

Curriculum for Rubber Processing Machine Operator (6 months)



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Overall Objective of the Course

This course, Rubber Processing Machine Operator, is for learners who have minimal knowledge of the process industry or math, physics and chemistry. These science concepts are necessary and include into the course modules. This course is for those learners who increase their knowledge and skill and also make career in Rubber, Plastic and allied industries. This course is of basic level and after completion this course, learners will be qualify for higher level course like Chemical Plant Operator. This course covers all areas of working in a Rubber Process Industry including weighing of raw materials, mixing, curing, Extrusion, Calendaring and autoclaving.

Competencies gained after Completion Of Course:

After completion of this course, learners acquired competencies as:

- Familiarity to workplace communications and quality work practices.
- Ability to perform all prescribed functions and operations of defined ranges along with all routine procedures.
- Ability to do safe work efficiently on specialized machines in rubber industry.
- Ability to monitor instruments and maintenance of machinery.

Job Opportunities available immediately and in the future:

On successful completion of this course learners will be able to enter in various sectors of rubber industries. For example Natural Rubber Sector in which natural latex is used as glue for impregnating textiles and making micro porous rubbers. Synthetic rubbers have two sectors i.e. General purpose and special purpose rubbers respectively. As rubber technology has vast ground of rubber products & techniques to obtain them. Day by day progress of science and technology is increasing concepts about rubber production. Learners can learn other high level vocational courses for progression. To improve job opportunities learners along with their employment may be trained in the organization.

Entry Level:

The candidate must possess:

- Secondary school certificate.
- Able to communicate both oral and written.
- Physically and mentally fit.

Duration:

- 6 months (800 hours)
- 5 modules

Overview about the program - Curriculum for Rubber Processing Machine Operator

Module Title and Aim	Learning Units	Theory hours	Workplace hours
Module -1 Basic Essential Skills Aim: Be able to understand and acquire different basic skills	1- Understand basic skills	20 hours	80 hours
Module-2 Weighing Raw Materials Aim: Be able to weigh various raw materials of dry rubber products	1- Weigh raw materials of rubber products 2- Segregate raw materials into batches	10 hours 10 hours	40 hours 40 hours
Module-3 Mixing Rubber Materials Aim: Be able to mix various ingredients/raw materials of Dry Rubber products	1- Operate and monitor Two Roll Mill 2- Operate and monitor Internal Mixer	20 hours 20 hours	80 hours 80 hours
Module-4 Vulcanization and Extrusion Rubber Compounds Aim: Be able to Cure, molded and extruded Rubber products	1- Operate and monitor Curing Press 2- Operate and monitor Extruder machine	20 hours 20 hours	80 hours 80 hours
Module-5 Calendaring and Autoclaving Rubber Compounds Aim: Be able to prepare Rubber Sheets using Calendar machine and Autoclave	1- Operate and monitor Calendar machine 2- Operate and monitor Autoclave	20 hours 20 hours	80 hours 80 hours

Rubber Processing Machine Operator Curriculum Contents (Teaching & Learning Guide)

Module 1: Basic Essential Skills

Objective of the Module: To be able to understand and acquire different basic skills

Duration: 100 hours **Theory:** 20 hours **Practice:** 80 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1- Understand basic skills	Be able to: 1.1-to apply skill in work shop	<ol style="list-style-type: none"> 1. Describe the safety precaution to be observe in workshop 2. understand various tools and machines 3. demonstrate the use of hand and power tools 4. understand the measurements of time , distance , volume , temperature and pressure 	100 hours	Tool kit	Work Shop
	1.2-show skill in communication	<ol style="list-style-type: none"> 1. described the term communication 2. Understand various reports generated in a manufacturing environment 3. Read labels, coding and recopies of compound 4. Enter details of jobs in log book 		Different types of forms formats i.e. data sheet	Class room
	1.3-sketch shapes of objects	<ol style="list-style-type: none"> 1 understand instruments use for drawing 2 sketch different angles and geometrical shapes 3 sketch symbolic diagrams of tools and machines 		Drawing Instruments Drawing sheet	Work place

