Model Curriculum

QP Name: Assistant Machine Operator – Plastics Processing

NQR Code: QG-03-CP-04129-2025-V2-CIPET

NSQF Level: 3

QP Version: 2.0

Model Curriculum Version: 1.0

Sector: Chemicals & Petrochemicals (CPC)

Central Institute of Petrochemicals Engineering & Technology (CIPET)
Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers, Govt. of India
CIPET Head office, T.V.K Industrial Estate, Guindy, Chennai – 600 032.

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Training Parameters

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<tr><td>Country</td><td>India</td></tr>
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<tr><td>Minimum Educational Qualification and Experience</td><td>
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<tr><th>S. No.</th><th>Academic/Skill Qualification (with Specialization - if applicable)</th><th>Required Experience (with Specialization - if applicable)</th></tr>
<tr><td>1.</td><td>Grade 10 pass or equivalent</td><td>No Experience required</td></tr>
<tr><td>2.</td><td>Grade 8 pass with two year of (NTC/ NAC) after 8th</td><td>No Experience required</td></tr>
<tr><td>3.</td><td>9th Grade pass</td><td>1.5 years relevant experience</td></tr>
<tr><td>4.</td><td>8thgrade pass</td><td>3 years relevant experience</td></tr>
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<tr><td>Pre-Requisite License or Training</td><td>Not Applicable</td></tr>
<tr><td>Minimum Job Entry Age</td><td>18 Years</td></tr>
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<tr><td>Minimum Duration of the Course</td><td>480 Hrs.</td></tr>
<tr><td>Maximum Duration of the Course</td><td>480 Hrs.</td></tr>
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Program Overview

This section summarizes the end objectives of the program along with its duration.

Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills.

After the successful completion of session, the trainee will be able to-

- Demonstration and practice on various plastic processing machine operation and its maintenance
- Discuss the significance of plastic processing and its industrial applications.
- Prepare the work area with required equipment and accessories such as raw materials, molds, tools, and safety gear to ensure efficiency and effectiveness.
- Explain the concept and fundamental principles of plastics injection Molding with the standard operating procedures (SOPs) and their importance.
- Demonstrate the setup and operation of blow mouldingmachines in accordance with SOPs
- Demonstrate the setup and operation of extrusion machines in accordance with SOPs.
- Demonstrate pre- and post-production requirements, including machine calibration and quality checks.
- Demonstrate the correct techniques for handling raw materials, setting process parameters, and troubleshooting defects.
- Maintain personal hygiene, workplace organization, and adherence to safety protocols as per industry standards.
- Demonstrate the process of maintaining relevant production records, process charts, and quality logs.
- Maintain a safe, healthy, and secure working environment by following safety regulations and best practices.

Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the QP.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
Module 1: CPC/N0109 - Familiarization with basic concepts, job requirements & basic related process.	20:00	40:00	00:00	00:00	**60:00**
Module 2: CPC/N0110 - Basic Knowledge about different plastic material	20:00	70:00	00:00	00:00	**90:00**
Module 3: CPC/N0111 - Familiarized with various Plastics processing techniques & to assist the Operator in Injection Moulding machine, Extrusion, Blow Moulding etc.	60:00	150:00	00:00	00:00	**210:00**
Module 4: CPC/N0411 - Maintain basic health and safety practices at the workplace, 5S	10:00	20:00	00:00	00:00	**30:00**
Module 5: CPC/N0219 - Basics of MS Office / Office open source suite	10:00	20:00	00:00	00:00	**30:00**
Module 6: DGT/VSQ/N0101 - Employability Skills	30:00	00:00	00:00	00:00	**30:00**
Module 7: On the Job Training (OJT)	00:00	00:00	30:00	00:00	**30:00**
Total Duration	**150:00**	**300:00**	**30:00**	**00:00**	**480:00**

Module Details

Module 1: CPC/N0109 - Familiarization with basic concepts, job requirements & basic related process.

Mapped to:

Terminal Outcomes:

- Introduction to Plastics processing.
- Types of conversion techniques, injection moulding, extrusion & blow moulding.
- Other Processing techniques viz compression & transfer moulding, rotational moulding, vacuum/ thermoforming etc.

