

# Curriculum for Plastic Processing Machine Operator (6 months)



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## **Overall objective of the course**

To achieve training in plastic processing operations, develop an understanding of basic engineering skills involved to manage the processing machines. Prepare the trainee to be able to conduct an analysis of defective molded products and suggest remedial measures.

### **Competencies gained after completion of the course**

After successful completion of the course, the learners will get the following competencies in particular:

- Operation of plastic processing machines
- Skills in trouble shooting of defective molded product along with exposure routine maintenance techniques would develop an operator capable enough to work in any plastic processing facility

### **Job Opportunities available immediately and in future**

- Plastic Industries are rated as medium to cottage scale industries, thus qualified technicians from this Program are always in demand all across the country
- Bottle to pipe manufacturing factory
- With an experience of at least 2-5 years, trainees qualify for supervisory positions
- Self employment as plastics product manufacturing can also be started with a low capital investment

## Overview about the program – Curriculum for Plastics Processing Machine Operator

Module Title & Aim	Learning Units	Theory hours	Workplace hours
<p><b>Module 1: Injection Molding Machine Operation</b></p> <p>Aim: This module develops competency in Injection Moulding machine operation, perform routine machine and mould inspection. Conduct trouble shooting of the process.</p>	<p>LU-1 Introduction to Inj. Moulding</p> <p>LU-2 Machine Construction</p> <p>LU-3 Machine Controls &amp; Instrumentation</p> <p>LU-4 Work Safety Precautions</p> <p>LU-5 Startup &amp; Shut down Procedures</p> <p>LU-6 Molding Process Parameters</p> <p>LU-7 Mould Handling</p> <p>LU-8 Auxiliary Equipment Handling</p> <p>LU-9 Trouble Shooting</p>	24 hrs	96 hrs
<p><b>Module 2: Extruder Machine Operation</b></p> <p>Aim: This module develops competency in Extruder machine operation, perform routine machine and die inspection. Conduct trouble shooting of the process.</p>	<p>LU-1 Introduction to Extruder</p> <p>LU-2 Machine Construction</p> <p>LU-3 Machine Controls &amp; Instrumentation</p> <p>LU-4 Work Safety Precautions</p> <p>LU-5 Startup &amp; Shut down Procedures</p> <p>LU-6 Extrusion Process Parameters</p>	24 hrs	96 hrs

	LU-7 Die Handling LU-8 Recycling of Plastics LU-9 Auxiliary Equipment Handling LU-10 Trouble Shooting		
<p><b>Module 3: Blow Molding Machine Operation</b></p> <p>Aim:          This module develops competency in Blow Moulding machine operation, perform routine machine, die and mould inspection. Conduct trouble shooting of the process</p>	LU-1 Introduction to Blow Moulding LU-2 Machine Construction LU-3 Machine Controls & Instrumentation LU-4 Work Safety Precautions LU-5 Startup & Shut down Procedures LU-6 Blow Moulding LU-7 Process Parameters LU-8 Die Handling LU-9 Auxiliary Equipment Handling LU-10 Trouble Shooting	24 hrs	96 hrs
<p><b>Module 4: Blown Film Machine Operation</b></p> <p>Aim:          This module develops competency in Blown film machine operation, perform routine machine and die inspection.</p>	LU-1 Familiarize with Blown Film Machine Process & Construction LU-2 Work Safety Precautions LU-3 Startup & Shut down Procedures	14 hrs	56 hrs

Conduct trouble shooting of the process.	LU-4 Die Handling LU-5 Trouble Shooting		
<p><b>Module 5: Compression Molding Machine Operation</b></p> <p>Aim: This module develops competency in Compression Moulding machine operation, perform routine machine and die inspection. Conduct trouble shooting of the process.</p>	<p>LU-1 Familiarize with the process &amp; machine</p> <p>LU-2 Work Safety Precautions</p> <p>LU-3 Startup &amp; Shut down Procedures</p> <p>LU-4 Mould Handling</p> <p>LU-5 Trouble Shooting</p>	14 hrs	56 hrs
<p><b>Module 6: Plastics Materials</b></p> <p>Aim: This module develops competency in developing an understanding about plastics materials and various additives. Their behavior when exposed to high temperature &amp; pressure.</p>	<p>LU-1 Introduction to Plastics Materials</p> <p>LU-2 Identify the Commodity &amp; Engineering Plastics</p>	40 hrs	20 hrs
<p><b>Module 7: QC &amp; Testing</b></p> <p>Aim: This module develops competency in understanding about testing of plastics materials, products. Implement inspection procedures as per Company policies.</p>	LU-1 Conduct inspection of plastic products & material	12 hrs	48 hrs

<p><b>Module 8: Workshop Practices</b></p> <p>Aim: This module develops competency about workshop skills used in routine mould and die maintenance.</p>	<p>LU-1 Learning to use hand and machine processes</p>	<p>16 hrs</p>	<p>64 hrs</p>
<p><b>Module 9: Engineering Drawing</b></p> <p>Aim: This module develops competency in understanding basic engineering drawings and P&amp;I diagram relevant to the Trade</p>	<p>LU-1 Learning basic dimensions for tool &amp; die machine</p> <p>LU-2 Learning orthographic &amp; pictorial projections</p> <p>LU-3 Understand P&amp;ID diagram</p>	<p>10 hrs</p>	<p>40 hrs</p>
<p><b>Module 10: Communication Skills</b></p> <p>Aim: This module develops competency in documentation of production &amp; QC reports. Prepare presentation on an assigned project</p>	<p>LU-1 Introduction to basic components of communication skills.</p> <p>LU-2 Learning to prepare activity reports</p> <p>LU-3 Research &amp; prepare a report on a topic related to plastics manufacturing</p>	<p>20 hrs</p>	<p>30 hrs</p>
<p><b>TOTAL HOURS (800)</b></p>		<p>198 hrs</p>	<p>602 hrs</p>

# Plastics Processing Machine Operator Curriculum Contents

**Module 1 Title :** Injection Moulding Machine Operation

**Objective of the Module :** To develop competency in Injection Molding machine operation, perform routine machine and mould inspection. Conduct trouble shooting of the process.

