



# Why Lubricant Prices Don't Mirror Crude Oil Prices

Changes in the prices of lubricants, and the base oils that are their foundation, do not mirror either those of crude oil or gasoline. **Supply and demand over time is the fundamental price-setting mechanism for lubricants and base oils.**

## Crude Oil Prices

The oil industry is a complex, global industry; however, there are three fundamental drivers for crude oil prices: supply versus demand, commodities markets, and the value of the U.S. Dollar. Crude oil is traded in a global market, and its prices are affected by geopolitical and weather-related events, supply chain mishaps and other causes that can disrupt the flow of crude oil to markets or the demand for that oil.

Commodities futures markets allow traders to buy contracts for crude oil for future delivery at an agreed-upon price and location. However, many traders have no intention of taking ownership of the crude oil, planning instead to sell the contract

for a profit. The ups and downs in the commodities markets affects crude oil prices as traders think of what the price of crude oil will be in the future.

Crude oil prices are denominated in U.S. Dollars, so they rise and fall compared to the currencies of other countries.

Even though there are many types of crude oil, typically the per-barrel price one sees in the news every day is a benchmark price for West Texas Intermediate or Brent North Sea crude oil. However, while crude oil can be purchased directly on the "spot market," the daily, reported crude oil prices do not reflect what the refiner or customer actually pays for crude oil.

## Refinery Operations

Crude oils containing thousands of hydrocarbons are processed at refineries into finished products, including base oils for producing lubricants. Crude oils differ physically and chemically, such as density and sulfur content, so refiners make crude oil purchase decisions based on factors, including location, transportation options and refinery optimization (including the ability to process a given crude and its associated product yields). Refineries have varied flexibility with crudes oils, meaning some refineries are locked into certain slates of crude and cannot run all types of crude oils.

No two refineries are alike, even though they each have three basic steps: separation, conversion, and treatment. U.S. refineries emphasize producing transportation fuels, with some 80 percent of the output being gasoline and diesel fuels. Base oils typically represent one percent of a refined barrel (42 gallons) of crude oil.



In addition to crude oil costs, refiners have fixed and variable costs in running their refineries. Fixed costs do not vary with the level of refinery throughput at any given time and include labor and equipment costs. Variable costs vary with the level of refinery throughput and include energy, chemicals and catalysts. Refiners often express their total costs on a per-barrel of crude oil basis. As refinery output declines, its per-barrel cost of operation goes up.

### Base Oil Pricing

Unlike prices for transportation fuels that are closely correlated with crude oil prices, base oil prices are less affected by crude oil price changes and have always been more complicated. Refiners produce different types of base oils that are classified by American Petroleum Institute (API) Group, depending on

viscosity index and the proportion of sulfur and saturates. Base oils generally cost more to produce than transportation fuels. Their costs of production set price floors for each of the API base oil groups. However, each refinery has a unique cost structure, in part, because of crude, energy and labor costs, and they compete against a range of market drivers, including API Group, viscosity, co-products, and by-products.

Base oil prices within each API Group are tied closely to the demand for targeted final applications, such as finished automotive and industrial lubricants. For example, increased demand for engine oils will shift base oils out of blending for industrial oils and will increase the prices for those needed base oils. Refiners set their base oil prices on their estimates demand in the market for these final applications.



### Lubricant Pricing

Base oils make up about 70-80 percent of a typical gallon of automotive lubricants and 90-99 percent of a typical gallon of industrial lubricants. All base oils have characteristics that determine how they will perform under intended use. Some of the most important base oil properties include viscosity index, volatility, pour point, oxidation and thermal stability. Chemical additives that make up the remaining gallon of lubricants are added to control or affect these properties.

Formulators choose base oils and additives to give them the lowest total costs to meet the specific quality or performance requirements they are trying to meet. A lubricant manufacturer may blend different API Group base oils together to meet this lowest total cost. Typically, the lubricant manufacturer will not pay for a higher quality base oil if it is not needed to optimize its asset/application mix or if it has operational constraints, such as tank capacity; however, supply and demand imbalances may allow for the use of higher quality base oils, if convenient. In many instances, base oils cannot be easily substituted, because many end-users' products are approved based on specific base oils and it takes time and resources to approve alternative or replacement base oils.

Beyond base oil and additive costs, the lubricant manufacturer has other manufacturing costs, including containers and container labels. In addition to transportation costs, the lubricant manufacturer has plant operating and overhead costs. These costs vary by location and the size of the facility.

In addition to its total costs that set a floor for the lubricant manufacturer's per-gallon price for lubricants, it also assesses supply and demand. If there is a high demand or undersupply, and product substitution is not effective, prices would be pushed higher.

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