QUALIFICATIONS PACK - OCCUPATIONAL STANDARDS FOR CAPITAL GOODS INDUSTRY

Contents

What are Occupational Standards(OS)?

- OS describe what individuals need to do, know and understand in order to carry out a particular job role or function
- OS are performance standards that individuals must achieve when carrying out functions in the workplace, together with specifications of the underpinning knowledge and understanding

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Introduction

Qualifications Pack: CNC Setter cum Operator - Turning

SECTOR: CAPITAL GOODS

SUB-SECTOR:

1. Machine Tools
2. Dies, Moulds and Press Tools
3. Plastics Manufacturing Machinery
4. Textile Manufacturing Machinery
5. Process Plant Machinery
6. Electrical and Power Machinery
7. Light Engineering Goods

OCCUPATION: Machining

REFERENCE ID: CSC/ Q 0120

ALIGNED TO : NCO-2004/7223.40

CNC Setter cum Operator - Turning: Setting of Computer Numerically Controlled (CNC) lathe machine, in order to perform turning operations on metal components, as per specifications provided.

Brief Job Description: It involves setting up the CNC turning machine, its work holding devices, tooling, loading the machine operating programmes, conducting trial runs and correcting faults, in order to ensure that the work output is produced as per specification.

Personal Attributes: Basic communication, numerical and computational abilities. Openness to learning, ability to plan and organize own work and identify and solve problems in the course of working. Understanding the need to take initiative and manage self and work to improve efficiency and effectiveness

Job Details

Qualifications Pack Code	**CSC/ Q 0120**		
Job Role	**CNC Setter cum Operator - Turning**		
Credits (NSQF)	**TBD**	**Version number**	**1.0**
Sector	**CAPITAL GOODS**	**Drafted on**	**14/04/14**
Sub-sector	1. Machine Tools 2. Dies, Moulds And Press Tools 3. Plastics Manufacturing Machinery 4. Textile Manufacturing Machinery 5. Process Plant Machinery 6. Electrical and Power Machinery 7. Light Engineering Goods	**Last reviewed on**	**18/03/15**
Occupation	**MACHINING**	**Next review date**	**30/08/16**
NSQC Clearance on	**26/03/2015**		

Job Role	CNC Setter cum Operator - Turning
Role Description	Setting of Computer Numerical Control (CNC) machines, such as CNC lathe machine, in order to perform turning operations on metal components, as per specifications provided.
NSQF level	4
Minimum Educational Qualifications	10th Standard
Maximum Educational Qualifications	N.A.
Training (Suggested but not mandatory)	Basic CNC programming training
Minimum Job Entry Age	18 Years old
Experience	Minimum 1 year as an CNC Turning Machine Operator
Applicable National Occupational Standards (NOS)	**Compulsory:** 1. CSC/ N 0120 (Set computer numerically controlled (CNC) machines for turning operations on metal components) 2. CSC/ N 0115 (Perform turning operations on metal components using Computer Numerically Controlled (CNC) machines) 3. CSC/ N 1335 (Use basic health and safety practices at the workplace) 4. CSC/ N 1336 (Work effectively with others) **Optional:** N.A.
Performance Criteria	As described in the relevant OS units

Definitions

Keywords /Terms	Description
Core Skills/Generic Skills	Core Skills or Generic Skills are a group of skills that are key to learning and working in today's world. These skills are typically needed in any work environment. In the context of the NOS, these include communication related skills that are applicable to most job roles.
Function	Function is an activity necessary for achieving the key purpose of the sector, occupation, or area of work, which can be carried out by a person or a group of persons. Functions are identified through functional analysis and form the basis of NOS.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organization.
Knowledge and Understanding	Knowledge and Understanding are statements which together specify the technical, generic, professional and organizational specific knowledge that an individual needs in order to perform to the required standard.
National Occupational Standards (NOS)	NOS are Occupational Standards which apply uniquely in the Indian context
Occupation	Occupation is a set of job roles, which perform similar/related set of functions in an industry.
Organisational Context	Organisational Context includes the way the organization is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Performance Criteria	Performance Criteria are statements that together specify the standard of performance required when carrying out a task.
Qualifications Pack(QP)	Qualifications Pack comprises the set of NOS, together with the educational, training and other criteria required to perform a job role. A Qualifications Pack is assigned a unique qualification pack code.
Qualifications Pack Code	Qualifications Pack Code is a unique reference code that identifies a qualifications pack.
Scope	Scope is the set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on the quality of performance required.
Sector	Sector is a conglomeration of different business operations having similar businesses and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-Sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Sub-functions	Sub-functions are sub-activities essential to fulfil the achieving the objectives of the function.
Technical Knowledge	Technical Knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Unit Code	Unit Code is a unique identifier for a NOS unit, which can be denoted with an 'N'
Unit Title	Unit Title gives a clear overall statement about what the incumbent should be able to do.
Vertical	Vertical may exist within a sub-sector representing different domain areas or the client industries served by the industry.

Acronyms

Keywords /Terms	Description
CNC	Computer Numerically Controlled
OD	Outside Diameter
ID	Inside Diameter
DTI	Dial Test Indicators
CO2	Carbon dioxide
CPR	Cardiac Pulmonary Resuscitation
PPE	Personal Protective Equipment

CSC/ N 0120: Set computer numerically controlled (CNC) machines for turning operations on metal components

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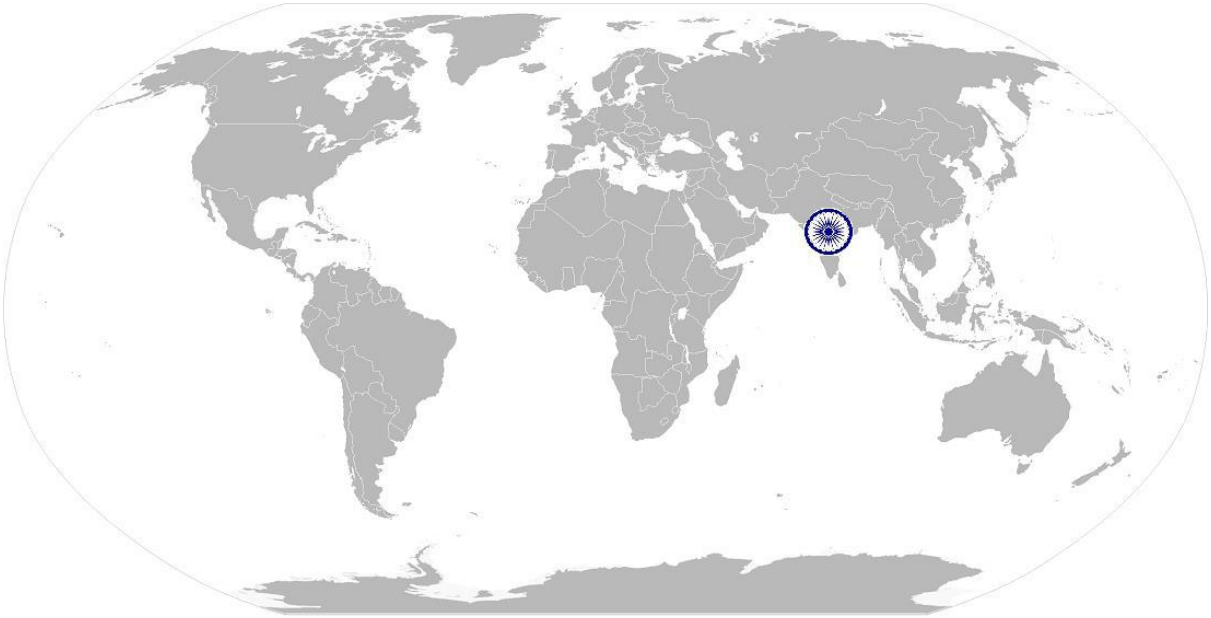
National Occupational Standard



Overview

This unit covers setting of Computer Numerical Control (CNC) lathe machine, in order to perform turning operations on metal and plastic components, as per specifications provided. It does not include programming or operating of the machine.

CSC/ N 0120: Set computer numerically controlled (CNC) machines for turning operations on metal components

National Occupational Standard

Unit Code	CSC / N 0120
Unit Title (Task)	**Set computer numerically controlled (CNC) machines for turning operations on metal components**
Description	This unit covers setting of computer numerically controlled (CNC) lathe machines, in order to perform turning operations on metal and plastic components, as per specifications provided. It does not include programming or operating of the machine. The candidate will be expected to perform independently as per instructions given, taking personal responsibility for one's own actions and for the quality and accuracy of the work produced.
Scope	This unit/task covers the following: • Working safely • Preparing for setting CNC turning machine for production • Carrying out setting for CNC turning operations using CNC machine

Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Working safely	The user/individual on the job should be able to: PC1. work safely at all times, complying with health and safety, environmental and other relevant regulations and guidelines PC2. check that all safety mechanisms are in place and that the equipment is set correctly for the required operations PC3. adhere to procedures or systems in place for health and safety, personal protective equipment and other relevant safety regulations and procedures to realize a safe system of work PC4. keep the work area clean and tidy PC5. ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition PC6. ensure that the components used are free from foreign objects, dirt or other contamination
Preparing for setting CNC turning machine for production	The user/individual on the job should be able to: PC7. obtain job specification from a valid and approved source **Valid sources**: job instruction sheet/job card; work drawings and instructions; planning documentation; quality control documents; operation sheets; instructions from supervisor **Job specification documents**: detailed component drawings; approved sketches/illustrations; national and organisational standards; reference tables and charts PC8. read and establish job requirements from the job specification document accurately **Job requirements**: raw materials or components required (type, quality, quantity); dimensions; limits and tolerances; operations required (list, sequence and procedures where applicable); work-holding devices; instruments and tools to be used; interdependencies; form tolerances; cycle

