UNIVERSITY OF COCHIN

B. TECH COURSE

IN RUBBER PROCESSING & TECHNOLOGY

PROJECT REPORT ON RUBBERISED FIBRE MANUFACTURING UNIT

DISSERTATION REPORT SUBMITTED BY

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PREFACE

This project is prepared and submitted in the form of a dissertation as a partial fulfilment of the course. I would like to express my thanks to A.U. George, Accounts Officer, C.M. George, Deputy Director, Agronomy Division, E.V. Thomas, Chemistry and Technology Division and M.K. Balagopalan Nair, Chemical Engineer, Rubber Board for their guidance in preparing the report. I would also express my thanks to P. Mathew of Rubo Fibre, Alleppey and J. Sebastian of Mahnam Sarathy and Company for their helpful suggestions.

SECTION. A

INTRODUCTION

Rubber plays a vital role in the day to day life of the present society, and has become an indispensible ingredient for making life comfortable and active. Rubber tyres are helpful in turning the wheels of the society while the various rubber mattresses give rest and comfort to the weary. Rubber foam mattresses have become costly and so cheap rubber mattresses has to be popularised for making it acceptable to the common people. Fibre foam is a development in this context.

The process of fibre foam production was first patented in the year 1934 by Smith by spraying latex on curled-fibres. Later use of coacervants - was patented by velatex in 1952. The process consists in immersing the fibre in a bath of - very dilute latex compound so that fibres get distributed throughout, then adding some delayed action coacervants and the contents are subjected to vibration as coacervation occurs, so that no mass coagulation sets in.

The modern production method is one which is understood to be in operation at the cushioning product division of Armour Company of America. Actually the main object of the project was the removal of waste hair which is a by product of animal slaughtering. Now it finds many application in the modern world.

This product comprises large diameter fibres bonded together by droplets of compounded latex. This material has a

very open structure resilient dimensionally stable and of low density approximately 5 lb/ft^3. Its resiliance derives essentially from fibres. The rubber serves merely to anchor the fibres to one another and to ensure permenance of structure. It is significant that the bonded fibre pads retain their flexibility and resilience even at temperatures sufficiently low for rubber to become leathery. The rubber content varies from 30 - 50 % by weight of the pad. Depending upon the rubber content the load carrying capacity and dimensional stability varies.

In India large scale production of rubberised coir fibre was started only in 1964 and ever since has been finding its application in various domestic & Industrial fields. At present there are only eight small and medium scale units in our country manufacturing this product and they are utilising their full production capacity. Synthetic or natural rubber foam articles are made from costly raw materials. Rubberised fibre requires indegenously available coir fibre and latex. Hence the finished rubberised fibre goods are cheaper than all the other similar resilient products.

Rubberised fibre products find their main application as mattresses and cushioning material. These are light, resilient, durable and comfortable. Some of the salient features or rubberised fibre are self ventilating capacity, washable nature, light weight, everlasting spring action, impact resistance and cheapness among others. These properties make this product accep-

table to the following applications.

1. Cushions for homes, hospitals and transport.
2. Packing pads.
3. Air filters and ventlating screens
4. Thermal and accounstic insulations.
5. Underlay for carpets.

Normal Sizes

1. Mattresses Dimensions - All mms.

   1905 x 762 x 101
   1981 x 838 x 101

2. Cushions
   406 x 406 x 51
   457 x 457 x 51

3. Pillow

   533 x 356 x 102
   610 x 356 x 102

4. Baby mattresses

   660 x 508 x 25

S E C T I O N . B.

M A R K E T S R U V E Y .

1. Users / Customers analysis and Sources of Supply

Curled ropes underlay pads filters and insulation materials find good off take in India as well as abroad. Because of the outstanding resilient properties and cheapness hospitals and hotels are mainly using fibre form mattresses. Fibre foam cushions are mostly used in transport vehicles. Packing delicate fragile equipments require this in bulk. Large quantities in the form of pads are used for filtering air, for conditioning. As foam rubber has become prohibitively costly, cheaper rubberised fibre foam have become popular now a days. With the growth of new industries the demand for rubberised fibre also is likely to increase.

As the population and the standard of living increases more and more people are likely to use fibre foam mattresses.

a. Home, Hospitals and Hotels

They consume mainly as mattresses and pillows. Many of the hospitals and hotels have started using fibre foam, as it has got price advantage and everlasting spring action of the fibre. Being a coir product fibre foam is free from excise duty. Fibre foam mattresses require replacement only after 10 - 15 Years.

Year	No. of Hospital beds in 000's. (in India)
60 - 61	186
70 - 71	266.2
71 - 72	269.8
72 - 73	281.6

Reference - Manorama Year Book 1975.

b. Commercial Vehicles

Commercial vehicles consume fibre foam in large quantities for cushioning. Fibre foam has replaced latex foam seats in almost all commercial vehicles. Main advantages are :

1. Lesser Price
2. Lesser distruction by travellers.

Year	No. of Commercial Vehicles.(in India)
1964	33507
1965	37483
1966	35362
1967	31602
1968	34940
1969	35242
1970	41136
1971	41854
1972	38934
1973	44903

Ref:- OIL STATISTICS

c. Theatures

Most of the theatures in the local areas are using fibre foam cushions. As more and more theatures are coming up in the local areas more and more consumption of fibre foam cushions can be expected.