Module 2: Weighing Raw Materials**Objective of the Module:** To be able to weigh various raw materials of dry rubber products**Duration:** 100 hours **Theory:** 20 hours **Practice:** 80 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1- Weigh raw materials of Rubber products	<p>Be able to:</p> <p>1.1-Prepare raw materials for weighing</p> <p>1.2-Select scale for weighing raw materials</p> <p>1.3-Weigh raw materials.</p> <p>1.4-Identify main hazards during weighing of raw materials.</p>	<p>1- Describe the characteristics of raw materials.</p> <p>2- Match containers/ begs and labels with data sheet.</p> <p>3- Arrange materials in correct sequence</p> <p>4- Make ready raw materials for weighing.</p> <p>1- Understand weighing and measurement.</p> <p>2- Differentiate various types of weighing scales/measuring devices to be used in rubber industry.</p> <p>3- Select appropriate weighing Scale.</p> <p>4- Assemble components of selected weighing scale.</p> <p>5- Adjust and correct weighing scale for zero error.</p> <p>1- Understand weighing method.</p> <p>2- Demonstrate weighing materials/ ingredients separately in the correct and required quantity as per job card.</p> <p>3- Record weights of raw materials in the data sheet.</p> <p>1- Observe safety precautions during weighing.</p> <p>2- Understand safe handling procedures for rubber raw materials.</p> <p>3- Identify the handling problems associated with various types of raw materials.</p> <p>4- Use proper tools/ utensils for loading and unloading the materials.</p>	50 hours	<ul style="list-style-type: none"> • Different types of rubber • Different types of Processing oils • Packing materials • Personal protective equipment. • Material handling equipment • Pen/pencil and record sheet • Bins for collecting materials <p>Chemicals:</p> <ul style="list-style-type: none"> -Anti oxidants -Stearic acid -Filter -Accelerators -Sulphur -Dyes -Weighing Scales -Safety (Fire Safety) Equipment 	Classroom and work place both may be used for learning

2- Segregate raw materials into batches	<p>2.1-Prepare various raw materials into batches.</p> <p>2.2-Handover batches to production place.</p>	<p>1. Describe segregation of raw materials. 2. Arrange different raw materials into batches. 3. Label different batches according to job card. 4. Re assure that the batches are in sufficient numbers for completion of specific production.</p> <p>1. Record number of batches in data sheet. 2. Transfer raw materials batch to the production floor as per production schedule.</p>	50 hours		Classroom and work place both may be used for learning
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Module 3: Mixing Rubber Materials**Objective of the Module:** To be able to mix various ingredients / raw materials of dry rubber products**Duration:** 200 hours **Theory:** 40 hours **Practice:** 160 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
- Operate and monitor two Roll Mill	<p>Be able to:</p> <p>1.1- Set up Two Roll Mill</p> <p>1.2- Prepare tools and accessories as per specification.</p> <p>1.3- Perform mixing in two roll mill.</p>	<p>1. Understand the basic components & their functions.</p> <p>2. Understand operation & basic maintenance of the two Roll Mills.</p> <p>3. Check proper operation and safety of the Mill according to the standard procedure.</p> <p>4. Adjust machine components/ meters to regulate speed, pressure and temperature.</p> <p>5. Adjust Mill gauge (nib) to suit the compound sheeting thickness.</p> <p>6. Adjust water circulation system to meet the process parameters.</p> <p>1. Understand the factors that contaminate tools and their chemical effects on production.</p> <p>2. Demonstrate efficient cutting by sharpening of knives or cutting devices.</p> <p>1. Understand the sequence of mixing method.</p> <p>2. Activate mixer machine by pressing control button.</p> <p>3. Demonstrate mixing by feeding ingredients in the correct sequence following safety practices.</p> <p>4. Make uniform dispersion of materials/ ingredients.</p> <p>5. Produce a homogenized compound by the cutting and rolling operations on the</p>	100 hours	<ul style="list-style-type: none"> • Different type of rubber Compounds • Different types of Processing oils • Packing materials • Personal protective equipment. • Material handling equipment • Pen/pencil and record sheet • Bins for collecting materials • Safety (Fire Safety) equipments <p>Chemicals as:</p> <ul style="list-style-type: none"> -Anti oxidants -Stearic acid -Filter -Accelerators -Sulpher -Dyes <p>Machinery:</p> <ul style="list-style-type: none"> - Two Roll Mill. 	Classroom and work place both may be used for learning

