Success Stories

Unlocking Historical and Real-Time Data Gives Delayed Coking Plant Unified View of Plant Operation for Improved Performance

The Customer

Sinopec Corp. is the largest producer of oil products in China. In 2004, the company processed 132.95 million tons of crude oil and produced 80.83 million tons of oil products. Key products include gasoline, kerosene, diesel, chemical light oil, fuel oil, solvent oil, petroleum wax, petroleum coke, propylene and benzene products for refining.

The Shijiazhuang Refining and Chemical Company (SRCC), a subsidiary of Sinopec Corp., operates a delayed coking operation in Hebei province. Pound for pound, coking is the most energy intensive of any operation in modern refining. Large amounts of energy are required to heat the thick, low grade petroleum residue to the 900-950 ºF temperatures required to crack the heavy hydrocarbon molecules into lighter, more valuable products. Due to complex relationships within the production process and the constraints of physics, coking is an expensive and volatile process. Maintaining steady state operating conditions, ensuring plant safety and controlling energy consumption are imperative for the customer.

The Production Challenge

Like most companies with complex industrial processes, the Shijiazhuang Refining and Chemical Company has made significant investment in plant automation projects including distributed control systems to support process monitoring and control. While they collect and archive huge volumes of data on a daily basis, they have struggled with how to exploit this data to improve performance. They generate, collect, store and then routinely purge the data, forever losing the value locked into this asset.

More specifically, SRCC wanted to:

- leverage the historical data.
- visualize performance problems before reaching critical thresholds.
- measure operator effectiveness to control the process
- determine economic impact of control variables by linking to energy consumption.

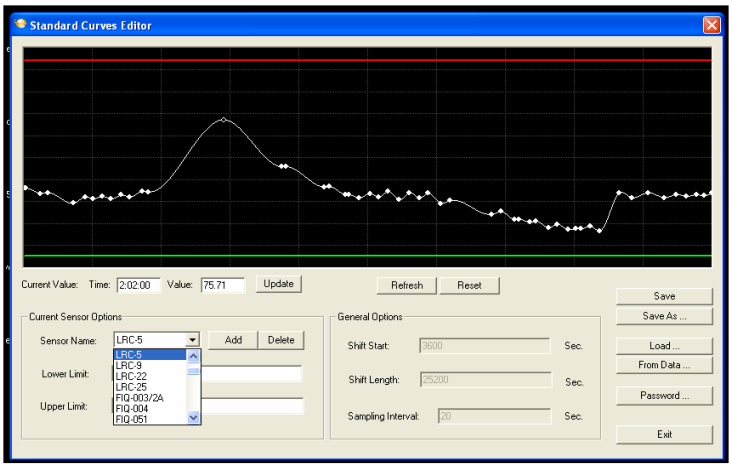
The Solution

After careful consideration Sinopec chose Pattern Discovery's Production Intelligence (PI) solution and expert analysis services. The overall goal is to provide SRCC with a system that will take advantage of historical plant data, integrating it with real-time data to establish a view into plant performance. This will allow operators, engineers and plant managers to gain a better understanding of the key factors that impact performance and initiate improvement measures.

Phase 1 of the project included the development of three modules: the *Standard Curve Generator (SCG), Real-Time Monitoring and Control System (RTMC)* and the *Sinopec Report Server.*

The Standard Curve Generator: Engineers were having trouble defining meaningful operating guidelines as they were unable to visualize operating conditions of key process variables. By creating the *Standard Curve Generato*r, Pattern Discovery was able to provide engineers with a view of standard operating conditions based on historical plant data and pre-selected KPIs. This module allows managers and engineers to modify the curves based on recognized anomalies or other design considerations as needed to accurately represent the desired operating condition. The resulting curves provide a baseline for operators to follow as guidelines for efficient, safe operation.