Duration: *20:00 Hours*	**Duration**: *40:00 Hours*
Theory–Key Learning Outcomes	**Practical–Key Learning Outcomes**
• Introduction to plastics processing like methods, types, machinery, raw material type etc. • Types of processing methods, their properties, application, process etc in detail.	• Define plastics processing and its importance in manufacturing. • Explain the different types of plastics processing methods, such as: • Extrusion • Injection Molding • Blow Molding • Thermoforming • Compression Molding • Describe the common machinery used in plastics processing, such as: • Extruders • Injection Molding Machines • Blow Molding Machines • Thermoforming Machines • Identify the different types of raw materials used in plastics processing, such as: Thermoplastics, Thermosets, Elastomers • Types of Processing Methods • Extrusion • Explain the extrusion process and its applications. • Describe the different types of extrusion processes, such as: • Single-screw extrusion • Twin-screw extrusion • Identify the advantages and disadvantages of extrusion. • Injection Molding • Explain the injection molding process and its applications. • Describe the different types of injection molding processes, such as: • Conventional injection molding • Gas-assisted injection molding • Identify the advantages and disadvantages of injection molding. • Blow Molding

	• Explain the blow molding process and its applications. • Describe the different types of blow molding processes, such as: • Extrusion blow molding • Injection blow molding • Identify the advantages and disadvantages of blow molding. • Thermoforming • Explain the thermoforming process and its applications. • Describe the different types of thermoforming processes, such as: • Vacuum forming • Pressure forming • Identify the advantages and disadvantages of thermoforming. • Compression Molding • Explain the compression molding process and its applications. • Describe the different types of compression molding processes, such as: • Hydraulic compression molding • Mechanical compression molding Identify the advantages and disadvantages of compression molding.
Class room Aids:	
Charts,Models,Videopresentation,FlipChart,White-Board/SmartBoard,Marker,Duster	
Tools, Equipment and Other Requirements	
Basics machines for training like hand injection moulding, semiautomatic injection moulding, Automatic injection moulding, Hand blow, semi auto and auto blow moulding machines.	

Module 2: CPC/N0110 - Basic Knowledge about different plastic material

Mapped to:

Terminal Outcomes:

- Introduction to polymers.
- Study of fundamental terminology of polymers.
- Classification of polymers, polymer structure and morphology, etc.

Duration: *20:00 Hours*	**Duration**: *70:00 Hours*
Theory–Key Learning Outcomes	**Practical–Key Learning Outcomes**
• Basics about Polymers, its type, characteristics, Melting point, processing parameters etc. • Nomenclature of plastics, types, grades etc. • Classification of polymers, polymer structure, characteristics and its effect on plastics.	• Define what polymers are and their importance in plastics processing. • Explain the different types of polymers, such as thermoplastics, thermosets, and elastomers. • Describe the characteristics of polymers, including melting point, glass transition temperature, and crystallinity. • Identify the common processing parameters for polymers, such as temperature, pressure, and cooling rate. • Explain the system of nomenclature used to identify different types of plastics. • Identify the different types of plastics, including commodity plastics, engineering plastics, and specialty plastics. • Describe the different grades of plastics, including virgin, regrind, and recycled materials. • Explain the different methods of classifying polymers, including molecular structure, thermal properties, and mechanical properties. • Describe the different types of polymer structures, including linear, branched, and cross-linked. • Identify the characteristics of polymers that affect their properties and behavior, including molecular weight, crystallinity, and additives. • Explain how the characteristics of polymers affect the properties and behavior of plastics, including their strength, stiffness, and thermal stability.
Classroom Aids:	
LCD Projector, White Board with marker and duster, charts, Pen drives, computers etc for conduct of class.	
Tools, Equipment and Other Requirements	
Plastics raw material like PP, HDPE, etc for training on machines of injection, Blow and Extrusion grade from good/reputed suppliers.	

Module 3: CPC/N0111 - Familiarized with various Plastics processing techniques & to assist the Operator in Injection Moulding machine, Extrusion, Blow Moulding etc.

