Model Curriculum

QP Name: Operator – Conventional Milling

QP Code: CSC/Q0108

Version: 3.0

NSQF Level: 3

Model Curriculum Version: 3.0

Capital Goods Skill Council || Awfice Space Solutions Pvt. Ltd, 1st Floor, L-29, Outer Circle, Connaught Place, New Delhi – 110001

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Training Parameters

Sector	Capital Goods
Sub-Sector	Machine Tools, Dies, Moulds and Press Tools, Plastics Manufacturing Machinery, Textile Manufacturing Machinery, Process Plant Machinery, Electrical and Power Machinery, Light Engineering Goods
Occupation	Machining
Country	India
NSQF Level	3
Aligned to NCO/ISCO/ISIC Code	NCO-2015/7223.1201
Minimum Educational Qualification and Experience	5th grade pass with 5 years of relevant experience OR 8th grade pass with 2 years of relevant experience OR 9th Grade pass with 1 year of relevant experience OR Grade 8th pass and pursuing continuous schooling in regular school OR Grade 8th pass with two year of (NTC/ NAC) after 8th OR Grade 10th pass
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	NA
Next Review Date	NA
NSQC Approval Date	NA
QP Version	3.0
Model Curriculum Creation Date	NA
Model Curriculum Valid Up to Date	NA
Model Curriculum Version	3.0
Minimum Duration of the Course	360 Hours
Maximum Duration of the Course	360 Hours

Program Overview

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

Training Outcomes

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

- Explain the importance of following the health and safety practices at work.
- Demonstrate ways to coordinate with co-workers to achieve work efficiency.
- Demonstrate the process of carrying out milling operations using conventional millingmachines.

Compulsory Modules

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

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
CSC/N1335 Follow the health and safety practicesat work NSQF Level- 3	**25:00**	**35:00**	**0:00**	**00:00**	**60:00**
Module 1: Introduction tothe role of an Operator-Conventional Milling	05:00	0:00	0:00	00:00	05:00
Module 2: Health and safety practices	20:00	35:00	0:00	00:00	55:00
CSC/N1336 Coordinate with co-workers to achieve work efficiency NSQF Level- 3	**10:00**	**20:00**	**0:00**	**00:00**	**30:00**
Module 3: Process of coordinating with co-workers to achieve work efficiency	10:00	20:00	0:00	00:00	30:00
CSC/N0108: Carry out milling operations using conventional milling machines NSQF Level: 3	**55:00**	**155:00**	**0:00**	**00:00**	**210:00**
Module 4: Process of carrying out milling operations using conventional milling machines	55:00	155:00	0:00	00:00	210:00
DGT/VSQ/N0101 - Employability Skills (30 hours)	**12:00**	**18:00**	**0:00**	**00:00**	**30:00**

NSQF Level – 2					
Module 5: Introduction to Employability Skills	0.5:00	0.5:00	0:00	00:00	1:00
Module 6: Constitutional values - Citizenship	0.5:00	0.5:00	0:00	00:00	1:00
Module 7: Becoming a Professional in the 21st Century	0.5:00	0.5:00	0:00	00:00	1:00
Module 8: Basic English Skills	1:00	1:00	0:00	00:00	2:00
Module 9: Communication Skills	1.5:00	2.5:00	0:00	00:00	4:00
Module 10: Diversity & Inclusion	0.5:00	0.5:00	0:00	00:00	1:00
Module 11: Financial and Legal Literacy	1.5:00	2.5:00	0:00	00:00	4:00
Module 12: Essential Digital Skills	1:00	2:00	0:00	00:00	3:00
Module 13: Entrepreneurship	2.5:00	4.5:00	0:00	00:00	7:00
Module 14: Customer Service	1.5:00	2.5:00	0:00	00:00	4:00
Module 15: Getting ready for apprenticeship & Jobs	1:00	1:00	0:00	00:00	2:00
Total Duration	**102:00**	**228:00**	**30:00**	**00:00**	**360:00**

Module Details

Module 1: Introduction to the role of an Operator- Conventional Milling

Bridge Module

Terminal Outcomes:

- Discuss the job role of an Operator- Conventional Milling.

