PROJECT REPORT ON A SMALL SCALE UNIT TO MANUFACTURE RUBBER ROLLERS FOR MODERN RICE MILLS

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CHAPTER - I

I N T R O D U C T I O N

1. HISTORY AND MAIN OBJECT OF THE PROJECT:-

Rubber covered Rollers are being used to an increasing extent in the machinery of many different industries. These rollers have to fulfil an extremely wide range of purposes - eg:- driving, conveying, controlling & guiding, squeezing off, applying materials, damping and pressing. Among them the most familiar fields of application of rolles are:-

1) Printing & Typewriting.
2) Paper Industry.
3) Steel Industry.
4) Leather Industry.
5) Metal coating Industry.
6) Plastics Industry.
7) Food Stuff Industry.
8) Paints, glues and adhesives applications.

They vary in size from very small (fraction of an inch in both diameter. and length) to very large, (some paper mills now use rolls of six feet in diameter and more than 30 feet in length), and in hardness from 10 shore A to bone hard.

In order to satisfy the rising demand and to satisfy special requirements, these artibles must be manufactured by very rational methods. At the same time old established processes must be improved and new methods is to be explored. All items of machineries and raw materials required for the production of rollers are indegenously available.

Rollers used in food stuff industry include those which are used in production and preparation of food stuffs eg:- rollers for dehusking rice, cracking nuts, squeezing stones out of fruits etc. This is a scheme for producing rubber covered rollers for modern rice mills according to the following schedule.

Black rollers	-	6000 per annum.
Non-black rollers	-	6000 per annum.
Total	-	12000 per annum.

There are two different processes of manufacture of the rubber rollers.

1) Autoclave curing method.

2) Press curing method.

In the case of rubberising the rollers which may be supplied by the rice mill owners autoclave curing is applicable. This is also applied in the case of very hard & very thick rollers for reducing the press cure. This is done by curing the roller partially in the press and then in autoclave after stripping it from mould. It is very difficult to get a uniform surface dimension and enough allowance is to be given in the size of green rolls.

In this project modern method is adopted. Press cure is employed for the manufacture of rubber rollers which are press fit on to the machine rolls. The rollers are supplied without any core. But a perforated metal sheet or wire mesh will be placed inside the rubber rolls adhered firmely to it.

Rice milling can be done in different types of mills even though the traditional method is by custom (cooly) milling. The different types of mills are Hullers (single & battery of hullers), Shellers, Sheller cum hullers and modern rice mills in which rubber rolls shellers are used.

The modernisation of rice mills have commenced since May 1970 and during the last ten years only around 5% of the rice mills have been modernised in India. Rubber rollers have been introduced in the existing shellers as well as in the new modern rice mills.

2. PRODUCT DESCRIPTION:-

These rubber rollers are manufactured (a) without a key (b) with single key and (c) with double key, and have a thickness of 3/4" to 1". The hardness is ranging from 80 to 90 shore A and colour may be black or non-black (white).

The advantages of using rubber rollers are

1) No cooling system is required.
2) Excellent quality of rice is obtained.
3) Required polish and colour for rice. Hence finished product achieve more price.
4) Superior quality of Bran & Husk with increased rice bran oil content. ie., 30% more than that detained through conventional rice mills.
5) Cheaper operational cost with higher tonnage.

A rubber roller is in fact a cylinder of rubber bended to a rigid core which is usually of wrought iron. The rigid metal core will be perforated, hollow and the two ends opened

so that the cylindrical metal core may be inserted into it. Instead of perforated metal sheets, wire meshes are also used in certain type of rollers.

The function of rubber rollers are manifold depending on the area of usage. Rubber rollers manufacturer requires good experience and knowledge as the uses of the rollers are so diverse.

The suitability of a rubber roller for any particular application will mainly depend on the merit of the rubber compound to meet the service requirements. Thus proper designing of the rubber compound is of atmost imprtance in the manufacture of rubber rollers. Non-toxicity, Heat and abrasion resistances are the most essential requirements of rice hulling rollers in service. Apart from compounding, metal to rubber bonding and fabrication (building curing and grinding) are also important factors contributing towards the durability/performance of the rollers in service.

The two different types of rollers are:-

1) Binny/Satake rubber rollers.
2) Schule/Dandeker rubber rollers.

These are having different diamensions and are used in different types of rice mills. The quality of the rollers are estimated from the durability of these rollers ie from the quantity of parboiled or raw paddy that can be shelled under normal conditions by using a pair of rollers in a particular mill.

3. <u>EVALUATION OF PROSPECTS AND IMPORTANCE OF THE PRODUCT TO THE COUNTRY</u>:-

A rubber covered roller is a speciality of its own

which cannot be replaced by other rollers. Even though the proposed project is specially prepared for the manufacture of rice rollers any type of rollers can be manufactured - with the existing machinery. Additional machineries required are an autoclave, a boiler and a big lathe in case of large rollers.

In view of the acute unemployment prevailing in the State, development of modern type of small scale industries assumes considerable significance in Kerala. As an encouragement for starting small scale industries, Government has introduced the State sponsorship through financial assistance and incentives and District Industries Centres are formed in all districts of the state and Action plan of industrialisation was implemented.

The rubber rollers for rice mills in India have already a developing market and due to the modernisation of rice mills this will be further increased. The need for modernisation was felt at the Central Governmeent, only after it was realised that this would save the country about (4 to 8 lakh tonnes of rice and 4 to 5 lakh tonnes of bran oil per year. Hence a notification was given to the state Governments to make all efforts to modernise all rice mills at an early date. Even though the target date for completion is 30 April 1981, it is expected to be completed only by 1984. Various schemes and incentives programme are also arranged for speedy modernisation of existing conventional rice mills.in the interest of (a) increasing the percentage of rice out-turn (b) maintaining good quality of rice (c) channelising the bye-products for better utility to the society like manufacture of oil from bran, utilisation of decoiled bran for cattle feed, fabrication of bricks with paddy husk etc. Also Government

institutions like Paddy Processing Research Centre, Centre for Extension service in modernisation of rice processing etc. are being formed.

The modernisation of rice mills in southern region is far behind from that of north region. This will be changed within a few years due to the high pressures from Central & State Governments to achieve better turnout in future. This indicates that with the modernisation of existing mills and establishment of new mills a sufficient market for rubber roller is there in the southern region itself. Another factor is that now there is only one standard roller manufacturer is south. The rollers for rice mills are mostly supplied from Northern India, which is to be substituted by South Indian manufacturers itself.

The availability of quality food rs grains can be considerably increased through rapid modernisation of existing conventional rice mills. For this the production of rubber rollers have to be increased to accomodate the rapid replacement requirements of the installed and additional rice mills units. Considering the supply and demand positions which is described in detail in the second chapter it will be realised that additional units for manufacturing the mbber rollers for rice mills are to be installed especially in southern region of India ie in Kerala or Tamil Nadu.

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CHAPTER - II

MARKET SURVEY

1. USERS/CUSTOMERS ANALYSIS:-

Rubber covered rollers consumes only a very little part of the total rubber consumed in the country. Even though there are so many units producing rubber covered rollers only a very few of them is producing rollers for rice mills. The trend of modernisation of rice mills in fact results in the increase in consumption of these type of rollers. This section deals with the analysis of the current and potential market for the rubber rollers for rice mills.

1. a) Present Demand:-

From the survey it is noticed that there are over 70,000 single hullers rice mills and about 10,000 sheller-cum-hullers operating in the country. Of the 10,000 sheller-cum-huller rice mills only about 1650 units have so far modernised. In kerala at present there is only one modern rice mill which is owned by FCI. Also Annamalai University has started five temporary modern rice mills in Kerala for propagation of modernisation. Most of the modern rice mills in South India are situated in Tamil Nadu (45) and Andra Pradesh (60). Also it could beseen that the Western and Northern parts of the country have progressed well with their modernisation programme unlike the southern states. (Appendix VII).

The same is the case of rice mill machinery manufacturers. Against a total number of 45 machinery manufacturers all over India 13 belongs to Andra Pradesh & 2 to Tamil Nadu. Very

recently one unit has been established in Kerala. Hence it is clear that the modernisation programme will be resulting in the increased demand of rubber rollers in the southern state .

The demand for rubber rice mill roller include both original equipment and replacement potential. The market segment for the previous are the ricemill machinery manufacturers and for the later are the existing modern rice mills.

Original Equipment:- A set of rubber roller is required for each equipment. Thus the potential is calculated based on the Rice mill machinery manufacturer's production capacity and their production per year. The total number of existing rice mill machinery manufacturers are approximately around 45 which include both convensional and modern. (Appendix VIII)

Among them leading are approximately around 10 which have a capacity of 50 shellers per month for each. The others have a capacity round about 10 rice mill units per month. Hence the total rice mill sheller manufacturing industries is estimated to have a production capacity of 10200 units per annum.

Even though the estimate from original equipment potential form only less than 5% of the total replacement potential for rubber rolls this can also be considered.

Replacement:- Replacement is the major market for rice mill rollers which depend on i) The capacity of the mills; ii) number of working hours per day; iii) number of working days per year; iv) quantity of paddy milled per roll.

In general we can estimate these as following:-

1) The capacity of the mills range from 2 to 4 tonnes per hour and so the average capacity is taken as 3 tonnes per hour.

2) There are mills which work in 3 shifts, 2 shifts and one shift per day. An average of 2 shifts ie,, 16 hours per day can be taken for estimation.

3) Eventhough the production of paddy is seasonal, some Government mills are working throughout the year. An average of 250 days in an year can be taken.

4) The information got from the current users ie., modern rice mills reveals that a set of standard norms for calculating the replacement requirement of rubber rollers are followed. That is each pair of rollers will be able to shell a minimum of 160 tonnes of parboiled paddy or 80 tonnes of raw paddy under normal working conditions. But considering the increased quality and performance of rubber rollers the capacity is estimated on the basis of 180 tonnes of parboiled paddy or 90 tonnes of raw paddy.

Total capacity of modern rice mills per annum. = 3 MT/hr x 16 hr/day x 250 day/year

= 12000 T/annum/mill.

The current all India regional (Kerala) Tamil Nadu, Andra Pradesh & Karnataka) replacement potential is calculated on the above factors.

Estimated Current All India Replacement Demand for rubber rollers:

Total number of instaled modern rice mills = 1650.

Average output capacity/Annum/Mill. = 12000 Tonnes.

Total tonnage of paddy out turned by the installed modern rice mills = 1650 x 12000

19800000 Tonnes.

Paddy milled in raw form 10% = 1980000 Tonnes.

Paddy milled after par boiling 90% = 17820000 Tonnes.

Demand for rubber rollers:

(a) For milling Raw paddy @ 80 tonnes/pair = $\frac{1980000}{90}$ = 22000 sets.

(b) For milling parboiled paddy @ 160 tonnes/pair. = $\frac{17820000}{180}$ = 99000 sets.

Total demand for rubber rollers = 22000 + 99000 = 121000 sets.

= 242000 nos.

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Regional replacement potential:-

Total number of modern rice mills in southern region. = 112 mills.

Average output capacity/mill/annum = 12000 tonnes.

Total output/annum = 1344000Tonnes.

Paddy milled in raw form (10%) = 134400 tonnes.

Paddy milled after parboiling (90%) = 1209600 tonnes.

Demand for rubber rollers:-

(a) for raw paddy milling @ 90 tonnes/pair = $\frac{134400}{90}$ = 1495 sets.

(b) for parboiled paddy milling @ 180 tonnes/pair = $\frac{1209600}{180}$

= 6720 sets.

Total regional demand = 1495 + 6720 = 8215 sets.

= 16430 nos.

