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: Tool and Die Maker

SECTOR: CAPITAL GOODS

SUB-SECTOR:
Machine Tools,
Dies, Moulds and Press Tools,
Plastic Manufacturing Machinery,
Textile Manufacturing Machinery
Process Plant Machinery,
Electrical and Power Machinery,
Light Engineering,

OCCUPATION: Fitting and Assembly

REFERENCE ID: CSC/ Q 0306

ALIGNED TO: NCO-2004/7222.20, 7222.50

Tool and Die Maker: Identifying tool or die specifications from design, plan and organize for making of tool and die, perform fitting activities using hand tools, manually operated machines and conventional machines, assemble and prove the tool.

Brief Job Description: It involves identifying the various operations required to make the tool or die and further sequence the same. Organise for these operations to be performed either by self or others. Must have a complete understanding of all the processes and operations required for tool and die making.

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 0306**		
Job Role	**Tool and Die Maker**		
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	**FITTING AND ASSEMBLY**	**Next review date**	**30/08/16**
NSQC Clearance on	19/05/2015		

Job Role	Tool and Die Maker
Role Description	Identifying tool or die specifications from design, plan and organize for making of tool and die, perform fitting activities using hand tools, manually operated machines and conventional machines, assemble and prove the tool.
NSQF level **Minimum Educational Qualifications** **Maximum Educational Qualifications**	5 10th Standard N.A.
Training (Suggested but not mandatory)	No Previous Training Required
Minimum Job Entry Age	18 Years Old
Experience	Minimum 1 year apprenticeship
Applicable National Occupational Standards (NOS)	**Compulsory:** 1. CSC/ N 0307 (Plan and co-ordinate the making of tools and die) 2. CSC/ N 0308 (Perform fitting operations on metal components for making tools and dies using hand tools and manually operated machines) 3. CSC/ N 0302 (Grind surface using hand and/or hand-held power tools) 4. CSC/ N 0108 (Operate conventional milling machines) 5. CSC/ N 0110 (Operate conventional turning machines) 6. CSC/ N 0109 (Operate grinding Machines) 7. CSC/ N 0309 (Perform assembly operations on metal components to make tools and dies) 8. CSC/ N 1335 (Use basic health and safety practices at the workplace) 9. CSC/ N 1336 (Work effectively with others) **Optional:** N.A.
Performance Criteria	As described in the relevant OS units

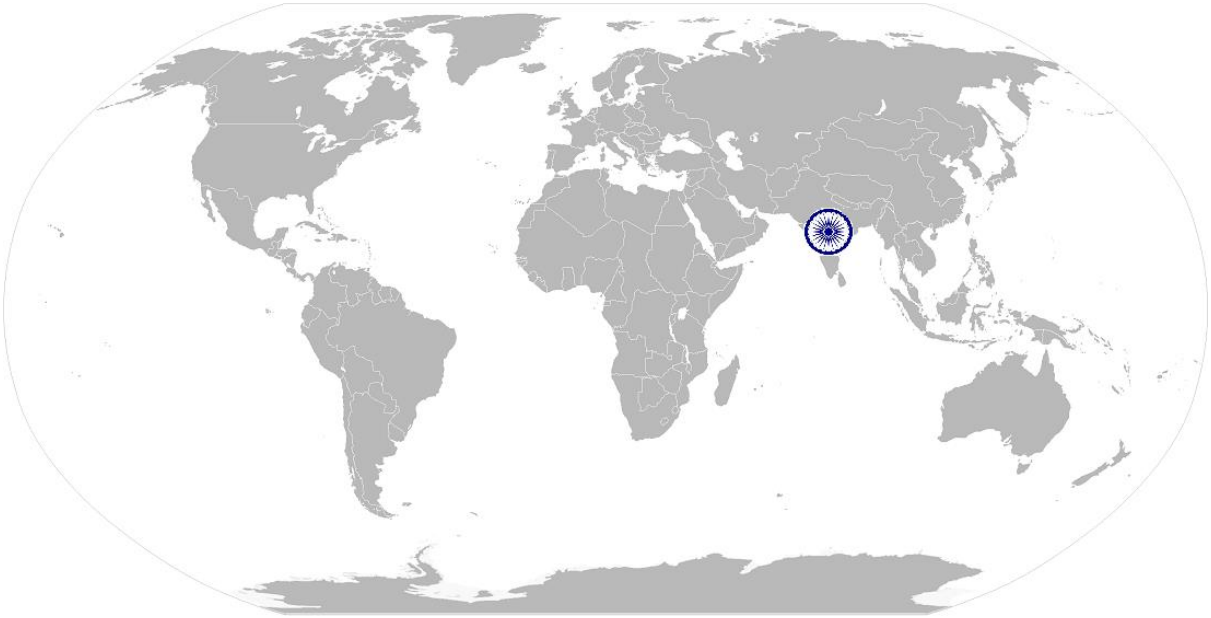
Definitions

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
EDM	Electric Discharge Machine
VMC	Vertical Machining Centre
CMM	Co-ordinate Measuring Machine
DTI	Dial Testing Indicators
GD&T	Geometric Dimensioning and Tolerancing
CO2	Carbon dioxide
CPR	Cardiac Pulmonary Resuscitation
PPE	Personal Protective Equipment
ISO	International Organization for Standardization

