



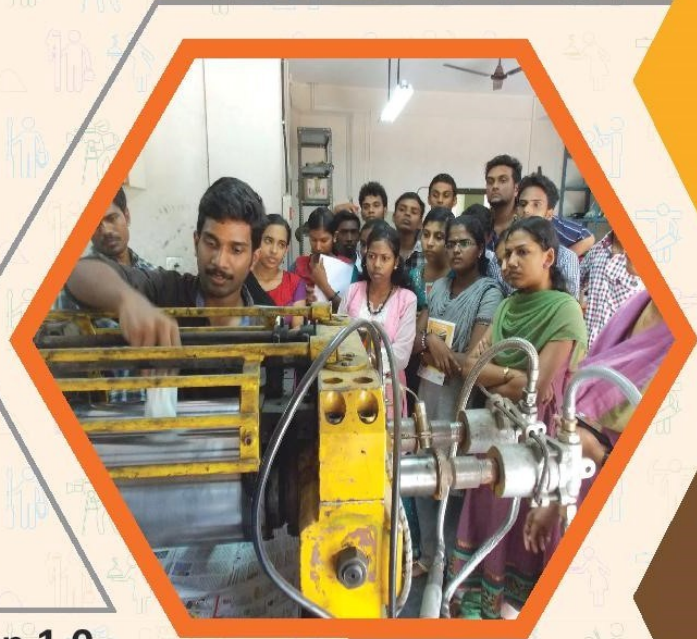
Participant Handbook

Sector
Rubber

Sub-Sector
1. Tyre, 2. Non-Tyre

Occupation
Mixing

Reference ID: **RSC/Q0101, Version 1.0**
NSQF Level 4



Mill Operator

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2. Prepare Mixing Mill and Accessories

Unit 2.1 - Mixing Mills

Unit 2.2 - Internal Mixers

Unit 2.3 - Safety Aspects



2.2.10 The Temperature Control Unit

The energy expended in mixing is manifested in the form of heat that the batch acquires during the mix cycle. Presence of abrasive materials such as carbon blacks and silica accelerate the process of temperature generation. The heat generated makes the stock to plasticise and excessive plasticisation is not advisable since it can affect the compound properties. It is not advisable to take the stock temperature beyond certain limits (Depending on the stock being mixed) for the risk of degradation, premature vulcanization etc. also. This temperature could be attained even before the mixing is complete, and dumping the batch at this stage could place the mix quality at question.

These issues are resolved through having water at a specified temperature to circulate through the provisions of the mixer. We have seen that such provisions are available, at the discharge door, drilled sides, floating weight etc. In the earlier internal mixers it used to be refrigerated water, later changed to process cooled water and of late, the medium is tempered water. Studies have shown that tempered water offers many advantages of productivity, power consumption, consistency etc.

The modern TCU are multi-cell units and are capable of supplying water at multiple specified temperatures, so that various parts of the machine can run with separate temperatures if required. While so much of variations of temperatures are not tried, keeping the drilled side around 10oC is proved to be useful in increasing the mixing efficiency.

2.2.11 Lubrication

The machine requires oil to run. Changing the oil on regular basis is the single most crucial thing you can do to prolong the life of your engine. When your car is at rest, the oil slops around in a container located at the bottom of the crankcase, the oil pan. When the car is running, oil is pumped by an Oil Pump through holes and channels in the engine where the oil helps cool and clean the engine and offers a nice slippery surface that keeps moving parts (like pistons) from grinding into one another. Oil has the following functions:

- Oil cools the engine
- Oil keeps the engine clean (it collects the abrasions from the engine, which is why it needs to be changed regularly)
- Oil cuts down on friction
- Oil retards corrosion
- Oil Pressure
- Dipstick
- Oil in Air intake
- Valve cover air tubing

2.2.12 Pre-Weighed Material

In the last 20 years, there has been a trend within the rubber industry to utilize pre-weighed blends of several of the powdered compounding ingredients in special dispersible poly baggage, prepared either in-house or from an outside supplier, in order to increase and improve productivity and quality whereas decreasing dust within the factory.

UNIT 2.3: Safety Aspects

Unit Objectives

At the end of the unit, you will be able to:

1. Recognise the different safety aspects at workplace
2. Work safely with different milling machines
3. Choose and put on the PPEs

2.3.1 Introduction

Safety aspects include:

- Main Mechanical hazards
- Feeding ingredients & collecting compound.
- The principal dangers & safeguards on a banbury type internal mixer.
- The rotor, via the feed opening (contact with rotors or falling in) on larger machines.

These risks can be guarded against by feed tables or conveyors placed ahead of the feed opening, with extra fixed side guards, where important. Safe reach distances require to meet the requirements of Table 4 of BS EN ISO 13857: Safety of machinery. Safety distances to stop hazard zones being reached by lower and upper limbs. The floating weight trap with the fixed bridge casting from either the feed opening or the rear inspection door.

- There needs to be sufficient clearance between the bridge and therefore the fixed bridge casting to prevent a finger trapping hazard. Prevent access by utilizing identical safeguards as for the rotors. The floating weight and therefore the lower edge of the front hopper door at the feed opening.
- The trap at the bottom of the weight is extremely hazardous. Mill Operators are in danger when sweeping down or when adding lubricant or other small ingredients. wherever access to the trap is feasible, interlock movement of the floating weight with the hopper door. The front hopper door and frame as the door closes and the stops because it opens beneath power
- wherever powered movement of the door creates a housings hazard, it's operation needs to be through a hold-to-run control, placed out of reach of the door or a two-hand control on the hopper itself.

2.3.2 Safety Precautions Grinding Machine Safety

Grinding machines are utilized daily during a machine shop. To avoid injuries one must follow the safety precautions mentioned below. Wear goggles for all grinding machine operations. Check grinding wheels for cracks before mounting. Never operate grinding wheels at speeds in more than the recommended speed. Never adjust the work-piece or work mounting devices once the machine is operating do not exceed suggested depth of cut for the grinding wheel or machine. Take away work piece from grinding wheel before turning machine off. Utilize appropriate wheel guards on all grinding machines.