

Model Curriculum

19. Operator- Non Conventional Electro Discharge Machine

SECTOR: CAPITAL GOODS
SUB-SECTOR: MACHINE TOOLS, DIES, MOULDS AND
PRESS TOOLS, PLASTICS
MANUFACTURING MACHINERY,
TEXTILE MANUFACTURING MCHINERY

OCCUPATION: Machining
REF ID: CSC/Q0119, V1.0
NSQF LEVEL: 3



Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

CAPITAL GOODS SKILL COUNCIL

for the

MODEL CURRICULUM

Complying to National Occupational Standards of

Job Role/ Qualification Pack: '**Operator – Non Conventional Electro Discharge Machine (Spark Erosion)**'
QP No. '**CSC/Q0119, NSQF Level 3**'

Date of Issuance: April 10th, 2014

Valid up to : August 30th, 2016

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



Authorised Signatory
Tourism & Hospitality Skill Council

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Operator-Non Conventional Electro Discharge Machine

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “Operator-Non Conventional Electro Discharge Machine”, in the “Capital Goods” Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	Operator- Non Conventional Electro Discharge Machine		
Qualification Pack Name & Reference ID. ID	CSC/Q0119, v1.0		
Version No.	1.0	Version Update Date	
Pre-requisites to Training	10 th standard pass, preferably		
Training Outcomes	<p>After completing this programme, participants will be able to:</p> <ul style="list-style-type: none"> • Perform machining operations on metal products using non-conventional Electro Discharge Machine (Spark erosion): machining of metal components using a non-conventional electro discharge machine (EDM) to modify a range of component shapes via spark erosion, as per given specifications. It does not cover setting of EDM machines • Basic health and safety practices at the workplace: identify risks and hazards at workplace, use of PPE, and apply good housekeeping practices, etc., • Work effectively with others: effectively communicate with others and demonstrate good ethical practices and discipline. 		