Mapped to:

Terminal Outcomes:

- Introduction to Plastics processing.
- Types of conversion techniques, injection moulding, extrusion & blow moulding.
- Other Processing techniques viz compression & transfer moulding, rotational moulding, vacuum/ thermoforming etc.
- Basic parts and function, clamping mechanism, ejector mechanism, Injection mechanism.
- Study of process parameters, plastics material for injection moulding.
- Study of mould and product design, Product defects and troubleshooting
- Study of Principle of blow moulding, types of blow moulding, machines parts and construction.
- Study of Plastics materials used, construction of dies assembly.
- Moulds used in blow moulding.
- Process parameters setting etc.
- Study of basics of parison programming and troubleshooting.
- Fundamental of Extrusion.
- Classification of Extruders, nomenclature of screws.
- Study of different types of screws, drive mechanism, die design, etc.
- Process parameters, difference between SSE and TSE etc.
- Study of types of Extrusion process-Pipe, Film & profile extrusion andtroubleshooting

Duration: *60:00 Hours*	**Duration**: *150:00 Hours*
Theory–Key Learning Outcomes	**Practical–Key Learning Outcomes**
• Introduction to plastics processing like methods, types, machinery, raw material type etc. • Types of processing methods, their properties, application, process etc in detail. • Basic machine parts and its function, clamping mechanism, ejector mechanism, Injection mechanism and its type. • To study process parameters in injection moulding , plastics material used in injection, its types, processing parameters setting etc. • Study of mould used in Injection moulding, types of product and effect on process, Product defects and troubleshooting with different defects like short Shot, Flash etc. •	• Understand the principles and physical operations of the • Plastic injection molding process. • Study Effect of polymer property on process techniques-process variables & its effects • Basic parts and function, clamping mechanism, ejector mechanism, Injection mechanism, • Study of process parameters, plastics material for injection moulding • Study of mould and product design, Product defects and troubleshooting • Machine start up and shut down procedure, process documentation • Fundamental of Extrusion • Classification of Extruders, nomenclature of screws • Study of different types of screws, drive mechanism, die design, etc. • Study of Principle of blow moulding, types of blow moulding, machines parts and construction

	• Study of Plastics materials used, construction of dies assembly • Moulds used in blow moulding • Introduction to Plastics processing • Types of conversion techniques, injection moulding, extrusion & blow moulding. • Other Processing techniques viz. compression & transfer moulding, rotational moulding, vacuum/ thermoforming etc. • To study the importance of various measuring instruments as accuracy of a component produced depends largely on the degree of precision of the measuring instruments • To understand the various methods of measurement including Direct measuring instrument, indirect measuring instruments, absolute measurements & comparative measurements • Demonstration and theory of use of measuring instruments like Vernier calliper, micrometer etc. • Study Common hand tools, names, types etc. • Description and explanation of simple fittings, hack sawing, punching, filling, their types etc. Use of hand tools • Demonstration and theory method of using drills, tapes and dies etc.
Class room Aids:	
Charts, Models, Video presentation, Flip Chart, White-Board/ Smart Board, Marker, Duster	
Tools, Equipment and Other Requirements	
Polymer samples and identification kits. Material testing equipment. Reference guides and classification charts.	

Module 4: CPC/N0411 -Maintain basic health and safety practices at the workplace, 5S

Mapped to:

Terminal Outcomes:

- Health and safety procedure.
- Fire safety procedure.
- Emergencies, rescue and first aid procedures.
- Ensure sorting, stream lining, storage and documentation, cleaning, standardization and sustenance across the plant premises of the organization.

Duration: *30:00 Hours*	**Duration**: *30:00 Hours*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Wear protective clothing/equipment for specific tasks and work conditions • Carry out safe working practices while dealing with hazards to ensure the safety of self and others. • Apply good housekeeping practices at all times • Demonstrate rescue techniques applied during fire hazard, demonstrate good housekeeping in order to prevent fire hazards, demonstrate the correct use of a fire extinguisher • Carry out safe working practices while dealing with hazards to ensure the safety of self and others • Demonstrate rescue techniques applied during fire hazard, demonstrate good housekeeping in order to prevent fire hazards, 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, and 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. • Follow the sorting process and check that the tools, fixtures & jigs that are lying on workstations are the ones in use and un-necessary items are not cluttering the	• Carry out safe working practices while dealing with hazards to ensure the safety of self and others. • Apply good housekeeping practices at all times • Use the various appropriate fire extinguishers on different types of fires correctly • Demonstrate rescue techniques applied during fire hazard, demonstrate good housekeeping in order to prevent fire hazards, 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, and 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. • Create awareness amongstothers by sharing information on the identified risks. • Ensure segregation of waste in hazardous/ non Hazardous waste as per the sorting work instructions • Follow the technique of waste disposal and waste storage in the proper bins as per SOP • Segregate the items which are labeled as

