



# Model Curriculum

**QP Name: Operator – Conventional Surface Grinding Machines**

**QP Code: CSC/Q0109**

**Version: 2.0**

**NSQF Level: 3**

**Model Curriculum Version: 1.0**

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## Training Parameters

<b>Sector</b>	Capital Goods
<b>Sub-Sector</b>	Machine Tools, Dies, Moulds and Press Tools, Plastics Manufacturing Machinery, Textile Manufacturing Machinery, Process Plant Machinery, Electrical and Power Machinery, Light Engineering Goods
<b>Occupation</b>	Machining
<b>Country</b>	India
<b>NSQF Level</b>	3
<b>Aligned to NCO/ISCO/ISIC Code</b>	NCO-2015/ 7224.30
<b>Minimum Educational Qualification and Experience</b>	Ability to Read and Write with 5 years of experience in the relevant field OR 5th Class Pass with 3 years of experience in the relevant field OR 8th Class Pass with 2 years of experience in the relevant field OR Class 8th + ITI (2 years) (Mechanical/Electrical and other relevant fields) Or Class 10th
<b>Pre-Requisite License or Training</b>	NA
<b>Minimum Job Entry Age</b>	18 Years
<b>Last Reviewed On</b>	NA
<b>Next Review Date</b>	NA
<b>NSQC Approval Date</b>	NA
<b>QP Version</b>	2.0
<b>Model Curriculum Creation Date</b>	NA
<b>Model Curriculum Valid Up to Date</b>	NA
<b>Model Curriculum Version</b>	1.0
<b>Minimum Duration of the Course</b>	300 Hours
<b>Maximum Duration of the Course</b>	300 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 grinding operations using conventional grinding machines.

### 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
<b>Bridge Module</b>	<b>04:00</b>	<b>00:00</b>	<b>0:00</b>	<b>00:00</b>	<b>04:00</b>
Module 1: Introduction to the role of an Operator- Conventional Surface Grinding Machines	04:00	0:00	0:00	00:00	04:00
<b>CSC/N1335 Follow the health and safety practices at work</b> <b>NOS Version- 2.0</b> <b>NSQF Level- 3</b>	<b>20:00</b>	<b>60:00</b>	<b>0:00</b>	<b>00:00</b>	<b>80:00</b>
Module 2: Health and safety practices	20:00	60:00	0:00	00:00	80:00
<b>CSC/N1336 Coordinate with co-workers to achieve work efficiency</b> <b>NOS Version-2.0</b> <b>NSQF Level- 3</b>	<b>20:00</b>	<b>60:00</b>	<b>0:00</b>	<b>00:00</b>	<b>80:00</b>
Module 3: Process of coordinating with co-workers to achieve work efficiency	20:00	60:00	0:00	00:00	80:00
<b>CSC/N0109 Carry out grinding operations using conventional grinding machines</b> <b>NOS Version- 2.0</b> <b>NSQF Level- 3</b>	<b>46:00</b>	<b>90:00</b>	<b>0:00</b>	<b>00:00</b>	<b>136:00</b>

Module 4: Process of carrying out grinding operations using conventional grinding machines	46:00	90:00	0:00	00:00	136:00
<b>Total Duration</b>	<b>90:00</b>	<b>210:00</b>	<b>0:00</b>	<b>00:00</b>	<b>300:00</b>

# Module Details

## Module 1: Introduction to the role of an Operator- Conventional Surface Grinding Machines

### Bridge Module

#### Terminal Outcomes:

- Discuss the job role of an Operator- Conventional Surface Grinding Machines.

Duration: 04:00	Duration: 0:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>• Describe the size and scope of the capital good industry and its sub-sectors.</li> <li>• Discuss the role and responsibilities of an Operator- Conventional Surface Grinding Machines.</li> <li>• Identify various employment opportunities for an Operator- Conventional Surface Grinding Machines.</li> </ul>	
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.

