



# Model Curriculum

**QP Name: Automotive CNC Machining Technician**

**QP Code: ASC/Q3503**

**QP Version: 4.0**

**NSQF Level: 4**

**Model Curriculum Version: 1.0**

Automotive Skills Development Council | 153, Gr Floor, Okhla Industrial Area, Phase – III, Leela Building,  
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# Training Parameters

<b>Sector</b>	<b>Automotive</b>
<b>Sub-Sector</b>	Manufacturing
<b>Occupation</b>	Machining Operation
<b>Country</b>	India
<b>NSQF Level</b>	4
<b>Aligned to NCO/ISCO/ISIC Code</b>	NCO-2015/7223.5002
<b>Minimum Educational Qualification and Experience</b>	10th Class + 1 year ITI OR 10th Class pass with 2 years of relevant experience OR 11th Class Pass OR Certificate-NSQF (Automotive Machining Operator Level 3) with 2 Years of experience
<b>Pre-Requisite License or Training</b>	NA
<b>Minimum Job Entry Age</b>	18 years
<b>Last Reviewed On</b>	20/11/2020
<b>Next Review Date</b>	20/11/2025
<b>NSQC Approval Date</b>	20/11/2020
<b>QP Version</b>	4.0
<b>Model Curriculum Creation Date</b>	20/11/2020
<b>Model Curriculum Valid Up to Date</b>	20/11/2025
<b>Model Curriculum Version</b>	1.0
<b>Minimum Duration of the Course</b>	450 Hours 00 Minutes
<b>Maximum Duration of the Course</b>	450 Hours 00 Minutes

# 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.

- Interpret engineering drawings for identification of raw material, tools and equipment requirement for the machining operations.
- Perform pre-machining activities such as lifting of workpiece, inspection of tools and equipment etc.
- Perform various machining operations such as turning, milling, shaping, grinding, boring, broaching, hobbing, facing, shaping, blanking, piercing etc.
- Perform post-machining operations to finish the final output workpiece with the required specifications and industry standards.
- Conduct quality checks and inspection of the finished products for any damages and deformities.
- Work effectively and efficiently as per schedules and timelines.
- Implement safety practices.
- Optimize the use of resources to ensure less wastage and maximum conservation.
- Communicate effectively and develop interpersonal skills.

## 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>05:00</b>	<b>00:00</b>			<b>05:00</b>
<i>Module 1: Introduction to the role of a Automotive CNC Machining Technician Bridge Module</i>	05:00	0:00			05:00
<b>ASC/N9803 – Organize work and resources (Manufacturing) NOS Version No. – 1.0 NSQF Level - 3</b>	<b>20:00</b>	<b>35:00</b>			<b>55:00</b>
<i>Module 2: Organize work and resources according to safety and conservation standards</i>	20:00	35:00			55:00

<b>DGT/VSQ/N0102 - Employability Skills (60 hours)</b> <b>NOS Version No. – 1.0</b> <b>NSQF Level – 5</b>	<b>24:00</b>	<b>36:00</b>			<b>60:00</b>
Module 4: Introduction to Employability Skills	0.5:00	1:00			1.5:00
Module 5: Constitutional values - Citizenship	0.5:00	1:00			1.5:00
Module 6: Becoming a Professional in the 21st Century	1:00	1.5:00			2.5:00
Module 7: Basic English Skills	4:00	6:00			10:00
Module 8: Career Development & Goal Setting	1:00	1:00			2:00
Module 9: Communication Skills	2:00	3:00			5:00
Module 10: Diversity & Inclusion	1:00	1.5:00			2.5:00
Module 11: Financial and Legal Literacy	2:00	3:00			5:00
Module 12: Essential Digital Skills	4:00	6:00			10:00
Module 13: Entrepreneurship	3:00	4:00			7:00
Module 14: Customer Service	2:00	3:00			5:00
Module 15: Getting ready for apprenticeship & Jobs	3:00	5:00			8:00
<b>ASC/N9805 – Interpret engineering drawing</b> <b>NOS Version No. – 1.0</b> <b>NSQF Level - 4</b>	<b>15:00</b>	<b>15:00</b>			<b>30:00</b>
Module 16: Interpret engineering drawing	15:00	15:00			30:00
<b>ASC/N3535 – Prepare for machining activities</b> <b>NOS Version No. – 1.0</b> <b>NSQF Level - 4</b>	<b>20:00</b>	<b>60:00</b>	<b>10:00</b>		<b>90:00</b>
Module 17: Perform pre-machining activities	20:00	60:00	10:00		90:00
<b>ASC/N3508 – Perform machining operations</b> <b>NOS Version No. – 3.0</b> <b>NSQF Level - 4</b>	<b>20:00</b>	<b>60:00</b>	<b>10:00</b>		<b>90:00</b>
Module 18: Perform machining activities	20:00	60:00	10:00		90:00
<b>ASC/N3509 – Perform post machining and maintenance activities</b> <b>NOS Version No. – 3.0</b> <b>NSQF Level - 4</b>	<b>20:00</b>	<b>90:00</b>	<b>10:00</b>		<b>120:00</b>
Module 19: Perform post-machining and maintenance activities	20:00	90:00	10:00		120:00