**Duration :** 120 Hrs. **Theory :** 24 Hrs. **Practice :** 96 Hrs.

Learning Unit	Learning Outcome	Learning Elements	Duration (Hrs)	Materials Required	Learning Place
<b>LU1- Introduction to Inj. Molding</b>	Familiarize with Injection Moulding process  Understand types of Injection Molding machines  Identify products that can be made by Injection Molding	i. Molding cycle from feeding to part ejection  i. Recognize screw configurations  i. Multi component molding	04	<ul style="list-style-type: none"> <li>• Injection Molding Machine</li> <li>• Moulded product samples</li> </ul>	Lecture room & Processing Hall
<b>LU2- Machine Construction</b>	Understand Injection side  Understand Clamping side	i. Screw & Barrel configuration ii. Tie-bars  i. Platens ii. Clamping mechanism iii. Ejector system	05	<ul style="list-style-type: none"> <li>• Injection Moulding Machine</li> </ul>	Lecture room & Processing Hall
<b>LU3- Machine Controls &amp; Instrumentation</b>	Identify heating mechanism	i. Differentiate b/w types of heaters, thermocouples & controllers ii. Understands energy	11	<ul style="list-style-type: none"> <li>• Injection Moulding Machine, heaters,</li> </ul>	Lecture room & Processing Hall



	Identify cooling mechanism	conservation issues i. Cooling water flow to mould and machine ii. Flow rate controlling devices		temperature indicators & controllers, heat exchanger. • Flow valves & gauges. • Pneumatic valves & gauges. • Hydraulic pump, filter & valves	
	Identify pneumatic devices	i. Pneumatic line circuit & devices.			
	Identify hydraulic circuit	i. Trace hydraulic lines w.r.t. process			
<b>LU4- Work Safety Precautions</b>	Knows about personal safety. Work permits  Identifies hazards while working on the machine  Identifies types of fire	i. Proper use of personal safety equipment ii. Hot work & cold work permit  i. Recognizes heater, micro switches and machine guards ii. Power lines & their controls.  i. Ability to select appropriate types of fire extinguishers	07	• Gloves, mask, goggles. • Heaters, safety switches & guards. • Water, CO2, Dry powder, BCF type fire extinguishers	Lecture room & Processing Hall
<b>LU5- Startup &amp; Shut down Procedures</b>	Understands heating and purging requirements  Understand energizing & de-energizing of circuits	i. Recognizes machine controls  i. Identifies power supply sources	04	• Injection Moulding Machine	Lecture room & Processing Hall
<b>LU6- Molding Process</b>	Identifies that melt flow depends upon temperature & pressure.	Learn to: i. Adjust temperature from feed zone to injection point ii. Adjust injection pressure	35	• Injection Moulding	Lecture room & Processing Hall

<b>Parameters</b>				Machine, plastic material, mould	
<b>LU7- Mould Handling</b>	Learns the basic mould configuration  Types of moulds  Ejector systems	i. Identify runner, gate and clamping  i. Identify two plate, slider mould, hot runner mould  i. Identify and set up part ejection in the mould	27	<ul style="list-style-type: none"> <li>• Injection Moulding Machine, Moulds, mould assembling tools, callipers</li> <li>• Ejector pins, plate.</li> </ul>	Lecture room & Processing Hall
<b>LU8- Auxiliary Equipment Handling</b>	Identify air compressor, chiller, generator circuit  Understand the need for resin drying	i. Handle air compressor, chiller, generator  i. Handles air drier for plastics(resin)	14	<ul style="list-style-type: none"> <li>• Air compressor, chiller, power generator</li> <li>• Vac. &amp; Hot Air drier, oven.</li> </ul>	Lecture room & Processing Hall
<b>LU9- Trouble Shooting</b>	Understand the effect of injection pressure, temperature on molded product	i. Recognize the different defects and their causes	13	<ul style="list-style-type: none"> <li>• Injection Molding Machine, plastic resin, mould, callipers, scales.</li> <li>• Defective plastic samples.</li> </ul>	Lecture room & Processing Hall

**Module 2 Title:** Extruder Machine Operation**Objective of the Module :** To develop competency in Extruder machine operation, perform routine machine and die inspection. Conduct trouble shooting of the process.**Duration :** 120 Hrs. **Theory :** 24 Hrs. **Practice :** 96 Hrs.