	1.4- Draw compound sheet using two roll mills.	<p>machine.</p> <ol style="list-style-type: none"> 1. Understand the factors that to be considered to draw homogenous compound sheet of required thickness. 2. Draw compound sheet of required thickness and width according to the specifications. 3. Use appropriate Coolant to obtained sheet to the required temperature. 4. Adopt stack arrangement of compound sheets for further process. 5. Label all the batches for identification as per company procedure. 		- Internal Mill	
2- Operate and monitor Internal Mixer.	Be able to: 2.1- Set up Internal Mixer.	<ol style="list-style-type: none"> 1 Understand the basic components & their functions. 2 Understand the operation and basic maintenance of Internal Mixer. 3 Check proper operation of Hooper door, ramp, drop door etc. 4 Adjust water circulation system, lubricating system, and other indicators/ meters according to process parameters. 5 Match the ingredients for mixing as per job card. 6 Record and maintain production/mixing on data card such as meter readings, quantity and quality. 	100 hours	<ul style="list-style-type: none"> • Different type of rubber Compounds • Different types of Processing oils • Packing materials • Personal protective equipment. • Material handling equipment • Brushes for cleaning • Shovels • Weighing scales <p>Chemicals as:</p> <ul style="list-style-type: none"> -Anti oxidants -Stearic acid -Filter -Accelerators -Sulpher -Dyes 	Classroom and work place both may be used for learning

	2.2- Perform Mixing and dumping.	<ol style="list-style-type: none">1. Describe standard operating procedure of an Internal Mixer.2. Arrange batches according to mixing schedule to ensure continuous operation.3. Activate Internal mixer by pressing control button.4. Demonstrate mixing by feeding ingredients in the correct sequence following safety factors.5. Understand de-stuffing of materials inside the mixer in the event of a power failure.6. Obtain batch of mixed compound at the end of the mixing cycle following safety factors.7. Make the machine ready for next series of batches by cleaning.8. Record number of batches / quantity in data sheet.			
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Module 4: Vulcanization and Extrusion Rubber Compounds**Objective of the Module:** To be able to Cure, molded and Extruded Rubber Products**Duration:** 200 hours **Theory:** 40 hours **Practice:** 160 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1- Operate and monitor curing press	Be able to: 1.1-Setup curing press 1.2-Carryout molding of products.	<ol style="list-style-type: none"> Understand basic components and their functions Understand various types of vulcanization vessels/curing presses used for molding. Check curing press for operation. Select required curing temperature and pressure.. Check condition of moulds with respect to cleanliness and damages. Setup curing press for running operation according to required specification. <ol style="list-style-type: none"> Understand molding techniques. Maintain at pre-heating temperature of molds. Select proper releasing agents used for molding(lubricants). Fill the blanks with rubber compound at proper temperature. Carryout molding product by applying the pressure for a specific time. Remove the product at the end of the cycle time. Inspect de-molded product for visual defects and stack the correct molded product for cooling. Prepare the product for next cycle according to standard procedure. 	100 hours	<ul style="list-style-type: none"> Rubber compound in the form of blanks or preformed assemblies. Moulds Instruments for checking Scissors Cutting knives Personal protective equipment Spray gun Machinery Curing Press/ Vulcanizing vessel	Classroom and work place both may be used for learning
2- Operate and Monitor Extruder	Be able to: 2.1-Setup extruder Machine	<ol style="list-style-type: none"> Understand basic components and their functions Understand the operation of Extruder machine. Acquire technique to assemble appropriate dies and accessories. Conduct pre start checks on Extruder machine. 	100 hours	<ul style="list-style-type: none"> Rubber compound in the form of blanks or 	Classroom and work place both may be

Module 5: **Calendaring and Autoclaving Rubber Compounds**

Objective of the Module: **To be able to prepare rubber sheets using calendar machine & autoclave**

Duration: 200 hours **Theory:** 40 hours **Practice:** 160 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1- Operate and monitor Calendar Machine	Be able to: 1.1- Set up Calendar Machine 1.2- Operate Calendar Machine 1.3- Rubber Lining Technique	<ol style="list-style-type: none"> Understand the basic components and their functions. Understand the operation of calendar machine pertaining to making of rubber sheets. Check calendar machine for correct operation and the function of safety devices. Adjust the machine to suit process parameters as per instructions. <ol style="list-style-type: none"> Understand MSDS (Material Safety Data Sheet) and to enter data Activate machine to obtain rubber sheets of uniform thickness and dimensions according to instructions. Arrange tests of samples for the assurance of required quality and specifications. Use winding up device to wind the calendar sheets using appropriate lines. Identify the features of defective sheets. <ol style="list-style-type: none"> Acquire rubber lining technique. Select binding material. Understand different layers formation. 	100 hours	<ul style="list-style-type: none"> Rubber compound Composite material such as steel wire, tire cord etc. Tools and accessories used with the calendar machine. Instrument for measuring thickness of sheets. Hoisting equipment. Material handling equipment. Personal protective equipment. <p>Machinery: Calendar machine Lab. size</p>	Classroom and work place both may be used for learning
2- Operate and monitor Auto Clave	Be able to: 2.1- Set up Autoclave	<ol style="list-style-type: none"> Understand Autoclaving. Check safety valves/devices to ensure the safety of machine. Setup machine according to required specifications. Select process parameters (i.e. Temperature, pressure and time) according to curing 		<ul style="list-style-type: none"> Preformed rubber products Tools and accessories used with Autoclave. Measuring 	Classroom and work place both may be used for learning

Assessment

MODULE- 1

Forms of Assessment

Continuous assessment is suitable for these units.

