

## SUBJECT: -Used Lubricant Oil (U L O) Re Refining Technology.

Coroney Technologies is recognised for its Invention of filter VACULIFE™ (US patent No: - US 8,628,607 B2) which protects vacuum pumps & systems from process impurities. VACULIFE™ has more than 1500 installation around the globe and is successfully used in many applications like pharmaceutical, chemical, oil, food, electrical & electronics industries & exported to many countries. Coroney has recently developed oil recycle technology

Used oil Re Refining is the process of extraction of lubricant oil from used discarded engine oils or waste oils.

Traditionally following technologies are used in the process of extraction of lubricant oil from discarded engine oils or waste oils, popularly known as oil re-refining:

- 1) Coagulant Clay Treatment and Distillation process
- 2) Acid Treatment, Sedimentation, Distillation and Clay treatment (Acid Process)

Both the above technologies have been identified under the Basel convention as environmentally hazardous processes and hence there is a ban on using these technologies in all countries ratifying the Basel convention.

Other processes which are widely in use are

- 1) Dehydration and High Vacuum Distillation Process using either High Vacuum distillation or Wipe Film Evaporator (WFE) or Thin Film Evaporator (TFE), etc. followed by any one of the following process to improve the colour & reduce the smell further.
  - i. Clay bleaching, or
  - ii. Solvent extraction, or
  - iii. Re-generative clay, or
  - iv. Hydrogenation

In all these technology first oil is dehydrated in Dehydration unit then pumped to Distillation unit where it is distilled under vacuum and temperature up to 330 to 370°C, to separate various fractions of oil. This distilled oil combined normally has colour of 5 to 7 depending upon the process and also has smell. It requires further treatment to improve the colour and reduce the smell either using clay bleaching / re-generative clay/ solvent extraction or Hydrogenation process. While some of these processes causing environment related issues continues to haunt this industry the heavy contamination and fouling of the equipment needs frequent shut down and maintenance.

The colour & smell in Distilled oil is caused by contaminates in used oil like Carbon, Sulphur, Sulphides & Mercaptans etc.

Keeping the issues faced by the Industry in view we have after spending substantial time and money on research, have developed High Vacuum Ionization Distillation (USHASH™ Trade mark & Patented) to charge the oil fumes and trap the sub micron & micron particles from oil vapours before condensation.

In distillation vessel under vacuum oils will be heated to 180 °C through close loop circulation through Boiler where water is removed then it further heated to 300°C where various fraction of oil are separated. During distillation sub micron & micron particle of contaminates are removed by using Entrainment separators & USHASH™

Distilled oil from our process has colour of L 3.5 (ASTM D 1500) with little or no smell with excellent flash. The lighter fractions too have little/no smell. This improved quality of distillate reduces post treatment costs substantially. Other advantage of the process is high recovery of Base oil and residue /asphalt is less than 10%.

To reduce the problem of frequent maintenance of the vacuum pumps filters (VACULIFE™) are installed in suction line to remove process Ingress & contamination also to reduce the smell from the plant.

The key highlights of the plant /technology are (i) the entrainment separators (Proprietary design) are having very high surface area with zero conductance drop (ii) no vacuum pressure drop (iii) charged micron & sub micron particles effectively can be trapped and (iv) it has self cleaning ability leading to increase the time interval (more than a year) to clean the same while inside the process vessel unlike other PAL rings & demister pads.

#### **No Separate Dehydration Unit:-**

The biggest advantage in our unit is that for plant capacity up to 50KL/Day capacity it does not require separate Dehydration System (No Dehydration Vessel, Condenser, Vacuum system, boiler etc. associated with dehydration) leading to a very big saving in capital cost compare to WFE and TFE and consequential benefits.

In order to demonstrate the effectiveness and efficiency of our technology we have set up 22 KL/day plant for demonstration purpose and running excellent for past 3 months at our site in, VADODARA, GUJARAT, INDIA.

#### **Advantages with Our Technology**

- 1) Excellent product quality
- 2) Energy and fuel efficient
- 3) Process temperature less than 310°C & Flash 220°C ++.
- 4) Little or no smell in the Distilled oil & Plant
- 5) Qualitative distillate Colour L 3.5 ASTM D 1500.
- 6) Excellent yield. & less residue (asphalt) 8-9 %.
- 7) Very less shut downs (as compared to WFE&TFE).
- 8) Capital cost is also lower compare to WFE& TFE.
- 9) Solid, Liquid& Gaseous effluents less by 60-70 %.



| S. No | Description                                                                      | Other Technologies<br>WFE, TFE | High VACUUM Ionization<br>Distillation<br>(USHASH™ Trademark & Patented) |
|-------|----------------------------------------------------------------------------------|--------------------------------|--------------------------------------------------------------------------|
| 1     | Cost of Equipment                                                                | High                           | 30-40 % Less                                                             |
| 2     | Power & fuel cost                                                                | High                           | 50 % Less                                                                |
| 3     | Man power requirement                                                            | High Skilled                   | Less Skilled and less people                                             |
| 4     | Break downs & Maintenance                                                        | High                           | 50 % Less                                                                |
| 5     | Space Requirement                                                                | High                           | 50 % Less                                                                |
| 6     | Diesel( Light ends)                                                              | Pungent Smell in Diesel        | No/Little smell                                                          |
| 7     | Smell in Distilled Oil                                                           | High Smell                     | No/Little smell                                                          |
| 8     | Post treatment cost<br>( clay or Regenerative clay or<br>Solvent, Hydrogenation) | High                           | Less by 50- 70 %                                                         |
| 9     | Yield                                                                            | Low                            | 6- 8 % more                                                              |
| 10    | Colour                                                                           | 5-7 (ASTM D 1500)              | L 3.5 (ASTM D 1500)                                                      |
| 11    | FLASH of distilled oil                                                           | 190 – 210 °C                   | 210- 250 °C                                                              |
| 12    | Process Temperature                                                              | 330 - 370 °C                   | Less than 310 °C                                                         |
| 13    | Sludge                                                                           | 12- 20 % ( Average is 15 % )   | 8-9 %                                                                    |
| 14    | Fuel to Black Ratio                                                              | 1 : 15 to 1:20                 | 1:29 to 1:33                                                             |
| 15    | Solid, Liquid & Gaseous<br>Effluents                                             | High                           | Less by 60- 70 %                                                         |

1. No expensive Thermic fluid oils and its pumps & storage tanks.
2. No pollution control devices or equipment is required
3. No oxidizers required to reduce smell in the plant.
4. No additional structure for removal of wiper in WFE & TFE units
5. Less space required
6. For small capacity plants Dehydration & distillation can be done in One Vessel to reduce project cost substantially.