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	time PC9. follow job instructions, assembly drawings and laid down procedures at all times PC10. report and rectify incorrect and inconsistent information in job specification documents as per organization procedures PC11. prepare the work area for the turning operations as per procedure or operational specification **Turning operations**: turning (OD and ID), facing, contour turning with roughing, finish turning using stock removal cycles (OD and ID), grooving (face, OD and ID), thread cutting (OD and ID), drilling, boring, rigid tapping and tapping with attachment PC12. conduct a preliminary check of the readiness of the CNC turning machine **CNC machines**: 2-axis CNC lathe machine PC13. obtain appropriate cutting tools and hand tools and measuring tools as per job requirements **Cutting tools**: turning tool (OD and ID), grooving tool (OD and ID), parting tool, threading tool, form tools, centre drills, twist/insert drills, reamers **Hand tools**: hammer (ball peen, mallet), magnifying glass, allen keys, spanner, wrenches, deburring tools PC14. ensure that all measuring equipment is calibrated and approved for usage **Measuring equipments**: steel rules, micrometers (external, internal, depth), verniers (digital, dial; length, depth; protractors), gauges (slip, bore/hole, thread, plug, radius/profile), dial test indicators (DTI), surface finish equipment (such as comparison plates), height master PC15. determine what operational objectives and targets need to be achieved and how best the machine will be set to achieve this PC16. extract and use information from engineering drawings and relate specifications in relation to work undertaken PC17. identify tool requirements from tooling layout and assess their suitability PC18. identify suitable work-holding or fixturing device as per the job requirement **Work-holding devices**: chucks with hard jaws, chucks with soft jaws, fixtures, drive centres, collet chucks, faceplates, magnetic/pneumatic devices, other work-holding devices PC19. ensure that the tools and fixtures are in usable condition (free from breakage, damage, calibration, etc.) PC20. ensure the correct and latest part-program is uploaded onto the CNC system PC21. pre-set the tooling appropriately using setting jigs/fixtures PC22. seek any necessary instruction/training on the operation of the machine where required
Carrying out setting for CNC turning operations using CNC machine	The user/individual on the job should be able to: PC23. mount tools in the correct position in the tool posts, turrets, magazine or carousel PC24. check that the tools have a specific tool number in relation to the operating program PC25. produce machined components that combine different turning operations and

	have a range of features **Features of machined components produced**: diameters (parallel, stepped, tapered), faces, undercuts (internal and external), profiles (internal and external), holes (reamed, tapped, drilled, bored), parting-off, threads (internal, external), chamfers and radii, grooves PC26. enter all relevant tool data to the operating program **Tool data**: e.g. tool types, tool lengths, tool offsets, radius compensation, etc. PC27. set tool datums, positions, lengths, offsets and radius compensation PC28. mount the work-holding device/fixture onto the machine PC29. set the work-holding device/fixture in relationship to the machine datum's and reference points PC30. set the machine tool operating parameters (eg. hydraulic pressure, clamping) as per the component requirements PC31. place the machine into the correct operating mode, and access the program edit facility in order to enter tooling data, **Mode of machine control**: machine / Operator Control Panel. CNC - MDI Panel PC32. conduct trial runs using single block run, dry run and feed and speed override controls PC33. measure the critical parameters of the machined component on the machine **Critical parameters**: linear dimensions (such as lengths, depths), slots (position, width, depth), flatness, squareness, parallelism, hole size/fit, angles, recesses, thread fit (suit to gauges / masters), runout, concentricity, contour/profile PC34. prove the program tool by tool in single block mode PC35. perform the necessary checks before allowing the machine to operate in full program run mode **Checks:** after proving the program, measure the dimensions of the component on the machine and correct tool offsets accordingly; unload the component after all the dimensions are as per specifications; inspect the component for all dimensions and record findings in specified formats; make a note of the corrections to be made in the tool wear offsets and correct accordingly; run the next component; ensure that all dimensions are within specifications; correct if required; repeat this till parts come within specifications without any correction requirement PC36. hand-over the machine after set-up to the machine operator along with relevant instructions and documentation PC37. complete relevant documentation as per organizational procedure PC38. handle the typical problems that can occur with the setting up of the tooling, work-holding devices and proving the program PC39. switch the CNC turning/lathe machine on and off in normal and emergency situations PC40. return the old cutting tools, workholding device/fixtures/intruments/drawings back to store and verified tapes and programs, safely and correctly PC41. ensure that there is no damage to the tool/fixture while doing the prove-out PC42. complete documentation during and post operations as per organizational procedures

	PC43. deal promptly and effectively with problems within their control, and seek help and guidance from the relevant people if they have problems that they cannot resolve PC44. shut down the equipment to a safe condition on conclusion of the activities PC45. leave the work area in a safe and tidy condition on completion of the fitting activities PC46. return all tools and equipment to the correct location on completion of the turning activities
Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the company / organization and its processes)	The user/individual on the job needs to know and understand: KA1. legislation, standards, policies, and procedures followed in the company relevant to own employment and performance conditions KA2. relevant health and safety requirements applicable in the work place KA3. importance of working in clean and safe environment KA4. own job role and responsibilities and sources for information pertaining to employment terms, entitlements, job role and responsibilities KA5. reporting structure, inter-dependent functions, lines and procedures in the work area KA6. relevant people and their responsibilities within the work area KA7. escalation matrix and procedures for reporting work and employment related issues KA8. documentation and related procedures applicable in the context of employment and work KA9. importance and purpose of documentation in context of employment and work
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. specific safe working practices, CNC turning procedures and environmental regulations that must be observed **Safe working practices and procedures**: ensure that the machine is not accidentally operated by others during setting; fitting and adjusting machine guards; machine must be operated in closed door condition; ensuring that the work-piece is secure and that tooling is free from work-piece before starting the machine; the personal protective equipment (PPE) to be worn for the CNC milling activities; as correctly fitting overalls and safety glasses; ensuring that long hair, it is tied back or netted; removing any jewellery or other items that can become entangled in the machinery KB2. hazards associated with carrying out the machining operations on a CNC machine and how can they be minimized **CNC machines**: 2-axis CNC lathe machine **Hazards**: automatic machine operations; revolving/moving parts of machinery; sharp cutting tools; lifting and handling work-holding devices; burrs and sharp edges on component; use of power operated chucks; moving machinery; hot and airborne metal and particles and fluid KB3. personal protective equipment to be used during the machining activities on a CNC machine and where can it be obtained KB4. types and sources of appropriate job specifications **Valid sources**: job instruction sheet/job card; work drawings and instructions;

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	planning documentation; quality control documents; operation sheets; instructions from supervisor **Job specification documents**: detailed component drawings; approved sketches/illustrations; national and organisational standards; reference tables and charts KB5. uses and applications of CNC Turning machines KB6. common terminology used in CNC turning KB7. how to read and interpret first and third angle component drawings KB8. how to extract information from engineering drawings or data and related specifications KB9. main features and working parts of the CNC machine, and the accessories that can be used KB10. importance of following specified machining sequences and procedures KB11. importance of ensuring suitability of work-pieces/materials and consumables for the specified job and related procedures KB12. importance and procedures to ensure that tools and equipment are in a safe and usable condition KB13. various CNC turning operations that can be performed, and the methods and equipment used **Turning operations**: turning (OD and ID), facing, contour turning with roughing, finish turning using stock removal cycles (OD and ID), grooving (face, OD and ID), thread cutting (OD and ID), drilling, boring, rigid tapping and tapping with attachment KB14. range of work-holding methods and devices that are used on CNC lathes **Work-holding devices**: chucks with hard jaws, chucks with soft jaws, fixtures, drive centres, collet chucks, faceplates, magnetic/pneumatic devices, other work-holding devices KB15. methods of setting the work-holding devices, and the tools and equipment that can be used KB16. factors determining selection and use of Tungsten carbide, Ceramic and Diamond indexible tips **Factors**: hardness of the material to be cut, the cutting characteristics of the material, tolerances to be achieved, component surface finish, component specifications, machine specifications like power, RPM, Torque, cutting speed KB17. range of cutting tools that are used on CNC lathes, and typical applications **Cutting tools**: turning tool (OD and ID), grooving tool (OD and ID), parting tool, threading tool, form tools, centre drills, twist/insert drills, reamers KB18. various tool holding devices that are used, and the methods of correctly mounting and securing the cutting tools to the tool holders KB19. explain the advantages of using pre-set tooling, and how to set the tooling using setting jigs/fixtures KB20. understand the use of tool posts, magazines and carousels, and how to position and identify the tools in relationship to the operating program KB21. function of error messages, and appropriate subsequent action KB22. importance of proving the program and how to do it KB23. quality control procedures that are used, inspection checks to be carried out, and the equipment that will need to be used

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	KB24. importance to report problems in a timely manner KB25. methods of checking quality of the shaped components against the required quality standards **Produce components standards**: components to be free from false tool cuts, burrs and sharp edges; general dimensional tolerance +/- 0.02mm; surface finish of Ra 1.6µm; reamed holes within H8(or as per basic machine alignment); screw thread fit better than 6G/6H; angles/tapers within +/- 15sec; flatness and squareness 0.025mm KB26. range of materials used in common engineering applications **Range of Materials**: ferrous metals: eg . carbon steels, stainless steels, cast iron, tool steel, hard metals; ; non-ferrous metals: eg. aluminium, aluminium alloys, copper and copper alloys; non-metals: eg. plastics KB27. the forms of supply of materials **Raw material form supply/ shapes**: square/rectangular (eg. bar stock, sheet material, machined components), circular/cylindrical (eg. bar stock, tubes, turned components, flat discs), irregular shapes/profile (eg. castings, forgings, odd shaped components) KB28. how to identify materials by their physical properties
Skills (S) [Optional]	
A. Core Skills/ Generic Skills	**Communication Skills(Reading, Writing, Listening and Speaking)**
	The user/ individual on the job needs to know and understand how to: SA1. read and interpret information correctly from various job specification documents, manuals, health and safety instructions, memos, etc. applicable to the job in English and/or local language SA2. fill up appropriate technical forms, process charts, activity logs as per organizational format in English and/or local language SA3. convey and share technical information clearly using appropriate language SA4. check and clarify task-related information SA5. liaise with appropriate authorities using correct protocol SA6. communicate with people in respectful form and manner in line with organizational protocol
	Numerical and computational skills
	The user/individual on the job needs to know and understand how to: SA7. undertake basic numerical operations, and calculations/ formulae **Numerical computations**: addition, subtraction, multiplication, division, fractions and decimals, percentages and proportions, simple ratios and averages SA8. identify various basic, compound and solid shapes as per dimensions given **Basic shapes**: square, rectangle, triangle, circle **Compound shapes**: involving squares, rectangles, triangles, circles, semi-circles, quadrants of a circle **Solid shapes**: cube, rectangular prism, cylinder SA9. use appropriate measuring techniques and units of measurement SA10. use appropriate units and number systems to express degree of accuracy SA11. use metric systems of measurement **Angles in a triangle**: right-angled, isosceles, equilateral

