UniSim® Design Suite
FCC Reactor
Product Information Note

High fidelity kinetic reactor module helping refiners predict unit performance and enhance fluid catalytic cracking results

The Challenge: Increase the availability and effectiveness of the overall FCC process

Modern refineries vary by design and scope, with more complex operations having more secondary conversion capability, meaning they can produce different types of petroleum products. Fluid catalytic cracking (FCC), a type of secondary unit operation, is primarily used in producing gasoline in the refining process.

FCC is one of the main processes enabling refiners to achieve greater operational flexibility and improved profitability. Over 50 percent of heavy petroleum goes through FCC for processing. This unit is designed to transform heavy crude oil into light oil under the action of heat and catalyst. It upgrades heavier, higher-boiling fractions from crude oil distillation by converting them into lighter and lower boiling, more valuable products like cracking gas, gasoline and diesel oil etc.

The Opportunity: Optimize feedstock selection and unit operations to produce additional gasoline

The FCC process has long been a trusted workhorse in the refining industry to meet the demand for motor fuels. Indeed, the ability to process residual oils and gas oils from different units/origins can have

WHY DO CUSTOMERS CHOOSE OUR SOLUTION?

- Proven technology backed by decades of refining industry experience
- Built on the UniSim EvOlution platform, which enables process design and optimization under the same environment
- FCC Riser model can handle different feed types ranging from vacuum gas oil to residue or blend of these
- Supports different riser configurations (i.e., single Riser or Two Riser in series with intermediate injection and catalyst recirculation from stripper)
- Supports different regenerator configurations (i.e., combustor-style regenerator, two-stage-type regenerator)
- Includes models that can be leveraged throughout the plant lifecycle
- Best-in-class support through Honeywell’s Benefits Guardianship Program (BGP)
a significant impact on refinery economics and margins.

However, the challenges encountered in the operation of FCC units are as varied as their hardware and catalysts, their feedstocks and desired products, and their operating strategy.

Refining facilities are looking for solutions to optimize and improve effectiveness of the FCC process. They need greater insights to critical questions such as: How do we maximize gasoline production over residual fuel oil? What’s the best approach for upgrading heavier distillate cuts to light products per barrel of crude oil?

**The Solution: UniSim Design FCC Reactor**

Honeywell Process Solutions is recognized for providing advanced software solutions enabling customers in refining and other industries to capture and share process knowledge, improve plant profitability, and maximize the return on their technology investments. For example, our UniSim software family substantially improves simulation of online and off-line process unit design and optimization applications. It also helps determine the workflow, equipment needs, and implementation requirements for a particular process.

The UniSim solution is part of the Honeywell Connected Enterprise, which connects processes, assets and people to make the most of plant data and process domain expertise.

The UniSim Design Suite provides intuitive process modeling software that enables process engineers at refineries to create steady state and dynamic models for plant design, performance monitoring, troubleshooting, business planning, and asset management. UniSim simulation technology also helps engineers gain the expertise they need to work with a host of complicated refining processes.

**Employ the EO platform for comprehensive modeling:** UniSim Design Suite now includes modules representing specific refining conversion reactors. The UniSim Design FCC Reactor is one of the latest offerings in the UniSim Refining portfolio. It includes the only individual reactor models built from the ground up on the next-generation Equation Oriented (EO) modeling platform, which solves all equations simultaneously (rather than sequentially) and provides comprehensive, model-wide optimization. The FCC reactor can be configured within the UniSim EO environment, together with other unit operations. The reactor fits into Honeywell’s overall UniSim refining model with interconnected processes allowing simulation of how one processing unit influences another. The result is a larger, refinery-wide simulation of how to run operations to produce more valuable and salable products.

![Figure 1: Honeywell’s UniSim Design FCC Reactor can be configured within the UniSim EO environment, together with other unit operations.](image)

**Take advantage of Honeywell UOP experience:** Developed in collaboration with Honeywell UOP, a global leader in advanced refining technology, the UniSim Design FCC Reactor employs a high-fidelity kinetic reactor module and is able to handle highly integrated and complex flowsheets. The reactor can be configured with other unit operations to represent the entire fluid catalytic cracker unit.

Today’s complex petroleum refineries rely on a number of secondary conversion processes, including fluid catalytic cracking (FCC), to diversify their product offering.
The UniSim Design FCC Reactor software is backed by the domain expertise of Honeywell Process Solutions and leverages the deep insights of Honeywell UOP.

With the versatile UniSim Design FCC solution, refineries can deploy advanced simulation strategies to evaluate feed alternatives for their FCC unit and decide whether to push feed rate or conversion. They can also examine cause and effect relationships and determine potential unit performance using various feed types. In addition, engineers can generate a consistent set of LP vectors with accurate product yields, qualities and unit constraints for different feedstocks and operating conditions. This solution addresses all major operational FCC reactor variables, including feed rate, composition and temperature; reactor outlet temperature; catalyst activity; etc.

The Benefits

Greater knowledge of unit performance: The UniSim Design FCC Reactor provides access to key performance indicators (KPIs) related to the overall FCC operation. This includes (but is not limited to) gasoline RON and selectivity, coke yield and catalyst-to-oil ratio.

Powerful modeling functionality: The UniSim Design FCC Reactor enables refineries to perform reactor calibration and/or kinetic parameter optimization to determine the best fit model depicting their plant configuration and conditions. They can also keep LP programs up to date for scheduling and planning purposes.

Faster operational decision-making: The UniSim Design FCC Reactor is implemented in the UniSim EO environment, which enables engineers to arrive at key operational decisions faster—making it suitable for both design and optimization applications. Additionally, they can do simple calibration and tuning. The reactor was specifically developed for refining end users, eliminating the need for expert consultants.

Knowledgeable Support

The UniSim FCC Reactor software is backed by the domain expertise of Honeywell Process Solutions and the deep insights of Honeywell UOP, which cover all aspects of the refining and petrochemical field. Customers can rely on Honeywell’s Global Technical Assistance Center (GTAC) for the help they need, no matter where they are located.

UniSim Design Suite Support Services

This product comes with worldwide, premium support services through our Benefits Guardianship Program (BGP). BGP is designed to help our customers improve and extend the usage of their applications and the benefits they deliver, ultimately maintaining and safeguarding their advanced applications.

Honeywell provides a complete portfolio of service offerings to extend the life of the plant and provide a cost-effective path forward to the latest application technology. The services include:

- Standard and Customized Training
- Consulting
- Model Building
- Engineering Studies
- Custom Thermo/Unit Operations

Why Honeywell

With over 40 years of worldwide experience in the refining industry, Honeywell provides proven technologies to support a quick and safe refinery start up, and efficient operations. Our solutions enable refiners to meet today’s demands in innovative and effective ways, lowering costs while reducing risks, optimizing processes, and maintaining the newest and best infrastructure to support
their business and operational needs.

Honeywell Process Solutions is committed to providing a wide range of software solutions for refining and petrochemicals. By combining our best-in-class automation technology with proprietary know-how of plant and process design from Honeywell UOP, we provide the largest portfolio of products and services available to refining companies. This includes solutions for automation & process control, advanced applications, regulatory compliance, and operator performance.

For More Information

Learn more about how Honeywell’s UniSim Design FCC Reactor can improve performance, visit www.honeywellprocess.com or contact your Honeywell Account Manager.

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