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1. b) Current Supply:-

The current supply of rice mill rollers are met by 20 manufacturers in India, of which there is only one leading manufacturer in South India. The capacities are uncertain

since apart from these rollers they produce other goods also. But it is realised that eventhough the installed production capacity of the 20 units all over India is around 235000 rollers per annum they had increased the rate of production slightly over the capacity to satisfy the current demand. Also in the case of regional demand and supply position, the southern market is still predominentely supplied by manufacturers from north despite disadvantages of distance, poor deliveries and variable qualities.

The two units in southern region who have started production of rubber rollers for rice mills are M/S Sundaram Industries Ltd., Madurai & M/S Lamax Rubber Industry Pvt. Ltd., Madurai. Since their main items of production is not rice mill rollers, they are not giving prior importance to this items. Hence the existing total regional supply position is estimated at 10000 rollers per annum and the total all India supply position is around 250000 rollers per annum.

1. c) Current capacity & Production of rubber rollers (1979-80)

Item	No. of Units All India	Regional	Average capacity of one mill.	Total capacity (Rollers/ annum)	Total supply.
1. Leading rice mill rollers manufacturers	7	Nil	15000	105000	112000
2. Other small and medium size units	13	2	10000	130000	130000
Total	20			235000	242000

1. d) Current Supply and Demand analysis. (1979-80)

	Production Capacity	Supply	Potential Demand.	Surplus/Deficit
All India	235000	242000	242000	0
Regional	10000	10000	16430	(-) 6430

2. ASSESSMENT OF FUTURE DEMAND AND DEMAND PROJECTIONS:-

As indicated earlier the number of modern rice mills available in the country is 5% of the total number of rice mills. Based on the average trend of modernisation of rice mills during the past 9 years (1970-1980) the future pattern of modernisation is calculated & tabulated (Appendix I). The regional future demand can also be estimated from the same. It is very clear that there exists a very good market for rubber rice mill rollers in the southern region itself.

Eventhough Central Government decided to complete the modernisation of rice mills by 1981 it is difficult due to the scarcity of latest equipments and reluctance of the mill owners to change from conventional system. But Machinery manufacturers and Government departments of Food and Civil Supplies division justifies that with the ease of supply of latest equipments and variousdemonstrations and practical training centres set up in modern method of milling the modernisation programme can be completed by four years (by 1984). The future demand of rubber rollers will also depend on the paddy production.

It is estimated that a buffer stock of 20 million tonnes of paddy would be maintained. Also in the years 1985, 1990 estimate would face a situation of deficit to the extent of mini-

mum 15 million tonnes. Since Govt. is interested in the entire demestic production development programmes are employed for increasing the paddy yield rate. The intensive paddy development unit is a part of it. Also high yielding verities of paddy introduced will increase the total production of paddy in the country.

By comparing with other states of India, Andra & Tamil Nadu has got a high yield rate of paddy. India average 1877 Kg/hectare.

Tamil Nadu 3255 Kg/hectare
Andra Pradesh 2485 kg/hectare.

This justifies the increased rate of production of paddy in the southern region.

The analysis of supply and demand shows clearly that the potential for rice mill rollers is ever expanding Appendix I. Though the supply and demand positions at present show a situation of just equalisation the requirement of our country by 1980-81 would be one of short supply. From the analysis of the regional supply & demand it is clear that the demand is mostly met by manufacturers from North India. So there exist ample scope for a unit to be set up in the southern region especially in Kerala (Palghat) or Tamil Nadu.

3. PRICES & EFFECT OF CHANGES IN PRICES ON DEMAND:-

The demand on the rollers depend on the following factors.

1) Quality in terms of hardness & performance.
2) Quick delivery period & maintenance of quality during service.

The present prices of regular quality rubber covered rollers for standard sizes are tabulated. (Appendix II)

Even though price is slightly higher, high performance (nonblack) rollers can be manufactured and aquire additional market advantage and penetrate the market. From the market survey it is clear that more importance is to be given for the quality than cost since rice mill owners prefer high performance rollers. They select cheapest out of the high performance roller after testing them individually. So the demand depends both on quality and price.

4. STANDARDISATION OF RUBBER ROLLS:-

ISI Specification for rice mill rollers are being introduced for the following sizes (IS. 8427 - 1977).

	Length mm	OD mm	ID mm
8" Single key	203	223	184
10" Double key	254	254	202/203

5. COMPETITIVE SITUATION AND EXPORT POSSIBILITIES/IMPORT SUBSTITUTION:

The non-black/high performance rollers can be satisfactorily introduced at the ~~raigk~~ original equipment level and subsequently gain entry into the replacement demand.

Also the brand preferance is to be established with little difficulty by maintaining strict quality and sophisticated technology.

It should be indicated here that most of the parties purchase the rollers on a prorate basis and if the rollers do not give the specified output, then price of the rollers will fall down accordingly to the fall in output capacity. Hence if the unit produces a high quality product, the scope for capturing the major shares of the existing market is very bright. The market for the mill rubber rollers is ever expanding and these exist sufficient market for full capacity production of the unit at12000 rollers/annum. Superior rubber rice mill roller technology which will give higher rice throughput tonnage per roll at competetive price will be sufficient for capturing market.

Even though in some foreign countries like Japan & Germany the rubber rollers in rice mill are being replaced by plastic rolls there are ample scope for exporting the rollers to other paddy producing countries like Burma, Bhutan, Thailand, Sree Lanka etc. Since there is no import of these type of rollers the question of import substitute does not arise at present.

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CHAPTER - III

PRODUCTION REQUIREMENTS

1. LAND & BUILDING:-

a) Location:-

The plant location is selected considering so many factors. This is very important since a plant is immobile and once it is established it is permanent. The locaion has got influence on the installing and operating costs and productivity. When a site is selected the following factors are taken into account and the optimum is to be selected.

1) Raw material availability.
2) Availability of water, power and other requirements.
3) Product marketability.
4) Skilled labours available at low cost.
5) Availability of land and building at cheap rate.
6) Transport (road) and communication services.
7) The government rules & regulations including taxes & excise duty should be favourable.

Proposed unit can be located were rice rollers can be easily marketed or where raw materials are easily available. By considering the present market situations it will be good for starting a factory in South India. Paddy production & consumption of rice is also should be taken into account. In South India a place where paddy is produced in large quantity and rice mills are located in large number like Palghat in Kerala State & Tanjoor in Tamil Nadu will be the suitable place for starting a rubber roller factory. Backward areas should be given consideration so that incentives provided by Government such as reduction in taxes,

and higher rate of subsidies etc. can be enjoyed.

Location of the plant in a developed area will mean a substantial increase in the land costs. So it is suggested to select the backward area as the factory site.

b. Plant layout:-

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

1) Material handling is to be the minimum.
2) Sufficient space for further expansion.
3) Ensure easy flow of materials through the factory.

A layout of the plant is shown in Appendix III.

Considering the floor area required for the plant including factory and office (2100 sq. ft.) The total land required for the factory site is about 8500 sq.ft. with provision for future expansion.

c. Building:-

Considering the lay out of plant, space for keeping the maximum amount of inprocess inventories, area for each machinery and expansion programmes the following areas are adopted for the individual requirements.

Raw material storage	-	225 Sq.feet.
Weighing	-	1125 sq. feet.
Mill room & stock storage (maturing)	-	200 sq. feet.
Calender room	-	100 sq. feet.
Building	-	287.5 sq. feet.

Hydraulic press (curing)	-	150 sq. ft.
Grinding & finishing	-	218.25 sq.ft.
Mandrel preparation	-	112.5 sq. ft.
Slow speed press (stripping)	-	131.25 sq.ft.
Inspection & Packing	-	150 sq. ft.
Finished goods store	-	100 sq.ft.
Office	-	300 sq.ft.
Toilet	-	50 sq.ft.
Total	-	2100 sq.ft.

2. RAW MATERIAL REQUIREMENT:-

A plant with a capacity of production of 12000 rice mill rollers per year. On a two shift basis is to facilitate production expansion at a future date since there are chances for increase in market.

Even though white rollers are high performance type there is existing demand for black rollers also. So the production is calibrated at a rate of 50% Black and 50% Non-black rollers. According to the existing demand this ratio can be altered. All raw materials are available indegeneously.

It is noted that the paddy huskers are of varrying sizes according to the mill capacity, hence the compound requirement also varries. Here the largest roller is considered for calculation of compound requirement to enable manufacture of paddy huskers of special sizes for specific customers and purposes. Average weight of the single husker (10") is found to be (weight of rubber compound) 5.600 Kg for white rolls & 5.500 kg for

Black rolls. Different formulations can be used to manufacture these rollers by using both natural & synthetic rubbers. (Appendix IV). High cost formulations are designed using carbon black & silica as fillers. Two types of bonding agents are to be used. One is used as primer ie., chemlok 205 which have a high bonding characteristic towards metal and the other as secondary bonding agent ie., chemlok 210 which have high bonding characteristic towards rubber. These two chemicals bond together firmly also. Both are isocyanate type. The raw material requirement is calculated for both black and white rollers by using typical formulation based on Nitrile rubber.

Typical formulations

a) Black Roller:

Nitrile rubber (Med. ACN content & Moonsy (40-60)	- 100.0
HAF Black	- 65.0
Modified PF resin	- 20.0
DOP	- 5.0
ZnO	- 4.0
Stearic acid	- 1.5
CBS	- 1.2
Sulphur	- 1.8
A/O PBN	- 0.75
A/O Acetone/Amine condensate	- 0.75
	- 200.00

b) Non-black:

Nitrile rubber (Med. ACN content & Mooney (40-60)	- 100.0
Prepepitated silica	- 60.0
Modified PF resin	- 20.0
Hexamine	- 2.0
ZnO	- 4.0
Steric acid	- 1.5
CBS	- 1.2
Sulphur	- 1.8
A/O SP	- 1.5
DEG	- 2.0
TiO_2	- 6.0
	- 200.0

Cure time 30' (152°C)

Considering a total production of 12000 rollers per annum the total annual requirement of raw materials including process loss is 70 metric tonnes. The annual raw material requirement with cost are ~~taken~~ tabulated in Annexure II A.

Source of Supply:- List of raw material suppliers are given in Appendix IX.

Terms of purchase:- The purchase of raw materials are done through banks. The bank will spent upto 70% for the purchase of materials on a margin money of 30%. This amount has to be paid back in 3 months with interest. All raw materials purchased will be pledged to the bank. The raw material can be purchased once in three months with necessary inventory.

3. REQUIREMENT OF PLANT & MACHINERY:-

The machinery required to produce the rice mill rolls are of four types:-

1. Mixing equipments.
2. Roller covering equipments.
3. Curing equipments.
4. Grinding & Finishing lathes.

The prices of machinery changes from time to time and for the same sizes and specifications there are significant difference in prices between different manufactures. Each of machinery is selected so that maximum utilisation of them may be made. For this following factors are considered.
1) The estimated capacity. 2) The standard diamension of the product and (3) Type of production. Average price is taken for the cost analysis. List of equipments with their prices required for manufacturing 12000 numbers of paddy huskers per annum on a two shift basis are tabulated in Annexure 2 B.

Mixing mill of 12" x 30" size with chilled cast iron rolls, driven by a 40 hp motor. Capacity of the mill is 20 kg/ batch. and hence 350 kg can be mixed per day ie., 14 hrs. (Batch time 45 minutes). Daily requirement of the compound is calculated as aproximately 250 Kgs. which is only consuming Ten hours for mixing. Hence enough rest for mill, time for repair and maintenance, and also production can be increased with the existing capacity.

The other equipment is a 3 roll calender of size 6" x 18" driven by a 7.5 HP motor. This can be eliminated if the two roll

mill itself can be used for sheetingout.

Roll covering equipments include stands for mounting the cores, consolidating equipments, building, tables etc.