National Occupational Standard



Overview

This unit covers the planning and co-ordination for making of tools and dies as per given specifications. It involves understanding the tool and die design, identifying the sequence of operations required by studying their designs and co-ordination with other for the performance of required operations on the metal component.

CSC/ N 0307: Plan and co-ordinate the making of tools and die

National Occupational Standard

Unit Code	CSC/ N 0307
Unit Title (Task)	Plan and co-ordinate the making of tools and die
Description	This unit covers the planning and co-ordination for making of tools and die as per given specifications. It involves understanding the tool and die design, identifying the sequence of operations required by studying their designs and co-ordination with other for the performance of required operations on the metal component. The candidate will further get the various operations done from the various operators and workers. The candidate will be expected to work unsupervised, on their own or as part of a team and may also be expected to lead or instruct a team, taking responsibility for own actions as well as the actions of the team and for the quality and accuracy of the work produced.
Scope	This unit/task covers the following: • Working safely • Understanding design requirements and planning • Co-ordinating with others

Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Working safely	The user / individual on the job should be able to: PC1. adhere to procedures or systems in place for health and safety, personal protective equipment (PPE) and other relevant safety regulations PC2. ensure all hand tools and equipment used are in a safe and useable condition PC3. ensure that all machine tools are correctly guarded at all times
Understanding design requirements and planning	The user / individual on the job should be able to: PC4. obtain sample parts/ blueprints/ drawings of tools/ dies and other engineering information as per company procedures PC5. identify requirements by analyzing sample parts, tool design and blueprints PC6. plan sequence of operations for tools & dies making keeping in mind various considerations like requirements, timelines, resources available, interdependencies, constraints, compliances, etc. PC7. report and rectify cases of inappropriate information in design documents as per organizational procedures PC8. compute dimensions, sizes, shapes and tolerances of sub-assemblies of the tools and dies as per specifications and as per company procedures PC9. determine information such as number of parts to make, engineered components and material to be used, and machines to be used PC10. identify and confirm resources required such as components, machinery, range of materials and processes **Range of Materials**: Ferrous metals: eg. carbon steels, stainless steels, cast iron, tool steel, hard metals; Non-ferrous metals: eg. bronze, bronze alloys, copper and copper alloys PC11. identify the operations that will be required for tools & dies making based on design requirements

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	PC12. identify type of equipment required for tools & dies making based on the operations selected PC13. estimate timelines for each task accurately PC14. establish milestones by determining a schedule of operations PC15. obtain necessary approvals for the plan PC16. allocate responsibilities to machine operators as per the operations selected PC17. ensure that the machine operators are clear about the sequence of activities, priorities and considerations
Co-ordinating with others	PC18. release drawings and machining specifications to machine operators PC19. identify and select tools for tools & dies making based on design and blueprints PC20. identify and select lifting and rigging equipment based on design and blueprints PC21. select and procure appropriate metals to be used for tools & dies making as per design requirement PC22. hand over tools, equipment and metal components to be machined to the machine operators PC23. handle all clarifications sought by the operators PC24. collect job from all operators PC25. check the jobs as per drawing/instruction PC26. ensure in-process inspection of the tool elements and final assembly
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. valid sources for information about job specifications **Valid sources**: job instruction sheet/job card; work drawings and instructions; planning documentation; quality control documents; operation sheets; process specifications; instructions from supervisor KB2. read and establish various types of job specification documents for job requirements **Job requirements**: raw materials or components required (type, quality, quantity); dimensions; limits and tolerances; surface texture requirements; operations required (list, sequence and procedures where applicable); shape

