed down the commissioning process. However, in the case of Reformer and Aromatics Plant II, the PlantWeb/FOUNDATION fieldbus technology provided device diagnostics alert feature in the field devices which was efficiently displayed by AMS Device Manager System in the control room. Hence, the operation people managed to easily navigate the AMS software, able to identify the root cause of the field issues and solve them quickly. This would have saved at least 20% of total commissioning time.

As mentioned above, high quality products are of paramount importance to PTTAR. Hence, process control has to be close to the set point with minimum control variability. During the design basis stage itself, PTTAR decided to adopt Control in the Field (CIF) for all control loops to the maximum extent. CIF helps to respond to process variations quickly thereby reducing the control variability. Further, with the use of advanced valve diagnostics software and plugged impulse line detection software in the devices, it is possible to identify errors in measurements such as valve travel deviation, plugging of impulse lines etc. These features also helped to reduce the control loop variability. An overall estimated reduction of about 1.5% variability helps to produce high quality of products.

The process licensing technology required a control response time of 300 ms for all fast loops such as flow, pressure and differential pressure. CIF is the best approach to achieve this requirement as all communications between the devices take place in the field itself without going through the DCS controller. This is further made easier by the fast function block execution time of Emerson's FOUNDATION fieldbus devices.

The plant has been in operation since September 2008. Overall, PTTAR is able to achieve their target of making high quality products using latest technologies from Emerson's PlantWeb digital architecture. They have also achieved other benefits such as smoother start- up and able to continuously run the plant without unscheduled shutdowns.

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