Prices and Effect of changes on demand

Reduction in price can be effected by the utilisation of indegenously fibricated machinery. Quality of the product is found to be maintained in the firm working with indegenous machinery at Mavelikara.

COMPETITIVE SITUATION

There are only eight factories in India producing about 25 lakhs Kg. of fibre foam, per annum. Seven of them are working with imported machinery. This factory starting to work on indegenous machinery can easily compete. Fixed Assets comes to only 1/3rd of the other factories.

Three ofthe factories are in Kerala, at Alleppey, Mavelikara and Velliyapattanam. Others are at Farithabad, Culcutta, Cuttak, Bangalore and Tinnaveli.

Export Situation

There is good export demand for fibre foam products

Year	Quantity in Qtls.	Value in Rs.
1971	8	10724
1972	1	1073
1973	7	7668
1974	29	40750
1975	13	25646
1976 July	14	

Ref:- From Coir News Vol. No. Year.

S E C T I O N . C.

PRODUCTION REQUIREMENTS

LOCATION

When selecting alternative sites for locating the factory three important considerations are to be kept in mind.

1. Factory is relatively immobile.
2. Impact of plant location on operating cost and profit are considerable.
3. Building occupancy cost are both large and relatively fixed.

Further essential requirements are:-

1. Proximity to the market
2. Proximity to raw materials
3. Facilities for transportation
4. Availability of skilled and unskilled labour
5. Availability of power and water.

This being a bulky product it is better to locate the plant near the market. The plant can be located at Mukundapuram in Trichur District. The main intention of selecting this particular area is to promote and give job opportunities to the industrially backward area and at the same time accept this backward area in all respects. At the same time this area is best suited to plenty of raw materials like coconut husk, coir fibre, latex, cheap labour, power and water. Transport through land and water are also satisfactory. An area of 2 acres would be ample to accomodate the proposed plant and machinery, office etc. Consuming the extent of 14000 sq. ft. ground floor is sufficient even for doubling the capacity of production in the future

2. Main Raw Materials

a. Coir Fibre

Coir fibre can either be purchased as such or as husk. If as husk it requires processing. Annual requirement of coir fibre is 1,72,500 Kg. Coir fibre is sold in open market in Kerala, Andhra Pradesh and Karnataka. List of suppliers given in Appendix-III.

b. Latex

60% Centrifuged Concentrate latex is used. Which is available from plantation corporation, Padinjarekara Agencies etc.

Annual requirement is 75,000 litres.

List of suppliers in Appendix - III.

c. Chemicals

List of Raw Materials

Sl.No.	Materials	Annual Requirement Kg.
1.	Coir Fibre	1,72,500
2.	N R Latex (DRC) 60% concentrated	46,000
3.	China Clay	4,500
4.	Potassium Hydroxide	90
5.	Vulcastab D	540
6.	Sulphur	1,200
7.	Vulcafor Z D C	600
8.	Zinc Oxide	1,350
9.	Nonox Sp	540
10.	Others including dispersing Agents & Emulsifying Agent.	

List of suppliers given in Appendix - III

Packing material cotton fabric available from madurai Mills.

Annual Requirement = 54000 Meters.

Available at a cost of Rs. 5/= meter

Source of supply in Appendix - III.

Terms of purchase

All negotiations are done through banks. On a margin money of 30%. The bank will spent 70% for the purchase. This amount has to be repayed in 70 days with interest.

3. Plant and Machinery

Sl. No.	Description	No.
1.	Fibre cleaning machine Base: 2 metres x 1.75 metres Height - 1.5 meters	1
2.	Fibre curling machine Base: Feeder : 2 meters x 1 meter Height - 2.75 meters. Base: C. Machine 4 meters x .75 meters. Base: Winding: 1.5 meters x .75 meters	2
3.	Untwisting machine Spiked drum 90 cm long and 60 cm. dia.	2
4.	Fibre layering machine spreading drum 150 cm. long and 60 cm. dia. RPM 300	1
5.	Hand Spraying tables 2.25 meters x 2 meters with air exhaust	1
6.	Hydraulic Press Two day light metal press 2.5 M. x 1.8 meters	1
7.	Compressor Working pressure 15 Kg/Cm² with 3 h.P. motor	1
8.	Table press stack 5 sets 2 meters x 1 meter 2 sets 2 meters x 1.5 meters 3 sets 2.2 meters x 1.75 Meters	1

Sl.No.	Description	No.
9.	Vulcanising Chambers Steel chamber 3.6 meter x 2.75 meters x 2.75 meters double shell.	1
10.	Steam Generator (Boiler) working pressure 100 Lb/sq.in^2	1
11.	Cutting table Band saw with $\frac{3}{4}$" cutting blade	1
12.	Roller press 2 meters x 1 meter	1
13.	Ball mill 60 Kg. milling per day	1
14.	Wooden working tables	10
15.	Hand Cart	5
16.	Spray guns	15
17.	Fibre extraction plant	1
18.	Others Lab Equipments Weighing Scales and Balances Hand tools and accessories Office Furniture and fixtures	

Capacities of Important Machines

Sl.No.	Machine	Capacity
		Kg./hr.
1.	Fibre cleaning machine	125
2.	Fibre curling machine	44
3.	Untwisting machine	44
4.	Fibre layering machine	88
5.	Hand Spraying tables	100
6.	Hydraulic Press	125
7.	Boiler	50

Terms of purchase

50 % of the machinary as advance along with order.
25% immediately after erection.
25% Immediately after commissioning.

