Model Curriculum

Machine Operator – Plastics Recycling

SECTOR: Rubber
SUB-SECTOR: Plastics Processing
OCCUPATION: Plastics Recycling
REF ID: RSC/Q4902 (CPC/Q2904), V1.0
NSQF LEVEL: 4

Skill India

RSDC
RUBBER SKILL DEVELOPMENT COUNCIL

N·S·D·C National Skill Development Corporation

Certificate

CURRICULUM COMPLIANCE TO
QUALIFICATION PACK - NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

RUBBER SKILL DEVELOPMENT COUNCIL

for the

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/ Qualification Pack: '**Machine Operator - Plastics Recycling**'
QP No. '**RSC/Q4902 (CPC/Q2904) NSQF Level 4**'

Date of Issuance: December 23, 2017

Valid up to: December 22, 2022

**Valid up to the next review date of the Qualification Pack*

Authorised Signatory
(Rubber Skill Development Council)

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Machine Operator – Plastics Recycling

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "Machine Operator – Plastics Recycling" Sector/Industry and aims at building the following key competencies amongst the learner.

Program Name	**Machine Operator – Plastics Recycling**		
Qualification Pack Name & Reference ID	RSC/Q4902 (CPC/Q 2904), v1.0		
Version No.	1.0	**Version Update Date**	29/05/2019
Pre-requisites to Training	VIIIth Standard		
Training Outcomes	**After completing this programme, participants will be able to:** • Describe basic concepts of plastics recycling process and assist the supervisor in production planning of plastics recycling section. • Perform the plastics recycling operations independently and safely. • Perform quality check of contamination levels of the recycled resins and compare properties with the given approved product. • Comply with the health, safety and security procedures stated by the organisation. • Create plan and budgeting for recycling business and apply entrepreneurship skill in plastics recycling. • Perform recording in mandated forms for receiving and perform various work related data entry operations on computer.		

This course encompasses 6 out of 6 NOS (National Occupational Standards) of "Machine Operator – Plastics Recycling" Qualification Pack issued by "Rubber Skill Development Council".

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	**Introduction** **Theory Duration** (hh:mm) 16:00 **Practical Duration** (hh:mm) 32:00 **Corresponding NOS Code** Bridge Module	• Explain development history of plastic. • Describe current industrial scenario of plastics and prospects. • Identify types of plastic. • Recognise major industrial associations. • Identify equipment used for plastics recycling process. • Describe roles and responsibilities for a Machine Operator – Plastics Recycling.	White board, marker, duster, laptop/PC, projector, flipcharts, samples – plastic scrap for recycling
2	**Basics of plastics** **Theory Duration** (hh:mm) 16:00 **Practical Duration** (hh:mm) 40:00 **Corresponding NOS Code** RSC/N4901 (CPC/N2911)	• Describe types of plastic used for different applications. • Interpret abbreviations used for different types of plastic. • State properties of different type of plastics. • Explain different processes for producing plastic products. • State the implications of not disposing the plastic waste properly. • Describe the importance of plastic recycling.	White board, marker, duster, Laptop/PC, projector, flipcharts, different variety of plastic samples
4	**Preparation for plastics recycling** **Theory Duration** (hh:mm) 32:00 **Practical Duration** (hh:mm) 64:00 **Corresponding NOS Code** RSC/N4904 (CPC/N2921)	• Identify tools and equipment for plastic recycling process. • Perform cleaning operation of the machine and surroundings. • Perform functionality check of the equipment used for plastic recycling. • Perform the changeover of required dye to the extrusion machine. • Perform the availability check of production plan for the plastic recycling. • Perform the availability check of process parameter documents for the plastic recycling. • Demonstrate the set-up of machine parameter as per company's Standard Operating Procedure (SOP). • Perform the availability check of plastic waste material and tools required for the plastic recycling.	White board, marker duster, laptop/PC, projector, weighing balance, calculator, automatic hopper loader, hot air oven and dryer, scrap grinder, hot air blow gun, water cooling tower, single screw- mechanical recycling plant, twin screw- mechanical recycling plant, chemical recycling machine, grinder / Shredder, agglomerators / Spin Drier / Silo with drier, safety goggles, safety gloves, apron, helmet, cleaning equipment, first aid box,

