

Research and development division orient paper mills, Amlai

BHANDARI I. M.*

The history of Paper Industry in India is one of sweat and toil and it is the undying faith of the pioneers that has been responsible for its ultimate success. Orient Paper Mills have strived their best to contribute to this cause.

The story of Orient Paper Mills has always been a story of development and expansion. After setting their first unit at Brajrajnagar in Orissa State in 1938 another fully integrated pulp and paper mill was planned and erected at Amlai incorporating the latest equipments and advanced technology to produce high quality printing and writing papers in 1965.

The mill at Amlai has a single machine producing 200 tonnes of writing, printing and packing papers per day from Bamboo, mixed hard woods and pine and is one of the fastest machines in the Country.

As one grows in age, one grows in experience and realises that the best is always yet to be and eternal pursuit is the prize of perfection. Acting on this faith Research and Development Division at Amlai was established in 1973 and recognized by the Department of Science and Technology in the same year. It is housed in a separate building. The laboratory is very well equipped for carrying out Research and Development in the field of Pulp and paper. A Pilot Plant with flexibility to process different varieties of conventional and non-conventional fibrous raw material for various grades of the Pulp and paper has also been attached to this Division. The main function of the pilot Plant is to translate the Laboratory Research findings on a Pilot scale thereby showing that these results have scope for translation on a commercial scale. The overall expenditure on this has been around 1.5 crores.

During the last decade the main stress of Research and Development Division has been in the following fields—

1. Evaluation of fibrous raw materials.

2. Process development, including the use of additives in the various stages of the process in pulping and paper making.
3. Pollution control and minimizing the effluent discharge in the main stream.
4. Use of effluent for agricultural purpose.
5. Use of the rejects from the mill.
6. Pilot Plant.
7. Library.
8. Training.
9. Transfer of Technology.

Each item is discussed below:

1. Evaluation of fibrous raw materials.

Both indigenous as well as foreign samples from Kenya, Nigeria, Venezuela, and Australia have been evaluated for the production of various grades of pulp and paper.

The indigenous raw material evaluated are listed below—

- (i) Eucalyptus hybrid (different age group), (ii) Adina Cordifolia, (iii) Gmelina Arborea, (iv) Butea Resinosa, (v) Shorea Robusta, (vi) Dalbergia Paniculata, (vii) Terminalia Tomentosa, (viii) Susbenia grandiflora, (ix) Boswellia Serrata (Salai), (x) Hawaiian wood (Kubabal), (xi) Pinus Caribaea.

The non-conventional raw materials studied so far are mentioned below:

- (i) Kenaf, (ii) Lemon grass, (iii) Urena lobata (iv) Sacharum Spontaneum, (v) Jute waste, (vi) Ilomoea Coccinea, (vii) Agave Sisalana (Sisal), (viii) Cotton linters.

Anthraquinone as additives in pulping has been fully investigated. Use of Sulphamic acid and Potassium Bromide and other additives has been tried as aids in bleaching.

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Gaur gum, percol and other polyelectrolytes have been tried as aids in beating and paper making.

Some of the chemicals like Morarfloc have also been tried as a setting agent for green liquor and white liquor in the Soda Recovery.

As a process development effect of chips size, bulk density and pulping condition including Sulphidity on the yield have also been investigated.

Oxygen pulping and bleaching of indigenous raw materials have also been tried. High yield pulping of indigenous materials by simulated Thermo-mechanical, Cold Soda high yield semi-chemical pulping using Sulphate liquor, green liquor and N.S.S.C. solutions has also been investigated with encouraging results. These investigations will be useful for the production of cheap grade of paper with little permanence, and pulps by these process may be used for making School test books, and School copies etc.

Relationship between the power requirement and strength properties during beating under different conditions of consistency and temperature in beating has been studied. Optimization experiments on the different stages of bleaching has also been carried out.

Pollution control and minimizing the effluent discharge in the main stream

It is an irony that the Industry which provides the daily needs of writing and printing papers and employment to thousands of people also creates some environmental and pollution hazards in the course of paper manufacturing. Orient Paper Mills being alive towards its social responsibility for prevention of such hazards have done pioneering efforts in the field of environmental pollution control right from the start up of the mills. In the short survey of our mills and effluent treatment units today, you will observe the huge efforts done by this industry in solving the pollution problems. Today our treated effluent meets all most all the I.S. Standards.