There are prospective suppliers as Mahnam Sarathy & Company.

They hold responsible for fabrication and erection of Machinery and undertake to give full plant in running condition. The machinery is guaranteed against manufacturing defects for a period of one year.

c. 4. MANPOWER REQUIREMENT

1. Managerial
2. Technical & Supervisory
3. Clerical
4. Labours

a. Managerial

1. Works Manager	1
2. Sales Manager	1
3. Secretary.	1

Technical & Administrative

1. Accountant	1.
2. Sales Representative	1.
3. Chemist	1.
4. Electrician	1.

Clerical

1. Clerks	3
2. Typist	1
3. Watchman	3
4. Peons	2
5. Sweepers	2

Factory Personnel Requirement

Sl.No.	Section Wise	U.S.	Skilled.
1	Fibre cleaning Section	4	1
2.	Fibre curling section	6	1
3.	Untwisting section	5	
4.	Fibre layering section	5	1
5.	Hand spraying and table press section	3	
6.	Vulcanising section	4	1
7.	Compounding Section	3	1
8.	Packing and despatch	5	1

Annual expenses on salaries and wages is given in Annexure II.B.

Training Programme

Training is promised by the machinery suppliers or can be got from other common facility service centres.

Building can be divided as 8000 Sq. ft. for stores
2000 Sq. ft. for office
4000 Sq. ft. for machinery.

Infrastructural and other facilities

This has to be taken into account at the time of site selection. Selected site offers cheap transportation to the various parts through water and trucks. To the main port of Cochin in case of any export.

Main points to be kept in mind are :-

1. Transportation for incoming raw materials and outgoing finished products.
2. Adequate storage facilities.
3. Power ie. availability of L.T. & H.T. Powerlines.

4. Communication facilities.

5. Facilities for waste disposal.

Utilities

Utilities include water, power and fuel.

Annual requirement of water 1000 Kilo liters.

Annual cost on water = 1000 Rs.

Annual requirement of power cost at 15 ps/kw.
Assuming 80% Total Consumption = 34,230 Rs.

Operating cost of boiler = 11,040 Rs.

Details as shown in Annexure II.C.

S E C T I O N . D.

PROCESS OF MANUFACTURE

D.1. Production Programme

There are basically two methods for the production of fibre foam materials. In one method, the fibre is first treated with latex compound and shaped by menas of perforated metal or wire moulds before being dried and vulcanised. In the second method a suitably compounded latex is applied to a preformed pad of the fibre usually with a spray gun and the pad is then pressed dried and vulcanised. First method is usually used for production of items of irregular shape. This factory is going to employ the second as it ~~is looks~~ aims mainly on production of sheet materials. ~~and simple items~~.

Different stages in the production of fibre foam are:-

1. Cleaning of the fibre.
2. Twisting of fibre to ropes and steaming to make fibre curl permanent.
3. Opening of the rope.
4. Arranging the curled fibre in loosely associated mass.
5. Preparation of latex compounding ingradients and dispersions.
6. Compounding of latex.
7. Spraying or saturating the arranged fibre with latex compound and building up required thickness.
8. Drying.
9. Vulcanisation
10. Trimming, covering, packing & despatch.

1. Cleaning of fibre

The teasing machine has got two stages combined operation

built in one frame. First stage with spiked drum 90 cm long, 75 cm diameter fitted with a blower of 150 rpm. Second stage spiked drum 90 cm long 60 cm. dia. fitted with a blower of 450 rpm. During this process fibre gets free of pith, dust and short fibre.

2. Twisting of fibre and steaming

Automatic fibre feeding with delivery conveyor 2 meters, feeder mouth with two meters conveyor, fibre straightening rollers sets twist, guard box spining head sets curling and winding drum winds up the rope. The twisted rope is put to steaming.

Opening of ropes

Untwisting is done on the untwisting machine feeding is automatic and is automatically fed into the layering machine.

Rubberisation, Drying and Vulcanisation

This untwisted fibre is fed into the layering machine which has got constant controlled output. It is followed by latex spraying guns spraying 15 cm. This is followed by another unit for spraying the reverse side then the conveyor conveys it to the drying chamber with hot air blower and exhaust, all movements are synchronised for continuous delivery of rubberised fibre fleece. Dimensions are adjustable. Cut the fibre fleece at required length. Then take up the required length of sprayed fibre fleece on to the table. Hand spraying is done if necessary. Thicker articles can be made by building. Then it is pressed in the press and dried on the press table stack vulcanised in the vulcanising chamber. Cutting or triming is done on the cutting table which has got cutting blades. Fit the cotton cover and despatch.