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		• Perform quality status check of plastic waste material to be used in the process.	fire extinguisher
5	**Plastics recycling** **Theory Duration** (hh:mm) 32:00 **Practical Duration** (hh:mm) 64:00 **Corresponding NOS Code** RSC/N4904 (CPC/N2921)	• Identify the waste material in plastics like dust, moisture and metal contaminants etc. • Apply additives, fillers in the plastic waste. • Perform preheating of sorted plastic waste. • Perform material handling as per SOP to avoid further contamination of plastic waste. • Perform test process and produce a sample output as per the company's SOP. • Perform recycling operations independently and safely. • Perform in-process inspection during plastic recycling to produce quality material. • Perform troubleshooting during recycling operations. • Assess production output rate during the recycling process and increase output if it is low.	White board, marker duster, laptop/PC, projector, weighing balance, calculator, automatic hopper loader, hot air oven and dryer, scrap grinder, hot air blow gun, water cooling tower, single screw- mechanical recycling plant, twin screw- mechanical recycling plant, chemical recycling machine, grinder / Shredder, agglomerators / Spin Drier / Silo with drier, safety goggles, safety gloves, apron, helmet, cleaning equipment, first aid box, fire extinguisher
6	**Post plastics recycling activities** **Theory Duration** (hh:mm) 32:00 **Practical Duration** (hh:mm) 64:00 **Corresponding NOS Code** RSC/N4904 (CPC/N2921)	• Perform inspection as per check-list to ensure quality of final produced material. • Demonstrate the process of sample submission to lab for batch approval. • Create batch identification for traceability. • Perform process of material movement to finished goods store after quality approval. • Use First In First Out (FIFO) rule for material storage. • Perform recording of production data. • Present production reports to supervisor. • Plan preventive maintenance for the machine and equipment with maintenance department during non-production hours.	White board, marker duster, laptop/PC, projector, weighing balance, calculator, automatic hopper loader, hot air oven and dryer, scrap grinder, hot air blow gun, water cooling tower, single screw- mechanical recycling plant, twin screw- mechanical recycling plant, chemical recycling machine, grinder / Shredder, agglomerators / Spin Drier / Silo with drier, safety goggles, safety gloves, apron, helmet, cleaning equipment, first aid box, fire extinguisher

Sr. No.	Module	Key Learning Outcomes	Equipment Required
7	**Quality checks and inspection** **Theory Duration** (hh:mm) 32:00 **Practical Duration** (hh:mm) 64:00 **Corresponding NOS Code** RSC/N4905 (CPC/N2922)	• Perform inspection of batch against the given approved sample. • Report the observations of the inspection to supervisor. • Identify the batch for processing as per work instruction. • Perform the disposal process of the batch which is contaminated. • Demonstrate the maintenance of quality records. • Determine the sample from first and last output from each batch for quality check.	White board, marker duster, laptop/PC, projector, weighing balance, approved sample
8	**Health and safety at the workplace** **Theory Duration** (hh:mm) 24:00 **Practical Duration** (hh:mm) 72:00 **Corresponding NOS Code** RSC/N4101 (CPC/N0411)	• Demonstrate safe working practices while dealing with hazards to ensure the safety of self and others. • Use the various appropriate fires extinguishers on different types of fires. • Demonstrate rescue techniques applied during fire hazard. • Demonstrate good housekeeping in order to prevent fire hazards. • Identify activities which can cause potential injury. • Inform the concerned authorities on the potential risks identified. • Perform the sorting process for the tools, fixtures and jigs. • Perform segregation of waste in hazardous/ non-hazardous waste categories. • Demonstrate the technique of waste disposal and waste storage as per standard operating procedure (SOP). • Demonstrate the proper labeling mechanism of instruments/ boxes/ containers.	White board, marker, duster, laptop/PC, projector, safety goggles, rubber gloves, heat protecting gloves, fire extinguisher, apron, helmet, first aid box
9	**Housekeeping** **Theory Duration** (hh:mm) 16:00 **Practical Duration** (hh:mm) 72:00	• Demonstrate good housekeeping practices in order to prevent fire hazards. • Perform the sorting process for the tools, fixtures and jigs. • Perform segregation of waste in hazardous/ non-hazardous waste categories. • Demonstrate the technique of waste disposal and waste storage as per standard operating procedure (SOP).	White board, marker, duster, Laptop/PC, projector, flipcharts, cleaning equipment, safety goggles, rubber gloves, heat protecting gloves, fire extinguisher, apron, helmet, first aid box