For vulcanisation two hydraulic presses of 16" x 16" size and two daylight, and 6 - moulds are required.

For stripping the rollers from the inner core a slow speed down stroke press of 18" size is required.

All machineries are manufactured indegenously and list of suppliers are tabulated in Appendix X.

Terms of Purchase:- Quotations are made and satisfactory quotations are confirmed. Advance is to be paid initially and the remaining at the time of purchase. Machineries can also be purchased in loan basis. Normal delivery period for major machinery varries from 2 to 5 months. Purchaser should inspect the machinery. Since the prices of machineries change due to unforeseen reasons the supplier possess the right for cancellation and changing delivery time and prices.

4. MANPOWER REQUIREMENTS:-

The total number of personnel including administrative and managerial staffs for paddy husker plant is 35.

A. Factory:-

1. Managerial & Supervisory staff:-

		Salary per month.	Total
Factory Manager	- 1 -	1200/=	1200/=
Technologist	- 1 -	800/=	800/=
Shift supervisors	- 2 -	600/=	1200/=

2. Skilled Labours:-			
Mixing	- 2 -	400/=	800/=
Calendering	- 2 -	400/=	800/=
Moulding	- 4 -	400/=	1600/=
Building	- 4 -	400/=	1600/=
Lathe Grinding	- 4 -	400/=	1600/=
Technical Assistant	- 1 -	400/=	400/=
3. Semi Skilled Labours:-			
Press stripping.	- 2 -	250/=	500/=
Weighing	- 2 -	200/=	400/=
Stores	- 1 -	250/=	250/=
4. Unskilled Labours:-			
Packing & Despatching	- 2 -	200/=	400/=
Watch & Ward	- 2 -	200/=	400/=
Total	- 30 -		11950/=
B. General Administration & Sales:-			
Accountant	- 1 -	500/=	500/=
Clerks	- 2 -	250/=	500/=
Typist	- 1 -	300/=	300/=
Peon	- 1 -	150/=	150/=
Total	- 5 -		1450/=

Total cost of personnel:-

Category	No.	2 shifts wages/month	Annual wages
1. Factory	30	11950/=	143400/=
2. Administration	5	1450/=	17400/=
Total	35	13400/=	160800/=
Add 20% benefits			32160/=
			192960/=

Grand total approximately Rs. 193000/= per annum.

5. Utilities and other infrastructural requirements:-

1. Water:- Water is available in plenty round the year, free of cost in any part of Kerala. A motor pump is required for providing enough water. Water is required for cooling mixing mill & calender and other general purposes like washing, toilet etc. The daily requirement is as follows:-

Mixing mills	-	2500 lit.
Calender	-	2000 lit.
Other purposes	-	2000 lit.
Total	-	6500 lit.

Annual requirement is 1950 K. litre. Annual running cost may be approximately about Rs.1560/=

2. Electric Power:- Adequate and continuous supply of power is

necessary for a factory to run efficiently. Transformer will be installed by the electricity board. A 150 KVA transformer is to be installed.

The power requirement for each item are calculated (load factor 0.7

	HP	KW
1. Mixing mill	40	28.0
2. Calender	7.5	6.0
3. Lathes 1.5 x 2	3.0	2.5
4. Hydraulic press 2 x 3	6.0	5.0
(Electric heating element)		24.0
5. Water pump	4.0	2.5
6. Light & Fixtures		2.0
Total		70.0

Total working days per annum = 300

Total working hours = 16 x 300

Total units per annuam = 70 x 16 x 300

= 336000 Units.

Cost per unit = 16.5 paise.

Total annual cost for electricity = Rs.55440.00

Total cost of utilities per annum = Rs.55440.00 +
(Power)

Water = Rs. 1560.00

= Rs.57000.00

4. Roads:- As this small unit can't afford to make roads at its own expense, it is proposed to locate the factory in a place neares to the main road. So that transportation of raw materials and finished goods will be easy.

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CHAPTER - IV

DESCRIPTION OF PROCESS OF MANUFACTURE

1. Process detailes and Production programme:-

Even though the process of manufacture of rubber covered rollers for rice mills is relatively simple, very accurate method is to be used. The main stages of manufacture are the following. (Process flow diagram - Appendix V.)

a) Compounding - weighing & Mixing.

b) Calendering.

c) Inner Core & perforated metal sheet preparation.

d) Building.

e) Moulding.

f) Stripping of Inner core.

g) Grinding & Finishing.

h) Inspection, Packing & Despatch.

Compound Design:- The primary requirement in the design of the rubber compound is that it shall meet the service needs at an economic price. Selection of polymer, curatives, fillers and softeners needs critical consideration for optimum performance of the rubber vulcanisate in service. All chemicals should be nontoxic. The polymers for the production of rollers should have good processibility, building tack & green strength.

The rollers run hot during dehusking and polishing and also the surface is spoiled by rice bran oil so natural rubber alone does not function satisfactorily. Typical formulation based on nitrile rubber is used in this project which gives high performance both oil & heat resistance. Among the readily available

other synthetic rubbers Neoprene is outstanding in heat resistance. Carboxylated nitrile rubber blended with polybutadiene gives heat, abrasion and oil resistance, and is a very good starting point polymer. As a substitute for reducing the roller cost a compound based on NR-SBR blend is also suggested which has got optimum properties.

A fundamental requirement in the manufacture of rubber covered roller is that the compounding ingredients should be dispersed entirely satisfactorily in the roll cover stock. Only very easily dispersible and pure products should be used. Fillers with a tendency to form lumps, should be carefully screened and platicizer & tackifier should be tested for purity.

The valcanising system can be chosen to suit the properties required rather than the need for bonding as their effect in general on metal-rubber bond strength is relatively insignificant. Since the rubber compound needs calendering for building the roller which in turn is cured in a press, the accelerator choosen should have good scorch safety and moderately fast cure rate. Zinc oxide is an excellent reinforcing ingredient for highly loaded mixing. Because of the high thermal conductivity it also helps in the uniform curing of thick sections. The silica fillers are best for white compounds and HAF black for black compounds.

Regarding Antioxidents PBN&Acetone amine condensate are quite satisfactory in black rollers. A combination of these has been used to achieve the optimum heat resistance of the compound. In white rollers SP is preferred.

Weighing:- The required raw materials are weighed as per the compound reciepe and batch weight and kept in batches in the store room.

Mixing:- Each batch is taken to the mixing mill and mixed. Normal procedure for mixing is adopted. Sulphur and accelerator are best added in masterbatch to prevent agglomeration & scorching.

Calendering:- The mixed compound is then sheeted out in the calender into about 4 mm thickness sheets of required width. During sheeting air entrapment should be reduced to minimum.

Inner Core & Perforated metal sheet Preparation:- The calendered sheets are to be rolled over a perforated, hollow & cylendrieal metallic core of which the two ends are opened.

In Binny/Satak type mills the rolls are having two keys whereas in Schule/Dandaker, rollers without key are used. In the later case instead of perforated metal sheet, a cylendrical wire mesh of defenit gm guage size is used.

To obtain good adhesion, the metal surface of the spindles must be free from moisture, grease, dirt, oil, scales and rust. They are first sweeted in an autoclave (or in hot water) This is followed by shot blasting, cleaning with a wire brush or pickling. The spindles are given a solvent wipe before bonding.

The inner metal core is also to be cleaned. This can be done by use of solvents, by turning on a lathe or by sand blasting.

Building:-

To avoid oxidation a primer coat is applied to the spindles as soon as possible after cleaning. On the top of this

a layer of secondary bonding agent is applied just before the sheeted compound is rolled on.

The calendered sheet is applied over the perforated core by hand using a hand roller, care being taken to ensure freedom from air entrapment during plying. Plying is improved by passing the sheets over a preheating roll in a direction opposite to the calender grain to minimise shrinkage. Blisters are removed by carefully pricking with a needle. The covering in care of thick rolls are done by plying two or more sheets. In case of nitrile rubber compounds the solvent (methyl ethyl ketone) is applied between layers for good adhesion. The plying is done for defeint weight which includes allowances for flash & grinding.

Moulding:- Curing is done by moulding in electically heated hydraulic press. To eliminate blowing a slow cure is employed allowance being made for the metal core when selecting cure time. The usual time taken to cure each roll in the hydraulic press is one hour. The inner core is inserted into the green roller and the assembly is placed in the two piece mould of size slightly higher than the actual size of the finished roller. Mould is generally having four parts apart from the perforated metal core inside the rubber roller. Bottom half & Top half of the outer mould. The inner core and a pin for positioning the inner core are the sections (Figure Appendix - VI). The assembly is placed in the heated press. Two moulds can be placed at a time in one 2 day light press. It is then cured under pressure after degassing three times.

After curing the roller is taken out from mould and deflashed.

Stripping:-

The rollers are removed from the metal insert using a downstrock hydraulic press or a pulling machine.

Grinding:- The rollers are subsequently ground to the required diameter and cut to length on a lathe type grinding machine.

Grooved and plane rollers are manufactured. For plane roller smooth finish is obtained by applying sand paper with talc.

Inspection:- The ground roll ie., the finished product is inspected for any physical deformations and measured once agains to recheck the dimensions as per requirement.

Packing & Despatch:- After inspection the finished rollers are packed in cartons and despatched to the mills ready for use.

2. QUALITY CONTROL MEASURES:-

The rice mill rollers are manufactured strictly to the standards and specifications required by the purchasing units. The diamensions accurately maintained are Length, Outerdia. and Inner dia. Hardness of the roller is to be checked using a durometer hardness tester. Other tests normally done are abrasion resistance, heat binded up and performance properties. These tests are to be done according to the standards specified by I S I (IS 8427 - 1977).

3. UTILISATION OF BYE-PRODUCTS, SCRAPS ETC., IF ANY:-

The roll grinding can be used as a filler in compounds like ebonite base stock for other type rollers.

4. WASTE DISPOSAL:-

1. Grinding can be reused.

2. Unvulcanised scraps can be sold out in the local market.

3. Scorched stocks can be scraped and sold for reclaiming.

CHAPTER - V

SELLING AND DISTRIBUTION

1. Method of Pricing and Sales programme:-

There are three strategies for pricing a product in the domestic market. They are:-

(i) Cost oriented pricing.

(ii) Competition Oriented Pricing.

(iii) Demand Oriented pricing.

Which one of these strategies should be adopted for a particular product depends on various considerations. For rubber covered rollers cost oriented pricing is more relevent.

The pricing of the rollers are done according to different sizes and qualities of the product. The surface area is calculated for pricing. Since the market situation is based on the following factors the pricing also depends on them -

1) Quality like hardness and performance. The performance is estimated in terms of the quantity of paddy milled in terms per roll before replacement.

2) Quick delivery of items and maintenance of quality during application.

3) Type of rollers - black and non-black (high performance)

The existing pattern of rice mill roller distribution are predominantely through direct sales. This is due to the fact that the purchase of Government units are through tenders & quotations for regular supply. Dealers or commission agents can also be

employed for places far away from the factory. Apart from Government rice mills there are so many private rice mills and allof them keep a minimum of 25 sets of rubber roller as inventory at all times. In case of export also direct quotations or dealers are the selling methods.

The work is of Job order type and rollers are produced according to customers specifications. The market is divided into two sections. They are original equipment and replacement. The original equipment segment are the rice mill machinery manufacturers. They purchase high quality rollers which are fitted to the new mills and supplied.

The major market segment ie., the replacement segment are the existing modern rice mills. The orders for replacement are to be collected from existing mills. The rollers are to be manufactured to the specifications required and directly send to the mills where they are used.

