

Greater Need for Research and Training in Pulp and Paper

D. D. Jatkar and I. K. Kacker*

Considerable technological advances have been registered in various sectors of pulp and paper industry during the Third plan period. The production has increased from 1,36,000 tons in 1950-51 to 4,50,000 tons in 1960-61. In addition, about 30,000 tons of newsprint is being produced. The target for capacity in the Second plan was fixed at 4,45,000 tons and the production target at 3,50,000 tons. The latter was almost reached by the scheduled date. In the Third Plan, the target for capacity was fixed at 8,20,000 tons and the production at 7,00,000 tons. Against this, the capacity stood at 5,38,700 tons and the production at 4,65,000 tons. With expansion of seven major mills involving foreign exchange expenditure of Rs. 2.08 crores, the production may reach 6,70,000 tons at the end of the Third Plan.¹ It is also worthwhile to mention here that the increase in the capacities to this level have been planned only to provide the basic needs of the developing country and the production would be only of traditional papers. It is also important to keep in view that major increase in capacities has been brought about through foreign collaboration only. Further, it may be mentioned that the perspective planned growth in the industry to the level of 4.20 million tons (including newsprint) by 1980-81 is likely to bring the **per capita** consumption to 7.0 kg. only², which is a low figure compared to even to-day's per capita consumption in the more advanced countries. To raise this level further would bring out more stupendous problems concerning raw materials, know-how, off-take, etc.

A factor which is not yet given due thought is the availability of trained personnel to man the increased industrial capacities and to make the industry free from foreign collaboration in time to come. In other words, Indian paper technology has to develop self-reliance and indigenous technology. Besides this, the growth of industry in other sectors, as well as an increase in economic level of the country as a whole, is likely to bring about diversification in the demand of various qualities of paper, and the consumer is apt to be dissatisfied in future with the present qualities produced in the country. All these considerations suggest a

concerted effort and thought by the organised sector of the industry.

The manufacture of paper and board is a highly specialised job, using complex chemical and mechanical process and control methods. To carry out different processes with precision, efficiency and skill to check waste and to control, operate and maintain costly machinery, trained technicians, and operators are needed. The need of technologists and engineers is much greater, since they are needed to direct, guide and supervise the other controlling staff, as also to adapt known processes, control methods and to evolve and design newer processes depending upon the raw material and the end use. They are also required for more effective quality control techniques which are almost absent in many paper factories in India. The remarkable progress made in recent years in the field of paper-pulp technology in the more developed countries like U.S.A., U.K., Canada, Sweden, Germany, and Japan etc., in the matter of high efficiency in production and research are undoubtedly the results of large scale organisation of training of technicians, technologists and engineers. In some of these countries, large units of pulp-paper mills manage trade schools for training of younger technicians or operators to meet their own requirements. In other countries, short term or sandwich courses in pulp-paper technology are organised at educational institutions to enable the technicians already employed by the industry to improve their qualifications and knowledge. However, in almost all the countries mentioned above, advance courses in pulp-paper technology leading to higher degree like M.Sc. or Ph.D. are on the curriculum of several universities and paper technological institutes.³

It may be mentioned that hitherto, most of the paper units looked forward to foreign collaborators for establishing newer units. In an earlier article⁴, Dr. J.C. Agrawala has rightly said that "It is rather humiliating that our paper industry should look to foreign countries for solutions of problems that are peculiar to Indian conditions.

* Regional Research Laboratory, Hyderabad—9

We have been looking to foreign countries for utilisation of bagasse. We are depending upon foreign technical know-how for the manufacture of newsprint from various raw materials. We are depending upon foreign countries to solve our problems relating to manufacture of rayon grade pulp. Such a state of affairs, does not augur well for the future and is already providing hindrance in all round development of the industry." It is, however, now true that many paper making units have established laboratories in their mills and are trying to work on problems relating to production and control. This is still not enough and is being done in a half-hearted way. To elucidate, we would cite the example of a few of the world's topmost research and training institutions.

The Institute of Paper Chemistry : Appleton, Wisconsin, U.S.A. established in 1929, is today one of the foremost institutions for cellulose and paper chemistry. The main functions of the institute are (i) graduate education ; (ii) research ; and (iii) information centre and library. Since its establishment, the institute has awarded 187 Ph.D. degrees and 300 M.S. degrees ; more than 80% of its graduates are employed in the pulp-paper industry. The institute has a research centre and laboratories which carry out both fundamental and applied research relating to pulp and paper industry, working in sixteen different branches. Research is classified into three types.

1. Academic : This is done by students in fulfilment of their academic qualifications.
2. Institutional : This is organised by one or more of the staff members, being generally fundamental.
3. Co-operative : This is undertaken on behalf of someone outside the institution and is paid for by that party.

