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268169

Published by

Small Industry Research Institute
4/43, Roop Nagar, Delhi-110007. Phone : 220885

Latest Enlarged Edition : 1981-82

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Printed at : J.N. Prints 251, Padam Nagar, Delhi-7

PREFACE

Rubber Industry in India has now secured an important place in the Industrial structure of the country. In the wake of all round progress of the country the demand for rubber items have increased magnificiently. The present book has been written keeping in view the entrepreneurs who are interested in starting a venture in the field of rubber and others who are already in this field.

Complete processing and technology of rubber has been given in details. Taking into consideration the general difficulties faced by manufacturers of these goods, author Mr. R.S. Gupta being an experienced person in this field has laid special emphasis on this and has included precautions to be taken wherever necessary. The description of manufacturing details and working of machineries leave no scope of ambiguity.

Besides this the book covers, machinery details with their sketches and also directory section, containing addresses of manufacturers and suppliers of raw material and machinery. The cost estimations of plant and machinery has also been given for the ready reference of the reader.

I am highly grateful to Mr. C.P. Tiwari who played an important role in revising this book.

—Publisher

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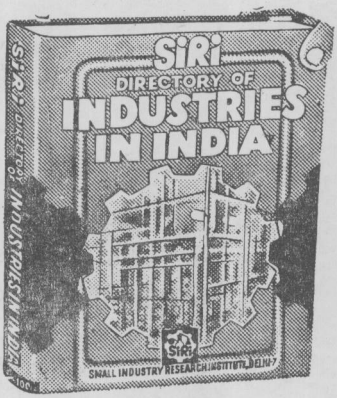

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Introduction

Indian rubber industry can be called young in comparison with world rubber industry (1820), having starting the first rubber factory only in 1921 in the then Bengal Presidency presently West Bengal. Production of natural rubber and the vast population of India, providing a potential market, are the two important factors which have contributed to the growth of rubber industry.

The industry manufactures over thirty thousand different products ranging from heavy duty automotive tyres to tiny articles like teats and ballons, including innumerable types of specialised industrial and mechanical products required by various industries like the automobile, aircraft, railways, shipping, textiles, medical and pharmaceuticals, sports goods, engineering, furniture, building and construction, as also by agricultural sector. There would hardly be any field where the use of one or the other rubber product is not found.

It would be interesting to know the per capita consumption of rubber in some industrially advanced countries as well as in India which will give an idea of the stage of development of the rubber industry in these countries.

The approximate figures are :

USA	13.8 kgs.
Germany	9.2 ,,
France	8.7 ,,
U.K.	8.6 ,,
Japan	8.2 ,,
India	0.24 ,,

It is also noted that rubber industry have a tendency to make increased use of synthetic rubber since 1940.

According to the licences issued by the Rubber Board for acquisition of rubber, India has over 1800 rubber goods manufacturing units of which eighty units including 12 automotive tyre units are on the list of the Rubber Development Wing (DGTD). Of these 1800 units, over 80% are small scale units. The industry's total turnover is estimated to exceed Rs. 1200 crores as against Rs. 50 crores in 1947, and employment over 5 lakh of persons. The rubber industry in India is mainly concentrated in the States of West Bengal, Maharashtra and Tamil Nadu, the three accounting for 65% of the total consumption of rubber. The others are Kerala, Haryana, Punjab, Delhi, U.P., Karnataka, Gujarat and the rest.

Besides, rubber industry has also emerged as an exchange earner. In the matter of quality, Indian rubber products are comparable to those of industrially developed countries and as such our rubber products do not find any difficulty in withstanding competition in export markets on account of quality. All rubber products are covered by excise duty levy. Rubber industry contributes to the exchanger over Rs. 200 crores by way of excise duty.

Raw Materials

Over a decade back, the industry had to depend entirely on import for some of its major raw materials like synthetic rubber, rubber chemicals, etc. This position has considerably changed and average import contents in rubber products are hardly 5%. It is essential that raw material base is to be strengthened further to maintain and accelerate the progress of the rubber industry.

The following are the important raw materials and components required by the rubber industry :

(1) Rubber, (*i*) Natural, (*ii*) Synthetic and (*iii*) Reclaim.

(2) Carbon Black.

(3) Accelerators, and Antioxidants.

(4) Tyre cords, (*i*) Nylon, (*ii*) Rayon and (*iii*) Cotton.

(5) Fabrics.

(6) Titanium Dioxide.

(7) Zinc Oxide.

(8) Stearic Acid.

(9) Sulphur.