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CHAPTER - VI

CAPITAL REQUIREMENTS

The Financial aspects of the firms can be given in the following heads:-

1. Fixed capital requirement.
2. Working capital requirement
3. Gross capital requirement.
4. Total manufacturing cost.

1. FIXED CAPITAL REQUIREMENT:-

This is the sum of the expenses incurred for plant, machinery, land, building and preoperative expenses that can be capitalised. The preoperative expenses are accounted for the costs incurred during the idle time of plant and machinery before regular production starts which include, interest during construction, project staff payment, travelling expenses, expenses for trial production ie., start up expenses etc. Miscellaneous fixed assets include expenses for furniture, office equipment, fire fighting, pipe fitting, service equipment other than machinery etc. A contigency of 10% on Land, Building, Machinery and miscellaneous expenses are also included in the fixed capital requirement.

The estimated fixed capital requirement in the above head are as follows:-

1. Land & Building	1,35,000.00
2. Plant & Machinery	5,14,050.00
3. Miscellaneous fixed assets	38,000.00

4. Contigency for price escalation 10%	-	68,700.00
5. Preoperative expenses	-	56,630.00
Total fixed assets	-	8,12,380.00

Details of fixed assets are shown in Annexure I.

2. WORKING CAPITAL REQUIREMENT:-

The working capital requirement depends on:-

(i) The duration for which raw material inventory has to be kept optimum so as to ensure uninterrupted production.

(ii) The duration involved in purchasing, manufacturing and selling.

(iii) The duration for which finished goods should be stocked to ensure uninterrupted supply.

(iv) The duration between selling of the goods and the payment to be received.

It also depends to a great extent on credit facilities available from the bank, from raw material suppliers and the credit terms between the firm and the customer.

The costs involved during this intervel is called working capital. In the present case since all materials are available indegineously onemonth raw material inventory is enough. The duration involved in manufacturing, storing, selling and cash payment is usually two months for rubber rollers. So the working capital may be taken as the total variable expenditure involved during the period of three months and are classified in the following heads:-

1.	Raw material cost, cost of purchase, transportation, inventory carrying cost etc.		27,95,000.00
2.	Manufacturing cost.		
	a. Cost of utilities	- 57,000.00	
	b. Salaries & Wages.	-193000.00	2,50,000.00
3.	Other over heads		40,500.00
	Total working capital (annual)		30,85,500.00
	Working capital for 3 months.		7,71,375.00

Details of the working capital component are given in Annexure II.

3. GROSS CAPITAL REQUIREMENT:

This is the sum of the fixed capital requirement and working capital requirement and is the total investment of the scheme. Gross capital requirement is given in Annexure III.

4. TOTAL MANUFACTURING COST:-

It comprises of all direct and indirect costs involved in the manufacturing operation. Annual manufacturing costs can be classified in the following heads:-

1. Raw material cost.
2. Personnel cost - Salaries & Wages.
3. Utilities - Power & Water.
4. Overhead expenses - Maintenance, Insurance etc.

5. Other fixed costs and interest on loans	-	Factory depreciation, interest on term loans and interest on working capital.

The Annual costs involved in these heads are as follows:-

1.	Raw material Cost	-	27,95,000.00
2.	Personnel cost	-	1,93,000.00
3.	Utilities	-	57,000.00
4.	Overhead expenses	-	40,500.00
5.	Other fixed costs and interest on loans.	-	2,43,270.00
	Total cost of production	-	33,28,770.00

Details of the total manufacturing costs are given in Annexure V.

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CHAPTER - VII

F I N A N C I N G P L A N

1. SOURCE OF FIXED & WORKING CAPITALS:-

As the entrepreneur cannot afford to take all the capital requirement for setting up the factory from his own pocket, he has to plan sufficiently early to raise the required capital. The capital requirement for the project can be divided into the following items.

1. Land.
2. Building.
3. Plant & Machinery.
4. Miscellaneous assets.
5. Preoperative expenses.
6. Contigency.
7. Margin money for working capital.

The resources for finance can be classified into three groups.

1. Own capital.
2. Loan amount (Financial Institutions, Banks)
3. Government Subsidy.

a. State Small Industries Development Corporation:-

Offer machinery on hire purchase on a margin money deposite of 20%. Repayment starts after two years and should be complete within 7 years. It offers special concession to technically qualified persons. Interest is 7.5%.

b. State Financial Corporation:-

Offers financial assistance as cash to small & medium scale industries. Provide 85% of Land, Building, Machinery, Miscellaneous assets & contigency. Upto 10 lakhs. Repayment starts by the end of second year and should be complet within 10 years in 17 half yearly instalments. The interest in the case of specified backward areas is 10.25% and for other areas it is 11.85%.

c. Commercial and Co-operative banks:-

Nationalised banks provide cash loans for machinery, loans are given on 25% margin money and 12 to 16% interest. For working capital any amount can be drawn. Payable period is 3 years.

d. National Small Industries Corporation, New Delhi.

Offer hire purchase facilities for machinery at 7.5% interest and the repayment period is 7½ years.

e. The Industrial Development Bank of India:-

Give financial assistance directly to industies upto 3/4th of the capital investment so that the promotors contribution should not be less than 25%. Interest is 12%.

f. State Government Industries Department:-

Under the rural industries project (RIP scheme) Government loans are available for machinery aquiring upto 90% of the machinery cost. The interest is 6½%.

Under RAP Scheme (Rural artisan Scope) 1/3rd grant is available for below 10000 Rs. machinery.

Details of the terms and conditions of financial assistance can be obtained from converned sourses.

2. FINANCING OF THE PROJECT:-

Gross capital of Rs.15,83,755.00 is proposed to be realised in the following manner.

1. Borrowing:- 85% of the land, building, machinery costs are obtained from Kerala Financial Corporation at an interest of 12%. Rs.6,75,000.00.

75% of the working capital is supposed to be taken from Industrial development bank of India or any other nationalised bank. Interest is 12%. - Rs. 5,75,000.00

2. Own Capital:- The balance of the total capital is contributed by the entrepreneur. This is 3,34,000 Rs. This amount of the fixed assets is used as part of working capital, Fixed capital and for preoperative expenses.

Financing Plan is given in Annexure - VI.

3. CASH FLOW:- Details given in Annexure VIII A & B.

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CHAPTER - VIII

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

The financial viability of the project can be guaged through the profitability. The following factors are examined in this case.

1. SALES INCOME AND PROFIT:-

	Cost Rs.
Total sales income	4350000.00
Less Central Excise duty	217500.00
	4133500.00
Less cost of distribution.	200500.00
	39,33,000.00
Less cost of production	33,28,770.00
Gross Profit	6,04,230.00
Less Tax incidence	3,92,998.70
Net profit	2,11,231.30

2. BREAK EVEN ANALYSIS:-

Break even quantity is that quantity which if produced and sold will give neither a profit nor a loss.

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

Where F = Annual fixed costs

P = Price per rubber roller(average)

V = Variable cost per roller (average)

Total sale of product = 12000 rollers.

Average cost per roller = 360 Rs.

Total variable cost:-

		Cost Rs.
(1) Raw materials	-	27,95,000.00
(2) Utilities	-	57,000.00
(3) Direct labour		1,43,280.00
(4) Distribution cost	-	2,07,000.00
(5) Central Excise duty	-	2,17,500.00
Total		34,19,780.00

V = Variable cost per roller = 285.00 Rs.

Fixed cost F = (Cost of production + Distribution cost + Central Excise Duty) - Variable cost.

= 333490.00

$$B E = \frac{333490}{360-285} = \text{approx. } 4450 \text{ Rollers}$$

By producing 4275 4450 rollers per annum the factory will operate at no loss no profit point and increase in production results in profit.

3. RATE OF RETURN ON OWN CAPITAL:-

Own capital	-	3,34,000.00
Net profit	-	2,11,231.50
Rate of return on own capital	-	= 63.25%.

4. RATE OF RETURN ON CAPITAL EMPLOYED:

Gross capital	-	15,84,000.00
Net profit	-	2,11,231.30

Rate of return on capital employed. = 13.34%

5. PROFIT ON SALES TURN OVER:-

Annual receipts from sales - 43,50,000.00

Net profit - 2,11,231.30

% Profit on sales turnover = 4.85 %

6. PAY BACK PERIOD:-

Pay back period is the time taken by the project by virtue of its cash flow to pay back the total investment, ie., Rs. 15,83,755.00.

Cash flow:

(Figures are in lakhs)

Year	Net profit after tax	Depreciation	Total	Cumulative total
1	0.95	0.933	1.883	1.883
2	1.015	0.933	1.948	3.831
3	1.515	0.933	2.448	6.279
4	1.52	0.933	2.453	8.732
5	1.54	0.933	2.473	11.105
6	1.554	0.933	2.487	13.692
7	1.69	0.933	2.623	16.315

PBP is approximately seven years considering the capital cost of project is Rs. 8,12,380.00.

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CHAPTER - IX

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

1. INTEREST ON COMMITMENTS:-

12% Interest on loan from KFC	Rs- 81000.00
12% Interest on working capital loan from IDBI	Rs. 69000.00
	Rs. 150,000.00

2. Ability of Repayment of Borrowed Funds:-

The term loans has to be paid back with in the prescribed time. The repayment period is to be kept at the minimum time possible to save the interest to be payed year after year. Once the repayment is started, year after year, the ability to payback the borrowings increases since cash inflows are higher due to decreased interests. Of the total profit approx. 25% is retained and 75% is used to pay back the term loan.

3. LOAN REPAYMENT PERIOD:-

1. Annual Net profit	-	211231.30
2. Depreciation	-	93270.00
Available surplus	-	304501.30
3. Less Drawings (25%)		79501.30
4. Amount used for repayment	-	225000.00
Team loan to be paid back	-	675000.00
Repayment period is	=	3 years.

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CHAPTER - X

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

An industry concern is an asset to the nation. A small scale industry does certain special services to a developing country like India:

(1) Larger employment with less investment.

(2) Mobilisis local resources, skills and savings and effects a wider dispersion of wealth.

(3) Contributes to nation's revenue earning through taxes, excise duty etc.

(4) Developes entreprenur-ship and entreprenеurial skills.

(5) Personnal profit to entrepreneur.

(6) By using rubber rollers in rice mills and thus reducing the percentage of brokens and fragments of rice during milling, 4 to 8 lakh tonnes more rice will be available to the country.

(7) The introduction of rubber rolls will make available 4 to 5 lakh tonnes of bran oil ~~kk~~ to the country.

