EXECUTIVE SUMMARY

0.1 BOPP

0.1.1 Plastic Industry had its beginning in India in the mid twenties, LDPE was produced in the late fifties, and HDPE in the late sixties. Polyethylene has been the most used plastic films in India, and in the early sixties cast polypropylene has made entry and was accepted because of its superior properties. Stretching this film, especially in both directions, produces even superior properties of tensile strength, flexibility, toughness and such other. The stiffness of BOPP film is three times that of cast film and eight times that of polyethylene film.

0.1.2 Even though the first BOPP process was developed in Germany in 1935, it made its rapid commercial entry only in the early sixties. The current world consumption is one million tonnes and the growth rate around 8%.

0.1.3. BOPP made its entry into India only during the eighties, and the present Indian consumption is less than 1% of the world consumption.

0.1.4. BOPP can be manufactured as heat sealable or as non heat sealable material and in either case produced as white opaque, pearl lustre or clear transparent films. Certain additives are usually added to improve its properties relating to slip, blocking, modifying the heat seal temperature and anti static requirements.

0.1.5. BOPP films are specified in terms of their end use requirements such as strength and other physical properties, clarity and permeability. The films are also converted through operations such as printing, coating, lamination, metallisation and pouching to enable ultimate end use.

0.1.6. BOPP can be manufactured through either the Tubular or Bubble process, or the Tenter process. In the Bubble process, polypropylene is extruded in a tubular form and transverse orientation is achieved by inflating the heated and softened tube with compressed air. On the other hand in the Tenter process, the film is cast as a sheet and then stretched in both directions.

0.1.7. Bubble process is generally used for lower capacity production and the Tenter process for larger capacity production suitable for longer runs. The film made by the Tenter process will have better clarity and higher tensile and compressive strengths.

0.1.8. The raw materials used in BOPP are Polypropylene homopolymer and Polypropylene copolymer. The latter is used to produce three layer BOPP

for heat sealable applications. A small part of the raw material requirement for this industry is produced by the Indian Petrochemicals Limited, Baroda and the rest of it has to be imported. IPCL is however going in for an expansion which could meet the full indigenous demand. The additives used in the film production are all imported.

0.1.9. The basic manufacturing plant comprises of compounding and feeding, extrusion, casting, orientation, gauging, winding, recycle, Corona treating and profile control systems. The main line plant is imported and auxillary equipment and utilities are indigenously obtained.

0.1.10. The first Indian BOPP unit to come up was MM Rubber in Tamilnadu closely followed by Cosmo films in Maharastra and later by M P United Polypropylene Ltd. At present, seven units are in operation, though thirtytwo units took license for this activity. The present installed capacity is 17000 tonnes and production during 1990-91 was 8400 tonnes. Cosmo films has the largest capacity of 4000 tpa followed by Biax Ltd with 3900 tpa.

0.1.11. The Indian market has applications for BOPP in areas relating to overwraps, innerliners, tapes, pouches/strip packs, print laminations and decorative and release films and such other.

0.1.12. Adhesive tapes, print laminations, cigarette wrapers and biscuit wrapers together account for more than two thirds of the BOPP market in India today. It is estimated that the BOPP demand will go up to 17000 tonnes by 1997 reflecting an annual growth rate of 13.5%.

0.1.13. Of the seven manufacturers, five have obtained their plants from Bruckner, Germany, one from Marshall Williams of USA and another from Mitsubishi of Japan. The Mitsubishi plant is of the Bubble process, while all other plants are of Tenter process.

0.1.14. BOPP is presently manufactured by over thirty companies around the world. Europe and North America account for roughly 80% of the total market. Plants of maximum unit capacities of 16000 tpa with 8 meter width of BOPP at speeds of 300-500 meters per minute are also in use. Tenter is the most widely used process and some of the recent improvements are automatic thickness and profile controls, and computerised process controls.

0.1.15. A major difference between a typical International plant and a typical Indian plant is the difference in size. This results from the larger international market and the consequent long runs between product changes. Infrastructural weaknesses, the very high cost of maintenance and spares, and end user requirements also inhibit usage of large capacity plants in India.

0.1.16. There is very little R & D activity in this industry. Testing facilities with certain institutions like Indian Institute of Packaging, Central Institute of Plastic Engineering & Technology, Indian Institute of Technology, Central Food Technology & Research Institute, Indian Institute of Toxicology are sometimes used by the industry. There are no Indian standards for this material and the industry very largely uses ASTM standards and end user specifications.

0.1.17. Of the seven manufacturers, six have obtained technical knowhow from machinery manufacturers and the seventh from a BOPP manufacturer overseas. Assistance from overseas consultants also have been used to help in knowhow transfer and trouble shooting.

0.1.18. Technology gaps exist between Indian and overseas manufacture in the area of raw material, equipment, process, film application, consumption norms, conversion and end use.

