



Model Curriculum

QP Name: Automotive CNC Machining Technician

QP Code: ASC/Q3503

QP Version: 3.0

NSQF Level: 4

Model Curriculum Version: 1.0

Automotive Skills Development Council | 153, Gr Floor, Okhla Industrial Area, Phase – III, Leela Building,
New Delhi – 110020

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Training Parameters

| | |
|---|--|
| Sector | Automotive |
| Sub-Sector | Manufacturing |
| Occupation | Machining Operation |
| Country | India |
| NSQF Level | 4 |
| Aligned to NCO/ISCO/ISIC Code | NCO-2015/7223.5002 |
| Minimum Educational Qualification and Experience | 8th Class + 2 years ITI with 2 years of relevant experience OR 10th Class pass with 2 years of relevant experience OR 10th Class + 2 years ITI OR 12th Class with 1 Year of experience OR Certificate-NSQF (Automotive Machining Operator Level 3) with 2 Years of experience |
| Pre-Requisite License or Training | NA |
| Minimum Job Entry Age | 18 years |
| Last Reviewed On | 20/11/2020 |
| Next Review Date | 20/11/2025 |
| NSQC Approval Date | 20/11/2020 |
| QP Version | 3.0 |
| Model Curriculum Creation Date | 20/11/2020 |
| Model Curriculum Valid Up to Date | 20/11/2025 |
| Model Curriculum Version | 1.0 |
| Minimum Duration of the Course | 390 Hours 00 Minutes |
| Maximum Duration of the Course | 390 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 |
|--|-----------------|--------------------|--|--|----------------|
| Bridge Module | 05:00 | 00:00 | | | 05:00 |
| <i>Module 1: Introduction to the role of a Automotive CNC Machining Technician Bridge Module</i> | 05:00 | 0:00 | | | 05:00 |
| ASC/N9803 – Organize work and resources (Manufacturing) NOS Version No. – 1.0 NSQF Level - 3 | 15:00 | 30:00 | | | 45:00 |
| <i>Module 2: Organize work and resources according to safety and conservation standards</i> | 15:00 | 30:00 | | | 45:00 |
| ASC/N9802 – Interact effectively with colleagues, customers and others NOS Version No. – 1.0 NSQF Level - 3 | 15:00 | 25:00 | | | 40:00 |

| | | | | | |
|---|---------------|---------------|--|--|---------------|
| Module 3: Communicate Effectively and Efficiently | 15:00 | 25:00 | | | 30:00 |
| ASC/N9805 – Interpret engineering drawing NOS Version No. – 1.0 NSQF Level - 4 | 15:00 | 15:00 | | | 30:00 |
| Module 4: Interpret engineering drawing | 15:00 | 15:00 | | | 30:00 |
| ASC/N3535 – Prepare for machining activities NOS Version No. – 1.0 NSQF Level - 4 | 30:00 | 60:00 | | | 90:00 |
| Module 5: Perform pre-machining activities | 30:00 | 60:00 | | | 90:00 |
| ASC/N3508 – Perform machining operations NOS Version No. – 3.0 NSQF Level - 4 | 30:00 | 60:00 | | | 90:00 |
| Module 6: Perform machining activities | 30:00 | 90:00 | | | 120:00 |
| ASC/N3509 – Perform post machining and maintenance activities NOS Version No. – 3.0 NSQF Level - 4 | 30:00 | 60:00 | | | 90:00 |
| Module 7: Perform post-machining and maintenance activities | 30:00 | 60:00 | | | 90:00 |
| Total Duration | 140:00 | 250:00 | | | 390:00 |

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

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.

| Duration: <15:00> | Duration: <30:00> |
|---|--|
| Theory – Key Learning Outcomes | Practical – Key Learning Outcomes |
| <ul style="list-style-type: none"> • List the potential workplace related risks and hazards, their causes and preventions. • Identify PPE to be used at workplace. • Identify various warning signs used at the workplace. • Describe appropriate strategies to deal with emergencies and accidents at the workplace. • Outline the organizational structure to be followed to report about health, safety and security breaches to the concerned authorities. • Discuss the importance of keeping work area clean and tidy. • Discuss the significance of conforming to basic hygiene practices such as washing hands, using alcohol based hand sanitizers or soap. • Discuss organizational hygiene and sanitation guidelines and ways of reporting breaches/gaps if any to the concerned authorities. • Discuss the ways of dealing with stress and anxiety. • Discuss how to complete the given work within the stipulated time period. • Explain how to maintain a proper balance between team and individual goals. • Explain 5S guidelines at workplace. • List the various materials used at the workplace. • Explain organisational recommended procedure for storage of tools, equipment and material after completion of work. • Explain the ways to optimize usage of resources. | <ul style="list-style-type: none"> • Apply appropriate safety practices to ensure safety of people at the workplace • Display the correct way of wearing and removing PPE such as face masks, hand gloves, face shields, PPE suits, etc. • Demonstrate the use of fire extinguisher. • Apply basic first aid procedure in case of emergencies. • Perform routine cleaning of tools, equipment and machines. • Employ various techniques for checking malfunctions in the equipment as per Standard Operating Procedure (SOP). • Show how to sanitize and disinfect one's work area regularly. • Demonstrate the correct way of washing hands using soap and water. • Demonstrate the correct way of sanitizing hands using alcohol-based hand rubs. • Demonstrate how to evacuate the workplace in case of an emergency. • Demonstrate sorting of materials, tools and equipment and spare parts after completion of work. • Demonstrate the steps involved in storage of tools, equipment and material after completion of work. • Perform basic checks to identify any spills and leaks and that need to be plugged /stopped. • Demonstrate different disposal techniques depending upon types of waste. • Employ different ways to check if equipment/machines are functioning as per requirements and report malfunctioning, if observed. |