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CHAPTER - XI

C O N C L U S I O N

1. Total fixed investment	-	8,12,380.00
2. Working capital required (3 months)	-	7,71,375.00
3. Total Investment	-	15,83,755.00
4. Working shift/day		2
5. Personnel requirement		35
6. Annual production		12000 rubber rollers
7. Annual sales	-	43,50,000.00
8. Break cum production	-	4450 rollers.
9. Net profit (Per year)	-	2,11,231.30
10. Rate of return on Investment	-	13.34%

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A N N E X U R E S

ANNEXURE - I

FIXED ASSETS

Item	Cost Rs.
1. Land & Building	135000.00
2. Plant & Machinery	514050.00
3. Miscellaneous fixed assets	38000.00
4. Contigency (@ 10% of 1,2 & 3)	68700.00
5. Pre operative expenses	56630.00
Total Fixed Assets	812380.00

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ANNEXURE - IA

LAND & BUILDING

1. Cost of 8500 Sq. feet of land @ Rs.5.00 per sq.feet.	42500.00
2. Cost of 2100 sq.feet of build up area (@ Rs.40/sq.feet) and Over head tank.	88000.00
3. Site Improvement	4500.00
Total	135000.00

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ANNEXURE - I B

PLANT & MACHINERY

Item		Space	Unit cost	Quantity	Total cost
1.	Mixing Mill	12"x30"	100000.00	1	100000.00
2.	Calender 3 roll	6" x18"	40000.00	1	40000.00
3.	Hydraulic press with electric heating 2 day light.	16"x16"	60000.00	2	120000.00
4.	Slowspeed hydraulic press for stripping the inner core from roller.	Downstroke	30000.00	1	30000.00
5.	Moulds		10000.00	6	60000.00
6.	Building tables		3000.00	4	12000.00
7.	Grinding & finishing Lathe with motor.	3' bed	20000.00	2	40000.00
8.	Weigh Scale		5000.00	1	5000.00
9.	Building guider & Spindler.				10000.00
10.	Lab.Equipment				10000.00
11.	Electrical items (Cabling)				20000.00
					447000.00
	Taxes, packing, forwarding, Insurance etc. @ 15%				67050.00
			Total	Rs.	514050.00

ANNEXURE - I C

MISCELLANEOUS FIXED ASSETS

Item	Cost Rs.
1. Equipment for supplying and distribution water. (Inclusive of pump)	26000.00
2. Cutting knife, scissors and other tools.	2500.00
3. Fire fighting equipments	3500.00
4. Office machineries and furniture	6000.00
Total	38000.00

ANNEXURE - I D

PREOPERATIVE EXPENSES

Item	Cost Rs.
1. Interest on loan @ 12% for 6 months.	40500.00
2. Establishment	3000.00
3. Property taxes	1830.00
4. Travelling Expenses	2800.00
5. Postage, Telephone, telegram and legal charges.	3000.00
6. Advertisement, Printing and typing	3500.00
7. Building Insurance	2000.00
Total	56630.00

ANNEXURE - II
WORKING CAPITAL

Item	Cost Rs.
1. Total Raw material cost	27,95,000.00
2. Manufacturing cost	2,50,000.00
3. Other overheads	40,500.00
Total working capital (annual)	30,85,500.00
Working capital (3 months)	7,71,375.00

ANNEXURE - II A

ANNUAL REQUIREMENT OF RAW MATERIALS

	White	Black
Average weight of Roller	5.600 Kg.	5.500 Kg.
Weight of 6000 rollers	33600 Kg.	33000Kg.
5% wastage	1680 Kg.	1650 Kg.
Total	35280 Kg.	34650 Kg.

Total weight (Black & White) = 69930 Kg.
= approx. 70 MT.

Raw materials	White rollers 6000		Black roller 6000		Total weight in MT	Cost Rs/Kg.	Total cost Rs.
	%	Wt.MT	%	Wt.MT			
Nitrile Rubber	50	17.640	50	17.325	34.965	34/=	1188810/=
Ppted Silica	30	10.590	--	--	10.590	15/=	158850/=
HAF Black	--	----	32.5	11.300	11.300	14/=	158200/=
Modified PF resin	10	3.530	10	3.470	7.000	82/=	574000/=
ZnO	2.0	0.710	2.0	0.700	1.410	13/=	18330/=
TiO_2	3.0	1.060	--	--	1.060	16/=	16960/=
DOP	--	--	2.5	0.835	0.835	22/=	18370/=
Sulphur	0.9	0.320	0.9	0.315	0.635	3.50	2223/=
Steric acid	0.75	0.265	0.75	0.260	0.525	16/=	8400/=
CBS	0.6	0.212	0.6	0.208	0.420	73/70	30955/=
DEG	1.0	0.355	--	--	0.355	12/=	4260/=
Heamine	1.0	0.355	--	--	0.355	26/=	9230/=
A/O SP	0.75	0.265	--	--	0.265	33.50	8878/=
A/O PBN	--	--	0.375	0.130	0.130	50.60	6578/=
A/O Acetone/ Aminecond.	--	--	0.375	0.130	0.130	51.85	6741/=
Total	100	35.302	100	34.673	69.975	--	2210785/=

COST OF RAW MATERIALS PER YEAR

	Item	Cost Rs.
1.	Rubber & Chemicals	2210785/=
2.	Bonding agent.	114500/=
3.	M.S. Sheets (perforated) & Wire mesh	360000/=
4.	Silicone Emulsion	15000/=
5.	Ethyl Methyl Ketone	5000/=
6.	Nylon tapes	10000/=
7.	Packing materials	75000/=
8.	Other materials	4715/=
	Total	Rs. 2795000/=

ANNEXURE - II B

MANUFACTURING COST (ANNUAL)

Item	Cost Rs.
1. Cost of Utilities	57000.00
2. Salaries and wages	193000.00
Total Rs.	250000.00

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ANNEXURE - II B-1

COST OF UTILITIES

Item	Cost Rs.
1. Cost of 336000 KWH power @ Rs.0.165/KWH	55440.00
2. Working expenses for water supply	1560.00
Total Rs.	57000.00

ANNEXURE - II B-2

Salaries & Wages

a. Salaries of administrative & technical staff:-

	Position	No.of shift	Total personnel per day	Monthly salary/staff Rs.	Total Salary. Rs.
1.	Factory Manager	1	1	1200/=	1200/=
2.	Technologist	1	1	800/=	800/=
3.	Sales-cum-Accounts Officer	1	1	500/=	500/=
4.	Clerks	1	2	250/=	500/=
5.	Typist.	1	1	300/=	300/=
6.	Peon	1	1	150/=	150/=
7.	Production supervisor.	2	2	600/=	1200/=
	Total		9		4650.00

b. Wages of Labourers:

1.	Skilled	2	18	400.00	7200.00
2.	Semi skilled	2	3	250.00	750.00
3.	Unskilled	2	4	200.00	800.00
	Total		25		8750/=
	Total salaries and wages/months				13400/=
	Total salaries and wages/ annum				160800/=
	Benefits and allowances @ 20%				32160/=
	Total				192960/=

Approximately Rs. 193000/=

ANNEXURE - II C

OTHER OVERHEADS

Item.	Cost Rs.
1. Repairs and maintenance of building at 1%	880.00
2. Repairs & Maintenance of Machinery @ 5%	22240.00
3. Travelling and advertising expenses	1830.00
4. Insurance, 2% of fixed capital.	12550.00
5. Property taxes	1000.00
6. Stationary, Postage & telephone	1000.00
7. Miscellaneous	1000.00
Total over heads	40500.00

ANNEXURE - III

GROSS CAPITAL REQUIREMENT

Item	Cost Rs.
1. Total fixed capital requirement	8,12,380.00
2. Total working capital requirement. (for 3 months)	7,71,375.00
Gross capital requirement	15,83,755.00

ANNEXURE - IV

OTHER FIXED COSTS AND INTEREST ON LOANS

Item	Cost Rs.
a. Depreciation:	
1. Depreciation on machinery @ 15%	84870.00
2. Depreciation on building @ 5%	4400.00
3. Amortization on other fixed assets. and pre-operative expenses @ 10%	4000.00
b. Interest on Loan:-	
1. Interest on working capital @ 12%	69000.00
2. Interest on estimated term loans @ 12%	81000.00
Total	243270.00

ANNEXURE - V

TOTAL COST OF PRODUCTION (ANNUAL)

Item		Cost Rs.
1. Raw material cost.	(Annexure II A)	27,95,000.00
2. Utilities	(Annexure IIB-1)	57,000.00
3. Personnel cost	(Annexure IIB-2)	1,93,000.00
4. Over heads	(Annexure II C)	40,500.00
5. Other fixed costs and interest on loans.	(Annexure IV)	2,43,270.00
Total cost of production		33,28,770.00

ANNEXURE - VI

FINANCING PLANS

Rs. in Lakhs.

Source	1st year	2nd year	3rd year	Total
KFC	6.75	--	---	6.75
IDBI	3.85	0.95	0.95	5.75
Own. Fixed Capital	1.37	--	--	1.37
Working Capital	1.38	0.335	0.335	1.97
		Total		15.84

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ANNEXURE - VII

SALES INCOME AND PROFIT

	Cost Rs.
1. 6000 Nos. of black rollers @ Rs.330/- per roller.	1980000.00
2. 6000 Nos. of white rollers @ Rs.390/- per roller.	2370000.00
Total	4350000.00
Less Central Excise duty @ 5%	217500.00
	4133500.00
Less : Distribution cost @ 4.85%	200500.00
	3933000.00
Less: Cost of Production	3328770.00
Gross Profit	604230.00
Less: Tax indidence	392998.70
Net Profit	211231.30

ANNEXURE - VIII

A. PROJECTED PROFIT & LOSS ACCOUNT (Rs. in Lakhs)

	Years						
	1	2	3	4	5	6	7
Production No.of rollers	8000	10000	12000	12000	12000	12000	12000100
Sale Income	27.60	34.50	41.40	41.40	41.40	41.40	41.40
Raw material, Additive & Packaging.	18.63	23.29	27.95	27.95	27.95	27.95	27.95
Utilitise	0.38	0.475	0.57	0.57	0.57	0.57	0.57
Personnel salaries & wages	1.93	2.03	2.125	2.24	2.35	2.46	2.59
Other overheads	0.405	0.405	0.405	0.405	0.405	0.405	0.405
Depreciation	0.933	0.933	0.933	0.933	0.933	0.933	0.933
Interest charges	1.27	1.58	1.36	1.185	1.005	0.825	0
Cost of Production	22.92	28.71	33.33	33.28	33.21	33.14	32.45
Distribution & sales cost	1.38	1.73	2.07	2.07	2.07	2.07	2.07
Cost of sales	24.30	30.44	35.40	35.35	35.28	35.21	34.52
Profit before tax	3.30	4.06	6.00	6.05	6.12	6.19	6.88
Income tax	2.35	2.945	4.485	4.53	4.58	4.636	5.16
Profit after tax	0.95	1.015	1.515	1.52	1.54	1.554	1.69
Profit before tax with interest added back	4.57	5.64	7.36	7.235	7.125	7.015	6.88
Profit + Depreciation	1.883	1.948	2.448	2.453	2.473	2.487	2.623

B. PROJECTED CASH FLOW STATEMENT (Rs. in Lakhs)

	Years						
	1	2	3	4	5	6	7
A. Source of Funds:-							
1. Own money	2.67	0.335	0.335	--	--	--	--
2. Profit before tax with interest added back.	4.57	5.64	7.36	7.235	7.125	7.015	6.88
3. Depreciation provision for the year	0.93	0.93	0.93	0.93	0.93	0.93	0.93
4. Increase in long term borrowing	6.75	--	--	--	--	--	--
5. Increase in bank borrowing	3.85	0.95	0.95	--	--	--	--
Total A	18.77	7.855	9.575	8.165	8.055	7.945	7.81
B. Disposition of funds:-							
1. Capital expenditure	8.12	--	--	--	--	--	--
2. Increase in working capital	5.15	1.285	1.285	--	--	--	--
3. Decrease in long term loans	--	0.75	1.5	1.5	1.5	1.5	1.5
4. Interest charges	1.27	1.58	1.36	1.185	1.005	0.825	0
5. Taxation	2.35	2.94	4.48	4.53	4.58	4.63	5.19
6. Dividents (Drawing 25%)	0.45	0.50	0.60	0.62	0.62	0.63	0.66
Total B	17.34	7.055	9.225	7.825	7.705	7.585	5.85
Opening balance	--	1.43	2.23	2.58	2.82	3.17	3.53
Net surplus (A - B)	1.43	0.80	0.35	0.24	0.35	0.36	1.96
Closing balance	1.43	2.23	2.58	2.82	3.17	3.53	5.49

APPENDICES

APPENDIX - I

TABLE OF MARKET POTENTIAL

Year	Total Existing rice mills.	Conventional	% of Modernisation	Yearly addition of modern rice mills.		Total Modern rice mills	
				All India	Regional	All India	Regional
1980	70000	68350	--	--	--	1650	112
1981	70000	67940	0.6	410	23	2060	135
1982	70000	67465	0.7	475	27	2535	162
1983	70000	66925	0.8	540	32	3075	194
1984	70000	66320	0.9	605	38	3680	232
1985	70000	65655	1.0	665	45	4345	277

ANNUAL REQUIREMENT OF RUBBER ROLLERS

Year	OE Potential		Replacement		Total	
	All India	Regional	All India	Regional	All India	Regional
1981	820	46	302820	18944	303640	19890
1982	950	54	372645	23816	373595	23870
1983	1080	64	452025	28516	453105	28580
1984	1210	76	540960	34104	542170	34180
1985	1330	90	638715	40720	640045	40810

Year	Production Capacity		Additional Capacity		Surplus/Deficit	
	All India	Regional	All India	Regional	All India	Regional
1981	235000	10000	8000	8000	(-)60640	(-)1890
1982	235000	10000	10000	10000	(-)128595	(-)3870
1983	235000	10000	12000	12000	(-)230105	(-)6580
1984	235000	10000	12000	12000	(-)319170	(-)12180
1985	235000	10000	12000	12000	(-)417045	(-)18810

APPENDIX - II

PRICES OF REGULAR QUALITY OF RUBBER ROLLERS OF STANDARD SIZES

	Length mm	OD mm	ID mm	Price per piece White	Price per piece Black
1. Schule/Dandekar 10"DL/DS	260	223	158.5/157	390/=	325/=
2. Satak/Binny 10" F_2/F_3	254	254	202/203	400/=	335/=
3. Satak/Binny 8" BK	203	223	184	330/=	295/=
4. Satak/Binny 6" DM	152	223	184	280/=	245/=
5. Schule/Dandekar 6" DL/DS	152	223	158.5/157	300/=	265/=
6. Satak/Binny 4" Mini.	101	223	184	165/=	140/=

(Sales tax extra.)

