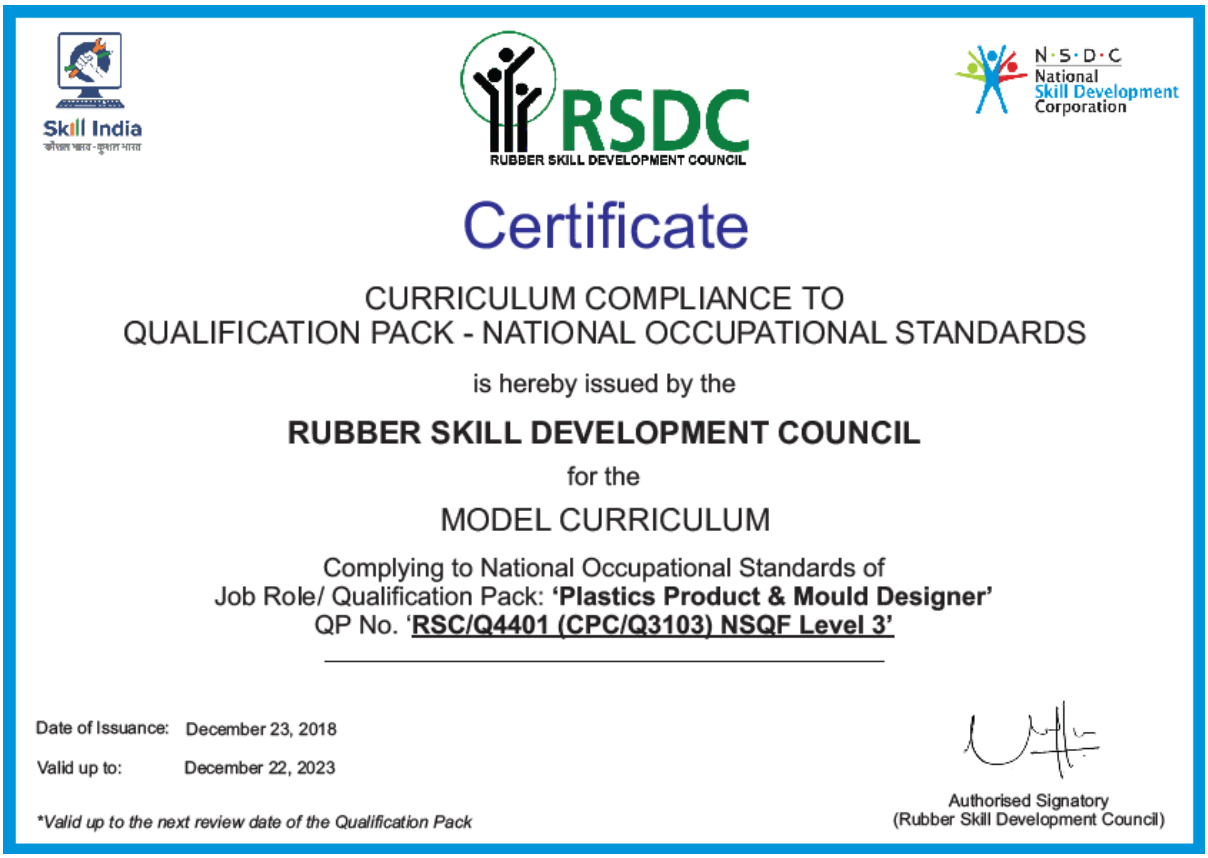
Model Curriculum

Plastic Product & Mould Designer

SECTOR: Rubber
SUB-SECTOR: Manufacturing / Plastics Processing
OCCUPATION: Design
REF ID: RSC/Q4401 (CPC/Q3103), V1.0
NSQF LEVEL: 3



Skill India
कौशल भारत-कुशल भारत

RSDC
RUBBER SKILL DEVELOPMENT COUNCIL

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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: **'Plastics Product & Mould Designer'**
QP No. **'RSC/Q4401 (CPC/Q3103) NSQF Level 3'**

Date of Issuance: December 23, 2018

Valid up to: December 22, 2023

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

Authorised Signatory
(Rubber Skill Development Council)

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Plastic Product & Mould Designer

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "Plastic Product & Mould Designer", in the "Rubber" Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	**Plastic Product & Mould Designer**		
Qualification Pack Name & Reference ID	RSC/Q4401 (CPC/Q3103), v1.0		
Version No.	1.0	**Version Update Date**	29/05/2019
Pre-requisites to Training	VIII Standard		
Training Outcomes	**After completing this programme, participants will be able to:** • Function effectively as a team player , within the group or outside • Use housekeeping techniques for maintaining cleanliness at workplace. • Comply with the health, safety and security procedures stated by the organisation. • Describe basic concepts of engineering drawing. • Interpret the mould drawing. • Describe construction of different type of moulds. • Prepare drawing with the layout of mould components and release upgraded version based on mould design change. • Inspect mould parts against relevant drawing. • Create report for mould and mould part production. • Perform repair of mould parts.		