Duration: 05:00	Duration: 0:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe the size and scope of the capital good industry and its sub-sectors. • Discuss the role and responsibilities of an Operator- Conventional Milling. • Identify various employment opportunities for an Operator- Conventional Milling.	
Classroom Aids	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films	
Tools, Equipment and Other Requirements	
NA	

Module 2: Health and safety Practices

Mapped to CSC/N1335 v2.0

Terminal Outcomes:

- Demonstrate ways to maintain personal health and safety.
- Describe the process of assisting in hazard management.
- Explain how to check the first aid box, firefighting and safety equipment.
- Describe the process of assisting in waste management.
- Explain the importance of following the fire safety guidelines.
- Explain the importance of following the emergency and first-aid procedures.
- Demonstrate the process of carrying out relevant documentation and review.

Duration: 20:00	Duration: 35:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the recommended practices to be followed to ensure protection from infections and transmission to others, such as the use of hand sanitizer and face mask. • Explain the importance and process of checking the work conditions, assessing the potential health and safety risks, and take appropriate measures to mitigate them. • Explain the importance and process of selecting and using the appropriate PPE relevant to the task and work conditions. • Explain the recommended techniques to be followed while lifting and moving heavy objects to avoid injury. • Explain the importance of following the manufacturer's instructions and workplace safety guidelines while working on heavy machinery, tools and equipment. • Explain the importance and process of identifying existing and potential hazards at work. • Describe the process of assessing the potential risks and injuries associated with the various hazards. • Explain how to prevent or minimise different types of hazards.	• Demonstrate the use of appropriate Personal Protective Equipment (PPE) relevant to the task and work conditions. • Demonstrate how to handle hazardous materials safely. • Demonstrate the process of testing the firefighting and various safety equipment to ensure they are in usable condition. • Demonstrate the process of recycling and disposing different types of waste appropriately. • Demonstrate how to use the appropriate type of fire extinguisher to extinguish different types of fires safely. • Demonstrate how to administer appropriate first aid to the injured personnel. • Demonstrate the process of performing Cardiopulmonary Resuscitation (CPR) on a potential victim of cardiac arrest. • Demonstrate the process of carrying out appropriate documentation following a health and safety incident at work, including all the required information.

• Explain how to handle and store hazardous materials safely. • Explain the importance of ensuring the first aid box is updated with the relevant first aid supplies. • Describe the process of checking and testing the firefighting and various safety equipment to ensure they are in a usable condition. • Explain the criteria for segregating waste into appropriate categories. • Describe the appropriate methods for recycling the recyclable waste. • Describe the process of disposing of the non-recyclable waste safely and the applicable regulations. • Explain the use of different types of fire extinguishers to extinguish different types of fires. • State the recommended practices to be followed for a safe rescue during a fire emergency. • Explain how to request assistance from the fire department to extinguish a serious fire. • Explain the appropriate practices to be followed during workplace emergencies to ensure safety and minimise loss to organisational property. • State the common health and safety hazards present in a work environment, associated risks, and how to mitigate them. • State the safe working practices to be followed while working at various hazardous sites and using electrical equipment. • Explain the importance of ensuring easy access to firefighting and safety equipment. • Explain the appropriate preventative and remedial actions to be taken in the case of exposure to toxic materials, such as poisonous	

chemicals and gases. • Explain various causes of fire in different work environments and the recommended precautions to be taken to prevent fire accidents. • Describe different methods of extinguishing fire. • List different materials used for extinguishing fire. • Explain the applicable rescue techniques to be followed during a fire emergency. • Explain the importance of placing safety signs and instructions at strategic locations in a workplace and following them. • Explain different types of first aid treatment to be provided for different types of injuries. • State the potential injuries associated with incorrect manual handling. • Explain how to move an injured person safely. • State various hazards associated with the use of various machinery, tools, implements, equipment and materials. • Explain the importance of ensuring no obstruction and free access to fire exits. • Explain how to free a person from electrocution safely. • Explain how to administer appropriate first aid to an injured person. • Explain how to perform Cardiopulmonary Resuscitation (CPR). • Explain the importance of coordinating with the emergency services to request urgent medical assistance for persons requiring professional medical attention or hospitalisation. • State the appropriate documentation	

to be carried out following a health and safety incident at work, and the relevant information to be included. • Explain the importance and process of reviewing the health and safety conditions at work regularly or following an incident. • Explain the importance and process of implementing appropriate changes to improve the health and safety conditions at work.	
Classroom Aids	
Computer, Projection Equipment, PowerPoint Presentation and Software, Facilitator's Guide, Participant's Handbook.	
Tools, Equipment and Other Requirements	
Personal Protective Equipment, Cleaning Equipment and Materials Like- Sanitizer, Soap, Mask, etc.	