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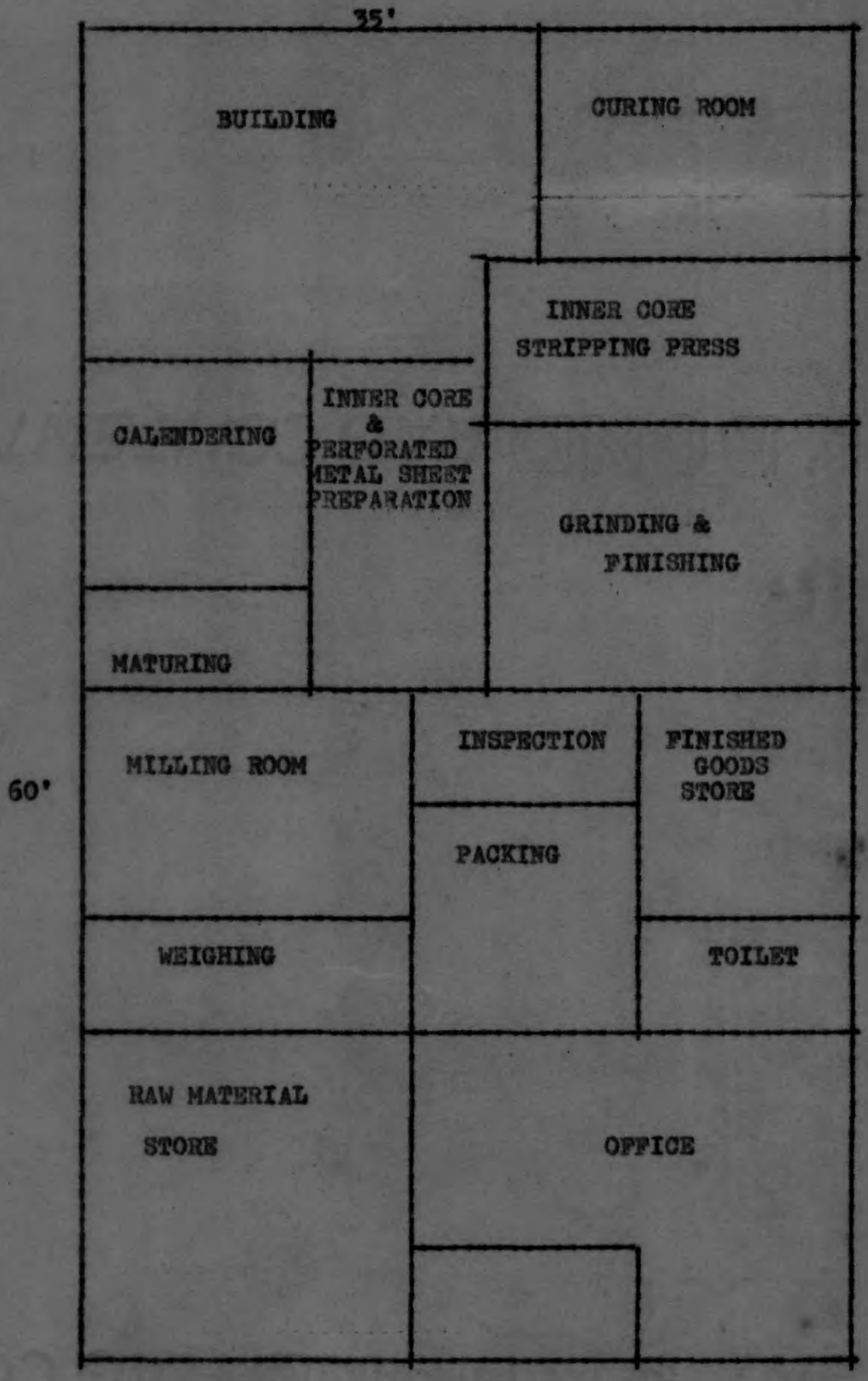
APPENDIX - III

PLANT LAYOUT



APPENDIX - IX

FORMULATIONS FOR RICE MILL ROLLERS

1. **N R Based:**

a) **Black**

NR	100
ZnO	5
Steric acid	2
HAF black	100
CI Resin	5
Acetone/Amine A/o condensate	1.5
CBS	1.0
Retarder (N-Nitroso diphenyl amine)	0.5
Sulphur	3.0
	218.0

b) **Non black**

NR	100
Activated ZnO	7
Steric acid	3
Process oil	5
CI Resin	5
Treated Calcium carbonate	20
Silica	70
Calcium silicate	20
MBT	1.2
DPG	0.5
Sulphur	2.5
DEG	2.0
	236.2.

2. **SBR Based:-**

Black:-

SBR	100
HAF	50
Chinaclay	100
Naphthenic oil	5
C I Resin	5
ZnO	4
Stearic acid	1
PBN	1
Paraffin wax	1
CBS	1.2
TMTD	0.3
Sulphur	2.0

3. Neoprene SBR Blend :(Outstanding heat resistance)

Black	
Neoprene WX	50
SBR 1500	40
SBR 1958	10
ZnO	10
Steric acid	1
HAF	50
Process Oil	10
Light calcined magnesia	2
PBN	1
Amine/Aceton condensate	1
CBS	0.6
TMT	0.5
DOTT	0.5
Sulphur	1.5

4. Carboxylated Nitrile rubber - Polybutadum blend.

Non Black		
CNBR	75	(CNBR-Carboxylated Nitrile rubber
BR	20	(Excellent flow properties at
Sulphur	2.5	moulding temperature, Fast cure
Steric acid	3.0	high modulus, tensile, strength,
Ppted silica	50.0	tear resistence and outstanding
PF resin	20	abrasion resistance.)
CI resin	10	
DEG	2.5	
DOP	10	
Hexamine	2	
TMTD	0.7	
Latex dispersed master batch of Zinc peroxide in NBR.	10.0	

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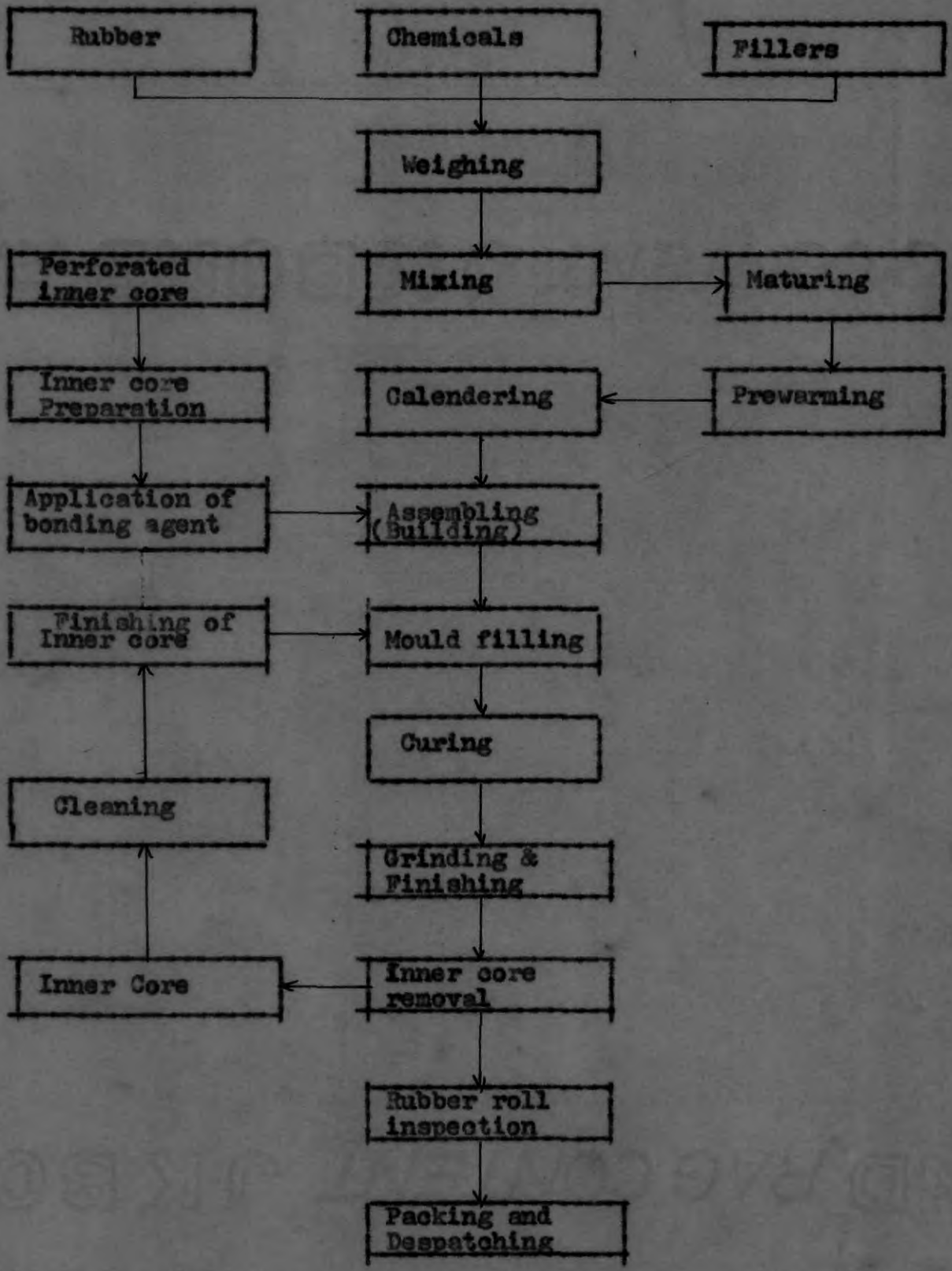
APPENDIX - V

