Brief Summary of Upcoming projects

At

Panipat Refinery & Petrochemical Complex

1. BS – VI Quality Upgradation Project
2. Capacity Expansion of PX / PTA
1. **Brief write-up on BS-VI fuel upgradation project**

Panipat refinery, a unit of Indian Oil Corporation Limited (IOCL) operates a 15.0 Million Metric Tons Per Annum (MMTPA) crude oil refinery at Panipat in Haryana. The refinery was commissioned in 1997-98 and started off with a crude oil processing capacity of 6.0 MMTPA. The refinery capacity was raised to 12.0 MMTPA with addition of another crude unit and a full conversion hydrocracker as the secondary processing unit and Delayed Coker unit for bottom processing. Through progressive revamps and addition of process units, the refining capacity has been further brought to the present operating capacity of 15.0 MMTPA. IOCL, Panipat is also integrated with Naphtha Cracker and Aromatic Complex.

In current refinery operations data corresponding to year 2016, refinery produces Gasoline & Diesel conforming to BS-IV specifications. However with the objective of meeting the guidelines established in Auto Fuel Policy 2025 wherein it would be required to manufacture 100% BS-VI fuels, a study has been carried out by Engineers India Limited (for existing refinery – 15.0 MMTPA) to analyze the potential for conforming to the mandate as described above by 2020 as envisaged by Govt. of India.
The major scope of the study by EIL is to identify new units, revamp of existing units, discreet investments and operating costs associated with the reduction in sulfur content of gasoline and diesel from BS IV compliance to BS VI specification, whilst maintaining the yields of the major products (MS and HSD) and carry out CAPEX cost estimation of revamp / new units at ± 30% accuracy level.

As part of the study, the base case is established initially for 15.0 MMTPA, which corresponds to 100% MS and Diesel production conforming to BS-IV specification, i.e. sulfur specification of 50 ppmw for both MS and Diesel. During BS-VI scenario, capacity of Panipat Refinery is also considered to be 15 MMTPA while entire MS and HSD production complying BS-VI specification i.e. sulfur specification of 10 ppmw for both MS and Diesel.

To meet the above requirement at Panipat Refinery, following new units / revamp of existing units are required to be executed:

1. New DHDT of capacity 2.2 MMTPA
2. New hydrogen generation unit of capacity 44 KTPA
3. Revamp of existing DHDS from 0.7 MMTPA to 1.0 MMTPA
4. Revamp of existing Prime G unit
5. New FG amine treating unit of 6 TPH
6. New SRU+TGT of 225 TPD capacity
7. New Amine Regeneration unit of capacity 84 TPH
8. New sour water stripper of capacity 16.4 m3/hr
9. TAME & Octamax unit for production of 95 RON MS
10. New DHDT feed tank of capacity 20000 m3

2. **Brief Write-up on PX-PTA Capacity Expansion**

1. **Introduction:**
   Para-xylene is a key petrochemical intermediate used in the production of Purified Terephthalic Acid which in turn is utilized in manufacture of synthetic fibers and PET resins. The synthetic fibers and PET respectively form the base for production of textiles and packaging applications such as polyester fabrics and fleece, water and soft drink bottles, films and thermoformed containers.
   In 2014, demand for polyester reached 47 Million Ton, making it the most commonly used synthetic fiber worldwide. In the same year, 22 Million Ton of PET resin was consumed.

2. **PX-PTA Plant at Panipat Refinery**
   Indian Oil stepped into the Petrochemical venture by setting up a Linear Alkyl Benzene plant at Gujurat Refinery in 2004. Subsequently in the year 2006, a facility for manufacturing Purified Terephthalic Acid (PTA) at Panipat Refinery was setup. A Para-xylene complex was setup to make the feed for the PTA plant. The feed to PX complex comprised Naphtha from Panipat Refinery as well as Naphtha from other IOC Refineries.
   The Para-xylene complex has a production capability of 360 kilo Tons Per Annum (kTPA) of PTA feed and PTA plant has a capacity of 553 kTPA. The plant is licensed by M/s UOP, USA.

3. **Need for Revamp**
   The markets for polyester fibre and PET resin has almost doubled over the last 10 years and reached nearly 37 million t in 2014. It is projected to grow by approximately 6% CAGR (compound annual growth rate) over the next 10 years. This growth in demand has led to requirement of revamp of PX-PTA plant.

4. **Revamp**
   a. **PX:**
      Paraxylene production of 460 kTPA.
The revamp will include addition of new distillation Column, debottlenecking of major equipment including Fired Heaters, Reactors, Fractionators, Combined Feed exchangers, major Vessels. The Preparation of Process Package and licensing shall be done by the licensor of the unit M/s UOP.

b. PTA:
The PTA unit will be revamped to a production capacity of 700 KTPA. The major revamp activity will involve
- PAC Suction Chilling Option
- Replacement of the CTA Drier

Apart from above debottlenecking of exchangers, vessels, columns and their internals will be carried out.


INTRODUCTION

Indian Oil Corporation Ltd. (IOCL) intends to expand the Naphtha Cracker Unit including associated units from the current 800 KTA ethylene @ 8000 hr/yr to 947 KTA ethylene (including ethylene from OSBL recycle streams) @8000 hr/yr. CBI Lummus is the licensor of the plant. Part of this expansion is to consider additional feed from an ethane/ethylene recovery unit. Downstream of NCU, associated units, MEG unit and polymer plants exist.

The petrochemical complex consists of the following existing plants & related utilities which are in operation.

- Naphtha Cracker Unit (NCU) including associated units
- High Density Polyethylene (HDPE) Unit
- Swing (LLDPE/HDPE) Unit
- Mono Ethylene Glycol (MEG) Plant
- Polypropylene (PP) Unit
- Utilities including Captive Power Plant
IOCL is currently planning expansions of its production capacities for NCU, MEG, HDPE and PP plant.

**Proposed Expansion Capacities**

<table>
<thead>
<tr>
<th>Plant</th>
<th>Existing (KTA)</th>
<th>Proposed (KTA)</th>
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</thead>
<tbody>
<tr>
<td>NCU (in terms of ethylene)</td>
<td>800</td>
<td>947</td>
</tr>
<tr>
<td>MEG (in terms of product)</td>
<td>300</td>
<td>425.5</td>
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<tr>
<td>HDPE (in terms of product)</td>
<td>300</td>
<td>351</td>
</tr>
<tr>
<td>PP (in terms of product)</td>
<td>600</td>
<td>780</td>
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IOC also intends to setup a Catalyst plant for production of FCC (Fluidized Catalytic Cracker) additives and hydro-treating (DHDS/DHDT) Diesel Hydro De-Sulfurisation/ Diesel Hydro Treater catalyst which will be situated in current PNC complex.

**New Catalyst Plant inside PNC:**

The plant is designed for manufacturing Fixed bed and Fluidized bed type catalyst systems used for refinery application. The plant shall be configured to manufacture 500 MTPA of ZSM-5 FCC catalyst additive and 1000 MTPA of DHDS/DHDT catalyst. This plant will also able to produce other FCC additives like Residue Up gradation Additive, CO-combustion promoter additive etc.

The plant shall also be designed to produce key ZSM-5 zeolite and gel alumina required for the manufacture of ZSM-5 additive and alumina support for manufacture of DHDS/DHDT catalyst & FCC additive/ catalyst. Other raw materials like fillers, silicates, hydrated alumina, and acids required are to be directly sourced from market. The following tables show batch size & batch times for the production of key raw materials and main catalysts.