

## Unit Profile

NIRMA LIMITED, is one of the leading detergent and Toilet soaps manufacturer in the country. The company, as a first step in Backward integration, has successfully implemented and commissioned 75,000 MTPA Linear Alkyl Benzene (LAB) project, a prime raw material for detergents manufacture, in the last quarter of 1997. Later, in January'2000, the 65,000 MTPA Normal Paraffin project was commissioned in a record 18 months time. Both these projects were implemented at a cost of around Rs.700 Crores. It may be noted that NIRMA is the second plant in the world to employ Eco-Friendly Solid Bed Alkylation catalyst for the manufacture of LAB.



The LAB and Normal Paraffin manufacturing facilities are located at Alindra Village, Savli Taluka, and Baroda. The process technology for the units were supplied by UOP LLC of USA. The detailed Engineering was carried out by reputed consultants including M/s SNC LAVALIN, Canada and M/s. UHDE, India.

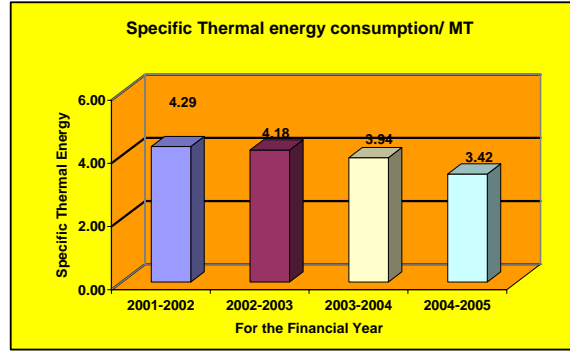
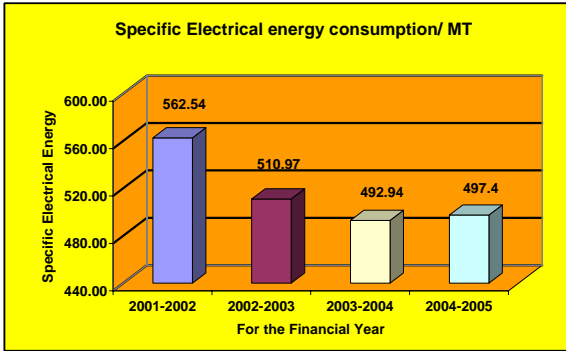
With the commissioning of these two projects, NIRMA joins the elite group of IPCL, TPL, Reliance and IOCL the only other 4 LAB & Normal Paraffin manufactures in the whole country.

## Energy Consumption

NIRMA Ltd. (Alindra site) has an annual consumption of about 650 lacs kWh of electrical units. Also about 55,000 KL of average fuel oil consumption is there for process heating.

The electricity is purchased from State Electricity Board. The annual bill of electricity is around 2500 lacs.

The specific consumption of electricity is around 550 kWh/MT of LAB produced and fuel oil consumption is around 0.35 MT/MT of LAB produced.



### Energy Conservation Commitment, Policy and Organization set-up:

NIRMA along with UOP ensured that the plant is designed with highest Safety Standards and Energy Efficient process. Also during the normal operation, NIRMA personnel have been consistently involving themselves in conserving Energy of various forms.

In view of the current market trend, the increasing petroleum prices and fast depleting petroleum resources, the management is constantly striving and putting efforts towards energy conservation measures. Consistent efforts are on to reduce the energy consumption in the complex.

A full-fledged energy cell with the latest equipment for monitoring the energy consumption in the complex. As per the management's policy, daily monitoring is being done and also the figures are declared on daily basis. Close monitoring is always ensured and any deviation from the standard is critically reviewed and the problem is sorted out there after.

The monitoring is done by Energy cell on daily basis and daily reports are being prepared and the same is being discussed in daily production meeting.

Monthly report for the same is also prepared and then discussed at apex levels and new targets are set every month and they are then reviewed in the next meeting.

### Energy Conservation Achievements

The untiring efforts made by the plant employees and the thriving encouragement shown by the management, NIRMA Ltd. has been able to implement number of energy conservation schemes which has led to enormous savings in terms of Power and fuel oil consumption. Some of the measures implemented till date are given below:

#### 1. Replacement of Raw water pump

Raw water pumps P-1807 A/B with capacity 180M<sup>3</sup>/Hr. each, were in operation while flow requirement was 90 M<sup>3</sup>/Hr maximum. Hence, the pump was replaced with the new one having revised capacity of 100 M<sup>3</sup>/Hr. each at the best operating efficiency . This has resulted in power saving to the tune of 18.38KWH. The details are given below.

- ❖ **Total Investment: 1.75 Lakhs**
- ❖ **Power consumption: 19.75 KWH**
- ❖ **Net power saving: 1.61 Lakh KWH/Yr.**



**New Raw water Pump (P-1807 A/B)**

❖ **Payback period: 76 days**

## 2. Energy saving by impeller trimming:

In our UNIONFINING section of N-Paraffin unit, Product Stripper Bottom pumps (600 P-07 A/B ) were having differential head of 86.04 MLc. The impellers of the pumps were trimmed based on present operating conditions without affecting the process, to reduce differential head to 54 MLc. This has resulted in energy saving to the tune of 6 KWH.