<b>Total Duration</b>	<b>124:00</b>	<b>296:00</b>	<b>30:00</b>		<b>450:00</b>
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# Module Details

## Module 1

### Introduction to the role of a Automotive CNC Machining Technician

#### *Bridge module*

#### Terminal Outcomes:

- Identify the role and responsibilities of a Automotive CNC machining technician.

Duration: <05:00>	Duration: <00:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>Describe the role and responsibilities of a Automotive CNC machining technician.</li> <li>List the job opportunities for a Automotive CNC machining technician.</li> <li>Explain about Indian automotive manufacturing market.</li> <li>List various automobile Original Equipment Manufacturers (OEMs) and different products/ models manufactured by them.</li> <li>Discuss the documentation involved in the different processes of machining and maintenance such as job sheet, drawing etc.</li> <li>Identify the standard checklists and schedules recommended by OEM.</li> </ul>	
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	
<ul style="list-style-type: none"> <li>Sample checklist of tools and equipment</li> </ul>	



## Module 2

### Organize work and resources according to safety and conservation standards

#### Mapped to ASC/N9803, v1.0

#### Terminal Outcomes:

- Employ appropriate ways to maintain safe and secure working environment.
- Perform work as per the quality standards.
- Apply conservation practices at the workplace.

<b>Duration: &lt;20:00&gt;</b>	<b>Duration: &lt;35:00&gt;</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• List the potential workplace related risks and hazards, their causes and preventions.</li> <li>• Identify PPE to be used at workplace.</li> <li>• Identify various warning signs used at the workplace.</li> <li>• Describe appropriate strategies to deal with emergencies and accidents at the workplace.</li> <li>• Outline the organizational structure to be followed to report about health, safety and security breaches to the concerned authorities.</li> <li>• Discuss the importance of keeping work area clean and tidy.</li> <li>• Discuss the significance of conforming to basic hygiene practices such as washing hands, using alcohol based hand sanitizers or soap.</li> <li>• Discuss organizational hygiene and sanitation guidelines and ways of reporting breaches/gaps if any to the concerned authorities.</li> <li>• Discuss the ways of dealing with stress and anxiety.</li> <li>• Discuss how to complete the given work within the stipulated time period.</li> <li>• Explain how to maintain a proper balance between team and individual goals.</li> <li>• Explain 5S guidelines at workplace.</li> <li>• List the various materials used at the workplace.</li> <li>• Explain organisational recommended procedure for storage of tools, equipment and material after completion of work.</li> <li>• Explain the ways to optimize usage of resources.</li> </ul>	<ul style="list-style-type: none"> <li>• Apply appropriate safety practices to ensure safety of people at the workplace</li> <li>• Display the correct way of wearing and removing PPE such as face masks, hand gloves, face shields, PPE suits, etc.</li> <li>• Demonstrate the use of fire extinguisher.</li> <li>• Apply basic first aid procedure in case of emergencies.</li> <li>• Perform routine cleaning of tools, equipment and machines.</li> <li>• Employ various techniques for checking malfunctions in the equipment as per Standard Operating Procedure (SOP).</li> <li>• Show how to sanitize and disinfect one's work area regularly.</li> <li>• Demonstrate the correct way of washing hands using soap and water.</li> <li>• Demonstrate the correct way of sanitizing hands using alcohol-based hand rubs.</li> <li>• Demonstrate how to evacuate the workplace in case of an emergency.</li> <li>• Demonstrate sorting of materials, tools and equipment and spare parts after completion of work.</li> <li>• Demonstrate the steps involved in storage of tools, equipment and material after completion of work.</li> <li>• Perform basic checks to identify any spills and leaks and that need to be plugged /stopped.</li> <li>• Demonstrate different disposal techniques depending upon types of waste.</li> <li>• Employ different ways to check if equipment/machines are functioning as per requirements and report malfunctioning, if observed.</li> </ul>