This course encompasses 5 out of 5 NOS (National Occupational Standards) of "Plastic Product & Mould Designer" 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) 8:00 **Corresponding NOS Code** Bridge Module	• Explain the developmental history of plastics. • Describe the current industrial scenario of plastics and prospects. • Identify different types of plastic. • Recognise major industrial associations. • Identify the equipment used for plastic product and mould designing. • Describe the roles and responsibilities of a Plastic Product and Mould Designer.	White board, marker, duster, laptop/PC, projector, flipcharts, samples – plastic injection moulded products, plastic extruded products, plastic blow moulded products
2	**Communication skills and Personality Development** **Theory Duration** (hh:mm) 32:00 **Practical Duration** (hh:mm) 48:00 **Corresponding NOS Code** RSC/N4401 (CPC/N3104)	• Describe the types of communication used at work place. • Use appropriate communication practices at work place as per the requirement of the situation. • Demonstrate the process of overcoming problems in communication. • Apply active listening skills while interacting with others at work. • Use appropriate tone, pitch and language to convey message. • Demonstrate the process of escalating grievances and problems to the appropriate authority. • Determine the time required for the task in hand and communicate the same. • Identify issues while working with colleagues and take the initiative to solve them. • Comply with the organization's policies and procedures for working with colleagues. • Share resources with other team members as per priority of tasks	White board, marker duster, laptop/PC, projector, flipcharts
3	**Health and safety** **Theory Duration** (hh:mm) 24:00 **Practical Duration** (hh:mm) 64:00 **Corresponding NOS Code** RSC/N4101	• Identify various hazards at the shop floor. • Identify different types of Personal Protective Equipment (PPE) used at a shop floor. • Demonstrate the use of different Personal Protective Equipment (PPE). • Describe various emergency situations at a shop floor. • Describe the common injuries in the industry. • Describe first aid box and its constituents.	White board, marker, duster, laptop/PC, projector, safety goggles, rubber gloves, heat protecting gloves, fire extinguisher, apron, helmet, first aid box

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	(CPC/N0411)	• Demonstrate how to use a multi-purpose Fire Extinguisher. • Select suitable fire extinguisher as per fire type and class. • Describe what is housekeeping? • Explain the importance and purpose of housekeeping. • Describe '5S.' • Identify housekeeping equipment. • Perform the process of cleaning of the machines. • Demonstrate the housekeeping of work area with specified equipment and material.	
4	**Engineering drawing and mould design** **Theory Duration** (hh:mm) 24:00 **Practical Duration** (hh:mm) 72:00 **Corresponding NOS Code** RSC/N4402 (CPC/N3112)	• Interpret the mould drawing. • Identify critical dimensions for the mould. • Identify and select the raw material required to make the mould. • Analyze the raw material and equipment requirement for a new tool such as: - Type of Moulds & Dyes - Mechanism required as per the moulding process - Online gauges, if required - Fixtures & associated parts - Robot mechanism • Determine the dimension required for new product in plastics as per the application. • Determine plastic material required for the product basis its application. • Create the drawings for the required plastics product using CAD software. • Determine the outline dimensions and other details for the selected machine. • Design the mechanism of working for the mould/ dye. • Create the drawings for the required mould / dye using CAD / CAE software. • Use simulation software as per the requirement to review the drawings.	White board, marker duster, laptop/PC, projector, plastic samples with engineering drawings, design board, drafter, CAD software, CAE Software
5	**Creating mould drawing** **Theory Duration** (hh:mm) 24:00 **Practical Duration** (hh:mm) 72:00	• Create the drawings for all the parts of the mould/ dyes. • Create the list of the parts for the mould/ dyes. • Determine and mention the required raw material on the mould drawing, with size of the mould parts. • Perform the activity of releasing the mould/ dye drawing to the user.	White board, marker duster, laptop/PC, projector, plastic samples with engineering drawings, design board, drafter, CAD software, CAE Software

