



Model Curriculum

1. Extrusion Operator

SECTOR: PAINTS AND COATINGS
SUB-SECTOR: MANUFACTURING
OCCUPATION: POWDER PRODUCTION
REF ID: PCS/Qo6o2, V1.0
NSQF LEVEL: 3



PAINTS AND
COATINGS
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CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

PAINTS AND COATINGS SKILL COUNCIL

for

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/Qualification Pack: 'Extrusion Operator' QP No. 'PCS/Qo6o2 NSQF Level 3'

Date of Issuance: December 27th, 2016

Valid up to*: March 31st, 2018

*Valid up to the next review date of the Qualification Pack or the
"Valid up to" date mentioned above (whichever is earlier)

Authorised Signatory
(Paints and Coatings Skill Council)



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Extrusion Operator

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “Extrusion Operator”, in the “Paints and Coatings” Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	Extrusion Operator		
Qualification Pack Name & Reference ID. ID	PCS/Qo6o2, v1.0		
Version No.	1.0	Version Update Date	
Pre-requisites to Training	5 th Standard		
Training Outcomes	<p>After completing this programme, participants will be able to:</p> <ul style="list-style-type: none"> • Know about the sector: Discuss the Paints and Coatings sector in India and its sub-sectors • Know about Powder Coating: What is Powder Coating; its benefits and features • Know about the major ingredients of powder coating. • Know about paint manufacturing in general and powder coating manufacture in particular and the process flow. • Understand the working of an extrusion mill, learn its calibration and operation and cleaning procedure after completion of the job. • Demonstrate various skills: Performance of behavioural, professional, technical and communication skills • Understand safety: Work in a safe manner without endangering your health and that of your colleagues 		



This course encompasses 5 out of 5 National Occupational Standards (NOS) of “Extrusion Operator” Qualification Pack issued by “Paints and Coatings Skill Council”.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	<p>Introduction</p> <p>Theory Duration (hh:mm) 6:00</p> <p>Practical Duration (hh:mm) 00:00</p> <p>Corresponding NOS Code Bridge Module</p>	<ul style="list-style-type: none"> Understand General Discipline in the class room (Do’s & Don’ts) Understand the scope of the Paints and Coatings sector in India with its sub sectors Understand the Powder Coating segment Advantages and benefits and features of Powder Coatings as well as its shortcomings Learn and Practice Basic skills of communication 	Laptop, white board, marker, projector
2	<p>Premix the raw materials</p> <p>Theory Duration (hh:mm) 30:00</p> <p>Practical Duration (hh:mm) 50:00</p> <p>Corresponding NOS Code PCS/No602</p>	<ul style="list-style-type: none"> Understand what are Powder Coatings, types, their characteristics and where they are used Compare and explain differences between Powder Coating and Liquid Paints Understand components of Powder Coating and its chemistry Learn basics of how Powder Coatings are manufactured Learn to study and understand customer specifications for Powder Coatings Understand and describe different colour finish and specifications in Powder Coatings Learn and understand the process flow, the process document sheet. Learn and understand the working and function of each equipment of powder coating manufacture. Learn and understand the working of the Extrusion Mill Identify the extrusion mill controls to calibrate the mill as per the process requirement. Collect the required raw material from the Stores and record. Understand and operate the Extrusion mill as per the SOP Pre-mix the raw materials as per the process sheet. Communicate with the supervisor regarding the operation at each stage 	<p>Laptop, white board, marker, projector, first aid kit.</p> <p>Lab model powder processing set up.</p>