Assessment context:

This unit may be assessed on the job. The competencies covered by this unit would be demonstrated by an individual working alone or as a member of a team.

Critical Aspects:

- Ability to observe safety precautions
- Ability to understand various tools/ machines
- Ability to major time ,distance temperature
- Read labels coding and recipes of compounds
- Enter Detail of Jobs in log book
- Sketch Geometrical and symbolic diagrams of tools/ machines

MODULE- 2

Forms of Assessment

Continuous assessment is suitable for these units.

Assessment Context

These units may be assessed on the job. The competencies covered by these units would be demonstrated by an individual working alone or as a member of a team.

Critical Aspects

- Ability to identify correct materials for weighing.
- Adjust the weighing scale and make corrections of zero error, zero settings..
- Weigh material accurately to meet requirements as per work instructions.
- Avoid contamination and mixing of material.
- Follow safety, health, environmental and good housekeeping practices.

MODULE - 3

Forms of Assessment

Continuous assessment is suitable these units.

Assessment Context

These units may be assessed on the job. The competencies covered by these units would be demonstrated by an individual working alone or as a member of a team.

Critical Aspects

UNIT-1

- Obtain rubber compound sheets to the required thickness.
- Mix the correct ingredient in the proper sequence as specified.
- Temperature control and adjusting water circulation.
- Safety in operation of machine.

UNIT-2

- Checking the machine for proper operation.
- Ensuring safety while operating machine.
- Following the mixing cycle as per instructions.
- Dumping compound for the next operation.
- Cleaning the mixer in between different types of compounds

MODULE-4

Forms of Assessment

Continuous and assessments are suitable for these units.

Assessment Context

These units may be assessed on the job. The competencies covered by these units would be demonstrated by an individual working alone or as a member of a team.

Critical Aspects

UNIT-1

- Selection of appropriate molds, blanks and pre-forms.
- Mold and vulcanize rubber compound using molding press.
- Follow safety practices.

UNIT-2

- Prepare the machine for Operation.
- Adjusting the machine to suit the product being Extruded.
- Storage of product.

MODULE-5

Forms of Assessment

Continuous assessment is suitable for these units.

Assessment Context

These units may be assessed on the job. The competencies covered by these units would be demonstrated by an individual working alone or as a member of a team. The assessment environment should not disadvantage the candidate.

Critical Aspects

UNIT-1

- Ability to setup the calendar machine.
- Ability to operate the calendar machine.
- Ability to operate winding up devices.
- Follow safety procedures.

UNIT-2

- Setting the Auto Clave to the required pressure and temperature.
- Follow the safety procedures.
- Maintain the quality of product according to specifications

Assessment Conditions for all Modules

The candidate will have access to:

- All tools, equipment, material and documentation required.

The candidate will be permitted to refer the following documents.

- Relevant workplace procedures
- Relevant products and manufacturer's instructions
- Relevant manuals, codes, standards and reference materials.

The candidate will be required to:

- Orally, or by other methods of communication, answer questions asked by the assessor
- Identify superiors who can be approached for the collection of competency evidence where appropriate.
- Present evidence of credit for any off-job training related to these units.

Assessors must be satisfied that the candidate can competently and consistently perform all elements of these units as specified by the criteria, and that he/she possesses required underpinning knowledge.

The candidate will be provided with all tools, equipments, material and documentation required as outlined within these units.

During assessment the individual will:

- Demonstrate safe work practices at all times.
- Communicate information about processes, events or tasks being undertaken to ensure a safe and efficient working environment.
- Take responsibility for the quality of their work.
- Plan tasks and review task requirements as appropriate.
- Relate to all stakeholders according to accepted company conventions.
- Perform all tasks in accordance with standard operating procedures.
- Perform all tasks to specification.
- Use accepted rubber processing machine techniques, practices and processes in line with workplace procedures.

Tasks involved will be completed within reasonable time frames relating to typical workplace activities.

Resources Required for Assessment Include: Materials, tools, equipment and machines listed within these units.

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