

SHRIRAM FERTILISERS & CHEMICALS : KOTA

1. UNIT PROFILE :

Shriram Fertilisers and Chemicals (SFC) is a division of DCM Shriram Consolidated Ltd., a conglomerate of diverse business interests making and trading products critical to the country's growth. SFC is engaged in the manufacture of Urea, PVC, Caustic Soda, Liquid Chlorine, Hydrochloric Acid, Cement.

SFC's complex is located at Kota, Rajasthan. The Fertiliser Unit was commissioned in February 1969 by Chiyoda Chemical Engineering and Construction Co. of Japan. Installed plant capacities were 450 TPD of Ammonia and 700 TPD of Urea.

AMMONIA / UREA PLANT :

Naphtha is the main feedstock for the Plant. The various technology licensors for the Ammonia Plant are Shell of USA, for Naphtha desulphurisation section, Haldor Topsoe of Denmark for the reforming and synthesis sections and Benfield Corporation of USA for the carbon dioxide removal system. Stamicarbon's Total Recycle Process has been utilised in the Urea process scheme.

The plant has been modified to use both naphtha and gas in any proportion in Aug.-Sep.'06. Plant has started using gas since 22nd Sep.'07 with the commissioning of gas pipeline by M/s GAIL.

The Plant capacity was expanded in 1974 to 600 TPD Ammonia and 1000 TPD Urea. New equipments were added to the plants and several equipment were replaced. A separate synthesis loop of 120 TPD capacity was added. With subsequent technology upgradation this loop has now become redundant. Immediately after expansion in 1974 the energy performance of the plant remained below par. Many initiatives were identified and undertaken to improve the performance of the plant since then. This has resulted in remarkable improvements in energy consumption over the years. Apart from some of the major energy conservation schemes the Converter basket was changed to the radial flow type in 1992. This was followed by replacement of reactor trays in the Urea plant with high efficiency trays. A hydrolyser stripper was also installed to improve effluent quality and save water.

2. ENERGY CONSUMPTION :

Since energy cost forms about 80% of the production costs energy conservation is a vital aspect of Ammonia - Urea Plants. The key focus has therefore always been on the reduction of energy consumption in the existing plant as well as on incorporating new process schemes into the plant to achieve better and better energy efficiency.

The main energy consumers in the plant are the Primary Reformer, the motor driven positive displacement type compressors and the refrigeration equipment of the synthesis section. A dedicated captive power plant of 35 MW and, to some extent, the State Electricity Board caters to the power requirements of the complex.

In order to avoid energy losses in any form in the plant energy audits are carried out periodically. This includes monitoring of critical plant parameters, steam and water balance, pressure drop surveys etc. Process analysis based on computer simulation of the plant process & various modifications undertaken have drastically reduced the energy consumption.

The overall energy consumption reduction from levels of 9.02 MKCal/MT Urea to present levels of 7.776 MKCal/MT i.e. a reduction of almost 1% every year. **To our knowledge our plant is the most efficient plant of this vintage based on naphtha feedstock.**

ROLL OF HONOURS

The following Awards have been received by our unit.

- 1983-84 : FAI Runner Up Award for "Best Production Performance of Nitrogenous Fertiliser Unit".
- 1989-90 : NPC Award for "Best Productivity Performance in Fertiliser Industry".
- 1990-91 : FAI Runner Up Award for "Best Production Performance of Nitrogenous Fertiliser Unit".
- 1990-91 : NPC Award for "Best Productivity Performance in Fertiliser Industry".
- 1990-91 : RPCB's Award for "Excellence in Pollution Abatement Measures".
- 1991-92 : National Award for "Public Recognition of Outstanding Activity for Prevention & Control of Pollution".
- 1993-94 : FAI Award for "Best Production Performance of Nitrogenous Fertiliser Unit".
- 1993-94 : NPC Award for "Best Productivity Performance in Fertiliser Industry".
- 1995-96 : FAI Runner up Award for "Best Production Performance of Nitrogenous Fertiliser Unit".
- 1996 : Energy Conservation Award in the Chemical Sector.
- 1996-97 : NPC Runner Up Award for "Best Productivity Performance in Fertiliser Industry".
- 1998 : Star Award SAP R-3/SAP Star Customer Award 98
- 2000 : National Energy Conservation Award-2000 (Fertiliser Sector)
- 2003-04 : Greentech Silver Safety Award
- 2006 : "Sword of Honour" from British Safety Council

3. ENERGY CONSERVATION COMMITMENT, POLICY AND SET UP :

We are committed to be one of the most energy efficient plants in the World and we endeavor continuously to reduce the energy consumption to the levels of new technologically advanced plants. Technical personnel are kept abreast with the State of Art technology in various fields through interactions in various forums. Technical personnel are nominated to participate in national and international technical conferences and the available information and technical inputs are absorbed into the plant processes wherever possible. External agencies are periodically employed to carry out energy audits to enable a fresh view of the systems and processes in operation.