<ul style="list-style-type: none"> <li>• Discuss various methods of waste management and its disposal.</li> <li>• List the different categories of waste for the purpose of segregation</li> <li>• Differentiate between recyclable and non-recyclable waste</li> <li>• State the importance of using appropriate colour dustbins for different types of waste.</li> <li>• Discuss common practices for conserving electricity at workplace.</li> <li>• Discuss the common sources of pollution and ways to minimize it.</li> </ul>	<ul style="list-style-type: none"> <li>• Employ ways for efficient utilization of material and water.</li> </ul>
<p><b>Classroom Aids:</b></p>	
<p>Whiteboard, marker pen, projector</p>	
<p><b>Tools, Equipment and Other Requirements</b></p>	
<ul style="list-style-type: none"> <li>• Housekeeping material: Cleaning agents, cleaning cloth, waste container, dust pan and brush set, liquid soap, hand towel, fire extinguisher</li> <li>• Safety gears: Safety shoes, ear plug, goggles, gloves, helmet, first-aid kit</li> </ul>	

## Module 3: Introduction to Employability Skills

### Mapped to DGT/VSQ/N0102

#### Terminal Outcomes:

- Discuss about Employability Skills in meeting the job requirements

<b>Duration:</b> <0.5:00>	<b>Duration:</b> <1:00>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Discuss the importance of Employability Skills in meeting the job requirements</li> </ul>	<ul style="list-style-type: none"> <li>• List different learning and employability related GOI and private portals and their usage</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	

## Module 4: Constitutional values - Citizenship

### Mapped to DGT/VSQ/N0102

#### Terminal Outcomes:

- Discuss about constitutional values to be followed to become a responsible citizen

<b>Duration:</b> <0.5:00>	<b>Duration:</b> <1:00>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Explain constitutional values, civic rights, duties, citizenship, responsibility towards society etc. that are required to be followed to become a responsible citizen.</li> </ul>	<ul style="list-style-type: none"> <li>• Show how to practice different environmentally sustainable practices</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	

## Module 5: Becoming a Professional in the 21st Century

### Mapped to DGT/VSQ/N0102

#### Terminal Outcomes:

- Demonstrate professional skills required in 21<sup>st</sup> century

<b>Duration:</b> <1:00>	<b>Duration:</b> <1.5:00>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Discuss 21st century skills.</li> <li>• Describe the benefits of continuous learning</li> </ul>	<ul style="list-style-type: none"> <li>• Exhibit 21st century skills like Self-Awareness, Behavior Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn etc. in personal or professional life.</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	

## Module 6: Basic English Skills

### Mapped to DGT/VSQ/N0102

#### Terminal Outcomes:

- Practice basic English speaking.

<b>Duration:</b> <4:00>	<b>Duration:</b> <6:00>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Describe basic communication skills</li> <li>• Discuss ways to read and interpret text written in basic English</li> </ul>	<ul style="list-style-type: none"> <li>• Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone</li> <li>• Read and interpret text written in basic English</li> <li>• Write a short note/paragraph / letter/e - mail using basic English</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	

## Module 7: Career Development & Goal Setting

### Mapped to DGT/VSQ/N0102

#### Terminal Outcomes:

- Demonstrate Career Development & Goal Setting skills.

<b>Duration:</b> <1:00>	<b>Duration:</b> <1:00>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Discuss need of career development plan</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate how to communicate in a well-mannered way with others.</li> <li>• Create a career development plan with well-defined short- and long-term goals</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	

## Module 8: Communication Skills

### Mapped to DGT/VSQ/N0102

#### Terminal Outcomes:

- Practice basic communication skills.

<b>Duration:</b> <2:00>	<b>Duration:</b> <3:00>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Explain the importance of active listening for effective communication</li> <li>• Discuss the significance of working collaboratively with others in a team</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	

## Module 9: Diversity & Inclusion

### Mapped to DGT/VSQ/N0102

#### Terminal Outcomes:

- Describe PwD and gender sensitisation.

