

# **COIR MATTRESSES**

## **1. INTRODUCTION:**

Rubberized coir is a versatile product used largely as a less expensive substitute cushioning material for foam rubber in furniture, upholstery, mattresses. Rubberized coir is made from curled fiber, which should be free from dust. The coir is made into endless fleece which is conveyed to the first set of rubber latex spray gums. Thickness of sheets is built by fixing multi layers fleeces and spraying is repeated to get a good bonding of layers. Then the sheet is hydraulically pressed and vulcanized to set the fibers. Coired board provides the training for this project. There are good schemes are also available for development of this industries.

## **2. PRODUCT & ITS APPLICATION:**

Rubberized Coir Mattress is made out of Rubberized Coir Sheets and Natural Latex Form Sheets. Rubberized Coir Mattress is appreciated due to its high strength and durability among the market. The advantages of coir mattresses over the conventional are Reliable, High strength, dimensionally accurate, Durable. The rubberized coir mattresses are widely accepted as bed for modern living style.

## **3. DESIRED QUALIFICATIONS FOR PROMOTER:**

Graduate in any graduate.

## **4. INDUSTRY LOOK OUT AND TRENDS**

Coir fibers are extracted from the husks surrounding the coconut. It is a common experience that fibers detached from the coconut skin are quite hard to break by simple tension, hence by pulling from both sides. Excellent properties of

resistance to wear and easy availability in countries, where coconut palms are widespread, have allowed coir to be employed for a variety of uses, e.g., for manufacturing toys, bags and carpets. Coir is popularly known as the golden FIBRE. It is extracted from the fibrous husk of the coconut shell. Coconut husk is a residue from coconut production, comprising approximately 30 wt. % coir fibers and 70 wt. % coir pith. It is used to manufacture a wide range of products such as ropes, mats, mattresses, baskets, brushes and brooms. Around 50 per cent of the coconut husk is used for making coir. Mixture of coir fiber and latex is steam heated, pressed and vulcanized to produce mattresses. Types & Structure of Coir Fiber There are two main types of coir fiber first is Brown Coir, from fully ripened coconut husks; strong and resistant to abrasion, it is used in brushes, floor mats, and upholstery padding and White Coir, from husks of coconuts harvested just before they ripen; softer and less strong, it is spun into yarn, used for ropes and mats. Uses and Applications A small amount is also made into twine. Pads of curled brown coir fibre, made by needle felting (a machine technique that mats the fibres together) are shaped and cut to fill mattresses and for use in erosion control on river banks and hillsides. A major proportion of brown coir pads are sprayed with rubber latex; bonds the fibers together (rubberized coir) to be used as upholstery padding for the automobile industry in Europe. The material is also used for insulation and packaging. The major use of white coir is in rope manufacture. Mats of woven coir fiber are made from the finer grades of bristle and white fiber using hand or mechanical looms. Coir is recommended as substitute for milled peat moss because it is free of bacterial and fungal spores.

## **5. MARKET POTENTIAL AND MARKETING ISSUES, IF ANY:**

With the present growth of furniture industry and the high cost of foam rubber, there is a tremendous scope for the use of rubberized coir as a total substitute for foam rubber. For mattresses and in upholstery, it can be used in combination with foam rubber. The total production of coir around 3 lakh tons valued at Ra.1000 crores. There is a huge potential to expand coir production because only 28% of the raw material is available for production.

Coir geo-textiles have been used by Konkan Railways on the rail embankments. They have been used in some of the Kerala districts road embankments in Idduki, bunds in Kuttanad, Irrigation canals in Muvatuppuzha and for hardening the marshy land in the NH-bypass in Kozhikode. Driving factors for demand of rubberized coir is the present growth of furniture industry and the high cost of foam rubber for mattresses and in upholstery, it can be used in combination with foam rubber.

