

Technological status of pulp & paper industry in India

An overview*

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INDUSTRIAL SCENE

Paper industry in India is a little over 100 years old. The first paper machine was installed in Lucknow in 1882. The installed capacity was barely 0.14 million TPA by 1950. However, organised growth of pulp and paper industry commenced only during the post independence period following the Industrial Policy Resolution of the Government of India. The installed capacity has gone upto 2.2 million TPA by 1986 and it is projected that by the year 2000 the installed capacity would touch 4.25 million TPA.

The per capita consumption of paper in India is very low, a mere 3 kgs compared to over 200 kgs in USA and Sweden; over 100 kgs in a number of advanced countries like Canada, FRG, Jaapan, UK, France, etc., close to 90 kgs in Taiwan. Even by the year 2000 with the installed capacity of 4.25 million TPA, the per capita capacity would be only 4.5 kgs.

The number of paper units in the country are over 280 with installed capacity of 2.8 million TPA. The capacity of the units vary widely from as low as 100 TPA to as large as 80,000 TPA. About 60% of the installed capacity is accounted for currently by 22 large paper mills based on utilization of forest raw materials such as bamboo and mixed hard woods. The average capacity utilization has been estimated to be only about 60%. The capacity utilization declined in the past decade, more so after the energy crisis of 1973. The capacity utilization which was 95.5% steadily declined to 67.9% in 1979. Shortage in the supply of raw materials and energy, particularly power are some of the major constraints in improving capacity utilization. Indian paper industry uses external fuel sources upto 70%. This is very high compared to mills in developed countries which depend on outside source only to the extent of 30-50%. Fuel component of our paper industry contributes to as high as 15-20% of the total IPPTA Vol 1, No. 2, June 1989.

cost of production at present compared to 6-12% before the energy crisis. Most of the mills are, on an average, 50 years old and are in dire need of modernization and rebuilding if the production capacity of these is to be utilized effectively in the country.

There are 4 large size mills for newsprint with installed capacity of nearly 0.35 million TPA. In the newsprint sector too self-sufficiency is not expected to be achieved in the near future.

With regard to machinery manufacture in India, 32 units are engaged in the manufacture of paper plants and components thereof at present. The indigenous manufacturing range covers paper plants with capacity from 10 TPD to 200 TPD. Also complete pulp plants, stock preparation equipment and certain types of finishing equipment are currently being manufactured indigenously. The capacity utilization of the pulp and paper machinery manufacturing industry also is low; 37.5% (1982); 55% (1983), 41.8% (1984); 46.9% (1985).

The paper industry in India is plagued with problems relating to shortage and high cost of cellulosic raw materials, uneconomic sizes, obsolete technology, high cost of production, low productivity, paucity of trained manpower and also problems relating to pollution control and management. To play its role in the achievement of national objectives the industry needs motivation, determination, encouragement and support.

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TECHNOLOGICAL DEVELOPMENTS ABROAD

The raw materials used in the developed countries are of soft wood category such as pine, spruce, etc. The process of cutting trees and debarking is highly mechanised. The glaring thing that is distinctively observed is in the area of pulping where the processes are of mechanical in nature which give out a yield as high as 95% compared to a yield of 45 to 50% obtained in India through chemical processes.

The various mechanical processes practised are—

- Stone ground wood pulping;
- Refiner mechanical pulping;
- Thermo mechanical pulping, and
- Chemi mechanical pulping.

Abundant availability of soft wood as raw material abroad make these mechanical processes possible at optimum levels of consumption.

The machinery manufacturing sector abroad has also developed over the years considerably. R&D efforts are made in appropriate directions towards design, development and manufacture of machinery. Some Trends are easily discernible abroad :

- Machine speeds continue to rise;
- Use of energy efficient equipment, and
- Use of sophisticated instrumentation system.

In the developed countries, significant steps have been taken in designing energy efficient equipment. Evolution of continuous digestors, cold blow systems, double disc refiner, falling film evaporator, displacement washing system, twin wire former and extended nip press are a few examples.