3	<p>Operate the Extrusion Mill</p> <p>Theory Duration (hh:mm) 30:00</p> <p>Practical Duration (hh:mm) 60:00</p> <p>Corresponding NOS Code PCS/No603</p>	<ul style="list-style-type: none"> Understand and identify the controls of the Extrusion Mill, calibrate the Extruder Mill as per the process requirements and SOP. Operate the Extrusion Mill as per the SOP, monitor the quality of the mill output. Clean the extrusion mill after completion of the job, understand and follow the SOP for cleaning. 	<p>Laptop, white board, marker, projector, first aid kit.</p> <p>Lab model powder processing set up.</p>
4	<p>Co-ordinate with colleagues and/or customers</p> <p>Theory Duration (hh:mm) 08:00</p> <p>Practical Duration (hh:mm) 04:00</p> <p>Corresponding NOS Code PCS/N9901</p>	<ul style="list-style-type: none"> Understand customer requirements and specifications Learn about various performance indicators, meaning of targets and timelines and how to communicate about these with your colleagues and customers Learn appropriate behavioural skills whilst dealing with colleagues/co-workers Learn how you can contribute to improving customer satisfaction 	<p>Laptop, white board, marker, projector</p>
5	<p>Maintain standards of product / service quality</p> <p>Theory Duration (hh:mm) 12:00</p> <p>Practical Duration (hh:mm) 10:00</p> <p>Corresponding NOS Code PCS/N9902</p>	<ul style="list-style-type: none"> Learn about quality requirements for Powder Coating process Understand how quality is defined, various tests and their acceptance criteria, and how standards can be achieved Learn about various equipment used for quality tests and how to use them Learn to meet and exceed quality requirements of a customer 	<p>Laptop, white board, marker, projector</p>
6	<p>Maintain OH&S standards and follow environmental standards</p> <p>Theory Duration (hh:mm) 10:00</p> <p>Practical Duration (hh:mm)</p>	<ul style="list-style-type: none"> Learn about health hazards of chemicals used in Powder Coating process as well as Powder Coating materials Learn the use and importance of personal protective equipment Learn to handle chemical, powder materials, tools and equipment in a safe manner Minimising risks of inhalation injury 	<p>Laptop, white board, marker, projector</p>



	<p>20:00</p> <p>Corresponding NOS Code PCS/N9903</p>	<ul style="list-style-type: none"> • Become aware of hazards in Powder Coating process and how to prevent/eliminate them • Understand methods and precautions to be taken for safe disposal of waste generated in the coating process • Learn about safety signs in a plant environment and how to interpret and adhere to them 	
	<p>Total Duration</p> <p>Theory Duration 96:00</p> <p>Practical Duration 144:00</p>	<p>Unique Equipment Required: First aid kit</p>	

Grand Total Course Duration: **240Hours, 0 Minutes**

(This syllabus/ curriculum has been approved by [Paints and Coatings Skill Council](#))



Trainer Prerequisites for Job role: "Extrusion Operator" mapped to Qualification Pack: "PCS/Qo6o2, v1.0"

Sr. No.	Area	Details
1	Description	An Extrusion Operator in an individual who feeds the raw materials for premixing and operates the extrusion machine in order to obtain the flakes, for powder paint manufacturing process, as per company's or customer's specifications working under supervision
2	Personal Attributes	An Extrusion Operator should have good physical strength, ability to work in paint-redolent environment, attention to details, good eyesight, and superior hand-eye coordination.
3	Minimum Educational Qualifications	B. Sc. (Chemistry)/(Paint Technology)
4a	Domain Certification	Certified for Job Role: "Extrusion Operator" mapped to QP: "PCS/Qo6o2, v1.0". Minimum accepted score is 80%
4b	Platform Certification	Recommended that the Trainer is certified for the Job Role: "Trainer", mapped to the Qualification Pack: "SSC/Q14o2". Minimum accepted % as per respective SSC guidelines is 70%.
5	Experience	<ul style="list-style-type: none"> 5-year experience in laboratory or manufacturing and relevant training or teaching experience.



Annexure: Assessment Criteria

Assessment Criteria	
Job Role	Extrusion Operator
Qualification Pack	PCS/Qo602, v1.0
Sector Skill Council	Paints and Coatings

Sr. 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 centre (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 criteria
5	To pass the Qualification Pack, every trainee should score a minimum of 60% in aggregate and each NOS
6	In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack.

	Performance Criteria	Total Marks (250)	Out of	Theory	Skills Practical
PCS/N0602 Premix the raw materials	PC1. receive the process doc-sheet from the shift in-charge or production supervisor	50	2.5	1	1.5
	PC2. understand the overall process flow		2.5	1	1.5
	PC3. understand the specific instructions pertaining to the premix and extruder operation		2.5	1	1.5
	PC4. assimilate the materials required		2.5	1	1.5
	PC5. understand the raw materials resin, hardener, pigment, additive, fillers, etc. required for the batch		2.5	1	1.5
	PC6. understand the location of the above mentioned class of raw materials in the store		2.5	1	1.5
	PC7. weigh the appropriate quantities of the raw materials using the appropriate aids and equipment like scales, gloves, etc		2.5	1	1.5
	PC8. replace the excess raw materials in the appropriate locations		2.5	1	1.5
	PC9. record the details of the raw materials taken for the batch		2.5	1	1.5
	PC10. identify the mixer controls in the equipment control room or chamber		2.5	1	1.5
	PC11. calibrate the mixer by modifying specifications such as temperature, flow, discharge control, etc.		2.5	1	1.5
	PC12. ensure the calibration is in line with the process requirements		2.5	1	1.5