## **6. RAW MATERIAL REQUIREMENTS:**

Coir fibers, centrifuged latex, sulphur, accelerator, anti-oxidants, zinc oxide, dispersing agent, caustic potash etc. The major raw materials required are coir fiber and compounded latex ready for spraying. Coir fiber is extracted from coconut flex, the outer fleshy part of the coconut. It is available abundantly, throughout the coastal parts in India particularly in Kerala State. Rubber is mainly of two finds, natural and synthetic rubber. Natural rubber is latex of the rubber plant, which is cultivated in South India on large scale, particularly in Kerala. The rubber latex collected from the rubber plants is very dilute and roughly contains only 25% solid rubber and rest is water. This latex is concentrated by centrifugation, electrolysis and several other methods. The former method is most commonly used and concentration of latex up to 60% can be obtained by this method.

Rubberized coir formulation:-

Basis: for 100 Kgs DRC (dry rubber contents) or 167 kg rubber latex.

Chemicals	%
Chalk powder	12
Zinc oxide	3
Sulphur	2
Accinex B.Rods or HSL beads	1
Accinex ZDC or Vulcanite LDA	1
Accicure ZMBT or vulkacit 2M	5
Dispersal F or Balloid Td	4% of total chemical weight

Emulvin T	1.5
Calsolune oil	5

## **7. MANUFACTURING PROCESS:**

Sulphur, accelerator, antioxidants, zinc oxide, dispersing agent, water etc. are put in the Ball mill and mixed and ground for 48 hours. Latex is poured into the mixing machine and caustic potash solution, stabilizer, antioxidant emulsion etc. are mixed. The filtered solution from the ball mill is poured slowly to this solution and stirred well. To this compound a watering agent is also added. Coconut fibers are cut long and curled into springs. This is then subjected to steam boiling and dried as curls. The curls are rearranged as fiber yarns and put in a spraying unit. The latex compound is sprayed from the top and bottom surface of the fibers and then heated to 60° centigrade for 30-60 minutes till the vulcanization is over. The product is ready for packing after sufficient cooling. The coir twisted ropes is treated with open steam. By this process, the fiber is moisturized by the steam and heated. This is done, so that the fiber acquires the permanent curved shape. The steam treated fiber is stored for a fortnight to dry up the moisturized fiber. The completely dried and tempered fiber ropes are fed into untwisting machine to untwist the rope and this machine throws out the fiber in carded firms. This untwisted fiber is now fed into sheet machine. This machine further untwists the fiber and gives out on the conveyor belts, the fiber in continuous sheet forms of required width and density. The sheet is now sprayed with the rubber latex and chemicals such as sulphur, sodium silicofluoride, Diphenyl Guanidine, ZMBT, ZDC and Zinc oxide. The conveyor belt passes through a drying chamber, when the water part of the rubber latex evaporates and the fiber gets bonded with rubber. The sheet comes out on the other end of the drying chamber. One side sprayed sheet is turned to another following conveyor belt, which further enters into the drying chamber. Before entering into the chamber, the unsprayed side of the sheet is sprayed and dried up in dryer chamber, which is a repeat process. A continuous sheet of required width and completely bond bonded with rubber comes out from the sheet machine.

## 8. MANPOWER REQUIREMENT:

Sr. No.	Designation of Employees	Salary Per Person	Monthly Salary ₹	Number of employees required				
				Year-1	Year-2	Year-3	Year-4	Year-5
1	Machine Operators	12,000	24000.00	2	2	2	2	2
2	Helpers	8,000	32000.00	4	5	5	6	6
1	Production supervisor	15,000	15000.00	1	1	1	1	1
2	Accounts/Stores Asst.	12,500	25000.00	2	2	2	2	2
3	Office Boy	9,000	9000.00	1	1	1	1	1
	<b>Total</b>		105000.00	10	11	11	12	12

## 9. IMPLEMENTATION SCHEDULE:

The project can be implemented in 3 months' time as detailed below:

Sr. No.	Activity	Time Required (in months)
1	Acquisition of premises	1.00
2	Construction (if applicable)	1.00
3	Procurement & installation of Plant & Machinery	1.00
4	Arrangement of Finance	2.00
5	Recruitment of required manpower	1.00
	Total time required (some activities shall run concurrently)	3.00

## 10. COST OF PROJECT:

The project shall cost ₹ 54.50 lacs as detailed below:

Sr. No.	Particulars	₹ in Lacs
1	Land	5.00
2	Building	15.00
3	Plant & Machinery	15.00

4	Furniture, Electrical Installations	3.00
5	Other Assets including Preliminary / Pre-operative expenses	1.50
6	Working Capital	15.00
	<b>Total</b>	<b>54.50</b>

## 11. MEANS OF FINANCE:

Bank term loans are assumed @ 75 % of fixed assets.

