AXIUM PROCESS LTD

MEMBRANE FILTRATION ON WASTE CUTTING OIL

The traditional method of treating waste cutting oil involves correcting the pH and heating to around 65ºC to 'crack' the dispersion into an oil phase and a water phase. Eventually the separated waste water can be sent to drain (consent charges apply) and the recovered oil can be resold.

Membrane filtration in the form of "Ultrafiltration", "Nanofiltration" or "Reverse Osmosis" could be used to make considerable financial savings by reducing running costs and helping to increase the capacity of an oil treatment facility.

Example:

- If cutting oil is concentrated 5:1 with the use of ultrafiltration, then essentially the "capacity" of any existing cracking plant will be increased 5 times.
- The concentrate from the ultrafiltration system will contain less water and should produce a higher yield of oil when used in the conventional 'cracking' process.
- Cost savings are possible for road tanker transportation if untreated cutting oil is pre-concentrated using membrane filtration (Reduce the volume/increase the concentration of oil)
- Permeate water from an RO process will have significantly reduced levels of COD generally meeting the requirements of discharge consent for oil based products.

Typical Procedure:

1. Feed material is processed initially using an **ultrafiltration (UF)** membrane system.
    - The UF retains larger molecules and suspended solids while allowing smaller molecules and water to pass through to produce a clear UF permeate, free from suspended solids.

2. The UF permeate becomes the feed for a **Reverse Osmosis (RO)** membrane system.
    - The RO typically retains 95 - 99% of the salts and organics in the concentrate while allowing the passage of water to produce a clean, colourless permeate with low levels of COD.

Conclusions:

It is evident that oily waste varies considerably from batch to batch. This is supported by a variation of between 4% - 12% oil concentration measured in typical feeds.

The COD levels achieved during trials indicate that a system comprised of an ultrafiltration plant followed by a two-pass reverse osmosis plant would be sufficient to produce a clear, colourless, final RO permeate with COD levels low enough to meet discharge consent to drain.

Although feed can vary considerably it has been proved that ultrafiltration, or a combination of ultrafiltration and reverse osmosis, is a suitable method of concentrating cutting oil with consistent results.