(10) Whiting and China Clay.

(11) Pigments and Colours.

(12) Miscellaneous materials like pine tar oil, light magnesium oxide, oleic acid, magnesium carbonate, etc.

(13) Beadwire Rings.

(14) Tube Valves for Automotive and Cycle Tubes.

Apart from high prices the rubber industry has to face some difficulties due to following reasons for some of its raw materials :

(*i*) inadequate supply

(*ii*) irregular supply

(*iii*) non-availability of required grades.

Rubbers

Rubbers—natural, synthetic and reclaim are the major and the most important raw material of the vital rubber industry and hold a strategic position in the country's economy. Natural rubber is tapped from rubber trees, synthetic rubber is chemically made and reclaim rubber is produced from rubber scrap. The first two rubbers are known as new polymers. In the wake of faster growth of the rubber industry, the country should concentrate on increasing production of natural rubber as well as manufacturing suitable types of synthetic rubbers in accordance to the international standards and quality acceptable to the rubber goods industry.

Natural Rubber

It is cis-polyisoprene (an unsaturated hydrocarbon) of very high molecular weight (1,00,000-5,00,000) having naturally occurring

antioxidants and accelerators. Natural rubber, all over world is presented to the industry in different grades. The internationally recognised market grades (Green Book Classification) of Natural Rubber are shown below :

Type		*Grades*
1. Ribbed smoked sheet		No. 1X R.S.S.
		No. 1 R.S.S.
		No. 2 R.S.S.
		No. 3 R.S.S.
		No. 4 R.S.S.
		No. 5 R.S.S.
2. White and Pale Crepes	Thick	No. 1X, 1, 2, 3.
	Thin	No. 1X, 1, 2, 3.
3. Estate Brown	Thick	No. 1X, 2X, 3X.
	Thin	No. 1X, 2X, 3X.
4. Compo crepes		No. 1, 2, 3
5. Thin brown crepes (Remills)		No. 1, 2, 3, 4
6. Thick blanket crepes (Ambers)		No. 2, 3, 4
7. Flat bark crepes		Standard, Hard
8. Pure smoked blanket crepe		Standard
Total types : 8		Total grade : 35

First two types of rubber are made by coagulating the latex. Estate brown crepe is made by scraps, hence it contains impurities like bark, dust etc. Remilled crepes are made of residuals after cuttings, so containing more impurities. Flat bark crepes contains high percentage of rosin, dirt content etc. Being cheapest, it is used for cycle padels etc.

In addition, there are special grades of natural rubber as follows :

(*i*) Air dried sheet (pale amber unsmoked sheet)
(*ii*) Anti-crystalline rubber

(*iii*) Cyclised rubber master batch

(*iv*) Heveaplus MG rubber

(*v*) Partially purified crepe (PP crepe)

(*vi*) Rubber powder

(*vii*) Skim Rubber

(*viii*) Softened or peptised rubber

(*ix*) Superior processing rubber

(*x*) Technically classified rubber

(*xi*) Arche Rubber

(*xii*) Viscosity-stabilised natural rubber (Constant viscosity & Low viscocity CV & LV rubber)

In India RSS 1, RSS 2, etc. are called as RMA 1, RMA 2 etc. Pale and white crepe is called Pale Latex Crepe (PLC) and so on. Lot rubber which is easily available in India contains RMA 2, 3, 4 and 5 grades mixed in unknown proportions. While RMA 1 and PLC 1X etc. are difficult to procure and that too by paying very high prices. Natural rubber is also used in the form of latex *i.e.* liquid rubber with different concentrations like 60%, 50% and 35%. Many rubber products are manufactured from rubber latex.

Since 1947, rubber goods manufacturing industry is paying cess to the Rubber Board, Rs. 400/- per tonne. The amount so collected is to be utilised for the development of the rubber plantation industry. Unfortunately most of the amount collected by Rubber Board is lying unutilised.

2

Synthetic Rubbers

In the wake of rapid industrialisation, changing economic conditions and advancing technology, new sophisticated rubber products are needed. So newer types of synthetic rubber with specific properties which natural rubber does not provide, has been developed. Moreover production of natural rubber has its own limitations and it may not meet the growing demand of the fast expanding rubber industry.

In India there are only two units manufacturing synthetic rubber. One is Messers Synthetics and Chemicals, Bareilly (U.P.) manufacturing Styrene butadiene (SBR) and nitrile rubbers. Another is Indian Petro-chemicals Corporation Ltd. (IPCL) Baroda (Gujarat) manufacturing polybutadiene. Unfortunately, the quality and supply of synthetic rubber is not consistent *i.e.* some quantity is to be imported. Some other types of synthetic rubbers like butyl, polychloroprene EPDM etc. are also imported as these are absolutely needed by the industry.