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B. Professional Skills	**Critical Thinking**
	The user/individual on the job needs to know and understand how to: SA12. participate in on-the-job and other learning, training and development interventions and assessments SA13. clarify task related information with appropriate personnel or technical adviser SA14. seek to improve and modify own work practices SA15. maintain current knowledge of application standards, legislation, codes of practice and product/process developments
	Problem Solving and Decision Making
	The user/individual on the job needs to know and understand how to: SB1. identify problems with work planning, procedures, output and behavior and their implications SB2. prioritize and plan for problem solving SB3. communicate problems appropriately to others SB4. identify sources of information and support for problem solving SB5. seek assistance and support from other sources to solve problems SB6. identify effective resolution techniques SB7. select and apply resolution techniques SB8. seek evidence for problem resolution
	Plan and Organize
	The user/individual on the job needs to know and understand how to: SB9. plan, prioritize and sequence work operations as per job requirements SB10. organize and analyze information relevant to work SB11. basic concepts of shop-floor work productivity including waste reduction, efficient material usage and optimization of time
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB12. undertake and express new ideas and initiatives to others SB13. modify work plan to overcome unforeseen difficulties or developments that occur as work progresses SB14. participate in improvement procedures including process, quality and internal/external customer/supplier relationships SB15. one's competencies in new and different situations and contexts to achieve more
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB16. exercise restraint while expressing dissent and during conflict situations SB17. avoid and manage distractions to be disciplined at work SB18. manage own time for achieving better results
	Teamwork

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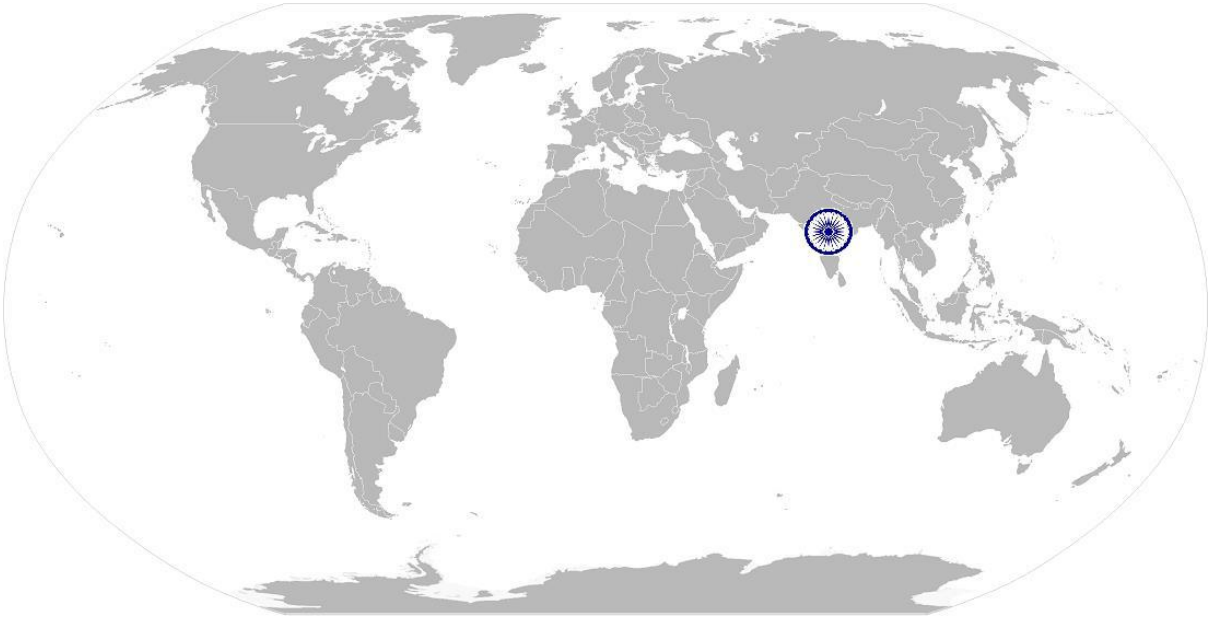
	The user/individual on the job needs to know and understand how to: SB19. work in a team in order to achieve better results SB20. identify and clarify work roles within a team SB21. communicate and cooperate with others in the team for better results SB22. seek assistance from fellow team members



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NOS Version Control

NOS Code	**CSC / N 0120**		
Credits(NSQF)	**TBD**	**Version number**	**1.0**
Industry	**Capital Goods**	**Drafted on**	**14/04/14**
Industry Sub-sector	1. Machine Tools 2. Dies, Moulds And Press Tools 3. Plastics Manufacturing Machinery 4. Textile Manufacturing Machinery 5. Process Plant Machinery 6. Electrical and Power Machinery 7. Light Engineering Goods	**Last reviewed on**	**18/03/15**
Occupation	**Machining**	**Next review date**	**30/08/16**

CSC/ N 0115: Perform turning operations on metal components using Computer Numerically Controlled (CNC) machines

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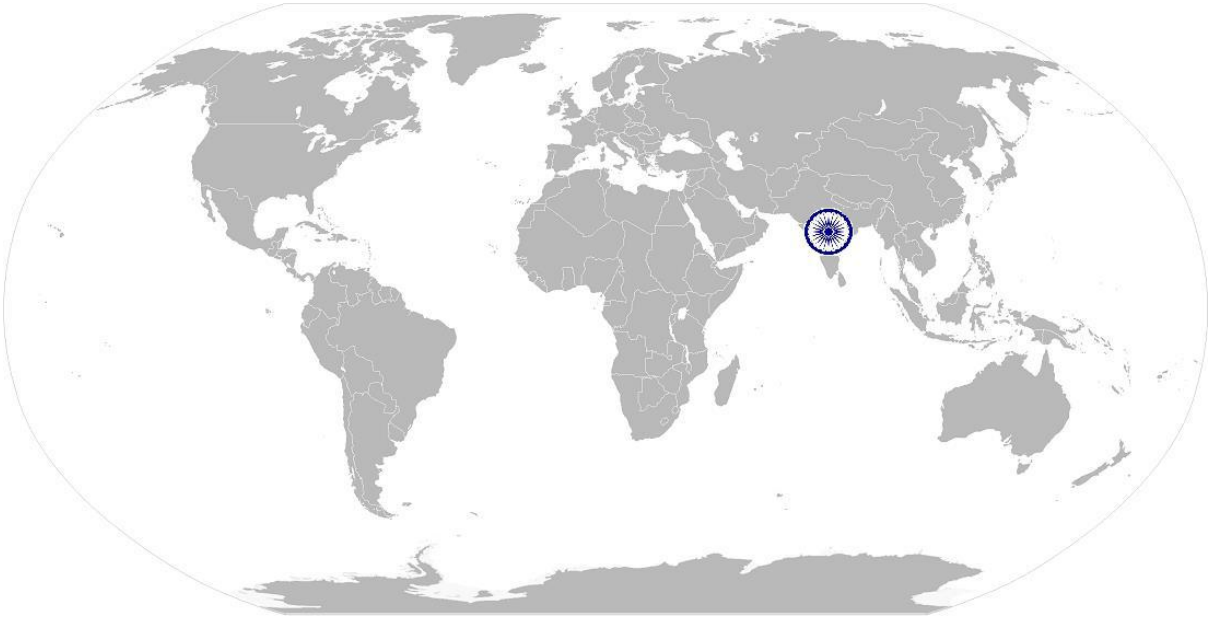
National Occupational Standard



Overview

This unit covers the operation of Computer Numerically Controlled (CNC) machines, such as CNC lathe machine, in order to perform turning operations on metal or plastic components, as per specifications provided. It does not include machine setting or programming.

CSC/ N 0115: Perform turning operations on metal components using Computer Numerically Controlled (CNC) machines

National Occupational Standard

Unit Code	CSC / N 0115
Unit Title (Task)	Perform turning operations on metal components using Computer Numerically Controlled (CNC) machines
Description	This unit covers the operation of Computer Numerically Controlled (CNC) lathe machines in order to perform turning operations on metal and plastic components, as per specifications provided. It does not include machine setting or programming. This involves removal of material from a rotating cylindrical work-piece. The candidate will be expected to perform under supervision and as per instructions given, taking personal responsibility for some actions and for the quality and accuracy of the work produced.
Scope	This unit/task covers the following: • Working Safely • Preparing for performing turning operations using CNC machine • Carrying out turning operations using CNC machine

Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Working safely	The user/individual on the job should be able to: PC1. comply with health and safety, environmental and other relevant regulations and guidelines at work PC2. adhere to procedures and guidelines for personal protective equipment (PPE) and other relevant safety regulations while performing CNC turning operations **Turning operations**: Turning (OD, ID), facing, grooving (OD and ID), face grooving, thread cutting (OD and ID), drilling, boring and tapping **Personal protective equipment**: correctly fitting overalls; safety glasses; long hair is tied back or netted; removing any jewelry or other items that can become entangled in the machinery; covered shoes; face mask PC3. read and understand safety instructions, warning signs on the CNC machines used **CNC machines used**: 2-axis CNC lathe machine PC4. work following laid down procedures and instructions PC5. ensure work area is clean and safe from hazards **Hazards associated with the use of CNC machines**: automatic machine operations; revolving/moving parts of machinery; airborne and hot metal particles; sharp cutting tools; lifting and handling work-holding devices; burrs and sharp edges on component; use of power operated chucks; moving machinery; hot and airborne metal and particles and fluid PC6. ensure that all tools and equipment are in a safe and usable condition
Prepare for performing turning operations using CNC machine	The user/individual on the job should be able to: PC7. obtain job specification from a valid source **Valid sources**: job instruction sheet/job card; work drawings and instructions; planning documentation; quality control documents; operation sheets;

process specifications; instructions from supervisor

PC8. read and establish job requirements from the job specification document accurately

Job specification documents: detailed component drawings; approved sketches/illustrations; national, international and organizational standards; process drawing

Job requirements: raw materials or components required (type, quality, quantity); dimensions; limits and tolerances; surface finish requirements; operations required (list, sequence and procedures where applicable); shape or profiles to be generated; instruments and tools to be used; form tolerances (flatness, concentricity, etc.); cycle time, production rate

PC9. report and rectify incorrect and inconsistent information in job specification documents as per organization procedures

PC10. prepare the work area for the turning operations as per procedure or operational specification

Turning operations: Turning (OD, ID), facing, grooving (OD and ID), face grooving, thread cutting (OD and ID), drilling, boring and tapping

PC11. perform daily maintenance of machine according to defined checklist, at the beginning of day's shifts.