<b>Duration:</b> <1:00>	<b>Duration:</b> <1.5:00>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>Discuss the significance of reporting sexual harassment issues in time</li> </ul>	<ul style="list-style-type: none"> <li>Demonstrate how to behave, communicate, and conduct oneself appropriately with all genders and PwD</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	

## Module 10: Financial and Legal Literacy

### Mapped to DGT/VSQ/N0102

#### Terminal Outcomes:

- Describe ways of managing expenses, income, and savings.

<b>Duration:</b> <2:00>	<b>Duration:</b> <3:00>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>List the common components of salary and compute income, expenditure, taxes, investments etc.</li> <li>Discuss the legal rights, laws, and aids</li> </ul>	<ul style="list-style-type: none"> <li>Outline the importance of selecting the right financial institution, product, and service</li> <li>Demonstrate how to carry out offline and online financial transactions, safely and securely</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	

## Module 11: Essential Digital Skills

### Mapped to DGT/VSQ/N0102

#### Terminal Outcomes:

- Demonstrate procedure of operating digital devices and associated applications safely.

<b>Duration:</b> <4:00>	<b>Duration:</b> <6:00>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Describe the role of digital technology in today’s life</li> <li>• Discuss the significance of using internet for browsing, accessing social media platforms, safely and securely</li> </ul>	<ul style="list-style-type: none"> <li>• Show how to operate digital devices and use the associated applications and features, safely and securely</li> <li>• Create sample word documents, excel sheets and presentations using basic features</li> <li>• Utilize virtual collaboration tools to work effectively</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	

## Module 12: Entrepreneurship

### Mapped to DGT/VSQ/N0102

#### Terminal Outcomes:

- Describe opportunities as an entrepreneur.

<b>Duration:</b> <3:00>	<b>Duration:</b> <4:00>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Explain the types of entrepreneurship and enterprises</li> <li>• Discuss how to identify opportunities for potential business, sources of funding and associated financial and legal risks with its mitigation plan</li> <li>• Describe the 4Ps of Marketing-Product, Price, Place and Promotion and apply them as per requirement</li> </ul>	<ul style="list-style-type: none"> <li>• Create a sample business plan, for the selected business opportunity</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	

## Module 13: Customer Service

### Mapped to DGT/VSQ/N0102

#### Terminal Outcomes:

- Describe ways of maintaining customer.

<b>Duration:</b> <2:00>	<b>Duration:</b> <3:00>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>Explain the significance of identifying customer needs and addressing them.</li> <li>Explain the significance of identifying customer needs and responding to them in a professional manner.</li> <li>Discuss the significance of maintaining hygiene and dressing appropriately.</li> </ul>	<ul style="list-style-type: none"> <li>Demonstrate how to maintain hygiene and dressing appropriately.</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	

## Module 14: Getting ready for apprenticeship & Jobs

### Mapped to DGT/VSQ/N0102

#### Terminal Outcomes:

- Describe ways of preparing for apprenticeship & Jobs appropriately.

<b>Duration:</b> <3:00>	<b>Duration:</b> <5:00>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>Discuss the significance of maintaining hygiene and confidence during an interview</li> <li>List the steps for searching and registering for apprenticeship opportunities</li> </ul>	<ul style="list-style-type: none"> <li>Create a professional Curriculum Vitae (CV)</li> <li>Use various offline and online job search sources such as employment exchanges, recruitment agencies, and job portals respectively</li> <li>Perform a mock interview</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	



## Module 15: Interpret engineering drawing

### Mapped to ASC/N9805, v1.0

#### Terminal Outcomes:

- Describe the basics of engineering drawing.
- Interpret the machine drawings and symbols for understanding the job requirements.