| | |
|---|--|
| <ul style="list-style-type: none"> • Discuss various methods of waste management and its disposal. • List the different categories of waste for the purpose of segregation • Differentiate between recyclable and non-recyclable waste • State the importance of using appropriate colour dustbins for different types of waste. • Discuss common practices for conserving electricity at workplace. • Discuss the common sources of pollution and ways to minimize it. | <ul style="list-style-type: none"> • Employ ways for efficient utilization of material and water. |
| Classroom Aids: | |
| Whiteboard, marker pen, projector | |
| Tools, Equipment and Other Requirements | |
| <ul style="list-style-type: none"> • 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 9

Communicate Effectively and Efficiently

Mapped to ASC/N9802, v1.0

Terminal Outcomes:

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

| Duration: <15:00> | Duration: <25:00> |
|---|--|
| Theory – Key Learning Outcomes | Practical – Key Learning Outcomes |
| <ul style="list-style-type: none"> • Explain the organizational structure for communicating with colleagues, seniors and others. • Discuss the ways to adjust the communication styles to reflect sensitivity towards gender and persons with disability (PwD). • Explain the importance of respecting personal space of colleagues. • State the procedure to receive work instructions and report problems to the supervisor. • List the various organizational policies and procedures to be followed at the workplace. • Describe different ways to rectify commonly occurring errors. • Explain the importance of complying with the instructions/guidelines and procedures while performing tasks related to the job specifications. • Discuss the importance of PwD and gender sensitization. | <ul style="list-style-type: none"> • Employ different means of communication depending upon the requirement while interacting with others. • Demonstrate using new ways to maintain good relationships with colleagues and supervisor. • Prepare a sample report to send the work status to the supervisor. • Demonstrate how to communicate with different genders and persons with disability (PwD) in a sensitive manner. |
| Classroom Aids: | |
| Whiteboard, marker pen, projector | |
| Tools, Equipment and Other Requirements | |
| Sample of escalation matrix, organisation structure. | |

Module

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

Module

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.

| Duration: <30:00> | Duration: <60:00> |
|---|---|
| Theory – Key Learning Outcomes | Practical – Key Learning Outcomes |
| <ul style="list-style-type: none"> • Discuss the information derived from the workorder, process charts and engineering drawings. • Explain different types of machining processes. • Describe operational fundamentals of CNC machine. • Explain working of machines such as lathe, CNC machine and accessories required for the machining work. • Explain the selection criteria of raw material or input component for the machining work. • List jigs and fixtures, tools, cutting tools, equipment and measuring instruments required during the machining work. • Discuss machine parameters like cutting speed, depth of cut, feed rate etc. and their impact on output. • Describe machine auto cycle and how to set it on the CNC machine. • List limits of machining e.g. surface finish, specific orientation, gauge inspection etc. • Describe importance of selecting correct program in the CNC machine for machining operation as per the work instructions. | <ul style="list-style-type: none"> • Select the tools, equipment and raw material required for work. • Demonstrate how to select the machine parameters as per the work instructions. • Demonstrate how to check the input component for the machining work as per the work instructions. • Demonstrate the standard operating procedures and use of tools, cutting tools, equipment and measuring instruments required during job. • Perform measurement and marking of reference points/ cutting lines on the work pieces by using measuring instruments. • Demonstrate how to support Lead Technician in programming the CNC/numerically controlled machine. |
| Classroom Aids: | |
| Whiteboard, marker pen, projector | |
| Tools, Equipment and Other Requirements | |
| <ul style="list-style-type: none"> • Basic tool box, Work bench with vice • Machining tools/ equipment: Surface marking plate, cutting tools, threading, dies & guides, etc. • Machines: Conventional lathe and vertical milling machine with standard accessories and Production CNC machining center with ATC | |