Sr. No.	Particulars	₹ in Lacs
1	Promoter's contribution	13.63
2	Bank Finance	40.88
	<b>Total</b>	<b>54.50</b>

## 12. WORKING CAPITAL CALCULATION:

The project requires working capital of ₹ 15.00 lacs as detailed below:

Sr. No.	Particulars	Gross Amt	Margin %	Margin Amt	Bank Finance
1	Inventories	7.50	0.25	1.88	5.63
2	Receivables	3.75	0.25	0.94	2.81
3	Overheads	3.75	100%	3.75	0.00
4	Creditors	-		0.00	0.00
	<b>Total</b>	15.00		6.56	8.44

## 13. LIST OF MACHINERY REQUIRED:

### Coir Sheet Machine (Sheeting Line)

This machine is used to process systematically, the coir fiber with the latex for manufacturing Rubberized Coir Fleeces of 1" thickness. These fleeces are piled to make the mattress and other allied items. This machine has speed controls throughout and is fully automatic state-of-the-art machine. This is manufactured in 3 different capacities. 1 meter width, wherein you can process a maximum width up to 3 feet, 1.4 meter width up to 4 feet and 2.2 meter width up to 6.5

feet.

**Coir Rope Untwisting Machine**

This machine is used to untwist the coir rope into the loose curled coir fiber. This has a capacity to untwist coir rope up to 250 Kgs. per hour.

**Hydraulic Press**

It operates hydraulically to press the coir fleeces to the exact thickness of the mattress made in solid MS Plates.

**Band Saw Cutting Machines**

this machine evens out the mattress to the exact length and width, by cutting unwanted parts.

**Ball Mill**

This is used to churn the chemicals to break them into fine powder before mixing it with the Latex.

**Vulcanizing Chamber**

This vulcanizes the mattresses at a very high temperature and pressure so as to dry of all the moisture contents. This is manufactured in different capacities.

**Tank**

This tank is used to store latex mixed with chemicals and is connected via pipes into the sheeting machine for free flow of latex mixed with chemicals on the coir sheet.

A detail of important machinery is given below: Power Requirement: 15 HP

Sr. No.	Particulars	UOM	Qty	Rate (₹)	Value (₹ in Lacs)
	<b>Plant &amp; Machinery / equipments</b>				
<b>a)</b>	<b>Main Machinery</b>				

i.	Coir Sheet Machine	NOS.	1	55000 0	5.50
ii.	Coir Rope Untwisting Machine	Nos	1	30000 0	3.00
iii.	Hydraulic Press	Nos	2	10000 0	2.00
iv	Band Saw Cutting Machines				
v	Water tanks	Nos	1	60,000	0.60
vi	Ball Mill Vulcanizing Chamber, and other equipments	NOS.	1		4.90
	<i>sub-total Plant &amp; Machinery</i>				<b>15.00</b>
	<b>Furniture / Electrical installations</b>				
a)	Office furniture	LS	1	1	1.00
b)	Stores Almirah	LS	1	1	1.00
c)	Computer & Printer	L. S.	1	1	1.00
	<i>sub total</i>				<b>3.00</b>
	<b>Other Assets</b>				
a)	preliminary and preoperative				1.50
	<i>sub-total Other Assets</i>				1.50
	<b>Total</b>				<b>19.50</b>

All the machines and equipment are available from local manufacturers. The entrepreneur needs to ensure proper selection of product mix and proper type of machines and tooling to have modern and flexible designs. It may be worthwhile to look at reconditioned imported machines, dies and tooling. Some of the machinery and dies and tooling suppliers are listed here below:

- Kamdhenu Agro Machinery  
Plot No. 6, Near Power House,  
Wathoda Road, Wathoda  
Nagpur - 440035  
Maharashtra, India



- Future Industries Private Limited  
Shed No. 15, Ambica Estate,  
Corporation Municipal Plot,  
Opposite Sadvichar Hospital,  
Naroda, Ahmedabad - 382330,  
Gujarat, India
  