<b>Duration: 20:00</b>	<b>Duration: 60:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• 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.</li> <li>• Explain the importance and process of checking the work conditions, assessing the potential health and safety risks, and take appropriate measures to mitigate them.</li> <li>• Explain the importance and process of selecting and using the appropriate PPE relevant to the task and work conditions.</li> <li>• Explain the recommended techniques to be followed while lifting and moving heavy objects to avoid injury.</li> <li>• Explain the importance of following the manufacturer’s instructions and workplace safety guidelines while working on heavy machinery, tools and equipment.</li> <li>• Explain the importance and process of identifying existing and potential hazards at work.</li> <li>• Describe the process of assessing the potential risks and injuries associated with the various hazards.</li> <li>• Explain how to prevent or minimise different types of hazards.</li> <li>• Explain how to handle and store</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate the use of appropriate Personal Protective Equipment (PPE) relevant to the task and work conditions.</li> <li>• Demonstrate how to handle hazardous materials safely.</li> <li>• Demonstrate the process of testing the firefighting and various safety equipment to ensure they are in usable condition.</li> <li>• Demonstrate the process of recycling and disposing different types of waste appropriately.</li> <li>• Demonstrate how to use the appropriate type of fire extinguisher to extinguish different types of fires safely.</li> <li>• Demonstrate how to administer appropriate first aid to the injured personnel.</li> <li>• Demonstrate the process of performing Cardiopulmonary Resuscitation (CPR) on a potential victim of cardiac arrest.</li> <li>• Demonstrate the process of carrying out appropriate documentation following a health and safety incident at work, including all the required information.</li> </ul>

<p>hazardous materials safely.</p> <ul style="list-style-type: none"> <li>• Explain the importance of ensuring the first aid box is updated with the relevant first aid supplies.</li> <li>• Describe the process of checking and testing the firefighting and various safety equipment to ensure they are in a usable condition.</li> <li>• Explain the criteria for segregating waste into appropriate categories.</li> <li>• Describe the appropriate methods for recycling the recyclable waste.</li> <li>• Describe the process of disposing of the non-recyclable waste safely and the applicable regulations.</li> <li>• Explain the use of different types of fire extinguishers to extinguish different types of fires.</li> <li>• State the recommended practices to be followed for a safe rescue during a fire emergency.</li> <li>• Explain how to request assistance from the fire department to extinguish a serious fire.</li> <li>• Explain the appropriate practices to be followed during workplace emergencies to ensure safety and minimise loss to organisational property.</li> <li>• State the common health and safety hazards present in a work environment, associated risks, and how to mitigate them.</li> <li>• State the safe working practices to be followed while working at various hazardous sites and using electrical equipment.</li> <li>• Explain the importance of ensuring easy access to firefighting and safety equipment.</li> <li>• Explain the appropriate preventative and remedial actions to be taken in the case of exposure to toxic materials, such as poisonous chemicals and gases.</li> <li>• Explain various causes of fire in</li> </ul>	
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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.

<ul style="list-style-type: none"> <li>• Explain the importance and process of reviewing the health and safety conditions at work regularly or following an incident.</li> <li>• Explain the importance and process of implementing appropriate changes to improve the health and safety conditions at work.</li> </ul>	
<p><b>Classroom Aids</b></p>	
<p>Computer, Projection Equipment, PowerPoint Presentation and Software, Facilitator’s Guide, Participant’s Handbook.</p>	
<p><b>Tools, Equipment and Other Requirements</b></p>	
<p>Personal Protective Equipment, Cleaning Equipment and Materials, Sanitizer, Soap, Mask</p>	

## 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.

<b>Duration: 20:00</b>	<b>Duration: 60:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Explain the importance and process of effective communication in the workplace.</li> <li>• Explain the barriers to effective communication and how to overcome them.</li> <li>• Explain the importance of teamwork in an organisation’s and individual’s success.</li> <li>• Explain the importance of active listening in the work environment.</li> <li>• State the appropriate techniques to be followed for active listening.</li> <li>• Explain the importance of tone and pitch ineffective communication.</li> <li>• Explain the importance of avoiding casual expletives and unpleasant terms while communicating professional circles.</li> <li>• Explain the importance of maintaining discipline and ethical behaviour at work.</li> <li>• State the common reasons for interpersonal conflict and how to resolve them.</li> <li>• Explain the importance of developing effective working relationships for professional success.</li> <li>• Describe the process of expressing and addressing grievances appropriately and effectively.</li> <li>• Explain the importance and process of planning daily tasks to ensure their timely completion and efficient use of</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate the process of preparing the relevant documents and reports as per the supervisor’s instructions, providing appropriate information clearly and systematically.</li> <li>• Demonstrate how to mentor and assist subordinates in the execution of their work responsibilities.</li> <li>• Demonstrate the process of using various resources efficiently to ensure maximum utilisation and minimum wastage.</li> <li>• Demonstrate how to communicate clearly and politely to ensure effective communication with co-workers.</li> <li>• Demonstrate appropriate verbal and non-verbal communication that is respectful of genders and disability.</li> </ul>