Module 3: Process of coordinating with co-workers to achieve work efficiency

Mapped to NOS CSC/N1336 v2.0

Terminal Outcomes:

- Demonstrate ways to Work and communicate effectively with co-workers.
- Discuss ways to promote diversity and inclusion at the workplace.

Duration: 10:00	Duration: 20:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the importance and process of effective communication in the workplace. • Explain the barriers to effective communication and how to overcome them. • Explain the importance of teamwork in an organisation's and individual's success. • Explain the importance of active listening in the work environment. • State the appropriate techniques to be followed for active listening. • Explain the importance of tone and pitch ineffective communication. • Explain the importance of avoiding casual expletives and unpleasant terms while communicating professional circles. • Explain the importance of maintaining discipline and ethical behaviour at work. • **State** the common reasons for interpersonal conflict and how to resolve them. • Explain the importance of developing effective working relationships for professional success. • Describe the process of expressing and addressing grievances appropriately and effectively. • Explain the importance and process of planning daily tasks to ensure their timely completion and efficient use of	• Demonstrate the process of preparing the relevant documents and reports as per the supervisor's instructions, providing appropriate information clearly and systematically. • Demonstrate how to mentor and assist subordinates in the execution of their work responsibilities. • Demonstrate the process of using various resources efficiently toensure maximum utilisation and minimum wastage. • Demonstrate how to communicate clearly and politely to ensure effective communication with co-workers. • Demonstrate appropriate verbal and non-verbal communication that is respectful of genders and disability.

time. • Explain the importance of adheringto the limits of authority at work. • Explain the importance of following the applicable quality standards and timescales at work. • Explain the importance of coordinating with co-workers to achieve the work objectives efficiently. • Explain the relevant documentation requirements. • Explain the importance of providing appropriate information clearly and systematically in work documents. • State the escalation matrix to be followed to deal with out of authority tasks and concerns. • Explain the importance and process of mentoring and assisting subordinates in the execution of their work responsibilities. • Explain how to identify possible disruptions to work prevent them. • Explain how to use various resources efficiently to ensure maximum utilisation and minimum wastage. • Explain the recommended practices to be followed at work to avoid and resolve conflicts at work. • Explain the importance and process of efficient and timely dissemination of information to the authorised personnel. • Explain the procedure to report inappropriate behaviour e.g., harassment.	
Classroom Aids:	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
NA	

Module 4: Process of carrying out milling operations using conventional milling machines

Mapped to CSC/N0108 v2.0

Terminal Outcomes:

- Describe the process of preparing for carrying out milling operations.
- Demonstrate the process of carrying out milling operations.
- Explain the importance of following safety guidelines.
- Explain the importance of using resources optimally.

Duration: 55:00	Duration: 155:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• State the applicable documentation requirements in the job role. • Explain the applicable health, safety and environmental regulations and guidelines. • Explain the concepts and benefits of Industry 4.0 and Industrial Internet of Things (IIoT). • Explain how to minimise various hazards associated with the milling operations. • Explain the importance of keeping the work area clean and hazard-free. • Explain how to read and interpret first and third angle component drawings. • Explain how to extract information/ data and related specifications from engineering drawings. • Explain how to use imperial and metric systems of measurement. • Explain different types of conventional milling machines suchas horizontal, and vertical milling machine. • Explain the use of the relevant accessories such as saddle,compound slide, tailstock, profile attachments, fixed and live stays, etc. • List the purpose of milling metal and non-metal components. • Explain the use of different types of	• Demonstrate how to prepare the work area for operations, following the applicable organisational procedure and operations requirements. • Demonstrate how to operate the machine controls in both hand and power modes. • Demonstrate the process of carrying out various milling operations to produce various features on metal and non-metal components. • Show how to create roughing and finishing cuts to achieve the required surface finish and dimensional accuracy with minimum impact on tool life. • Demonstrate how to use the relevant equipment such as tri-square, bevel protractor, vernier calliper and micrometre to check critical parameters such as dimensions, squareness, hole size/fit, angles, flatness; surface finish, etc. • Show how to remove the components from the milling machine after performing the necessary quality checks or carry out further milling as appropriate. • Show how to record the measured values as per the organisational standards and complete the post-machining inspection sheet. • Demonstrate how to clean the milling