Latex compounding

The Ammonia Content of the latex is reduced to about 0.2%. The stabiliser vulcastab D is added first. Then dispersions, emulsions and solutions of the compounding ingradients are added one by one. The compound is stirred well and transferred to the spraying tank.

Soft clay is added as a filler (1) to modify its properties.
(2) to reduce the cost of production.

All the ingradients are added in the form of dispersions and emulsions.

Prepations of Dispersions and Emulsions.

Zinc Oxide Dispersions

Zinc Oxide	40
Dispersol LN	3
Water	57

Ball mill for 24 hrs. Zinc Oxide is used as an activator.

Sulphur Dispersions

Sulphur	2.5
Dispersol LN	1
Water	46.5

Ball mill 48 hrs.

Accelerator Dispersions

Vulcafor ZDC	2.5
Despersol LN	1
Water	46.5

Ball mill 24 hrs.

China Clay Dispersions

China Clay	5
Dispersol LN	3
Water	92

Ball Mill 24 hrs.

Nonox Sp Emulsion

A	Nonox Sp	- 47
	Oleic Acid	- 3
	Distilled Water	-48
B		
	0.888 Ammonia	- 2

A is added to B while B is stirred well.

Water used should be soft.

Quandum of Production

This factory is proposed to produce 180000 kg. of rubberised fibre foam a year. Utilising one shift.

Flow chart is given in Appendix II.

2. Quality control measures

Every product should have a certain level of quality worth its price. Quality control ensures product uniformity.

Raw Materials

Fibre Fibre should be free from retting. It should be tough and strong. It should have sufficient girth and strength. Free from any foreign matter. Inspected visually.

Latex

Should have enough mechanical and chemical stability.

Chemicals

Chemical are tested for purity by measurement of M.Pt and solubility.

Product

Indendation Hardness

Indendation hardness is tested by the shore A hardness Tester./

2. Aging Test

Aging is done at 70°c for 7 days and change in properties studied.

3. Density

Density is determined by dividing wt. in air by loss of weight in water, using a sinker.

4. Compression set

The change in thickness, after application of a known compressive load is measured and is expressed as the percentage change in thickness to the original thickness.

Utilisation of bye product

During processing 10% of fibre will come out as dust and short fibres. Short fibres can be sorted out baled and can fetch a nominal price. Dust made up of coconut pith is good for soil aeration and finds application in paddy fields.

Other trimings can be reworked on the fibre extraction plant and recircled.

Process Loss

During spraying of latex on fibre there is considerable loss as fumes in air and small drop lets that are not skicking pass through in between fibres and get coagulated due to heat. Loss of rubber varies with weather. Loss of rubber in hot weather comes to 15%.

LAY OUT

In order to keep the operating cost at the minimum the following points should be taken into account in determining the layout of the plant.

1. Material handling to be minimum
2. Room for further expansion.
3. Ensure an easy flow of materials through factory.

Lay out is shown in Appendix II.

S E C T I O N : E

SELLING AND DISTRIBUTION

The most commonly adopted procedure for selling are direct sales by opening sales depots and sales through agents on commission basis. It would be impractical to open depots on such a bulky product. This product can be sold through agents and dealers on a commission basis of 15 % .

S E C T I O N. F

CAPITAL REQUIREMENTS

Fixed Capital

It is the sum of the expenses incurred on land, building, plant and machinery. Other fixed assets are preoperative expenses. It should also include expenses incurred on office furniture and fixtures.

Table I.

1. Land and Building	=	4,75,000
2. Plant and Machinery	=	7,17,735
3. Other Fixed Assets	=	30,250
4. Pre operative expenses	=	65,000
Total:		12,87,985

Working capital

The working capital provides fund for a definite period of productio depending on the time taken for the realisation of sales value. This is usually worked out for three months. Working capital includes Raw material cost, manpower, utilities and other over heads.

Table II.

1. Raw Material and packing material cost	=	2,74,423
2. Wages and salaries	=	60,750
3. Utilities	=	11,567
4. Other over heads	=	40,500
Total		3,97,240
Round off		4,00,000

S E C T I O N. G.

FINANCING PLAN.

As the entreprenure can't afford to take all the capital requirements from his own pocket he has to plan sufficiently early to raise the required capital. The financial institutions and nationalised banks are at help.

Some of the financial institutions and their provisions.

1. State Financial corporation

They provide 100 % of M/C cost 70 % of building cost. 40% of working capital at 7.5% interest upto 10 lakhs. Repayment starts after 2 years and should be complete by 10 years.

2. State director of industries

They provide loans under state aid to industries act.

3. State bank of India and Subsidiaries

They sanction medium investment credit loans for purchase of machinery and construction of factory building. Also provide working capital for purchase of raw materials. The rate of interest is usually 14 %.

4. Commercial Banks

They sanction loans for meeting working capital.

5. National Industries Corporation

They give machinery for hire purchase at 7% interest. Time for repayment is 7 years.

MARGIN MONEY FOR WORKING CAPITAL

Working capital required	=	4,00,000
Bank finance(70%)	=	2,80,000
Margin money requirement on working capital	=	1,20,000

SOURCE OF FINANCE

Capital	: 2,40,000
Secured loan from K.F.C.	:10,00,000
Unsecured loans and deposits: from directors and others	2,00,000
Bank Loan	: 2,50,000

No foreign exchange is required as machinery and skill are available in our country.