Practically all the units operation contribute to liquid waste viz :

- a) Bamboo washing and chipping
- b) Digester house and pulp washing
- c) Bleaching
- d) Paper Machine and
- e) Chemical Recovery

Extensive studies were undertaken by the

Research Division in collaboration with N E R I Nagpur. Data on flow and characteristics of waste waters was determined and the different liquid waste from different Section were segregated in three grades.

Grade I- Clean water of condensates from paper machine and evaporators. This is reused in the system.

Grade II- White water from paper machine out flow, from chlorination and Hypo Section of bleach plant, Supernatant from Causticizer mud, and wash water from Chipper House and Grit collector.

Grade III- Black liquor Spills and leakages from digester house wash liquors from pulp mill, brown stock washers plus caustic extractions effluent from bleached plant.

Grade II was passed through Clariflocculator and aerators and the discharge met with the I.S.I. Specifications.

Grade III effluent which is brown in colour contains colouring matter and lignin. Investigations were undertaken for the removal of lignin and colouring matters of this liquor by both biological degradation as well as physico chemical methods, and it was observed that this treatment is too expensive.

The Research activities have been extended to (i) minimize BOD load from grade III effluent by water plants such as (A) AZOLA (B) WATER HYACINTH.

(ii) Colour removal of grade III effluent with the help of (A) Hypo sludge (B) Fly ash and (C) Boiler cinder.

The outlet of the quality effluent is reduced by recirculating the water in the system. Further investigations are in progress.

In recognition of our excellent work done in the field of water pollution control members of the United Nations Environment Programme Workshop (held in Delhi from 17th to 23rd February) visited Amlai on 20th February 1983 and appreciated the efforts made by the mill in direction of pollution control. Latter on, a member of the Workshop Mr. Martin Wright, Producer, Technology, British Broadcasting Corporation, Open University Production Centre Walton Hall, Milton Keynes MK7 6BH England, took shots for a film on pollution control.

Use of effluent for agricultural purpose

In collaboration with N E E R I and B.S.I.R. investigation have been going on for studying the use of grade III effluent as land irrigation.

The use of kraft pulp and paper mill waste water for irrigation of corn, Barley, Kenaf, Wheat Cowpeas gave yield similar to crop irrigated with fresh well water. Soil analysis after three years of irrigation showed a slight increase in soluble salts and an increase of about one unit in pH. These change had no apparent detrimental effect on the crops.

Taking into consideration the physico-chemical properties of the soils, available water resources, climatic conditions and the agricultural practices adopted by the farmers in the region, green house and field studies have been carried out to study the effect of anaerobically treated pulp mill waste water on the germination, plant growth and yield of various kharif and rabi crops. Apart from it an extensive plantation programme have been started for woods i.e. eucalyptus hybrid by using effluent water successfully.

Use of the rejects from the Mill

Fibrous rejects have been investigated for the production of duplex and triplex board with encouraging results and it is proposed to set up a 30 tonne board plant.

Experiments have been carried out on the use of lime sludge as a filler in paper making and also its use in cement industry.

The waste water coming out of the mill have been evaluated and reuse of this water in various stages of the process has been investigated.

Pilot Plant

To confirm and develop the know how of producing new grades of papers a Pilot Plant with an installed capacity of 500kg/hr has been erected. The various varieties of papers tried are white maplitho, super white maplitho, cream wove, Bank paper, Bond paper, Board paper, base papers etc. In the pulping Section experiments have been tried on pulping of cotton linters and other bast fibres.

Library

The Division has a well equipped library with 1500 volumes of books in various disciplines and journals pertaining to the related fields are

also procured. There is a photo copying machine for photo copying material of interest.

Training

Graduate trainees from Kenya, Nigeria, etc and India are trained in different fields. Besides these I.T.I. apprentices are given factory training before they qualify for appearing in I.T.I. examinations.