Learning Unit	Learning Outcome	Learning Elements	Duration (Hrs)	Materials Required	Learning Place
<b>LU1- Introduction to Extruder</b>	Familiarize with Extrusion process.  Understand types of Extrusion Machines  Identify products that can be made by extrusion.	i. Extrusion cycle from feeding to stacking of extruded product  i. Screw configurations ii. Single screw & Twin screw  i. Absence of feeding points	04	<ul style="list-style-type: none"><li>• Extruder, High Speed mixer, pipe extrusion downstream line</li><li>• Extruded product samples</li></ul>	Lecture room & Processing Hall
<b>LU2- Machine Construction</b>	Trainee understands basic extruder construction	i. Screw & Barrel configuration ii. Screw drives system iii. Die assembly set-up	05	<ul style="list-style-type: none"><li>• Extruder machine</li></ul>	Lecture room & Processing Hall
<b>LU3- Machine Controls &amp; Instrumentation</b>	Identify heating mechanism  Identify cooling mechanism	i. Differentiate b/w types of heaters, thermocouples & controllers. ii. Understands energy conservation issues  i. Cooling water flow to mould and machine ii. Flow rate controlling	11	<ul style="list-style-type: none"><li>• Extruder Machine, heaters, temperature indicators &amp; controllers, heat exchanger.</li><li>• Flow valves &amp; gauges.</li><li>• Pneumatic</li></ul>	Lecture room & Processing Hall

	Identify pneumatic devices	<p>devices</p> <p>i. Pneumatic line circuit &amp; devices</p>		valves & gauges.	
<b>LU4- Work Safety Precautions</b>	<p>Knows about personal safety. Work permits.</p> <p>Identifies hazards while working on the machine</p> <p>Identifies types of fire</p>	<p>i. Proper use of personal safety equipment. Hot work permit.</p> <p>i. Recognizes heater, micro switches and machine guards. Power lines &amp; their controls.</p> <p>i. Types of fire extinguishers</p>	07	<ul style="list-style-type: none"> <li>• Gloves, mask, goggles.</li> <li>• Heaters, safety switches &amp; guards.</li> <li>• Water, CO2, Dry powder, BCF type fire extinguishers</li> </ul>	Lecture room & Processing Hall
<b>LU5- Startup &amp; Shut down Procedures</b>	<p>Understands heating and purging requirements</p> <p>Understand energizing &amp; de-energizing of circuits</p>	<p>i. Recognizes machine controls</p> <p>i. Identifies power supply sources</p>	04	<ul style="list-style-type: none"> <li>• Extrusion Machine</li> </ul>	Lecture room & Processing Hall
<b>LU6- Extrusion Process Parameters</b>	Identifies that melt flow depends upon temperature & pressure.	<p>i. Learn to adjust temperature from feed zone to metering zone</p> <p>ii. Uses back pressure</p>	35	<ul style="list-style-type: none"> <li>• Extruder Machine, plastic material, die</li> </ul>	Lecture room & Processing Hall
<b>LU7- Die Handling</b>	<p>Learns : the basic die configuration</p> <p>Types of dies.</p>	<p>i. Identify breaker plate, mandrel, and torpedo</p> <p>i. Identify spider die, coat hanger die.</p>	27	<ul style="list-style-type: none"> <li>• Die assembling tools, callipers, wire brush &amp; polishing tools</li> </ul>	Lecture room & Processing Hall

<b>LU8- Recycling of Plastics</b>	Learns recycling extruders and post processing	<ul style="list-style-type: none"> <li>i. Sorting of plastic waste</li> <li>ii. Crushing of waste</li> <li>iii. Feeding of recycle</li> </ul>		<ul style="list-style-type: none"> <li>• Plastics waste material.</li> <li>• Sorting &amp; washing vessels</li> <li>• Crusher.</li> <li>• Recycle Extruder</li> </ul>	Lecture room & Processing Hall
<b>LU9- Auxiliary Equipment Handling</b>	Identify air compressor, chiller, generator circuit  Understand the need for resin drying	<ul style="list-style-type: none"> <li>i. Handle air compressor, chiller, vacuum pump, generator</li> <li>i. Handles air drier for plastics(resin)</li> </ul>	14	<ul style="list-style-type: none"> <li>• Air compressor, chiller, power generator</li> <li>• Vac. &amp; Hot Air drier, oven.</li> </ul>	Lecture room & Processing Hall
<b>LU10- Trouble Shooting</b>	Understand the effect of back pressure, temperature on molded product	<ul style="list-style-type: none"> <li>i. Recognize the different defects and their causes</li> </ul>	13	<ul style="list-style-type: none"> <li>• Extruder Machine, plastic resin, mould, callipers, scales.</li> <li>• Defective plastic samples.</li> </ul>	Lecture room & Processing Hall

**Module 3 Title :** Blow Moulding Machine Operation

**Objective of the Module :** To develop competency in Blow Molding machine operation, perform routine machine, die and mould inspection. Conduct trouble shooting of the process.