PROCESS FLOW DIAGRAM



APPENDIX - VI

MOULD FIGURES

SCHULE/DANDEKAR 10" DL/DS

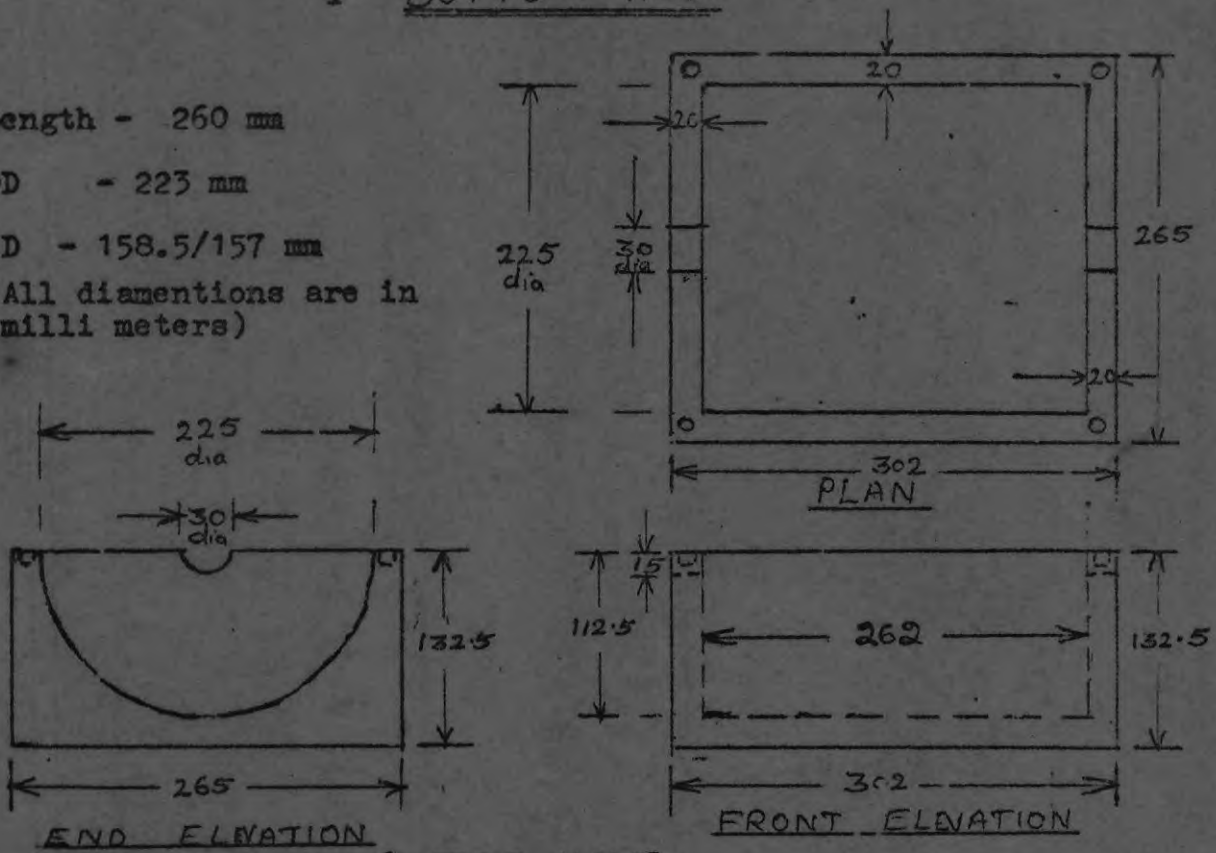
1. BOTTOM HALF

Length - 260 mm

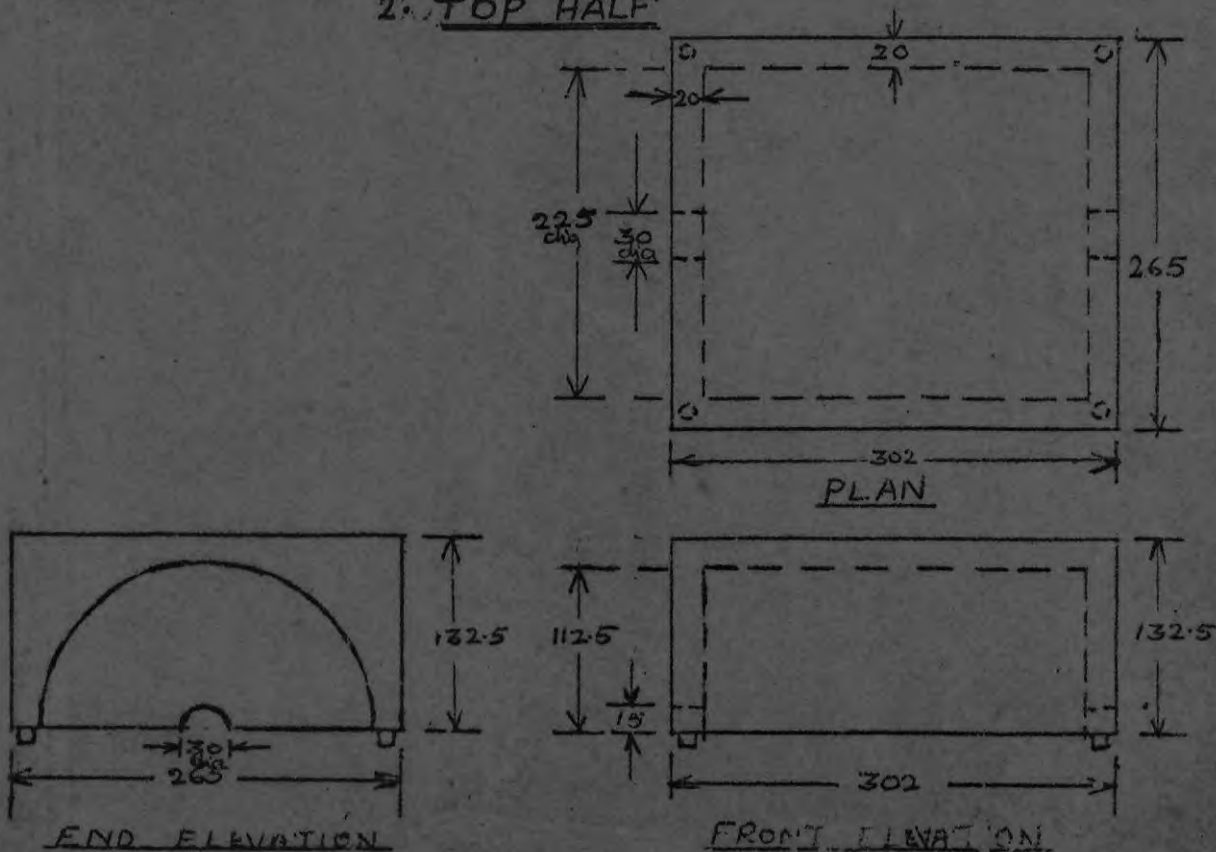
OD - 223 mm

ID - 158.5/157 mm

(All diamentions are in milli meters)