<p>time.</p> <ul style="list-style-type: none"> <li>• Explain the importance of adhering to the limits of authority at work.</li> <li>• Explain the importance of following the applicable quality standards and timescales at work.</li> <li>• Explain the importance of coordinating with co-workers to achieve the work objectives efficiently.</li> <li>• Explain the relevant documentation requirements.</li> <li>• Explain the importance of providing appropriate information clearly and systematically in work documents.</li> <li>• State the escalation matrix to be followed to deal with out of authority tasks and concerns.</li> <li>• Explain the importance and process of mentoring and assisting subordinates in the execution of their work responsibilities.</li> <li>• Explain how to identify possible disruptions to work prevent them.</li> <li>• Explain how to use various resources efficiently to ensure maximum utilisation and minimum wastage.</li> <li>• Explain the recommended practices to be followed at work to avoid and resolve conflicts at work.</li> <li>• Explain the importance and process of efficient and timely dissemination of information to the authorised personnel.</li> <li>• Explain the procedure to report inappropriate behaviour e.g., harassment.</li> </ul>	
<p><b>Classroom Aids:</b></p>	
<p>Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop</p>	
<p><b>Tools, Equipment and Other Requirements</b></p>	
<p>NA</p>	

## Module 4: Process of carrying out grinding operations using conventional grinding machines

*Mapped to CSC/N0109 v2.0*

### Terminal Outcomes:

- Demonstrate the process of carrying out grinding operations.
- Explain the importance of using resources optimally.

<b>Duration: 46:00</b>	<b>Duration: 90:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• State the applicable documentation requirements in the job role.</li> <li>• Explain how to use and extract information from engineering drawings and related specifications.</li> <li>• Explain how to use the safety mechanisms available on different types of grinding machines, and the process of checking them for correct function.</li> <li>• Explain the correct operation of machine controls in hand and power modes.</li> <li>• Explain how to stop and restart grinding machines during emergencies.</li> <li>• Explain the importance of maintaining cleanliness in the work area.</li> <li>• Explain how to carry out minor repair and maintenance of grinding machines.</li> <li>• Explain how to ensure safety from spilt cutting fluids.</li> <li>• List the applicable ISO standard symbols and abbreviations.</li> <li>• Explain the concepts and benefits of Industry 4.0 and the Industrial Internet of Things (IIoT).</li> <li>• Explain the imperial and metric systems of measurement.</li> <li>• Explain workpiece reference points and the system of tolerance.</li> <li>• Explain how to mount a workpiece in the work holding devices such as</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate how to use the machine tool controls safely and correctly as per the applicable operational procedures.</li> <li>• Show how to prepare the grinding wheels following the applicable methods, such as dressing, truing up, wheel forming, etc.</li> <li>• Demonstrate the process of grinding the components to produce a variety of features such as flat, parallel, vertical, angular faces; steps and shoulders; counter, tapered, parallel bores; slots; stepped, tapered diameters; etc.</li> <li>• Demonstrate the process of carrying out regular repair and maintenance of the grinding machine.</li> <li>• Demonstrate the use of various industry 4.0 manufacturing technologies.</li> <li>• Demonstrate the process of disposing the industrial waste in compliance with the applicable regulations and organisational procedures.</li> <li>• Show how to use electricity and other resources optimally in various tasks and processes.</li> </ul>

magnetic chuck or blocks, angle plates, fixed vice, v-block and clamps, swivel or universal vice, fixtures, mandrels, etc.

