

THE MANUFACTURE OF GLOVES FROM RUBBER LATEX

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Abstract

Gloves will provide a barrier of protection from infections organism which is an essential feature of medical practice, natural rubber latex has consistently been the most satisfactory raw material for the manufacture of gloves. Certain latex proteins will lead to some allergic reactions to patients and medical co-worker. As a result the risk departs as the route of exposure and dosage level.

This method of manufacturing gloves includes the coating of gloves which helps the sensitive people to be exposed to latex allergens. This project, explains about the several process, inverted for the synthesis of gloves for the betterment of the people.

Introduction:-

The basic raw material used for manufacturing gloves is latex concentrate, which is the product of “*Hevea brasiliensis*”: Also known as “Para rubber tree” Rubber was slow to catch on globally because it could be temperamental to work with : in cold weather, it become brittle and in hot weather, it was sticky. Due to this drawback later on they discovered the process of vulcanization where the sulfur and lead fortified rubber are heated at a low temperature to render it stronger, melt-resistant and reliable. This process come into existence in the year 1844 and essentially gave birth to “Modern Rubber Industry⁽³⁾”. Today most of the world’s natural Rubber comes from plantations in India, Indonesia, Thailand, Malaysia and Vietnam, Srilanka.

THE MANUFACTURE OF GLOVES

The gloves are manufactured by either a

- Batch dipping process, or a
- Continuous dipping process

Batch dipping process

Batch dipping process is presently being used only for the manufacture of irregular shaped articles or where the output required is small. Industrial gloves are generally made using a batch process and household gloves are made on a combination of batch and continuous process.



A BATCH DIP PROCESS-

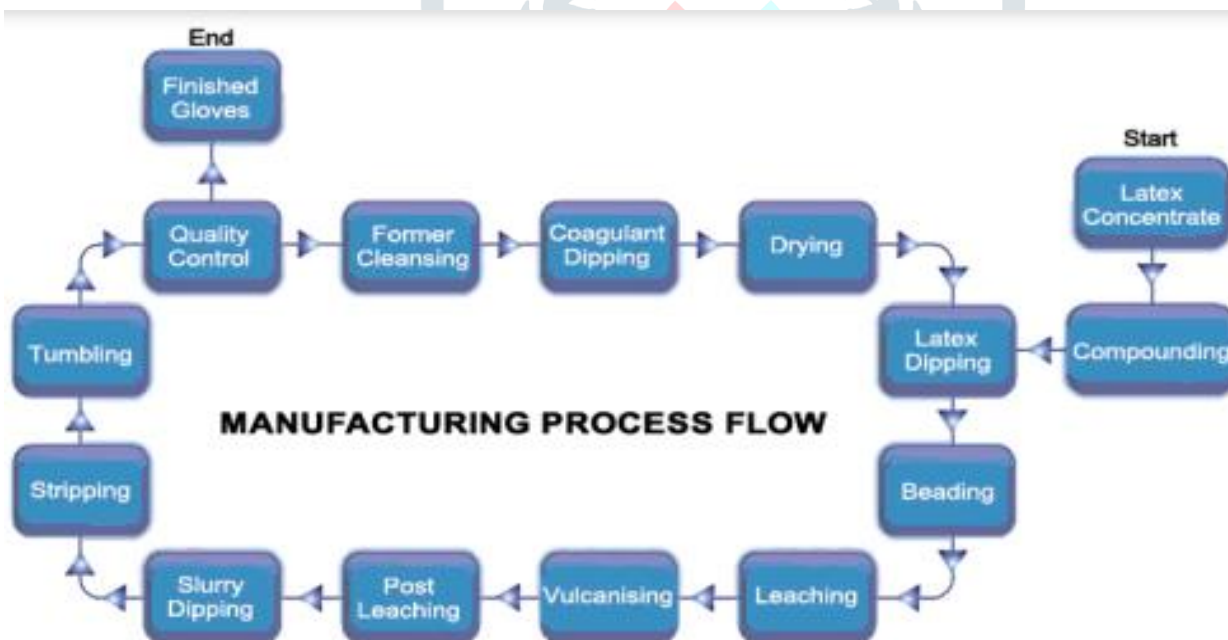
Continuous dipping process

Surgical and examination gloves are presently made on high-speed continuous dipping lines with very high output.



- A CONTINUOUS DIP PROCESS -

The Manufacturing Process



The production process and the steps involved are similar in both Batch and Continuous processes.

