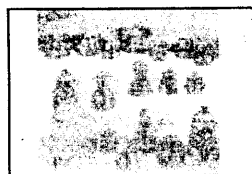
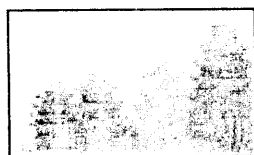


## Manufacture of Rubber Automotive Boots

Rubber Boots are used at special joints of Automobiles as a cover to protect them from contamination with dirt and other foreign particles. There are many types of Rubber Boots that are available in the market today. The main function of these boots is to protect oil and grease at the joints from contamination of dust. Axle boots, gear boots, steering boots and lever boots are available now a days for all makes of automobiles.

**Malani Dharmathilake**  
**Deputy Director**  
**Technical Services Division**  
**and**  
**Mangalika Mendis**  
**Assistant Technologist**  
**Rubber Products Development and**  
**Services Centre**



manufacture of steering boots, gear boots and axle boots. China clay which is a natural resource is found at very low cost in the market. Whiting, carbon black and other chemicals used as compounding ingredients are also readily available in the market.

### List of Raw Materials

Natural Rubber (RSS), Nitril Rubber, HAF black, Process oil, Di Iso octil phthalate, steavicacid, zinc oxide, accelerators MBTS and TMTD, Sulphor, whiling, paraffin wax, wood rosin, permanex TC, petroleum jelly and china clay.

Rubber Automotive Boots

### Raw Materials

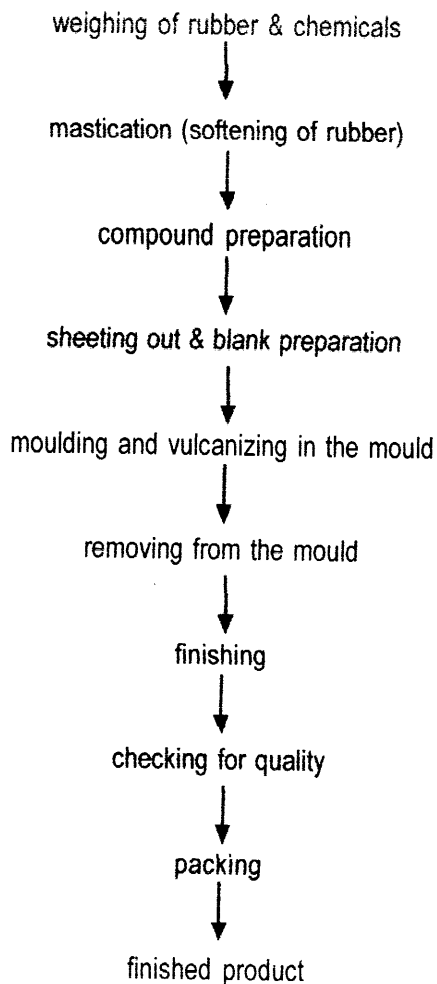
Natural rubber is used as the main raw material for the manufacture of lever boots while Nitric rubber which has the property of resistance to oils, is used to manufacture steering boots, gear boots an axle boots. As for the mix formulation for rubber compound is concerned there are only four bulky ingredients involved. They are rubber ( Natural or Nitril), carbon black, whiting and china clay.

Nitril rubber which is a Co polymer of acrylonitrile and Butadiene is available in various grades according to the percentage of acrylonitrile content present in the polymer. But as a compromise. Selection of Nitril rubber (medium) is recommended as suitable for the

### Machinery & Equipment

- Two Roll Mixing Mill 24"x10"
- Electrically heated Hydraulic press
- 14" x 14" with two day lights
- Air compressor & other accessories
- Buffing Machine
- Weighing Scale
- Moulds
- Compressed air line
- Pair of scissors
- Spares & other consumables

### Process Flow Chart



### Production Process

This Process consists of three main steps namely

1. Mastication (softening) and compounding of rubber
2. Blank preparation and moulding.
3. Vulcanization.

Initially a mix formulation should be designed by a qualified Rubber Technologist so as to meet the required end Properties of the product. Here the services of the Rubber Products Development & Services Centre of the IDB is readily available for prospective industrialists.

Then comes the stage where raw rubber is masticated to soften and thereafter mixing of the chemical

ingredients (called compounding) which is carried out by the two Roll Mills.

After mixing the compound is sheeted out and cut into required shape. The weight of the compound mix should be little more than the weight of the product to be manufactured because some of the compound will flow out of the moulds while moulding. This is called as blank preparation for the moulds. The moulds are made out of mild steel and they are generally in three parts.

The moulds are initially heated in a hydraulic press which is adjusted to reach a temperature of 150°C. After removing them from the press mould releasing agent is applied over the cavities of the moulds. Then the cut pieces of rubber compound are inserted in to the cavities of the moulds and they are brought under pressure between the heated hydraulic press. The cure time is about 15 minutes which may vary slightly depending on the type of the vulcanization system that is used. The cured product is removed from the moulds by means of compressed air. A pair of gloves must be worn when removing the product from the mould as it will be very hot. Final finishing is carried out by trimming any flash material.

To be competitive with the imported products it is important to adopt regular process control and quality control measures with the ultimate goal of falling in line with the ISO 9000 standards.

### Land and Building

A land of about 40 perches with a building of about 1500 sq. feet in floor is area sufficient for this subject.

### Utilities

Since the production process is carried out using heavy machinery, three phase power supply is essential. Well water can be used for this industry.

### Employment

A unit of this nature can provide job opportunities to about 07 persons viz. manager/supervisor, a clerk, 02 skilled workers and 01 semi skilled worker and 02 unskilled workers.

### Investment

The total investment on this project is Rs. 3.8 million.

The capital investment could be cut down by a substantial amount by obtaining rubber compounds from the Rubber Products Development & Services Centre of the Industrial Development Board.