Basic maintenance activities: replenish coolant; ensure all parts are clean; perform housekeeping tasks on the machine; remove and dispose swarf

PC12. ensure that the components used are free from foreign objects, dirt or other contamination

PC13. conduct a preliminary check of the readiness of the CNC turning machine used

Preliminary check ensuring readiness: e.g. machine is clean, lubrication are functioning, coolant level is correct, sub-systems are working correctly, confirmation received from the machine setter that the machine is ready for production, received necessary instruction/training on specific operation of the machine, etc.

CNC machines used: 2-axis CNC lathe machine

PC14. obtain correct work-pieces/raw materials and consumables as per job requirements

PC15. obtain appropriate cutting tools and hand tools and measuring tools as per job requirements

Hand tools: hammer (ball peen, mallet), magnifying glass, allen keys, spanner, wrenches and deburring tools

Cutting tools: turning tool (OD and ID), grooving tool (OD and ID), parting tool, threading tool, form tools, centre drills, twist/insert drills and reamers

Measuring equipments: steel rules, micrometers (external, internal, depth), verniers (digital, dial; length, depth; protractors), gauges (slip, bore/hole, thread, plug, radius/profile), dial test indicators (DTI), surface finish equipment (such as comparison plates) and height master

PC16. ensure that all measuring equipment is calibrated and approved for usage

PC17. set work pieces as per job requirements using appropriate positioning and/or

CSC/ N 0115: Perform turning operations on metal components using Computer Numerically Controlled (CNC) machines

	holding devices and support mechanisms PC18. seek necessary instruction/training on the operation of the machine where required from appropriate sources PC19. check that the operating program is at the correct start point and the tool is at a safe position clear of the part PC20. perform basic daily maintenance activities as per the checklist given
Carry out turning operations using CNC machine	The user/individual on the job should be able to: PC21. obtain the component drawings, specifications and/or job instructions required for the components to be machined PC22. use and extract information from engineering drawings, dimensioning and labeling data **Drawings, dimensioning and labeling**: projections (orthographic [first angle, third angle]; isometric [including exploded], sectional view); reference points, lines, edges and surfaces PC23. use and extract information from reference charts, tables, graphs and standards **Information pertaining to**: e.g. thread sizes; feeds and speeds; machining symbols and tolerances; surface finish symbols; etc. PC24. interpret the visual display and the various messages displayed correctly PC25. find the correct restart point in the program when the machine has been stopped before completion of the program PC26. load and unload component(s) using pre-determined fixtures or work holding devices as per work instructions **Work-holding devices to position and secure work-pieces**: chucks with hard jaws, chucks with soft jaws, fixtures, drive centres, collet chucks, faceplates, magnetic/pneumatic devices and other work-holding devices PC27. check correctness of program through dry run and single block check PC28. do first part cutting trial by setting tool offsets to get oversize part PC29. measure the critical parameters of the machined component on the machine (without removing from the machine), after the trial run **Critical parameters**: linear dimensions (such as lengths, depths), slots (position, width, depth), flatness, surface finish, squareness, parallelism, hole size/fit, angles, recesses, thread fit, runout and roundness PC30. correct the offsets based on the measurements by accessing program edit facility in order to enter tooling data **Tooling data**: offsets compensation, radius compensation PC31. measure the component after unloading to check for accuracy in the critical parameters as per job specifications PC32. produce machined components that combine different turning operations and have a range of features **Features of machined components produced**: diameters (parallel, stepped, tapered), faces, undercuts (internal and external), profiles (internal and external), holes (reamed, tapped, drilled, bored), parting-off and threads (internal, external) **Turning operations**: Turning (OD, ID), facing, grooving (OD and ID), face

	grooving, thread cutting (OD and ID), drilling, boring and tapping PC33. follow the specified machining sequence and procedure as per job specifications PC34. interpret in-built machine alarms and respond to the same as per operating manual/organizational guidelines PC35. inspect as per frequency of inspection mentioned in the inspection plan (part of the job specifications) PC36. record the measured values as per organizational procedure PC37. observe for inconsistency in dimensions due to tool wear and correct the offsets accordingly PC38. ensure that machine settings are adjusted as and when required, either by self or the setter, to maintain the required accuracy PC39. identify when tools need replacing PC40. replace worn tool with new tool PC41. cut a trial part and adjust tool offsets after each tool change PC42. store finished components as well as raw material as per organizational procedure PC43. produce components as per standards applicable to the process **Produce components standards**: components to be free from false tool cuts, burrs and sharp edges; general dimensional tolerance +/- 0.02mm; specific dimensional tolerances within +/- 0.1mm; surface finish within 1.6µm; reamed holes within H8; screw threads 6G/6H; angles/tapers within +/- 15 sec; flatness and squareness 0.025mm PC44. report problems and seek appropriate assistance in a timely manner PC45. deal with finished components as per organizational guidelines PC46. complete documentation during and post operations as per organizational procedures PC47. return the machine and all tools and equipment to the correct location on completion of activities PC48. leave the work area in a safe and tidy condition on completion of job activities **Safe conditions**: correctly isolated; operating programs closed or removed; cleaning the machine; ensuring that any spilt cutting fluids are correctly dealt with; disposing of waste
Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the company / organization and its processes)	The user/individual on the job needs to know and understand: KA1. legislation, standards, policies, and procedures followed in the company relevant to own employment and performance conditions KA2. relevant health and safety requirements applicable in the work place KA3. importance of working in clean and safe environment KA4. own job role and responsibilities and sources for information pertaining to employment terms, entitlements, job role and responsibilities KA5. reporting structure, inter-dependent functions, lines and procedures in the work area KA6. relevant people and their responsibilities within the work area KA7. escalation matrix and procedures for reporting work and employment related issues

	KA8. documentation and related procedures applicable in the context of employment and work KA9. importance and purpose of documentation in context of employment and work
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. specific safe working practices, CNC turning procedures and environmental regulations that must be observed **Safe working practices and procedures**: ensuring the correct isolation of the machine before mounting work-holding devices and tooling; fitting and adjusting machine guards; ensuring that the work-piece is secure and that tooling is free from work-piece before starting the machine; the personal protective equipment (PPE) to be worn for the CNC turning activities; as correctly fitting overalls and safety glasses; ensuring that, if they have long hair, it is tied back or netted; removing any jewelry or other items that can become entangled in the machinery KB2. hazards associated with carrying out the machining operations on a CNC machine and how can they be minimized **Hazards associated with the use of CNC machines**: automatic machine operations; revolving/moving parts of machinery; airborne and hot metal particles; sharp cutting tools; lifting and handling work-holding devices; burrs and sharp edges on component; use of power operated chucks; moving machinery; hot and airborne metal and particles and fluid KB3. safety mechanism on the machine and how to check if they are functioning properly **Safety mechanisms on the CNC machine**: emergency stop buttons, emergency brakes KB4. personal protective equipment to be used during the machining activities on a CNC machine and where can it be obtained **Personal protective equipment**: correctly fitting overalls; safety glasses; long hair is tied back or netted; removing any jewelry or other items that can become entangled in the machinery; covered shoes; face mask KB5. types and sources of appropriate job specifications **Valid sources for job specifications**: job instruction sheet/job card; work drawings and instructions; planning documentation; quality control documents; operation sheets; process specifications; instructions from supervisor KB6. common terminology used in CNC turning KB7. how to read and interpret first and third angle component drawings KB8. how to extract information from engineering drawings, dimensioning and labeling data **Drawings, dimensioning and labeling**: projections (orthographic [first angle, third angle], isometric [including exploded], sectional view); reference points, lines, edges and surfaces KB9. symbols and conventions to appropriate ISO standards in relation to work undertaken KB10. main features and working parts of the CNC machine, and the accessories that can be used

	KB11. importance of following specified machining sequences and procedures KB12. importance of ensuring suitability of work-pieces/materials and consumables for the specified job and related procedures KB13. tools and equipment used for machining operations on a CNC machines KB14. importance and procedures to ensure that tools and equipment are in a safe and usable condition KB15. various CNC turning operations that can be performed, and the methods and equipment used **Turning operations**: Turning (OD and ID), facing, grooving (OD and ID), face grooving, thread cutting (OD and ID), drilling, boring and tapping KB16. correct techniques and procedures to carry out specific turning operations on a CNC lathe KB17. importance of using correct procedures as per raw material form of supply/shapes **Raw material form of supply/shapes**: square/rectangular (eg. bar stock, sheet material, machined components); circular/cylindrical (eg. bar stock, tubes, turned components, flat discs); irregular shapes/profile (eg. castings, forgings, odd shaped components) KB18. understanding error messages on machine and taking appropriate corrective action KB19. importance of securing the work-piece/raw material correctly using appropriate devices and mechanisms KB20. importance of setting the work-holding device in relationship to the machine axis and reference points KB21. common problems that can occur in CNC turning operations and their implications KB22. correct procedures to address problems commonly encountered during CNC turning operations KB23. importance of reporting problems immediately and accurately KB24. meaning and importance of quality in relation to final and intermediate job output KB25. how to check the quality of machined components against the specified quality standards **Produce components standards**: components to be free from false tool cuts, burrs and sharp edges; general dimensional tolerance +/- 0.02mm; specific dimensional tolerances within +/- 0.1mm; surface finish within 1.6µm; reamed holes within H8; screw threads 6G/6H; angles/tapers within +/- 15 sec; flatness and squareness 0.025mm KB26. range of materials used in relevant CNC turning applications and their machinability characteristics **Range of Materials**: ferrous metals: eg. steel, stainless steel, cast iron; non-ferrous metals: eg. aluminium, aluminium alloys, copper and copper alloys; non-metals: eg. plastics KB27. problems peculiar to machining of each raw material KB28. metric systems of measurement KB29. absolute and incremental systems of tool positioning and offsetting