❖ **Total Investment: 0.3 Lakhs**

❖ **Power consumption: 11.17 KWH**

❖ **Net power saving: 0.5 Lakh KWH/Yr.**

❖ **Payback period: 45 days**

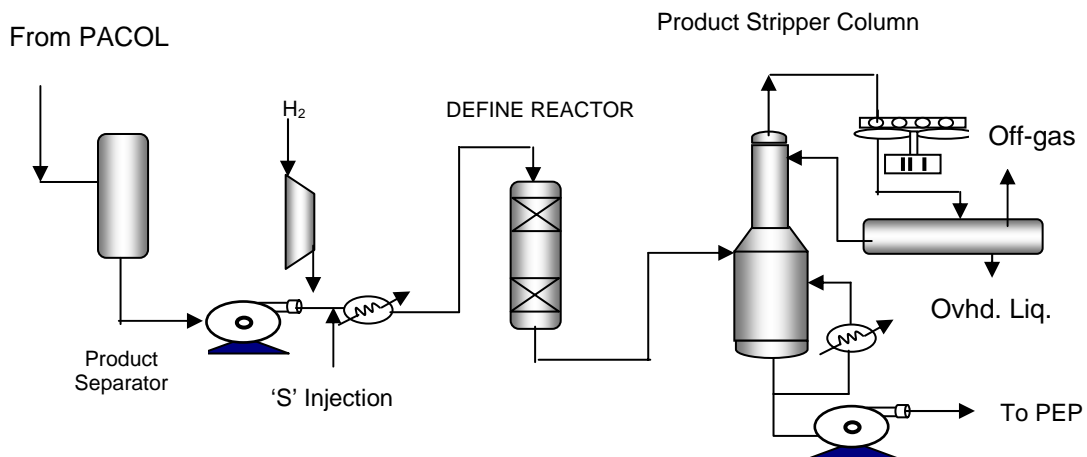


**Product Stripper bottom pumps having trimmed impellers (600 P-7 A/B)**

In our DEFINE section of LAB unit, reactor operating pressure was brought down from 40 Kg/Cm<sup>2</sup> (g) to 16 Kg/Cm<sup>2</sup> (g) without affecting our product specifications. This has led to significant reduction in process operating hazards & in power savings to the tune of 136 KWH. Presently the unit is being operated at 26 Kg/Cm<sup>2</sup> (g)

Study for this operation at lower pressure was conducted from 10<sup>th</sup> May,2004 to 7<sup>th</sup> August,2004 wherein the operating pressure of DEFINE reactor was brought down gradually from 30 KSC to 15.8 KSC.

<b>Total Investment:</b>	<b>350 Lakhs</b>
<b>Net power saving:</b>	<b>11.42 Lakh KWH/Yr.</b>
<b>Payback period:</b>	<b>05 Years</b>



**SCHEMATIC DEFINE UNIT**

**Brief Process Description:**

DEFINE unit is a part of PACOL section. In PACOL n-Paraffin gets converted to mono Olefin & Di-Olefin at elevated temp. & low pressure in hydrogen atmosphere. The liq. from PACOL reactor is exchanges heat in process exchangers & is sent to separator. In separator, hydrogen gas is separated from liq. Mix. Of olefin and unconverted paraffin is pumped to the define unit. Before define reactor, this liquid mixture is mixed with compressed hydrogen and heated up to 180-210<sup>0</sup> C. In define reactor nickel is used as catalyst. Here hydrogen is reacted with di-olefin to give mono olefin, which is our desire product. Effluent from define reactor is sent to the product stripper. This feed contains unconverted paraffin, olefins and some cracked light ends. These light ends are separated from paraffin – olefin mixture in product stripper. Light ends are used as a fuel in the heater and mixture of paraffin - olefin is sent to the pep unit.

#### **4. Energy Savings Due To High “On Stream Efficiency Factor”:**

Our LAB plant is a continuous operation plant. LAB unit was operated at an average of 120.15 % "On stream Efficiency Factor" during the year. This is achieved by critical process monitoring efforts and reducing the plant down time period to the lowest possible extent. This has resulted in significant specific Power and Fuel consumption reduction of apart from Raw material consumption. The equivalent furnace oil savings in the tune of 1086 KL is achieved due to increase in "On stream Efficiency"

### **Energy Conservation Plans and Targets**

Towards the untiring efforts of our management and the active participation shown by the employees, the management is considering the following future plans for energy conservation:

1. We have successfully carried out the energy audit of our complex and identified a potential to recover heat from one of our process stream, which was otherwise being wasted in the atmosphere by cooling through an air fin cooler. Hence we are going to install a new exchanger for heat recovery in our DETAL section and shall be completely stopping one fin fan cooler
2. In our DETAL section we have two reactors. One reactor is one line and other is in regeneration. The regeneration is being carried out at high temperature. Hence to bring it on line, we have to carryout the cooling also. There is an air fin cooler provided for the same. We have identified that by process line modification the cooling can be carried out without Regenrant fin fan cooler. This shall simply call for an additional bypass control valve in one of our process heat exchanger. We shall able to save power and fuel oil both by doing the above modification.
3. Utilization of Recycle Benzene pump for the circulation of desorbent through PEP adsorber instead of Hot reflux to column along with the Recycle Benzene stream to Detal Reactor.& thereby eliminating the desorbent circulation pump. For hot reflux new lower head pump is to be installed to reduce the head losses & there by power savings.
4. Carrying out FRP coating in our circulating cooling water pumps for power savings and efficiency improvement. Efficiency will be improved by 2%.
5. Other Long Term Projects expected to be partly completed during next year...
  - a. Partly revamping the unit for higher production.
  - b. Hard ware changes for converting a high-pressure Hydrogenation operation (40 ksc) to low pressure operation (14 ksc).