Transfer of Technology

Over the years O.P.M. has also extended its activities beyond the National horizon and have participated in growth of paper industries in Kenya Nigeria and other third World countries by undertaking Research and Development activities in evaluating their raw materials and providing technical know-how and management services for the erection, commissioning and operation of the plant on continuous basis. The raw material evaluated are—

(A) Kenyan wood

Cypressus Lusitanica (Cypress), Pinus Radiata Pinus Patula and Eucalyptus.

(B) Venezuelan wood

Pinus caiveae, Penteria species, Mouriri species, Bonbacopis Quinata

(C) Nigerian hard wood

Albizzia species, Banbusa species

(D) Zambian wood—

Pinus Kesiya, Eucalyptus grandis

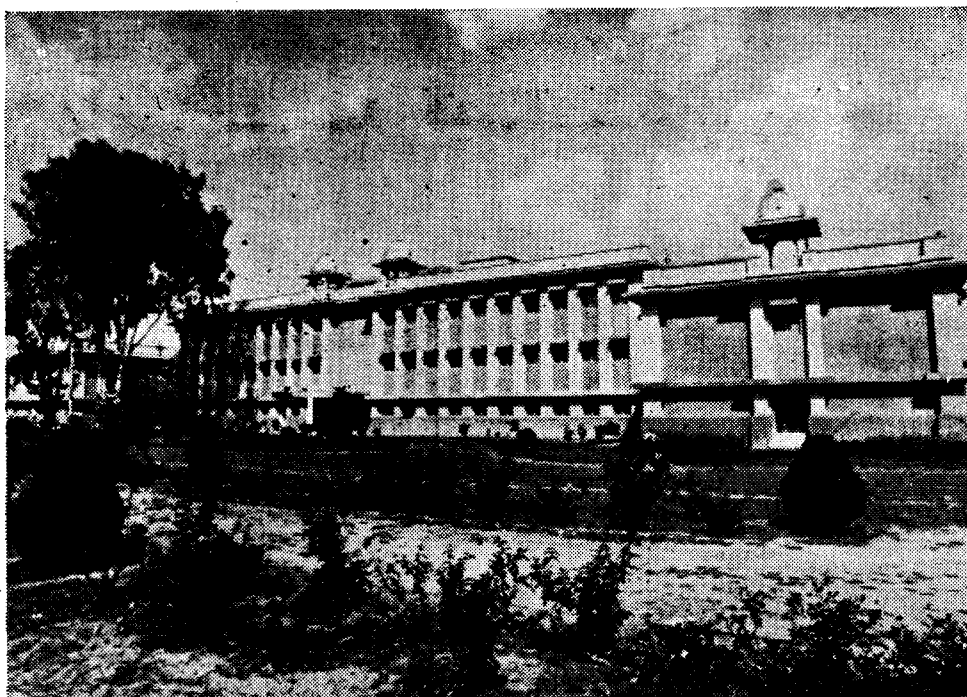
(E) Australian wood—

Pine species, Eucalyptus species

Director of Research and Development was deputed to study problems in Panafrican Paper Mills, Webuye Kenya.

Committees, Seminars and Publications

Director of Research and Development is member of the Technical Sub Committee of the Indian Paper Mill Association and is also active member of various I.S.I. Committees dealing with pulp and paper.



Research and Development Building



Analytical and Effluent Testing Laboratory.



