APPRENTICESHIP CURRICULUM (OPTIONAL TRADE)

Rubber

Machine Operator_Plastics Extrusion

Course Code: CO072200041

☒NAPS ☐Non-NAPS

NSQF Level: 4

Table of Contents

Course Details

<table>
<tr><td>1.</td><td>Course Name</td><td>Machine Operator_Plastics Extrusion</td></tr>
<tr><td>2.</td><td>Course Code</td><td>CO072200041</td></tr>
<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>
<tr><td>Remarks</td><td></td></tr>
<tr><td>4.</td><td>Credit</td><td>TBD</td></tr>
<tr><td>5.</td><td>NSQF Level (Mandatory for NAPS)</td><td>4 NSQC Approval Date: 20/07/2016</td></tr>
<tr><td>6.</td><td>Related NSQF aligned qualification details</td><td>
<table>
<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 Plastics Extrusion</td><td>RSC/Q4602_V1</td><td>2021/CP/CIPET/04626</td></tr>
</table>
</td></tr>
<tr><td>7.</td><td>Brief Job Role Description</td><td>The Machine Operator Plastics Extrusion is responsible for plastics raw material handling, mixing /compounding (if required), performing the extrusion operation to produce Plastics Pipes /Films as per the requirements.</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>
<tr><td>9.</td><td>Minimum Eligibility Criteria
(Educational and/ or Technical Qualification)</td><td>8th class</td></tr>
<tr><td>10.</td><td>Entry Age for Apprenticeship</td><td>18 years</td></tr>
<tr><td>11.</td><td>Any Licensing Requirements (wherever applicable)</td><td></td></tr>
</table>

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, PVC pipes and fittings manufacturing company, sports and leisure industry
16.	**Career Progression**	Machine Operator - Plastics Extrusion to Supervisor - Plastics Extrusion to Quality Control Inspector

17.	**Trainer's Qualification & Experience:**	B.Tech / BE preferably in Chemical or Polymer with 5+ yrs. of experience in Plastic or related industry
18.	**Curriculum Creation Date**	07.07.2022
19.	**Curriculum Valid up to Date**	31.12.2024

Module Details

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
1	**Basic Plastics Raw Material & Extrusion Concept** **RSC/N4606** **Version 1.0**	• Describe the types and properties of plastics used in extrusion • Identify the different plastics raw materials based on the items produced • State the ways to handle the raw materials • Identify the types of extruders used in the extrusion process • Identify types of dyes used for different extruded products • Discuss about haul-off units • Demonstrate storage and handling of finished products • Identify the types of additives, master batches • Identify the types of mixing and compounding • Elucidate how to ensure proper measurement of additives • Discuss about storage and handling of raw materials in compounding area • Identify the Do's and Don'ts in area of operation • Comply with safety precautions before operations • Demonstrate how to select the plastics raw materials based on the items produced • Demonstrate how to handle the raw materials and house keeping • Demonstrate how to observe the types of extruders used in the extrusion process and their parts • Show how to analyze haul-off units • Demonstrate storage and handling of finished products • Demonstrate how to evaluate the types of additives, master batches • Show how to evaluate the types of mixing and compounding	25	60	70%	70%

		• Demonstrate proper measurement of additives • Practise storage and handling of raw materials in compounding area • Perform safety precautions before operations				
2	**Plastics Compounding / Mixing** **RSC/N4607** **Version 1.0**	• Identify the types of chemicals, additives and colorants • Evaluate the properties of chemicals, additives, colorants and pigments used • Explain the changes in plastic properties by adding chemicals, additives and pigments • Discuss about the formulation defined for different products • Identify the types of blenders, mixers and their parts • Explain how to prepare batches as per the formulations • Demonstrate loading and unloading of batches • Tell how to setup the temperature, pressure and speed involved in blenders and mixers • Elucidate the importance of each and every extrusion parameter • Identify the precautions to be taken during the batch preparation • Discuss ways to store the batches after preparation • Demonstrate how to analyze the types of chemicals, additives and colorants • Demonstrate how to study the properties of chemicals, additives, colorants and pigments used • Show how to analyze the changes in plastic properties by adding chemicals, additives and pigments • Demonstrate how to study the formulation defined for different products • Show how to study the types of blenders, mixers and their parts • Perform preparation batches as per the formulations • Demonstrate loading and unloading of batches • Setup the temperature, pressure and speed involved in blenders and mixers • Analyze the importance of each and every extrusion parameter • Demonstrate the precautions to be taken during the batch preparation	25	60	70%	70%

