

Manufacture of Rubber to Metal Bonded Products

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Rubber to metal bonded products were introduced to the mechanical world to minimize the damaging effects of vibration and to protect against shock. The motor vehicle industry is the biggest user of these products. Typical applications such as engine mounts are found in almost every vehicle. Type, shape, size etc. varies with different size of vehicles. They consist of vulcanized rubber sandwiched between two metal plates by which they are mounted on to a bracket or chassis of the vehicle. The purpose of fixing these mounts between an engine and the chassis of the vehicle is to inhibit the vibration emitted by the engine from transmitting same to the body by damping. This minimizes the damage to the body. Rubber and Metal plates being the main components, it is clear that there should be a perfect bond if the product is to function as a composite unit.

Raw Materials

Natural rubber is the basic raw material used in making the rubber compound. As for the mix formulation for rubber compound is concerned there are only three bulky ingredients involved. They are rubber, carbon black and china clay. Rubber is available in various grades according to their qualities. But as a compromise, selection of RSS III is recommended as suitable for this type of product. China clay which is a natural resource is found in abundance at very low cost. Carbon black and other chemicals used as compounding ingredients are readily available in the market.

However, the Small Industrialists who cannot afford to invest a large capital to buy a mixing mill to make rubber compounds can buy the ready made compounds from Rubber Products Development & Services Centre

of Industrial Development Board or other available sources of compound supply in the country.

Raw Materials

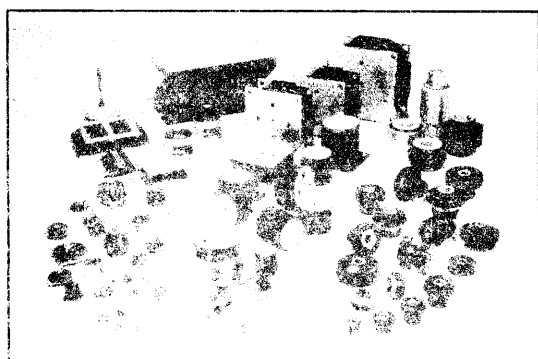
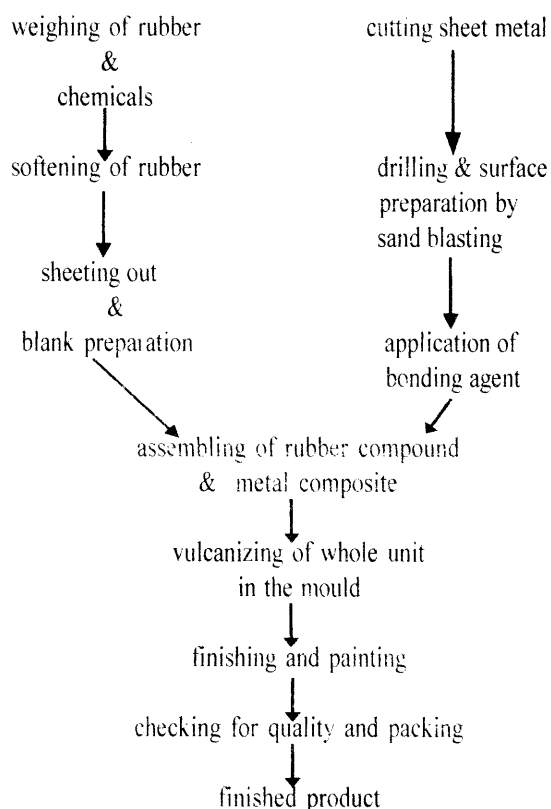
R.S.S. Zinc Oxide, Stearic Acid, HAF Black, China Clay, Process Oil, Permanex T.Q., MBTS, TMTD, Sulphur, Wood Rosin, Parafin Wax, Mild Steel Sheet, Chemlock.

Typical Rubber Compound Formula	Parts by Weight
Ribbed Smoke Sheets	100
Zinc Oxide	5
Stearic Acid	1
HAF Black	15
China Clay	30
Process Oil	2
Antioxidant Permanex TQ	1
MBTS	1
TMTD	0.25
Sulphur	2.5
Wood Rosin	3.0
Parafin Wax	1.5

Machinery & Equipment

10"x24" Two Roll Mixing Mill	01 No.
Sand Blasting Machine (High pressure)	01 No.
"18 x 18" - 2 day light Hydraulic press	01 No.
Sheet Metal Cutter	01 No.
Electric Welding Set	01 No.
Spray Gun	01 No.
Electric Drilling Machine	01 No.
Grinding Wheel	01 No.
Weighing Scale	01 No.
Air Compressor	01 No.
Moulds	9 Nos.

Process Flow Chart



Rubber to Metal Bonded Products

Production Process and Technology

This process consists of three main steps.

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

Initially a mix formula for sheet is designed by a qualified rubber technologist. To meet the

required end properties of the product. Here the services of Rubber Products Development and Services Centre of 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 (compounding) which is carried out by the two roll mills. After mixing the compound is sheeted out and cut into a predetermined shape using a standard die.

This product is a composite unit when rubber and metal are bonded to serve as a single unit in service. Hence the metal part too has to be prepared prior to bonding. Here the sheet metal is cut into required sizes and then drilled wherever necessary. This is followed by cleaning the surface of metal by a process called sand blasting using a special machine. This cleaning is compulsory because the strength of rubber to metal bond depends on surface condition.

A protective primer layer of bonding agent is applied immediately afterwards, followed by a secondary coating of bonding agent to finish the surface preparation.

Next step is building of the composite by laying the rubber and metal pieces in the mould which is usually of two halves. Vulcanization is carried out by compression moulding by pressing out around 200 bars and at 150°C for 20 minutes using the hydraulic press. Final finishing is carried out by trimming any flash material followed by spraying the whole with a black paint to give a neat matt finish.

The latest trend in industry being manufacture of high quality products, it is important to adopt regular process control and quality control measures with the ultimate goal of being in line with the ISO 9000 standards so as to be at least competitive with the imported product. In this regard technological guide lines advice and assistance on overall quality management could be obtained from public service organizations such as Industrial Development Board & Sri Lanka Standards Institution.

Land and Building

A building having a clear height of 5.00 m to 6.00 m required for a proper installation of the