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Corresponding NOS Code RSC/N4403 (CPC/N3114)	• Monitor the mould development. • Determine the reasons for the problem encountered while development of the mould. • Mention the changes required, for developing the mould, in the drawing and release new drawing. • Determine the quality issues faced while running a trial for the development of the mould, and modify the drawing as required. • Apply quality system to develop defect free mould. • Determine the impact on the fixture parts / mechanism due to the engineering changes required in the design. • Use standard operating procedure for releasing the modified documents.	
6	**Upgrade the mould development knowledge** **Theory Duration** (hh:mm) 24:00 **Practical Duration** (hh:mm) 72:00 **Corresponding NOS Code** RSC/N4404 (CPC/N3117)	• Use micrometer, vernier calliper, gauges, rulers, weighing scales and any other inspection equipment to measure the specifications of the mould parts. • Compare texture, surface properties, hardness and strength with the given product specifications. • Create the batch wise records of each category of work outputs • Determine the linkage between rejection of the part produced and the possible causes for the same. • Apply quality assurance standard for controlling rejection. • Perform rectification of minor defects like shape deformation, grooves, holes etc. • Perform escalation of all issues related to changes in surface properties, hardness etc.	White board, marker duster, laptop/PC, projector, vernier caliper, micrometer, height gauge, gauges, steel scale, weighing scale, hardness tester, surface plate
	Total Duration: **Theory Duration 144:00** **Practical Duration 336:00**	**Unique Equipment Required:** White board, marker duster, laptop/PC, projector, design board, drafter, CAD software, CAE Software, vernier caliper, micrometer, height gauge, gauges, steel scale, weighing scale, hardness tester, surface plate, safety goggles, rubber gloves, fire extinguisher, apron, helmet, first aid box.	

Grand Total Course Duration: 480 Hours, 0 Minutes.

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

Trainer Prerequisites for Job role: "Plastic Product & Mould Designer" mapped to Qualification Pack: "RSC/Q4401 (CPC/Q3103), 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/Q4401 (CPC/Q3103) 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- organized 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: "Plastic Product & Mould Designer" mapped to QP: "RSC/Q4401 (CPC/Q3103)". 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/ Q2601". 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:	**Plastic Product & Mould Designer**
Qualification Pack Code:	**RSC/Q4401 (CPC/Q3103)**
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/ 4401 (CPC/N3104) Communication skill and personality development	PC1. Maintain clear communication with colleagues.	31	2	0.5	1.5
	PC2. Work with colleagues.		2	0.5	1.5
	PC3. Pass on information to colleagues in line with organizational requirements.		2	0.5	1.5
	PC4. Work in ways that show respect for colleagues.		2	0.5	1.5
	PC5. Carry out commitments made to colleagues.		2	0.5	1.5
	PC6. Let colleagues know in good time if cannot carry out commitments, explaining the reasons.		2	0.5	1.5
	PC7. Identify problems in working with colleagues and take the initiative to solve these problems.		2	0.5	1.5
	PC8. Follow the organization's policies and procedures for working with colleagues.		2	0.5	1.5
	PC9. Ability to share resources with other members as per priority of tasks.		2	0.5	1.5
	PC10. Note down the observations of the basic inspection process and identify pieces which are OK and also not meeting the specified standards.		2	0.5	1.5
	PC11. Separate the defective pieces into two categories – Pieces which can be repaired / modified and pieces which are beyond repair.		2	0.5	1.5
	PC12. Discard the pieces which are beyond repair and repair the ones which need minor modifications / rework.		2	0.5	1.5
	PC13. Maintain records of each category of work outputs as per the batch/ cavity etc. so that correction can be organized.		2	0.5	1.5
	PC14. Establish linkage between rejection of output and the pertinent causes for the same (process / material etc.); Recommend the means for rejection control.		1	0.5	0.5
	PC15. Rectify minor defects like shape deformation, grooves, holes etc. by cutting, finishing etc.		1	0.5	0.5
	PC16. Escalate all issues related to change in surface properties, hardness etc. so that the manufacturing equipment can be reset to achieve the specified output.		1	0.5	0.5
	PC17. Provide first and last moulding from each batch to the lab for quality check on its composition, properties etc.		1	0.5	0.5
	PC18. Obtain clearance for the entire batch from the lab		1	0.5	0.5
	Total		**31**	**09**	**22**
RSC/N4101 (CPC/N0411) Maintain basic health and safety practices at	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. Apply good housekeeping practices at all times.		2.5	0.5	2

