

SEQUOIA'S RE-REFINING TECHNOLOGY

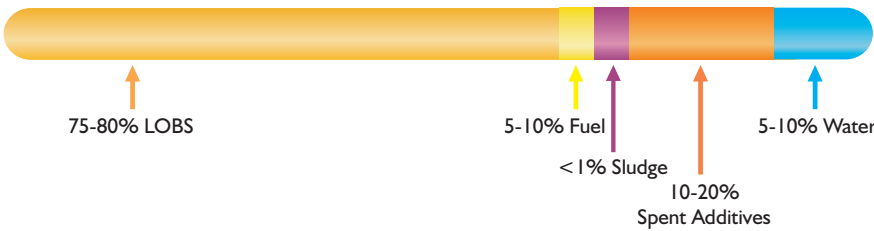
- Based on thin-film evaporation and hydrotreating processes
- This process combination is commercially most successful worldwide
- Highest product quality and yields, including those for intermediate products and byproducts.
- Environmentally friendly

WHAT IS RE-REFINING?

Composition of new lubricants



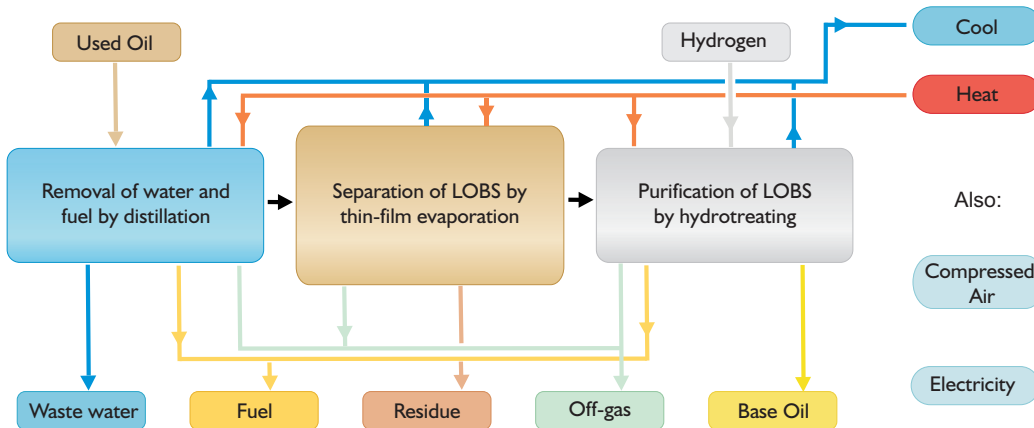
Composition of used lubricating oils



Re-refining

- Separation of lube oil base stock (LOBS) from spent additives and other contaminants present in used oil
- Purification of LOBS to Internationally-accepted premium standards.

BLOCK DIAGRAM OF SEQUOIA'S TECHNOLOGY FOR RE-REFINING:



KEY DATA

Mass Balance

IN		OUT	
Wet Used Oil (with 5% water)	100.0	Base Oil	75.0
Hydrogen	0.2	Fuel	6.0
Water	5.0	Residue	14.0
		Wastewater	10.0
		Off-gas	0.2
Total	105.2	Total	105.2

Consumables for processing

1m³ (1000 liters) of used / waste oil

	Unit	Quantity
Electricity	kwh	90
Heat	kcal	180000
Water	litre	700
Catalyst	kg	0.4

ECONOMICS OF RE-REFINING

- The cost for electricity, fuel, water, wastewater disposal and chemicals will be \$40-50 per m³ (US\$ 0.15-0.19 per US gallon) of used oil processed.
- Direct labor (operators, maintenance, laboratory, engineering) will be about 25-30 persons.
- The land requirement for a fully integrated re-refining facility (including hydrotreating, tanks, truck loading/unloading areas, office & laboratory buildings) will be about 2 acres (8000-9000 m²).
- Overall profitability depends on geography (mainly production labor costs) and capacity (as fixed costs remain constant over a wide capacity range).
- Simple payback period for a new plant in a developing country processing 20000 m³ per year of used oil will be less than two years.
- The payback period for a new plant in the USA/EU processing 11 million gallon (40000 m³) per year will be less than two years.

ENGAGING SEQUOIA

Sequoia will custom design the re-refining plant for each project. Sequoia can also supply the plant equipment / modules and manage the project from conception to startup.

Sequoia should be engaged for a role that is best suitable to the customer. Ultimately, it's the role that requires lowest total investment and delivers timely completion of the plant with high quality of components and construction.

WHEN YOU CALL UPON US, BE READY TO DISCUSS:

- Plant location and capacity
- How will you secure the feedstock and at what price
- Your research about product quality, grades, expected selling price
- Availability of utilities near and at the plant site.

OVERVIEW OF SEQUOIA

Sequoia Energy & Environment Pvt. Ltd.

Sequoia is a renewable resource technology company based in India. Sequoia designs and builds plants for:

- Re-refining of used lubricating oils - separation of lube oil base stock (LOBS) from used oil using thin film evaporation and purification-stabilization of LOBS to premium International standards using hydrotreating technology.
- Complete removal of water from wastes contaminated with soluble and/or highly emulsified oils using Oil Dehydrator.

Sequoia's role in a project is flexible and determined by the project owners depending on their needs and capabilities.

SEQUOIA'S MISSION STATEMENT

- We are committed to our **customer's success** and our **employees' future**.
- We employ engineering technology and global sourcing of products & services for serving Mother Nature and her children.
- We will continuously strive to innovate and improve our methods and technologies.
- We aim to be the absolute best **team** in the market we serve.



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