VENI VIDI VICI

Problem Statement

(Set up of a paper industry)

The Indian Paper Industry is a booming industry and is expected to grow in the years to come. The usage of paper cannot be ignored and this awareness is bound to bring about changes in the paper industry for the better. It is a well known fact that the use of paper is being objected to these days. The reason being, there are few papers which do not possess the property of being degradable, as such, use of paper is being discouraged. Excessive use of non degradable papers upsets the ecological equilibrium.

The annual global paper and paperboard production was approximately 402.0 million tonnes in 2011. It is expected to increase to 490.0 million tonnes by 2020.

India is the 15th largest paper producer in the world. It provides employment to nearly 1.5 million people and contributes INR35.0 billion to the government's exchequer. Indian paper mills can be categorised based on the raw materials - wood/forest based mills, agro-residue based mills and wastepaper-based mills. Around 10 million tons of paper was consumed in India in 2008, of which 9 million tons was manufactured in India. Paper production and consumption have both grown at around 7-8 per annum on average over the past 10 years, broadly in line with the increase in GDP. Nevertheless, paper consumption per capita, at around 8-9 kg per annum, remains low by international standards.

Broadly, the industry can be classified into two segments :

- Paper and paperboard (***writing, printing, packaging and tissue***). The writing and printing paper market can be further divided into coated and uncoated segments.
- Newsprint mainly uses ***for newspapers, flyers, and other printed material*** intended for mass distribution

Various macro-economic factors like national economic growth, industrial production, promotional expenditure, population growth and the government’s allocations for the educational sector influence the demand for paper
- The growth in paper consumption is directly related to GDP growth in the country. In the past, it has shown the 1:1 relationship with the GDP growth rate.
- With expected GDP growth of 9-9.5%, the demand for Newsprint and Writing & Printing Paper is expected to grow at the same rate.

Indian paper industry needs the following for being globally more competitive.
1) Sustained availability of good quality of raw materials (forest based) and bulk import of waste paper to supplement the availability of raw materials.
2) Adequate modernization of the manufacturing assets.
3) Improvement of the infrastructure.
4) Quality improvements and reduction in cost of production
5) Import policy conducive for import of material, equipment, instruments, raw materials & technologies which are bearing of the quality and environment.

SOME KEY INFORMATION REGARDING PAPER INDUSTRY :

Pulp manufacturing starts with raw material preparation, which includes debarking (when wood is used as raw material), chipping, and other processes such as depithing (for example, when bagasse is used as the raw material). Cellulosic pulp is manufactured from the raw materials, using chemical and mechanical means. Manufactured pulp is used as a source of cellulose for fiber manufacture and for conversion into paper.

Paper are manufactured from raw materials containing cellulose fibers , generally wood, recycled paper and agricultural residues .In developing countries, about 60% of cellulose fibers originate from non wood raw materials such as bagasse (sugar cane fibers), cereal straw,bamboo, reeds, esparto grass, jute, flax, and sisal.

The main steps in paper manufacturing :
1) Raw material preparation, such as wood debarking and chip making
2) Pulp manufacturing
3) Pulp bleaching
4) Manufacturing of paper
5) Fiber recycling.

Paper and pulp may exist as integrated or separated operations.

Environmental Issue:

The most significant environmental issues are the discharge of chlorine-based organic compounds (from bleaching) and of other toxic organics. The unchlorinated material is essentially black liquor that has escaped the mill recovery process. Some mills are approaching 100% recovery. Industry developments demonstrate that total chlorine free bleaching is feasible for many pulp and paper products but cannot produce certain grades of paper. The adoption of these modern process developments, wherever feasible, is encouraged. Pollution prevention programs should focus on reducing wastewater discharges and on minimizing air emissions. Process recommendations may include the following:
• Use energy-efficient pulping processes wherever feasible. Acceptability of less bright products should be promoted. For less bright products such as newsprint, thermomechanical processes and recycled fiber may be considered.
• Reduce effluent volume and treatment requirements by using dry instead of wet debarking; recovering pulping chemicals by concentrating black liquor and burning the concentrate in a recovery furnace; recovering cooking chemicals by recausticizing the smelt from the recovery furnace; and using high-efficiency washing and bleaching equipment.

Future Papers Pvt Ltd is a ***well established*** paper manufacturing company in India. It has various plants across India that manufactures conventional paper products .However, owners of the company want to set up a new plant to manufacture 15000 tonnes paper initially keeping in mind the deficit paper industry is facing.

Further studies show that there are over 200 machinery manufacturers in India with different scale of technologies in India supplying 3000 machines per annum ranging from fully automatic to semi automatic machines. The owners, in order to create jobs for workers, have specially instructed not to use fully automatic machinery in the plant.

HINTS FOR THE SOLUTION:

Your solution must include,
1) Suggestion of a suitable plant location and possible range of Products (other than those mentioned in the problem)
2) A proper plant layout keeping in mind all the auxiliary functions, machinery and material handling equipments. Give the plan view of the layout. (Layout should be drafted in AutoCAD/ ProE with exact dimensions.)
3) Cost Estimation, Costing and Pricing of the product with breakeven analysis.
4) The inventory structure and norms to be followed for smooth production.
5) Master Production Schedule (MPS) with current resources and projected demand.
6) List of all the raw materials required in the process.
7) Carve out the marketing strategy for your products keeping in mind various products already present in the market segment as yours.

You as a Mechanical or Production engineer have been assigned to work out the logistics of the new plant.

1) 1st and 2nd year students may skip Inventory Model and MPS in their submission. Special credit will be awarded for 1st & 2nd years who include these as well in their submission.
2) As mentioned earlier, the raw material can either be imported from foreign countries or be manufactured in the plant itself

Special credit will be awarded to those teams who include Sewage treatment plant taking into consideration various environmental factors as listed above(with all the processes and cost estimation).

Rules and Regulations for Submission (Round 2)

1) Submit your summary latest by 23:59 hrs on 18th September, 2011.
2) Submission should be in hard copy and not be more than 6 pages
(Font Size : 11 , Line Spacing 1.5) excluding the cover page.
3) Mention Team Name and details of Team members on Cover Page.
4) Late entries will not be entertained.
5) Mention all the references used.
6) Assume Suitable Data if necessary. State the assumptions clearly in the beginning of the report.

Rules and Regulations (Round 3)

1) Selected teams have to submit a comprehensive report one day before the final presentation.
2)The final presentation will be held during Avishkar.

For further details and queries mail to vvv.mechrocosm11@gmail.com
You can download the soft copy of the problem statement from the Mechrocosm and downloads section of the site: www.avishkar.mnnit.ac.in

Contacts:

Shubham Agarwal : 09451545566 : Tandon 52
Ankit Yadav : 09453414553 : Tandon 40
Rishabh Jain: 09453023187 : Tandon 13
Saumya Pandey
Smriti Priya