This course encompasses 3 out of 3 National Occupational Standards (NOS) of “Operator-Non Conventional Electro Discharge Machine” Qualification Pack issued by “Capital Goods Skill Council”.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	<p>Perform Machining Operations on Metal Products using Non conventional controlled Electro Discharge Machine</p> <p>Theory Duration (hh:mm) 40:00</p> <p>Practical Duration (hh:mm) 100:00</p> <p>Corresponding NOS Code CSC/N0901</p>	<ul style="list-style-type: none"> • Explain the importance of following safe working practices • Identify Hazards associated electro discharge machine operations • Identify Personal Protective Equipment required for EDM machining • Define ‘unit’ and ‘systems of measurement’ • Explain British and Metric system of measurement • Convert units form one system of measurement to another • Interpret First angle and third angle projections • Identify various types of ferrous and non ferrous metals and explain their characteristics • Explain mechanical properties of most commonly used metals-low medium steel, high carbon steel, low alloy steel, stainless steel, aluminium, aluminium alloys, bronze and silicon carbide • Explain main features, accessories and specification of the electro discharge machine – electrical conditions, alignment of electrodes, filtration equipment, linear speeds and feeds, dielectric flow rates, ventilation and fume extraction, • List various erosion operations that can be performed by a an electro discharge machine • Identify material used for electrodes – copper, tungsten copper and graphite • Identify various types of electrodes – plain electrode, profile electrode, hollow electrode • Identify safety mechanisms on the machine and explain the procedure to check the functioning • Explain the method to operate the machine in emergency and normal mode • Explain the importance of sparking and arcing in EDM machining • State the effect of arc gap and backlash in EDM machining • Define polarity and state the effect of polarity • State the effect of roughing and finishing cut on the electrode life, 	<p>Training Kit (PowerPoint, Trainer Guide)</p> <p>EDM machine with all accessories, protractor, micrometer, vernier calliper, vernier height gauge, feeler gauge, bore/hole gauge, slip gauge, radius/profile gauge, thread gauge, stick micrometer, dial stand and comparator, vee block, U clamp, Pneumatic/magnetic table, machine vice, angle plate, fixtures, chucks, auxiliary indexing device, Personal Protective Equipment etc.</p>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<p>surface finish and dimensional accuracy</p> <ul style="list-style-type: none"> • Select dielectric fluid based on the type of material being machined • State quality control procedures and inspection checks to be carried out after the machining operation • List most commonly occurring machining faults and take corrective actions to avoid such faults • Identify most common problems that can occur with electro discharging machining activities and state the methods to overcome such problems • Conduct preliminary checks on the electro discharge machine – cleanliness of the machine, alignment of the work piece, lubrication, coolant level etc. • Read and establish job requirements from the job document specifications • Prepare the work area for the machining operations as per the standard process • List marking and measuring tools required for the machining operation – protractor, micrometer, vernier calliper, height gauge, feeler gauge, bore/hole gauge, slip gauge, radius/profile gauge, thread gauge, plug gauge, dial test indicator, comparator, vee block, u clamp etc. • Identify positioning and holding devices - pneumatic or magnetic table, machine vice, angle plate, fixtures, chucks, auxiliary indexing device • Adjust machine settings to get the required accuracy • Produce various features such as flat, parallel, angular, holes, cavities, slots, radii, arcs etc. • Produce components with dimensional accuracy, form and surface finish within all the relevant quality and accuracy standards as is applicable to the operations performed Accuracy standards: components to be free from damage, false tool cuts, burrs, scratches and non-specified sharp edges; general dimensional tolerance +/- 0.020mm; flatness 	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<p>and squareness 0.05mm; angles within +/- 1 degree</p> <ul style="list-style-type: none"> • Check the quality of the component produced using visual checks and measure dimensional parameters • Carryout documentation as per the standard process • Follow proper communication protocol • Communicate with people in respectful manner in line with organizational policy • Perform numerical operations, geometry and calculations • Maintain current knowledge of application standards, legislation etc. • Demonstrate problem solving abilities • Plan, organize and sequence work operations as per the job requirement • Work in a team to achieve better results 	
2	<p>Health and safety</p> <p>Theory Duration (hh:mm) 10:00</p> <p>Practical Duration (hh:mm) 08:00</p> <p>Corresponding NOS Code CSC/N1335</p>	<ul style="list-style-type: none"> • Explain the importance of personal protective equipment (PPE) required for gas cutting operation • State the causes for accidents • Identify job site hazardous work and state possible causes of risk or accident at the workplace • Explain the importance of '5S' at the workplace 	<p>Training kit (Trainer guide, PowerPoint)</p> <p>Leather gloves, leather apron, welding screen – helmet types, hand screen welding and safety shoes</p>
3	<p>Fire Safety</p> <p>Theory Duration (hh:mm) 05:00</p> <p>Practical Duration (hh:mm) 30:00</p> <p>Corresponding NOS Code CSC/N1335</p>	<ul style="list-style-type: none"> • Explain types of fires - Class A, B, C and D • Select appropriate fire extinguisher to control fire • Use PASS method to operate a fire extinguisher • Follow fire safety signs and safe evacuation method in case of a fire • Identify the location of assembly point, fire exit, fire alarm • Follow reporting procedure in case of a fire 	<p>Training kit (Trainer guide, PowerPoint)</p> <p>Class A, B, C, D and K fire extinguishers</p>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
4	<p>Emergencies, rescue and first aid procedure</p> <p>Theory Duration (hh:mm) 09:00</p> <p>Practical Duration (hh:mm) 18:00</p> <p>Corresponding NOS Code CSC/N1335</p>	<ul style="list-style-type: none"> Follow electrical safety procedures Use approved method to rescue a person from electrocution State the importance of first aid Identify the contents of a first aid kit and their application Administer first aid in case of bleeding, burns, choking, electrical shock, poisoning, etc. Use of CPR process Bandage wounds Explain stages of crisis and crisis management Prepare an incident report 	<p>Training kit (Trainer guide, PowerPoint)</p> <p>First aid kit with all contents</p>
5	<p>Work effectively with others</p> <p>Theory Duration (hh:mm) 20:00</p> <p>Practical Duration (hh:mm) 60:00</p> <p>Corresponding NOS Code CSC/N1336</p>	<ul style="list-style-type: none"> Explain the importance of team work and team dynamics State 4Cs of working in a team Explain types of communication Apply effective communication technique Overcome barriers to effective communication Demonstrate active listening skills Demonstrate good customer service skills Explain the importance of ethical behaviour in your day-to-day work State the importance of discipline in life and apply the same at workplace 	<p>Training kit (Trainer guide, PowerPoint)</p>
6	<p>Final Assessment</p> <p>Theory Duration (hh:mm) 04:00</p> <p>Practical Duration (hh:mm) 06:00</p> <p>Corresponding NOS Code</p>	<ul style="list-style-type: none"> To test skills and knowledge 	
	<p>Total Duration</p> <p>Theory Duration 88:00</p> <p>Practical Duration 222:00</p>	<p>Unique Equipment Required: EDM machine with all accessories, protractor, micrometer, vernier calliper, vernier height gauge, feeler gauge, bore/hole gauge, slip gauge, radius/profile gauge, thread gauge, stick micrometer, dial stand and comparator, vee block, U clamp, Pneumatic/magnetic table, machine vice, angle plate, fixtures, chucks, auxiliary indexing device, Personal Protective Equipment , Class A, B, C, D and K fire extinguishers, First aid kit with all contents</p>	

