A DIVISION OF
SPECX TECHNOLOGIES PVT. LTD.



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USED OIL RE-REFINING

USED OIL · BLACK OIL · SPENT LUBE RECYCLING

Turnkey re-refining plants that recover base oil from spent lubricants: pre-treatment, vacuum distillation and a finishing step chosen to suit the feed and the market.

- Chemical pre-treatment
- Dehydration & light-ends removal
- High vacuum distillation
- Wiped film / short-path evaporation
- Clay & carbon finishing
- Adsorbent or solvent polishing

DIVISION
hitorq.in

GROUP
www.specxtech.com

EMAIL
connect@specxtech.com

PHONE
+91 7600 12 1222

PROCESS OVERVIEW

SPENT LUBRICANT IS MOSTLY GOOD BASE OIL

A lubricant wears out long before its base oil does. In service it collects water, fuel dilution, wear metals, soot and oxidation products, and its additives are used up. Re-refining strips away those contaminants and returns the hydrocarbon backbone to the market as base oil, which can be blended into new lubricants.

HiTorq plants follow a proven sequence: clean the feed, distil it gently under vacuum, then finish the distillate to the colour, odour and stability your customers expect. The finishing step is the part we tailor most closely to each project.

01 **Receipt & settling**
Collected oil is heated and settled; free water and sludge are drawn off.

02 **Pre-treatment**
Chemical and thermal treatment drops out metals, ash and carbon ahead of distillation.

03 **Dehydration & light ends**
Remaining water and fuel-range hydrocarbons are flashed off and recovered.

04 **Vacuum distillation**
Lube-range fractions are vaporised at low temperature and condensed as clean cuts.

05 **Finishing**
Clay, adsorbent or solvent treatment brings the cuts to final specification.

WHY PRE-TREATMENT MATTERS

PROTECT THE HOT SECTION

Metals, additive ash and fine carbon are the main causes of fouling and coking in heaters, evaporators and vacuum systems. Removing them before the oil is heated keeps heat-transfer surfaces clean, stretches run lengths between cleanings and gives a lighter, more stable distillate.



FIG. 1.1 RECOVERED BASE OIL AFTER FINISHING

BENEFITS ENGINEERED IN

- **Longer run lengths** between shutdowns for cleaning.
- **Lower heater duty** because fouling does not insulate the tubes.
- **Better distillate colour**, which eases the load on the finishing step.
- **Saleable by-products**: fuel-range oil and a heavy residue suited to bitumen blending or similar uses.
- **Feed flexibility** for mixed engine, industrial and hydraulic oils.
- Chemistry selected to avoid banned or hazardous reagents and to meet local discharge rules.

PRODUCT STREAMS FROM A RE-REFINING PLANT

Base oil
Light and heavy lube cuts, the main product

Fuel oil
Gas-oil range light ends, used as plant fuel or sold

Residue
Heavy bottoms for bitumen and similar applications

Water
Separated and sent to effluent treatment

Yields depend strongly on the feed collected and are established from your samples during the design stage.

DISTILLATION TECHNOLOGY

LOW PRESSURE, LOW TEMPERATURE, CLEAN CUTS

Lube-range hydrocarbons boil at temperatures where they would start to crack at atmospheric pressure. Reducing the pressure lowers their boiling points, so they can be vaporised without thermal damage. The deeper the vacuum and the shorter the time the oil spends hot, the better the colour and stability of the distillate.

We offer three distillation configurations. The choice depends on plant size, the cut points you want, the share of heavy material in the feed and how much operating flexibility you need.

TABLE 1.1 DISTILLATION CONFIGURATIONS COMPARED (QUALITATIVE)

CONFIGURATION	HOW IT WORKS	WHERE IT FITS
Fractionating vacuum column	Heated oil enters a packed column under vacuum; side draws give separate light and heavy lube cuts	Larger plants needing several sharp cuts
Wiped film evaporator	Rotor blades spread the oil as a thin film on a heated wall; vapour forms in seconds and is condensed outside	Heat-sensitive feeds, low coking, compact layouts
Short-path evaporator	Wiped film with an internal condenser for the deepest vacuum and lowest temperature	Heavy cuts and premium quality targets



FIG. 1.2 FROM BLACK FEED TO CLEAR BASE OIL: SAMPLES ARE CHECKED AT EVERY STAGE

HEATING

Indirect or direct

Thermic fluid circuits give gentle, even heat. Direct firing suits larger units where fuel economy leads.

VACUUM

Matched to the cut

Steam ejectors, liquid-ring and dry pumps, or combinations, sized to the operating pressure needed.

CONTROL

Stable operation

PLC/HMI control of temperatures, vacuum and levels for consistent product from shift to shift.

FINISHING & POLISHING

CHOOSE THE FINISH YOUR MARKET PAYS FOR

Distilled oil still carries traces of colour bodies, odour, nitrogen and sulphur compounds and oxidation products. A finishing step removes them. Each route below is well established in the industry; we help you choose by comparing product quality, consumables, waste and capital cost for your situation.

TABLE 1.2 FINISHING ROUTES FOR DISTILLED LUBE OIL

ROUTE	PRINCIPLE	WASTE / CONSUMABLE	MODE
A · Clay & carbon	Polar impurities and colour bodies adsorb onto activated clay and carbon, which are then filtered out	Spent clay for disposal	Batch
B · Regenerable adsorbent	Oil flows through fixed beds of mineral adsorbent; when loaded, the beds are regenerated in place and reused	Minimal; media replaced after long service	Semi-continuous
C · Solvent extraction	A selective solvent such as NMP extracts aromatics and polar compounds; the solvent is recovered and recycled	Small extract stream	Batch or continuous
D · Hydrofinishing	Hydrogen over a catalyst saturates and removes sulphur, nitrogen and oxygen compounds	Hydrogen supply needed	Continuous



FIG. 1.3 SKID-MOUNTED ADSORBENT POLISHING UNIT WITH REGENERABLE BEDS

CAPACITY

ENGINEERED TO YOUR REQUIREMENT

Plant capacity, number of cuts and finishing route are sized to your collection volume and product plan, from compact modular units to larger continuous plants.

04

WHAT WE NEED TO SIZE YOUR PLANT

- Expected feed types and monthly volumes
- Sample analysis, or samples we can test
- Target base oil grades and buyers' specifications
- Site, utilities and environmental conditions

LET'S TALK ABOUT YOUR PLANT

FROM A FEED SAMPLE TO A RUNNING PLANT.

Share your feedstock, the products you want and the capacity you have in mind. Our process team will come back with a technical route, a block flow diagram and the next steps.

01 · Send

Feed details

Feedstock type, source, analysis if available, and the volume you expect per day.

02 · Define

Target products

The grades or cuts you need, the quality they must meet, and site constraints.

03 · Receive

Technical proposal

Process route, equipment scope and an execution plan for your review.

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