



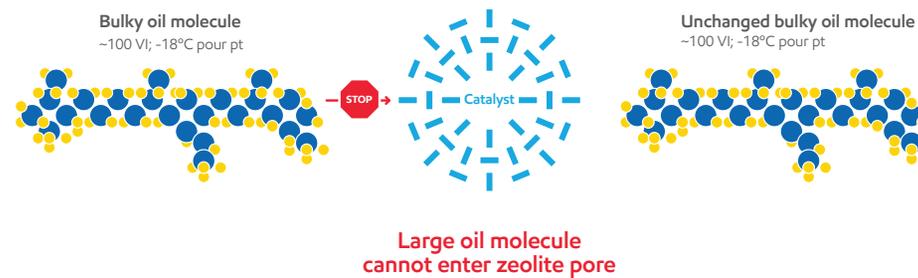
## Maximum productivity and profitability

Boost yields with MSDW™ technology

Energy lives here

Demonstrated in nearly 20 years of proven performance, MSDW selective dewaxing technology delivers outstanding activity, yield, selectivity, run length and durability. Refiners rely on MSDW catalyst technology to improve base stock cold-flow properties and convert wax to high VI lubricant.

### Hydroprocessing value



### Catalytic dewaxing technology

Proprietary shape-selective catalysts containing zeolites and small amounts of noble metals are specifically designed to isomerize n-paraffins and saturate aromatics with maximum selectivity to lubes and minimal cracking to fuels.

The catalysts display superior activity and unsurpassed tolerance to nitrogen, sulfur and aromatic contaminants in the feed. Even degradation in feed quality, which can poison other catalysts, requires only a temporary increase in operating temperature with minimal impact on aging and virtually no impact on product yield.

### Key benefits

#### Higher performance

- Increased yields
- Improved selectivity
- Higher activity
- Long life

#### Low operating cost

- Proven performance
- Simple fixed-bed operation
- Tolerant to feed upsets

#### Exceptional product quality

- API Groups II, II+, III and III+ classification
- Outstanding low-temperature performance
- High oxidation stability
- Low and high viscosity grades

### Operational flexibility

High contaminants tolerance improves stability and reliability, and MSDW is compatible with a full range of feed from light neutral to Bright stock. MSDW catalyst technology is capable of processing a wide range of feedstocks, from hydrotreated or hydrocracked VGOs and DAOs to hydrotreated raffinates and slack waxes. Typical products are base stocks in the API Group II to III+ range, with viscosity grades as low as 2 and as high as 25 cSt at 100°C.

### Increase profitability

The proven, highly selective MSDW catalyst has demonstrated some of the highest base oil yields, maximizing profitability. Extremely high catalyst activity can lower capital costs and improves run length.

To put the yield advantage in context: for an average MSDW unit, a difference of 1 percent in base stock product yield is currently worth between \$2 million and \$4 million per year over producing diesel fuel, or about \$7 million to \$8 million in annual revenue.

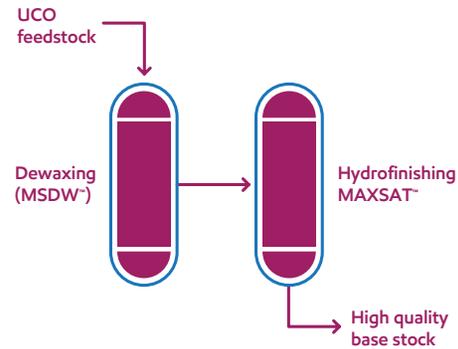
Even the by-product is valuable because the majority of the conversion product is diesel fuel with essentially no sulfur, an excellent cetane number and outstanding low temperature properties. The product is often blended with other distillates to increase the quality of the diesel pool or to supplement sources of arctic-grade diesel.

### Market leader

MSDW is the clear technology leader, currently used in 21 units, with more than 30 licenses. More than 55 percent of Group II and Group III is currently produced over MSDW. None of the more than 20 commercial units operating with MSDW catalyst has changed the catalyst fill due to aging, poor performance due to feed contamination, refinery upsets or reaching end of cycle. Two of the units have operated for more than 12 years, with one still using the original catalyst fill.

### Continued advancement

Through on-going R&D, we continue to boost yield, improve tolerance to heteroatom contaminants and broaden the range of acceptable feedstock. The MSDW system is in its third generation, offering better activity, selectivity and polar tolerance.



### About us

ExxonMobil helps refiners and petrochemical manufacturers increase capacity, lower costs, improve margins, reduce emissions and operate safe, reliable and efficient facilities. Along with a commitment to helping to implement best practices and to achieve better results, we provide cutting-edge proprietary catalysts and license advantaged process technologies for refining, gas and chemical needs.

>55% of global Group II and Group III base stocks are produced using MSDW technology

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