**Duration :** 120 Hrs. **Theory :** 24 Hrs. **Practice :** 96 Hrs.

Learning Unit	Learning Outcome	Learning Elements	Duration (Hrs)	Materials Required	Learning Place
<b>LU1-</b> Introduction to Blow Moulding	Familiarize with Blow Moulding process.  Understand types of Blow Moulding Machines  Identify products that can be made by extrusion.	<ul style="list-style-type: none"> <li>i. Blow Moulding cycle from feeding to ejection of product.</li> <li>i. Extrusion Blow Molded &amp; Stretch Blow Moulded products e.g., PET, PP HDPE, PVC.</li> <li>i. Absence of injection points &amp; parting lines, transparency defects</li> </ul>	04	<ul style="list-style-type: none"> <li>• Blow Molding Machines for HDPE &amp; PET</li> <li>• Blow Moulded product samples.</li> </ul>	Lecture room & Processing Hall
<b>LU2-</b> Machine Construction	Understand basic extrusion blow molding machine construction	<ul style="list-style-type: none"> <li>i. Screw &amp; Barrel configuration</li> <li>ii. Screw drive system</li> <li>iii. Die assembly set-up</li> </ul>	05	<ul style="list-style-type: none"> <li>• Blow Molding machine.</li> </ul>	Lecture room & Processing Hall
<b>LU3-</b> Machine Controls & Instrumentation	Identify heating mechanism  Identify cooling mechanism	<ul style="list-style-type: none"> <li>i. Differentiate b/w types of heaters, thermocouples &amp; controllers.</li> <li>i. Cooling water flow to mould and machine.</li> <li>ii. Flow rate controlling</li> </ul>	11	<ul style="list-style-type: none"> <li>• Blow Moulding Machine, heaters, temperature indicators &amp; controllers, heat exchanger.</li> <li>• Flow valves &amp; gauges.</li> </ul>	Lecture room & Processing Hall

		<p>devices.</p> <p>i. Pneumatic line circuit &amp; devices.</p>		<ul style="list-style-type: none"> <li>• Pneumatic valves &amp; gauges.</li> </ul>	
<p><b>LU4-</b> Work Safety Precautions</p>	<p>Knows about personal safety. Work permits.</p> <p>Identifies hazards while working on the machine</p> <p>Identifies types of fire</p>	<p>i. Proper use of personal safety equipment. Hot work permit.</p> <p>i. Recognizes heater, micro switches and machine guards. Power lines &amp; their controls.</p> <p>i. Types of fire extinguishers</p>	07	<ul style="list-style-type: none"> <li>• Gloves, mask, goggles.</li> <li>• Heaters, safety switches &amp; guards.</li> <li>• Water, CO2, Dry powder, BCF type fire extinguishers</li> </ul>	Lecture room & Processing Hall
<p><b>LU5-</b> Startup &amp; Shut down Procedures</p>	<p>Understands heating and purging requirements</p> <p>Understand energizing &amp; de-energizing of circuits</p>	<p>i. Recognizes machine controls</p> <p>i. Identifies power supply sources</p>	04	<ul style="list-style-type: none"> <li>• Blow Molding Machine</li> </ul>	Lecture room & Processing Hall
<p><b>LU6-</b> Blow Molding Process Parameters</p>	<p>Identifies that melt flow depends upon temperature &amp; pressure.</p>	<p>i. Learn to adjust temperature from feed zone to metering zone</p> <p>ii. Uses back pressure</p>	35	<ul style="list-style-type: none"> <li>• Blow Molding Machine, plastic material, die.</li> </ul>	Lecture room & Processing Hall
<p><b>LU7-</b> Die Handling</p>	<p>Learns : the basic die configuration</p>	<p>i. Identify mandrel, torpedo, die centering device.</p>	27	<ul style="list-style-type: none"> <li>• Blow Molding Machine,</li> <li>• Dies &amp; Moulds,</li> </ul>	Lecture room & Processing Hall

				assembling tools, callipers	
<b>LU8-</b> Auxiliary Equipment Handling	Identify air compressor, chiller, generator circuit  Understand the need for resin drying	i. Handle air compressor, chiller, vacuum pump, generator  i. Handles air drier for plastics(resin)	14	<ul style="list-style-type: none"> <li>• Air compressor, chiller, power generator</li> <li>• Vac. &amp; Hot Air drier, oven.</li> </ul>	Lecture room & Processing Hall
<b>LU9-</b> Trouble Shooting	Understand the effect of back pressure, temperature on molded product	i. Recognize the different defects and their causes	13	<ul style="list-style-type: none"> <li>• Blow Machine, plastic resin, mould, callipers, and scales.</li> <li>• Defective plastic samples.</li> </ul>	Lecture room & Processing Hall



**Module 4 Title:** Blown Film Machine Operation

**Objective of the Module:** To develop competency in Blown film machine operation, perform routine machine and die inspection. Conduct trouble shooting of the process.

**Duration:** 70 Hrs. **Theory:** 14 Hrs. **Practice:** 56 Hrs.

Learning Unit	Learning Outcome	Learning Elements	Duration (Hrs)	Materials Required	Learning Place
<b>LU1-</b> Familiarize with Blown Film Machine Process & Construction	Trainee will be able to Operate film manufacturing unit.	<ul style="list-style-type: none"> <li>i. Identify production cycle from feeding to stacking of product</li> <li>ii. Screw &amp; Barrel &amp; blowing system</li> <li>iii. Die assembly set-up</li> <li>iv. Differentiate b/w types of heaters, thermocouples &amp; controllers</li> <li>v. Pneumatic line circuit &amp; devices</li> </ul>	40	<ul style="list-style-type: none"> <li>• Extruder and Blown Film attachments</li> <li>• Extruded film product samples.</li> </ul>	Lecture room & Processing Hall
<b>LU2-</b> Work Safety Precautions	<p>Know about personal safety. Work permits.</p> <p>Identify hazards while working on the machine</p> <p>Identify types of fire</p>	<ul style="list-style-type: none"> <li>i. Proper use of personal safety equipment. Hot work permit.</li> <li>i. Recognizes heater, micro switches and machine guards. Power lines &amp; their controls.</li> <li>i. Types of fire extinguishers</li> </ul>	02	<ul style="list-style-type: none"> <li>• Gloves, mask, goggles</li> <li>• Heaters, safety switches &amp; guards</li> <li>• Water, CO2, Dry powder, BCF type fire extinguishers</li> </ul>	Lecture room & Processing Hall