S E C T I O N. H

PRICING POLICY

The Price should not only fetch a profit on the investment but also should be viable in the market and should as far as possible conforming to the prices of the competitors. Pricing is done on a universal basis.

Typical price list

Mattresses	Price Rs.
2" thick	
1. (72" x 30")	135
2. (72" x 36")	157
4" thick	
1.(72" x 30")	212
2.(72" x 42")	288
3.(75" x 36")	260
4.(78" x 42")	310
3" thick	
1.(72" x 36")	202
2.(75 "x 42")	240
3.(78" x 42")	250

S E C T I O N.I.

P R O F I T A B I L I T Y

RATE OF RETURN ON OWN CAPITAL

Own Capital	=	2,50,000
Net profit	=	2,08,770
Rate of return on own capital	=	82.1 %

RATE OF RETURN ON FIXED CAPITAL

Fixed Capital	=	12,87,985
Net profit	=	2,08,770
Rate of return on fixed capital	=	16.6 %

RATE OF RETURN ON WORKING CAPITAL

Working capital	=	4,00,000
net Profit	=	2,08,770
Rate of return on working capital	=	52.2 %

RATE OF RETURN ON TOTAL CAPITAL

Total capital employed	=	16,87,985
Net profit	=	2,08,770
Rate of return on Total capital		17.4 %

PERCENTAGE PROFIT ON SALES T U R N O V E R

Annual receipt from sales	=	27,00,000
Annual profit	=	2,08,770
Percentage profit on sales turn over	=	7.7 %

BREAK EVEN A N A L Y S I S

Break even production is one at which there is no profit no loss. A knowledge of break even point is always desirable for an efficient operation of a unit.

$$B.E. = \frac{F}{P-V}$$

B.E.	= Break even production Kg/year
F	= Fixed cost/year
P	= Selling price/kg.
V	= Variable cost/kg.
Fixed Cost	= Rs. 2.5/kg.
P	= Rs. 15/kg.
V	= Rs. 8/kg.
B.E	= 65,000 Kg.
Annual production	= 1,80,000 Kg.

In this unit break even production is about 36 % of the annual production. This firm can easily make profit.

S E C T I O N. J.

E C O N O M I C V I A B I L I T Y

Annual Sales Turnover	=	Rs. 27,00,000
Annual Expenses	=	Rs. 24,91,230
Annual Net Profit	=	Rs. 2,08,770
Annual Depreciation	=	Rs. 97,913
Available Surplus	=	Rs. 3,06,683
Term Loan	=	Rs. 10,00,000
Pay BackPeriod	=	Rs. 40 months.

Details given in Annexure III

S E C T I O N.K.

S O C I A L B E N E F I T S

Establishment of new industry can give personal benefits to the entreprenure and social benefits to the society as a whole.

1. It offers employment
2. It offers equitable distribution of national income
3. Utilisation of capital and skill.
4. As is to be developed in an underdeveloped area, offers distribution of industry all over the country.
5. Increase of revenue earnings through taxes and Excise duty.

ANNEXURE - I. A.

CAPITAL REQUIREMENT ON FIXED ASSETS

LAND AND BUILDING

a. Area of land Rs. 200/= per cent 2 Acres	= 40,000
Conveyance charge, stamp and Registration	= 2,000
b. Building	
Factory and Office Building	=3,32,287
Total	4,74,287
Round off	4,75,000

ANNEXURE. I.B.

PLANT AND MACHINERY & OTHER FIXED ASSETS

Sl.No.	Description	Numbers	Cost
1.	Fibre Cleaning Machine	1	20,700
2.	Fibre Curling Machine	2	1,01,400
3.	Untwisting Machine	2	27,000
4.	Layering Machine	1	1,31,700
5.	Hand Spraying Table	1	9,200
6.	Hydraulic Press	1	75,000
7.	Compressors	1	25,000
8.	Table Press Stack	1	35,000
9.	Vulcanising Chambers	1	35,000
10.	Steam Generator	1	30,000
11.	Cutting Table	1	16,800
12.	Roller Press	1	36,000
13.	Ball Mill	1	10,000
14.	Wooden working tables	10	3,000
15.	Hand Carts	5	5,200
16.	Spray Guns	15	3,750
17.	Fibre Extraction Plant	1	70,000
18.	Lab Equipments	1	2,000
19.	Weighing Scales & Balances	1	6,000
20.	Hand Tools & Accessories		2,000
21.	Plastic Tubes		250
22.	Office Furniture & Fixtures		20,000
	5% Escalation transportation etc.		21,985
	Total		7,47,985

ANNEXURE - I.C.

PRELIMINARY & PRE ERECTION EXPENSES.

Sl.No.	Description	Cost
1.	Preparation of Articles of Association memorandum etc.	1,000
2.	Preparation of Plan and Estimate	500
3.	Loan application fee	3,750
4.	Stamp, Registration fee	28,250
5.	Other expenses connected with loan	1,500
6.	Provision for interest during construction period	20,000
7.	Contingencies	10,000
	Total	65,000

A N N E X U R E - I

TOTAL FIXED A S S E T S.