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Corresponding NOS Code RSC/N4101 (CPC/N0411)	• Demonstrate the proper labelling mechanism of instruments/ boxes/ containers.	
10	**Finance for entrepreneurship** **Theory Duration** (hh:mm) 32:00 **Practical Duration** (hh:mm) 64:00 **Corresponding NOS Code** RSC/N4906 (CPC/N2923)	• Describe basic financial terminology used in a business. • Perform planning and budgeting for plastic wastes recycling business. • Demonstrate book keeping of accounts and various transactions. • Determine the prices of various inputs and products for the business. • Determine the need and requirement of the clients. • Determine critical market information which is important for the business. • Evaluate the influence of various quality parameters of products/pellets on the product pricing. • Choose appropriate buyer in a given situation of market parameters. • Identify best ways of attracting market price for one's produce. • Perform banking transactions required to run a business.	White board, marker, duster, laptop/PC, projector, flipcharts
10	**Marketing & customer relationship** **Theory Duration** (hh:mm) 32:00 **Practical Duration** (hh:mm) 64:00 **Corresponding NOS Code** RSC/N4906 (CPC/N2923)	• Build cordial relations with various clients for the benefit of industry. • Determine the need and requirement of the clients. • Determine the critical market information which is important for the business. • Perform market analysis for developing customer base. • Assess competitor's strengths and weakness to win new business. • Compare the advantage and disadvantage of doing business with each customer. • Use industry contacts to increase the business.	White board, marker, duster, laptop/PC, projector, flipcharts
11	**Basics of computer and data entry operations** **Theory Duration** (hh:mm) 24:00 **Practical Duration** (hh:mm) 72:00	• Identify data entry formats used in shop floor. • Perform data entry in the prescribed format as per Company's SOP. • Identify different computer devices used for data input. • Perform data feeding in to computer application. • State the different MS office application used for office work.	White board, marker, duster, Laptop/PC, projector, MS Office suite, flipcharts

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Corresponding NOS Code RSC/N4504 (CPC/N0219)	• Perform data entry for presentation in different MS office applications. • Perform documents scanning as per process requirement. • Perform verification of the data entered with source documents. • Perform file maintenance of documents created.	
	Total Duration: **Theory Duration 288:00** **Practical Duration 672:00**	**Unique Equipment Required:** White board, marker duster, laptop/PC, projector, weighing balance, calculator, die, pelletizer, automatic hopper loader, hot air oven and dryer, scrap grinder, hot air blow gun, water cooling tower, single screw- mechanical recycling plant, twin screw- mechanical recycling plant, chemical recycling machine, grinder/ Shredder, agglomerators/ Spin Drier / Silo with drier, cleaning equipment, material handling equipment, safety goggles, rubber gloves, heat protecting gloves, fire extinguisher, apron, helmet, first aid box	

Grand Total Course Duration: 960 Hours, 0 Minutes.