<b>LU3-</b> Startup & Shut down Procedures	Understand heating and purging requirements  Understand energizing & de- energizing of circuits	<ul style="list-style-type: none"> <li>i. Recognizes machine controls</li> <li>ii. Identifies power supply &amp; compressed air sources</li>   <li>i. Handle air compressor, chiller, generator</li> </ul>	08	<ul style="list-style-type: none"> <li>• Blown Film Machine, air compressor, generator</li> </ul>	Lecture room & Processing Hall
<b>LU4-</b> Die Handling	Learn : the basic die configuration	<ul style="list-style-type: none"> <li>i. Identify breaker plate, mandrel, torpedo.</li> <li>ii. Trainee performs die cleaning procedures</li> </ul>	10	<ul style="list-style-type: none"> <li>• Blown Film Machine, die assembling tools, callipers</li> </ul>	Lecture room & Processing Hall
<b>LU5-</b> Trouble Shooting	Understand the effect of back pressure, temperature on product	<ul style="list-style-type: none"> <li>i. Recognize the different defects and their causes</li> <li>ii. Understand the effect of un-melted resin</li> </ul>	10	<ul style="list-style-type: none"> <li>• Blown Film Machine, plastic resin, die, thickness gauges.</li> <li>• Defective plastic samples.</li> </ul>	Lecture room & Processing Hall

**Module 5 Title:** Compression Molding Machine Operation

**Objective of the Module:** To develop competency in Compression Moulding machine operation, perform routine machine and die inspection. Conduct trouble shooting of the process.

**Duration:** 70 Hrs. **Theory:** 14 Hrs. **Practice:** 56Hrs.

Learning Unit	Learning Outcome	Learning Elements	Duration (Hrs)	Materials Required	Learning Place
LU1- Familiarize with the process & machine	Able to Operate manufacturing unit	<ul style="list-style-type: none"> <li>i. Identify production cycle from feeding to de-moulding of product.</li> <li>ii. Understand the materials used for moulding.</li> <li>iii. Trainee feeds and removes the products from the</li> <li>iv. Differentiates b/w types of heaters, thermocouples &amp; controllers mould.</li> </ul>	40	<ul style="list-style-type: none"> <li>• Compression Moulding Machine &amp; mould, weigh scale, plastic material, product samples</li> <li>• Extruded film product samples</li> </ul>	Lecture room & Processing Hall
LU2- Work Safety Precautions	<p>Know about personal safety. Work permits.</p> <p>Identify hazards while working on the machine</p> <p>Identify types of fire</p>	<ul style="list-style-type: none"> <li>i. Proper use of personal safety equipment. Hot work permit.</li> <li>i. Recognizes heater, micro switches and machine guards. Power lines &amp; their controls.</li> <li>i. Types of fire extinguishers</li> </ul>	03	<ul style="list-style-type: none"> <li>• Gloves, mask, goggles.</li> <li>• Heaters, safety switches &amp; guards.</li> <li>• Water, CO<sub>2</sub>, Dry powder, BCF type fire extinguishers</li> </ul>	Lecture room & Processing Hall

<b>LU3-</b> Startup & Shut down Procedures	Understand heating and purging requirements  Understand energizing & de- energizing of circuits	i. Recognizes machine controls  i. Identifies power supply & handle hydraulic circuit	07	<ul style="list-style-type: none"> <li>• Compression Moulding Machine &amp; mould.</li> </ul>	Lecture room & Processing Hall
<b>LU4-</b> Mould Handling	Learn : the basic Mould configuration	i. Assembles the mold & performs die cleaning procedures	10	<ul style="list-style-type: none"> <li>• Compression Molding Machine, mold assembling tools, gloves</li> </ul>	Lecture room & Processing Hall
<b>LU5-</b> Trouble Shooting	Understand the effect of over loading the resin, temperature on product	i. Recognize the different defects and their causes  ii. Understand the effect of un-melted resin	10	<ul style="list-style-type: none"> <li>• Compression Moulding Machine, plastic resin, mold, thickness gauges, weigh scale.</li> <li>• Defective plastic samples</li> </ul>	Lecture room & Processing Hall

**Module 6 Title:** Plastics Materials**Objective of the Module:** To develop competency in developing an understanding about plastics materials and various additives. Their behavior when exposed to high temperature & pressure.**Duration:** 60 Hrs.    **Theory:** 60 Hrs.