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	or profiles to be fabricated; cutting, bending and rolling allowances for fabricated forms; instruments and tools to be used; interdependencies; timelines KB3. hazards associated with the activities **Hazards**: use of power tools, trailing leads or hoses, damaged or badly maintained tools and equipment; using files with damaged or poor fitting handles; using machine tools; handling of oils and grease; misuses of tools; not following laid-down maintenance procedures KB4. the various fitting activities to be carried out **Fitting activities**: measuring and marking out; fabrication using hand tools; fabrication using manually operated power tools(cutting, forming, grinding, drilling, threading, tapping, reaming, polishing, boring, etc); machining using conventional machine tools (milling, drilling, turning, grinding); machining using CNC machines (grinding, milling, turning, polishing, VMC, EDM, etc); inspection of finished products(visually, using measuring tools, using CMM machine) KB5. how to extract and use information from engineering drawings and related specifications in relation to work undertaken KB6. various hand fitting methods **Methods**: cutting out the rough profile using saws (eg. hacksaw, band saw), cutting a screw thread (eg. tapping or dieing), filing (flat, square, curved), drilling holes, tapping KB7. how to interpret first and third angle drawings KB8. basic principles of tool and die design KB9. basic knowledge of accessing computer drawing software to be used for viewing designs drawings KB10. make minor modifications in the design drawings KB11. how to access the specific computer modelling software to be used KB12. how to set up the viewing screen to show multiple views of the component KB13. factors that affect the selection of cutting feeds and speeds, and the depth of cut that can be take **Factors**: type of material, size of material, operations being performed, workholding method/security of workpiece, condition of machine, finish required, tolerance required KB14. the British and metric systems of measurement KB15. geometric dimensioning and tolerancing -- GD&T KB16. required dimensional parameters and components quality standards as per the process **Parameters**: linear dimensions (eg. lengths, depths); diameters (eg. external, internal); flatness; squareness; angles; profiles; hole size and position; thread; size and fit; surface finish **Quality standards**: components to be free from false tool cuts, burrs and sharp edges; dimensional tolerance +/-0.020mm; flatness and squareness 0.05mm; angles within +/- 1 degree; screw threads to fit as per standard; reamed and bored holes within interference: - 0.025mm (hole) + 0.025mm (shaft), transition: - 0.1mm (hole) + 0.1 (shaft) , clearance: 50microns; radius: 0.5 r; surface finish 63µin or 1.6 µm KB17. how to plan and organize the team KB18. machine operations and sequencing

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	KB19. machine capacity and capabilities KB20. types of machine tools such as lathes, drills, grinders, saws and milling machines KB21. work holding devices and equipment **Workholding devices**: bench / machine vice; clamps (eg. toolmaker's); three-jaw chuck; four-jaw chuck; collet chuck; drive plate and centres; magnetic chucks(holding devices); special purpose tool holders (3R for holding electrodes) KB22. machining accessories KB23. limits and capabilities of tooling, accessories and holding devices KB24. how to check the workpiece and the measuring equipment that is used **Measuring equipment**: external micrometers, vernier/digital/dial caliper, surface finish equipment (eg. comparison plates, machines), rules, squares, protractors, depth micrometers, depth verniers, feeler gauges, bore/hole gauges, slip gauges, radius/profile gauges, thread gauges, height gauge, hardness tester, dial test indicators (DTI), surface roughness tester, coordinate measuring machine (CMM), profile projectors KB25. need to check that the measuring equipment is within current calibration dates, and that the instruments are correctly zeroed KB26. measuring internal and external dimensions KB27. how to check surface finish KB28. properties of metals **Properties**: plasticity, elasticity, ductility, malleability, toughness, hardness, tensile strength, compressive strength, shear strength, corrosion resistance, density KB29. heat treatment processes of tool steel
Skills (S) [Optional]	
A. Core Skills/ Generic Skills	**Communication**
	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 numerical operations, geometry and calculations/ formulae **arithmetic**: addition, subtraction, multiplication, division, fractions and decimals, percentages and proportions, simple ratios and averages SA8. use appropriate measuring techniques SA9. express numerical solutions to a degree of accuracy that is appropriate to the value being calculated **degree of accuracy**: correct to three significant figures, correct to two decimal

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	places, express a decimal fraction in standard form, express tolerance in terms of limits of size SA10. use a calculator to raise a number to a power and determine square roots SA11. use algebraic expressions to solve linear equations SA12. plot and interpret straight line graphs SA13. apply pythagoras' theorem to perform calculations SA14. calculation of the value of angles in a triangle
	Learning
	The user/individual on the job needs to know and understand how to: SA15. maintain current knowledge of applicable standards, legislation, codes of practice and product/process developments SA16. participate in on-the-job and other learning, training and development interventions and assessment SA17. clarify task related information with appropriate personnel or technical adviser SA18. seek to improve and modify own work practices
	Computer Basics
	The user/individual on the job needs to know and understand how to: SA19. perform basic operations in a computer like switching it on/off, using the mouse and keyboard, accessing files, opening, closing, creating and deleting folders, etc. SA20. use basic office applications like spread sheet, word processor, presentations SA21. use ERP software and other organizational software specific to quality function SA22. use email to communicate within the organization as per organization guidelines SA23. retrieve and enter data using standard system forms and templates SA24. take printouts of documents
B. Professional Skills	**Problem Solving**
	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
	Initiative and Enterprise

