

1.1 ABOUT THE TECHNICAL SERVICE LABORATORY

The Technical Service Laboratory is well equipped with modern instruments who's mission is to modify rubber compound formulations in order to solve technical problems with the utilization of raw material from Ram Charan. It provides a guideline to familiarise Indian Technology with respect to raw materials and synthetic rubbers.

Technical Service Laboratory offers customer's service including Testing facilities for rubber compounds, finished products and development of formulations to meet specifications of quality or cost given by the them.

An Technical Laboratory can function effectively only with excellent technical staff. TSL is staffed with very good experienced people with a through knowledge of Rubber technology. TSL focuses on development of new formulations and provide technical services to rubber industries and customers to fulfill their current and future requirements satisfactorily.

This laboratory follows ASTM, ISO, DIN and BIS Standards.

So following are the available equipments in Technical Service Laboratory with the most sophisticated rubber processing and testing equipments so that the factory conditions can be simulated in the laboratory to study the problems faced by the customers.

This Technical Service Lab has two sections . One as Solid rubber section and other as Latex section.

Solid Rubber section consists of 3 compartments

- I. Rubber Physical Testing Lab
- II. Rubber Compounding and Mixing Lab
- III. Rubber Dynamic Testing Lab

1.4 So the **AVAILABLE EQUIPMENTS** are as follows

RUBBER COMPOUNDING AND MIXING LAB

A variable speed two friction ratio 200mm×450mm laboratory mixing mill with heating and cooling arrangement.

1. 2 litre variable speed internal mixer (Banbury)
2. 25mm variable speed extruder(garvey die extruder)
3. 400 × 400mm 150 tones hydraulic press
4. 450 × 450mm electrical heated press.
5. High pressure (6 bars) autoclave with automatic controls for jacket steam temperature, inside steam or air temperature.
6. Ozone Chamber
7. Hot Air oven
8. Multi cell ovens & Geared oven
9. Compression Set Apparatus(Method-A)

RUBBER PHYSICAL TESTING LAB

The testing section of the laboratory is also equipped with the following special apparatus:

Latest system to follow the processing and curing characteristics:

- a) Mooney Viscometers(Monsanto)
- b) Oscillating Disc Rheometer(Toyoseiki)
- c) Tensometer(Tensile Tester)
- d) IRHD Hardness & Shore A Hardness tester
- e) DIN Abrader (for index and for loss)
- f) Densimeter
- g) Shoeb Rebound Tester
- h) Digital Thickness Gauge
- i) Air Permeability Tester
- j) Oxygen Bomb tester
- k) Die punching Hand Press
- l) Compression Set Apparatus(Method-B)
- m) Drilling M/C for punching buttons for Abrasion testing
- n) Electro Mechanical Balance (Dona)
- o) Thickness Gauge (upto 0.01gm accuracy)

RUBBER DYNAMIC TESTING LAB

- a) Goodrich Compression Flexometer
- b) 2 Monsanto Fatigue to failure tester
- c) Ross flex tester
- d) De-mattia flex tester

To study compound composition

- 1) TGA – Thermo-gravimetric Analysis
- 2) DSC – Differential Scanning Calorimetry

LATEX APPLICATION LABORATORY

- a) pH meter
- b) 2 Brookfield Viscometers(Digital & Manual)
- c) Dyno mill
- d) Ball mill
- e) 2 Fritsch mills(Double pot & single pot)
- f) Particle size Analyzer
- g) 3 Magnetic stirrers
- h) Foam Beater
- i) Latex maturation apparatus with(controlled temperature)water circulation.
- j) Infrared Lamp
- k) 3 Hot Air Ovens
- l) Centrifugal Ball Mill
- m) Small Water Bath
- n) 1 Mettler Balance (upto 0.0001gm accuracy)
- o) 3 Mettler Balance (upto 0.01gm accuracy)

| Sr No. | Instruments | Use |
|--------|------------------------------|---|
| 1 | Oscillating Disc Rheometer | Cure Characteristics |
| 2 | Mooney Viscometer | Viscosity of rubber |
| 3 | Tensile Tester | Tensile strength of rubber |
| 4 | DIN Abrader | Abrasion resistance |
| 5 | Compression Flexometer | Heat build up |
| 6 | Multicell Oven & Geared oven | Hot air ageing |
| 7 | Ozone Chamber | Ozone resistance |
| 8 | Oxygen Bomb Tester | Ageing in O ₂ /N ₂ Atmosphere |
| 9 | Gas Permeability Tester | Air permeability properties |
| 10 | Rebound Resilience Tester | Dynamic Property |