Land and Building	=	4,75,000
Plant and Machinery and others	=	7,47,985
Preliminary and Pre erectione Cost	=	65,000
Total		12,87,985
Round off		12,90,000

ANNEXURE.II.A.

RAW MATERIAL COST

Sl. No.	Raw Materials	Annual Requirement	Cost/Kg. Rs. Ps.	Total Cost
		Kg.		Rs.
1.	Coir Fibre	172500	1.60	2,76,000
2.	N R Latex	75000	6.25/ litre.	4,68,750
3.	China Clay	4500	0.30	1,350
4.	Potassium Hydroxide	90	16.00	1,440
5.	Vulcastab D	540	30.00	20,520
6.	Sulphur	1,200	2.25	2,700
7.	Vulcafor Z D C	600	33.50	20,100
8.	Zinc Oxide	1,350	18.00	24,300
9.	Nonox Sp	540	20.00	10,800
10.	Others including Despersing agents and Emulsifying Agents			6,000

Annual Cost of Raw Materials = 8,27,640

Annual Cost on packing materials= 2,70,000

ANNEXURE . II. B.

WAGES AND SALARIES

Sl.No.	Descriptions	Nos.	Salary per month.	Total
			Rs.	Rs.
1	Works Manager	1	750	750
2.	Skilled Workers	6	500	3000
3.	Unskilled Workers	35	250	8750
4.	Electrician	1	350	350
5.	Chemist	1	500	500
6.	Clerks	3	300	900
7.	Sweepers	2	150	300
8.	Typist	1	300	300
9.	Watchman	4	250	1000
10.	Peons	2	200	400
11.	Secretary	1	1500	1500
12.	Accountant	1	750	750
13.	Sales Manager	1	1000	1000
14.	Sales Representative	1	750	750

Annual Expenses as Wages and Salaries = 2, 43,000

ANNEXURE II. C.

UTILITIES.

Water

Annual Water Requirement

For Toilet and others	=	800 K. Litres
Water for boiler	=	200 K. Litres
Total	=	1000 K. Litres

Annual Cost on Water = Rs. 1000/-

Power

Sl.No.	Machinery and Equipment	H.P.	K. W.
1.	Fibre Cleaning Machine	20	14.82
2.	Fibre Curling Machine	16	12.14
3.	Untwisting Machine	10	7.46
4.	Fibre Layering Machine	16	12.14
5.	Hand Spraying Tables	2	1.492
6.	Roller Press	6	4.476
7.	Others	4	2.984
			56.592

Total K.W. = 56.592.

Annual Electrical Requirement cost at 15 Ps. per K.W. assing 80% utilisation } = Rs. 34230.

Fuel

Boiler Capacity	= 50 Kg/hr.
Annual fuel requirement at 80% utilisation	= 9600 Litres
Cost of fuel/litre	= 1.1 Rs.
Transportation cost	= 0.05 Rs.
Annual cost on fuel as 1.15/litre	= Rs. 11040/-

ANNEXURE: II. D.

OTHER OVERHEADS.

1. Postage and communication	=	750
2. Printing and Stationary	=	750
3. Director Board expenses	=	3500
4. Advertisement and Sales promotion	=	2500
5. Repair and Maintenance	=	6000
Annual expense on other overheads	=	1,62,000

ANNEXURE. II.

TOTAL WORKING CAPITAL

3 Months

1. Raw Material and packing material cost	=	2, 74, 423
2. Wages and Salaries	=	60,750
3. Utilisation	=	11,567
4. Other over heads	=	40,500
Total		3,97,240
Round off	=	4,00,000

ANNEXURE. III

COST OF PRODUCTION AND PROFITABILITY.

Gross Expected Sales.

A. Rubberised Fibre 500 Kg x 300 days 1,80,000 (a) Rs. 15	=	27,00,000
B. Cost of manufacture		
Raw Materials	=	8,27,640
Packing Materials	=	2,70,000
Wages and Salaries	=	2,43,000
Provident Fund, E.S.I.Bonus etc.	=	62,000
Medical Allowances	=	30,000
Repair and Maintenance	=	72,000
Utilities	=	46,270
Insurance and Taxes	=	10,000
C. Depreciation		
On building @ 5%	=	16,614
On Machinery @ 10%	=	74,799
On Preliminary Expenses @ 10%	=	6,500
Total	=	97,913
Total (B+C)	=	16,99,180
D. Total Estimated Gross operating Profit		
|A - (B+C) |	=	9,02,907

E. Sales Expenses

Commission @ 15 %	=	4,05,000
Packing and forwarding charges	=	20,000
Travelling and Advertisement Charges	=	30,000
Miscellaneous expenses	=	1,000
Postage and Communication Expenses	=	5,000
Total	=	4,61,000