Duration: <15:00>	Duration: <15:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>• Identify uniqueness, dimensioning and important features of 2D and 3D shapes.</li> <li>• Identify types of lines, angles, points and their symmetry in shapes.</li> <li>• Differentiate between first angle and third angle projection.</li> <li>• Interpret 3 axis (x, y and z axis) of projection and machine symbols used in drawing.</li> <li>• Describe GD&amp;T and use of its symbols in the drawings.</li> <li>• Identify required limits and tolerances of component from drawing.</li> <li>• Explain standards used in India for making machine drawings.</li> <li>• Identify organisational drawing standards for interpreting the work requirements appropriately.</li> </ul>	<ul style="list-style-type: none"> <li>• Read an object in first angle and third angle projection.</li> <li>• Demonstrate appropriate way of reading and interpreting the shapes (cones, cylinder, sphere, cuboid, etc) on to a 2D and 3D projection.</li> <li>• Interpret and read orthographic and isometric views.</li> <li>• Read GD&amp;T symbols in the given drawing.</li> <li>• Employ appropriate ways of storing the drawings in a defined and appropriate place.</li> <li>• Role play a situation on how to communicate the changes in drawing to the concerned authority.</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	
<ul style="list-style-type: none"> <li>• Drawing tools</li> <li>• Machine drawing handbook</li> <li>• Machine drawings</li> </ul>	

## Module 16: Perform pre-machining activities

### Mapped to ASC/N3535, v1.0

#### Terminal Outcomes:

- Identify tools and equipment required for machining.
- Perform pre-machining activities such as inspection of tools and equipment, measurement and marking of workpiece etc.

<b>Duration:</b> <20:00>	<b>Duration:</b> <70:00>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Discuss the information derived from the workorder, process charts and engineering drawings.</li> <li>• Explain different types of machining processes.</li> <li>• Describe operational fundamentals of CNC machine.</li> <li>• Explain working of machines such as lathe, CNC machine and accessories required for the machining work.</li> <li>• Explain the selection criteria of raw material or input component for the machining work.</li> <li>• List jigs and fixtures, tools, cutting tools, equipment and measuring instruments required during the machining work.</li> <li>• Discuss machine parameters like cutting speed, depth of cut, feed rate etc. and their impact on output.</li> <li>• Describe machine auto cycle and how to set it on the CNC machine.</li> <li>• List limits of machining e.g. surface finish, specific orientation, gauge inspection etc.</li> <li>• Describe importance of selecting correct program in the CNC machine for machining operation as per the work instructions.</li> </ul>	<ul style="list-style-type: none"> <li>• Select the tools, equipment and raw material required for work.</li> <li>• Demonstrate how to select the machine parameters as per the work instructions.</li> <li>• Demonstrate how to check the input component for the machining work as per the work instructions.</li> <li>• Demonstrate the standard operating procedures and use of tools, cutting tools, equipment and measuring instruments required during job.</li> <li>• Perform measurement and marking of reference points/ cutting lines on the work pieces by using measuring instruments.</li> <li>• Demonstrate how to support Lead Technician in programming the CNC/numerically controlled machine.</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	
<ul style="list-style-type: none"> <li>• Basic tool box, Work bench with vice</li> <li>• Machining tools/ equipment: Surface marking plate, cutting tools, threading, dies &amp; guides, etc.</li> <li>• Machines: Conventional lathe and vertical milling machine with standard accessories and Production CNC machining center with ATC</li> </ul>	

- Measuring equipment: Vernier calipers, micrometre, feeler gauges, bore gauge, slip gauge, thickness gauge, steel ruler, measuring tape, height, gauge, dial gauge, angle plate, set square, compass etc.
- Consumables: Oil stones, Emery, Dressing stone, File cord, Tool post packing, Spares for cutting tools, Carbide inserts, Grinding Wheels etc.
- Hand book, job orders, work order, completion material requests, and Technical Reference Books.
- Safety materials: Fire extinguisher, helmet, leather safety gloves, leather aprons, safety glasses with side shields, ear plug, safety shoes and first-aid kit
- Cleaning material: Tip cleaner, wire brush (M.S.), cleaning agents, cleaning cloth, waste container, dust pan and brush set, liquid soap, hand towel

## Module 17: Perform machining activities

### Mapped to ASC/N3508, v3.0

#### Terminal Outcomes:

- Perform various machining operations such as turning, milling, boring etc.