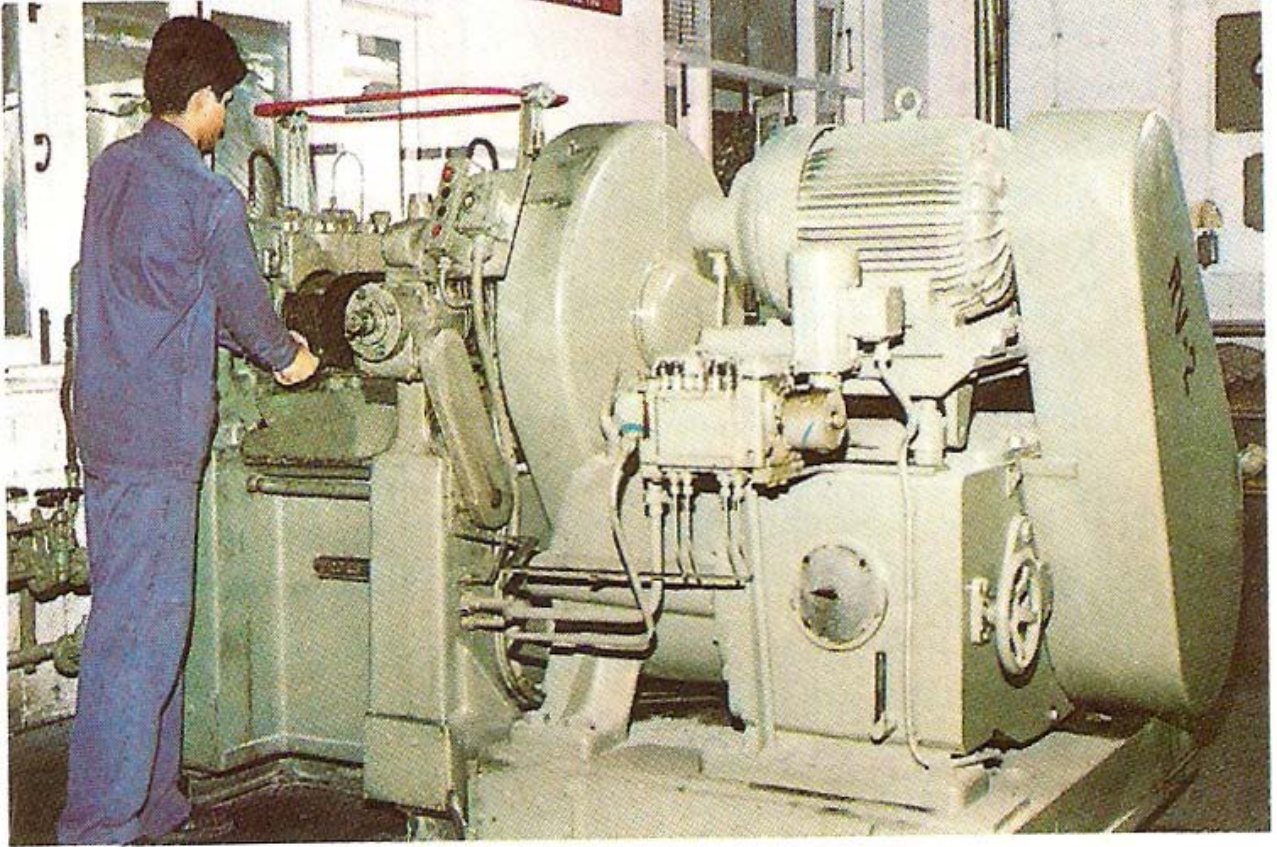
Rubber Processing Operations

➤ **MIXING MILL :**

It is the basic processing machine used in rubber industries for mixing rubber compounds. Final batches of vulcanizable rubber compounds are made on this machine. Even though there are many limitations along with mixing mill it is the basic machinery to be used. IIR rubber is very difficult to mix on mixing mill due to its mill bagging problem.

MIXING CYCLE:

- 0' Load Rubber
- 3' ZnO + Stearic Acid
- 5' 3/4th of Filler
- 7' Rest of Filler + Oil
- 18' Antioxidants
- 26' Sulphur
- 28' Accelerators
- 30' Sheet Out



➤ **BANBURY :**

It is an internal mixer used to mix the rubber compounds which are difficult to mix on mixing mill. Also when there is high filler loading of fine carbon black, internal mixer are preferred for achieving good dispersion of fillers. Only master batches are mixed in this internal mixer.

MIXING SEQUENCE IN INTERNAL MIXER FOR GENERAL PURPOSE RUBBER@ 90°C & 40 RPM.

