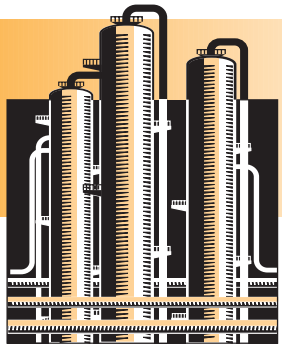
PETROLEUM

Project Fact Sheet



Advanced Process Analysis for Petroleum Refining

Benefits

- Saves up to $304,000 per year when producing 10,000 barrels per day of olefin charge for gasoline production
- Improves product yield of alkylation by approximately 1% or 140 BPD, equivalent to $100,000 per year, through source reductions
- Productively uses low-valued light olefins
- Reduces electricity consumption by 4.4%
- Reduces steam consumption by 2.2%
- Reduces cooling water consumption by 4.9%
- Reduces natural gas emissions by 4.4%
- Reduces caustic consumption by 5.1%
- Reduces spent sulfuric acid catalyst by 6.4%
- Reduces sodium hydroxide by 5.1%

Applications

This process analysis system can be rapidly transferred to petroleum refineries across the country.

Advanced process saves operating costs by improving efficiency of petroleum refining

Motiva Enterprises is demonstrating its advanced computer analysis system for improving the sulfuric acid alkylation process, one of the most important refinery processes for producing conventional gasolines. Motiva's innovative process does not require purchase or installation of additional refinery equipment with the exception of specific computer software that augments current monitoring systems.

Fuels reformulated with alkylates reduce both evaporative and combustion emissions from automobiles. Motiva's new system produces immediate process improvements, including: 1) source reduction of sulfuric acid, 2) decreased energy consumption in heat transfer and separation units, 3) source reduction of air emissions through decreased energy consumption, 4) productive use of light by-product olefins (mostly butylenes), and 5) improvements in product yield. With Motiva's system, a refinery handling 240,000 barrels of crude oil per day can reduce energy use by 96 billion Btu and sulfuric acid consumption by 2,555 tons per year when producing 10,000 barrels of olefin charge for gasoline production. Revision of the alkylation process improves refining operations, which reduces energy consumption and waste emissions while increasing production capacity.

Advanced Process Analysis System for Petroleum Refining

The advanced alkylation process produced through Motiva's new process analysis system reduces energy use and sulfuric acid.

Project Description

Goal: The project goal is to demonstrate an advanced process analysis system for process and environmental engineers to perform comprehensive economic, environmental, and energy evaluations for refining processes. The sulfuric acid alkylation process is being used to develop and demonstrate the capabilities of the system and to achieve source reduction of sulfuric acid and energy.

To achieve reduced energy consumption, an innovative approach combining Microsoft Windows Rapid-Application Development (RAD) tools with established chemical engineering process analysis programs and the Motiva Enterprise alkylation process are being used to develop and demonstrate the capabilities of the system. An interactive Windows program integrates chemical reactor analysis, pinch analysis, and flowsheeting to analyze energy and emission reductions, intro-process recycle, and retrofit. This information is then integrated with process, economic, energy, and environmental data to produce an effective process analysis and design package to be used by refineries to design more efficient operations.

Motiva Enterprises is demonstrating this new technology with assistance from the Gulf Coast Hazardous Substance Research Center, the Louisiana Department of Natural Resources, and the NICE^3 Program through the Department of Energy's Office of Industrial Technologies.

Progress and Milestones

- The advanced process analysis system is available for downloading from the Louisiana State University Web site (www.leeric.lsu.edu/mpri/frame1.htm), and includes a self-installing program and detailed users manual. Technical assistance for installing and using the program is available from program developers who can be contacted through the Web site.
- In addition, short courses on the online optimization, chemical reactor analysis, pinch analysis, and pollution index methodologies used in the advanced process analysis system are available through the Gulf Coast Hazardous Substance Research Center.

Industry of the Future—Petroleum

Petroleum is one of nine energy- and waste-intensive industries that is participating in the U.S. Department of Energy's (DOE) Office of Industrial Technolgies' Industries of the Future initiative. Using an industry-defined vision of the petroleum industry in the year 2020, the industry and DOE are building collaborations to develop and deploy technologies crucial to the industry's future.

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NICE^3—National Industrial Competitiveness through Energy, Environment, and Economics: An innovative, cost-sharing program to promote energy efficiency, clean production, and economic competitiveness in industry. This grant program provides funding to state and industry partners for the first commercial demonstration of energy efficient and clean production manufacturing and industrial technologies. Total project cost for a single award must be cost-shared at a minimum of 50% by a combination of state and industrial partner dollars. The DOE share for each award shall not exceed $500,000 to the industrial partner and up to $25,000 to the sponsoring state agency for a maximum of $525,000.

Project Partners

Gulf Coast Hazardous Substance Research Center (GCHSRC)
Beaumont, TX

Louisiana Department of Natural Resources
Baton Rouge, LA

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Convent, LA

NICE^3 Program
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