APPRENTICESHIP CURRICULUM (OPTIONAL TRADE)

Rubber

Machine Operator_Plastic Blow Moulding

Course Code: CO072200040

☒NAPS ☐Non-NAPS

NSQF Level: 4

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Course Details

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<tr><td rowspan="2">3.</td><td>Apprenticeship Training Duration:
(2 to 4 weeks of BT is embedded in this duration as per the requirement of the establishment)</td><td>Months: 12 Months</td></tr>
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<tr><td>4.</td><td>Credit</td><td>TBD</td></tr>
<tr><td>5.</td><td>NSQF Level (Mandatory for NAPS)</td><td>NSQC Approval Date: 20/July/2016</td></tr>
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<tr><th>S. No.</th><th>QP/ Qualification/ NOS Name (As applicable)</th><th>QP/ NOS Code & Version</th><th>NQR Code</th></tr>
<tr><td>1.</td><td>Machine Operator - Plastic Blow Moulding</td><td>RSC/Q4102_V1</td><td>2021/CP/CIPET/04624</td></tr>
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<tr><td>7.</td><td>Brief Job Role Description</td><td>Plastics blow moulding operator is responsible for produce bottles, containers or others hollow objects from plastics resin by operating semi & fully automatic and advance blow moulding machines. They are responsible for troubleshooting process problems and performing minor maintenance to ensure continued operation of the production line. They arealso responsible for completing the output learn Good Manufacturing Practices.</td></tr>
<tr><td>8.</td><td>NCO-2015 Code & Occupation (Access the NCO 2015 volumes from: https://labour.gov.in/organizationsofmole/directorate-general-employment-training-dget)</td><td>NIL</td></tr>
</table>

9.	**Minimum Eligibility Criteria** *(Educational and/ or Technical Qualification)*	8th class
10.	**Entry Age for Apprenticeship**	*18 Years*
11.	**Any Licensing Requirements** (*wherever applicable*)	NA
12.	**Is the Job Role amenable to Persons with Disability**	☐ **Yes** ☒ **No** **If yes, check the applicable type of Disability** ☐ **Locomotor Disability** ☐ **Leprosy Cured Person** ☐ **Cerebral Palsy** ☐ **Dwarfism** ☐ **Muscular Dystrophy** ☐ **Acid Attack Victims** ☐ **Blindness** ☐ **Low Vision** ☐ **Deaf** ☐ **Hard of Hearing** ☐ **Speech and Language Disability** ☐ **Intellectual Disability** ☐ **Specific Learning Disabilities** ☐ **Autism Spectrum Disorder** ☐ **Mental Illness** ☐ **Multiple Sclerosis** ☐ **Parkinson's Disease** ☐ **Haemophilia** ☐ **Thalassemia** ☐ **Sickle Cell Disease** ☐ **Multiple Disabilities**
		Remarks:
13.	**Submitting Body Details**	**Name:** Rubber, Chemical & Petrochemical Skill Development Council **E-mail ID:** ceo@rcpsdc.in **Contact Number:** 011-41009347- 48
14.	**Certifying Body**	Rubber, Chemical & Petrochemical Skill Development Council

15.	**Employment Avenues/Opportunities**	Plastic product manufacturing company, Plastic furniture, construction, sports and leisure industry.
16.	**Career Progression**	Warehouse Supervisor and Academic progressionto Level 5 program
17.	**Trainer's Qualification & Experience:**	Any Graduate preferably in rubber or polymer and 5+ year Experience
18.	**Curriculum Creation Date**	08/July/2022
19.	**Curriculum Valid up to Date**	31/Dec/2024

Module Details

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
1.	Introduction	• Explain the history of development of plastic products • Evaluate current industrial scenario of plastics • Identify the types of plastic • List major industrial associations related to blow moulding. • Identify equipment used for blow moulding • Describe the roles and responsibilities of a machine operator - plastic blow moulding.	0	0	0	0
2.	Advanced method for Fitting Tools Measuring Equipments and Practice RSC/N4109_V1	• Maintain a hazard free workplace • Ensue that all tools, equipment, power tool cables, extension leads are in a safe and usable condition • Assemble job specification from a valid and approved source • Identify job requirements from the job specification document • Rectify incorrect information in the job specification document • Prepare fitting operations as per procedure • Check that all measuring instruments are calibrated • Ensure that the components used are free from foreign objects, dirt and corrosion • Assemble correct work pieces and consumables • Assemble appropriate tools and measuring instruments. • Organize work pieces as per job requirements • Identify specified features with the help of marking-out methods on the work pieces • Identify templates for tracing/transferring the specified features on the work pieces as per drawing • Demonstrate how to transfer the specified features from the templates onto the work pieces as per drawing	25	65	70%	70%