workbenches or work surfaces.	red tag items for the process area and keep them in the correct places • Follow the floor markings/ area markings used for demarcating the various sections in the plant as per the prescribed instructions and standards. • Check that the items in the respective areas have been identified as broken or damaged • Make sure that all material and tools are stored in the designated places and in the manner indicated in the 5S instructions.
Classroom Aids:	
Charts, Models, Video presentation, Flip Chart, White-Board/Smart Board, Marker, Duster	
Tools, Equipment and Other Requirements	
Safety PPE's like apron, gloves etc.	

Module 5: CPC/N0219 - Basics of MS Office / Open Source office suite software

Mapped to:

Terminal Outcomes:

- Enter, update and maintain data in the MS Office / Open Source office suite software.

Duration: *30:00 Hours*	**Duration**: *30:00 Hours*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Fill and process mandated forms for receiving, processing, or tracking data, enter data from source documents (such as trial report, process sheet etc.) into Computer application having MS Office / Open Source office suite software. • Scan source documents in accordance with specific instructions. • Maintain files of source documents or other information related to data entered. • Update database information to reflect most current source information	• Filling and processing mandated forms for receiving, processing, or tracking data enter data from source documents (such as trial report, process sheet etc.) into Computer applications having MS Office / Open Source office suite software. • Scanning source documents in accordance with specific instructions. • verify data entered with source documents, checks for compliance and corrects all typographical errors and missing or repeated data. • Maintain files of source documents or other information related to data entered. • update database information to reflect most current source information • Assist in the filing and storage of security and back up data files
Classroom Aids:	
Charts, Models, Video presentation, Flip Chart, White-Board/Smart Board, Marker, Duster	
Tools, Equipment and Other Requirements	
Computer with MS Office / Open Source office suite software, UPS, Table Chair etc.	

Module 6: Employability Skills

Mapped to: DGT/VSQ/N0101: Employability Skills

Mandatory Duration: *30:00 Hours*			
Location: Training Centre			
S. No.	**Module Name**	**Key Learning Outcomes**	**Duration (hours)**
1.	Introduction to Employability Skills	• Discuss the importance of Employability Skills in meeting the job requirements.	1
2.	Constitutional values - Citizenship	• Explain constitutional values, civic rights, duties, citizenship, responsibility towards society etc. that are required to be followed to become a responsible citizen. • Show how to practice different environmentally sustainable practices.	1
3.	Becoming a Professional in the 21st Century	• Discuss 21st century skills. • Display positive attitude, self -motivation, problem solving, time management skills and continuous learning mindset in different situations.	1
4.	Basic English Skills	• Use appropriate basic English sentences/phrases while speaking.	2
5.	Communication Skills	• Demonstrate how to communicate in a well -mannered way with others. • Demonstrate working with others in a team.	4
6.	Diversity & Inclusion	• Show how to conduct oneself appropriately with all genders and PwD. • Discuss the significance of reporting sexual harassment issues in time.	1
7.	Financial and Legal Literacy	• Discuss the significance of using financial products and services safely and securely. • Explain the importance of managing expenses, income, and savings. • Explain the significance of approaching the concerned authorities in time for any exploitation as per legal rights and laws.	4
8.	Essential Digital Skills	• Show how to operate digital devices and use the associated applications and features, safely and securely. • Discuss the significance of using the internet for browsing, accessing social media platforms, safely and securely.	3
9.	Entrepreneurship	• Discuss the need for identifying opportunities for potential business, sources for arranging money and potential legal and financial challenges.	7
10.	Customer Service	• Differentiate between types of customers. • Explain the significance of identifying customer needs and addressing them. • Discuss the significance of maintaining hygiene and dressing appropriately.	4
11	Getting ready for apprenticeship & Jobs	• Create biodata. • Use various sources to search and apply for jobs. • Discuss the significance of dressing up neatly and maintaining hygiene for an interview. • Discuss how to search and register for apprenticeship opportunities.	2

