

# How does the re-refining of lubricating oil work, after all?

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It is usual to hear about the recycling of lubricating oil. The National Environment Council (CONAMA, Conselho Nacional do Meio Ambiente, in Portuguese) uses a specific term for this: re-refining. Because the initial process of producing lubricating oil occurs at petroleum refineries, the word is suitable. A previously used or contaminated oil would therefore need to be refined once more.

The emphasis on this technique is mostly for environmental reasons. A single liter of lubricating oil can get contaminated and potentially destroy all of the oxygen in one million gallons of water. Don't you find it surprising? Without a doubt, all individuals working in the lubricant oil sector should be more familiar with the re-refining process.

If you have any concerns regarding the new technologies in this area and require additional technical information, please refer to our detailed description of the re-refining process. This post is based on an exclusive conversation with Marcelo da Costa Loures, PETRONAS's executive for industrial lubricants. Check it out!

## Why is the re-refining important?

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The process of re-refining is simply one aspect of reverse logistics. It is also the process of collecting used (seemingly useless) products to be discarded appropriately. This can include both reuse and disposal using effective means. Re-refining provides economic benefits to the company that does it as well as significant environmental benefits. See the reason below.

### Savings on raw materials

Firstly, it is vital to understand the basic composition of a lubricant: base oil and additives. Oil, like gasoline and diesel, is a petroleum derivative that is obtained from refineries. The higher the demand for lubricants, the higher the need for petroleum extraction, and consequently, the final raw material cost will be higher. So, where does re-refining fall in? This is the second method of obtaining basic mineral oil. To get a sense of the magnitude of the savings, 1000 liters of used lubricating oil can result in 700 to 800 liters of oil that can be returned to the manufacturing process of lubricants and other products, as we will see later.

### Environment

The environmental aspect is more important than raw material savings. Remember what we saw in the introduction about the enormous pollution potential of oil. When it comes into touch with water, it can form a thin coating on the surface that prevents air and light from passing through. It inhibits aquatic life's respiration and photosynthesis. Aside from damage to the water, there is also damage from the burning of used oil. Such burning produces carcinogenic and toxic gases. Groundwater can become irreversibly contaminated if the used oil is discarded on the ground. So, the re-refining prevents all these damages.

## What are the steps involved in re-refining?

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Some people argue that the procedure is too costly. However, examining the factors involved indicates that it is not that complicated. The first step for a company to begin re-refining is to develop a waste management plan that will inform about the product's life cycle and how it should be treated. See the involved steps below.

### Collection and transportation

Each organization is responsible for collecting or paying for the collection of discarded oil. Vehicle dealerships, vehicle repair shops, factories and petrol stations can serve as collection points. Then, because the material is hazardous, its transportation is done in specially designed trucks operated by specially trained drivers. In the next step, laboratory tests are undertaken to identify impurities and classify the oil that will be purified. This assures a high standard of quality and excellent yield rates.



### Chemical Processes

The Internet of ThingsMeio Ambiente Industrial Magazine, Year VI, ed. 31, # 30 describes the involved chemical processes., also known as IoT connects items to the network via sensors capable of receiving orders as well as collecting and transferring information.

1. Dehydration: the oil is dumped into collecting boxes, where it is filtered and sieved to eliminate condensed parts. After that, preheating is used to perform dehydration.
2. Distillation: to get the light fractions, the dehydrated oil is passed through furnaces heated over 200°C.
3. Deasphalting: at this stage, asphalt is removed from the oil at temperatures above 300°C, separating the most degraded sections of the oil.
4. Chemical treatment (acid sludge): sulfuric acid is added to the deasphalted oil at this stage to produce "acid sludge" a highly polluting waste. The sludge becomes heavy fuel after being treated with water, neutralized, and dehydrated. After the water has been neutralized with lime, it is transferred for treatment, where the sulfuric acid is converted into magnesium sulfate.
5. Clarification and neutralization: at this stage, a bleaching agent is added to absorb unsuitable compounds. Mixing this with lime to adjust the acidity of the oil is an additional step.
6. Filtration: at this stage, the oil is filtered once more, this time in press-type filters. Following this step, the re-refined oil is obtained.



## What are the byproducts of re-refining?

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### New lubricating oil

The primary outcome of the method described above is an oil with the same qualities as base oil from petroleum refineries. But it will still receive additives to suit each specification of use. This new oil is produced by approximately 80% of re-refining.

### Asphalt fraction of the oil

The majority of the pollutants extracted from an old oil can be reused as a plasticizer additive in manufacturing high-performance asphalt products used for waterproofing, for example.

### Gypsum

The acidic water produced by washing the sludge is neutralized with lime mud and quicklime, resulting in gypsum for soil pH correction.

### Heavy fuel

The acid sludge from re-refining is the source of the heavy fuel. It can be used in huge, low-speed engines, such as those found in ships. It is also suitable for use in high-temperature ovens.

As you can see, re-refining is not only required by law, but it is also advantageous to the company and the environment. According to Marcelo da Costa, "reverse logistics must always be part of the initial development of the product, that is, in the creation phase of the product, we discuss how it will be destined or reused after release."

We are confident that you enjoyed learning more about oil re-refining. We now have a special offer for you: the Lubricant Similarity Table . The table will assist you in better understanding the various oils and greases available on the market.



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