

**FEMD-TECH
USED OIL RE-REFINING PLANT
FOR RECYCLING USED OIL TO BASE OIL**



TAIWAN WOLMO INC

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WORKING PRINCIPLE OF FEMD-TECH

- 1ST STAGE – T.F.E

WATER REJECTION BY MEANS OF THIN FILM
EVAPORATION

- 2ND STAGE – M.S.E

1. REJECTING DIESEL/SOLVENT IF ANY

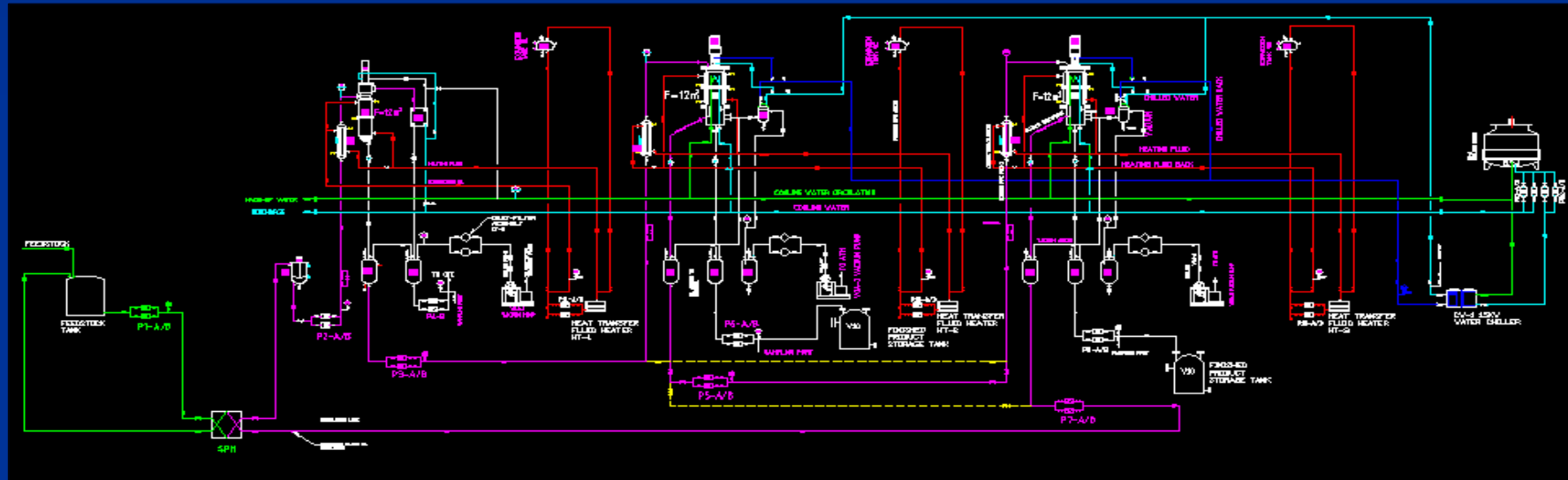
2. DISTILL (RECYCLE) BASE OIL FROM WASTE
ENGINE OIL (SPENT LUB/GEAR
OIL/HYDROLIC FLUID / METAL COOLING
FLUID)

APPLICATION

- USED ENGINE OIL
- USED GEAR OIL
- USED HYDRAULIC FLUID
- USED TRANSFORMER FLUID
- USED VACUUM OIL
- USED METAL CUTTING FLUID

FLOW CHART OF FEMD-TECH (1)

