Hydrogen Management Services

IDENTIFY INEFFICIENCIES, OPTIMIZE YOUR NETWORK AND SUSTAIN THE BENEFITS

Refinery-wide $H_2$ optimization for improved profitability
Today’s refineries face the tremendous challenge of meeting an increasing demand for cleaner fuels.

New fuel specifications are putting a higher load on a refinery’s existing hydrogen system. Creative solutions are needed to address the increase in hydrogen demand in ways that increase the refinery’s profitability, rather than simply looking at minimizing the negative impact of new rules.

UOP utilizes a unique methodology and approach to analyze the refinery’s hydrogen system. The approach focuses on meeting new fuel specifications, addressing hydrogen demands and increasing the refinery’s bottom-line profits through optimum production, utilization and recovery throughout the refinery.

**UOP Hydrogen Management Studies**

UOP’s Hydrogen Management Studies optimize the use of hydrogen throughout the whole refinery network. The UOP methodology analyzes the refinery hydrogen balance as a network problem, utilizing hydrogen pinch analysis. Minimum hydrogen requirements are set and network improvements are defined using refinery-wide hydrogen network models, and hydrogen generation and purification process models. The UOP methodology relies on detailed hydroprocessing process models and refinery-wide LP economic models to optimize the use of hydrogen.

**A four-stage approach**

- **Analyze refinery hydrogen balance:** A systematic methodology is used to develop a consistent refinery-wide H$_2$ balance, determine minimum hydrogen requirements and identify where network improvements can be made.
- **Improve/add hydrogen purification:** Improvements to existing hydrogen purification units are evaluated as well as various alternatives for new purification.
- **Consider impact on process units:** UOP combines analyses of hydrogen network and purification systems with a thorough understanding of the role of hydrogen.

**Benefits of UOP H$_2$ Management Studies**

Create value: Improve refinery margins

- **Hydrogen** – specifically hydrogen partial pressure – has a strong impact on profitability because of its effect on throughput, product quality, conversion, yield and catalyst life. By combining hydrogen network analysis with an in-depth understanding of the role that hydrogen plays in hydrogen-consuming processes, UOP can help open opportunities for increased refinery profitability far beyond the benefit realized by simply reducing hydrogen costs.

UOP’s approach provides a means of setting minimum consumption targets and direction on where network improvements can be made. It can lower refinery operating costs or new hydrogen plant capacity by reducing overall hydrogen needs.
hydrogen partial pressure to identify hidden profit potential in process units. Because process changes require redesign of the hydrogen network, the analysis becomes iterative.

- **Sustain the benefits**: The full benefits of hydrogen management can only be realized if network optimization becomes an integral part of refinery operations. A UOP H₂ network model running on the engineer’s desktop allows optimization and what-if analysis on a routine basis.

**Powerful results**

UOP Hydrogen Management Studies have been successfully employed at 50 refineries ranging in size from 90,000 to 810,000 bpd and involving as few as four and as many as 32 hydrogen-consuming units to meet U.S., European and Asian fuel specifications. In each case, practical methods were identified to improve hydrogen efficiency and refinery profitability. Some refiners focused on immediate profit improvement, while others used the study to better understand their options for meeting the upcoming fuel specifications.

Two recent Hydrogen Management Studies demonstrate that simply minimizing hydrogen consumption does not maximize refinery profitability. In the first case, hydrogen was valued at approximately fuel value, so there was no incentive to maximize hydrogen efficiency. However, increasing hydrogen purities increased refinery profitability by $2.1 million. In another refinery, more than $9 million in new hydrogen plant capital costs were avoided through increased hydrogen efficiency. Additionally, an improvement in refinery margin of $4.5 million could be realized through better hydrogen utilization in a critical hydrotreater.

**UOP H₂ Management Consulting Services**

H₂ Management services from UOP can be customized to provide the level of support that will best meet your needs. An engagement can last from two to 16 weeks and can range from high-level evaluations to very detailed data analysis with modeling and on-site reviews and reports. Depending on your needs, we can identify opportunities and recommend a rough path forward, or provide you with a detailed plan that includes:

- A reconciled, believable look at your current H₂ balance
- Cost-justified, specific improvements for future and current cases
- A detailed H₂ network model for use in operations and project planning

The real benefit of hydrogen management is derived by optimizing the use of hydrogen and viewing it as a means to increase refinery profit. Utilizing more hydrogen in certain critical hydroprocessing units is often the best solution.
Expertise

UOP is a leader in the field of hydrogen purification technology, catalytic reforming and hydroprocessing and is able to optimize and revamp the operations of purification units and reformers. We can model and select the most effective purification units and ensure that they are placed in the correct location in the network.

UOP’s Optimization services group oversees and coordinates the preparation of Hydrogen Management Studies. The group has the core skills required for network analysis and refinery optimization, and utilizes UOP’s hydroprocessing and hydrogen purification proprietary detailed process models.

Getting the most from an H₂ study

Hydrogen Management Studies can benefit the refinery at any time, but are particularly important when the refinery is constrained by hydrogen availability, when major hydroprocessing changes are being planned for the refinery, or when design bases are being set for new/revamped hydroprocessing units.

Find out more

If you are interested in learning more about UOP Hydrogen Management Services, please contact your UOP representative or visit us online at www.UOP.com.