



# Model Curriculum

**QP Name: Automotive Machining Operator**

**QP Code: ASC/Q3501**

**QP Version: 2.0**

**NSQF Level: 3**

**Model Curriculum Version: 1.0**

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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>	3
<b>Aligned to NCO/ISCO/ISIC Code</b>	NCO-2015/7223.5001
<b>Minimum Educational Qualification and Experience</b>	10th Class OR Certificate-NSQF (Automotive Machining Assistant) with 1-2 Years of experience
<b>Pre-Requisite License or Training</b>	NA
<b>Minimum Job Entry Age</b>	18 years
<b>Last Reviewed On</b>	23/09/2020
<b>Next Review Date</b>	23/09/2025
<b>NSQC Approval Date</b>	
<b>QP Version</b>	2.0
<b>Model Curriculum Creation Date</b>	23/09/2020
<b>Model Curriculum Valid Up to Date</b>	23/09/2025
<b>Model Curriculum Version</b>	1.0
<b>Minimum Duration of the Course</b>	320 Hours 00 Minutes
<b>Maximum Duration of the Course</b>	320 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 required equipment for the machining operations.
- Support technician in pre-machining activities such as inspection of tools and equipment etc.
- Support technician in machining operations such as turning, milling, shaping, grinding, boring, broaching, hobbing, facing, shaping, blanking, piercing etc.
- Support technician in post-machining operations such as inspection, quality check, cleaning.
- 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 using 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
<i>Introduction to the role of an Automotive Machining Operator</i> <i>Bridge Module</i>	8:00	0:00			8:00
<b>ASC/N9803 – Organize work and resources (Manufacturing)</b> <b>NOS Version No. – 1.0</b> <b>NSQF Level - 3</b>	<b>16:00</b>	<b>24:00</b>			<b>40:00</b>
Organize work and resources according to safety and conservation standards	16:00	24:00			40:00
<b>ASC/N9802 – Interact effectively with colleagues, customers and others</b> <b>NOS Version No. – 1.0</b> <b>NSQF Level - 3</b>	<b>12:00</b>	<b>20:00</b>			<b>32:00</b>
Communicate Effectively and Efficiently	12:00	20:00			32:00
<b>ASC/N9805 – Interpret engineering drawing</b> <b>NOS Version No. – 1.0</b> <b>NSQF Level - 4</b>	<b>16:00</b>	<b>16:00</b>			<b>32:00</b>

Interpret engineering drawing	16:00	16:00			32:00
<b>ASC/N3506 – Support in machining and post-machining activities NOS Version No. – 1.0 NSQF Level - 3</b>	<b>32:00</b>	<b>56:00</b>			<b>88:00</b>
Prepare for machining activities	32:00	56:00			88:00
<b>ASC/N3506 – Support in machining and post-machining activities NOS Version No. – 1.0 NSQF Level - 3</b>	<b>36:00</b>	<b>84:00</b>			<b>120:00</b>
Support in machining and post-machining activities	36:00	84:00			120:00
<b>Total Duration</b>	<b>120:00</b>	<b>200:00</b>			<b>320:00</b>

# Module Details

## Module 1

### Introduction to the role of an Automotive Machining Operator

#### *Bridge module*

#### Terminal Outcomes:

- Discuss the role and responsibilities of an Automotive Machining Operator.

Duration: <08:00>	Duration: <00:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>• Describe the role and responsibilities of an Automotive Machining Operator.</li> <li>• List the job opportunities for an Automotive Machining Operator in the Automotive industry.</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 standards and procedures involved in the different processes of machining.</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*

#### 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;16:00&gt;</b>	<b>Duration: &lt;24:00&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>

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|---|--|
| <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> |
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**Classroom Aids:**

Whiteboard, marker pen, projector

**Tools, Equipment and Other Requirements**

- Housekeeping material: Cleaning agents, cleaning cloth, waste container, dust pan and brush set, liquid soap, hand towel, fire extinguisher
- Safety gears: Safety shoes, ear plug, goggles, gloves, helmet, first-aid kit



## Module 3

### Communicate Effectively and Efficiently

#### Mapped to ASC/N9802

#### Terminal Outcomes:

- Use effective communication and interpersonal skills.
- Apply sensitivity while interacting with different genders and people with disabilities.

<b>Duration: &lt;12:00&gt;</b>	<b>Duration: &lt;20:00&gt;</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Explain the organizational structure for communicating with colleagues, seniors and others.</li> <li>• Discuss the ways to adjust the communication styles to reflect sensitivity towards gender and persons with disability (PwD).</li> <li>• Explain the importance of respecting personal space of colleagues.</li> <li>• State the procedure to receive work instructions and report problems to the supervisor.</li> <li>• List the various organizational policies and procedures to be followed at the workplace.</li> <li>• Describe different ways to rectify commonly occurring errors.</li> <li>• Explain the importance of complying with the instructions/guidelines and procedures while performing tasks related to the job specifications.</li> <li>• Discuss the importance of PwD and gender sensitization.</li> </ul>	<ul style="list-style-type: none"> <li>• Employ different means of communication depending upon the requirement while interacting with others.</li> <li>• Demonstrate using new ways to maintain good relationships with colleagues and supervisor.</li> <li>• Prepare a sample report to send the work status to the supervisor.</li> <li>• Demonstrate how to communicate with different genders and persons with disability (PwD) in a sensitive manner.</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	
Sample of escalation matrix, organisation structure.	