1-STAGE TFE + 2-STAGE MSE



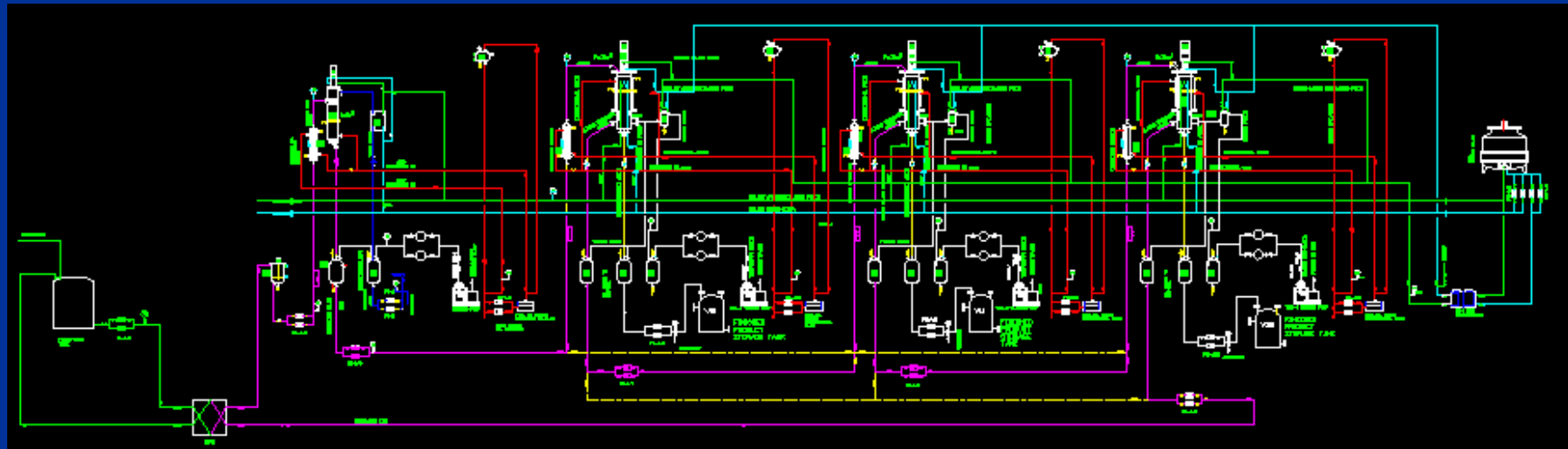
APPLICATION

1-STAGE TFE+2-STAGE MSE

- CASE #1 : COMPOSITION OF FEEDSTOCK
WATER+ 2 OF DIFFERENT SPENT LUB MIXED
- WORKING TEMPERATURE OF MSE
 1. 90% OF ONE SORT OF SPENT LUB CAN BE DISTILLED AT FIRST TEMP. RANGE (e.g. 190°C)
 2. 90% OF OTHER SORT OF SPENT LUB CAN BE DISTILLED AT THE 2ND TEMP. RANGE (e.g. 200~220°C)

- CASE #2 : COMPOSITION OF FEEDSTOCK
WATER + DIESEL/SOLVENT + SPENT LUB
- WORKING TEMPERATURE OF MSE
 1. 100% OF DIESEL/SOLVENT CAN BE DISTILLED ($\leq 180^\circ\text{C}$)
 2. 90% OF SPENT LUB CAN BE DISTILLED AT ONE TEMP. RANGE (e.g.190~220 °C)