*(This syllabus/ curriculum has been approved by **Rubber Skill Development Council)***

Trainer Prerequisites for Job role: "Machine Operator – Plastics Recycling" mapped to Qualification Pack: "RSC/Q4902 (CPC/Q2904), v1.0"

Sr. No.	Area	Details
1	**Description**	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack "RSC/Q4902 (CPC/Q2904), Version 1.0".
2	**Personal Attributes**	Aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well- organised and focused, eager to learn and keep oneself updated with the latest in the mentioned field.
3	**Minimum Educational Qualifications**	Any Graduate preferably in plastic technology.
4a	**Domain Certification**	Certified for Job Role: "Machine Operator – Plastics Recycling" mapped to QP: "RSC/Q4902 (CPC/Q 2904)". Minimum accepted score as per SSC guidelines is 80%.
4b	**Platform Certification**	Recommended that the Trainer is certified for the Job Role: "Trainer", mapped to the Qualification Pack: "MEP/ Q0102". Minimum accepted score as per SSC guidelines is 80%.
5	**Experience**	5+ years of relevant work-experience, above supervisor level.

Annexure: Assessment Criteria

Assessment Criteria	
Job Role:	**Machine Operator – Plastics Recycling**
Qualification Pack Code:	**RSC/Q4902 (CPC/Q 2904)**
Sector Skill Council:	**Rubber Skill Development Council**

S. No.	Guidelines for Assessment
1	Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2	The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3	Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below).
4	Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criterion.
5	To pass the Qualification Pack, every trainee should score a minimum of 70% of aggregate marks to successfully clear the assessment.
6	In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack.

Assessable Outcome	Assessment Criteria	Total Mark (800)	Out Of	Marks Allocation	
				Theory	Skills Practical
RSC/N4901 (CPC/N2911) Understand basic concepts, job requirements & basics knowledge related to process	PC1. Interact with the operator in order to understand the production schedule.	163	9.5	2.5	7
	PC2. Help in planning the day's production activities based on the operator's instructions.		9.5	2.5	7
	PC3. Check availability of consumables and plastics materials for production in sufficient quantity as per production plan / operators instructions.		9	1.5	7.5
	PC4. Follow the does and don'ts of the manufacturing process as defined in SOPs / Work Instructions or defined by operator.		9	1.5	7.5
	PC5. Check availability of the personal protective equipments (PPE) like gloves, goggles etc.		9	1.5	7.5
	PC6. Follow the moulding procedure and process to be adopted for completing the work order from the operator by referring the work instruction document / SOP manual.		9	1.5	7.5
	PC7. Ensure that the required plastics waste material is procured from the store before starting the process.		9	1.5	7.5
	PC8. Handle the die and pelletizer etc. required for executing the required operation and ensure that the same is available for operation.		9	1.5	7.5
	PC9. Collect the die from tool room, if die is not available.		9	1.5	7.5
	PC10. Install and bolt the die and pelletizer etc. in place.		9	1.5	7.5
	PC11. Add the plastics waste material in the machine using material loader or by manual feeding.		9	1.5	7.5
	PC12. Ensure die are clean if not clean with soft cotton cloth.		9	2.5	6.5
	PC13. Ensure cleaning of the other auxiliaries tools, (if any) before the initiation of the recycling and pelletizing process.		9	2.5	6.5
	PC14. Ensure cleaning of the area around the apparatus for any oil, grease, combustible substances etc. so as to prevent any accident.		9	2.5	6.5
	PC15. Ensure availability of the coolant and working of valves to circulate the coolant to cool and solidify plastic filaments for pelletizing.		9	2.5	6.5
	PC16. Identify the plastics waste material like dust, moisture etc. required for executing the activity.		9	2.5	6.5
	PC17. Refer the queries to supervisor if they cannot be resolved by the operator.		9	2.5	6.5

