

SURGICAL ABSORBENT COTTON

1. Introduction

The project proposes to produce Surgical Absorbent Cotton with capacity of 300 TPA. Absorbent cotton also known as surgical cotton or cotton wool is mainly used for medical purposes in hospitals, nursing homes, Dispensaries etc., because of high fluid absorbency power, it is better known as absorbent cotton.

The project recommends producing Surgical Absorbent Cotton of different varieties. Further it also recommends producing as per regulations under Drug Control Authorities of respective state government in India.

2. Product and its application

Absorbent cotton is cleaned, de-oiled and bleached cotton packed in different sizes. Since absorbent cotton is a material which comes in direct contact with the human body, its quality is very important and should satisfy the required pharmaceutical parameters.



Either virgin cotton or waste cotton can be used as raw material. Combed waste cotton is desirable in case of waste cotton. The fiber of absorbent cotton is very elastic. It consists of (98-99.5%) cellulose which has a diameter of 16.30 mm, and a length of 12-40 mm. Absorbent cotton is mainly used for sanitary purposes and surgical operations as well as for ordinary daily use.

The absorbent cotton should be chemically inert and soft to give maximum protection and should not cause irritation. These properties can be achieved by manufacturing the product as per standard method of manufacture. The raw cotton is processed by series of steps which render the Cotton hydro-phallic in character and free from external Impurities needed to be fit for use in surgical dressings and Personal hygiene.

Absorbent cotton is also used for making Conventional type of sanitary napkins or pads besides medical Purposes. And fairly good quality of cotton wool is consumed in Beauty parlors for removing make up and dirt etc. Absorbent Cotton also known as surgical cotton or cotton wool is mainly used for medical purposes in hospitals, nursing homes, Dispensaries etc., because of high fluid absorbency power, it is better known as absorbent cotton. The absorbent cotton should be chemically inert and soft to give maximum protection and should not cause irritation. These properties can be achieved by manufacturing the product as per standard method of manufacture.

3. Desired Qualification for promoter

The promoter should ideally be having formal qualifications in the field of Pharmacy (Bachelor or Diploma). Further he / she should have experience of working in a unit manufacturing such products

4. Market potential and marketing issues, if any

It is estimated that demand for surgical and absorbent cotton is growing at the rate of 10 percent per annum across the world. The demand for absorbent cotton in India is estimated to be about 2 million bales (of 170 kg each) per year.

Besides the Indian market, there is enormous export potential for surgical cotton in countries such as the US, EU and Japan. Within the next 5 years, 3 – 3.5 million bales will be required to fulfill the domestic demand and more would be needed for the export market.

Although, the area under surgical cotton cultivation in India was 97 percent in 1947, it fell to 42 percent in 1990, 28 percent in 2000 and about 1 percent in 2012, and it is now estimated to be much less than 1 percent. The absorbent cotton varieties are now

confined to marginal lands, saline tracts, and drought prone areas. The price of surgical cotton is high because of the shortage of short staple absorbent cotton.

Until 2005, India had at least 2 million hectares of land under absorbent cotton cultivation which used to cater to the needs of the surgical cotton sector. The market price for absorbent cotton was low because of abundant availability of short staple surgical cotton.

Market exploitation is the biggest challenge faced by the surgical cotton growers in India, today. Another factor affecting the surgical cotton growers is the lack of proper ginning machinery suitable for short staple cotton, especially the *Gossypium arboreum* race from cernuum.

That is why, the small scale industries that manufacture absorbent cotton find it difficult to source short staple cotton. For example, the industries in Maharashtra and Madhya Pradesh are sourcing short staple cotton at high price from Rajasthan or the Northeastern part of India. So there is an imminent need to create an interface and a common platform between Indian cotton farmers as well as absorbent cotton industry.

The demand for absorbent cotton is also met through import.