		• Demonstrate ways to store the batches after preparation				
3	**Perform the HDPE/PVC Pipe Extruder Machine Operation RSC/N4608 Version 1.0**	• Identify the types of HDPE / PVC extruders • Identify the extruder parts and their functions • Explain the pressure and vacuum sizing units • Evaluate the types of dyes used for different extruded pipes • Explain how to perform operations for Haul-Off units • Explain how to perform dismantling and assembling extruder parts • Illuminate the safety precaution during assembling and disassembling of extruder machine • Show how to adjust parameters like temperature, pressure and speed controls • Explain the effect of process parameters on the product • Illustrate how to setup trial production and check product stabilization • Explain how to ensure control of parameters for actual production • Elucidate how to comply with post production and storing procedure • Identify common faults for trouble shooting • Explain how to perform disposal of faulty products as per the procedure laid down under SOP • Identify safety equipment and their use • Analyse the extruder parts and their functions • Analyse the pressure and vacuum sizing units • Evaluate the types of dyes used for different extruded pipes • Perform operations for Haul-Off units • Perform dismantling and assembling extruder parts • Demonstrate safety precaution during assembling and disassembling of extruder machine • Demonstrate how to adjust parameters like temperature, pressure and speed controls • Show how to analyze the effect of process parameters on the product	20	75	70%	70%

		• Demonstrate how to setup trial production and check product stabilization • Perform control of parameters for actual production • Show how to comply with post production and storing procedure • Demonstrate how to identify common faults for trouble shooting • Perform disposal of faulty products as per the procedure laid down under SOP • Demonstrate the use of safety equipment				
4	**Perform the Plastic Film Extruder Machine Operation** **RSC/N4609** **Version 1.0**	• Evaluate the types of film extruders • Identify extruder parts and their functions • Discuss the ways to handle air compressor pressure • Identify types of dyes used for different extruded films • Throw light on operating the Haul Off Units • Discuss about dismantling and assembling of extruder parts • Explain how to adjust the process parameter like temperature, pressure and speed controls as per the requirement • Discuss the effect of parameters set for the process on the properties of the product • State how to perform a trial production and check product stabilization • Explain how to assess actual production and parameter / process control • Tell how to perform quality check • State how to perform post production and storage of material • Identify common faults for trouble shooting • Explain how to segregate the faulty product • Illustrate the ways of disposal of faulty products as per the procedure laid down by the company • Demonstrate ways to handle air compressor pressure • Demonstrate how to handle types of dies used for different extruded films • Practise operating the Haul Off Units • Perform dismantling and assembling of extruder parts	20	75	70%	70%

		• Adjust the process parameter like temperature, pressure and speed controls as per the requirement • Demonstrate the effect of parameters set for the process on the properties of the product • Perform a trial production and check product stabilization • Assess actual production and parameter / process control • Perform quality check • Perform post production and storage of material • Show how to identify common faults for trouble shooting • Demonstrate how to segregate the faulty product • Demonstrate ways of disposal of faulty products as per the procedure laid down by the company				
5	**To carry out quality checks** **RSC/N4605** **Version 1.0**	• Discuss about total range of checks as per the prescribed standards • Explain how to apply appropriate measuring instruments, equipment, tools, accessories etc., as prescribed / required • Identify non-conformities to quality assurance standards. • Identify potential causes of non-conformities to quality assurance standards • Identify impact on final product due to non-conformance to prescribed standards • Evaluate the need for action to ensure that problems do not reoccur • Discuss how to apply corrective action to address a problem • Illustrate how to review effectiveness of the corrective action • Interpret the results of the quality check • Analyse results of the findings with QC in charge/appropriate authority • Discuss about recording the results of the action taken • Identify the adjustments not covered, for future reference • Explain how to perform correct reporting procedure where the cause of defect cannot be identified	15	45	70%	70%

		• Perform total range of checks as per the prescribed standards • Apply appropriate measuring instruments, equipment, tools, accessories etc, as prescribed / required • Show how to identify non-conformities to quality assurance standards. • Show how to identify potential causes of non-conformities to quality assurance standards • Demonstrate the identify impact on final product due to non- conformance to prescribed standards • Apply corrective action to address a problem • Review effectiveness of the corrective action • Show how to interpret the results of the quality check • Analyse results of the findings with QC in charge/appropriate authority • Practise recording the results of the action taken • Perform correct reporting procedure where the cause of defect cannot be identified				
6	**To carry out house keeping** **RSC/N4610** **Version 1.0**	• Identify the area that comes under housekeeping • Apply appropriate signage immediately if oily substance / water spills on the floor • Plan housekeeping activities required to be performed • Identify the material / equipment required for cleaning the areas • Plan the sequence for cleaning the area to avoid re-soiling the cleaned areas and surfaces • Ensure that there is adequate ventilation for the work being carried out • Explain the use of personal protective equipment required for the cleaning method • Discuss how to perform cleaning activities without disturbing others • Explain how to comply with workplace procedures related to accidental damage caused during the cleaning process	10	40	70%	70%