<b>Duration: &lt;20:00&gt;</b>	<b>Duration: &lt;70:00&gt;</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• List raw material, tools, cutting tools, equipment and measuring instruments required during the machining work.</li> <li>• List the steps for setting up and adjusting the machine tools, fixtures/jigs and cutting tools on the machine as per work instructions.</li> <li>• Discuss the process of lifting and fixing the workpiece on the machine.</li> <li>• Outline the process of various machining operations such as milling, shaping, grinding, boring, broaching etc.</li> <li>• Describe importance of maintaining length to bore ratio of the tool in case of boring operation.</li> <li>• Recall common issues occurring during machining work such as power failure, rejection, tool breakage, machine failure due to jammed pieces etc.</li> <li>• Explain process of evaluating the machined output for quality standards.</li> <li>• List the steps to be performed for observing and recording machine performance.</li> <li>• Discuss organisational standards and procedures for replacing worn out tool in the machine.</li> <li>• Discuss various aspects such as tool changing cycle, tool life in number of pieces etc. need to consider for changing the worn out tool from machine.</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate the procedure of securing workpiece on machine by using lifting tools.</li> <li>• Demonstrate the procedure of setting up and adjusting the machine tools, fixtures, cutting tools etc. on the machine.</li> <li>• Perform inspection of the working of different holding fixtures, gears, stops etc. to control work piece movement.</li> <li>• Demonstrate organizational specified procedure of all machining operations such as turning, milling, shaping, grinding, boring, broaching, hobbing, facing, shaping, blanking, piercing etc.</li> <li>• Apply appropriate techniques to maintain coolant level and lubrication on work material.</li> <li>• Employ appropriate ways for managing issues such as power failure, rejection, tool breakage, machine failure due to jammed pieces etc.</li> <li>• Employ appropriate ways of detecting defects in the manufactured component.</li> <li>• Record operational data such as pressure readings, length of strokes, feed rates, speed etc.</li> <li>• Demonstrate safe procedure of replacing worn out tools timely from the machine.</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	
<ul style="list-style-type: none"> <li>• Basic tool box, Work bench with vice</li> <li>• Machining tools/ equipment: Surface marking plate, cutting tools, threading, dies &amp; guides, etc.</li> <li>• Machines: Conventional lathe and vertical milling machine with standard accessories and Production CNC machining center with ATC</li> </ul>	

- Measuring equipment: Vernier calipers, micrometre, feeler gauges, bore gauge, slip gauge, thickness gauge, steel ruler, measuring tape, height, gauge, dial gauge, angle plate, set square, compass etc.
- Consumables: Oil stones, Emery, Dressing stone, File cord, Tool post packing, Spares for cutting tools, Carbide inserts, Grinding Wheels etc.
- Hand book, job orders, work order, completion material requests, and Technical Reference Books.
- Sample of Rejected parts for defects like dent, scratch, damage and burrs
- Safety materials: Fire extinguisher, helmet, leather safety gloves, leather aprons, safety glasses with side shields, ear plug, safety shoes and first-aid kit
- Cleaning material: Tip cleaner, wire brush (M.S.), cleaning agents, cleaning cloth, waste container, dust pan and brush set, liquid soap, hand towel

## Module 18: Perform post-machining and maintenance activities

### Mapped to ASC/N3509, v3.0

#### Terminal Outcomes:

- Identify requirements for maintenance and post-machining activities.
- Perform maintenance and post-machining activities.

Duration: <20:00>	Duration: <100:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>• Describe de-burring and shot blasting process for removing the extra burrs and chips from the metal surface.</li> <li>• List tools, equipment and measuring instruments required for de-burring process and quality inspection process.</li> <li>• Describe the commonly occurring defects in the machined workpieces.</li> <li>• Discuss the impact of burrs, edges and chips on the quality of machined workpieces.</li> <li>• Describe methods of identifying the defects and checking the quality of machined workpieces.</li> <li>• Describe the process of separation of damaged workpieces.</li> <li>• Describe need of routine maintenance of tools and equipment required.</li> <li>• Discuss the checklist for tasks to be performed for routine or non-routine service/repair.</li> <li>• Describe lubrication process and importance of selecting correct lubricant.</li> <li>• Explain properties and specifications of coolant and lubricant required for machining the required component.</li> <li>• Identify different methods for disposing off waste material such as waste oil, scrap, etc.</li> <li>• List the records/documents to be maintained w.r.t machining and maintenance tasks.</li> <li>• Discuss the necessary precautions to avoid any hazard and accident during maintenance activities.</li> </ul>	<ul style="list-style-type: none"> <li>• Apply appropriate ways for inspecting and repairing the tools and equipment.</li> <li>• Perform the steps involved in de-burring process.</li> <li>• Demonstrate the steps involved in shot blasting/ vibro processes.</li> <li>• Apply appropriate inspection methods for identifying the defects and checking the quality of machined workpieces.</li> <li>• Show how to separate damaged and correct workpieces.</li> <li>• Apply basic maintenance techniques to ensure that the tools and equipment are functioning as per SOP.</li> <li>• Perform the process of routine service/maintenance as per standard operating procedures.</li> <li>• Apply appropriate method for oiling and cleaning machine and its components as per the maintenance plan.</li> <li>• Demonstrate how to check the coolant and lubrication level of machine.</li> <li>• Demonstrate how to check the broach teeth and metal chips in the broaching machine after completion of work.</li> <li>• Apply appropriate method for lubricating the machine.</li> <li>• Apply ways to conduct repairs and adjustments of tools, equipment and workstations.</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	
<ul style="list-style-type: none"> <li>• Basic tool box, work bench with vice</li> </ul>	