Latex concentrate

The latex from the tree is collected and then concentrated to 60 % DRC in latex centrifuging plants. The concentrated latex is the basic raw material for the dipping process.

Compounding

Compounding involves the addition of rubber chemicals like curing agents, rubber accelerators, antioxidants, stabilizers, pigments, and others to the concentrated latex. The added chemicals are mainly solids and hence have to be ground before adding to the latex. The chemicals are ground to dispersion in ball mills, pearl mills or attritors. The compounded latex is matured to get the required maturation before feeding on to the dipping line.

Coagulant dipping

The formers are cleaned, dried and then dipped in a coagulant bath containing suitable quantities of calcium nitrate, calcium carbonate and a suitable wetting agent.

Latex dipping

The compounded latex is fed to the latex tank, which is maintained at a temperature lower than ambient. The coagulant coated dry formers are then dipped into the latex bath. The angle of dip of the formers into the bath is critical.

Beading

The latex film is gelled in a gelling oven and then passed through edge rollers, which curl the latex film at the cuff forming a rolled bead. The beading is given to facilitate gripping of the gloves during donning.

Leaching

Leaching is the process by which the latex film is dipped in a bath of hot water maintained at a temperature of around 80 deg C. This process removes the excess chemicals in the latex film. This process is before curing and hence is also called as pre-cure leaching.

Vulcanization

Vulcanization or curing is the process by which the latex film gets dried and chemically cross linked to form the glove. The curing takes place in a long continuous tunnel oven maintained at around 130 deg c.

Post leaching

The glove film after curing is leached again in hot water to remove the water soluble protein and chemicals. This is an important step in the manufacture, which keeps the residual protein level of gloves at the minimum.

Slurry Dip

The formers with the gloves are then dipped in wet slurry containing modified cornstarch. The cornstarch is dried in an oven and it forms the donning powder on the gloves. The starch powder is bio-absorbable and hence soft on skin.

Stripping

The gloves are then stripped off the formers and put in crates or bins. The gloves are segregated size wise and put in the respective crates or bins.

Tumbling

The gloves are dried in a tumble drier where the excess moisture and powder is removed. The gloves are then made into lots. The lots are then transferred for further processing.

Quality control

The gloves, size wise, in lots, are either 100% inspected or audited randomly and released for further processing.

Glove packing

Gloves are either packed bulk or in sterile pouches. Bulk packing involves stuffing the gloves into packs of 100, in dispenser boxes. Sterile packing involves wrapping the gloves, left and right, into primary packing called wallets and then into a pouch made of either paper or plastic. The pouches are then packed into inner cartons or shelf boxes of generally 50 pairs. The shelf boxes are then packed in shipper cartons.

Glove sterilization

Gloves are sterilized either by Ethylene oxide or Gamma irradiation. Ethylene oxide (ETO) sterilization involves subjecting the gloves to Ethylene oxide under controlled conditions. ETO kills the microorganisms and makes the gloves sterile. Gamma irradiation involves subjecting the gloves to Gamma rays. Gamma rays kill the microorganisms but do not affect the rubber glove.

Finished gloves



Types of Gloves

Medical Gloves

Industrial Gloves



Household Gloves
Speciality Gloves



Properties of Gloves:-

1. Good finger flexibility
2. Protection from chemicals
3. Good grip
4. Protection from handling objects
5. High level of Mechanical properties

Uses :

1. Rubber, plastic gloves can be used for cleaning (or) working with oils.
2. Gloves has been used as a solvent.
3. Leather gloves has been used when welding as the leather can resist sparks and moderate heat.

Safety standards

The safety standards are compared to that of European standards.

EN 388	:	Protective against mechanical risk.	
EN 374	:	Protective against chemical and microorganism	
EN 420	:	General requirement for gloves includes sizing and a	number of
		health and safety aspects including latex	
		protein and chromium level.	
EN 60903	:	Electric shock	
En 407	:	Heat resistance	
EN 511	:	Cold resistance	
EN 1149	:	Antistatic	
EN 10819	:	Antivibratim gloves	

Conclusion :

Rubber has been used for centuries as the favoured material for the manufacturing of many products. Manufacturing methods have evolved considerably towards achieving a greater efficiency, and overall volume of rubber. Hevea brasiliensis is still and harvested in many plantations centres. Although petroleum is now favoured as the source of rubber manufacture, it is a non-renewable resource which will eventually become depleted. Hevea brasiliensis may therefore become more important in future.

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