The largest group presently working is sponsored by 47 companies. The institution is basically interested in fundamental, long range, research and does not necessarily emphasise 'patent pursuit'.

The institute has also started a "pioneering research programme". This programme is the

continued effort of 24 pulp-paper companies in U.S., to push back the frontiers of fundamental research in the areas of significance to pulp and paper making. This programme is aided by over half a million dollars and its implementation and administration are entirely controlled by the institute.

Pulp and Paper Research Institute of Canada is a unique partnership in research and post-graduate education. Having its origin about 50 years ago, it is now a non-profit corporation under the federal charter. The Government of Canada, McGill University and Canadian Pulp-paper Association are the main parties which created the institute and have built it into one of the largest industrial research organisations in the nation and a leading world institution in its specialised field.

In the field of research, for a number of years, the institute has studied chemical and semi-chemical pulping, penetration of liquor in wood chips, production of high grade kraft pulp from conventional mill chips, simplification and streamlining of bleaching operations, etc. Years ago the basic work led to the development of vanillin plant and many chemicals such as alcohol, tall oil, turpentine, galic acid, formic acid, Lingesol dispersants, etc., have been extracted with profit from pulping liquor. The future programme includes :—

- a. more rapid continuous chemical pulping under computer control.
- b. transportation of wood chips in water in pipe lines and partial to complete chemical processing of wood enroute.
- c. economic extraction of many more chemical byproducts from wood and pulping liquor.
- d. increasing use of combinations in paper with films, foils and plastic coating.
- e. chemical modifications of cellulose fibres and copolymeric grafting of cellulose with other polymers to provide new properties and end products etc.

Manchester College of Science & Technology, England, teaches the students taking courses in Paper Science to apply the basic scientific methods to the manufacturing problems of paper and closely related industries. A diploma in Technical

Science can be obtained by a science graduate who attends a one-year course in Paper Technology, and research leading to M.Sc. (Tech.) and Ph.D. can be carried out. Some of the research projects under study at present are as follows :

1. Chemical sensibility of paper
2. Hydrosensibility and physical properties of paper
3. Compressibility of paper
4. Drying of paper in fluidised beds
5. Flow of water through paper pulp mats.

Apart from the above, there are institutions in Germany, Norway Sweden etc., which cater to both graduate, post-graduate and doctoral studies in cellulose-pulp and paper chemistry. Private enterprises such as British Paper and Board Research Association, the Reed Paper Research Centre in Kent, U. K., the Finish Pulp and Paper Research Institute, etc., have played an important part in training of technical and research personnel for the pulp industry. In United States alone, a dozen universities have cellulose-paper chemistry as an academic subject on the university curriculum. The monthly or periodical publications like TAPPI, the Canadian Pulp and Paper, THE APPITA (The Australian Pulp-Paper Technical Industries Association), Das Papier, etc., have a place of their own. Also, in most of the western countries, the mills have their own developmental centres.

In comparison, in our country, Forest Research Institute, Dehra Dun, with only one section dealing with paper technology has been existing for many years. Though it has done pioneering work in this field in this country, its efforts have not been commensurate with the needs of the country—present and future. As regards the academic training, no education in pulp and paper as a subject, is available at the university level. It forms a small part of chemical technology training. Comparatively few men who studied abroad occupy supervisory posts. The position with regard to trained technicians or plant operators is still more unsatisfactory. The practice of direct recruitment of graduates or under-graduates still continues in mills. These apprentices are put in different sections of mills for training. This system

which worked satisfactorily in earlier days, is no longer adequate with the development of complicated equipment and increased emphasis on production by automation and instrumentation. It is heartening to note that an institution at Saharanpur for imparting education in paper technology is being set up jointly by the Union Government, the U. P. Government and the Swedish Government. This represents the growing consciousness that the manufacture of pulp and paper is a scientific process, which calls for the employment of personnel with adequate knowledge of the subject. In our view, one institute is not enough and some more training facilities are to be created.

The Ministry of Industry and Supply, Government of India, has constituted a new Development Council for Pulp-Paper and Allied Industries. This Development Council and the newly formed IPPTA could together bring about far-reaching changes in the pulp-paper training and research in India and few suggestions that we would like to make are :

1. The status of the Forest Research Institute, Dehra Dun, be raised to that of a University. In addition, its research activities should increase, covering various aspects of cellulose and paper technology, excluding textiles.
2. The Industry and G. S. I. R. together should establish a research institution to cover the various aspects of cellulose and paper industry. The expenses should be shared equally. This institute should have its regional centres.
3. Indian Pulp and Paper Technical Association or other competent bodies should award Trade Certificates to the personnel working in the mills, specially the under-graduates ; that would serve as an incentive.
4. Short term lectures or summer schools of two to three weeks duration should be arranged for the Supervisory and other staff to acquaint them with the latest developments in the subject by the top men in the area in industry and research.

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