- Measuring equipment: Vernier calipers, micrometre, feeler gauges, bore gauge, slip gauge, thickness gauge, steel ruler, measuring tape, height, gauge, dial gauge, angle plate, set square, compass etc.
- Sample of Rejected parts for defects like dent, scratch, damage and burrs
- Safety materials: Fire extinguisher, leather safety gloves, leather aprons, safety glasses with side shields, ear plug, helmet, safety shoes and first-aid kit
- Cleaning material: Tip cleaner, wire brush (M.S.), cleaning agents, cleaning cloth, waste container, dust pan and brush set, liquid soap, hand towel

# Annexure

## Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
ITI	Machinist/Turner	5	CNC Machining	1	CNC Machining	NA
ITI	Machinist/Turner	6	CNC Machining	0	CNC Machining	NA
Certificate NSQ- Level 6	Machining Master Technician	3	CNC Machining	1	CNC Machining	NA
Diploma	Mechanical/Automobile	3	CNC Machining	1	CNC Machining	NA
Diploma	Mechanical/Automobile	4	CNC Machining	0	CNC Machining	NA

Trainer Certification	
Domain Certification	Platform Certification
“CNC Machining Technician, ASC/ Q3503, version 3.0”. Minimum accepted score is 80%.	“ MEP/Q2601, Trainer (VET and Skills), Version-2” Minimum accepted score is 80%.



## Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training/Assessment Experience		Remarks
		Years	Specialization	Years	Specialization	
ITI	Machinist/Turner	6	CNC Machining	1	CNC Machining	NA
ITI	Machinist/Turner	7	CNC Machining	0	CNC Machining	NA
Certificate NSQ- Level 6	Machining Master Technician	4	CNC Machining	1	CNC Machining	NA
Diploma	Mechanical/Automobile	4	CNC Machining	1	CNC Machining	NA
Diploma	Mechanical/Automobile	5	CNC Machining	0	CNC Machining	NA

Assessor Certification	
Domain Certification	Platform Certification
“CNC Machining Technician, ASC/ Q3503, version 3.0”. Minimum accepted score is 80%.	“MEP/Q2701, Assessor (VET and Skill), Version-2” Minimum accepted score is 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
  - Assessment agency deploys the ToA certified Assessor for executing the assessment
  - SSC monitors the assessment process & records
2. Testing Environment:
  - 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 as 10 a.m. and 5 p.m.
  - If the batch size is more than 30, then there should be 2 Assessors.
  - 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 level 1 to 3 are for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management
  - Assessor must be ToA certified & trainer must be ToT Certified
  - 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:
  - Surprise visit to the assessment location
  - Random audit of the batch
  - Random audit of any candidate
6. Method for assessment documentation, archiving, and access
  - 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 in the Hard Drives

## 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 Outcome</b>	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 task. It is the ability to work, or produce a tangible work output by applying cognitive, affective or psychomotor skills.
<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>	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

<b>NOS</b>	National Occupational Standard(s)
<b>NSQF</b>	National Skills Qualifications Framework
<b>QP</b>	Qualifications Pack
<b>TVET</b>	Technical and Vocational Education and Training
<b>SOP</b>	Standard Operating Procedure
<b>GD&amp;T</b>	Geometric Dimensioning & Tolerancing
<b>CAD</b>	Computer-Aided Drafting
<b>CAM</b>	Computer-Aided Manufacturing
<b>CNC</b>	Computerized Numerical Control
<b>WI</b>	Work Instructions
<b>PPE</b>	Personal Protective equipment