54,000 bpd Pre-Owned OIL REFINERY (Euro 5 Quality) for Sale and Relocation

1. History, Background, Product Portfolio & Main Production Units

The Oil Refinery is an inland refinery, located in the western part of Europe with a capacity of approx 54,000 bpd. The Nelson Complexity Index is 8.4 for the refinery and it was designed/optimised for Heavy Crude with API approx. 29. During the years from construction, it went through several phases of modernization and upgrading, including increase of efficiency (New Mild Hydrocracker) in 2005 and minimization of environmental impact (New Sulphur Recovery Unit, new Flare) in 2010.

The refinery produces:

- LPG
- Gasoline
- Virgin Naphtha
- Jet Fuel
- Diesel
- Heating Gasoil
- Fuel Oil
- Bitumen
- Liquid Sulphur

Total capacity ~ 2,6 MTon/Year

Main Production Units:

1. Hydroskimming Units

- Atmospheric (Crude) Distillation Unit (CDU)	7,800 t/d
- Vacuum Distillation Unit (VAC)	2,900 t/d
- Unifining	1,800 t/d
- Platinum Reformer Unit (Platformer)	1,050 t/d
- Penex	350 t/d
- Hydro-Desulphurization (HDS-Kero)	950 t/d
- HDS-1	1,400 t/d
- HDS-3	2,000 t/d
- Sulphur Recovery 3	100 t/d

2. Conversion Units

- Mild Hydrocracker 1,900 t/d
- Visbreaker 3,400 t/d
- Thermal Cracker 1,400 t/d

2. Refinery Arrangement

Area No. 1 Distillation & Conversion
Atmospheric Distillation Unit (CDU)
Vis-Breaking Unit
Vacuum Unit (VAC)

Area No. 2 Heavy Distillates Cracking
Mild Hydrocracking Unit
Thermal Cracking Unit

Area No. 3 Streams Setting
Hydro-Desulphurization Units
Reforming Unit (Platformer)
Penex Unit

Area No. 4 Utilities
Power station & Electrical Distribution
Sulphur Recovery Units
Amine Washing Units
Miscellaneous Units

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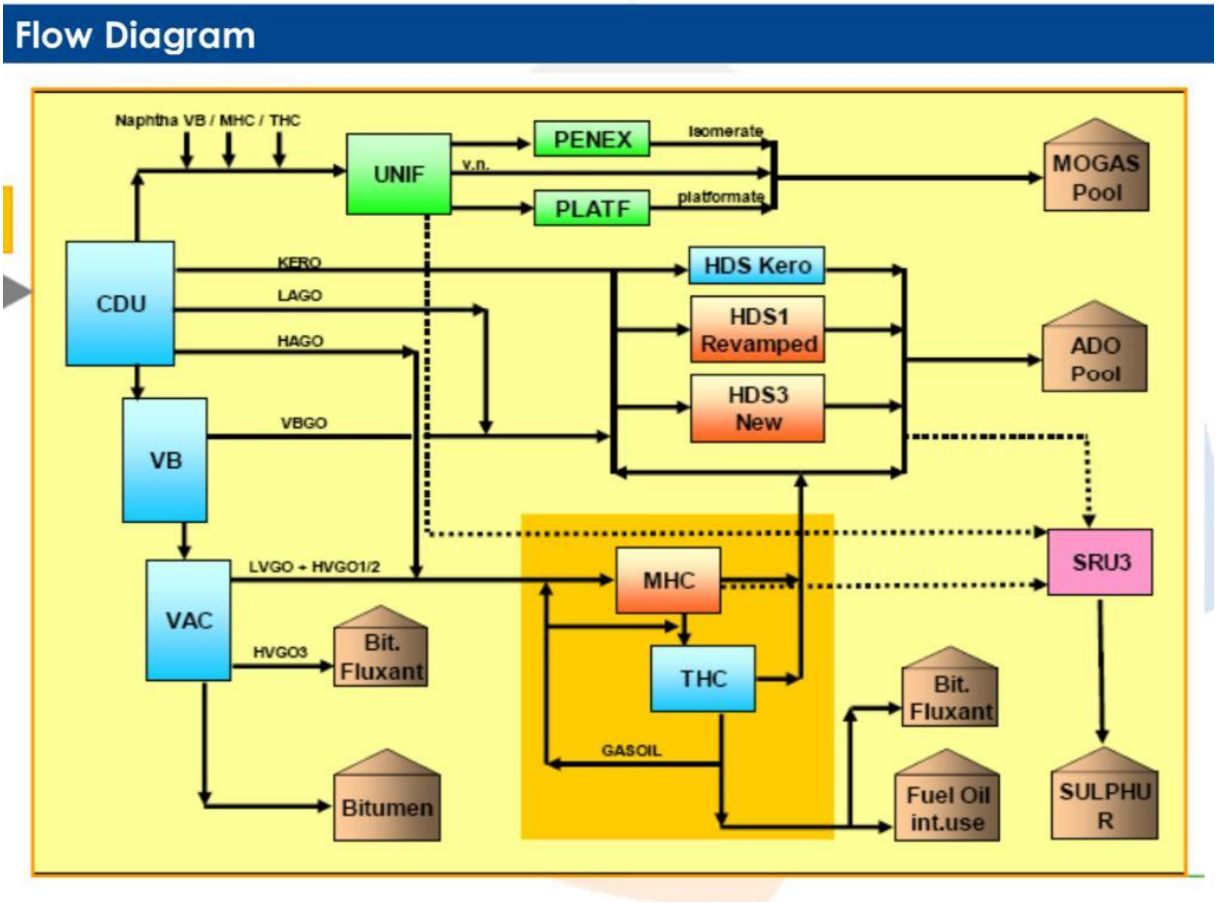
3. Simplified Flow Diagram