The demand of Surgical Absorbent Cotton is directly related with the increase in population and expansion of public health services. The demand for Surgical

Absorbent Cotton increases with the increase in population and number of hospitals, dispensaries, nursing homes, health care centers etc. Progressive increase in health amenities offered by Government and coming up of new hospitals and health care centers in private sector even at small towns are contributing to the growth of absorbent cotton industry. Government hospitals and large nursing homes are the largest consumer for cotton wool.

With the development of medical facilities and growing awareness towards personal hygiene, the surgical absorbent cotton industry registered steady growth rate in past and is picking up pace with the spread of education and upward economic growth of towns and villages.

Due to the reasons mentioned above the end use approach have been utilized to estimate the demand for the product. Accordingly, data obtained on the number of

health facilities and their corresponding requirement has been utilized. Based on a study made by IPS, the average requirement of absorbent cotton by different types of health facilities is as follows:

- Hospitals @ 27 kg per month
- Clinics @ 3 kg per month and
- Health centers, @ 1 kg per month

With increasing awareness on use of hygienic healthcare materials the demand for sterilized surgical absorbent cotton is increasing. This supports overall demand prospects of Surgical Absorbent Cotton.

The demand for surgical cotton is rapidly increasing in India as more people are getting access to basic health care and the number of people who can afford more complex medical facilities, like surgeries, transplants, etc. has increased in the country.

Within the next 5 years, 3-3.5 million bales will be required to fulfill the domestic demand and more would be needed for the export market.

Besides the Indian market, there is enormous export potential for surgical cotton in countries such as the US, EU and Japan,

There is also a rise in demand for Indian surgical cotton in Middle East and African region.

Witnessing the rapid rise in demand for surgical cotton **The Central Institute for Cotton Research (CICR)** has recently implemented a project of high-density cotton cultivation to increase cotton yield in shallow soils where BT cotton is not cultivated.

5. Raw material requirements

Surgical cotton is made from a special cotton variety called as Bengal Desi Cotton grown extensively only in India (18 districts near Ganganagar in Rajasthan) and adjoining areas in Pakistan. Almost all major surgical cotton manufacturers in world look forward to procuring this cotton as it has almost all the characteristics required for good quality surgical cotton like liquid absorbency, fiber quality (strictly 18 inches), minimum wax and micronaire value of 5.

The Central Institute for Cotton Research (CICR) here is now working towards partnering with farmers and absorbent cotton manufacturers for promoting organic desi cotton as raw material.

The CICR has already started producing desi cotton seeds to be distributed to a select group of farmers — who are going to have assured buyers offering good price.

"We have discussed it with many manufacturers. They are ready to pay up to Rs 4,000 per quintal. For now, we will emphasize on the idea in Vidarbha and parts of Madhya Pradesh where farmers around villages near surgical cotton units will be encouraged to produce organic desi varieties with an assured high price," said CICR director Keshav Kranthi.

One such unit has come up recently near Nagpur. Prakash Rathi, owner of Rathi Chemicals, is partnering in the venture with CICR. The Central Institute for Research in Cotton Technology (CIRCOT), Mumbai, will be another stakeholder in the process of converting raw cotton into finished product.

"As of now, the companies in India are using Bengal Cotton, a desi variety being produced mainly in north-east and Rajasthan, to manufacture surgical cotton. But it requires chemical treatment. What we are looking at is having organic desi varieties that will eliminate the need for chemical treatment. We have certain microbes that can be used," Kranthi said.

Another advantage with desi cotton is its low input cost. "It requires fewer inputs since it has traditionally come to withstand hard Indian conditions," Kranthi said. He says because organic cotton is devoid of chemicals, it is ideally the most-suited cotton for manufacturing absorbent cotton. "And anything organic has a great demand in Europe, so the produce will also have a great export potential," he adds.

During the next planting season, CICR is planning to have 500 hectares of dedicated desi organic area in Vidarbha.