Assessable Outcome	Assessment Criteria	Total Mark (800)	Out Of	Marks Allocation	
				Theory	Skills Practical
the workplace, 5S	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
	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 & 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 labelled 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.		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 is 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

Assessable Outcome	Assessment Criteria	Total Mark (800)	Out Of	Marks Allocation	
				Theory	Skills Practical
	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**
RSC/N4402 (CPC/N3112) Understanding the basic concepts of design, & drawings for mould components	PC1. Understand the work order (work output) required from the process and discuss the same with the supervisor.	**184**	8	2	6
	PC2. Refer all sketches/ work orders/ process related documents to understand dimensions and properties of the required work output.		8	2	6
	PC3. Understand the process requirements in terms of Temperature required for the Mould and Plastics material required and its quantity with its market rate, hydraulic pressure/ air pressure/ vacuum pressure in the machine, weight of the product, injection time, refilling time etc. as mentioned in the Work Instruction/ SOP/ Control Diagrams.		8	2	6
	PC4. Clearly understanding the does and don'ts in the working area as defined in OPs / Work Instructions or defined by supervisors.		8	2	6
	PC5. Understand the moulding procedure and process to be adopted for completing the work order from the supervisor by referring the Work Instruction document/ SOP manual.		8	2	6
	PC6. Understand the raw material like plastics granules, bonding additives etc. required for executing the activity		8	2	6
	PC7. analyze the requirement a new tool such as ➢ Type of Moulds & Dies ➢ Mechanisms within as per the moulding process ➢ Online gauges if require ➢ Fixtures & associated parts ➢ Robot mechanism required (if require) ➢ for facilitating the process of manufacturing for broad classification of process types such as ➢ Assembly Process ➢ Special processes- Polymer parts, welding, Surface/ Heat treatment.		8	2	6
	PC8. Finalize the required dimension for new required product in plastics as per the application.		8	2	6

Assessable Outcome	Assessment Criteria	Total Mark (800)	Out Of	Marks Allocation	
				Theory	Skills Practical
	PC9. Decide accurate plastic material of the product as per its application.		8	2	6
	PC10. Prepare the drawings for the required plastics product using /CAE software.		8	2	6
	PC11. Share the drawings for the Product to the in – house tool room or third party agency (if require) whichever applicable for preview & later for fabrication. Sometimes if require take approval from third party agency/supplier.		8	2	6
	PC12. On the base of work order and the discussion had with process engineer, get the outline dimensions and other details for selected Machine to be used such as Injection Moulding, Extruder, etc. for preparation of drawing.		8	2	6
	PC13. Based on the sequence of operations required for the Moulding process and required moulding machine, devise the mechanism of working for the Mould/die. Sometimes if require prototype mould may also be prepared for checking its working by using wax.		8	2	6
	PC14. Finalize the rough dimensions for the mould based on the process requirement, space constraints, aux. main equipment selected for the process by the Process Engineer and the above Product drawing. PC15. Prepare the drawings for the required Mould / Dies using CAD/CAE software.		8	2	6
	PC16. Share the drawings for the new mould / dies to the in – house tool room or third party agency whichever applicable for preview. If require discuss the point with Tool Room engineer.		8	2	6
	PC17. On the base of feedback received from process engineer, Tool Room engineer, etc. final dimension of the mould decide.		8	2	6
	PC18. If required, use simulation software for understanding the mould / die operation and review the drawings.		8	2	6
	PC19. During design stage, analyse the working of mould / die by CAE software to check end result.		8	2	6
	PC20. In case of robotics / automation application require for mould functioning, finalize the operation sequence program in consultation with the process engineer.		8	2	6
	PC21. Decide in consultation with Process Designer / Manager required working system for the mould/die like Guiding system, Feed system, Ejection system etc. in injection mould. Type of die, size of mandrel required in extrusion die and shape of bottle and its size in blow moulding.		8	2	6
	PC22. Decide in consultation with Process Designer/ Manager, all the technical dimension of sub parts of the mould/dies as per requirement of sample and process.		8	2	6