4. Units Description

4.1 Atmospheric (Crude) Distillation Unit (CDU)

The CDU was originally built in 1968. In 1997, the crude furnace casing and coils were replaced.

The stream day capacity is 7,800 t/d, which is equivalent to approx 54,000 barrels per day.

The unit includes:

- Train of exchangers exchangers for crude pre-heat
- Desalter
- Crude furnace with air pre-heating
- Main fractionator with 4 side strippers separation.

The bottom products (Atmospheric Residue) is fed to the Visbreaker.

4.2 Visbreaking Unit

The Visbreaking Unit was built in 1980, with a stream day capacity of 3,400 t/d and has undergone the following main upgrades:

- Main fractionator replaced in 1984
- Reaction chamber installed in 1986, turning the Visbreaker from a “Coil” operation to a “Soaker”, increasing run length to 10 – 11 months.

The Visbreaking Unit produces an overhead product (-155°C), 4. Units Description The Visbreaking Unit produces an overhead product (-155°C), 155-260°C Kerosene Cut and 260-355°C Gasoil Cut.

Gas is mixed with the Gas from the CDU, compressed and scrubbed before being fed to the refinery fuel gas system.

Visbreaker Naphtha, Kero and Gasoil Cuts are hydrotreated with the equivalent Atmospheric Cuts from the CDU in the HDS units.

Residue from the Visbreaker is the feed to the Vacuum Distillation Unit.

4.3 Vacuum Distillation Unit (VAC) – Unit 1100

The Vacuum Distillation Unit was built in 1984, with a stream day capacity of 3,100 t/d. A pre-flash tower was added in 2004.
The VAC recovers
- A 355-395°C Light Gasoil Cut (LVGO)
Three Heavy Gasoil Cuts
- HVGO 1 (395-465°C)
- HVGO 2 (465-490°C)
- HVGO 3 (490-505°C)
LVGO, HVGO1 and HVGO2 are blended and fed to the Hydrocracker.
Heavy Gasoil HVGO3 is stored and then blended with the Vacuum Residue for the production of Bitumen.

4.4 Mild Hydrocracking Unit (MHC) – Unit 1500

The MHC was put on stream in 2004 with a stream day capacity of 1,900 t/d.
The feed to the MHC is a blend of the Atmospheric Heavy Gasoil from the CDU and three Vacuum Gasoils (LVGO, HVGO1 and HVGO2) from the VAC, downstream the Visbreaker.
The operating pressure of the reactor is 77 barg and the 4. Units Description
The operating pressure of the reactor is 77 barg and the conversion is 53%.
The reactor has three beds with intermediate quench with H2.
The recovered Products are:
- Gas, sent to fuel gas system
- Naphtha, processed in the Hydrofiner
-Platformer
- Gasoil, sent to Diesel pool
- Residue, processed in the Thermal Cracker
The recovered distillates have a Sulphur content that increase during the catalyst aging (directly in Diesel pool, Heating Oil pool HDS3 feed).