Ideally, surgical cotton requires coarse textured lint with a fibre length of approximately 18 mm so that these can easily be arranged into layers for surgical use. Micronaire is an index of fineness or coarseness of the fibre and the preferred micronaire value for surgical use is 6.5 to 8.0.

"CICR has a rich repository of desi cotton that will be utilized for popularizing this type of cotton. Several varieties like Lohit, LD-133, RG-8, LD-327, DS-21, LD-491, and HD-11 have been released by the public sector in the past with fibre quality parameters suitable for surgical cotton,

6. Manufacturing process

The manufacturing process basically involves opening and cleaning of pressed cotton bales, boiling it at 90 degrees Celsius with water and chemicals to give it white color (raw Bengal desi cotton is almost brownish), removing water completely, drying it, lapping, carding, rolling, cutting and packaging. An improvised the cleaning process to remove sulphated ash, biggest contaminant in cotton and the vacuum process for draining water before drying the cotton.

The process is described in detail as follows

a) Opening and cleaning of Raw Cotton:

Raw cotton received in bale or otherwise is opened in opener where it is loosened and simultaneously dust / foreign particles are also removed. Loosened cotton is then put into a keir where chemicals such as caustic soda, soda ash, detergent, etc. are added along with adequate water and steam boiled for about 3- 4 hours. By this process most of the natural waxes and oils are removed while remaining foreign matter get soften and disintegrated. The treated cotton is transferred to washing tanks where it is washed thoroughly.

b) Bleaching:

Washed cotton is bleached to remove brownish color developed due to chemical treatment. Bleaching is done by using bleaching agent such as sodium hypochlorite or hydrogen peroxide. The bleaching process improves whiteness, wetting properties and assists in disintegration of any remaining foreign materials.

c) Removal of Chemicals:

The bleached cotton is thoroughly washed again to remove the chemicals. A little quantity of dilute hydrochloric acid or sulphuric acid is also added to neutralize excess alkali. If required, it's again washed with water. The water of cotton is removed with the help of hydro-extractor. It is then sent to a wet-cotton opening machine.

d) Drying:

The cotton so obtained is dried by passing through dryer or alternatively subjected to sun drying where provision for dryer is not there.

e) Lapping:

The dried cotton is sent to blower room where it is thoroughly opened and made into laps.

f) Carding:

The laps are then fed into carding machine wherein cotton is warped around rollers in thin layers.

g) Rolling:

Cotton so obtained is compressed and rolled into suitable role size along with packaging paper.

h) Weighing and cutting:

The rolls are then weighed and cut according to required weight and sizes and labeled properly before packing in polythene sheets and heat sealed.

i) Quality Control & Specification:

This item is covered under Drug Control Act. Hence, it should be manufactured to meet its requirements.

7. Manpower requirements

Sr. No.	Designation	Number	Approx. Salary (Rs. Per month)
1	Manager	1	15000
2	Chemist	1	12000
3	Supervisor	1	10000
4	Blow Room Operator	1	7000
5	Boiler Attendant	1	7000
6	Storekeeper	1	7000
7	Clerk – cum – Accountant	1	7000
8	Skilled Worker	20	80000 (total)
9	Unskilled Worker	35	100000(total)
10	Packers	5	15000(total)
11	Peon – cum – Watchman	2	8000(total)
	Sub total		2, 45, 000
	Perks @ 15 %		37000
	Total		Say,2, 81,000/-

8. Implementation Schedule

Sr. No	Activity	Time
1	Preparation of Project Report	Six weeks
2	E M Registration & approval from Drug Control Authority	One month
3	Financial/Loan from Banker or Financial Institutions	Two months
4	Power connection/Building construction Six months	One month
5	Machinery procurement & Trial run.	Two months
6	Recruitment of Staff & Labour	One month
7	Actual commercial production	One month

9. Cost of project

The total cost of project is estimated as below:

Sr. No	Component	Particulars	Cost (Rs. Lacs)
1	Land	550 @ Rs. 700/-	3.80
2	Building	400 Sq. mtrs @ Rs. 3000/	12.00
3	Plant & Machinery	As per details	45.00
4	Other Assets	-	1.00
5	P & P Expenses	-	0.50
6	Contingencies	-	5.70
7	WC Margin (1 month basis)	-	4.00
		Total	72.00 lacs

10. Means of Finance

- Term Loan : Rs.50.00 lacs
- Promoter own contribution :Rs. 22.00 lacs

11. Working capital calculation

Particulars	Duration	Estimated cost (Rs. Lacs)
Raw materials/ Packing materials	1 month	4.00
Working expenses	1 month	2.00
Finished goods	15 days	3.00
Receivable	15 days	3.00
	Total	12.00

12. List of machinery required

Sr. no.	Machine	Number	Approx. Cost (Rs. Lacs)
1	High pressure Keir (MS) inside coated with acid resistant epoxy coating, fitted with pump, steam pipe, capacity 2000 kgs. Charge of cotton with all accessories.	1	2.00
2	Carding machine (Revolving flat high production) 1016 mm width with dust extruder, electronic stop motion, brush rolls, stripping brush rolls and other accessories.	2	10.00
3	Two compartment continuous cotton dryer with steam heating arrangements at 100 psi provided with trolley, electrical heaters and electric control panel	2	8.00
4	Porcupine cleaners 1200 mm working with 406 mm diporcupine type cylinder with strikers having two striking edges, centrally adjustable grid bars and reduction gear, electric motor(5 HP) for materials transport with accessories	2	4.00
5	Centrifugal Hydro-extractor with S.S. Basket dia 1000 mm fitted with motor and other accessories	1	1.00
6	Wet cotton opener working width 1000 mm fitted with motors and accessories	1	0.60
7	Vertical opener with 7 steel discs and three separate centrally adjustable settings for beater and grid bars fitted with motor 5 HP complete with accessories	1	1.00
8	Single souter and lap machine 1065 mm working width with Kirschener beater, centrally adjustable grid bars, high pressure device for loading calendar rollers and lap racks, etc. for making lap holder for continuous operations with 10 HP motor starter	2	8.00
9	Rolling and winding machine 1320 mm on face, complete with motor starter and other accessories	2	0.70
10	Small band saw type machine with motor for rolls cutting	2	0.20
11	Coal/wood fired boiler 1000 kg/ hrs. Evaporation capacity,	1	2.50

	50 psi complete with feed pump and accessories		
12	Water overhead tank of 10,000 liters capacity and tube well fitted with accessories	-	1.00
13	Water treatment plant for treating process water required for boiler and keir		1.00
14	Water and pipe connection with insulation, various M.S. tanks and concrete tanks for washing purpose etc.		0.50
15	QC and Testing equipments such as pH meter, Soxhlet-extractor, chemical balance, crucibles, furnace, oven, etc.		1.50
16	Pollution Control and Energy Conservation equipments		2.00
17	Electrification, etc.		
	Total		45.00

13. Profitability calculations

- Installed Capacity : 300 TPA
- Total Sales turnover @ Rs.80000/- : 240. 00 lacs
- Cost of production & other expenses: 210.00 lacs
- Profit : Rs. 30.00 lacs

Profitability Projections

Particulars	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Capacity utilisation (%)	60	75	80	80	80
Sales	144.00	180.00	192.00	192.00	192.00
Expenses	126.00	157.50	168.00	168.00	168.00
Gross profit	18.00	23.00	24.00	24.00	24.00
Profit to Sales (%)	12.20	13.00	15.00	15.00	15.00

14. Breakeven analysis

Fixed Cost X 100 Rs. 35, 00,000/- X 100

BEP = 54.00 %

Fixed Cost + Profit Rs. 35, 00,000 /-+ Rs. 3000000/-