		• State how to ensure that, on completion of the work, the area is left clean and dry and free from any leftover • Tell how to ensure the storage of the equipment, materials and personal protective equipment in appropriate places • Explain how to maintain inventory records • Throw light on the ways to dispose the waste garnered from the activity • Elucidate how to maintain schedules and records for housekeeping duty. • Demonstrate how to take an overlook of the area under house keeping • Apply appropriate signage immediately if oily substance / water spills on the floor • Plan housekeeping activities required to be performed • Plan the sequence for cleaning the area to avoid re-soiling the cleaned areas and surfaces • Demonstrate how to ensure that there is adequate ventilation for the work being carried out • Demonstrate the use of personal protective equipment required for the cleaning method • Perform cleaning activities without disturbing others • Dramatize a situation to inform the appropriate person about the difficulties in carrying out your work • Comply with workplace procedures related to accidental damage caused during the cleaning process • Demonstrate how to keep the area dry and clean on completion of work • Demonstrate how to ensure the storage of the equipment, materials and personal protective equipment in appropriate places • Demonstrate how to maintain inventory records • Demonstrate ways to dispose the waste garnered from the activity • Show how to maintain schedules and records for housekeeping duty.				
7	**Reporting and documentation**	• Identify data/problems/incidents as per the laid down	20	45	70%	70%

	RSC/N4604 **Version 1.0**	• Identify documentation to be completed relating to the job profile • Explain how to ensure detailed record is kept in an appropriate format • Tell how to perform all documentation within stipulated time according to company procedure • Explain how to ensure that documents are available to all appropriate authorities for inspection purposes • Discuss how to furnish detailed response to any requests for information • State how to inform the appropriate authority about the requests received for the information to be provided. • Demonstrate how to report data/problems/incidents as per the laid down procedure in the prescribed format and registers • Demonstrate how to report to the appropriate authority as laid down by the company procedure • Show how to identify documentation to be completed relating to the job profile • Practice recording details accurately in an appropriate format • Show how to complete all documentation within stipulated time according to company procedure • Demonstrate how to ensure documents are available to all appropriate authorities to inspect • Display how to respond to requests for information in an appropriate manner whilst following organizational procedures • Dramatize a situation to inform the appropriate authority of requests for information received				
8	**Maintain basic health and safety practices at the workplace, 5S** **RSC/N4101** **Version 1.0**	• Explain how to comply with environmental and safety policies of organisation • Identify personal safety, job safety and machine safety procedures • Discuss how to coordinate with other resources at the workplace to achieve the healthy, safe and secure environment for all • Identify hazards like illness, accidents, fires • Discuss about safe working practices while dealing with hazards • Explain good housekeeping standards at all times	10	30	70%	70%

		• State the correct use of a fire extinguishers • Identify activities which can cause potential injury through sharp objects, burns, fall, electricity, gas leakages, radiation, poisonous fumes, chemicals, loud noise • State how to conduct regular checks with support of the maintenance team on machine health • Discuss how to maintain awareness amongst others by sharing information on the identified risks. • Categorize the types of wastes • Explain the technique of waste disposal and waste storage in proper bins • Explain how to segregate the items which are labelled as red tag items for the process area and keep them in the appropriate places • Identify the floor markings/ area markings used for demarcating the various sections in the plant • Explain how to maintain reference files/ documents with the codes and the lists • Discuss how to comply with the given instructions and check for labelling of fluids, oils, lubricants, solvents, chemicals etc. • Illustrate how to organize all material and tools in the designated places as indicated in the 5S instructions • Comply with environmental and safety policies of organisation • Show how to coordinate with other resources at workplace to achieve the healthy environment • Demonstrate how to 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. • Demonstrate how to conduct regular checks with support of the maintenance team on machine health to identify potential • hazards due to wear and tear of machine.				

		• 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. • 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 • 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. • Demonstrate proper storage of the materials to avoid spillage, leakage, fire etc.				
		• **Total Marking**	**145**	**430**	**70%**	**70%**

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	Vernier Caliper	4
2	File Sets	4
3	Micrometer	4
4	Projector/Screen	1
5	screw driver set with Multiple heads,	4
6	Safety Goggles	4
7	Allen key hexagonal	4
8	Apron,	30
9	PVC Extrusion Grade.	5
10	HDPE	2
11	Cooling Tower	1
12	Black / White board	1
13	Steel Ruler	4
14	Radius gauge	4
15	Feeler gauge	4
16	Weighing Balance	4
17	Steel measuring tape	4
18	Hacksaw	4

19	Spanner set double side,	4
20	Fire Extinguisher	2
21	Helmet	30
22	PP	2
23	Hot air oven	1
24	Plastic Extruder Machine	1
25	Adjustable spanner single side	4
26	Hammer	4
27	Gloves	4
28	30mm Dye Blown Film	1
29	Dryer	1
30	Dye head for HDPE Pipe 25mm	2
31	Mould Temperature Controller	1
32	Air Compressor	1
33	Scrap Grinder	1
34	PVC pipe 40mm	1
35	First Aid Box with Medicines	1
36	Crane	1
37	Hot air blow Gun	1

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.