- Explain the importance of clamping the workpiece in a chuck/work holding device, and the effect of improper clamping such as distortion on the components.
- Describe the process of checking the grinding wheels for recommended balance, damage and cracks.
- Explain the need for truing up and dressing of wheels to prevent glazing and burning of the workpiece.
- Describe methods of forming the wheels according to the required profile such as the use of pantograph, and diamond dressing units.
- Explain how to overcome the effects of backlash in machine slides and screws.
- Explain the techniques of taking trial cuts and checking dimensional accuracy.
- Explain the application of roughing and finishing cuts, and their effect on tool life, surface finish and dimensional accuracy.
- Explain different types of grinding wheels, cutting feeds and speeds to be used, and the depth of cut that can be taken.
- Explain the application of cutting fluids concerning a range of different materials.
- List relevant materials do not require cutting fluids to be used.
- Explain how to identify grinding faults and the need of dressing the grinding wheels.
- List the relevant checks to be carried out on the components before removing them from the grinding machine such as dimensional and surface finish checks.
- Explain how to address the common

<p>issues encountered during grinding operations, such as defects caused by glazed wheels; inappropriate feeds/speeds; damage by work holding devices.</p> <ul style="list-style-type: none"> <li>• Explain the importance of isolating the machine on the completion of daily activities.</li> <li>• Explain how to ensure isolation of the grinding machine before mounting the work holding devices and workpiece.</li> <li>• Explain how to fit and adjust machine guards and dust extraction equipment.</li> <li>• Explain how to secure workpiece on the grinding machine</li> <li>• Explain the importance and process of ensuring grinding wheels are free from damage and no workpieces are loaded on the machine before starting the machine.</li> <li>• Explain how to minimize various hazards associated with the grinding operations, such as revolving/moving parts of machinery; sparks/airborne particles; bursting grinding wheels; insecure components; burrs and sharp edges on components, etc.</li> <li>• Explain the importance of using the relevant PPE during the grinding operations such as overalls, face shields with safety glasses; gloves made from the recommended material; steel toe shoes, etc.</li> <li>• Explain the benefits and methods of resource optimization.</li> </ul>	
<p><b>Classroom Aids</b></p>	
<p>Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop</p>	
<p><b>Tools, Equipment and Other Requirements</b></p>	
<p>Horizontal Or Vertical Surface Grinding Machines, Cylindrical or Universal Grinding Machines, Magnetic Chucks, Angle Plates, Vee Block, Clamps, Centres, Swivel or Universal Vice, Fixtures, Mandrels, Overalls, Safety Glasses, Safety Shoes, External Micrometer, Surface Finish Equipment</p>	

# 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	CNC Operator- Conventional Surface Grinding Machines	0		Practical skills and knowledge required in the relevant field

Trainer Certification	
Domain Certification	Platform Certification
Certified for Job Role: <b>“CNC Operator- Conventional Surface Grinding Machines”</b> mapped to QP: <b>“CSC/Q0109, v1.0”</b> . The minimum accepted score is 80%	Recommended that the Trainer is certified for the Job Role: <b>“Trainer”</b> , mapped to the Qualification Pack: <b>“MEP/Q0102”</b> . 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	CNC Operator- Conventional Surface Grinding Machines	0		Practical skills and knowledge required in the relevant field

Assessor Certification	
Domain Certification	Platform Certification
Certified for Job Role: “ <b>CNC Operator- Conventional Surface Grinding Machines</b> ” mapped to QP: “CSC/Q0109, v1.0”. The minimum accepted score is 80%	Certified for the Job Role: “Assessor”, mapped to the Qualification Pack: “MEP/Q2701, v1.0”, 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
<b>Declarative knowledge</b>	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.
<b>Key Learning</b>	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).
<b>OJT (M)</b>	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on-site
<b>OJT (R)</b>	On-the-job training (Recommended); trainees are recommended the specified hours of training on-site
<b>Procedural Knowledge</b>	Procedural knowledge addresses how to do something, or how to perform a
<b>Training Outcome</b>	Training outcome is a statement of what a learner will know, understand and be able to do <b>upon the completion of the training.</b>
<b>Terminal Outcome</b>	The terminal outcome is a statement of what a learner will know, understand and be able to do <b>upon the completion of a module.</b> A set of terminal outcomes help to achieve the training outcome.

## Acronyms and Abbreviations

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