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
		• Perform fitting operations on various forms of metal components using a range of hand tools and manually operated machines • Comply with specified machining sequence and procedure • Check the components to ensure completeness of work • Check the quality of the output as per required standards, using visual checks and measurement of dimensional parameters • Demonstrate how to produce components with various features as per standards applicable • Check the finished components as per job requirement • Perform documentation during and post operations • Maintain a safe and tidy work area after completion of job.				
3.	Introduction and Test method for Polymers & thermoplastics Materials RSC/N4110_V1	• Define the basic importance of polymers in human life. • Elaborate the terminologies related to polymers • Categorise polymers- polymer structure and morphology etc • Elaborate monomers and polymers • Discuss the types of polymersthermoplastics, elastomers • Define polymerization • Elaborate the types of polymerization, condensation, addition, copolymerization • Elaborate characterization • Elaborate polymer solution • Determine the measurement of molecular weight, sizes-structure and properties of polymers. • Analyse the commodity polymers: Polyolefin: LDPE – HDPE – LLDPE, PP etc. • Identify the engineering polymers: PC, ABS, PMMA, POM, PA- NYLON etc. • Define special polymers: FEP, PVDF etc. • Practise conventional methods of identification like drop test, water floatation test scratch test • Practise advanced methods of identification: -MFI, Melting	15	45	70%	70%

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
		• List common acronyms in the plastics and commercial trade.				
4.	Basics of Plastics Processing Methods RSC/N4104_V1	• Categorize all plastics processing machineries • Identify merits and demerits of plastic blow moulding over all others process • Discuss the terminologies related to plastic processing • Demonstrate the finishing operation including surface treatment of the fabricated product • Comply with the primary processing methods as per SOP • Comply with the secondary processing methods as per SOP • Define the fundamentals of processing method • Discuss the machine operation terminologies like semiautomatic, fully automatic • Analyse the type of conversion technique like Injection, blow, compression, transfer, rotational • Identify the materials to be processed • Comply with the product design / configuration, tolerance. • Comply with the process limitations and quality • Comply with the cost and performance balance. • Distinguish the type of process to be used depending on a variety of factors, including product shape and size, plastic type, quantity to be produced, quality and accuracy (Tolerances) required, design load performance, cost limitation, and time schedule	15	45	70%	70%
5.	Advanced Blow Moulding Techniques for Plastics Processing & Inspection of the finished products RSC/N4111_V1	• Analyse the principle of blow moulding process. • Demonstrate plasticizing/ melting the resin • Perform production and blowing of parison • Perform ejection of the part and trim • Identify the need of tools, accessories and machineries. • Identify the plastic material to be used for blow moulding • Analyze various types of extrusion blow moulding and process.	45	90	70%	70%

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
		• Demonstrate continuous blow moulding process - single head method, twin station method, rotary table system • Demonstrate intermitted blow moulding process - reciprocating screw extruder, ram accumulator extrusion accumulator head method • Demonstrate the process of the Extrusion Blow Moulding (EBM) • Demonstrate the process of Injection Blow Moulding (IBM) • Demonstrate the process of Injection Stretch Blow Moulding (ISBM) • Demonstrate the process of Extrusion Stretch Blow Moulding(ESBM) • Identify various types of blow moulds-side feed, centre feed, spiral mandrel, extrusion blow, stretch blow, injection blow moulds etc. • Set the PET injection moulding machine operation merits and demerits/over other moulding process • Demonstrate how to load the material in the correct pattern as per SOP to minimize material overflow/ wastage/ excess flash • Check the identified feed strip for dimension uniformity/identified granules • Prepare the plastic compound or granule for feeding into the machine • Demonstrate how to feed the machine • Set the moulding pressure and temperature during the process cycle • Check the mould lifting/ ejection/ slide mechanism of the press • Comply with SOP for manufacturing • Practice manufacturing the preform from the mould as per SOP. • Check operation of moulding apparatus like hopper, heaters, extruder, blow moulding die/mould, screen pack etc. as per the checklist • Demonstrate how to fix the desired die/mould to the blow moulding machine apparatus in order to achieve the desired operation				