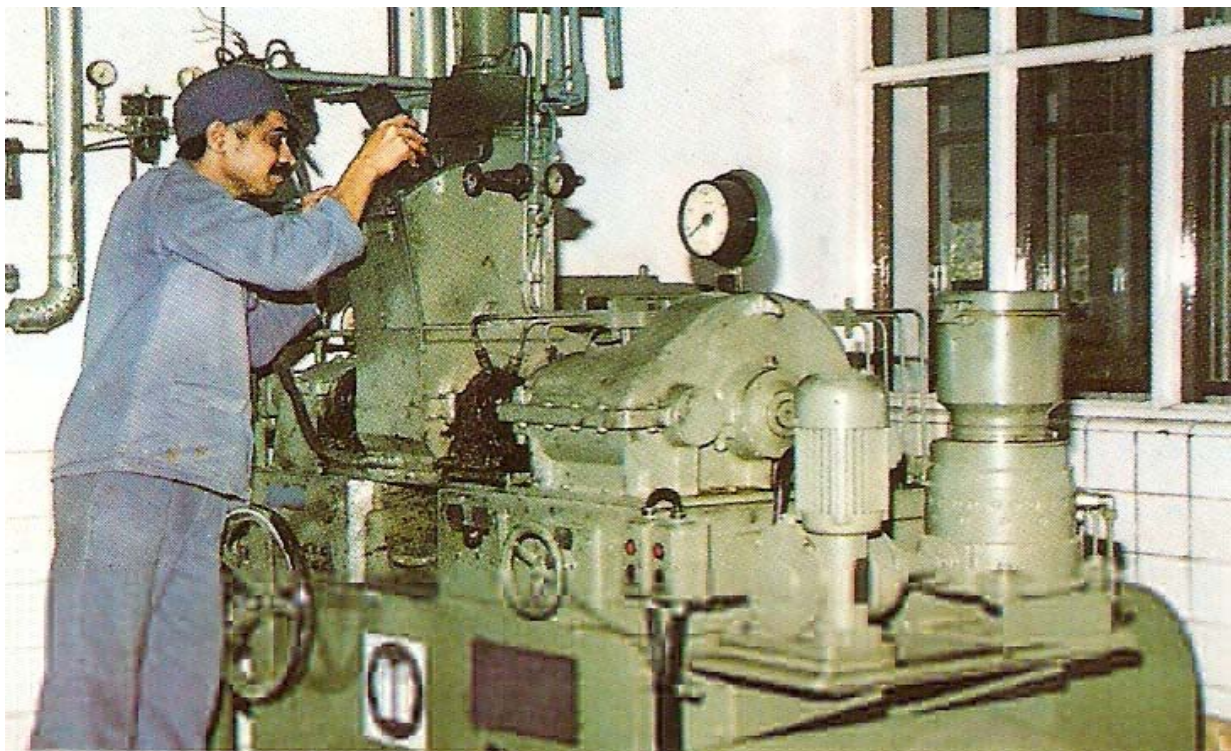
| | |
|------------------------------------|-----------|
| Premastication of Rubber (NR) | 0 MIN |
| Zinc Oxide | 1/2 MIN |
| 1/2 Carbon Black + Stearic Acid | 1 MIN |
| 1/2 Carbon Black + OIL + A/O2 +Wax | 3 MIN |
| SWEEP & CLEAN THE THROAT | 6 MIN |
| DUMP @ 150° C | 6 1/2 MIN |

Cooling down the batch and divide the final batch into equal batches and add curatives on OPEN MIXING MILL @ 60° C.

UPSIDE DOWN MIXING SEQUENCE IN INTERNAL MIXER FOR EPDM RUBBER@ 90°C & 40 RPM.

| | |
|---|-----------|
| Zinc Oxide+Stearic Acid+Carbon Black+Oil+A/O2 | 0 MIN |
| EPDM Rubber | 1/2 MIN |
| Plunger Up and Clean the throat | 3 1/2 MIN |
| Sweep down | 6 MIN |
| Dump down | 6 1/2 MIN |

Cooling down the batch and divide the final batch into equal batches and add curatives on OPEN MIXING MILL @ 60° C.



3.2 LATEX SECTION

1. TESTS PERFORMED ON LATEX

- Total Solid Content of latex
- Dry Rubber Content of latex
- Total Alkalinity Content of latex
- pH of Latex
- Mechanical Stability Test of latex
- Viscosity of Latex
- Wetting Test of powders

2. PREPARATION OF DISPERSIONS AND EMULSIONS

- ZnO Dispersion
- SKF Dispersion
- ZMBT Dispersion
- Sulphur Dispersion

3. PREPARATION OF LATEX COMPOUNDS

- Foam Compound
- Balloon Compound