



Technology Profile **Solvent extraction: Furfural refining**

Application

Process to produce lube oil raffinates of high viscosity index from vacuum distillates and deasphalted oil.

Feeds

Vacuum distillate lube cuts and deasphalted oils.

Products

Lube oil raffinates of high viscosity indices. The raffinates contain almost all of the desirable lubricating oil components present in the feed stock. The extract contains an aromatics concentrate that may be utilised as rubber oil or cracker feed.

Process description

This liquid-liquid extraction process uses furfural as the selective solvent for removing aromatics and other impurities present in the distillates and deasphalted oils. Furfural has a high solvent power for those components which are unstable to oxygen as well as for other undesirable materials including colour bodies, resins, carbon-forming constituents and sulphur compounds. In the extraction tower, the feed oil is introduced below the top at a predetermined temperature. The raffinate phase leaves at the top of the tower and the extract, which contains the bulk of the furfural, is withdrawn from the bottom. The extract phase is then cooled and a so-called "pseudo raffinate" may be sent back to the extraction tower. Multi-stage solvent recovery systems for raffinate and extract solutions ensure energy efficient operation.

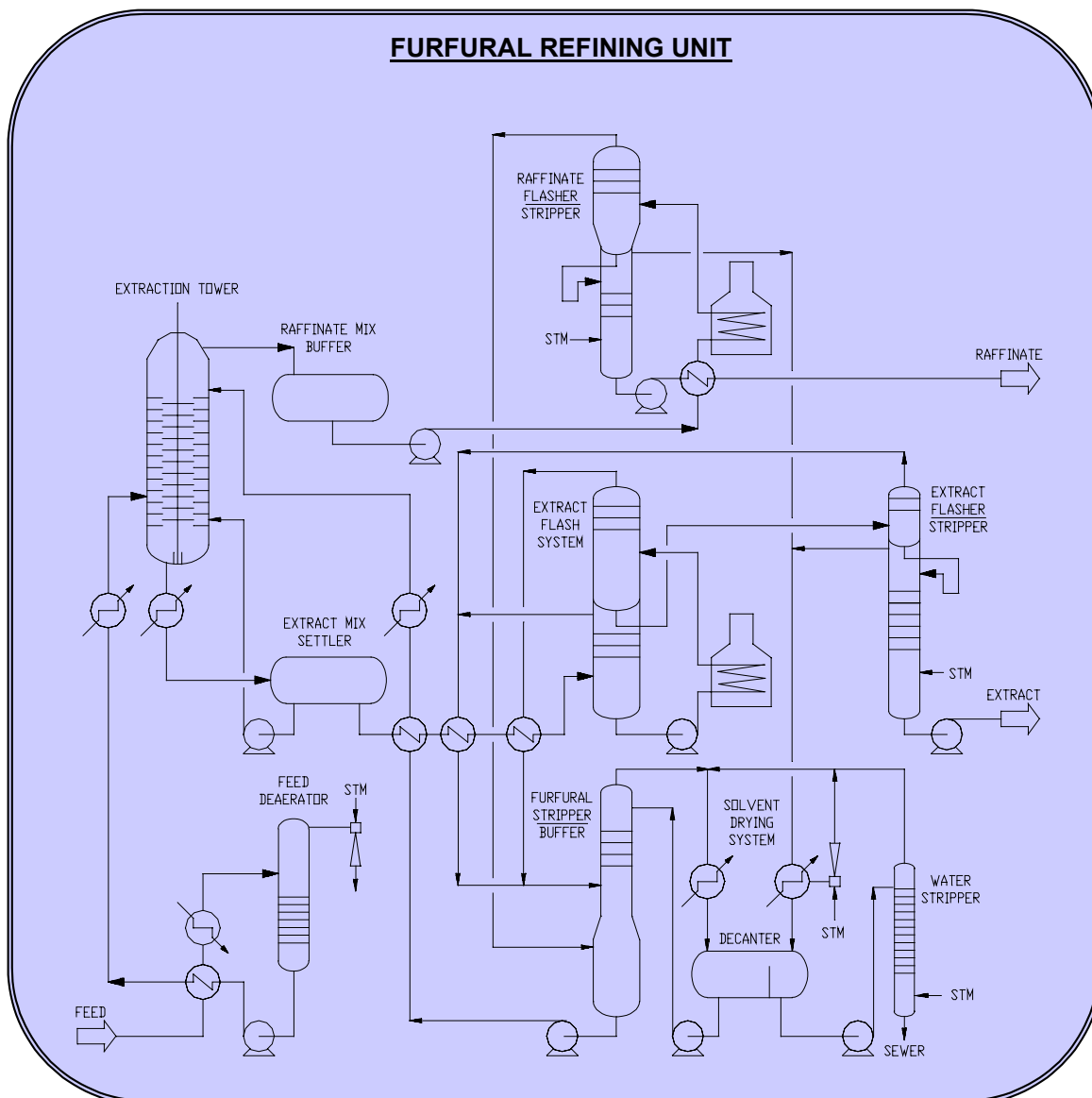
Utility requirements (typical, Middle East Crude; units per m³ of feed)

Electricity	kWh	10
MP Steam	kg	10
LP Steam	kg	35
Fuel oil	kg	20
Cooling water	m ³	20



References

There are numerous installations under licence from Uhde in operation around the world. The most recent success is a complete lube oil production facility licensed to the state of Turkmenistan, which successfully passed performance testing in 2002.





Solvent extraction: MP refining

Application

Process to produce high quality raffinates suitable for blending into highest-quality motor oils and industrial products.

Feeds

Paraffinic or naphthenic lubricating oil distillates and deasphalted oils. The solvent used is N-Methyl-2-Pyrrolidone (MP).

Products

High-quality raffinates suitable (after dewaxing if the feedstock is paraffinic) for blending into highest-quality motor oils and industrial products. Solvent-neutral oils and bright stocks can be produced by upgrading the viscosity index, colour, carbon residue, sulphur, additive response and oxidation stability.

Process description

The feed and MP enter the treating tower at controlled temperatures and flow rates required for optimum counter-current oil extraction. The raffinate mix exits from the top of the treating tower and flows through heat exchangers and a fired heater to the raffinate vacuum flash tower. Most of the MP is vaporised from the raffinate for recycle to the treating tower. Raffinate from the flash tower flows to the raffinate stripper where it is steam stripped of MP.

The MP-rich extract mix exits from the bottom of the treating tower, then is heat exchanged and passed through a triple-effect evaporation system for MP removal. The extract is stripped free of MP with steam in the extract stripper.

N-Methyl-2-Pyrrolidone is a highly selective solvent. A low solvent-to-oil ratio can therefore be used with MP to achieve the desired yield of a specified product quality.

Existing solvent refining units can be converted to MP in order to increase throughput and/or reduce energy consumption. In the case of a grass-roots unit, MP offers significant savings in investment and operating cost over most other solvents.

Utility requirements (typical, Middle East Crude; units per m³ of feed)

Electricity	kWh	3
MP Steam	kg	2
Fuel oil	kg	12
Cooling water	m ³	7