Assessable Outcome	Assessment Criteria	Total Mark (800)	Out Of	Marks Allocation	
				Theory	Skills Practical
	PC18. Confirm self - understanding to the operator once the query is resolved so that all doubts and queries can be resolved before the actual process execution.		9	2.5	6.5
	Total		**163**	**36**	**127**
RSC/N4904 (CPC/N2921) Perform the plastics recycling related operations, monitor process parameters and troubleshoot the process / product if any	PC1. Check for operation of recycling apparatus like hopper, heaters, washing equipment etc. as per the checklist provided.	**180**	17	5	12
	PC2. Fix the desired dies to the extrusion machine in order to achieve the desired operation as per the Work Instructions/ SOPs.		17	5	12
	PC3. Make modifications in the process parameters (by selecting the right program from the machine control system) if required and ensure alignment with the prescribed standards.		17	5	12
	PC4. Perform preheating of sorted plastic wastes (In case of engineering plastics).		16	4	12
	PC5. Ensure that the plastic waste is mixed with additives, fillers (if any) before being fed into the hopper.		14	4	10
	PC6. Conduct a test process and produce a sample output as per requirement.		13	4	9
	PC7. Ensure that the inspection and dimensions of the output pellets are inspected and measured as per the process given in the Work Instructions/ SOP.		13	4	9
	PC8. In case the test product or pellets matches the dimensions and quality of the final output, start the production process.		13	4	9
	PC9. Feed the required operation code in the apparatus for heaters to melt the plastic waste at the predefined temperature.		12	3	9
	PC10. Enter moulding temperature, volume of plastic waste and weight settings in the machine as per data sheet.		12	3	9
	PC11. Enter machine and process parameters such as pressure and time as per the data sheet.		12	3	9
	PC12. Add master batch and fillers as per standard composition and mix it well.		12	3	9
	PC13. Check-list procedure to ensure quality of final product.		12	3	9
	Total		**180**	**50**	**130**

Assessable Outcome	Assessment Criteria	Total Mark (800)	Out Of	Marks Allocation	
				Theory	Skills Practical
RSC/N4905 (CPC/N 2922) To conduct quality check and inspection of contamination levels of the recycled resins with reference to approved product	PC1. Compare texture, colour, surface properties, hardness and strength etc. with the given approved product.	**110**	30	10	20
	PC2. Note down the observations of the basic inspection process and Identify pieces which are OK and also not meeting the specified standards.		15	5	10
	PC3. Discard the batch which are contaminated and reprocess it again.		13	3	10
	PC4. Maintain records of each category of work outputs as per the batch etc.		13	3	10
	PC5. Escalate all issues related to change in surface properties, Tensile strength etc. so that the manufacturing equipment can be reset to achieve the specified output.		13	3	10
	PC6. Provide first and last output from each batch to the lab for quality check on its composition, properties etc.		13	3	10
	PC7. Obtain clearance for the entire batch from the lab.		13	3	10
	Total		**110**	**30**	**80**
RSC/N4101 (CPC/N0411) Maintain basic health and safety practices at the workplace, 5S	PC1. Wear protective clothing / equipment for specific tasks and work conditions.	**40**	2.5	0.5	2
	PC2. Carry out safe working practices while dealing with hazards to ensure the safety of self and others.		2.5	0.5	2
	PC3. Keep good housekeeping practices at all times.		2.5	0.5	2
	PC4. Use the various appropriate fire extinguishers on different types of fires correctly.		2.5	0.5	2
	PC5. Demonstrate rescue techniques applied during fire hazard, demonstrate good housekeeping in order to prevent fire hazards, demonstrate the correct use of a fire extinguisher.		2.5	0.5	2
	PC6. 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.		2.5	0.5	2
	PC7. Inform the concerned authorities on the potential risks identified in the processes, workplace area/ layout, materials used etc. Inform the concerned authorities about machine breakdowns, damages which can potentially harm man/ machine during operations.		2.5	0.5	2

