



**EXPAND
YOUR PROFITS.
UNLEASH THE
POTENTIAL OF
YOUR NAPHTHA
CRACKER.**

Honeywell UOP Integrated Olefin Suite

Honeywell
UOP

STEAM CRACKING THE WORKHORSE OF THE OLEFIN INDUSTRY

Steam cracking is used to produce over 97% of the world's ethylene and more than 40% of the propylene. A variety of different hydrocarbons are used as feedstock, with ethane and naphtha being the most common.

Ethane is a preferred feedstock in regions that have an abundant supply (mainly the Middle East and North America) due to lower feedstock cost and high yield to ethylene. However, the supply of ethane is currently insufficient to meet the global demand for ethylene. Ethane is also relatively expensive to transport. Therefore, other regions, including Asia and Europe, mainly rely on naphtha as feedstock, which is available with lower transportation costs.

THE CHALLENGES OF NAPHTHA CRACKING

Operators of naphtha crackers are facing a variety of challenges:

- First, naphtha crackers tend to have a high production cost versus ethane crackers.
- Second, the higher production costs tend to make naphtha crackers the global price setter for ethylene, which limits the Return on Investment for new units.
- Third, naphtha crackers produce a large number of by-products that may not match the strategic objectives of the owner (forcing them to make derivatives they prefer not to produce or sell certain by-products on the open market where they are subject to varying demand/price).
- Finally, naphtha crackers have a large environmental footprint.

GET MORE OF WHAT YOU NEED

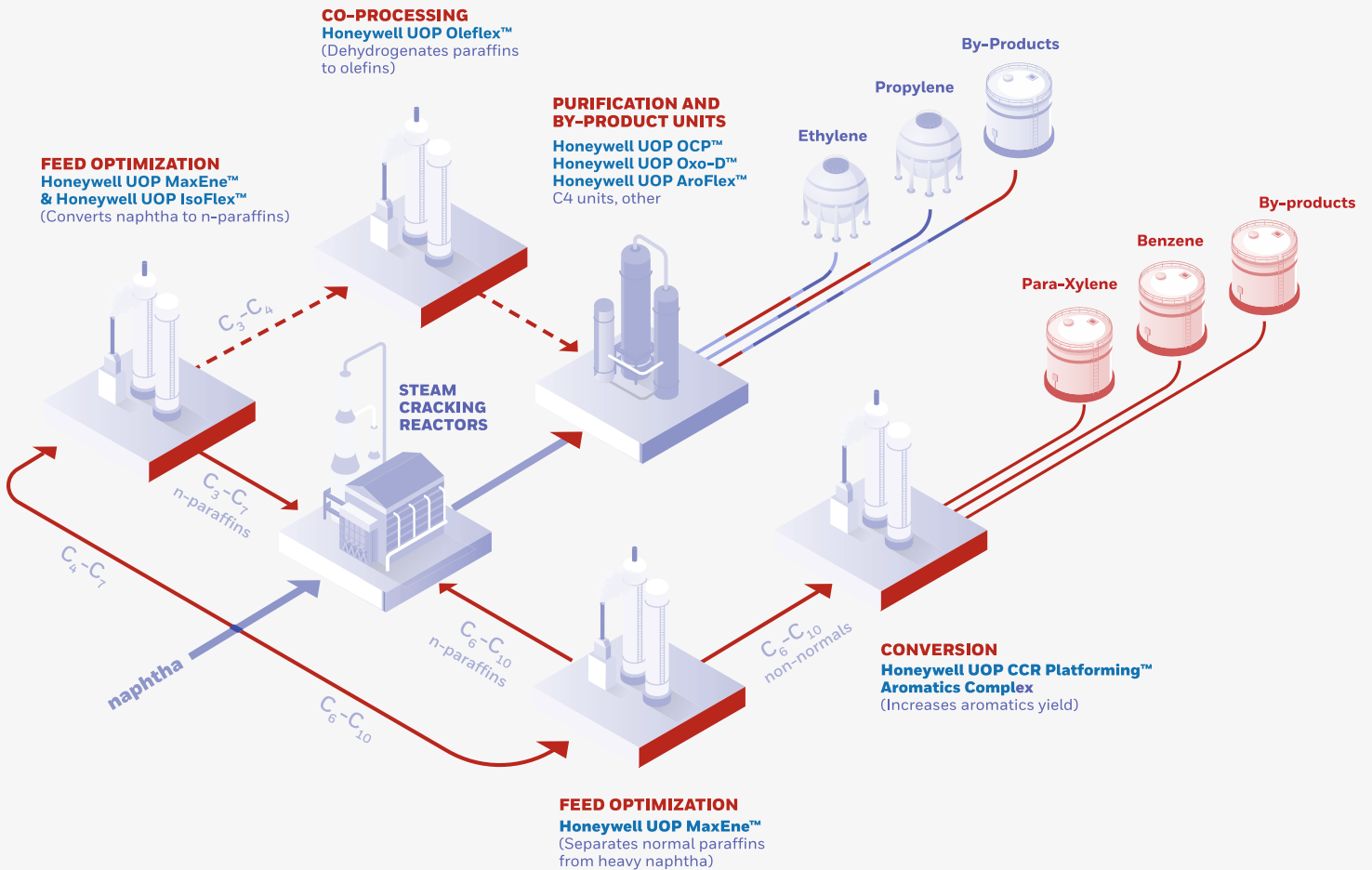
UOP understands the challenges that naphtha cracking investors and operators are facing. An innovative take on proven UOP technologies, the UOP Integrated Olefin Suite has been developed to enhance the performance of naphtha crackers.