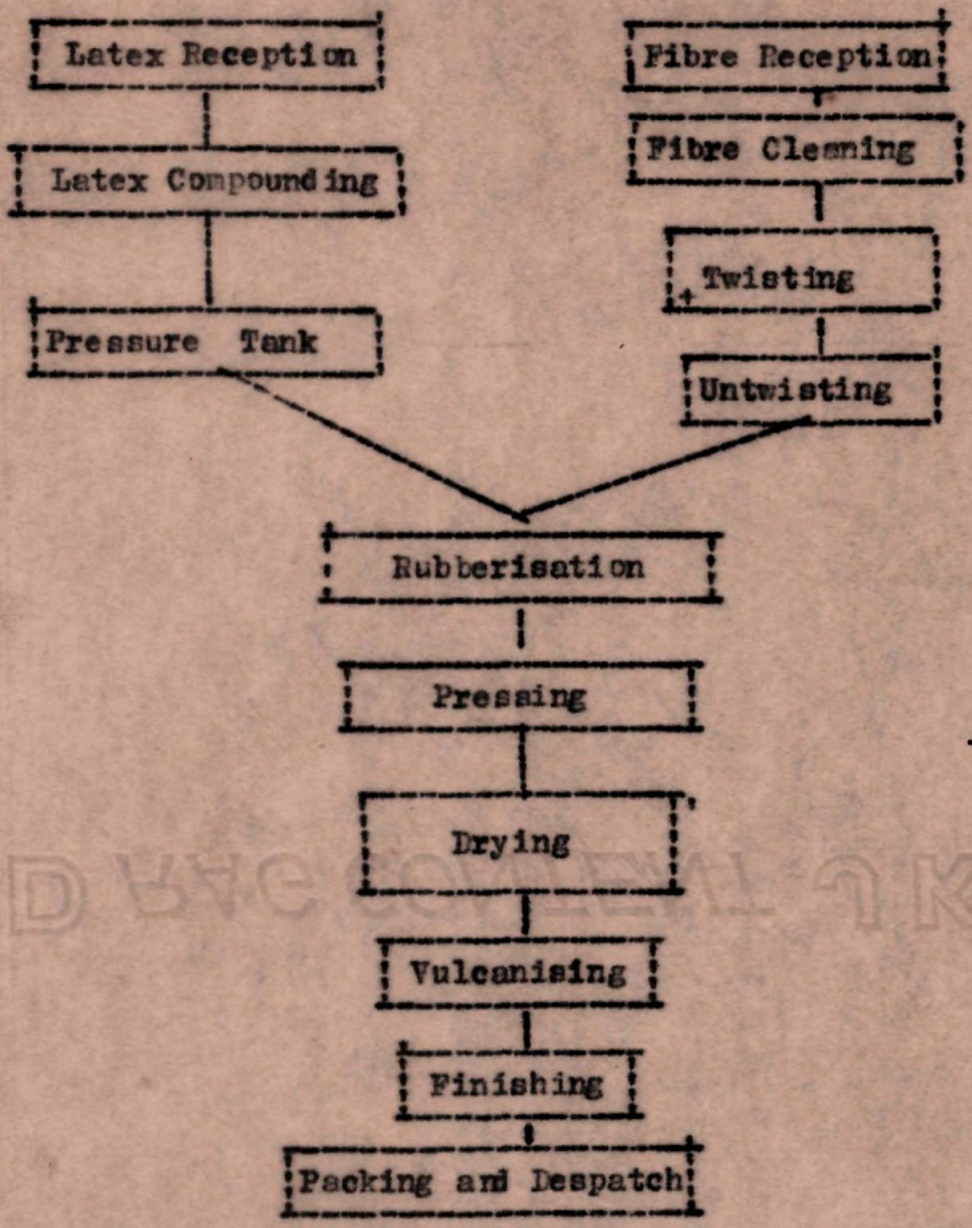
F. Financial Expenses

Interest on K.F.C. loan @ 8½%	=	85,000
Interest on Bank loan @ 15%	=	37,665
Interest on other borrowing @ 10%	=	21,000
Total	=	1,43,665

Total Financial + Sales Expenses	=	6,04,665
Estimate of Net operating profit ‖ D + (E+F) ‖	=	2,98,242
Less Provision for taxation @30%	=	89,472
Estimate of Profit after taxation	=	2,08,770
ie. Balance Profit	=	2,08,770
Add Depreciation	=	97,913
Net Cash flow	=	3,06,683
Pay Back Period	=	40 Months.