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
		• Modify the process parameters (by selecting the right program from the machine control system) if required and ensure alignment with the prescribed standards • Check the preliminary requirement and preparation of raw material use • Check the parameters – temperature, pressure, current, extruder speed etc. • Plan how to setup the apparatus as per the selected process and the moulding standards • Adjust the temperature and other parameters of the moulding apparatus • Ensure availability of the coolant in the valves • Check the functionality and assembly of die as per SOP. • Adjust the parison controlling and program the parison with the help of parison programming tools • Check the dye shaping in blow moulding. • Analyze the types of mandrel used in blow moulding. –divergent and convergent. • Identify the blow ratio, parison swell, die swell, types of parison blowing system -Pneumatic and Ejection system. • Comply with the moulding procedure and process to be adopted for completing the work order • Adjust moulding parameters like temperature of the heaters, back pressure/ air pressure/ vacuum pressure, screw speed of the extruder, regulating current, flow of coolant/ water etc. before starting the process. • Manage the raw materials required for the activity • Ensure that the required material is procured from the store • Ensure that the dye is available for operations • Identify the number of heaters required for the extruder assembly • Perform preheating of plastic granules to improve their tensile strength • Ensure that the plastic granules are mixed with additives (if any) before being fed into the hopper • Demonstrate how to turn valves of machines to regulate screw speed and quantity of the plastic coming out of the hopper				

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
		• Ensure that pouring is in line with defined standards and specifications • Demonstrate how to document the feeding observations like interrupted pouring or any abnormality • Demonstrate extrusion blow moulding. • Demonstrate injection blow moulding. • Demonstrate extrusion injection stretch blow moulding. • Demonstrate multilayer blow moulding. • Practise optimization of process parameters Conduct a test process and produce a sample output as per the sketches/ engineering drawing • Ensure that the hollow articles (bottles, container) for geometry, material and dimensional parameters as per the control plan • Ensure that the dimensions of the output product are measured as per the process given in the work instructions • Demonstrate how to start the production process if test product matches the dimensions and quality of the final output. • Practise feeding the required plastic material in the apparatus for heaters to melt the plastic granules at the predefined temperature • Adjust the extruder speed and the extruder pressure to force the molten plastic into the die to create the desired output. • Practise turning valves of machines to regulate speed and quantity of the plastic coming out of the hopper • Manage feeding in line with the defined standards and specifications • Practise documenting the feeding observations like interrupted pouring or any abnormality • Ensure that proper functioning of screen pack and die for uniform melting of plastic and removal of the contaminants (if any)				

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
		• Monitor the process (parameters like temperature, pressure, speed etc.) by observing and analyzing the readings on various panels/ meters • Analyze and observe any irregularity in the process and take preventive steps • Practise cleaning the die opening and die, changing the screen pack. • Manage code printing of the product with the identifying information and send the same for further processing • Check finish and pinch off of the product as per the desired geometric specifications • Evaluate the final plastic moulded product and compare the dimensions as prescribed in the work order/ job work • Ensure that the faulty parts are sent for further processing in terms of cutting, finishing etc. • Estimate the specifications of the finished products using devices like micrometers, vernier calipers, gauges, rulers, weighing scales, thickness gauge and any other inspection equipment • Compare the texture, surface properties, hardness and strength with the given product specifications • Document the observations of the basic inspection process • Identify pieces which are OK and the ones not meeting the specified standards • Discard the batches which are beyond repair and repair the ones which need minor modifications • Maintain records of each category of work output as per the batch etc. • Plan how to establish linkage between rejection of output and the pertinent causes for the same (process/ material etc.) • Revise minor defects like dimension variation, thickness variation etc., by control process parameters, etc. • Escalate all issues related to change in surface properties, tensile strength etc. • Assemble first and last output from each batch to the lab for quality check • Demonstrate ways to achieve clearance for the entire batch from the lab.				