FLOW CHART OF FEMD-TECH (2) 1-STAGE TFE + 3-STAGE MSE



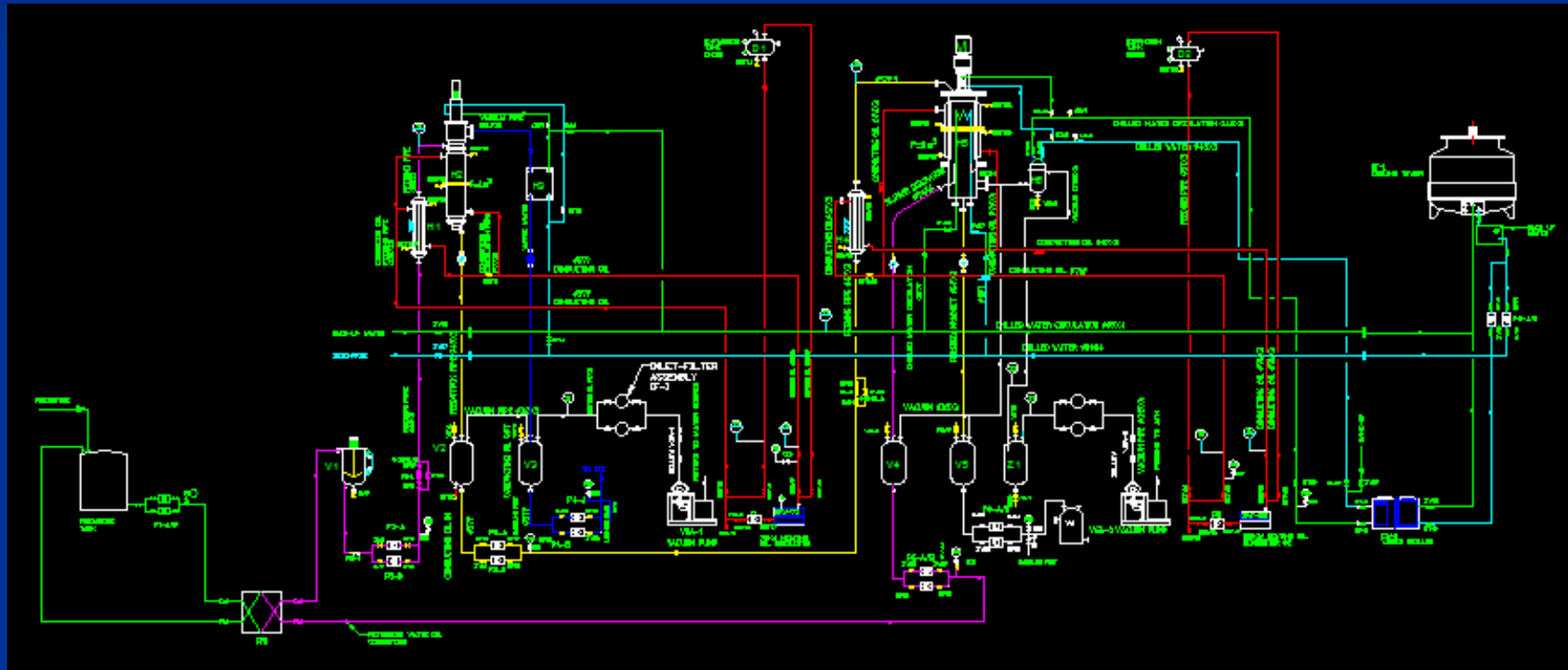
APPLICATION

1-STAGE TFE+3-STAGE MSE

- CASE #1 : COMPOSITION OF FEEDSTOCK
WATER+ 3 OF DIFFERENT SPENT LUB MIXED
- WORKING TEMPERATURE OF MSE
 1. 90% OF ONE SORT OF SPENT LUB DISTILLED AT CERTAIN TEMP. RANGE (e.g. 190°C)
 2. 90% OF OTHER SORT OF SPENT LUB DISTILLED AT THE 2ND TEMP. RANGE (e.g.190~220°C)
 3. 90% OF OTHER SORT OF SPENT LUB DISTILLED AT THE 3RD TEMP. RANGE (e.g. 220 °C or above)

- CASE #2 : COMPOSITION OF FEEDSTOCK
WATER + DIESEL/SOLVENT + 2 OF DIFFERENT SPENT LUB MIXED
- WORKING TEMPERATURE OF MSE
 1. 100% DIESEL/SOLVENT DISTILLED AT CERTAIN RANGE ($\leq 380^{\circ}\text{C}$)
 2. 90% OF ONE SPENT LUB DISTILLED AT ONE TEMP. RANGE(380~430°C)
 3. 90% OF OTHER SPENT LUB DISTILLED AT ANOTHER TEMPERATURE RANGE(430 ~520 °C)

FLOW CHART OF FEMD-TECH (3) 1-STAGE TFE + 1-STAGE MSE



APPLICATION

1-STAGE TFE + 1-STAGE MSE

- COMPOSITION OF FEEDSTOCK
WATER+ SPENT LUB
- WORKING TEMPERATURE OF MSE
90% SPENT LUB DISTILLED IN A TEMP.
RANGE (e.g. 190 ~220°C)