Assessable Outcome	Assessment Criteria	Total Mark (800)	Out Of	Marks Allocation	
				Theory	Skills Practical
	PC8. Create awareness amongst other by sharing information on the identified risks.		2.5	0.5	2
	PC9. Follow the sorting process and check that the tools, fixtures and jigs that are lying on workstations are the ones in use and un-necessary items are not cluttering the workbenches or work surfaces.		2.5	0.5	2
	PC10. Ensure segregation of waste in hazardous / non Hazardous waste as per the sorting work instructions.		2.5	0.5	2
	PC11. Follow the technique of waste disposal and waste storage in the proper bins as per SOP.		1.5	0.5	1
	PC12. Segregate the items which are labeled as red tag items for the process area and keep them in the correct places.		1.5	0.5	1
	PC13. Sort the tools/ equipment/ fasteners/ spare parts as per specifications/ utility into proper trays, cabinets, lockers as mentioned in the 5S guidelines/ work instructions.		1.5	0.5	1
	PC14. Ensure that areas of material storage areas are not Overflowing. PC15. Properly stack the various types of boxes and containers as per the size/ utility to avoid any fall of items/ breakage and also enable easy sorting when required.		1.5	0.5	1
	PC16. Return the extra material and tools to the designated sections and make sure that no additional material/ tool are lying near the work area.		1.5	0.5	1
	PC17.Follow the floor markings/ area markings used for demarcating the various sections in the plant as per the prescribed instructions and standards.		1.5	0.5	1
	PC18. Follow the proper labelling mechanism of instruments / boxes / containers and maintaining reference files / documents with the codes and the lists.		1.5	0.5	1
	PC19. Check that the items in the respective areas have been identified as broken or damaged.		1.5	0.5	1
	PC20. Follow the given instructions and check for levelling of fluids, oils, lubricants, solvents, chemicals etc. and proper storage of the same To avoid spillage, leakage, fire etc.		1.5	0.5	1
	PC21.Make sure that all material and tools are stored in the designated places and in the manner indicated in the 5S instructions.		1.5	0.5	1
	Total		**40**	**10**	**30**

Assessable Outcome	Assessment Criteria	Total Mark (800)	Out Of	Marks Allocation	
				Theory	Skills Practical
RSC/N4906 (CPC/N 2923) Entrepreneurship in plastics recycling	PC1. Plan and Budgeting with reference to various Plastics waste for recycling.	85	7.5	0.5	7
	PC2. Keep books of accounts and various transactions.		8	1	7
	PC3. Arrange for financial assistance from various quarters in the light of various schemes available in setup for plastic recycling.		8	1	7
	PC4. Ascertain the prices of various inputs and products from the market.		8	1	7
	PC5. Assess the influence of various quality parameters of products/ pellets on the product pricing.		8	1	7
	PC6. Establish cordial relations with various clients for the benefit of industry.		8	1	7
	PC7. Assess the needs and requirement of the clients and assess one's own unique selling proposition.		8	1	7
	PC8. Extract critical market information that is otherwise not in the public domain.		8	1	7
	PC9. Choose appropriate buyer in a given situation of market parameters.		8	1	7
	PC10. Identify best ways of attracting market price for one's produce.		8	1	7
	PC11. Ensure good quality before and during the sale activity to ensure good returns.		5.5	0.5	5
	Total		**85**	**10**	**75**
RSC/N4504 (CPC/N0219) Basics of computer and data entry in MS office / office open source suite software	PC1. Fill and process mandated forms for receiving, processing, or tracking data enter data from source documents (such as trial report, process sheet etc.) in to computer application having MS OFFICE software.	22	3	2	1
	PC2. Scan source documents in accordance with specific instructions.		3	2	1
	PC3. Verify data entered with source documents, checks for compliance and corrects all typographical errors and missing or repeated data.		3	2	1
	PC4. Maintain files of source documents or other information related to data entered.		3	2	1
	PC5. Investigate and confirm data that is unclear before entering, generate reports of data entry, store completed work in designated locations and perform backup operations.		3	2	1
	PC6. Update database information to reflect most current source information.		2	1	1

Assessable Outcome	Assessment Criteria	Total Mark (800)	Out Of	Marks Allocation	
				Theory	Skills Practical
	PC7. Assist in the filing and storage of security and back up data files.		3	2	1
	PC8. Respond to requests for information and access relevant files.		2	1	1
	Total		**22**	**14**	**8**
	Grand Total	**600**	**600**	**150**	**450**
	Percentage Weightage:			**25%**	**75%**
	Minimum Pass% to qualify (aggregate):			**70%**	