	Performance Criteria	Total Marks (250)	Out of	Theory	Skills Practical
	PC13. ensure the other equipment controls are not modified, once set		2.5	1	1.5
	PC14. notify the shift in-charge or production supervisor about completion of calibration before exiting the equipment control room or chamber		2.5	1	1.5
	PC15. take the weighed raw materials like resin, hardener, pigment, additive, fillers, etc		2.5	1	1.5
	PC16. approach the mixer and position appropriately to load the same		2.5	1	1.5
	PC17. load the mixer with the raw materials		2.5	1	1.5
	PC18. ensure that the mixing process is carried out for the requisite time		2.5	1	1.5
	PC19. ensure that the mixed by-product moves to the extruder		2.5	1	1.5
	PC20. halt the mixer after a particular batch, if required		2.5	1	1.5
	POINTS		50	20	30
	TOTAL POINTS		50		

	Performance Criteria	Total Marks (250)	Out of	Theory	Skills Practical
PCS/N0603 Operate the extrusion mill	PC1. identify extruder controls in the equipment control room or chamber	50	2.5	1	1.5
	PC2. calibrate the extruder by modifying specifications such as temperature, flow, pressure, etc.		3	1	2
	PC3. ensure the calibration is in line with the process requirements		3	1	2
	PC4. ensure the other equipment controls are not modified, once set		3	1	2
	PC5. notify the shift in-charge or production supervisor about completion of calibration before exiting the equipment control room or chamber		3	1	2
	PC6. operate the extruder as per standard operating procedure		3	1	2
	PC7. ensure the flakes are discharged in the discharge crater		3	1	2
	PC8. ensure the flakes are cooled for the stipulated time		3	1	2
	PC9. ensure the ground product moves to the next stage, i.e., grinding process in stipulated time and as per specified quality standards		3	1	2



	Performance Criteria	Total Marks (250)	Out of	Theory	Skills Practical
	PC10. cease the operation once the batch is completed		3	1	2
	PC11. inspect the overall process flow in order to achieve productivity standards		3	1	2
	PC12. visually assess the flakes from the extruder to check if they are in line with process requirement		3	1	2
	PC13. notify the shift in-charge / production supervisor in case of any significant deviation from the process requirements		3	1	2
	PC14. identify the various parts / chambers of the extruder		3	1	2
	PC15. understand how the extruder needs to be handled during cleaning		3	1	2
	PC16. clean the various parts of the extruder like barrel, liner, flow channels, etc.		3	1	2
	PC17. make the extruder ready in working condition for next batch		2.5	1	1.5
	POINTS		50	17	33
	TOTAL POINTS		50		

	Performance Criteria	Total Marks (250)	Out of	Theory	Skills Practical
PCS/N9901 Coordinate with colleagues and/or customers	PC1. receive job order and instructions from reporting superior	50	0.5	0.0	0.5
	PC2. understand the work output requirements, targets, performance indicators and incentives		2.0	0.5	1.5
	PC3. deliver quality work on time and report any anticipated reasons for delays		2.0	0.5	1.5
	PC4. escalate unresolved problems or complaints to the relevant senior		2.0	0.5	1.5
	PC5. communicate maintenance and repair schedule proactively to the superior		2.0	0.5	1.5
	PC6. receive feedback on work standards		1.0	0.0	1.0
	PC7. document the completed work schedule and handover to the superior		2.0	0.5	1.5
	PC8. exhibit trust, support and respect to all the colleagues in the workplace		1.0	0.25	0.75
	PC9. aim to achieve smooth workflow		2.0	0.5	1.5
	PC10. help and assist colleagues with information and knowledge		1.0	0.0	1.0
	PC11. seek assistance from the colleagues when required		1.0	0.25	0.75