	KB30. machine zero, work piece zero, work offsets, tool offsets KB31. tool nose radius compensation- its necessity and effects of not using it KB32. use of HSS, Tungsten carbide, Ceramic and Diamond indexible tips, and factors which determine their selection and use **Factors to determine selection and use of tungsten carbide, ceramic and diamond indexible tips**: hardness of the material, the cutting characteristics of the material, tolerances to be achieved, component surface finish, component specifications KB33. use of various work holding devices – chuck, tailstock, steady rest **Work-holding devices to position and secure work-pieces**: chucks with hard jaws, chucks with soft jaws, fixtures, drive centres, collet chucks, faceplates, magnetic/pneumatic devices and other work-holding devices KB34. 1st and 2nd setup operation, use of hard and soft jaws KB35. deciding holding length, Jaw pressure setting KB36. importance of conducting cutting trial, methods of trial – dry run, single block checks, cutting with offset adjustment to get oversize part KB37. parameters to be checked before operating in auto mode – dimensions, surface finishes KB38. importance of periodic maintenance checks for the machine and what are the common maintenance checks **Basic maintenance activities**: replenish coolant; ensure all parts are clean; perform housekeeping tasks on the machine; remove and dispose swarf KB39. production cost, machine hour rate, raw material cost, tool cost, coolant cost, overheads, cycle time, idle time, cost of machine idling, part rejection cost KB40. selection of cutting tools, tool materials, chip breaker geometry, selecting cutting parameters from tool catalogues, selecting coolant **Cutting tools**: turning tool (OD and ID), grooving tool (OD and ID), parting tool, threading tool, form tools, centre drills, twist/insert drills and reamers KB41. relationship between surface finish, tool nose radius and feed rate KB42. factors that affect feed and speed **Factors**: type and condition of material, work-holding method, tooling used, tolerance to be achieved, finish to be achieved KB43. impact of depth of cut on chatter, surface finish KB44. extent of their own authority and to whom they should report if they have problems that they cannot resolve KB45. importance of leaving the work area and machine in a safe condition on completion of the activities **Safe conditions**: correctly isolated; operating programs closed or removed; cleaning the machine; ensuring that any spilt cutting fluids are correctly dealt with; disposing of waste
Skills (S) [Optional]	
A. Core Skills/ Generic Skills	**Communication (Reading, Writing, Listening and Speaking)**
	The user/ individual on the job needs to know and understand how to: SA1. read and interpret information correctly from various job specification documents, manuals, health and safety instructions, memos, etc. applicable to the job in English and/or local language

CSC/ N 0115: Perform turning operations on metal components using Computer Numerically Controlled (CNC) machines

	SA2. fill up appropriate technical forms, process charts, activity logs as per organizational format in English and/or local language SA3. convey and share technical information clearly using appropriate language SA4. check and clarify task-related information SA5. liaise with appropriate authorities using correct protocol SA6. communicate with people in respectful form and manner in line with organizational protocol
	Numerical and computational skills
	The user/individual on the job needs to know and understand how to: SA7. undertake numerical operations, and calculations/ formulae **Numerical computations**: addition, subtraction, multiplication, division, fractions and decimals, percentages and proportions, simple ratios and averages **Algebraic expressions**: represent numerical quantities using symbols, apply laws of precedence in the use of precedence (BODMAS) SA8. identify various basic, compound and solid shapes as per dimensions given **Basic shapes**: square, rectangle, triangle, circle **Compound shapes**: involving squares, rectangles, triangles, circles, semi-circles, quadrants of a circle **Solid shapes**: cube, rectangular prism, cylinder SA9. use appropriate measuring techniques and units of measurement SA10. use appropriate units and number systems to express degree of accuracy **Units and number systems representing degree of accuracy**: decimals places, significant figures, fractions as a decimal quantity SA11. use metric systems of measurement **Angles in a triangle**: right-angled, isosceles, equilateral
	Computer skills
	The user/individual on the job needs to know and understand how to: SA12. use basic office applications like spread sheet, word processor, presentations SA13. use ERP software and other organizational software specific to quality function SA14. use email to communicate within the organization as per organization guidelines
B. Professional Skills	**Critical Thinking**
	The user/individual on the job needs to know and understand how to: SA15. participate in on-the-job and other learning, training and development interventions and assessments SA16. clarify task related information with appropriate personnel or technical adviser SA17. seek to improve and modify own work practices SA18. maintain current knowledge of application standards, legislation, codes of practice and product/process developments
	Problem Solving and Decision Making

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	The user/individual on the job needs to know and understand how to: SB1. identify problems with work planning, procedures, output and behavior and their implications SB2. prioritize and plan for problem solving SB3. communicate problems appropriately to others SB4. identify sources of information and support for problem solving SB5. seek assistance and support from other sources to solve problems SB6. identify effective resolution techniques SB7. select and apply resolution techniques SB8. seek evidence for problem resolution
	Plan and Organize
	The user/individual on the job needs to know and understand how to: SB9. plan, prioritize and sequence work operations as per job requirements SB10. organize and analyze information relevant to work SB11. basic concepts of shop-floor work productivity including waste reduction, efficient material usage and optimization of time
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB12. undertake and express new ideas and initiatives to others SB13. modify work plan to overcome unforeseen difficulties or developments that occur as work progresses SB14. participate in improvement procedures including process, quality and internal/external customer/supplier relationships SB15. one's competencies in new and different situations and contexts to achieve more
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB16. exercise restraint while expressing dissent and during conflict situations SB17. avoid and manage distractions to be disciplined at work SB18. manage own time for achieving better results
	Teamwork
	The user/individual on the job needs to know and understand how to: SB19. work in a team in order to achieve better results SB20. identify and clarify work roles within a team SB21. communicate and cooperate with others in the team for better results SB22. seek assistance from fellow team members

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NOS Version Control

NOS Code	**CSC / N 0115**		
Credits(NSQF)	**TBD**	**Version number**	**1.0**
Industry	**Capital Goods**	**Drafted on**	**14/04/14**
Industry Sub-sector	1. Machine Tools 2. Dies, Moulds And Press Tools 3. Plastics Manufacturing Machinery 4. Textile Manufacturing Machinery 5. Process Plant Machinery 6. Electrical and Power Machinery 7. Light Engineering Goods	**Last reviewed on**	**18/03/15**
Occupation	**Machining**	**Next review date**	**30/08/16**

CSC/ N 1335: Use basic health and safety practices at the workplace

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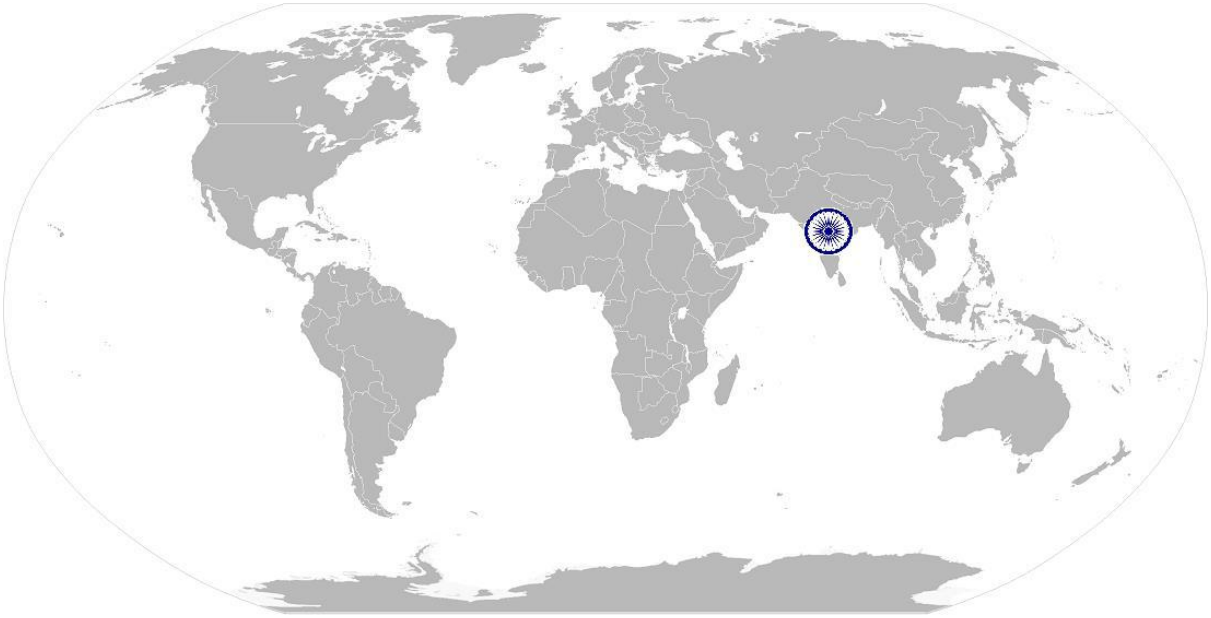
National Occupational Standard



Overview

This unit covers health, safety and security at the workplace. This includes procedures and practices that candidates need to follow to help maintain a healthy, safe and secure work environment.

CSC/ N 1335: Use basic health and safety practices at the workplace

National Occupational Standard

Unit Code	CSC / N 1335
Unit Title (Task)	**Use basic health and safety practices at the workplace**
Description	This OS unit is about knowledge and practices relating to health, safety and security that candidates need to use in the workplace. It covers responsibilities towards self, others, assets and the environment. It includes understanding of risks and hazards in the workplace, along with common techniques to minimize risk, deal with accidents, emergencies, etc. It covers knowledge of fire safety, common first aid applications, safe practices and emergency procedures.
Scope	This unit/task covers the following: • Health and safety • Fire safety • Emergencies, rescue and first-aid procedures
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Health and safety	The user/individual on the job should be able to: PC1. use protective clothing/equipment for specific tasks and work conditions **Protective clothing**: leather or asbestos gloves, flame proof aprons, flame proof overalls buttoned to neck, cuffless (without folds), trousers, reinforced footwear, helmets/hard hats, cap and shoulder covers, ear defenders/plugs, safety boots, knee pads, particle masks, glasses/goggles/visors **Equipment**: hand shields, machine guards, residual current devices, shields, dust sheets, respirator PC2. state the name and location of people responsible for health and safety in the workplace PC3. state the names and location of documents that refer to health and safety in the workplace PC4. identify job-site hazardous work and state possible causes of risk or accident in the workplace **Hazards**: sharp edged and heavy tools; heated metals; oxyfuel and gas cylinders; welding radiation; hazardous surfaces(sharp, slippery, uneven, chipped, broken, etc.); hazardous substances(chemicals, gas, oxy-fuel, fumes, dust, etc.); physical hazards(working at heights, large and heavy objects and machines, sharp and piercing objects, tolls and machines, intense light, load noise, obstructions in corridors, by doors, blind turns, noise, over stacked shelves and packages, etc.) electrical hazards (power supply and points, loose and naked cables and wires, electrical machines and appliances, etc.)