A copy of the Energy Management Policy is attached.

4. ENERGY CONSERVATION ACHIEVEMENTS :

1. We had taken up a project of converting feedstock of our ammonia plant from costlier naphtha to Gas, a comparatively cheaper feedstock. All modifications required to operate the plant on gas have been completed during Aug.06-Sep.'06. However, due to non availability of gas, plant could not be run on gas.
2. In our Urea plant, Purge type pressure transmitter which required water for purging, was replaced with a level tank thus avoiding liquid entrainment and choking. This has reduced water ingress into the system thereby reducing steam consumption equivalent to a coal consumption of 80 MT / Year.

5. ENERGY CONSERVATION PLANS & TARGETS :

In the Ammonia Plant several schemes for energy conservation are under consideration.

Some of the major upcoming projects listed below illustrate the thrust on energy conservation measures.

- Revamp of CO₂ Removal section
- Installation of New Methanator heat exchanger etc.
- Heat Recovery from 1st stage Carbamate condenser in Urea Plant

The energy consumption in our CO₂ removal section is very high compared to modern gas based plants. We are planning to revamp this section by installing a flash vessel and replacing existing activator with a better one. An energy saving of about **4.1 MKCal/Hr.** is expected with this scheme.

In Ammonia Plant, Carbon Monoxide present in the raw synthesis gas is converted to CO₂ in two stages, first at high temperature followed by low temperature. The low temperature reaction is carried out in a reactor called Low Temperature Shift Reactor. The pressure drop in this reactor is very high. To reduce pressure drop we are planning to install an additional reactor in parallel to existing one. This is expected to save about **1.1 MKcal/Hr** of energy.

In the urea plant revamp of the synthesis section is being studied alongwith enhanced heat recovery from the first stage carbamate condenser. This is to be finalized and implemented in next two years to bring down the steam and power consumptions in the Urea plant.

6. ENVIRONMENT AND SAFETY :

In line with our commitment to preservation of the environment and improvement of our safety performance we have taken up a new initiative to implement the safety management system as formulated by the British Safety Council. The system covers not only the operating personnel but also the contract workmen as well as persons engaged in commercial functions. System audit was carried out by an auditor from British Safety Council, U.K. **We have been awarded prestigious "Sword of Honour" by the British Safety Council.**

In our pro active approach to the subject we have installed and built in adequate pollution control devices so as to prevent any discharge of effluents or emission of gases. Electrostatic Precipitators have been installed in the power plant. The fertiliser plant effluent is treated and pollutants are removed and recycled to the process. Special attention has been accorded to create a clean and green environment in the plant and towards this goal about 4.6 lac trees have been planted.

A new Hydrolyser Stripper System has been installed in Urea Plant at an expenditure of Rs. 6.3 Crores. This has resulted in improving effluent quality significantly. The discharged water is now being used as boiler feed water/cooling tower make up instead of being drained.

Our unit has received recognition at the national level in 1991-92 for Prevention and Control of Pollution from the Govt. of India. Again in 2003-2004 the unit has received the Greentech Silver Safety Award for our performance in the field of EHS.

Our Fertiliser and Power plants have been certified for ISO-14001 and OHSAS-18001.

Safety of manpower is accorded highest priority and all measures are taken to ensure safe operation. Continual training is given to the operating staff and workmen so that all operations are carried out safely and there are no accidents. Safety audits of the buildings, plants, equipments and rotating machinery are carried out by in-house safety officers every month and external agencies once a year to identify and rectify any short comings.

Operating practices and safety practices are audited periodically and improved by benchmarking with the best practices world over.

Any new change or modifications are subjected to HAZOP studies and adequate measures are taken at the design stage itself.

Competitions on safety awareness are organised to further reinforce the concept of safe working. Training is also accorded to any contract labour engaged for working in the factory.