Assessable Outcome	Assessment Criteria	Total Mark (800)	Out Of	Marks Allocation	
				Theory	Skills Practical
	PC23. Decide typical allowances, Fits and tolerance required on matching parts for process trimming, and warpage etc. are considered based on requirement & past experience of the machining process.		8	2	6
	PC24. Once finalized, then inform the in – house tool room or third party agency for reviewing the complete Mould profile, dimensions and accordingly if required update the drawings. PC25. For any on-line gauges designed as part of this exercise ensures GD & T requirements are adhered to.		8	2	6
	Total		**184**	**46**	**138**
RSC/N4403 (CPC/N3114). Preparation of drawing with the layout of mould components and upgrade the information about the documentation of drawing	PC1. Complete the parts – list and drawings / specifications for all the plates/items required for the mould / dies.	**104**	9	2	7
	PC2. Prepare require raw material list with it's required size as per the finished plates/items.		9	2	7
	PC3. Release the drawings of the Mould / Die to Production department/ In – House / user.		8	2	6
	PC4. If require, release the model of the core & cavity along with drawing.		8	2	6
	PC5. Monitor its development as per machining process in Tool Room for any revisions, clarity required etc.		8	2	6
	PC6. In case of any problem encountered while development of the Mould, usage by Production during process, probe the reasons and if required, modify / re-design in coordination with in – house tool room or third party agency, based on the severity of problem.		8	2	6
	PC7. During assembly of parts of the mould, if further any modification require, release new sub drawing to overcome the problem.		8	2	6
	PC8. After trial of the mould, if any parts of the mould is required to modify, release new drawing of the part with consultant to process engineer.		8	2	6
	PC9. In case of any Engineering Change require in the design OR a process or any part dimension change, review the impact on fixture parts / mechanism and decide the action of Rework / re make based on cost and time available / production requirement schedules by the moulds. Check the size, stock and raw material available with the company or in the market.		8	2	6
	PC10. To save the time, the discussion may be done with process engineer, Tool Room engineer analyzer to use the material available in the company by changing the shape /dimension. Re-draw the parts and release the issue-II drawing.		8	2	6
	PC11. Based on the above make the changes in drawing / part-list and order the new parts/ rework with help of Validation/ Process engineer.		8	2	6

Assessable Outcome	Assessment Criteria	Total Mark (800)	Out Of	Marks Allocation	
				Theory	Skills Practical
	PC12. Make final changes in documentation after trials by declaring successful design by the user and release the change documents as per SOP.		7	1	6
	PC13. In consultation with the process engineer / Tool Room / Mould Designer, maintain the performance data of the mould and keep in safe custody for next project.		7	1	6
	Total		**104**	**24**	**80**
RSC/N4404 (CPC/N3117): Upgrade the knowledge by preparing of mould component and verify it	PC1. Measure the specifications of the finished product using devices like micrometers, Vernier calipers, gauges, rulers, weighing scales and any other inspection equipment and compare with the parameters given in the work order.	**41**	4	1	3
	PC2. Compare texture, surface properties, hardness and strength with the given product specifications.		4	1	3
	PC3. Note down the observations of the basic inspection process and identify pieces which are OK and also not meeting the specified standards.		4	1	3
	PC4. Separate the defective pieces into two categories – pieces which can be repaired/ modified and pieces which are beyond repair.		4	1	3
	PC5. Discard the pieces which are beyond repair and repair the ones which need minor modifications / rework.		4	1	3
	PC6. Maintain records of each category of work outputs as per the batch / cavity etc. so that correction can be organized.		4	1	3
	PC7. Establish linkage between rejection of output and the pertinent causes for the same (process / material etc.); Recommend the means for rejection control.		4	1	3
	PC8. Rectify minor defects like shape deformation, grooves, holes etc. by cutting, finishing etc.		4	1	3
	PC9. Escalate all issues related to change in surface properties, hardness etc. so that the manufacturing equipment can be reset to achieve the specified output.		3	1	2
	PC10. Provide first and last moulding from each batch to the lab for quality check on its composition, properties etc.		3	1	2
	PC11. Obtain clearance for the entire batch from the lab.		3	1	2
	Total		**41**	**11**	**30**
	Grand Total	**400**	**400**	**100**	**300**
	Percentage Weightage:			**25%**	**75%**
	Minimum Pass% to qualify (aggregate):			**70%**	