TECHNOLOGY DEVELOPMENT AND R&D IN INDIA

As per the demand projections the country needs additional 2 million TPA paper by the year 2000. The state of manufacturing technology in India is inadequate to meet the projected demand. Our largest mill has only 1/4th installed capacity compared to that of any paper mill in developed countries. Paper industry is highly power intensive; power consumption ranges between 1500-1700 KWH/- Tonne. The role of pulp and paper machinery in attainment of high technology/performance norms in the paper industry hardly needs emphasis. It will be necessary to develop

indigenous technology in areas of pulping, recovery, paper making, pollution control, energy conservation, instrumentation, and development of equipment to suit local conditions. The challenges of the 21st century will emanate primarily in conservation and management of resources. Paper requires a number of resources—forest produce, water, chemicals, energy—all of which are getting increasingly scarce. There is a dire need for augmentation and conservation of the limited resources through improved technology. Some of the high priority areas are as under :

- * Revolutionary developments that have taken in genetic engineering enabling phenomenal increase in bio mass production from given area of land needs to be exploited for producing paper making raw materials.
- * Potable water is becoming increasingly scarce. Our Paper plants consume as high as 250-320 cubic meters of water per tonne of paper. Designing and adaptation of closed cycle systems in paper making without waste or pollution is of immediate concern.
- * Energy conservation and fuel economy in the paper plants is of utmost concern. It is also necessary to identify and develop new energy sources and also to recover waste heat wherever possible. Regular energy audit and efficient energy management are essential for each paper plant.
- * There is room for substantial improvement in chemical consumption as the consumption pattern in different mills range widely. More efficient chemical recovery techniques, improvement in bleaching and washing techniques, adoption of oxygen bleaching in Indian conditions, etc. deserve due consideration. Continuous process of washing and bleaching which consumes 40% less power and 80% less water has already been successfully adopted by several mills abroad.
- * Computer based process control systems which improve the quality of paper and also result in higher material conservation need to be incorporated in the existing and new paper mills.
- * Although much of the paper plant and machinery can be produced domestically, there is a need for greater technical sophistication. Specific equipment

types which need further development are continuous digesters, falling film evaporators, twin wire turner paper machines, drum chippers, quality control equipment for paper machines, extended trinity press in paper machines, etc.

- * There is also need for energy saving devices. The development of indigenous capability for rebuilding and modernizing existing pulp and paper machinery, incorporating contemporary technology also deserves attention.
- * Our immediate task is to improve the process technology and to undertake a massive exercise of modernization of outdated machines. Concerted efforts in R&D will directly effect the improvement in process technology and machines.

R & D in pulp and paper is carried out mainly in the Central Pulp and Paper Research Institute (CPPRI) Institute of Paper Technology, few National Laboratories, such as, Regional Research Laboratory, Jorhat Indian Institute of Chemical Technology, Hyderabad and about 20 In-house R&D Units set up by large paper plants and machinery manufacturers and duly recognised by the Department of Scientific & Industrial Research. Broadly the R&D programmes are directed towards the following :

- Improved utilization of indigenous resources;
- Improved productivity;
- Equipment standardization and design;
- Optimization and conservation of utilities;
- Pollution control and treatment.

Human resources development and technical services are also given due importance.

An overview of the R&D efforts reveal that there is urgent need for strengthening our R&D base in the industry; also the linkages between the industry and the

Research Organisations set up or promoted by the Government must become stronger. Some of the immediate challenges and areas in which active research is required are as under :

- * Identification of new and fast growing fibrous raw materials.
- * Development of new energy efficient and less polluting pulping and bleaching processes and systems
- * Development of computer aided process control system suitable to Indian paper plants.
- * Development of improved stock preparation methods with special reference to short fibre materials and recycling of fibres.
- * Development of coating formulations to improve capacity and reduce fibre content in paper.
- * Development of equipment and machinery to meet indigenous requirements.
- * Development of suitable chipper for bamboo and dense woods.
- * Improved design of washers for hard woods.
- * Development of efficient pollution control and treatment systems.
- * Development of energy audit systems.

CONCLUSION

With the liberal policies of the Government towards R&D, technology development, and modernization of our industry, with the technical competence and skills available in the country, with the dedication of the industry for removing obsolescence and incorporating new developments, the pulp and paper industry in India can aspire to become modern and technologically self-reliant to play its rightful role in the overall national progress as we enter the 21st century.