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	Possible causes of risk and accident: physical actions; reading; listening to and giving instructions; inattention; sickness and incapacity (such as drunkenness); health hazards (such as untreated injuries and contagious illness) PC5. carry out safe working practices while dealing with hazards to ensure the safety of self and others **Safe working practices**: using protective clothing and equipment; putting up and reading safety signs; handle tools in the correct manner and store and maintain them properly; keep work area clear of clutter, spillage and unsafe object lying casually; while working with electricity take all electrical precautions like insulated clothing, adequate equipment insulation, use of control equipment, dry work area, switch off the power supply when not required, etc.; safe lifting and carrying practices; use equipment that is working properly and is well maintained; take due measures for safety while working in confined places, trenches or at heights, etc. including safety harness, fall arrestors, etc. PC6. state methods of accident prevention in the work environment of the job role **Methods of accident prevention**: training in health and safety procedures; using health and safety procedures; use of equipment and working practices (such as safe carrying procedures); safety notices, advice; instruction from colleagues and supervisors PC7. state location of general health and safety equipment in the workplace **General health and safety equipment**: fire extinguishers; first aid equipment; safety instruments and clothing; safety installations(eg fire exits, exhaust fans) PC8. inspect for faults, set up and safely use steps and ladders in general use **Ladder faults**: corrosion of metal components, deterioration, splits and cracks timber components, imbalance, loose rungs, missing/ unfixed nuts or bolts, etc. **Ladders set up**: firm/level base, clip/lash down, leaning at the correct angle, etc. PC9. work safely in and around trenches, elevated places and confined areas PC10. lift heavy objects safely using correct procedures PC11. apply good housekeeping practices at all times **Good housekeeping practices**: clean/tidy work areas, removal/disposal of waste products, protect surfaces PC12. identify common hazard signs displayed in various areas **Various areas**: on chemical containers; equipment; packages; inside buildings; in open areas and public spaces, etc. PC13. retrieve and/or point out documents that refer to health and safety in the workplace

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	Documents: fire notices, accident reports, safety instructions for equipment and procedures, company notices and documents, legal documents (eg government notices)
Fire safety	The user/individual on the job should be able to: PC14. use the various appropriate fire extinguishers on different types of fires correctly **Types of fires**: Class A: eg. ordinary solid combustibles, such as wood, paper, cloth, plastic, charcoal, etc.; Class B: flammable liquids and gases, such as gasoline, propane, diesel fuel, tar, cooking oil, and similar substances; Class C: eg. electrical equipment such as appliances, wiring, breaker panels, etc. (These categories of fires become Class A, B, and D fires when the electrical equipment that initiated the fire is no longer receiving electricity); Class D: combustible metals such as magnesium, titanium, and sodium (These fires burn at extremely high temperatures and require special suppression agents) PC15. demonstrate rescue techniques applied during fire hazard PC16. demonstrate good housekeeping in order to prevent fire hazards PC17. demonstrate the correct use of a fire extinguisher
Emergencies, rescue and first-aid procedures	The user/individual on the job should be able to: PC18. demonstrate how to free a person from electrocution PC19. administer appropriate first aid to victims where required eg. in case of bleeding, burns, choking, electric shock, poisoning etc. PC20. demonstrate basic techniques of bandaging PC21. respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments PC22. perform and organize loss minimization or rescue activity during an accident in real or simulated environments PC23. administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock, before the arrival of emergency services in real or simulated cases PC24. demonstrate the artificial respiration and the CPR Process PC25. participate in emergency procedures **Emergency procedures**: raising alarm, safe/efficient, evacuation, correct means of escape, correct assembly point, roll call, correct return to work PC26. complete a written accident/incident report or dictate a report to another person, and send report to person responsible **Incident Report includes details of**: name, date/time of incident, date/time of report, location, environment conditions, persons involved, sequence of events, injuries sustained, damage sustained, actions taken, witnesses, supervisor/manager notified PC27. demonstrate correct method to move injured people and others during an emergency
Knowledge and Understanding (K)	

CSC/ N 1335: Use basic health and safety practices at the workplace

A. Organizational Context (Knowledge of the company / organization and its processes)	The user/individual on the job needs to know and understand: KA1. names (and job titles if applicable), and where to find, all the people responsible for health and safety in a workplace. KA2. names and location of documents that refer to health and safety in the workplace.
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. meaning of "hazards" and "risks" KB2. health and safety hazards commonly present in the work environment and related precautions KB3. possible causes of risk, hazard or accident in the workplace and why risk and/or accidents are possible KB4. possible causes of risk and accident **Possible causes of risk and accident**: physical actions; reading; listening to and giving instructions; inattention; sickness and incapacity (such as drunkenness); health hazards (such as untreated injuries and contagious illness) KB5. methods of accident prevention **Methods of accident prevention**: training in health and safety procedures; using health and safety procedures; use of equipment and working practices (such as safe carrying procedures); safety notices, advice; instruction from colleagues and supervisors KB6. safe working practices when working with tools and machines KB7. safe working practices while working at various hazardous sites KB8. where to find all the general health and safety equipment in the workplace KB9. various dangers associated with the use of electrical equipment KB10. preventative and remedial actions to be taken in the case of exposure to toxic materials **Exposure:** ingested, contact with skin, inhaled **Preventative action**: ventilation, masks, protective clothing/ equipment); **Remedial action:** immediate first aid, report to supervisor **Toxic materials:** solvents, flux, lead KB11. importance of using protective clothing/equipment while working KB12. precautionary activities to prevent the fire accident KB13. various causes of fire **Causes of fires**: heating of metal; spontaneous ignition; sparking; electrical heating; loose fires (smoking, welding, etc.); chemical fires; etc. KB14. techniques of using the different fire extinguishers KB15. different methods of extinguishing fire KB16. different materials used for extinguishing fire **Materials**: sand, water, foam, CO2, dry powder KB17. rescue techniques applied during a fire hazard KB18. various types of safety signs and what they mean

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	KB19. appropriate basic first aid treatment relevant to the condition eg. shock, electrical shock, bleeding, breaks to bones, minor burns, resuscitation, poisoning, eye injuries KB20. content of written accident report KB21. potential injuries and ill health associated with incorrect manual handing KB22. safe lifting and carrying practices KB23. personal safety, health and dignity issues relating to the movement of a person by others KB24. potential impact to a person who is moved incorrectly
Skills (S) [Optional]	
A. Core Skills/ Generic Skills	**Reading and Writing Skills**
	The user/individual on the job needs to know and understand how to: SA1. read and comprehend basic content to read labels, charts, signages SA2. read and comprehend basic English to read manuals of operations SA3. read and write an accident/incident report in local language or English
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA4. question coworkers appropriately in order to clarify instructions and other issues SA5. give clear instructions to coworkers, subordinates others
	Decision Making
	The user/individual on the job needs to know and understand how to: SA6. make appropriate decisions pertaining to the concerned area of work with respect to intended work objective, span of authority, responsibility, laid down procedure and guidelines
B. Professional Skills	**Plan and Organize**
	The user/individual on the job needs to know and understand how to: SB1. plan and organize their own work schedule, work area, tools, equipment and materials to maintain decorum and for improved productivity
	Working with others
	The user/individual on the job needs to know and understand how to: SB2. remain congenial while discussing and debating issues with co-workers SB3. follow appropriate protocols for communication based on situation, hierarchy, organizational culture and practice SB4. ask for, provide and receive required assistance where possible to ensure achievement of work related objectives SB5. thank coworkers for any assistance received SB6. offer appropriate respect based on mutuality and respect for fellow worksmanship and authority

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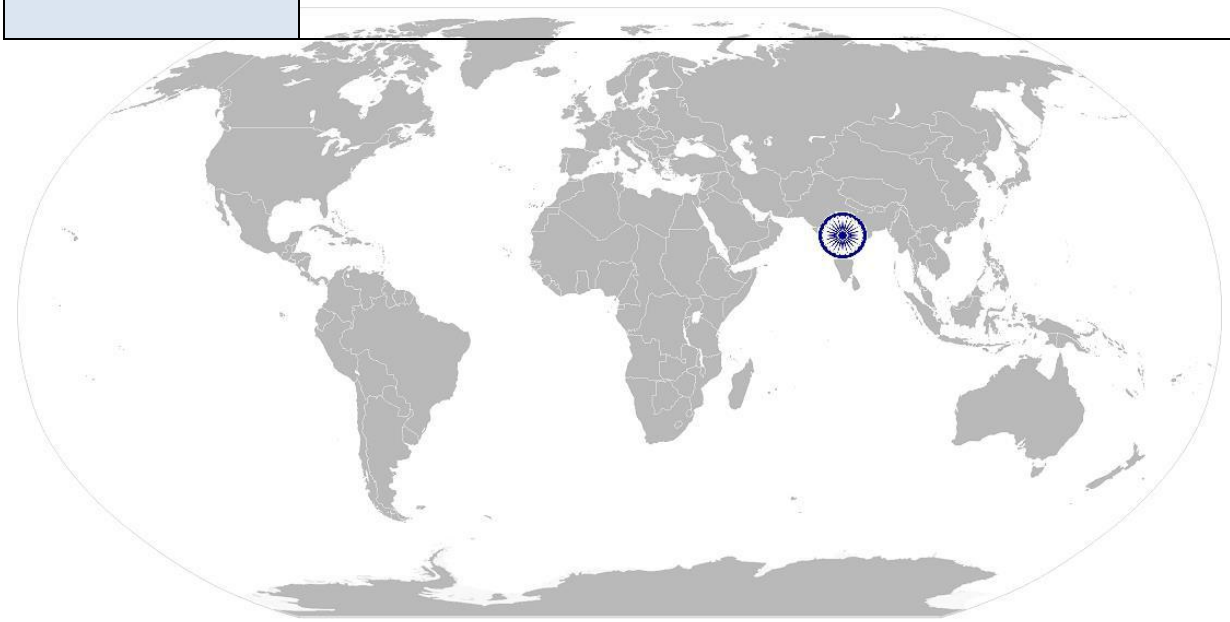
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB7. think through the problem, evaluate the possible solution(s) and suggest an optimum /best possible solution(s) SB8. identify immediate or temporary solutions to resolve delays SB9. identify sources of support that can be availed of for problem solving for various kind of problems SB10. seek appropriate assistance from other sources to resolve problems SB11. report problems that you cannot resolve to appropriate authority
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB12. identify cause and effect relations in their area of work SB13. use cause and effect relations to anticipate potential problems and their solution