INTRODUCING THE UOP INTEGRATED OLEFIN SUITE

The UOP Integrated Olefin Suite includes three main sections:

- A feed optimization section that allows the cracker to produce a more valuable product slate with more ethylene and fewer by-products.
- If more propylene is desired, there is an option to add an Oleflex™ unit (propane dehydrogenation unit) to convert propane made in the Feed Optimization section along with other sources to propylene.
- Options are also available to add different by-product processing units to increase, decrease, or eliminate other by-products, so the owners produce only the by-products they want and in the quantities they need.

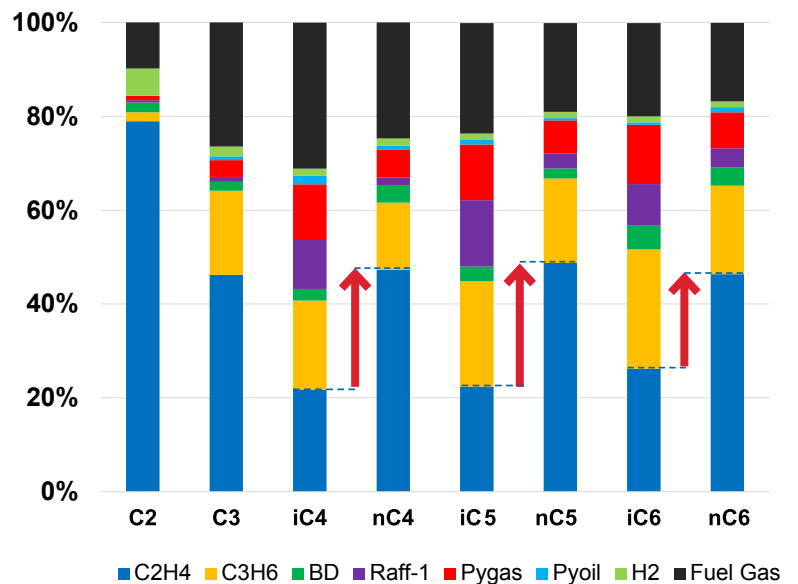




HOW DOES IT WORK?

- The feed optimization section transforms typical light naphthas that contain a mixture of normal paraffins, iso-paraffins, naphthenes, and aromatics into a naphtha cracker feed that is rich in n-paraffins. Normal paraffins increase the yield of ethylene and decrease the yield of most by-products including propylene, butadiene, butenes, pygas, and pyoil.
- For customers needing more propylene, the Total Petrochemicals / UOP Olefin Cracking process is available to upgrade C4-C8 olefin by-products to additional propylene and ethylene. If even greater amounts of propylene are desired the UOP Oleflex Process can efficiently convert propane, including propane generated in the feed optimization section, to significant incremental propylene.
- To better manage by-products, UOP has technologies to increase, decrease or eliminate the production of butadiene, butenes, higher olefins, and aromatics.
- The UOP Integrated Olefin Suite solution is suitable for both new crackers and revamps of existing crackers.