TYPICAL WORKING PARAMETERS

- THIN FILM EVAPORATION (T.F.E)
95~100°C
- MOLECULAR DISTILLATION
190 UP TO 250 °C EQUIVALENT TO
DISTILLATION TEMP. 380 ~520 °C AT 1TM
DEPENDING ON CATEGORY OF FEEDSTOCK
- WORKING PRESSURE: < 1 ATM
(BY MEANS OF VACUUM SYSTEM)

UTILITY

- POWER CONSUMPTION

TYPICAL: 0.245~0.262KW-Hr/l_t

- WATER CONSUMPTION

5~10 LITER /1,000 l_t

- ADDITIVE REQUIRED

NONE

TYPICAL RECOVERY RATE

- FINISHED PRODUCTS (BASE OIL)
80% (TYPICAL) DEPENDING ON
QUALITY OF FEEDSTOCK)
- OILY WATER
100% REJECTED FROM T.F.E DEPENDING ON
QUALITY OF FEEDSTOCK (WASTE OIL)
- OIL SLUDGE
10~15% (RE-CIRCULATION, NO DISCHARGE)

EMISSION

- NO EMISSION WILL BE GENERATED
IN THE PROCESS

INDUSTRIAL WASTE TREATMENT

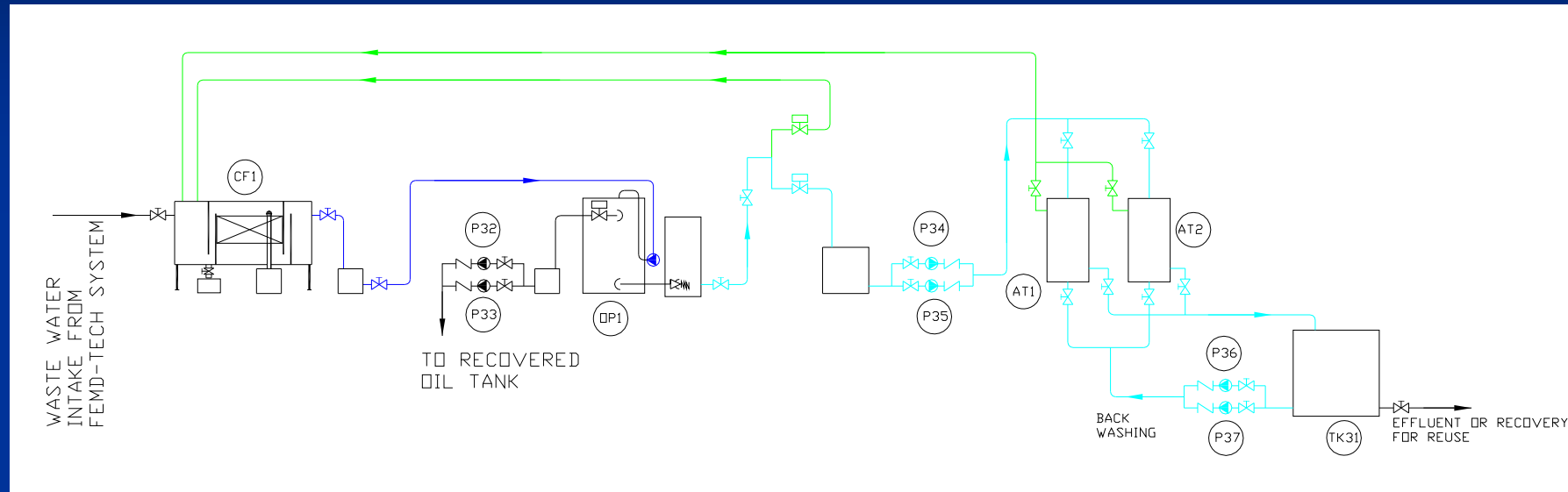
■ OILY WATER

- VOLUME OF WASTE WATER: DEPENDING ON FEEDSTOCK (AVERAGE 2-6%)
- BY TERTIARY TREATMENT PROCESS
- OIL TO BE RECOVERED BY CFI & OIL SEPARTOR
- EFFLUENT (WATER) SHOULD BE RE-USABLE