- The Global Pharma Equipments  
Star Industrial Estate,  
D-32, Naik Pada,  
Near Hanuman Mandir,  
Opposite Dwarka Industrial Estate,  
Vasai East, Vasai - 401208,  
Maharashtra, India

#### 14. PROFITABILITY CALCULATIONS:

Sr. No.	Particulars	UOM	Year-1	Year-2	Year-3	Year-4	Year-5
1	Capacity Utilization	%	60%	70%	80%	90%	100%
2	Sales	₹. In Lacs	45.00	52.50	60.00	67.50	75.00
3	Raw Materials & Other direct inputs	₹. In Lacs	37.87	44.18	50.50	56.81	63.12
4	Gross Margin	₹. In Lacs	7.13	8.32	9.50	10.69	11.88
5	Overheads except interest	₹. In Lacs	7.10	7.55	8.44	8.70	8.88
6	Interest	₹. In Lacs	4.09	4.09	2.73	2.04	1.64
7	Depreciation	₹. In Lacs	10.50	7.50	5.25	3.75	3.38
8	<b>Net Profit before tax</b>	₹. In Lacs	<b>-14.56</b>	<b>-10.82</b>	<b>-6.91</b>	<b>-3.80</b>	<b>-2.01</b>

The basis of profitability calculation:

The growth of selling capacity will be increased 10% per year. (This is assumed by various analysis and study; it can be increased according to the selling strategy.)

Energy Costs are considered at Rs 7 per Kwh and fuel cost is considered at Rs. 65 per litre. The depreciation of plant is taken at 10-12 % and Interest costs are taken at 14 -15 % depending on type of industry.

## 15. BREAKEVEN ANALYSIS:

The project shall reach cash break-even at % of projected capacity as detailed below:

Sr. No.	Particulars	UOM	Value
1	Sales at full capacity	₹. In Lacs	75.00
2	Variable costs	₹. In Lacs	63.12
3	Fixed costs incl. interest	₹. In Lacs	10.52
4	BEP = $FC/(SR-VC) \times 100$ =	% of capacity	88.51%

## 16. STATUTORY / GOVERNMENT APPROVALS

As per the allocation of business rules under the Constitution, labour is in the concurrent list of subjects. It is dealt with by the MOLE at the Central and Departments of Labour under State Governments in respective States / UTs. The MOLE has enacted workplace safety and health statutes concerning workers in the manufacturing sector, mines, ports and docks and in construction sectors.

Further, other Ministries of the Government of India have also enacted certain statutes relating to safety aspects of substances, equipment, operations etc. Some of the statutes applicable in the manufacturing sector are discussed below:

### **The Static and Mobile Pressure Vessels (Unfired) Rules, 1981**

These (SMPV) Rules are notified under the Explosives Act, 1884. These rules regulate storage, handling and transport of compressed gases. These rules stipulate requirements regarding construction and fitments, periodic testing, location, fire protection, loading and unloading facilities, transfer operations etc. in respect of pressure vessels whose water capacity exceeds one thousand Litres. These rules are enforced by the Chief Controller of Explosives under the Ministry of Industry and Commerce, Govt. of India (PESO).

### **The Manufacture, Storage and Import of Hazardous Chemicals Rules (MSIHC), 1989**

These MSIHC Rules are notified under the Environment (Protection) Act, 1986. These rules are aimed at regulating and handling of certain specified hazardous chemicals. The rules stipulate requirements regarding notification of site, identification of major hazards, taking necessary steps to control major accident, notification of major accident, preparation of safety report and on-site emergency plan; prevention and control of major accident, dissemination of information etc. These rules are notified by the Ministry of Environment and Forests (MOEF) but enforced by the Inspectorates of Factories of respective States / UTs in the manufacturing sector.

### **The Factories Act, 1948 and State Factories Rules**

The Factories Act, 1948 is very comprehensive legislation dealing with the matters of safety, health and welfare of workers in factories. The Act places duties on the occupier to ensure safety, health and welfare of workers at work. Some of the salient provisions of the Act include:

- Guarding of machinery
- Hoists and Lifts; Lifting Machines and Appliances
- Revolving Machinery
- Pressure Plant
- Excessive Weight

- Protection of Eyes
- Precautions against dangerous fumes, gases etc.
- Explosive or inflammable dust, gas etc.
- Precautions in case of fire
- Safety of buildings and machinery
- Permissible limits of exposure of chemical and toxic substances
- Entrepreneur may contact State Pollution Control Board where ever it is applicable.