## Module 4

### Interpret engineering drawing

#### Mapped to ASC/N9805

#### Terminal Outcomes:

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

<b>Duration: &lt;16:00&gt;</b>	<b>Duration: &lt;16:00&gt;</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<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 5

### Prepare for machining activities

#### *Mapped to ASC/N3506*

#### 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: &lt;32:00&gt;</b>	<b>Duration: &lt;56:00&gt;</b>
<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 job orders and engineering drawings and identify the work requirements.</li> <li>• Explain different types of machining processes.</li> <li>• Discuss operational fundamentals of conventional and CNC machine.</li> <li>• List jigs and fixtures, tools, cutting tools, equipment and measuring instruments required during the machining and post-machining work.</li> <li>• List tooling instructions for fixtures, cutting tools, jigs, gauges etc.</li> <li>• Discuss machine parameters like cutting speed, depth of cut, feed rate etc. and their impact on output.</li> <li>• Elucidate the importance of selecting correct lubricant and coolant for machine components.</li> <li>• Explain properties and specifications of coolant and lubricant required for machining component.</li> <li>• Summarise the steps to be performed for checking the tools and equipment before use.</li> <li>• Summarise the steps to be performed for checking the raw material or input component for the machining work.</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate how to set the machine and select the machine parameters 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>• Apply appropriate ways of checking the tools and equipment for defects before use.</li> <li>• Demonstrate how to check the input component for the machining work as per the work instructions.</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 6

### Support in machining and post-machining activities

#### Mapped to ASC/N3506

#### Terminal Outcomes:

- Perform various machining operations such as turning, milling, boring etc.
- Identify requirements for post-machining activities.
- Perform post-machining activities.

<b>Duration: &lt;36:00&gt;</b>	<b>Duration: &lt;84:00&gt;</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Discuss importance of selecting correct program in the CNC machine for machining operation as per the work instructions.</li> <li>• Explain process of evaluating the irregularities of machined input with the specified quality standards.</li> <li>• Explain methods of inspecting the quality of machined workpieces.</li> <li>• Discuss the process of segregating the ok and damaged workpieces.</li> <li>• List the steps to be performed for checking the machine operations for any defects in its component and informing the supervisor/maintenance team.</li> <li>• Discuss the impact of burrs, edges and chips on the quality of machined workpieces.</li> <li>• Identify different methods for disposing off waste material such as waste oil, scrap, etc.</li> <li>• Discuss the necessary precautions to avoid any hazard and accident during machining activities.</li> </ul>	<ul style="list-style-type: none"> <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>• Demonstrate how to support Technician in selecting the right program in the CNC machine and mass production of components.</li> <li>• Employ appropriate ways of measuring and comparing manufactured component dimensions with the specified dimensions in the job orders.</li> <li>• Prepare a report for the supervisor about the issues faced during the machining process.</li> <li>• Apply appropriate inspection methods for identifying the defects and checking the quality of machined workpieces as per the control plan.</li> <li>• Show how to segregate damaged and ok workpieces.</li> <li>• Demonstrate how to remove chips, burrs and sharp edges from different machine areas.</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> <li>• 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.</li> </ul>	

- 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

# Annexure

## Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
ITI	Machinist/Turner	3	CNC Machining	1	CNC Machining	NA
ITI	Machinist/Turner	4	CNC Machining	0	CNC Machining	NA
Certificate NSQF- Level 5	Automotive Machining Lead Technician	3	CNC Machining	1	CNC Machining	NA

Trainer Certification	
Domain Certification	Platform Certification
<p>“Automotive Machining Operator, ASC/Q3501, version 2.0”.</p> <p>Minimum accepted score is 80%.</p>	<p>“Trainer, MEP/Q2601”</p> <p>Minimum accepted score is 80%.</p>

## Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training/Assessment Experience		Remarks
		Years	Specialization	Years	Specialization	
ITI	Machinist/Turner	4	CNC Machining	1	CNC Machining	NA
ITI	Machinist/Turner	5	CNC Machining	0	CNC Machining	NA
Certificate NSQF- Level 5	Automotive Machining Lead Technician	4	CNC Machining	1	CNC Machining	NA

Assessor Certification	
Domain Certification	Platform Certification
<p>“Automotive Machining Operator, ASC/Q3501, version 2.0”.</p> <p>Minimum accepted score is 80%.</p>	<p>“Assessor; MEP/Q2701”</p> <p>Minimum accepted score is 80%.</p>



## 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 can
  - didate
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