

## Application Brief: Petroleum Distillation and Sulfonation

At its facility near Houston, Texas-based Allied Petrochemical produces familiar petroleum-based distillates like naphtha kerosene and diesel fuel. It also produces sulfonates, also called sulfonic acids, which are used primarily as additives for coatings, greases, oils, and water-soluble detergents.

The refinery depends on Opto 22 SNAP PAC hardware and software products to reliably and accurately control the distillation towers, reactors, storage tanks, and auxiliary equipment such as pumps and valves needed to produce these petroleum-based products.

### Challenges

Joey Kessel, Manager at Allied Petrochemical, describes the plant as consisting of two sides: refining and additives. On the refining side, two vacuum distillation towers separate petroleum distillates to produce naphtha kerosene, diesel, and residual fuel oil. The additive side has three reactor units in which high-molecular-weight alkylates are sulfonated to produce Allied Petrochemical's signature additive products SA-320, SA-470, and SA-490. These products are subsequently neutralized and carbonated to create both neutral- and overbase calcium sulfonate products.

Sulfonation is a rapid and highly exothermic reaction, and the reaction mass must be cooled continually. Along with temperature control, the amount of sulfur trioxide ( $\text{SO}_3$ )



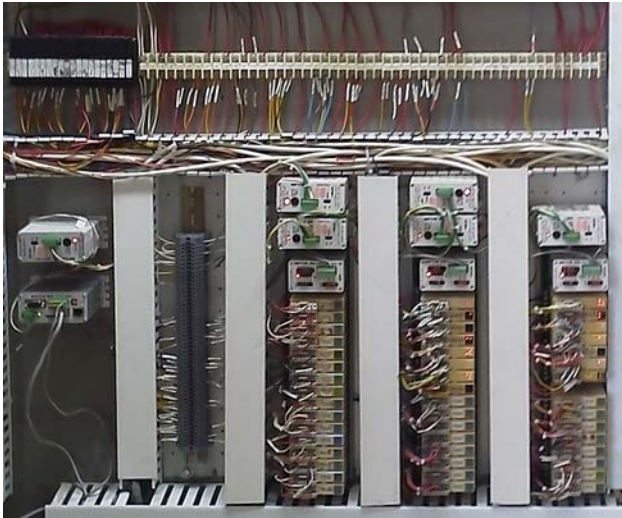
added to the process must be precisely controlled to avoid side reactions and unwanted carbon from forming.

Before installing the Opto 22-based control system, Allied Petrochemical manually controlled refining. Of course this required many hours of workers' time and introduced the opportunity for human error. Controlling these processes manually also made it difficult to increase production and expand the business.

### Solutions

After researching the automation marketplace, Kessel selected Opto 22 products to build a control system for the refining operations. Much of this choice, he says, was due to the ease with which control points could be mapped and changed in the PAC Control controller programming software. The affordability of the products and the long-held reputation of Opto 22 products for reliable operation were factors that also contributed to his choice.

The control system Kessel installed incorporates Opto 22 SNAP PAC S- and R-Series controllers, I/O processors (or "brains"), and I/O modules. PAC Display HMI (human-machine interface) software provides operator interfaces at control stations, and monitoring and control at a central location. Equipment is connected over an Ethernet network that runs throughout the plant.



*Multiple racks of SNAP I/O modules wired to field devices throughout the refinery are connected to a SNAP PAC controller running a control program.*

founded in 1974 and is privately held in Temecula, California, U.S.A. Opto 22 products are available through a global network of distributors and system integrators. For more information, contact Opto 22 headquarters at +1-951-695-3000 or visit [www.opto22.com](http://www.opto22.com).

## Results

Changing distillation from manual to automatic control delivered several benefits. It's now easier, for example, to achieve and maintain the quality of the final distillate products. The instrumentation added for the control system makes extensive process data available for production and regulatory purposes, while new equipment monitoring and logging capabilities allow preventive maintenance that keeps downtime to a minimum.

Having the control system in place reduced by half the number of personnel needed to operate the plant. Operators are needed at the plant 24 hours a day, so this resulted in significant savings. This also gives company staff time to fine-tune production processes, maintain equipment, and scale up production for company growth.

## About Opto 22

Opto 22 develops and manufactures hardware and software for applications involving industrial automation and control, energy management, remote monitoring, and data acquisition. Designed and made in the U.S.A., Opto 22 products have an established reputation worldwide for ease of use, innovation, quality, and reliability. Opto 22 products, which use standard, commercially available networking and computer technologies, are used by automation end-users, OEMs, and information technology and operations personnel in over 10,000 installations worldwide. The company was