Reclaim Rubber

There are over 10 units including a couple of captive units manufacturing reclaim rubber in India. The total production in the country which was 200 tonnes in 1960 increased to 24,000 tonnes in 1979-80. Its consumption too has increased to 23,000 tonnes from 500 tonnes. However in view of the faster growth of the rubber industry, the requirement of this rubber is estimated to reach about 30,000 tonnes in 1981-82. Reclaim rubber produced in India is as good as that produced in advanced countries in the matter of quality, so some quantity of reclaim rubber is also exported.

Carbon Black

There are two units manufacturing carbon black in the country. Prior to 1963, this essential raw material was imported. These two units are :

		Installed Capacity
1.	Phillips Carbon Black Ltd.	36,000 tonnes
2.	United Carbon India Ltd., Bombay	35,700 tonnes
3.	Eureka Chemicals Ltd., Calcutta	—

In addition Fertilizer Corporation of India Ltd. is manufacturing certain grades of carbon black for rubber industry as a bye-product. Three more licences have been issued but only one is coming up. The quality of carbon black is satisfactory. In fact, some quantities of carbon black are being exported to foreign markets. The prices of carbon black have been raised substantially due to increase in crude oil prices.

Tyre Cord

Tyre Cord is the most important raw material of the automotive tyre industry. There are three types of tyre cords *i.e.* Cotton, Rayon, Nylon Cord. The use of cotton tyre cord is very negligible. As regard rayon tyre cord, it is manufactured by three units :

		Licenced Capacity
1.	National Rayon Corporation	7,000 tonnes
2.	Century Rayon	6,800 ,,
3.	Shriram Rayon	5,000 ,,

Nylon tyre cord is being manufactured by five units :

		Licenced Capacity
1.	J. K. Synthetics Ltd., Kota (Raj.)	1,600 tonnes
2.	Nirlon Synthetics Fibres & Chemicals Ltd., Bombay	2,190 ,,
3.	Baroda Rayon Corporation Ltd.	2,000 ,,

4. Shriram Fibres Ltd. 2,000 tonnes
5. National Rayon Corporation Ltd. 2,200 ,,

The manufacturers of both rayon and nylon tyre cord have to face difficulties on account of rayon grade wood pulp and caprolactum respectively.

Rubber Chemicals

There are three firms manufacturing accelerators and antioxidants in the country. The installed capacities of the three existing units and one more unit to which letter of intent has been issued are given hereunder :

Name of the Company	*Installed Capacity (Tonnes)*	*Letter of Intent*	
1. Alkali and Chemical Corporation of India Ltd., Calcutta	6000 (+2500)	—	Figures in brackets are for intermediates
2. Bayer (India) Ltd., Bombay	6765 (+2460)	—	
3. Mindia Chemicals Ltd., Bombay	3300 (+3400)	—	
4. Amar Dye-Chem Ltd., Bombay	—	3800 (+4400)	

There are a few more units in small scale sector manufacturing rubber chemicals, whose production is insignificant as compared to these units. The quality of rubber chemicals made in India is of international standard but prices fluctuates from time to time due to increasing prices of raw materials needed by them.

Other Raw Materials and Components

There are several other raw materials used in manufacture of rubber products like sulphur, textiles, titanium dioxide, zinc oxide, stearic acid, colours, various fillers, cycle tube valves, beadwire.

Out of these only sulphur is imported. The use of sulphur is a must in the rubber industry for vulcanisation. Regarding other raw materials, they are available to the industry in adequate quantities.

Rubber Plant & Machinery

There are about 35 units manufacturing one or the other type of machinery required by the rubber industry. However about 8 units manufacture a wider range of rubber machinery.

Presently the main machines manufactured in India are :

Mixing Mill upto 24″×60″

Extruders (upto a certain size)

Hydraulic Presses (upto a certain size)

Hand Presses

Calender Machines

Moulds

Miscellaneous Machine Tools

Some testing equipments like tensile testing machine, hardness tester etc. are manufactured in India. There is a scope for further improvement in quality of the machinery manufactured in India. There is a good scope for machinery not manufactured in India like Banbury mixers, Mixing mills and hydraulic presses of bigger sizes and sophisticated testing equipments. Recently some new units for manufacture of rubber machinery have been set up with foreign collaboration.