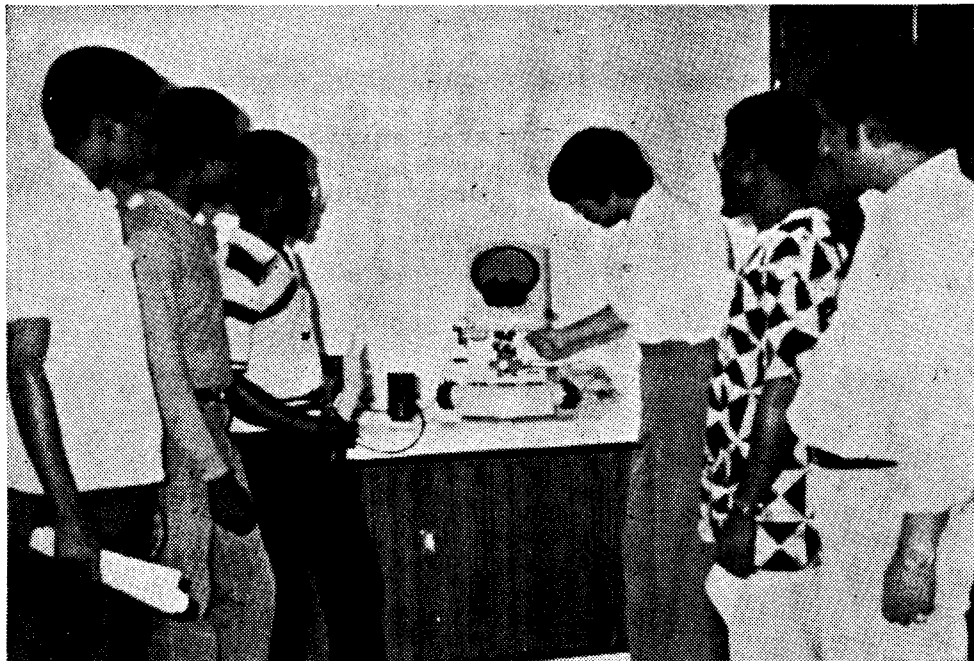
Laboratory 30 litres electrically heated forced Circulation type of digesters.



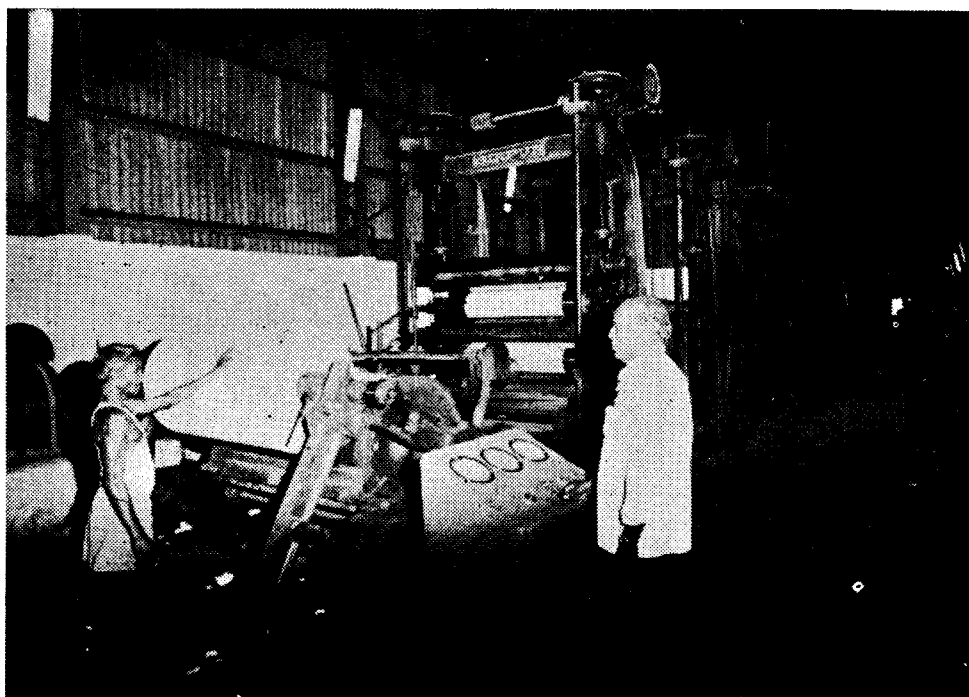
Double Disc Sprout Waldren Refiner



Physical Testing Laboratory (Schopper double folds).



Projection Microscope



Pilot Paper Machine

The staff in the Research and Development Division is well qualified and takes part in various seminars conducted by the Pulp and paper industry and other related fields. They have published research finding in various journals.

Thus it is seen that the activities of the research and development division at Amlai are significant for the benefit of the paper industry not only in the country but also in the third world.

It is contemplated to expand the activities further by installing a Pilot Plant speciality paper machine for making light weight papers as the existing Pilot Plant is suitable for research on heavy weight paper only. More equipments for doing basic research will also be added in due course. Engineering Section of the Research and Development Division is also being considered.