	Performance Criteria	Total Marks (250)	Out of	Theory	Skills Practical
	PC12. identify the potential and existing conflicts with the colleagues and resolve		1.0	0.25	0.75
	PC13. pass on essential information to other colleagues on timely basis		1.0	0.0	1.0
	PC14. maintain the etiquette, use polite language, demonstrate responsible and disciplined behaviors to the colleagues		2.0	0.5	1.5
	PC15. interact with colleagues from different functions clearly and effectively on all aspects to carry out the work among the team and understand the nature of their work		1.0	0.25	0.75
	PC16. put team over individual goals and multi task or share work where necessary supporting the colleagues		2.0	0.0	2.0
	PC17. highlight any errors of colleagues, help to rectify and ensure quality output		1.0	0.25	0.75
	PC18. work with cooperation, coordination, communication and collaboration, with shared goals and supporting each other's performance		1.0	0.0	1.0
	PC19. ask more questions to the customers and identify their needs		1.0	0.25	0.75
	PC20. possess strong knowledge on the product, services and market		2.0	0.5	1.5
	PC21. brief the customers clearly on potential costs and hazards		1.0	0.25	0.75
	PC22. communicate with the customers in a polite, professional and friendly manner		1.0	0.25	0.75
	PC23. build effective but impersonal relationship with the customers		0.5	0.25	0.25
	PC24. ensure the appropriate language and tone are used with customers		1.0	0.25	0.75
	PC25. listen actively and have a two way communication		1.0	0.25	0.75
	PC26. be sensitive to the gender, cultural and social differences such as modes of greeting, formality, etc.		1.0	0.25	0.75
	PC27. understand the customer expectations correctly and provide the appropriate products and services		2.0	0.5	1.5
	PC28. understand the customer dissatisfaction and address or escalate their complaints effectively		2.0	0.5	1.5
	PC29. maintain a positive, sensible and cooperative manner all time		1.0	0.25	0.75
	PC30. ensure to maintain a proper body language, dress code, gestures and etiquettes towards the customers		1.0	0.25	0.75



	Performance Criteria	Total Marks (250)	Out of	Theory	Skills Practical
	PC31. avoid interrupting the customers while they talk		1.0	0.0	1.0
	PC32. ensure to avoid negative questions and statements to the customers		1.0	0.0	1.0
	PC33.inform the customers on any issues or problems before hand and also on the developments involving them		2.0	0.5	1.5
	PC34. ensure to respond back to the customer immediately for their voice messages, e-mails, apps, etc.		1.0	0.0	1.0
	PC35. develop good rapport with the customers and promote other products and services		2.0	0.5	1.5
	PC36. seek feedback from the customers on their understanding to what was discussed		1.0	0.0	1.0
	PC37. explain the terms and conditions clearly		2.0	0.5	1.5
	POINTS		50	10	40
	TOTAL POINTS			50	

	Performance Criteria	Total Marks (250)	Out of	Theory	Skills Practical
PCS/N9902 Maintain standards of product/ service quality	PC1. keep in mind the profiles of expected customers	50	2.0	0.5	1.5
	PC2. understand the target customers and their product/ service quality requirements as defined by the company		3.0	0.5	2.5
	PC3. receive superior's/ customer feedback regularly		2.0	0.0	2.0
	PC4. aim to build a good connect with the customers through quality product/ service		2.0	0.5	1.5
	PC5.keep tab on frequent discussions with regular customers on general likes and dislikes in the market, latest trends, customer expectations, etc.		2.0	0.5	1.5
	PC6. receive updates on regular feedbacks from the clients on current service, complaints, and improvements to be made, etc.		2.0	0.5	1.5
	PC7. if necessary, compulsively seek customer rating of product/ service in order to help develop a set of regularly improved procedures		2.0	0.5	1.5
	PC8. demonstrate quality orientation at all level		4.0	1.5	2.5



	Performance Criteria	Total Marks (250)	Out of	Theory	Skills Practical
	PC9. aim to gain their long lasting loyalty through satisfaction		3.0	1.0	2.0
	PC10. ensure 100% customer satisfaction via product/ service quality		3.0	0.5	2.5
	PC11. treat the customers fairly and with due respect		3.0	0.5	2.5
	PC12. focus on executing company's marketing strategies and product development needs		3.0	1.0	2.0
	PC13. focus on enhancing brand value of company by maintaining or enhancing quality standards		3.0	1.0	2.0
	PC14. ensure that customer expectations are met		2.0	0.5	1.5
	PC15. learn to read customers' needs and wants		2.0	0.5	1.5
	PC16. willingly accept and implement new and innovative products and services that help improve customer satisfaction		3.0	1.0	2.0
	PC17. communicate feedback of customer to senior, especially, the negative feedback		2.0	0.5	1.5
	PC18. maintain close contact with the customers and focus groups		2.0	0.5	1.5
	PC19. offer promotions to improve product satisfaction level to the customers periodically		3.0	1.0	2.0
	PC20. weigh the cost of fulfilling unscheduled customer requests, consult with senior and advise the customer on alternatives		2.0	0.5	1.5
	POINTS		50	13	37
	TOTAL POINTS				50