Learning Unit	Learning Outcome	Learning Elements	Duration (Hrs)	Materials Required	Learning Place
<b>LU1-</b> Introduction to Plastics Materials	Understands the raw materials used in the manufacturing of plastic materials Differentiate between Thermoplastic & Thermo set material  Understand the relevance of molecular weight & its effect on product properties  Understand various additives & the need for compounding	i. Identifies the hydrocarbon structure and source plastics from oil & gas.  i. Identifies Crystalline & Amorphous plastics.  i. Understands properties like density, specific gravity, melting temperature etc.	30	<ul style="list-style-type: none"><li>• Plastic Material in granular form.</li><li>• Plastic product samples.</li></ul>	Lecture room
<b>LU2-</b> Identify the Commodity & Engineering Plastics	Understand the difference between Olefin, PVC, Acrylic, Styrenics, Polyamide, Polyester (PET)	i. Identifies performance & cost reducing materials. ii. Differentiate the plastic material w.r.t. application and structural properties	30	<ul style="list-style-type: none"><li>• Polymer additives, reinforcing &amp; cost reducing materials</li></ul>	Lecture room

**Module 7 Title:** QC & Testing**Objective of the Module:** To develop competency in understanding about testing of plastics materials, products. Implement inspection procedures as per Company policies.**Duration:** 60 Hrs. **Theory:** 12 Hrs. **Practice:** 48 Hrs.

Learning Unit	Learning Outcome	Learning Elements	Duration (Hrs)	Materials Required	Learning Place
LU1- Conduct inspection of plastic products & material	Able to perform tests on the samples and report them.	i. Understand basic plastics testing for performance evaluation & their identification.	45	<ul style="list-style-type: none"><li>• Measuring instruments: micrometers, calipers, weigh scales, etc.,</li><li>• Universal testing machine, Melt flow rate tester, impact tester, density meter</li><li>• Plastic product &amp; Material samples.</li></ul>	Lecture room , Processing Hall & Testing Laboratories
		ii. Correlate the test results with spec., sheet	05		
		iii. Correctly prepare samples for tests.	10		
	i. Understand operation and handling of Testing equipment				

**Module 8 Title:** Work shop Practices

**Objective of the Module:** To develop competency about workshop skills used in routine mould and die maintenance.

**Duration:** 80 Hrs. **Theory:** 16 Hrs. **Practice:** 64 Hrs.

Learning Unit	Learning Outcome	Learning Elements	Duration (Hrs)	Materials Required	Learning Place
LU1- Learning to use hand and machine processes	Able to use hand tools and machines	i. Understands the applications for hand & power tools	48	• Plastic Product samples	Lecture room & Testing Laboratories
		ii. Properly use lathe machine, grinding and drilling machines	32		

**Module 9 Title:** Engineering Drawing**Objective of the Module:** To develop competency in understanding basic engineering drawings and P&I diagram relevant to the Trade.**Duration:** 50 Hrs. **Theory:** 10 Hrs. **Practice:** 40 Hrs.

Learning Unit	Learning Outcome	Learning Elements	Duration (Hrs)	Materials Required	Learning Place
<b>LU1-</b> Learning basic dimensions for tool & die machine	Develop an understanding of various drawings and sectional views	i. Interpretation of different angles, figures and symbols used in eng. Drawings.		<ul style="list-style-type: none"><li>• Drawing board, measuring devices</li><li>• Plastic product samples.</li></ul>	Lecture room & Processing Hall
<b>LU2-</b> Learning orthographic & pictorial projections	Able to sketch orthographic projection from pictorial projections	i. Understands the relevance of isometric views and type of lines used.			
<b>LU3-</b> Understand P&ID diagram				<ul style="list-style-type: none"><li>• Plastic processing machines</li></ul>	



**Module 10 Title:** Communication Skills

**Objective of the Module:** To develop competency in documentation of production & QC reports. Prepare presentation on an assigned project

**Duration:** 50 Hrs. **Theory:** 30 Hrs. **Practice:** 20 Hrs.

Learning Unit	Learning Outcome	Learning Elements	Duration (Hrs)	Materials Required	Learning Place
<b>LU1- Introduction to basic components of communication skills</b>	Able to understand different methods of communication	i. Understands the different tools used for communication	15	<ul style="list-style-type: none"><li>• Computer with access to internet, printing device, multimedia</li></ul>	Lecture room & Processing Hall
<b>LU2- Learning to prepare activity reports</b>	Able to prepare documents clearly stating production and testing status.	i. Understands various reports generated in a manufacturing environment	15		
<b>LU3- Research &amp; prepare a report on a topic related to plastics manufacturing</b>	Develop skills in searching technical issues and compiling them for presentation	i. Learns: searching technical issues on internet, word processing & Power point	20		

## Plastics Processing Machine Operator Curriculum Assessment

**Module I Title :** Injection Moulding Machine Operation

**Objective of the Module :** To develop competency in Injection Molding machine operation, perform routine machine and mould inspection. Conduct trouble shooting of the process.

**Duration :** 120 Hrs. **Theory :** 24 Hrs. **Practice :** 96 Hrs.

Learning Units	Theory Days/Hours	Work Place Days/Hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
<b>M1-LU1</b> Introduction to Injection Moulding			<ul style="list-style-type: none"> <li>Identify machine &amp; products made by the process</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M1-LU2</b> Machine Construction			<ul style="list-style-type: none"> <li>Identify machine parts &amp; various configurations</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M1-LU3</b> Machine Controls & Instrumentation			<ul style="list-style-type: none"> <li>Identifies process control devices &amp; their function</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M1-LU4</b> Work Safety Precautions			<ul style="list-style-type: none"> <li>Understand &amp; counter occupational hazards</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M1-LU5</b> Startup &			<ul style="list-style-type: none"> <li>Can locate power supply, plastic</li> </ul>	<ul style="list-style-type: none"> <li>Short answer</li> </ul>	