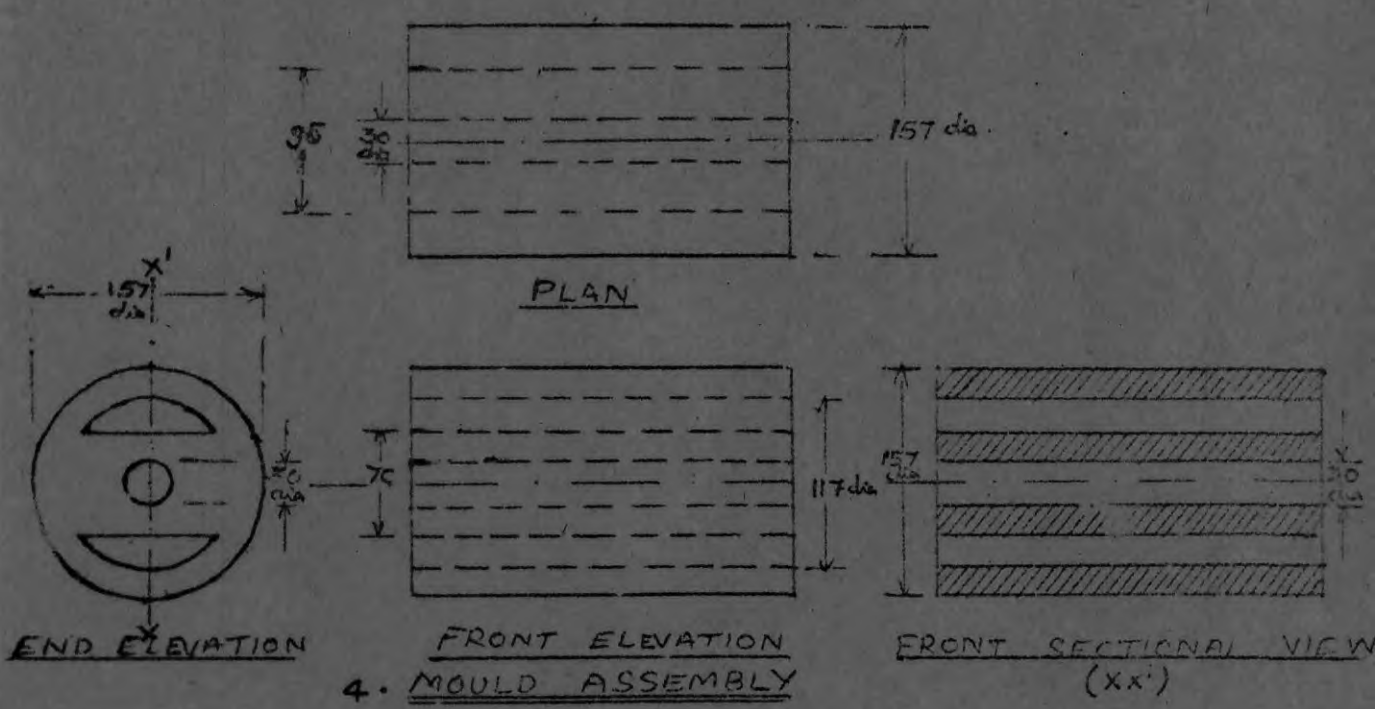


2. TOP HALF

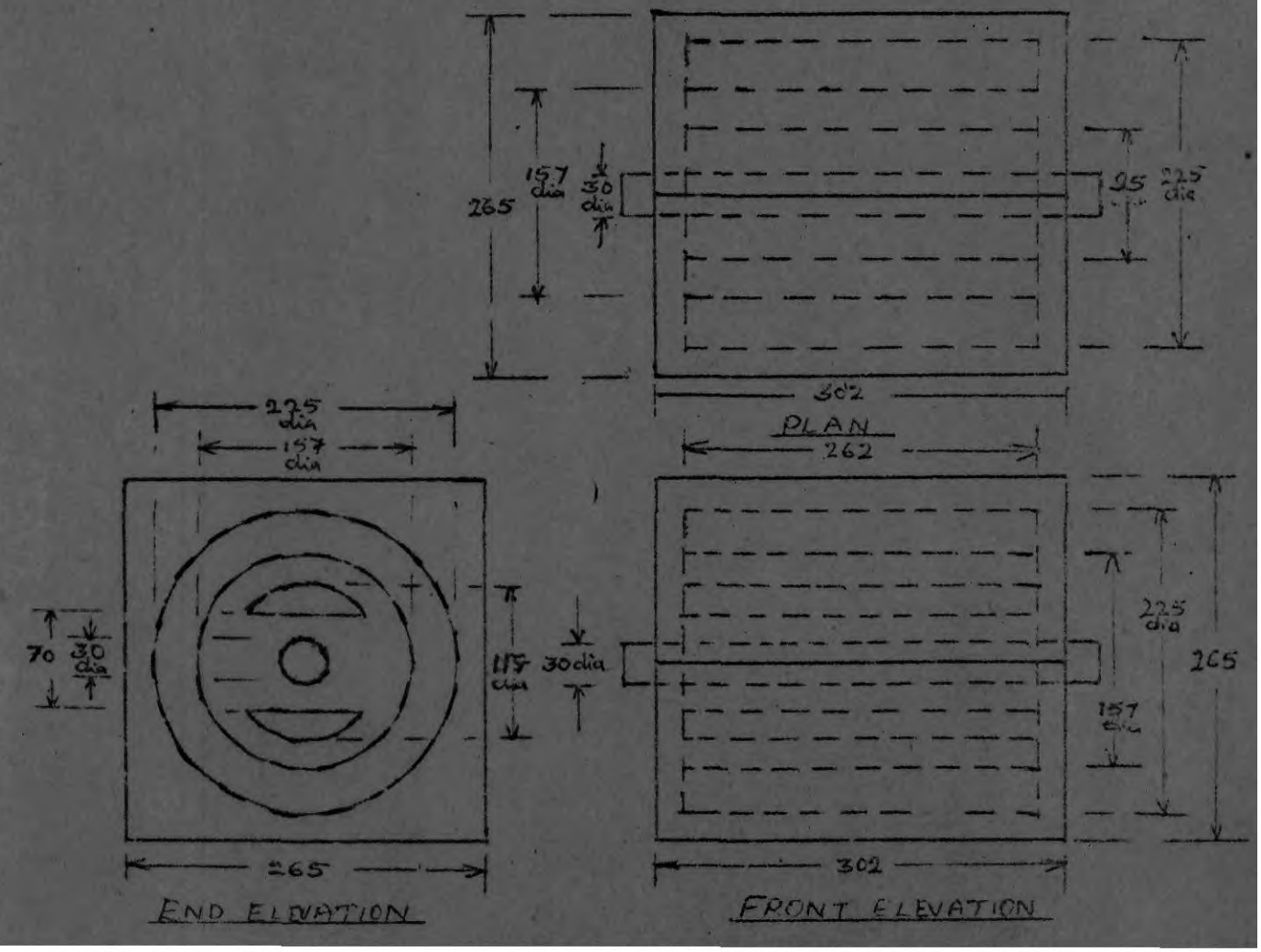


MOULD FIGURES CONTD.

3. INNER CORE



4. MOULD ASSEMBLY



APPENDIX - VII

LIST OF MODERN RICE MILLS IN SOUTH INDIA

	Kerala	Tamil Nadu	Andra Pradesh
FCI -	Palghat - 1	Madras - 3	
Annamalai University	Palghat - 2	Chingalpet - 2	
	Ernakulam-1	North Arcot- 1	
	Alleppey -1	South Arcot- 4	
	Trichur - 1	Salem - 3	
		Coimbator - 3	
		Madurai - 1.	
		Tiruchirappally - 1	
		Tanjoor - 28	
		Tirunelveli - 1.	
Total	6	47	60

APPENDIX - VIII

MANUFACTURERS OF RICE MILL MACHINERY

(both conventional & modern)

Leading Manufacturers:-

1. Binny Engineering Works Ltd.,
   P. B. No. 1111, Meenambakam,
   Madras - 61.

2. Pandu Engineering Works,
   Autonagar, Vijayawada - 7,
   A.P.

3. Sree Venkateswara Engineering Works,
   1-7-152/A Opp. Fire Station,
   Bakaram New Nursirabad Road,
   Hyderabad - 48. A.P.

4. Damodar Enterprises Ltd.,
   1/A Vansistari Row, Calcutta.

5. M/S Dahanu Industrial Works,
   Dahanu Road, Thana (Dist), Maharastra.

6. G G Dandekar Machine Works Ltd.,
   Bhiwandi, Thana (Dist)., Maharastra.

7. Geekay Industries, G.T. Road.,
   Batala, Punjab.

8. M G Industries, G.T. Road,
   Batala, Punjab.

9. Kiran Engineering Works,
   PO Box No. 20, G.T. Road,
   Batala, Punjab.

10. Shanti Sheller Manufacturer,
    Siad, Punjab.

Other Manufacturers:-

1. M/S Bhasha Engg., Works, Tarapet,
   Vijayawada - 1, A.P.

2. M/S Bharath Bearing & Mill agencies,
   P.P. Road, Bhimavaram, 534201.

3. Jalil Khan WorkShops,
   (Near) Gandhi Park,
   Vijayawada - 1, A.P.

4. Labour Mechanical & Engineering Works,
Man road, Rice Mills area,
Karali (Dist.), Nellore, A.P.

5. Murli Engg. & Mill stores,
Station road, Tensli,
Guntur (Dist.), A.P.

6. Y. Narayana Rajan,
Rice mill Manufacturers, Tensli,
A.P.

7. Sree Gopala Krishna Foundry,
Station Road, Tensli, Guntur.

8. Sree Rama Engg. Works.,
Tarapet, Vijayawada - 1, A.P.

9. Sree Venkata Subramania meshwaram Engg. Works,
11/78 Mashlipatanam, A.P.

10. Mill Stores Engineering Works,
Park Road, Vijayawada (A.P.)

11. Union Industrial Works,
Dahame Road, Thana.

12. New Industrial Works,
Daham Road, Thana, Maharastra.

13. Francis De Saze, Dahanu Road,
Thana, Maharastra.

14. M/s Bahari Industrial Works,
Dahanu Road, Thana, Maharastra.

15. Bihar Inspatt (Engrs) Ltd.,
P.B. No. 54, Ranchi - 1.

16. Gurucharan Industrial Works,
Station Road, Manipuri, U.P.

17. Kisan Krishi Yantra Udyog,
Collector Ganj, 64 Noti Bhavan, Kanpur-7.

18. Parakesh Rice mill, Kashipur,
Naniital District, U.P.

19. Jagdes Mechanical Works,
Patiala Road, Rajpury.

20. Veera Mechanical Works,
Ferospur road, Maga, Punjab.

21. Sadhu Singh & Sons, Inside Bagadi Gate,
Ferozpur city, Punjab.

22. N B Patel & Co.,
C/o V.R. Traders, Outside Daryapur Gate,
Sivaninamium Godown, Ahmedabad.

23. M/S Adarsh Sons., Kasturba Sewa Mandir,
Rajpur, Punjab.

24. Deva Singh Shamsingh, Paddy Sheller Manufacture,
Ferozepur city, Punjab.

25. Elastocheur PVt., Ltd.,
H 2/6 Model Town, New Delhi.

26. Friends Rice Mill Manufacturers,
Outside Chait wind Gate,
Amritsur, Punjab.

27. Indian Foundary works,
Bordur Road, Ferozepur city, Punjab.

28. Jeswindes Mechanical works,
Sanlenali Road, Taran Taran, Punjab.

29. Kuldip Engg. Works,
Taran Taran, Punjab.

30. Northern India Floor mills corporation,
Sullanward Road, Amritsar, Punjab.

31. On bar Technical Works,
GT Road, Batala,

32. Panesar Brothers,
(Opp) Water Works, Taran Taran, Punjab.

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APPENDIX - IX

LIST OF RAW MATERIALS SUPPLIERS

A. **Nitrile Rubber**

(1) Synthetics & Chemicals,
Regd. Office 7, Jamshedji Tata Road,
P.B. No. 11486, Bombay 400020.

Factory : Bareilly, U.P.

B. **Carbon Black:-**

1. Philips Carbon black Ltd.,
31 Netaji Subhas Road, Calcutta-1.

2. United Carbon (India) Ltd.,
NKM International House,
178 Backbay Reclamation, Bombay - 20.

C. **Ppted Silica**

1. Indian Minerals & Associated Industries,
12 B Netaji Subhas Road, Calcutta - 700001.

2. Xerofils, 57 GIDC Estate,
Nandesari 391340, Baroda.

D. **Process Oil:-**

1. Rollwala Associates,
12 Mill Officers Colony, Ashram Road,
Narnangpur, Ahamadabad - 9.

2. Aristo Chemicals (P) Ltd., 77, 10th Khetwadi,
Bombay - 22.

E. **Modified PF resin:-**

1. Bakelite Hylam Ltd.,
PB No. 1908, Hyderabad - 18.

2. Dr. Beck & Co. (India) Ltd.,
Prinpuri, Pune - 18.

F. **Titanium Dioxide:-**

1. Rubochem. Industries Pvt. Ltd.,
1005 Prasad Chambers, 10th floor,
Near Roxy Cinema, Bombay - 14.

Branch - Near C.M.S. College, Kottayam.

2. Travancore Titanium Products Ltd.,
P.B. No. 64, Trivandrum.

3. Paramount Commercial Corporation,
12-B - Fort Chambers, Dean Lane, Port Bombay-1.

G. **Sulphur:-**

1. I A & I C (P) Ltd.,
86 Dr. Annie Basent Road, Worli, Bombay - 18.

2. H. Chandranmal & Co., 97 Nyniappa Naicken Street,
Madras - 600003.

H. Zinc Oxide:

1. Rubochem.Industries Pvt. Ltd.,
   Near C.M.S. College, Kottayam -1.

2. Weldies Ltd.,
   A-1 Gillander House, Netaji Subhash Road,
   Calcutta - 1.

I. Stearic Acid:-

1. M/s Godrej Soaps (P) Ltd.,
   Eastern Express High Way,
   Vikhroli Bombay - 400079.

2. Bombay Oil Industries (P) Ltd.,
   Kanmoor House, 291/87 Narsi Natha Street,
   Bomaby - 400009.

4. The calcutta Chemicals Co. Ltd.,
   35, Padnitia Road,
   Calcutta - 29.

J. Rubber Chemicals:-

1. M/S Bayer India Ltd., 82 Vir Narmans Road,
   P.B. No. 1436, Bombay - 400001.

2. The ACCI Ltd., 34 Chawrighu,
   Calcutta 13.

3. Mindia Chemicals Ltd., Wake Field House,
   aa Sprott Road, Bombay.

K. Bonding Agent:-

1. Union Commercial & Industrial Company Pvt. Ltd.,
   7, Homj Street,
   Fort Bombay - 400001.

L. M S Sheets:-

1. Reliance Hardware Mart,
   13, Elababu Street, Madras - 1.

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APPENDIX - X

RUBBER MACHINERY MANUFACTURERS LIST

1. Farrel Anand Machinery Manufactures Ltd., Mahalaxmi Chambers, 22, Bhulabhai Desai Road, Bombay-26.	Mixing mill, Calender Refining mill, Extruder.
2. Sohal Engineering Works, Sohal Industrial Estate, LB shastri Marg, Bombay - 400078.	Mixing mill, Calender, Extruder, Presses - Hydraulic & Hand Fly. Vulcaniser.
3. Indian Expeller Works (P) Ltd., A/4 Naroda Industrial Estate, Naroda, Ahemadabad-382330.	Mixing mill, Calender, Presses hand fly.
4. Richardson & Cruddas Ltd., Byculla Iron Works, PB No. 4503, Bombay - 400008.	Mixing Mill, Calender, Presses - hydraulic general purpose & Moulding works.
5. Kelachandra Iron & Steel Works, Chingavanam, Kottayam, Kerala.	Mixing Mills, Calender, Hand fly press.
6. Blue steel Engineers (P) Ltd., 144 A/2 Industrial Estate, Pergusan Road, Bombay - 400013.	Rubber Testing instruments.
7. Avery (India) Ltd., Armenian Street, Madras - 1.	Weigh Scales.
8. Polymer Engineering Services, 6, Lalbhag Road, Bangalore - 560007.	Testing equip- ments.& Moulds.
9. Common Facility Service Centre, Tool Room, Changanacherry Industrial Estate, Kerala.	Moulds, Dies & Tools.
10. Arc Engineering Works, Madras.	Roller Mandrels.
11. Nasa Pump Factory, B-13, Industrial Estate, Guindy, Madras-32.	Household and Industrial pumps.

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