0.1.19. The single manufacturer of raw material in India, IPCL, manufactures a limited range. Additives are not manufactured in India.

The plants in use in India are of less than half the capacity of typical international plants and have lesser degree of automation such as computerised, controlled, automatic reprocessing of scrap and such other.

0.1.20. Certain types of films such as those for DC capacitors, twist wraps are not manufactured in India. Technology is also not available in India for certain conversions of BOPP film such as acrylic coating, PVDC coating, cold seal. High aroma barrier film has also to be developed. It is also generally observed that the plant down time and wastage is of a higher magnitude in India as compared to overseas plants.

0.1.21. Exports from India are minimal in this area mainly because of technology gaps. Further India does not appear to have a comparative advantage because of importation of plant and raw materials and low labour intensity.

0.2. POLYESTER FILMS

0.2.1. The manufacturing process for polyester was first patented by Calico Printers Association in 1941. The patent was later assigned to Dupont for USA and ICI for the rest of the world.

0.2.2. Polyester entered the world market in 1959 and the production in India commenced in 1975-76 by Garware Plastics and the present Indian consumption is less than four percent of the world consumption.

0.2.3. Polyester films are manufactured as plain general purpose, oneside pretreated, oneside heatsealable co-extruded and laminated and metallised

films. Additives are added to impart specific properties for enduse applications.

0.2.4. Polyester films are also specified in terms of their strength, clarity, permeability, tear strength, printability and lidding properties.

0.2.5. Polyester films are manufactured by melt extrusion of polyester chips and additives which are then cooled on the surface of a casting drum. This is then fed through a series of rollers where, under heat, is drawn to approximately three times its original length. This is then stretched sideways by three times. While under tension and still in the oven the film is set to produce biaxially oriented polyester films.

0.2.6. Polyester chips are produced by the condensation polymerisation of ethylene glycol and terepthalic acid. Polyester chips which were imported earlier are currently being met largely by the Indian manufacturers Garware Plastics, Century Enka and Petrofils. Additives are being imported.

0.2.7. The basic manufacturing plant comprises of polyester drying system, extruder line, film casting system, longitudinal stretcher, transverse stretching machine and take-off unit, co-ordinated DC drives, thickness measuring gauges, primary and secondary slitters, etc. The main line plant is imported, and utilities and auxilliary equipments are procurred locally.

0.2.8. The first Indian polyester film unit was by Garware Plastics in Maharashtra, later followed by Polyplex Ltd. At present there are six units in operation though there are over twenty licencees. The present installed capacity is 20000 TPA while the production for the year 1991-92 was 12000 TPA. Garware Plastics has the largest capacity of 10000 TPA while the other units have capacities ranging from 1800 to 4000 TPA.

0.2.9. Indian market has applications for polyester films in audio/video magnetic tapes, insulation tapes, metallic yarn, sun control films, drafting and reprographic films, floppy diskettes, flexible packaging, carbon ribbon and paper, labels and stickers, adhesive tapes, etc.

0.2.10. Flexible packaging, audio/video magnetic tapes and metallic yarn account for nearly two thirds of the market in India. It is estimated that the polyester film demand will go upto 19500 TPA by 1996-97 reflecting an annual growth rate of 10%.

0.2.11. Major suppliers of the polyester film line for Indian manufacturers are Dornier of Germany and Cellier of France. Didier of Germany and Lyndas of Zurich have supplied the technologies to the Indian industries.

0.2.12. The current world production is around 4 lakh TPA with an average growth rate of 6% per annum. About 40% of the world market is in graphic arts.

0.3. RECOMMENDATIONS

0.3.1. The following major recommendations may be drawn out from the study.

0.3.2. A major component of indigenisation and technology absorption could be the development of the manufacturing plant within the country. Until now, this has not been attempted because of the low demand. However, the increasing cost of the imported plant makes it worthwhile for any existing BOPP manufacturer to attempt developing the plant for diversification and expansion.

0.3.3. There is need for development of a wider range of homo and copolymers for this industry and it is also worthwhile for research institutions to take up work on such additives. Efforts taken up to standardise equipment at the end users would also benefit this industry.

0.3.4. A basic requirement for this industry is that the Indian manufacturers should increase their scale of operation to be able to achieve economies, considering the substantial overseas market that can be tapped. With increasing size they should also consider the degree of appropriate automation they can adopt.

0.35. There is need to make use of national research institutions in areas of product development, material development and process development on a sponsored research basis.

0.36. There is need for the large BOPP manufacturers to take the initiative to develop their own main line plants. Developments in the area of raw materials and end use applications are also required and it is possible that market forces will themselves prompt these developments as the size of the industry gorws.

0.37. In the field of exports, BOPP converters can consider value added product exports.