LIST OF TOOLS & EQUIPMENT FOR EMPLOYABILITY SKILLS		
S.No.	**Name of the Equipment**	**Quantity**
1.	Computer (PC) with latest configurations – and Internet connection with standard operating system and standard word processor and worksheet software (Licensed) (all software should either be latest version or one/two version below)	As required
2.	UPS	As required
3.	Scanner cum Printer	As required
4.	Computer Tables	As required
5.	Computer Chairs	As required
6.	LCD Projector	As required
7.	White Board 1200mm x 900mm	As required
Note: Above Tools & Equipment not required, if Computer LAB is available in the institute.		

Module 7: On-the-Job Training

Mapped to:

Mandatory Duration: *30:00*
Module Name: On-the-Job Training
Location: On Site

Terminal Outcomes

- On-the-Job Training (OJT) is a hands-on learning method where participants acquire skills and knowledge while performing their job tasks.
- Participants learn specific job-related skills that are directly applicable to their roles.
- Industrial training often leads to participants becoming more effective and efficient in their learning.
- Industrial training experience builds the confidence level of participants.
- Training occurs in the actual work environment, reducing the need for induction training programs while joining in industry.
- Interaction with industry captains or mentors during training strengthens learning teamwork and workplace relationships.
- Trainees become familiar with the industrial tools, systems, and workflows quickly.
- Participants encounter and address challenges in industry, developing critical thinking and adaptability.

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
Diploma	Plastics / Polymer Engineering / Technology	2	Plastics Processing Industry	-	-	-
B.E. / B.Tech. / M.Sc.	Plastics / Polymer Engineering / Science	-	-	-	-	-

Trainer Certification	
Domain Certification	**Platform Certification**
Minimum Educational Qualification as above, additionally he/ she should have done a job role relevant skill training course from CIPET.	Recommended that the Trainer Should have done a job role relevant upskilling course from CIPET.

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training/Assessment Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
Diploma	Plastics / Polymer Engineering / Technology	2	Plastics Processing Industry	3	Plastics / Polymer Engineering / Technology	-
B.E. / B.Tech.	Plastics / Polymer Engineering	1	Plastics Processing Industry	1	Plastics / Polymer Engineering	-

Assessor Certification	
Domain Certification	**Platform Certification**
Minimum Educational Qualification as above, additionally he/ she should have done a job role relevant skill training course from CIPET.	Recommended that the Trainer Should have done a job role relevant upskilling course from CIPET.

Assessment Strategy

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

Mention the detailed assessment strategy in the provided template.

1. Assessment System Overview:
    - Batches are assigned to Training Assessment Wing (TAW), CIPET HO for planning of assessment
    - Training Centers request TAW for Assessment and Certification of Trainees
    - TAW identifies suitable assessor and nominates the assessor to the respective Training Centre
    - TAW monitors the assessment process
    - Training Centers maintain necessary records

2. Testing Environment:
    - Check the Assessment location, date and time
    - If the batch size is more than 30, then there should be 02 Assessors in a day (or) 01 assessor in 2 days
    - Check that the allotted time to the candidates to complete the Theory & Practical Assessment

3. Assessment Quality Assurance levels/Framework:
    - Question bank / Question Paper is prepared by the Subject Matter Experts (SME) / Assessor
    - Questions are mapped to the specified assessment criteria
    - Certified Assessor & Trainer will be engaged in the process

4. Types of evidence or evidence-gathering protocol:
    - Date / Time recorded for the reporting of the assessor from assessment location
    - Assessment batch - Group Photo of Trainees along with Assessor

5. Method of verification or validation:
    - Surprise visit to the assessment location
    - Virtual meet with the Assessor / Trainees

6. Method for assessment documentation, archiving, and access
    - Hard copies of the documents are stored, soft copies of assessment evidences are stored in Email for future correspondence

References

Glossary

Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
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 a similar/ related set of functions in an industry.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualification pack code.

Acronyms and Abbreviations

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
OJT	On-the-Job Training
PwD	People with Disability PPE Personal Protective Equipment ES Employability Skills
PPE	Personal Protective Equipment
ES	Employability Skills