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
6.	Analyze the auxiliary equipment used in plastics processing RSC/N4106_V1	• Inspect operating fuel systems, fuel oil transfer, supply lines and associated equipment • Operate condensate and feed water systems, circulating and cooling water systems, condensate and makeup systems, circulating service water treatment equipment, auxiliary lube oil systems • Demonstrate the use of emission control equipment and miscellaneous equipment • Deliver onsite training programs • Demonstrate how to connect basic plant services to meet production requirements • Conduct initial checks of operating conditions before initiating production runs. • Assist in cleaning and lubrication of equipment and tooling • Perform various preventative maintenance tasks as needed • Analyze different types of pre-drier hot air oven, hopper driers, dehumidifiers etc. • Evaluate the basics of chiller, cooling tower for the controlling temperature of mould, machine and fluids. • Carry out basic operation and monitor gauges, dials, or other indicators to make sure a machine is working properly. • Analyze the compressor and scrap grinder. • Determine when and what kind of maintenance is needed and carry out routine maintenance of equipment • Practise equipment selection - determine the kind of tools and equipment needed to do a job. • Comply with the instructions given on the equipment • Comply with the relevant safety boards/ signs are placed on the shop floor • Ensure that waste is disposed off at the designated areas and manner of disposal is as per organization SOP.	10	30	70%	70%
7.	Advanced mould technology techniques for	• Identify the mould material requirement, mould manufacturing process and machineries. • Ensure that the dimensions, sizes, shapes and tolerances of machining component are as per specifications	20	65	70%	70%

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
	RSC/N4112_V1	• Assemble information such as number of parts to make, engineered components and material to be used, and machines to be used • Define the range of materials and its effect on process and life of mould • Identify the operations that will be required for machining components based on design requirements • Compare the blow mould with the injection/rotational and merits and demerits • Analyze moulds for EBM, IBM, and SBM • Demonstrate how to manage the mould cooling systems: - pneumatic, water cooling • Evaluate the main components of moulds (die core, die cavity and screw neck) • Ensure that cavities preform mould is designed and developed as per SOP • Comply with the instructions given on the equipment manual, describing the operating process of the equipment				
8.	Basic knowledge of computer skill RSC/N4108_V1	• Define fundamental of computers • Identify the components of computer: - hardware and the software • Practise how to accurately receive information and instructions from the supervisor/operator • Practise how to accurately pass on information to authorized persons • Assist others to maximize effectiveness and efficiency • Display active listening skills while interacting with others at work • Apply appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism • Demonstrate responsible and disciplined behaviours at the workplace • Escalate grievances and problems to appropriate authority as per procedure to resolve them.	10	30	70%	70%
9.	Quality management system	• Evaluate the need of management in product quality. • Evaluate the concept of total quality management • Adhere to the Total Quality Management philosophy.	10	40	70%	70%

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
	RSC/N4113	• Discuss the need for quality system. • Comply with the total quality control tools-ISO, 5S, Six Sigma, OHSAS 18001 • Evaluate behavioural science • Differentiate between behavioural science and social science • Discuss the categories of behavioural science • Evaluate the theories of behavioural psychology, entrepreneurship development, preparing project report selecting a particular plastic product of their choice and submission.				
10.	Maintain basic health and safety practices at the workplace RSC/N4101	• Comply with environmental and safety policies of organisation • Identify personal safety, job safety and machine safety procedures • Coordinate with other resources at workplace to achieve the healthy environment • Identify any hazards like accidents, fires or any other natural calamity and act appropriately • Demonstrate safe working practices while dealing with hazards • Practise good housekeeping standards at all times • Demonstrate rescue techniques applied during fire hazard • Demonstrate the correct use of a fire extinguisher. • Identify activities which can cause potential injury through sharp objects, burns, fall, electricity, gas leakages, radiation, poisonous fumes, chemicals, loud noise • Identify areas in the plant which are potentially hazardous / unhygienic in nature. • Conduct regular checks with support of the maintenance team on machine health to identify potential hazards due to wear and tear of machine. • Practise how to create awareness amongst others by sharing information on the identified risks. • Demonstrate the sorting process and check that the tools, fixtures and jigs that are lying on workstations are the ones in use and unnecessary items are not cluttering the workbenches or work surfaces. • Categorize the types of wastes	10	30	70%	70%

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
		• Demonstrate the technique of waste disposal and waste storage in proper bins as per SOP • Segregate the items which are labelled as red tag items for the process area and keep them in the correct places • Categorize the tools/ equipment/ fasteners/ spare parts as per specifications/ utility into proper trays, cabinets, lockers • Practise proper stacking of various types of boxes and containers as per the size/ utility to avoid any fall of items • Identify the floor markings/ area markings used for demarcating the various sections in the plant • Practise proper labelling mechanism of instruments/ boxes/ containers and maintaining reference files/ documents • Comply with the given instructions for labelling of fluids, oils, lubricants, solvents, chemicals etc. • Ensure proper storage of the materials to avoid spillage, leakage, fire etc.				
	Total Marks		**160**	**440**		

Glossary

Term	Description
Sector	Sector is a conglomeration of different business operations
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organization.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.

