

FEND-TECH

FILM EVAPORATION & MOLECULAR DISTILLATION TECHNOLOGY
CONVERTING WASTE OIL TO BASE OIL

FEATURES

- RELATIVE LOW CAPITAL COST
- LOW OPERATION MAN-POWER REQUIRED
- EASE OF OPERATION
- LOW POWER CONSUMPTION
- LOW MAINTENANCE COST

FEMD-TECH Film Evaporation & Molecular Distillation Technology

TREATMENT METHOD OF WASTE OIL

Several treatment methods could be found to deal with waste oil, and can be in turns of direct or indirect re-use at the final stage.

As to direct re-use, waste oil usually is treated as RFO (Recovered Fuel Oil), and blending with virgin fuel oil as fuel for the Power Plants and Road Stone Industry, or to spray on low caloric coal at Coal-fired Cement Kiln or industrial furnaces.

As to indirect re-use, 2 main stream processes are available. One of them is using thermal cracking or solvent extraction technology to convert waste oil to diesel-like- fuel oil, and the other one is recycling waste oil to base oil.



CORE-PROCESS OF FEMD-Tech

Core processes of recycling waste oil to base oil are inclusive of discoloration and oxidized substances and dirt rejecting. As to discoloration acid clay filtration or micro-filtration with vacuum enforcement were the main methods in the past, nevertheless, in order to eliminate environment impact, these processes are fade out, instead, solvent extraction and various grades of distillation processes are developed.

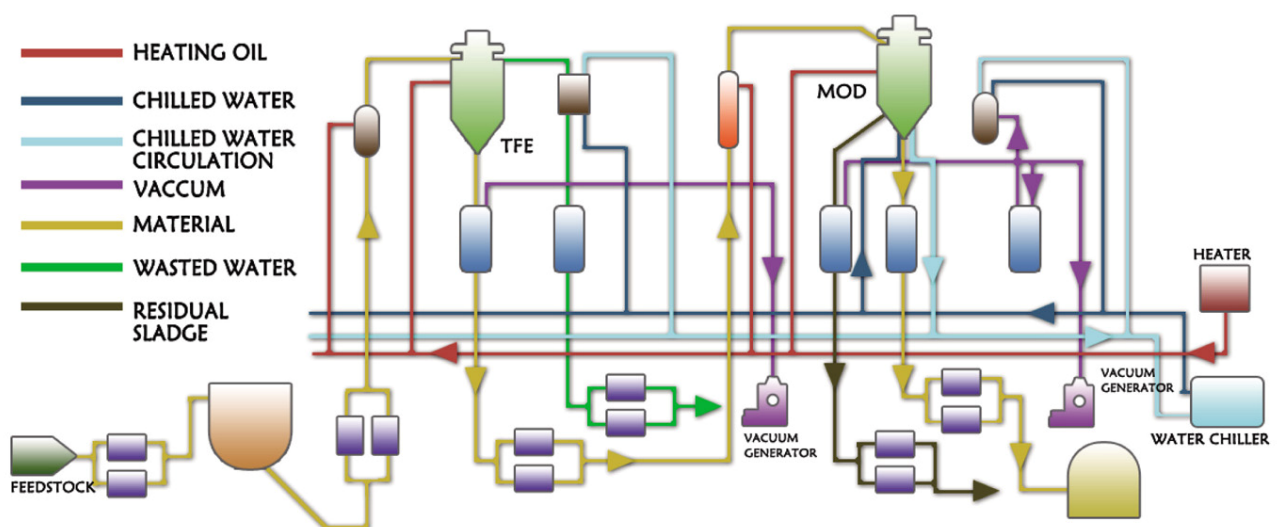


Solvent extraction technology, for large scale plant Capacity of solvent extraction technology for large scale plant consideration usually could be up to 50,000 KL annually. Capital cost, operation cost, and waste disposal, however, would be the major problems for this technology.

In exception of working times, distillation process is an ideal substitution. In order to increase working efficiency, distillation in associated with vacuum enforcement has then become a main stream technology recently.

Different from other similar technology, FEMD-Tech use high vacuum-enforcement at about 0.1 mPa in the 1st core process with Thin Film Evaporator for water repelling, and followed by a Molecular Distillation process with an ultra-deep-vacuum system at a range of 15~20 Pa for base oil recovery at the 2nd core process.

Flow Sketch



Distilling Used Engine Oil to Base Oil



WORKING PRINCIPLE

There are 2 (two) independent core processes that work respectively. The 1st core process is water repelling, feedstock from raw material storage tank conveyed by eccentric internal-gear pump to a Thin Film Evaporator (TFE). In the meantime, the low level vacuum pump starts generating vacuum force. Waste water, the heavy phase product from TFE, working at a temperature about 90 °C then drop down to the intermediate tank underneath, and oil mixture, the light phase product, ready for next processing, then by-pass to another intermediate tank.

The 2nd core process is prosecuted in a Molecular Distillation process system. Depending on properties of waste oil mixture incoming, working temperature in this phase could be various from 250 up to 350 °C.

QUALITY OF FINISHED PRODUCT

Thanks to deep vacuum enforcement, there is no need to use ultra-high working temperature in the Molecular Distillation Process. In the contrary, due to deep-vacuum enforcement, high quality sellable neutral base oil is obtainable.

Analysis report for the finished products from the system are available on request.

WASTE DISPOSAL

Total volume of possible waste material to be disposed will not be increased on contrast to its original thanks to that not any additive or chemicals is required in the processes. In general, without unexpected adding, oily water from the 1st phase core process would be not in excess of 2% on contrast to total volume of the feedstock.

Another waste from FEMD-Tech is residual oil sludge from the 2nd core process. Generally, total volume of residual/concentrated oil sludge would be about 3-6 % depending on the sources when feedstock was collected. Compositions of residual oil sludge are mainly oxidized substances, heavy metal, metallo-organic compounds, dirt, metal deactivator and so on. Usually, residual waste could be sent to the Cement Kiln or Road Stone Industry for another application.



OPTIONS PROVISION

- OILY-WATER TREATMENT PLANT

If oily-water treatment plant around the system is unavailable, a high efficient oily-water treatment plant could be provided. This plant consisting of a Cross Flow Interceptor and a 2-stage oil-water separator could eliminate free-oil content in effluent could down to less than 2PPM.

- RESIDUAL SLUDGE TREATMENT PLANT

If non Cement Kiln or Coal-fired power plant is nearby, or handling charge for the waste by the third party is too high, a residual sludge incinerator could be provided.

- HYDROTREATING & ADDITIVE DOSING & PLANT

FEMD-Tech could recycle waste oil into sellable neutral base oil. However, in some cases, the customers may request a foreign-object-repelling service. i.e. they are seeking a service which could convert waste oil back to lubricant. In this case, the operator will need a Hydro-treating & additive dosing equipment linking with the FEMD-Tech system for making different grade of lubricant.



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