milling cutters. • Explain various features produced on metal and non-metal components such as flat, square, parallel, angular face; steps/shoulders; enclosed, open-ended, and tee slots; recesses; drilled and bored holes; vee, concave, convex, gear forms, etc. • Describe different processes of milling such as up milling, down milling, face milling, end milling, gang and straddle milling; milling of sunk and recessed surfaces, side milling, angular milling, etc. • Explain the effects of backlash in machine slides and screws, and how to overcome it. • Explain the importance of clamping the workpiece in a chuck/work holding device appropriately. • Explain the importance of checking the process sheet and matching it with the received drawings and other material. • Explain the importance and process of checking the quality of machined components according to the post-machining sheet to ensure conformance to the applicablequality standards. • Explain how to run the part program in single block mode and the importance of checking the tool condition after each operation. • Explain the importance of maintaining the recommended coolant levels and positioning the coolant nozzles appropriately. • Explain the importance of checking the sequence of the program as per the process sheet. • Explain the importance of checking for the presence of appropriate tools in the relevant pocket of Automatic Tool Changer (ATC). • Explain how to identify abnormal noises coming from the machine and	machine and other relevant tools and equipment. • Demonstrate the use of various industry 4.0 manufacturing technologies. • Demonstrate the process of disposing the industrial waste appropriately following the applicable environmental regulations and organisational procedures. • Demonstrate the use of the appropriate Personal Protective Equipment (PPE) during machining operations. • Demonstrate how to use the relevant power and manual tools, equipment, and accessories as per the manufacturer's instructions to avoid injury and achieve work efficiency. • Demonstrate the process of optimising the usage of electricity and other resources in various tasks and processes.

component. • Explain how to adjust the feed and Revolutions Per Minute (RPM). • Explain the importance of checking the condition of tools being used in machining at appropriate intervals during the process. • Explain how to identify inconsistencies in the dimensions due to tool wear and the process of correcting the offsets accordingly. • Explain how to adjust the machine settings to maintain the desired accuracy. • Describe the process of sharpening or replacing the worn-out/ damaged tools, using the necessary equipment. • Explain the importance of modifying the tool offsets according to the new tools replacing them. • List the relevant safety guidelines to be followed while sharpening/ replacing the worn-out/damaged tools. • Explain the importance of clamping the workpiece in a chuck/work holding device appropriately. • Explain the impact of improper clamping of a workpiece, such as distortion of the components. • Explain different types of costs such as production cost, raw material cost, tool cost, coolant cost, cost of machine idling, part rejection cost, overheads, etc. • List the impact of machine hour rate, cycle time and idle time on milling operations. • Describe the process of selecting cutting tools, chip breaker geometry and cutting parameters. • List the appropriate materials usedfor making a variety of tools, selecting coolant. • List the impact of tool nose radius,	

speed and feed rate on the milling operations. • Explain how to identify various machining faults. • Explain how to identify the sharpening needs of relevant tools and the process of sharpening them. • List common problems encountered during milling and how to resolve them. • Explain the relevant safe working practices and environmental regulations to be followed. • Explain the importance of reporting problems promptly for their timely resolution. • Explain the benefits and methods of resource optimisation.	
Classroom Aids	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Sample Drawing of First Angle and Third Angle, Vernier Caliper, Micrometer Screw Gauge, Depth Gauge, Go-No Gauge, Plane Glasses, Ear Plug, Leather Gloves, Safety Shoes, Leather Apron, Cutting Tool, Vertical Milling Machine with Accessories, Horizontal Milling Machine with Accessories, Work Holding Devices Like – Vice, Clamps, Chucks, Vblock, Sample Instruction Sheets, Marking Tool, Measuring Tool	

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
Diploma /Degree	Diploma /Degree in Mechanical Engineering	4	Operator- Conventional Milling	0		Practical skills and knowledge required in the relevant field

Trainer Certification	
Domain Certification	**Platform Certification**
Certified for Job Role: "**Operator- Conventional Milling**" mapped to QP: "CSC/Q0108, v1.0". Minimum accepted score is 80%	Recommended that the Trainer is certified for the Job Role: "Trainer", mapped to the Qualification Pack: "MEP/Q2601". The Minimum accepted as per respective SSC guidelines is 80%.