Acronyms

Acronym	Description
NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training

Annexure 1: Tools and Equipment

List of Tools and Equipment

The tools and equipment required are:

Sno	Tool / Equipment Name	Specification (as per batch of 30 trainees)
1	Hacksaw	4
2	screw driver set with Multiple heads,	4
3	Blow Mould	2
4	Hot air oven	1
5	Mould Temperature Controller	1
6	Dryer	1
7	Crane	1
8	Blow Moulding Machine	1
9	Micrometer	4
10	Vernier Caliper	4
11	Black / White board	1
12	Radius gauge	4
13	Steel measuring tape	4
14	Hammer	4
15	Allen key hexagonal	4
16	Spanner set double side,	4
17	Adjustable spanner single side	4
18	Fire Extinguisher	1

19	Helmet	30
20	Gloves	4
21	First Aid Box with Medicines	1
22	PP	2
23	HDPE	2
24	Blow moulding grade.	2
25	Hand mould	2
26	Steel Ruler	4
27	Projector/Screen	1
28	Feeler gauge	4
29	Weighing Balance	1
30	Safety Goggles	4
31	Apron,	30
32	Scrap Grinder	1
33	Cooling Tower	1
34	Hot air blow Gun	1
35	Air Compressor	1
36	File Sets,	4

Classroom Aids

The aids required to conduct sessions in the classroom are:

1 Projector
2 Computer/laptops
3 Internet connectivity
4 Whiteboard

Annexure 2: Assessment Strategy

This section includes the processes involved in identifying, gathering and interpreting information to evaluate the learner on the required competencies of the program.

Assessment System Overview:

- Batches assigned to the assessment agencies for conducting the assessment on SDSM/SIP or email
- Assessment agencies send the assessment confirmation to VTP/TC looping SSC
- Assessment agency deploys the ToA certified Assessor for executing the assessment
- SSC monitors the assessment process & records
- If the batch size is more than 30, then there should be 2 Assessors.

Testing Environment: Assessor must:

- Confirm that the centre is available at the same address as mentioned on SDMS or SIP
- Check the duration of the training.
- Check the Assessment Start and End time to be as 10 a.m. and 5 p.m.
- Check that the allotted time to the candidates to complete Theory & Practical Assessment is correct.
- Check the mode of assessment—Online (TAB/Computer) or Offline (OMR/PP).
- Confirm the number of TABs on the ground are correct to execute the Assessment smoothly.
- Check the availability of the Lab Equipment for the particular Job Role.

Assessment Quality Assurance levels / Framework:

- Question papers created by the Subject Matter Experts (SME)
- Question papers created by the SME should be verified by the other subject Matter Experts along with the approval required from SSC
- Questions are mapped with NOS and PC

- Question papers are prepared considering that level 1 to 3 is for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management Apprenticeship Curriculum: NAPS Jr. Machine Operator – CNC Milling of Plastic Page 20 of 14
- Assessor must be ToA certified
- Assessment agency must follow the assessment guidelines to conduct the assessment

Types of evidence or evidence-gathering protocol:

- Time-stamped & geotagged reporting of the assessor from assessment location
- Centre photographs with signboards and scheme specific branding
- Biometric or manual attendance sheet (stamped by TP) of the trainees during the training period
- Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos.

Method of verification or validation:

- Surprise visit to the assessment location
- Random audit of the batch
- Random audit of any candidate

Method for assessment documentation, archiving, and access

- Hard copies of the documents are stored
- Soft copies of the documents & photographs of the assessment are uploaded / accessed from Cloud Storage and are stored in the Hard Drive

On the Job:

1. Assessment for on the job training to be conducted by the industry partner on the practical competency output defined in the NOS/QP and the assessment criteria.
2. The candidate must score 70% in each module to complete the OJT.
3. Tools of Assessment that can be used are:
   a. Videos of Trainees during OJT should be shared by employer to RCPSDC.
4. Assessment will ensure that the apprentice will be able to:
   a. Work effectively and efficiently as per schedules and timelines while complying with the health and hygiene norms.
   b. Implement safety practices.
   c. Optimize the use of resources to ensure less wastage and maximum conservation.
   d. Communicate effectively and develop interpersonal skills.