	Performance Criteria	Total Marks (250)	Out of	Theory	Skills Practical
PCS/N9903 Maintain O&HS standards and follow environmental norms	PC1. assess the various health, safety and environmental hazards in the work areas	50	1.5	0.4	1.1
	PC2. take necessary steps to eliminate or minimize the hazards		1.0	0.4	0.6
	PC3. analyze the causes of accidents at the workplace		1.5	0.4	1.1
	PC4. suggest measures to prevent such accidents from taking place		1.5	0.4	1.1
	PC5. take preventive measures to avoid risk of burns and other injury due to contact with hot surfaces, gas, fire, hot fluids/ liquids, etc.		1.5	0.4	1.1
	PC6. suggest methods to improve the existing safety procedures at the workplace		1.5	0.4	1.1



	Performance Criteria	Total Marks (250)	Out of	Theory	Skills Practical
	PC7. dispose waste in the designated areas safely as per company's policies and rules		1.5	0.4	1.1
	PC8. maintain appropriate ventilation in the rooms while there is more exposure to paint vapours		1.0	0.4	0.6
	PC9. avoid dumping unused cans to safeguard the environment		1.0	0.0	1.0
	PC10. be aware of the locations of fire extinguishers, emergency exits, etc.		1.0	0.4	0.6
	PC11. practice correct emergency procedures		1.5	0.4	1.1
	PC12. check and review the storage areas frequently		1.5	0.4	1.1
	PC13. stack items in an organized way and use safe lifting techniques to reduce risk of injuries from handling procedures at the storage areas		1.5	0.4	1.1
	PC14. ensure to be safe while handling materials, tools, acids, chemicals, equipment, etc.		1.0	0.4	0.6
	PC15. store the chemicals and acids in a well-ventilated and locked areas with warning signs displayed		1.5	0.4	1.1
	PC16. ensure safe techniques while moving furniture and fixtures		1.5	0.4	1.1
	PC17. ensure to reduce risk of injury from use of electrical tools		1.5	0.4	1.1
	PC18. read the manufacturer's manual carefully before use of any equipment		1.0	0.0	1.0
	PC19. unplug the electrical equipment before performing maintenance		1.0	0.4	0.6
	PC20. keep the floors free from oil, water and grease to avoid slippery surface		1.0	0.4	0.6
	PC21. use rubber mats in the places where floors are constantly wet		1.0	0.0	1.0
	PC22. ensure safety from injuries of cuts to loss of fingers, while handling sharp hazardous tools and equipment		1.5	0.4	1.1
	PC23. use flat surfaces, secure holding and protective wear while using such sharp tools		1.5	0.4	1.1
	PC24. use health, safety and environmental protection practices for storing, cleaning, and maintaining tools, equipment, and supplies		1.5	0.4	1.1
	PC25. practice ergonomic lifting, bending, or moving equipment and supplies		1.5	0.4	1.1
	PC26. identify the requirement for maintaining environmental norms		1.0	0.4	0.6
	PC27. comply with the environmental safety norms while on work to prevent accidents and health hazards		1.0	0.4	0.6



	Performance Criteria	Total Marks (250)	Out of	Theory	Skills Practical
	PC28. follow company policies and rules regarding use of hazardous materials to avoid health, safety and environmental impacts caused by them		1.0	0.4	0.6
	PC29. ensure the employees have access to first aid kit when needed		1.0	0.0	1.0
	PC30. ensure all equipment and tools are stored and maintained properly and safe to use		1.0	0.4	0.6
	PC31. ensure to use personal protective equipment and safety gear such as gloves, mask, headwear, footwear, glasses, goggles, etc. for specific tasks and work conditions where required		1.5	0.4	1.1
	PC32. ensure to display safety signs at places where necessary for people to be cautious		1.5	0.4	1.1
	PC33. ensure electrical precautions such as insulated clothing, adequate equipment insulation, dry work area, switch off the power supply when not required, etc.		1.5	0.4	1.1
	PC34. ensure availability of general health and safety equipment such as fire extinguishers, first aid equipment, safety equipment, clothing, safety installations such as fire exits, exhaust fans, etc.		1.5	0.4	1.1
	PC35. document all the first aid treatments, inspections, etc., conducted to keep track of the safety measures undertaken		1.0	0.4	0.6
	PC36. document all the environmental hazards caused and the measures undertaken to comply with the established safety procedures of the workplace		1.0	0.0	1.0
	PC37. report to the supervisor on any problems and hazards identified and any breach of environmental procedures.		1.0	0.4	0.6
	PC38. ensure zero accident at workplace		1.0	0.4	0.6
	PC39. adhere to safety standards and ensure no material damage		1.0	0.4	0.6
	PC40. take necessary action and correct any environmental hazards caused		1.0	0.4	0.6
	POINTS		50	14	36
	TOTAL POINTS			50	
	GRAND TOTAL	250			