■ OIL SLUDGE

- AS FEEDSTOCK FOR RE-RECYCLING
- CONCENTRATE (WASTE) COULD BE BLENDED WITH COAL FOR BURNING DOWN

OILY WATER TREATMENT PROCESS (OPTION)



< 15 MG/L (PPM)

< 10~15 MG/L (PPM)

< 2-5 MG/L (PPM)

TYPICAL OIL CONTENT IN EFFLUENT : < 10 MG/LITER

CFI & OILY WATER SEPARATOR

- CFI



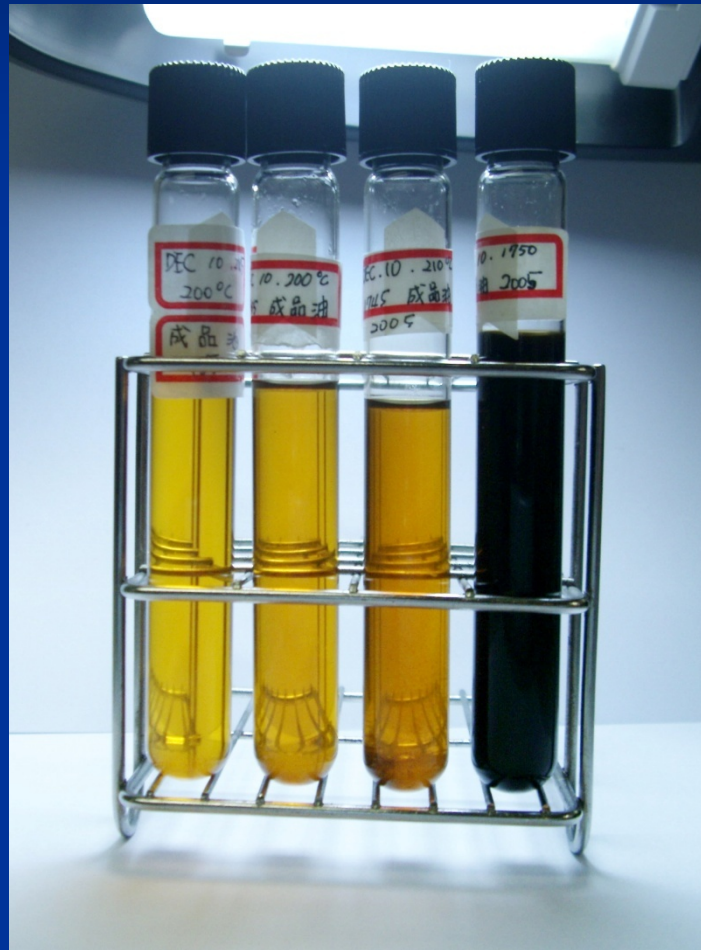
- OILY WATER SEPARATOR



ADVANTAGE OF FEMD-TECH

- VERY LOW ENERGY CONSUMPTION
- NON FILTERING AID REQUIRED
- NON CHEMICAL OR ADDITIVE REQUIRED
- NO EMISSION GENERATED
- VERY LOW INDUSTRIAL WASTE
- RELATIVE LOW ACOUSTIC
(APPROX 80dBA)
- HIGH SAFETY (NON-EXPLOSIVE & NON-FLAMABLE DUE TO HIGH DEEP VACUUM OPERATION SYSTEM)

FINISHED PRODUCT & RAW MATERIAL



**GALLERY
OF
FEMD-TECH PLANT**

FACTORY CONFIGURATION



HEATING OIL EXPANSION TANKS



HEATEING OIL CONDUCTOR



SAMPLING POINT



H1,H2,H3, & H4



V3 & V2



CONTROL ROOM



CONTROL ROOM ACCESS



OPERATION CONTROL PANEL



FEEDSTOCK FLOW METER



WASTE WATER TREATMENT PLANT



WASTE WATER POLISHER



SECURITY SIGN



MSE & FINISHED PRODUCT RECEPTION TANK



PUMP CONFIGURATION



FLAMEPROOF MOTOR



GROUND LEVEL CONFIGURATION



COOLING TOWER



VACUUM BUFFER TANK



WATER CHILLER