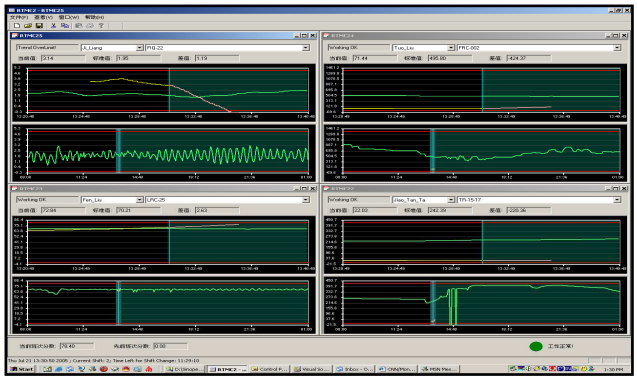
.



Standard Curve Generator

Real-Time Monitoring and Control (RTMC): With an accurate view of historical operating conditions, managers were interested in comparing the conditions to real-time data generated in the course of daily operation. In order to do this, Pattern Discovery developed the *Real Time Monitoring and Control* module. Drop down menus allow operators to pick key sensors from various points in the process, giving them the ability to monitor one sensor or multiple sensors simultaneously. The module also incorporates a predictive model to determine and display future trends. The RTMC alerts operators to deteriorating conditions while the trend predictions give instant feedback of potential problems, before they occur. This allows them to move from reactive to proactive adjustment decisions to maintain or improve plant conditions and performance.

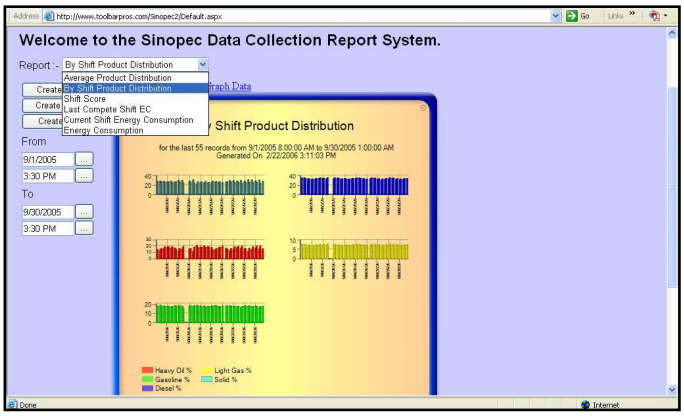
Real -Time Curve vs. Standard Curve



Multiple Sensor Monitoring

Sinopec Report Server: Managers and operators wanted the ability to create reports by linking the data generated by the distributed control system to their Enterprise Resource Planning (ERP) data. Ultimately the client wanted to have a view of the real-time operation of the plant in order to make proactive decisions for improved performance. Pattern Discovery provided the *Report Server*, allowing reports to be generated including:

- average product distribution
- average product distribution by shift
- shift scores
- energy consumption
- energy consumption by shift



Sinopec Report Server

The Future Frontier

Based on the tremendous success of Phase 1, Sinopec has engaged Pattern Discovery for a second phase of development of the Production Intelligence (PI) system. Phase 2 will include:

.

- the ability to model standard curves for specific grades of crude oil inputs
- the ability to combine sensors in meaningful groups to produce new KPI's
- incorporate theoretical formulas and calculations, creating new KPI's which can be monitored and compared
- expanded architecture to include client-server applications which will allow corporate intranet interfacing and remote viewing

About Pattern Discovery
Pattern Discovery Technologies provides Production Intelligence solutions to measure, monitor and manage plant performance. Specializing in the oil and gas industry, Pattern Discovery creates analytical frameworks for integrating plant data and applying expert analysis to improve performance and aid in the decision making process. For more information contact:

Mr. Paul Sheremeto, President & CEO
Pattern Discovery Technologies Inc.
554 Parkside Drive
Waterloo, Ontario, Canada
paul.sheremeto@patterndiscovery.com
tel: (519) 888-1001 ext. 249
fax:(519) 884-8600