

CITGO Uses Honeywell Advanced Applications for FCC Optimization



“We have a great working relationship with Honeywell and they are always responsive to our needs. We have done a number of audits post-installation and have seen good returns on the optimization – so much so that we have standardized on Profit Controller. Honeywell products are very well researched and tested, and our implementation team was top notch.”

Mike Piatt, Senior Process Control Engineer, CITGO

Benefits

On-line optimization of CITGO Corpus Christi’s 65,000 bpd Fluidized Catalytic Cracking Unit (FCCU) was recently upgraded using Honeywell’s Profit[®] Bridge and Profit Controller software in conjunction with a rigorous FCC model. Honeywell was chosen to configure, install and deliver a Profit Bridge solution to CITGO that updated the gains in Profit Controller for the FCCU at the company’s Corpus Christi, Texas refinery. Honeywell was chosen because the solution was well integrated with the existing Profit Controller advanced control application, and also leveraged CITGO’s existing FCC simulation model.

Significant results included:

- Annual benefits estimated at \$1M per year due to increased throughput and conversion
- Software installed and commissioned with 14 days of on-site effort
- Solution well accepted by operators and tightly integrated with existing Profit Controller application
- Required significantly less effort and cost to implement compared to traditional real-time optimization – optimizing 99 percent of the time at a frequency of one minute
- Leveraged already existing technologies, namely an effective Profit Controller and the FCC simulation model
- Lower maintenance required compared to a traditional optimizer



Honeywell technology helped CITGO optimize its FCCU

Background

CITGO, based in Houston, is a refiner, transporter and marketer of transportation fuels, lubricants, petrochemicals, refined waxes, asphalt and other industrial products. The company is owned by PDV America, Inc., an indirect wholly owned subsidiary of Petróleos de Venezuela, S.A., the national oil company of the Bolivarian Republic of Venezuela.

The company’s refineries produce a wide range of conventional and reformulated gasoline. Refineries produce 140 million barrels of gasoline, 55 million barrels of distillates and 30 million barrels of jet fuel per year.

Challenge

CITGO operates a 65,000 FCCU at its Corpus Christi refinery that processes a mixed feedstock to produce fuel gas, C3/C4, a gasoline blend stock, light cycle oil and a heavy fuel oil blend stock. Feeds include hydro-treated/hot heavy gas oil (HGO) and cold feed in varying proportions. Much of the feed from tankage is externally purchased, resulting in significant variations in feed quality.

Optimization of the FCCU had been considered necessary for some time due to these changes in feed quality and also changing economics. In the past a third-party on-line optimization solution was installed to optimize the plant, but recent process modifications required significant changes to this solution that were not considered to be cost-effective. A new solution was sought to replace the optimization system that would result in similar benefits and would also integrate well with the existing Profit Controller application on the unit.

“We had two main objectives with this project which were to maintain safe, reliable FCC operation while protecting operating constraints, and to optimize FCC reactor/regenerator operation to produce the most profitable combination of FCC products under changing economic, environmental and feed conditions,” said Mike Piatt, Senior Process Control Engineer, CITGO.

Solution

CITGO reviewed two options for updating its system--a traditional real-time optimization (RTO) and a non-linear optimization approach. After evaluating both options CITGO selected Honeywell's Profit Bridge solution. Honeywell was chosen because the solution was well integrated with the existing Profit Controller advanced control application, and also leveraged the third-party FCC simulation model CITGO was using.

More Information

For more information on Honeywell's advanced applications, visit www.honeywell.com/ps or contact your Honeywell account manager.

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One of the advantages of the Profit Bridge approach to plant optimization is the speed of commissioning and ease of installation. The Profit Bridge system at CITGO Corpus Christi was running at an execution frequency of one minute within three days of the first on-site activity. After five days, the system was running continuously with an uptime greater than 99 percent. The system was allowed to run for three weeks and then a second commissioning trip of four days was used to install the final software (first installation was beta software). The system was installed and commissioned in a total of 14 days, significantly less time than required for a traditional RTO system, which can require months of commissioning effort.

“After previous experience with Honeywell, we knew going in that its products are very well researched and tested,” said Piatt. “We've worked with great implementation teams over the years and this was no exception. We had such a high level of acceptance and utilization that we've standardized on Honeywell's Profit Controller.”

The optimization approach in this design makes use of what each of the model types does well, using the constraint models of Profit Controller to define and protect the process constraints and the FCC simulation model to predict the change in the product yield derivatives (i.e., Product Value Optimization variable model gains in Profit Controller) for optimization. The combined problem is solved in a single step using the Profit Controller optimization features. Profit Bridge then interfaces third-party models to Profit Controller.

Concluded Piatt, “The Honeywell people on site have been incredibly responsive to our operators' needs and actually help them understand the total value of the applications they use. Over the next few years we plan to continue to upgrade our systems using Honeywell technology.”

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