Shutdown Procedures			<ul style="list-style-type: none"> <li>feeding system.</li> <li>Understands melting of plastic &amp; barrel cleaning</li> </ul>	<ul style="list-style-type: none"> <li>questions</li> <li>Demonstration</li> </ul>	
<b>M1-LU6</b> Molding Process Parameters			<ul style="list-style-type: none"> <li>Understand temperature, pressure gauges &amp; their effect on product</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M1-LU7</b> Mould Handling			<ul style="list-style-type: none"> <li>Handles clamping &amp; assembling of mould</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M1-LU8</b> Auxiliary Equipment Handling			<ul style="list-style-type: none"> <li>Manages to operate utilities.</li> <li>Understand hydraulic circuit elements</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M1-LU9</b> Trouble Shooting			<ul style="list-style-type: none"> <li>Correlate the molding parameters with product defects</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	

**Module 2 Title:** Extruder Machine Operation

**Objective of the Module :** To develop competency in Extruder machine operation, perform routine machine and die inspection. Conduct trouble shooting of the process.

**Duration :** 120 Hrs. **Theory :** 24 Hrs. **Practice :** 96 Hrs.

Learning Units	Theory Days/Hours	Work Place Days/Hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
<b>M2-LU1</b> Introduction to Extruder Machine			<ul style="list-style-type: none"> <li>Identify machine &amp; products made by the process</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M2-LU2</b> Machine Construction			<ul style="list-style-type: none"> <li>Identify machine parts &amp; various configurations</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M2-LU3</b> Machine Controls & Instrumentation			<ul style="list-style-type: none"> <li>Identifies process control devices &amp; their function</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M2-LU4</b> Work Safety Precautions			<ul style="list-style-type: none"> <li>Understand &amp; counter occupational hazards</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M2-LU5</b> Startup & Shutdown Procedures			<ul style="list-style-type: none"> <li>Can locate power supply, plastic feeding system.</li> <li>Understands melting of plastic &amp; barrel cleaning</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M2-LU6</b> Molding			<ul style="list-style-type: none"> <li>Understand temperature, pressure</li> </ul>	<ul style="list-style-type: none"> <li>Short answer</li> </ul>	

Process Parameters			gauges & their effect on product	<ul style="list-style-type: none"> <li>questions</li> <li>Demonstration</li> </ul>	
<b>M2-LU7</b> Die Handling			<ul style="list-style-type: none"> <li>Handles die assembling &amp; clamping of die</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M2-LU8</b> Auxiliary Equipment Handling			<ul style="list-style-type: none"> <li>Manages to operate utilities</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M2-LU9</b> Trouble Shooting			<ul style="list-style-type: none"> <li>Correlate the extrusion parameters with product defects</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	

**Module 3 Title :** Blow Moulding Machine Operation

**Objective of the Module :** To develop competency in Blow Molding machine operation, perform routine machine, die and mould inspection. Conduct trouble shooting of the process.

**Duration :** 120 Hrs. **Theory :** 24 Hrs. **Practice :** 96 Hrs.

Learning Units	Theory Days/Hours	Work Place Days/Hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
<b>M3-LU1</b> Intro to Blow Moulding Machine			<ul style="list-style-type: none"> <li>Identify machine &amp; products made by the process</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M3-LU2</b> Machine Construction			<ul style="list-style-type: none"> <li>Identify machine parts &amp; various configurations</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M3-LU3</b> Machine Controls & Instrumentation			<ul style="list-style-type: none"> <li>Identifies process control devices &amp; their function</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M3-LU4</b> Work Safety Precautions			<ul style="list-style-type: none"> <li>Understand &amp; counter occupational hazards</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M3-LU5</b> Startup & Shutdown Procedures			<ul style="list-style-type: none"> <li>Can locate power supply, plastic feeding system.</li> <li>Understands melting of plastic &amp; barrel cleaning</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M3-LU6</b> Molding			<ul style="list-style-type: none"> <li>Understand temperature, pressure</li> </ul>	<ul style="list-style-type: none"> <li>Short answer</li> </ul>	

Process Parameters			gauges & their effect on product	<ul style="list-style-type: none"> <li>questions</li> <li>Demonstration</li> </ul>	
<b>M3-LU7</b> Die & Mould Handling			<ul style="list-style-type: none"> <li>Handles die &amp; mould assembling &amp; clamping procedures.</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M3-LU8</b> Auxiliary Equipment Handling			<ul style="list-style-type: none"> <li>Manages to operate utilities.</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M3-LU9</b> Trouble Shooting			<ul style="list-style-type: none"> <li>Correlate the blow moulding parameters with product defects</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	

**Module 4 Title:** Blown Film Machine Operation

**Objective of the Module:** To develop competency in Blown film machine operation, perform routine machine and die inspection. Conduct trouble shooting of the process.