## **17. BACKWARD AND FORWARD INTEGRATIONS**

Chemical companies often become integrated and undergo other activities outside the chemical industry. Increased competition prompts many companies to reduce supply chain costs by looking outside the chemical sector at suppliers and customers. While most companies within the chemicals sector primarily produce chemicals, some companies also conduct other manufacturing activities. The exact proportion of chemicals sector companies that are integrated with other sector activities is unknown, but many companies actively seek vertical integration. Many manufacturers pursue vertical integration to secure suppliers and customers for their products.

Mergers and acquisitions are a common way for companies to undertake new chemical ventures. By purchasing their chemical suppliers, some manufacturers secure future chemical feedstock for their products or other chemicals that they use in manufacturing. The company making the purchase obtains valuable expertise and equipment. Some mining and petrochemical production is more cost-effective when integrated within a chemical company.

Energy and feedstock costs are often a significant expense for chemical companies. Integrating chemical production with activities that secure supplies of

chemical feedstock and energy is relatively common as chemical companies grow. Chemical companies are located near mines, oil fields, ammonia factories and water supplies. This reduces transportation costs and increases the reliability of supplies by reducing the distance between feedstock and the factory.

Some companies, such as Sino-Coking Coal and Coke Chemical Industries Incorporated, own their mines. BHP Billiton operates a broad range of mines and is primarily a mining company. It does, however, also produce petrochemical feedstock for the chemical industry and therefore operates within the chemical industry as well. These companies technically operate within both the chemical and mining industries in their normal business operations.

Integrating a chemical company with other activities provides several direct benefits for the company and is becoming increasingly common. High energy costs necessitate greater control of energy resources and minimal reliance on expensive transportation. Chemical companies experience volatile profitability due to fluctuations in feedstock and energy expenses. Some companies control this volatility through careful supply chain management and by charging supply surcharges. Actively researching and developing alternative feedstock and energy supplies helps the company reduce costs.

Vertical integration supports these activities by eliminating redundant activities at multiple companies and increasing efficiency. By consolidating activity among multiple, similar operations, chemical companies achieve cost savings that contribute to higher profitability. End products are often very profitable, and some chemical companies purchase their former customers to take advantage of the marked-up prices of products further along in the supply chain.

Integration may become more common for many chemical companies as competition strengthens and traditional feedstock becomes more expensive. Market demand for chemical feedstock increases as emerging market economies grow and result in increased consumer spending around the world.

## **18. TRAINING CENTERS AND COURSES**

There is no such training required to start this business but, basic chemical bachelor's degree is plus point for enterpriser. Promoter may train their employees in such specialized institutions to grow up the business. There are few specialised Institutes provide degree certification in chemical Technology, few most famous and authenticate Institutions are as follows:

1. Department of chemical LD college of engineering  
No.120, Circular Road, University Area, Navrangpura,  
Opposite Gujarat University, Ahmedabad, Gujarat 380015
2. MIT College of chemical Engineering, **Pune**  
Gate.No.140, Raj Baugh Educational Complex,  
Pune Solapur Highway,  
Loni Kalbhor, Pune - 412201  
Maharashtra, India

Udyamimitra portal ( link : [www.udyamimitra.in](http://www.udyamimitra.in) ) can also be accessed for handholding services viz. application filling / project report preparation, EDP, financial Training, Skill Development, mentoring etc.

Entrepreneurship program helps to run business successfully is also available from Institutes like Entrepreneurship Development Institute of India (EDII) and its affiliates.

**Disclaimer:**

Only few machine manufacturers are mentioned in the profile, although many machine manufacturers are available in the market. The addresses given for machinery manufacturers have been taken from reliable sources, to the best of knowledge and contacts. However, no responsibility is admitted, in case any inadvertent error or incorrectness is noticed therein. Further the same have been given by way of information only and do not carry any recommendation.

Source:- Udyami Mitra/Sidbi