Grand Total Course Duration: **310 Hours, 0 Minutes**

(This syllabus/ curriculum has been approved by [Capital Goods Skill Council](#))

Trainer Prerequisites for Job role: “Operator-Non conventional Electro Discharge Machine” mapped to Qualification Pack: “CSC/Q0119 v1.0”

Sr. No.	Area	Details
1	Description	Producing machined components that combine a number of different features using a non-conventional Electro discharge Machine (EDM), inspecting the components after machining and continuously monitoring the erosion operations and, where necessary, make minor adjustments in order to ensure that the work output is to the required quality and accuracy.
2	Personal Attributes	Basic communication, numerical and computational abilities. Openness to learning, ability to plan and organize own work and identify and solve problems in the course of working. Understanding the need to take initiative and manage self and work to improve efficiency and effectiveness.
3	Minimum Educational Qualifications	Diploma/Degree in Mechanical Engineering
4a	Domain Certification	Certified for Job Role: “ <u>Operator-Non Conventional Electro Discharge Machine</u> ” mapped to QP: “ <u>CSC/Q0119, v1.0</u> ”. 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/Q1402”. Minimum accepted 70 % as per respective SSC guidelines is 70%.
5	Experience	<ul style="list-style-type: none"> 3-4 years of industry experience in the relevant field 3-4 years of teaching experience

Annexure: Assessment Criteria

Assessment Criteria	
Job Role	Operator- Non conventional Electro Discharge Machine
Qualification Pack	CSC/Q0119, v1.0
Sector Skill Council	Capital Goods Skill Council

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 40% in each NOS
6	The marks are allocated PC wise; however, every NOS will carry a weight age in the total marks allocated to the specific QP

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
1.CSC/N0119 Perform machining operations on metal products using Non-conventional Electro-Discharge Machine (Spark Erosion)	PC1.comply with health and safety, environmental and other relevant regulations and guidelines at work	100	3	1	2
	PC2.adhere to procedures and guidelines for personal protective equipment (PPE) and other relevant safety regulations while performing calibration operations		4	1	3
	PC3.work following laid down procedures and instructions		3	1	2
	PC4.ensure work area is clean and safe from hazards		2	0	2
	PC5.ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition		2	0	2
	PC6.ensure that machine guards are in place and are correctly adjusted		2	0	2
	PC7.conduct a preliminary check of the readiness of the electro discharge machine		3	0	3
	PC8.obtain job specification from a valid and approved source		2	0	2
	PC9.read and establish job requirements from the job specification document accurately		3	0	3
	PC10.report and rectify incorrect and inconsistent information in job specification documents as per organization procedures		4	1	3
	PC11.prepare the work area for the machining operations as per procedure or operational specification		4	1	3
	PC12.ensure that all measuring equipment is calibrated and approved for usage		2	0	2
	PC13.ensure that the components used are free from foreign objects, dirt or other contamination		2	0	2
	PC14.obtain correct workpieces/raw materials and consumables as per job requirements		3	1	2
	PC15.obtain appropriate measuring, marking tools and equipment as per job requirements		3	1	2
	PC16.set work pieces as per job requirements using appropriate positioning and/or holding devices and support mechanisms		5	1	4
	PC17.manipulate the machine tool controls safely and correctly in line with operational procedures		6	2	4
	PC18.obtain and use the appropriate documentation (eg. job instructions, drawings, quality control documentation)		2	0	2
	PC19.ensure that machine settings are adjusted as and when required to maintain the required accuracy		3	0	3
	PC20.produce component shapes on a range of materials with various mechanical properties		4	0	4