**Duration:** 70 Hrs. **Theory:** 14 Hrs. **Practice:** 56 Hrs.

Learning Units	Theory Days/Hours	Work Place Days/Hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
<b>M4-LU1</b> Familiarize with Blown Film Machine Process & Construction			<ul style="list-style-type: none"> <li>Identify machine &amp; products made by the process</li> <li>Identify machine parts &amp; various configurations</li> <li>Identifies process control devices &amp; their function</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M4-LU2</b> Work Safety Precautions			<ul style="list-style-type: none"> <li>Understand &amp; counter occupational hazards</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M4-LU3</b> Startup & Shutdown Procedures			<ul style="list-style-type: none"> <li>Can locate power supply, plastic feeding system.</li> <li>Understands melting of plastic &amp; barrel cleaning</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M4-LU4</b> Die Handling			<ul style="list-style-type: none"> <li>Identify breaker plate, mandrel, torpedo.</li> <li>Can performs die cleaning procedures</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M4-LU5</b> Trouble Shooting			<ul style="list-style-type: none"> <li>Recognize the different defects and their causes</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> </ul>	



			<ul style="list-style-type: none"> <li>Understand the effect of un-melted resin</li> </ul>	<ul style="list-style-type: none"> <li>Demonstration</li> </ul>	
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**Module 5 Title:** Compression Molding Machine Operation

**Objective of the Module:** To develop competency in Compression Moulding machine operation, perform routine machine and die inspection. Conduct trouble shooting of the process.

**Duration:** 70 Hrs. **Theory:** 14 Hrs. **Practice:** 56Hrs.

Learning Units	Theory Days/Hours	Work Place Days/Hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
<b>M5-LU1</b> Familiarize with Compression Molding Machine Process & Construction			<ul style="list-style-type: none"> <li>Identify machine &amp; products made by the process</li> <li>Identify machine parts &amp; various configurations</li> <li>Identifies process control devices &amp; their function</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M5-LU2</b> Work Safety Precautions			<ul style="list-style-type: none"> <li>Understand &amp; counter occupational hazards</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M5-LU3</b> Startup & Shutdown Procedures			<ul style="list-style-type: none"> <li>Can locate power supply, plastic feeding system.</li> <li>Understands melting of plastic &amp; barrel cleaning</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M5-LU4</b> Mould Handling			<ul style="list-style-type: none"> <li>Assembles the mold &amp; performs die cleaning procedures</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M5-LU5</b> Trouble Shooting			<ul style="list-style-type: none"> <li>Recognize the different defects and their causes</li> <li>Understand the effect of un-melted</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	

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**Module 6 Title:** Plastics Materials

**Objective of the Module:** To develop competency in developing an understanding about plastics materials and various additives. Their behavior when exposed to high temperature & pressure.

**Duration:** 60 Hrs. **Theory:** 60 Hrs.

Learning Units	Theory Days/Hours	Work Place Days/Hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
<b>M6-LU1</b> Intro to Plastics Materials			<ul style="list-style-type: none"> <li>Understands polymer melt flow behavior</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> </ul>	
<b>M6-LU2</b> Identify the Commodity & Engineering Plastics			<ul style="list-style-type: none"> <li>Differentiate products made from Commodity &amp; Performance polymers</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	

**Module 7 Title:** QC & Testing

**Objective of the Module:** To develop competency in understanding about testing of plastics materials, products. Implement inspection procedures as per Company policies.

**Duration:** 60 Hrs. **Theory:** 12 Hrs. **Practice:** 48 Hrs.

Learning Units	Theory Days/Hours	Work Place Days/Hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
<b>M7-LU1</b> Conduct inspection of plastic products & material			<ul style="list-style-type: none"> <li>Understands and can handle measuring instruments. Can fill QC report Performa.</li> <li>Can make samples for the respective tests. Understand operation and handling of Testing equipment</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> </ul>	

**Module 8 Title:** Work shop Practices**Objective of the Module:** To develop competency about workshop skills used in routine mould and die maintenance.**Duration:** 80 Hrs. **Theory:** 16 Hrs. **Practice:** 64 Hrs.

Learning Units	Theory Days/Hours	Work Place Days/Hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
<b>M8-LU1</b> Learning to use hand and machine processes			<ul style="list-style-type: none"> <li>Handles the tools correctly</li> <li>Differentiate the processes needed for a specific task</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	

**Module 9 Title:** Engineering Drawing**Objective of the Module:** To develop competency in understanding basic engineering drawings and P&I diagram relevant to the trade**Duration:** 50 Hrs. **Theory:** 10 Hrs. **Practice:** 40 Hrs.

Learning Units	Theory Days/Hrs	Work Place Days/Hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
<b>M9-LU1</b> Learning dimensions, tool & die and machine drawings			<ul style="list-style-type: none"> <li>Trainee can sketch different angles, figures and symbols of basic engineering drawing.</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M9-LU2</b> Learning orthographic & pictorial projections			<ul style="list-style-type: none"> <li>Trainee can sketch different projections</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M9-LU3</b> Understand P&I			<ul style="list-style-type: none"> <li>Trace &amp; explain P&amp;I diagrams</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> </ul>	

diagram				• Demonstration	
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**Module 10 Title:** Communication Skills

**Objective of the Module:** To develop competency in documentation of production & QC reports. Prepare presentation on an assigned project

**Duration:** 50 Hrs. **Theory:** 30 Hrs. **Practice:** 20 Hrs.

Learning Units	Theory Days/Hours	Work Place Days/Hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
<b>M10-LU1</b> Introduction to basic components of communication skills.			<ul style="list-style-type: none"> <li>Understands different techniques used in communication.</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M10-LU2</b> Learning to prepare activity reports			<ul style="list-style-type: none"> <li>Understands various reports generated in a manufacturing environment</li> </ul>	<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	
<b>M10-LU3</b> Research & prepare a report on a topic related to plastics manufacturing				<ul style="list-style-type: none"> <li>Short answer questions</li> <li>Demonstration</li> </ul>	

## National Curriculum Review Committee Members

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