Steam Cracking Yields, wt%



*Data has been extracted based on the sources mentioned in footnote⁴



PROVEN TECHNOLOGIES. HIGH FLEXIBILITY. DRIVING BETTER OUTCOMES.

The UOP Integrated Olefin Suite increases operating margins by producing a more valuable product slate, increasing light olefin production, and tailoring by-products to meet your strategic objectives.

WHAT PROBLEMS DOES IT SOLVE?

- **Increases profitability** from cracking operations to improve competitiveness².
- **Increases light olefin production** (ethylene and/or propylene) even when feedstocks are constrained.
- **Increases, decreases, or eliminates steam cracker by-products** (e.g., butadiene, butenes, benzene.)
- **Facilitates an economic transition** from fuels to petrochemicals.
- **Maximizes production** of light olefins from high-priced bio-naphthas².
- **Reduces CO₂ per ton feed** upto 55%².

- It gives steam cracking operators an unprecedented level of control over by-products to align with their strategic objectives.²
- It opens up a pathway to produce significant amounts of propylene from naphtha, which can be particularly valuable for customers not having easy access to propane.
- Increase carbon efficiency to light olefins up to 40% via molecule management².

FEATURES AND BENEFITS

MAXIMIZE ETHYLENE

Boost the production of ethylene from naphtha by 15%-30%¹ in typical applications and over 50%² in certain situations using MaxEne and IsoFlex to convert C4-C7 hydrocarbon streams containing normal paraffins, iso-paraffins, naphthenes and aromatics to an ideal and consistent steam cracker feed containing over 90% n-paraffins.

MAXIMIZE PROPYLENE

If more propylene is desired, byproduct C4-C8 olefins from the cracker along with other sources can be converted into mainly propylene using the Total Petrochemicals/ UOP Olefin Cracking Process. If even greater production of propylene is desired, propane from other sources can be fed to a UOP Oleflex unit to generate a step change in propylene.

REDUCE FEEDSTOCK

With the higher yields of ethylene and propylene from a given amount of feed stock, the UOP Integrated Olefins Suite can reduce feedstock requirements by up to 50%³ for a given light olefin production.

CUSTOMIZE BY-PRODUCTS

The UOP Integrated Olefin Suite contains optional process technologies to increase desired by-products and decrease or eliminate undesired by-products to meet your strategic objectives.

REDUCE ENVIRONMENTAL FOOTPRINT

The Integrated Olefin Suite significantly** improves the efficiency of olefin complexes and reduces environmental footprint^{2,3}.

** It depends on the customer's objective/ which process they want to deploy/ types of feedstock.

¹ Based on yield estimations from commercial steam cracking model for a typical light naphtha before and after processing using MaxEne and IsoFlex

² Based on customer (ID# 0030) study using standard Honeywell-UOP process simulations to generate a side-by-side comparison of a crude to olefins complex using conventional technology and a crude to chemicals complex with the UOP Integrated Olefin Suite including MaxEne, IsoFlex, Oleflex and AroFlex. Dated: Sept 2021

³ Based on customer (ID# 0031) study using standard Honeywell-UOP process simulations to generate a side-by-side comparison of a crude to olefins complex using conventional technology and a crude to chemicals complex with the UOP Integrated Olefin Suite including MaxEne, IsoFlex, Oleflex and AroFlex. Dated: Sept 2021

⁴ Internally generated yield information predicted using purchased commercial steam cracking model (CoilSim)The data is of typical yields for different feed components when processed in naphtha cracker. This has been extracted considering different temperature, feedstock, other design parameter, typical operating severity. This graph is for illustration purpose. But not which UOP is representing the performance of.



TAILORED TO YOUR UNIQUE NEEDS

UOP is your partner: we are equipped to efficiently work with you to develop the most optimal solution to meet your objectives. We're the company that can offer a petrochemical complex to make the products you want in the quantity that you need.

WHY HONEYWELL-UOP?

Only UOP can bring the comprehensive solutions needed to maximize the potential of your naphtha cracking unit. For 100 years, Honeywell UOP has been one of the leading international supplier and licensor for the petroleum refining, gas processing, petrochemical production and major manufacturing industries. As a respected pioneer, we are responsible for developing and implementing some of the most groundbreaking technologies in the world.

For more information

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