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training/Assessment Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
Diploma /Degree	Diploma /Degree in Mechanical Engineering	4	Operator- Conventional Milling	0		Practical skills and knowledge required in the relevant field

Assessor Certification	
Domain Certification	**Platform Certification**
Certified for Job Role: "**Operator- Conventional Milling**" mapped to QP: "CSC/Q0108, v1.0". The minimum accepted score is 80%	Certified for the Job Role: "Assessor" (VET and skills, mapped to the Qualification Pack: "MEP/Q2701, v2.0", with a minimum score of 80%.

Assessment Strategy

1. Assessment System Overview:
    - Batches assigned to the assessment agencies for conducting the assessment on SDMS/SIP or email
    - Assessment agencies send the assessment confirmation to VTP/TC looping SSC
    - The assessment agency deploys the ToA certified Assessor for executing the assessment
    - SSC monitors the assessment process & records
2. Testing Environment

    To ensure a conducive environment for conducting a test, the trainer will:
    - Confirm that the centre is available at the same address as mentioned on SDMS or SIP
    - Check the duration of the training.
    - Check the Assessment Start and End time to be 10 a.m. and 5 p.m. respectively
    - Ensure there are 2 Assessors if the batch size is more than 30.
    - Check that the allotted time to the candidates to complete Theory & Practical Assessment is correct.
    - Check the mode of assessment—Online (TAB/Computer) or Offline (OMR/PP).
    - Confirm the number of TABs on the ground are correct to execute the Assessment smoothly.
    - Check the availability of the Lab Equipment for the particular Job Role.
3. Assessment Quality Assurance levels / Framework:
    - Question papers created by the Subject Matter Experts (SME)
    - Question papers created by the SME verified by the other subject Matter Experts
    - Questions are mapped with NOS and PC
    - Question papers are prepared considering that levels 1 to 3 are for the unskilled & semi-skilled individuals, and levels 4 and above are for the skilled, supervisor & higher management
    - The assessor must be ToA certified and the trainer must be ToT Certified
    - The assessment agency must follow the assessment guidelines to conduct the assessment
4. Types of evidence or evidence-gathering protocol:
    - Time-stamped & geotagged reporting of the assessor from assessment location
    - Centre photographs with signboards and scheme-specific branding
    - Biometric or manual attendance sheet (stamped by TP) of the trainees during the training period
    - Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos
5. Method of verification or validation:

    To verify the details submitted by the training centre, the assessor will undertake:
    - A surprise visit to the assessment location
    - A random audit of the batch
    - A random audit of any candidate
6. Method for assessment documentation, archiving, and access

    To protect the assessment papers and information, the assessor will ensure:
    - Hard copies of the documents are stored

- Soft copies of the documents & photographs of the assessment are uploaded/accessed from Cloud Storage
- Soft copies of the documents & photographs of the assessment are stored on the Hard drive

References

Glossary

Term	Description
Declarative knowledge	Declarative knowledge refers to facts, concepts and principles that need to be known and/or understood in order to accomplish a task or to solve a problem.
Key Learning	The key learning outcome is the statement of what a learner needs to know, understand and be able to do in order to achieve the terminal outcomes. A set of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory) and skills (practical application).
OJT (M)	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on-site
OJT (R)	On-the-job training (Recommended); trainees are recommended the specified hours of training on-site
Procedural Knowledge	Procedural knowledge addresses how to do something, or how to perform a
Training Outcome	Training outcome is a statement of what a learner will know, understand and be able to do **upon the completion of the training**.
Terminal Outcome	The terminal outcome is a statement of what a learner will know, understand and be able to do **upon the completion of a module.** A set of terminal outcomes help to achieve the training outcome.

Acronyms and Abbreviations

Term	Description
NOS	National Skills Qualification Committee
NSQF	National Skills Qualification Framework
OJT	On-the-Job Training
OMR	Optical Mark Recognition
PC	Performance Criteria
PwD	Persons with Disabilities
QP	Qualification Pack
SDMS	Skill Development & Management System
SIP	Skill India Portal
SSC	Sector Skill Council
TC	Trainer Certificate
ToA	Training of Assessors
ToT	Training of Trainers
TP	Training Provider