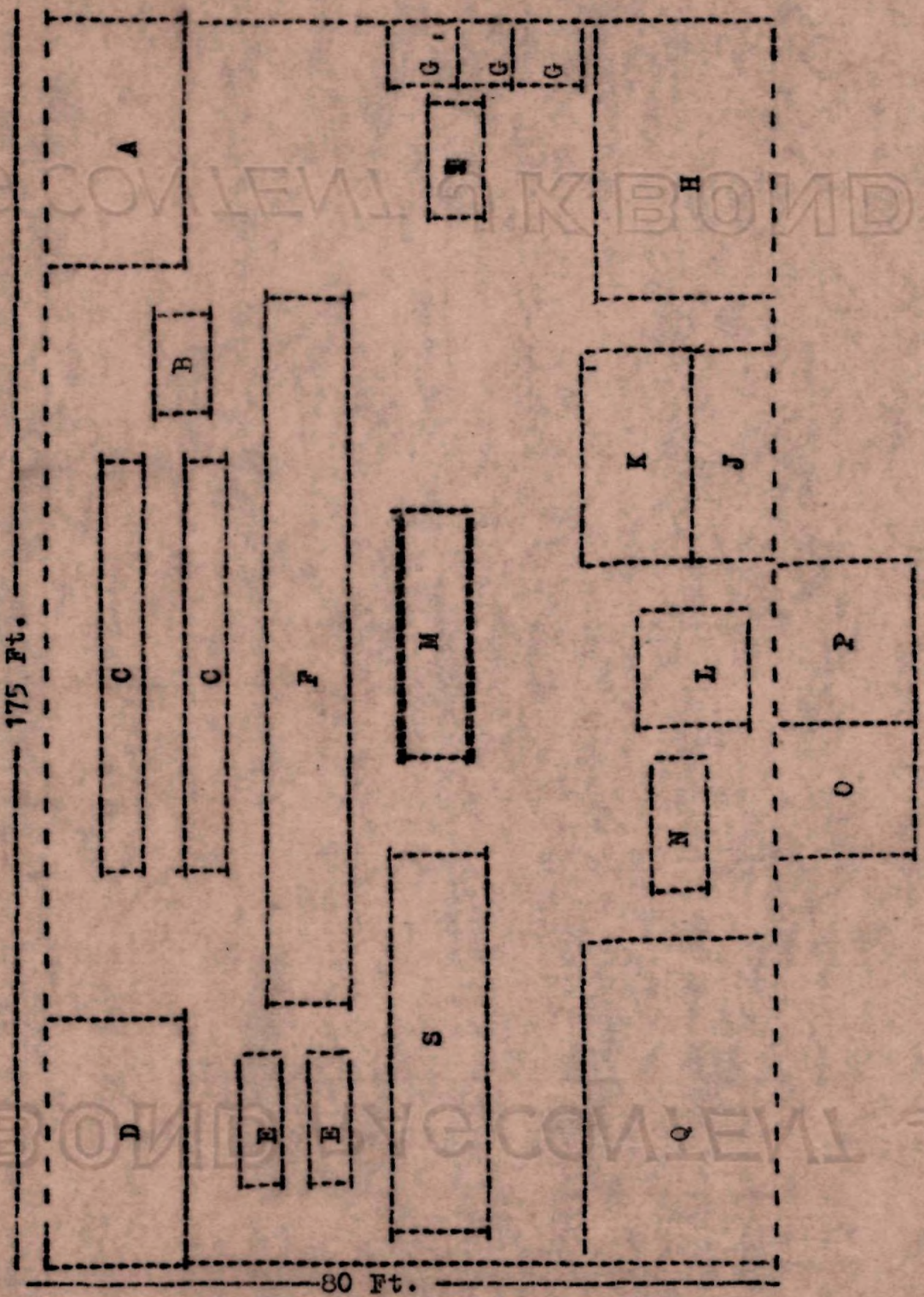
APPENDIX. I.

FLOW CHART.



APPENDIX.II

LAYOUT OF FACTORY



A. Fibre Store

B. Cleaning Machine

C. Curling Machine

D. Curled Fibre Store

E. Untwisting Machine

F. Continuous Layering Machine

G. Spraying Tables

H. Latex and Chemicals Store

J. Hydraulic Press

K. Drying Chamber

L. Vulcanising Chamber

M. Cutting Table

N. Roller Press

O. Boiler Room

P. Compressor Room

Q. Office

S. Finished Goods store

T. Laboratory.

APPENDIX - III.

Suppliers of Raw Materials

I. **Fibre**

1. Kocherry Industries
   Perumbavoor.
2. Reston Fibres
   Edayar
   Trichur District.
3. West Coast Fibre
   Calicut.

Sold in open market in Tamil Nadu and Mysore & Andhra Pradesh.

II. **60% Latex Concentrate**

1. Plantation Corporation, Kerala.
2. Padinjarekara Agencies, Kerala.

III. **Accelerators, Stabilisers and Antidegradients**

Alkali & Chemicals Ltd,
34. Chowringhee Road,
Culcutta.

2. Bayer(India) Ltd.,
   82 Vir Nariman Road,
   Post Box 1436,
   Bombay.

Mindia Chemicals of India Pvt. Ltd,
Wakefield House, Sprott Road,
Balland Estate,
Bombay.

IV. Other Chemicals

Para Chemicals
C/o. Kerala Paints Pvt. Ltd.,
Mahathma Gandhi Road,
Ernakulam, Kerala.

V. Packing Cotton Fabric

Madurai Mills Co. Ltd,
Mfr. Agent AF Havvey,
Madras.

Machinery Suppliers

Mahnam Sarathy & Co,
Desom,
Near North Mangalapuzha Bridge,
Alwaye.

They are the prospective suppliers of the whole machinery.

APPENDIX - IV.

FORMULATION.

Ingradients	Dry Weight	Wet Weight
60% NR Latex	100.0	167.0
20% Potassum Hydroxide	0.2	1.0
20% Vulcastable D Solution	1.2	6.0
50% Sulphur Dispersion	2.5	5.0
40% Zinc Oxide Dispersion	1.0	2.5
50% Nonox Sp Emulsion	1.0	2.0
50% China Clay	10.0	20.0
50% Vulcafor Z.D.C. Dispersion	1.25	2.5