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
	PC21.produce machined components with the required features		4	0	4
	PC22.produce components with dimensional accuracy, form and surface finish within all the relevant quality and accuracy standards as is applicable to the operations performed		6	2	4
	PC23.check the quality of the output as per required standards using visual checks		5	1	4
	PC24.complete documentation during and post operations as per organizational procedures		3	1	2
	PC25.return all tools and equipment to the correct location on completion of the fitting activities		2	0	2
	PC26.leave the work area in a safe and tidy condition on completion of job activities		2	0	2
	PC27.carry out sampling checks at suitable intervals		4	0	4
	PC28.ensure that the components produced meet the required specification for quality and accuracy		3	1	2
	PC29.use appropriate gauges or instruments to carry out the necessary checks, during production, for testing accuracy parameters		5	1	4
	PC30.deal promptly and effectively with problems within span of responsibility and control and report those that cannot be solved		4	0	4
	Total		100	16	84
2.CSC/N1335 Use basic health and safety practices at the workplace	PC1.use protective clothing/equipment for specific tasks and work conditions	100	5	2	3
	PC2.state the name and location of people responsible for health and safety in the workplace		3	1	2
	PC3.state the names and location of documents that refer to health and safety in the workplace		3	1	2
	PC4.identify job-site hazardous work and state possible causes of risk or accident in the workplace		5	2	3
	PC5.carry out safe working practices while dealing with hazards to ensure the safety of self and others state methods of accident prevention in the work environment of the job role		4	2	2
	PC6.state location of general health and safety equipment in the workplace		3	2	1
	PC7.inspect for faults, set up and safely use steps and ladders in general use		5	2	3
	PC8.work safely in and around trenches, elevated places and confined areas		5	2	3
	PC9.lift heavy objects safely using		5	2	3

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
	correct procedures				
	PC10.apply good housekeeping practices at all times		4	2	2
	PC11.identify common hazard signs displayed in various areas		5	2	3
	PC12.retrieve and/or point out documents that refer to health and safety in the workplace		3	1	2
	PC13.use the various appropriate fire extinguishers on different types of fires correctly		4	1	3
	PC14.demonstrate rescue techniques applied during fire hazard		4	1	3
	PC15.demonstrate good housekeeping in order to prevent fire hazards		3	1	2
	PC16.demonstrate the correct use of a fire extinguisher		4	1	3
	PC17.demonstrate how to free a person from electrocution		4	1	3
	PC18.administer appropriate first aid to victims where required eg. in case of bleeding, burns, choking, electric shock, poisoning etc.		4	1	3
	PC19.demonstrate basic techniques of bandaging		3	1	2
	PC20.respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments		4	1	3
	PC21.perform and organize loss minimization or rescue activity during an accident in real or simulated environments		3	1	2
	PC22.administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock, before the arrival of emergency services in real or simulated cases		3	1	2
	PC23.demonstrate the artificial respiration and the CPR Process		3	1	2
	PC24.participate in emergency procedures		3	2	1
	PC25.complete a written accident/incident report or dictate a report to another person, and send report to person responsible		4	1	3
	PC26.demonstrate correct method to move injured people and others during an emergency		4	1	3
	Total		100	36	64

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
3.CSC/N1336 Work effectively with others	PC1. accurately receive information and instructions from the supervisor and fellow workers, getting clarification where required		10	3	7
	PC2. accurately pass on information to authorized persons who require it and within agreed timescale and confirm its receipt		10	3	7
	PC3. give information to others clearly, at a pace and in a manner that helps them to understand		10	3	7
	PC4. display helpful behavior by assisting others in performing tasks in a positive manner, where required and possible		10	3	7
	PC5. consult with and assist others to maximize effectiveness and efficiency in carrying out tasks		10	3	7
	PC6. display appropriate communication etiquette while working		10	3	7
	PC7. display active listening skills while interacting with others at work		10	3	7
	PC8. use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism		10	3	7
	PC9. demonstrate responsible and disciplined behaviors at the workplace		10	3	7
	PC10. escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict		10	3	7
	Total			100	30
Grand Total		300	300	82	218
Percentage Weightage:				28	72
Minimum Pass% to qualify (aggregate):				60	