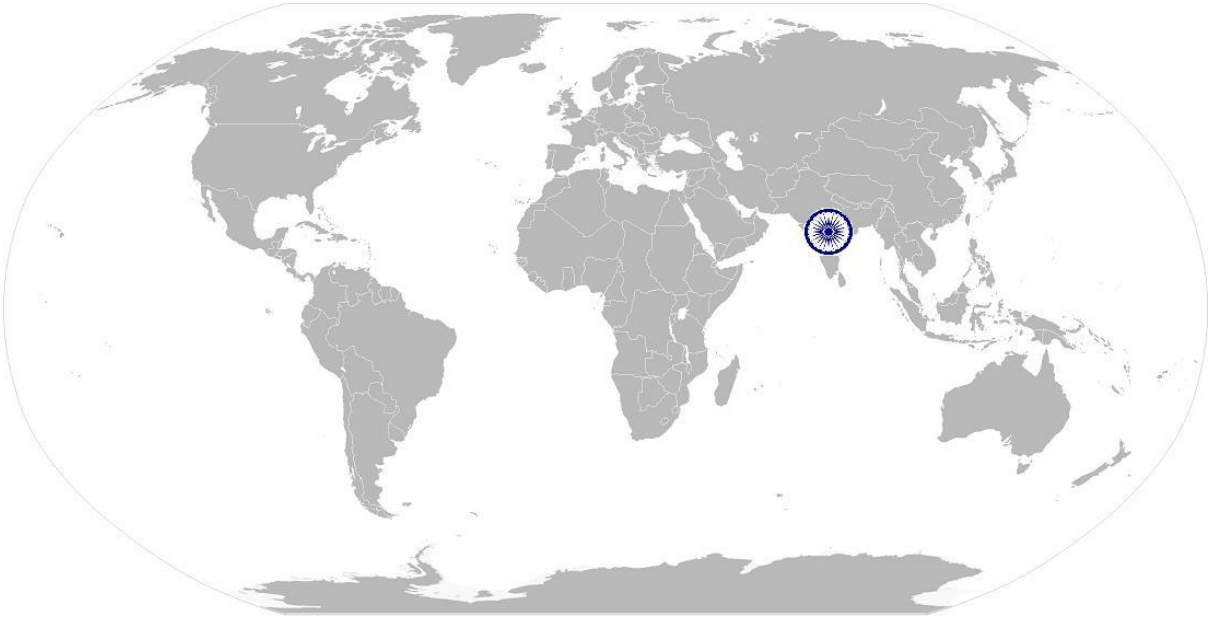


CSC/ N 1335: Use basic health and safety practices at the workplace

NOS Version Control

NOS Code	**CSC / N 1335**		
Credits (NSQF)	**TBD**	**Version number**	**1.0**
Industry	**Capital Goods**	**Drafted on**	**10/04/14**
Industry Sub-sector	1. Machine Tools 2. Dies, Moulds And Press Tools 3. Plastics Manufacturing Machinery 4. Textile Manufacturing Machinery 5. Process Plant Machinery 6. Electrical and Power Generation Machinery 7. Light Engineering Goods	**Last reviewed on**	**18/03/15**
Occupation	**Machining**	**Next review date**	**30/08/16**

National Occupational Standard



Overview

This unit covers basic practices that improve effectiveness of working with others in an organizational set-up.

National Occupational Standard

CSC/ N 1336: Work effectively with others

Unit Code	**CSC / N 1336**
Unit Title (Task)	**Work effectively with others**
Description	This unit covers basic etiquette and competencies that a candidate is required to possess and demonstrate in their behavior and interactions with others at the workplace. These cover areas such as communication etiquette, discipline, listening, handling conflict and grievances.
Scope	This unit/task covers the following: • Working with others

Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
Working with others	The user/individual on the job should be able to: PC1. accurately receive information and instructions from the supervisor and fellow workers, getting clarification where required PC2. accurately pass on information to authorized persons who require it and within agreed timescale and confirm its receipt PC3. give information to others clearly, at a pace and in a manner that helps them to understand PC4. display helpful behavior by assisting others in performing tasks in a positive manner, where required and possible PC5. consult with and assist others to maximize effectiveness and efficiency in carrying out tasks PC6. display appropriate communication etiquette while working **Communication etiquette:** do not use abusive language; use appropriate titles and terms of respect; do not eat or chew while talking (vice versa)etc. PC7. display active listening skills while interacting with others at work PC8. use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism PC9. demonstrate responsible and disciplined behaviors at the workplace **Disciplined behaviors:** e.g. punctuality; completing tasks as per given time and standards; not gossiping and idling time; eliminating waste, honesty, etc. PC10. escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict

Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the company / organization and its processes)	The user/individual on the job needs to know and understand: KA1. legislation, standards, policies, and procedures followed in the company relevant to own employment and performance conditions KA2. reporting structure, inter-dependent functions, lines and procedures in the work area KA3. relevant people and their responsibilities within the work area KA4. escalation matrix and procedures for reporting work and employment related issues

CSC/ N 1336: Work effectively with others

B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. various categories of people that one is required to communicate and co-ordinate with in the organization KB2. importance of effective communication in the workplace KB3. importance of teamwork in organizational and individual success KB4. various components of effective communication KB5. key elements of active listening KB6. value and importance of active listening and assertive communication KB7. barriers to effective communication KB8. importance of tone and pitch in effective communication KB9. importance of avoiding casual expletives and unpleasant terms while communicating professional circles KB10. how poor communication practices can disturb people, environment and cause problems for the employee, the employer and the customer KB11. importance of ethics for professional success KB12. importance of discipline for professional success KB13. what constitutes disciplined behavior for a working professional KB14. common reasons for interpersonal conflict KB15. importance of developing effective working relationships for professional success KB16. expressing and addressing grievances appropriately and effectively KB17. importance and ways of managing interpersonal conflict effectively
Skills (S) [Optional]	

CSC/ N 1336: **Work effectively with others**

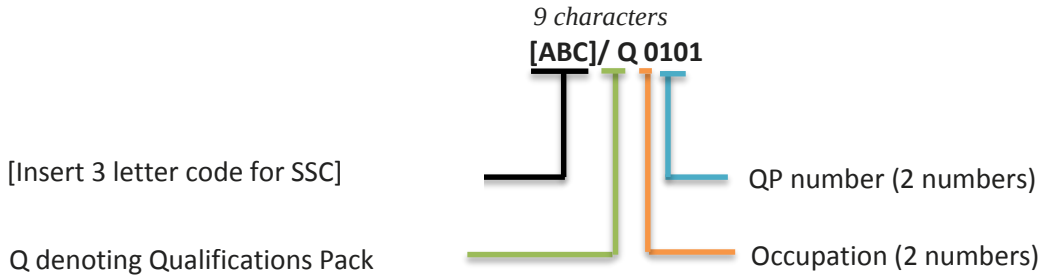
NOS Version Control

NOS Code	**CSC / N 1336**		
Credits(NSQF)	**TBD**	**Version number**	**1.0**
Industry	**Capital Goods**	**Drafted on**	**10/04/14**
Industry Sub-sector	1. Machine Tools 2. Dies, Moulds And Press Tools 3. Plastics Manufacturing Machinery 4. Textile Manufacturing Machinery 5. Process Plant Machinery 6. Electrical and Power Machinery 7. Light Engineering Goods	**Last reviewed on**	**18/03/15**
Occupation	**Machining**	**Next review date**	**30/08/16**

Annexure

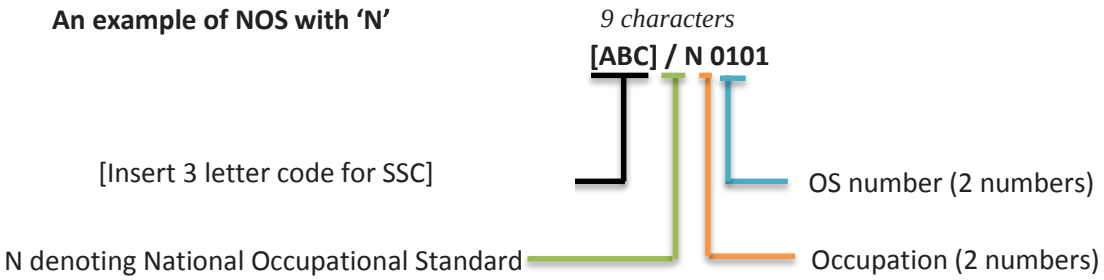
Nomenclature for QP and NOS

Qualifications Pack



Occupational Standard

An example of NOS with 'N'



The following acronyms/codes have been used in the nomenclature above:

Sub-sector	Range of Occupation numbers
Machine Tools	01-13
Dies, Moulds and Press Tools	01-13
Plastics Manufacturing Machinery	01-13
Textile Manufacturing Machinery	01-13
Process Plant Machinery	01-13
Electrical and Power Machinery	01-13
Light Engineering Goods	01-13

Sequence	Description	Example
Three letters	Capital Goods	CSC
Slash	/	/
Next letter	Whether **Q**P or **N**OS	N
Next two numbers	Occupation code	01
Next two numbers	OS number	01

CRITERIA FOR ASSESSMENT OF TRAINEES

Job Role : CNC Setter cum Operator -Turning

Qualification Pack : CSC/ Q 0120

Sector Skill Council : Capital Goods sector skill Council

Guidelines for Assessment:

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below)
4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criteria
5. To pass the Qualification Pack , every trainee should score a minimum of 70% in every NOS
6. In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack.

