



KNPC saves \$14M annually through advanced process control



Profile

Kuwait National Petroleum Company (KNPC) operates one of the largest oil complexes in the world, with a total refining capacity of approximately 850,000 barrels per day (bpd). As a subsidiary of the state-owned Kuwait Petroleum (KPC), KNPC is responsible for KPC's activities in refining, gas liquefaction and local marketing of products.

The KNPC complex comprises three refineries—Mina Al-Ahmadi, Mina Abdulla and Shuaiba—located on the Arabian Gulf, 50 kilometers south of Kuwait City and within 15km of each other.

Business Challenge

In the mid-1990s, the Mina Abdulla refinery was supporting 240,000 bpd, much more than the original 30,000 bpd it had been built to support in 1958. Given the refinery's significant expansion in capacity, the company determined that it was time to embark on a modernization project that would make extensive use of multivariable, model-predictive control for the purpose of:

- Improving quality
- Increasing uptime
- Creating a more stable environment

The first phase of the project to implement multivariable advanced control began with an initiative to upgrade control of the cokers at the Mina Abdulla refinery.

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Issa Al-Abdeen
Superintendent Computer Application
KNPC

Solution

KNPC selected AspenTech's DMCplus, to upgrade control of the cokers at Mina Abdulla. The initial success at the Mina Abdulla refinery prompted KNPC to acquire a site-wide DMCplus license for the Mina Abdulla site and begin its second implementation at its Mina Al-Ahmadi refinery, considered one of the world's most modern refineries with capacity of 415,000 bpd. Like Mina Abdulla, the Mina Al-Ahmadi refinery adopted DMCplus for its first move into multivariable advanced control. The first targets for DMCplus at Mina Al-Ahmadi were the three gas plants, followed by the ARDS unit, one of the crude units, the fluid bed catalytic converter (FCC), alkylation and MTBE units, and the hydrogen and vacuum units.

KNPC also uses InfoPlus.21, (IP.21), AspenTech®'s real-time Manufacturing Execution System (MES), at all three refineries. IP.21 provides a window into the refinery, in graphical and tabular form, and is used to perform analyses.

Business Benefits

The story of DMCplus at KNPC has been one of steady progress since the mid 1990s, beginning with its initial success with the cokers at the Mina Abdulla refinery. "With this initial small invest-

ment, the plant operation became more stable. The coking is a semi-batch operation, and without advanced control, there were many disturbances— including off-specification quality—and product flows to the downstream units were unstable," said Issa Al-Abdeen, superintendent of computer application at KNPC. "The introduction of DMCPlus solved most of these issues. The first success with the cokers totals US\$3M/year," Al-Abdeen said.

Other benefits include:

- Typical payback of three months
- \$14M annual payback
- \$1M/year in savings from the Mina Al-Ahmadi gas plant project alone

"The advanced process control projects at Mina Al-Ahmadi and Mina Abdullah have been successful, with paybacks often in just a few months as well as other intangible benefits. Uptime of the DMCplus controllers is close to 100%," Al-Abdeen said.

Vision

A program similar to the one accomplished in Mina Abdullah is envisaged at Shuaiba, KNPC's third refinery. Shuaiba is the world's first all-hydrogen refinery, with advanced technology for desulfurization and upgrading of heavy residues. Implementation of AspenTech's DMCplus at Shuaiba is scheduled to follow a DCS upgrade that is currently under completion.

To date, 100% of the process units at Mina Abdullah Refinery are equipped with DMCplus. Most of the units at Mina Al-Ahmadi are also equipped with DMCplus technology, and the remainder will be completed over the next two years.

In the next phase of its extended project, KNPC envisions real-time optimization of its refining units.

About AspenTech

Aspen Technology, Inc. is a leading supplier of enterprise software to the process industries, enabling its customers to increase their margins and optimize their business performance. AspenTech's engineering solutions, incorporating Hyprotech's technologies, help companies design and improve their plants and processes, maximizing returns throughout their operational life. AspenTech's supply chain manufacturing solutions allow companies to run their plants and supply chain more profitably, from customer demand through to the delivery of the finished product. Over 1,200 leading companies rely on AspenTech's software every day to drive improvements across their most important engineering and operational processes. AspenTech's customers include: Air Liquide, AstraZeneca, Bayer, BASF, BP, ChevronTexaco, Dow Chemical, DuPont, ExxonMobil, GlaxoSmithKline, Lyondell Equistar, Merck KGaA, Mitsubishi Chemical, Shell and Unilever. For more information, visit www.aspentech.com.



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