4.5 Thermal Cracking Unit – Unit 1200

The Thermal Cracking Unit was built in 1984, to process Heavy Vacuum Distillate (UOP license), with a stream day capacity of 1,400 t/d.
Following installation of the MHC in 2004, the Feed to the Thermal Cracker is the unconverted product of the MHC.
The soaker effluent fractionator produces:
- Naphtha Cut fed to the Hydrofiner-Platformer
- Overhead product (-150°C)
- Kerosene Cut (150 - 250°C)
- Gasoil Cut (260 – 380°C) blended with the Diesel pool
- Overhead Gas (Compressed, scrubbed and routed to the refinery fuel gas system)

4.6 Medium Distillates Processing – Gasoil HDS 1 – Unit 700

The Gasoil HDS was built in 1968 with a stream day capacity of 1,100 t/d in its current operation mode, to meet the 10 ppm Sulphur specifications for Diesel or 500 ppm for Heating Oil.
The Unit was extensively revamped in 1992 with the addition of a second reactor to de-wax Atmospheric Heavy Gasoil and replacement of the furnace coils.
The de-waxing reactor was converted to HDS operation in 2004 due to the construction of the Mild Hydrocracker.
The Unit operates at 57 barg and can achieve 10 ppm Sulphur specification by changing the catalyst charge every 16 – 18 months.

4.7 Medium Distillates Processing – Kerosene HDS (HDSK) – Unit 760

The Kerosene HDS Unit was built in 1968 and revamped in 1992.
The Unit has a stream day capacity of 900 t/d in its current operating mode to meet the 10 ppm Sulphur specifications.
Operating pressure is 54 barg.

4.8 Medium Distillates Processing – Gasoil HDS (HDS 3) – Unit 1300

The Gasoil HDS was installed in 2009 with a stream day capacity of 2,000 t/d in its current operating mode to meet the 10 ppm Sulphur specifications. Operating pressure is 55 barg.

4.9 Light Distillates Processing –Platinum Reforming Unit (Platformer)– Unit 300

The Platformer was built in 1968 with a stream day capacity of 970 t/d and has undergone the following main upgrades:
- Three furnaces coils replaced in 1988.
- Three reactors replaced in 1988, optimizing the reactor catalyst inventory.
- Feed/Effluent exchangers replaced in 1992 with a plate type, single bundle exchanger (Packinox).

Feed to the Platformer is desulphurized Heavy Naphtha (C7+) coming from the Hydrofiner Unit.
The Platformer is a semi-regenerative reforming unit, operating at 15 – 18 barg pressure.
Two year run length with a severity of RON 98.5

4.10 Light Distillates Processing – Isomerization Unit (Pemex) – Unit 400

The Isomerization Unit was built in 1968 with a stream day capacity of 370 t/d in “once through” mode and 500 t/d in “recycle” mode.
The first Penex Unit licensed by UOP in Europe – Three Reactors replaced in 1988, optimizing the reactor catalyst inventory.
The feed to the Penex is the deisopentanized Light Naphtha from the Hydrofiner Unit.
In the recycle operation, the Penex product is fractionated in the Deisohexanizer. The overhead (Isohexane) is a Gasoline component, Isomerate, while the bottom product is recycled to Penex.
The catalyst operates in a chlorinated environment and the Isomerate is RON 82 – 83. Operating pressure is 46 barg.

4.11 Naphtha Hydrofiner and Light Ends – Unit 200

The Naphtha Hydrofiner was built in 1968 with a stream day capacity of 1,850 t/d and has undergone the following main upgrades:

- Hydrofiner furnace coil was replaced in 1988
- New tail reactor built in 1991
- A 400 t/d capacity de-isopentanizer tower built in 1992
- A 500 t/d capacity de-isohexanizer tower built in 1997 4. Units Description

The feed to the Naphtha Hydrofiner is a blend of the overhead liquids from the CDU, Visbreaker, Mild Hydrocracker and Thermal Cracker. H2 rich gas comes from the Platformer and network.

Two catalytic reactors operate in series.

- The lead reactor, operating at higher temperature, saturates olefins and removes Nitrogen.
- The second reactor, operating at lower temperature with a Virgin Naphtha quench, removes Sulphur.

The two reactors operate at 28 barg.

4.12 Utilities

- Power Plant
- Flare
- Water cooling towers
- Deminaralized water plant
- Wastewater treatment
- Vapor recovery units.