Assessable Outcomes	Assessment Criteria	Total Marks	Out Of	Theory	Practical Skill
CSC/ N 0120 : Set computer numerically controlled (CNC) machines for turning operations on metal components	PC1. work safely at all times, complying with health and safety, environmental and other relevant regulations and guidelines	100	2	1	1
	PC2. check that all safety mechanisms are in place and that the equipment is set correctly for the required operations		2	0	2
	PC3. adhere to procedures or systems in place for health and safety, personal protective equipment and other relevant safety regulations and procedures to realize a safe system of work		3	1	2
	PC4. keep the work area clean and tidy		1	0	1
	PC5. ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition		1	0	1
	PC6. ensure that the components used are free from foreign objects, dirt or other contamination		1	0	1
	PC7. obtain job specification from a valid and approved source		1	0	1

	PC8. read and establish job requirements from the job specification document accurately		2	1	1
	PC11. follow job instructions, assembly drawings and laid down procedures at all times		2	1	1
	PC12. report and rectify incorrect and inconsistent information in job specification documents as per organization procedures		2	0	2
	PC13. prepare the work area for the turning operations as per procedure or operational specification		2	1	1
	PC14. conduct a preliminary check of the readiness of the CNC turning machine		1	0	1
	PC15. obtain appropriate cutting tools and hand tools and measuring tools as per job requirements		2	1	1
	PC16. ensure that all measuring equipment is calibrated and approved for usage		1	0	1
	PC17. determine what operational objectives and targets need to be achieved and how best the machine will be set to achieve this		2	1	1
	PC18. extract and use information from engineering drawings and relate specifications in relation to work undertaken		3	1	2
	PC19. identify tool requirements from tooling layout and assess their suitability		3	1	2
	PC20. identify suitable work-holding or fixturing device as per the job requirement		2	1	1
	PC21. ensure that the tools and fixtures are in usable condition (free from breakage, damage, calibration, etc.)		1	0	1
	PC22. ensure the correct and latest part-program is uploaded onto the CNC system		3	1	2
	PC23. pre-set the tooling appropriately using setting jigs/fixtures		3	1	2
	PC24. seek any necessary instruction/training on the operation of the machine where required		1	0	1
	PC25. mount tools in the correct position in the tool posts, turrets, magazine or carousel		3	1	2
	PC26. check that the tools have a specific tool number in relation to the operating program		2	0	2

	PC27. produce machined components that combine different turning operations and have a range of features		5	2	3
	PC28. enter all relevant tool data to the operating program		3	1	2
	PC29. set tool datums, positions, lengths, offsets and radius compensation		3	1	2
	PC30. mount the work-holding device/fixture onto the machine		3	1	2
	PC31. set the work-holding device/fixture in relationship to the machine datum's and reference points		3	1	2
	PC32. set the machine tool operating parameters (eg. hydraulic pressure, clamping) as per the component requirements		3	1	2
	PC33. place the machine into the correct operating mode, and access the program edit facility in order to enter tooling data,		3	1	2
	PC34. conduct trial runs using single block run, dry run and feed and speed override controls		2	1	1
	PC35. measure the critical parameters of the machined component on the machine		3	0	3
	PC36. prove the program tool by tool in single block mode		5	2	3
	PC37. perform the necessary checks before allowing the machine to operate in full program run mode		3	1	2
	PC38. hand-over the machine after set-up to the machine operator along with relevant instructions and documentation		4	2	2
	PC39. complete relevant documentation as per organizational procedure		2	1	1
	PC40. handle the typical problems that can occur with the setting up of the tooling, work-holding devices and proving the program		2	1	1
	PC41. switch the CNC turning/lathe machine on and off in normal and emergency situations		1	0	1
	PC42. return the old cutting tools, workholding device/fixtures/intruments/drawings back to store and verified tapes and programs, safely and correctly		1	0	1

	PC43. ensure that there is no damage to the tool/fixture while doing the prove-out		1	0	1
	PC44. complete documentation during and post operations as per organizational procedures		2	1	1
	PC45. deal promptly and effectively with problems within their control, and seek help and guidance from the relevant people if they have problems that they cannot resolve		2	0	2
	PC46. shut down the equipment to a safe condition on conclusion of the activities		1	0	1
	PC47. leave the work area in a safe and tidy condition on completion of the fitting activities		1	0	1
	PC48. return all tools and equipment to the correct location on completion of the turning activities		1	0	1
		Total	**100**	**30**	**70**
CSC/ N 0115 : Perform turning operations on metal components using Computer Numerically Controlled (CNC) machines	PC1. comply with health and safety, environmental and other relevant regulations and guidelines at work		2	1	1
	PC2. adhere to procedures and guidelines for personal protective equipment (PPE) and other relevant safety regulations while performing CNC turning operations		3	1	2
	PC3. read and understand safety instructions, warning signs on the machine		2	0	2
	PC4. work following laid down procedures and instructions		2	1	1
	PC5. ensure work area is clean and safe from hazards	**100**	1	0	1
	PC6. ensure that all tools and equipment are in a safe and usable condition		1	0	1
	PC7. obtain job specification from a valid and approved source		1	0	1
	PC8. read and establish job requirements from the job specification document accurately		2	1	1
	PC9. report and rectify incorrect and inconsistent information in job specification documents as per organization procedures		3	1	2
	PC10. prepare the work area for the turning operations as per procedure or operational specification		2	1	1

	PC11. perform daily maintenance of machine according to defined checklist, at the beginning of day's shifts.		3	1	2
	PC12. ensure that the components used are free from foreign objects, dirt or other contamination		1	0	1
	PC13. conduct a preliminary check of the readiness of the CNC turning machine		2	0	2
	PC14. obtain correct work-pieces/raw materials and consumables as per job requirements		2	1	1
	PC15. obtain appropriate cutting tools and hand tools and measuring tools as per job requirements		2	1	1
	PC16. ensure that all measuring equipment is calibrated and approved for usage		2	0	2
	PC17. set work pieces as per job requirements using appropriate positioning and/or holding devices and support mechanisms		3	1	2
	PC18. seek necessary instruction/training on the operation of the machine where required from appropriate sources		2	0	2
	PC19. check that the operating program is at the correct start point and the tool is at a safe position clear of the part		2	0	2
	PC20. perform basic daily maintenance activities as per the checklist given		2	1	1
	PC21. obtain the component drawings, specifications and/or job instructions required for the components to be machined		1	0	1
	PC22. use and extract information from engineering drawings, dimensioning and labeling data		2	0	2
	PC23. use and extract information from reference charts, tables, graphs and standards		2	0	2
	PC24. interpret the visual display and the various messages displayed correctly		2	0	2
	PC25. find the correct restart point in the program when the machine has been stopped before completion of the program		2	0	2
	PC26. load and unload component(s) using pre-determined fixtures or work holding devices as per work instructions		3	1	2

	PC27. check correctness of program through dry run and single block check		2	0	2
	PC28. do first part cutting trial by setting tool offsets to get oversize part		3	0	3
	PC29. measure the critical parameters of the machined component on the machine (without removing from the machine), after the trial run		3	0	3
	PC30. correct the offsets based on the measurements by accessing program edit facility in order to enter tooling data		3	0	3
	PC31. measure the component after unloading to check for accuracy in the critical parameters as per job specifications		4	1	3
	PC32. produce machined components that combine different turning operations and have a range of features		4	1	3
	PC33. follow the specified machining sequence and procedure as per job specifications		2	1	1
	PC34. interpret in-built machine alarms and respond to the same as per operating manual/organizational guidelines		2	1	1
	PC35. inspect as per frequency of inspection mentioned in the inspection plan (part of the job specifications)		2	1	1
	PC36. record the measured values as per organizational procedure		1	0	1
	PC37. observe for inconsistency in dimensions due to tool wear and correct the offsets accordingly		3	1	2
	PC38. ensure that machine settings are adjusted as and when required, either by self or the setter, to maintain the required accuracy		2	0	2
	PC39. identify when tools need replacing		2	0	2
	PC40. replace worn tool with new tool		1	0	1
	PC41. cut a trial part and adjust tool offsets after each tool change		1	0	1
	PC42. store finished components as well as raw material as per organizational procedure		2	1	1
	PC43. produce components as per standards applicable to the process		3	1	2
	PC44. report problems and seek appropriate assistance in a timely manner		2	0	2

	PC45. deal with finished components as per organizational guidelines		2	1	1
	PC46. complete documentation during and post operations as per organizational procedures		2	1	1
	PC47. return the machine and all tools and equipment to the correct location on completion of activities		1	0	1
	PC48. leave the work area in a safe and tidy condition on completion of job activities		1	0	1
		Total	**100**	**22**	**78**
CSC/ N 1335 : Use basic health and safety practices at the workplace	PC1. use protective clothing/equipment for specific tasks and work conditions	**100**	5	2	3
	PC2. state the name and location of people responsible for health and safety in the workplace		3	1	2
	PC3. state the names and location of documents that refer to health and safety in the workplace		3	1	2
	PC4. identify job-site hazardous work and state possible causes of risk or accident in the workplace		5	2	3
	PC5. carry out safe working practices while dealing with hazards to ensure the safety of self and others state methods of accident prevention in the work environment of the job role		4	2	2
	PC6. state location of general health and safety equipment in the workplace		3	2	1
	PC7. inspect for faults, set up and safely use steps and ladders in general use		5	2	3
	PC8. work safely in and around trenches, elevated places and confined areas		5	2	3
	PC9. lift heavy objects safely using correct procedures		5	2	3
	PC10. apply good housekeeping practices at all times		4	2	2
	PC11. identify common hazard signs displayed in various areas		5	2	3
	PC12. retrieve and/or point out documents that refer to health and safety in the workplace		3	1	2
	PC13. use the various appropriate fire extinguishers on different types of fires correctly		4	1	3

	PC14. demonstrate rescue techniques applied during fire hazard		4	1	3
	PC15. demonstrate good housekeeping in order to prevent fire hazards		3	1	2
	PC16. demonstrate the correct use of a fire extinguisher		4	1	3
	PC17. demonstrate how to free a person from electrocution		4	1	3
	PC18. administer appropriate first aid to victims where required eg. in case of bleeding, burns, choking, electric shock, poisoning etc.		4	1	3
	PC19. demonstrate basic techniques of bandaging		3	1	2
	PC20. respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments		4	1	3
	PC21. perform and organize loss minimization or rescue activity during an accident in real or simulated environments		3	1	2
	PC22. administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock, before the arrival of emergency services in real or simulated cases		3	1	2
	PC23. demonstrate the artificial respiration and the CPR Process		3	1	2
	PC24. participate in emergency procedures		3	2	1
	PC25. complete a written accident/incident report or dictate a report to another person, and send report to person responsible		4	1	3
	PC26. demonstrate correct method to move injured people and others during an emergency		4	1	3
		Total	**100**	**36**	**64**
CSC/ N 1336 : Work effectively with others	PC1. accurately receive information and instructions from the supervisor and fellow workers, getting clarification where required	**100**	10	3	7
	PC2. accurately pass on information to authorized persons who require it and within agreed timescale and confirm its receipt		10	3	7
	PC3. give information to others clearly, at a pace and in a manner that helps them to understand		10	3	7

	PC4. display helpful behavior by assisting others in performing tasks in a positive manner, where required and possible		10	3	7
	PC5. consult with and assist others to maximize effectiveness and efficiency in carrying out tasks		10	3	7
	PC6. display appropriate communication etiquette while working		10	3	7
	PC7. display active listening skills while interacting with others at work		10	3	7
	PC8. use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism		10	3	7
	PC9. demonstrate responsible and disciplined behaviors at the workplace		10	3	7
	PC10. escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict		10	3	7
		Total	**100**	**30**	**70**