- 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

Perform machining activities

Mapped to ASC/N3508, v3.0

Terminal Outcomes:

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

| | |
|--|---|
| Duration: <30:00> | Duration: <60:00> |
| Theory – Key Learning Outcomes | Practical – Key Learning Outcomes |
| <ul style="list-style-type: none"> List raw material, tools, cutting tools, equipment and measuring instruments required during the machining work. List the steps for setting up and adjusting the machine tools, fixtures/jigs and cutting tools on the machine as per work instructions. Discuss the process of lifting and fixing the workpiece on the machine. Outline the process of various machining operations such as milling, shaping, grinding, boring, broaching etc. Describe importance of maintaining length to bore ratio of the tool in case of boring operation. Recall common issues occurring during machining work such as power failure, rejection, tool breakage, machine failure due to jammed pieces etc. Explain process of evaluating the machined output for quality standards. List the steps to be performed for observing and recording machine performance. Discuss organisational standards and procedures for replacing worn out tool in the machine. 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. | <ul style="list-style-type: none"> Demonstrate the procedure of securing workpiece on machine by using lifting tools. Demonstrate the procedure of setting up and adjusting the machine tools, fixtures, cutting tools etc. on the machine. Perform inspection of the working of different holding fixtures, gears, stops etc. to control work piece movement. Demonstrate organizational specified procedure of all machining operations such as turning, milling, shaping, grinding, boring, broaching, hobbing, facing, shaping, blanking, piercing etc. Apply appropriate techniques to maintain coolant level and lubrication on work material. Employ appropriate ways for managing issues such as power failure, rejection, tool breakage, machine failure due to jammed pieces etc. Employ appropriate ways of detecting defects in the manufactured component. Record operational data such as pressure readings, length of strokes, feed rates, speed etc. Demonstrate safe procedure of replacing worn out tools timely from the machine. |
| Classroom Aids: | |
| Whiteboard, marker pen, projector | |
| Tools, Equipment and Other Requirements | |
| <ul style="list-style-type: none"> Basic tool box, Work bench with vice Machining tools/ equipment: Surface marking plate, cutting tools, threading, dies & guides, etc. Machines: Conventional lathe and vertical milling machine with standard accessories and Production CNC machining center with ATC | |

- 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 7

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: <30:00> | Duration: <60:00> |
|--|--|
| Theory – Key Learning Outcomes | Practical – Key Learning Outcomes |
| <ul style="list-style-type: none"> • Describe de-burring and shot blasting process for removing the extra burrs and chips from the metal surface. • List tools, equipment and measuring instruments required for de-burring process and quality inspection process. • Describe the commonly occurring defects in the machined workpieces. • Discuss the impact of burrs, edges and chips on the quality of machined workpieces. • Describe methods of identifying the defects and checking the quality of machined workpieces. • Describe the process of separation of damaged workpieces. • Describe need of routine maintenance of tools and equipment required. • Discuss the checklist for tasks to be performed for routine or non-routine service/repair. • Describe lubrication process and importance of selecting correct lubricant. • Explain properties and specifications of coolant and lubricant required for machining the required component. • Identify different methods for disposing off waste material such as waste oil, scrap, etc. • List the records/documents to be maintained w.r.t machining and maintenance tasks. • Discuss the necessary precautions to avoid any hazard and accident during maintenance activities. | <ul style="list-style-type: none"> • Apply appropriate ways for inspecting and repairing the tools and equipment. • Perform the steps involved in de-burring process. • Demonstrate the steps involved in shot blasting/ vibro processes. • Apply appropriate inspection methods for identifying the defects and checking the quality of machined workpieces. • Show how to separate damaged and correct workpieces. • Apply basic maintenance techniques to ensure that the tools and equipment are functioning as per SOP. • Perform the process of routine service/maintenance as per standard operating procedures. • Apply appropriate method for oiling and cleaning machine and its components as per the maintenance plan. • Demonstrate how to check the coolant and lubrication level of machine. • Demonstrate how to check the broach teeth and metal chips in the broaching machine after completion of work. • Apply appropriate method for lubricating the machine. • Apply ways to conduct repairs and adjustments of tools, equipment and workstations. |
| Classroom Aids: | |
| Whiteboard, marker pen, projector | |
| Tools, Equipment and Other Requirements | |
| <ul style="list-style-type: none"> • Basic tool box, work bench with vice | |

- 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%. | "Trainer, MEP/Q2601" 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%. | “Assessor; MEP/Q2701” 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 |
|------------------------------|---|
| 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 Outcome | 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 task. It is the ability to work, or produce a tangible work output by applying cognitive, affective or psychomotor skills. |
| 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 | 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

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