

As a result of investigations carried out at the Central Laboratories of the Council of Scientific and Industrial Research, Karachi, it has been possible to evolve a process for the manufacture of insulating tape from exclusively indigenous raw materials. The tape is about 100% above the British Standards Specifications (B.S.S.).

The total capital investment for a unit of production for manufacturing 300,000 spools ($1\frac{1}{2}'' \times 50$ yards) per annum is estimated at approximately Rs. 2,14,000. The average cost of a spool in a unit of this size works out to Rs. 1/7, inclusive of overhead expenses, as against the present market price of Rs. 2 to Rs. 2/8.

Process, Equipment and Raw Materials

The process involves the following unit operations: mixing the various ingredients, coating of the tape, drying of the tape at controlled temperature and winding of the tape and cutting into spools of required sizes.

The equipment required for the process consists of: jacketted vessel with mixing and temperature control device, bath for coating purpose, drying chambers and winding and cutting machine.

The raw materials required are: insulating medium, vehicle, filler and cloth.

All these materials are available in the country.

Pre-Construction Cost Estimation

(Production capacity = 3 lakh spools per annum)

Capital expenditure

	Rs.	Rs.
Equipment	70,000	
Building	43,000	
		1,13,000

Running expenditure (for 3 months)

Raw materials	85,275	
Direct labour	3,330	
Indirect labour	3,210	
Selling expenses	1,260	
Packages, power, interest on capital and contingencies	7,865	
		1,00,940

Total capital investment	2,13,940
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Cost of production of 3 lakh spools	4,28,763
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Average cost Rs. 1/7 per spool.

HEAT AND SOUND INSULATION BOARDS FROM SUGAR-CANE BAGASSE AND OTHER AGRICULTURAL WASTES

Sugar-cane bagasse, reeds, coconut fibre, rice husks and similar other materials find little economic use and are wasted in considerable quantities. For instance, bagasse which is a by-product in the process of cane crushing is mainly used as a cheap fuel for boilers in sugar-cane factories, but even after meeting the requirements of fuel, large quantities are left over as surplus for which there is practically no use.

With a view to utilise these materials, investigations were undertaken in the Laboratories of the Council of Scientific and Industrial Research, and it has been possible to evolve a commercially feasible process for the manufacture of low-cost heat and sound insulation boards which can be used in buildings for partitions, false ceilings, etc. These boards have a thermal conductivity of 0.09 (same as glass wool), 1 inch thickness of the board being roughly equivalent to 10 inches of brickwork in respect of insulation, and a tensile strength of 90 lbs. per sq. inch. These boards can also be used for light weight roofs in a sandwich system of water proof material. On account of the light weight of the roof, made of sandwiched boards, the supporting structure and the load-bearing walls need not be as strong as would be necessary for any other normal type of roof, thus resulting in a considerable amount of saving in the overall construction cost.

The total capital investment for a unit producing annually 60,000 boards of $8'' \times 4'' \times 1''$ thick is estimated at approximately Rs. 5,25,000. The average cost per sq. ft. of the board in a unit of this size is estimated at $2\frac{1}{2}$ annas. The market price of similar board is 8 to 10 annas per sq. ft.

Process, Equipment and Materials

The process of manufacturing these boards consists of the following unit operations: shredding, cooking, mixing and beating, pressing in moulds, and drying.

The process is simple, requiring very little specialised knowledge or technical know-how,

and can be carried out by semi-skilled labour with limited overall technological supervision.

The basic equipment required consists of : shredder, pressure cooker, beater, hydraulic press, and drying chamber.

With the exception of the last item which can be constructed locally, the other items of the equipment will have to be imported.

The raw materials required in the process are : bagasse, reeds, coconut fibre, and chemicals.

All these materials are easily available in the country.

Pre-Construction Cost Estimation

(Production capacity = 60,000 boards of 8" × 4" × 1" per year).

<i>Capital expenditure</i>	Rs.	Rs.
Equipment	3,50,000
<i>Running expenditure (per annum)</i>		
DIRECT EXPENSES		
Raw materials ..	1,01,000	
Direct wages ..	48,000	
Power	15,000	
Contingencies ..	6,000	
Depreciation @ 10% ..	45,700	
		2,15,700
INDIRECT EXPENSES		
Establishment ..	18,360	
Promotion of the project @ 2 1/2% on 5 1/4 lakhs (= capital investment)	13,125	
		31,485
<i>Selling expenses</i>		12,600
Interest on capital @ 4% on Rs. 5 1/4 lakhs.		21,000
Insurance @ 2 1/2% on Rs. 5,58,000.		13,950
Total cost of production for 60,000 boards		2,94,735
Cost per board = Rs. 4/14/7, say Rs. 5		
Cost per sq. ft. = Rs. 0/2/6		

FOUNTAIN PEN INKS

The making of writing ink is a very ancient art. The earliest inks consisted of lamp black ground with glue and moulded into sticks which were mixed with water before use. Such inks were used in the early Egyptian and Chinese civilizations as early as 2500 B. C. There are references to iron-gallo ink solutions of an iron salt, usually ferrous sulphate, in extracts of tannin bearing materials dating back to 210 B.C. Prior to the modern era of wide spread manufacture and distribution of goods, the making of writing ink was a household art. The present day writing ink industry, although very old, is relatively small and highly competitive, and the exact composition of the product is the individual manufacturer's secret.

The present annual consumption of fountain pen ink, in Pakistan, which has an upward trend is estimated at 30,000 gal., valued at about Rs. 1,000,000, of which about 50% is imported.

The locally produced inks are, however, of a very poor quality, necessitating the continued import of high quality inks from abroad. The ink produced according to the process developed in the Council's laboratories has been found, to be comparable with the best imported brands.

The total capital investment for a production unit with a capacity of 7000 gallons per year is estimated at Rs. 100,000, and the average cost of one fluid oz. bottle of ink would be 3 annas as against one rupee for a similar quality of imported ink.

Process, Equipment and Raw Materials

The unit processes involved are : preparation of distilled water, preparation of the various solutions, mixing of the solutions, ageing of the ink, centrifuging, filling the bottles, capping the bottles, labelling, and packing.

The equipment required consists of : water distillation plant, agitators, mixers, filters, centrifugal separating machine, mixing tank, air tight storage tanks, filling machine, bottle capping machine, bottle washing machine, labelling machine, and packing machine.

The last four machines are not very essential and can be dispensed with.

The raw-materials required are : dyes, acids, and some chemicals.