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	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
	Self-Management
	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
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB23. apply, analyze, and evaluate the information gathered from observation, experience, reasoning, or communication, as a guide to thought and action

CSC/ N 0307: Plan and co-ordinate the making of tools and die

NOS Version Control

NOS Code	**CSC/ N 0307**		
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	**Fitting and Assembly**	**Next review date**	**30/08/16**

CSC/ N 0308: Perform fitting operations on metal components for making tools and dies using hand tools and manually operated machines

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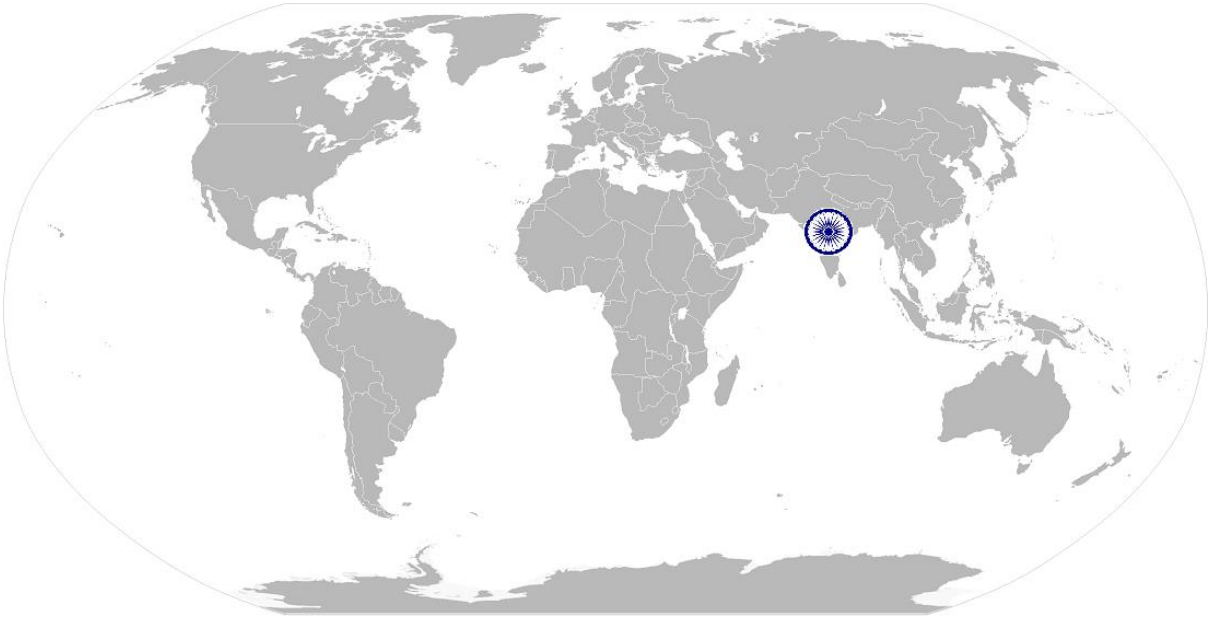
National Occupational Standard



Overview

This unit covers fitting of metal components for making tools and dies using hand tools and manually operated machines, to modify the shape of a component and/or generate components from raw material, as per given specifications.

CSC/ N 0308: Perform fitting operations on metal components for making tools and dies using hand tools and manually operated machines

National Occupational Standard

Unit Code	CSC / N 0308
Unit Title (Task)	**Perform fitting operations on metal components using hand tools and manually operated machines**
Description	This unit covers fitting of metal components for making tools and dies using hand tools and manually operated machines, to modify the shape of a component and/or generate components from raw material, as per given specifications. This involves carrying out the fitting operations like filing, drilling, chiseling, threading, tapping, scraping and manual lapping in order to fit a component as per specifications. The candidate will be expected to perform under minimum supervision, taking personal responsibility for their actions and for the quality and accuracy of the work that they produce.
Scope	This unit/task covers the following: • Working safely • Preparing for fitting operations • Marking components • Performing fitting operations

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 die fitting operations PC3. work following laid down procedures and instructions PC4. ensure work area is clean and safe from hazards PC5. ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition
Preparing for fitting operations	The user / individual on the job should be able to: PC6. 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; process specifications; instructions from supervisor PC7. read and establish job requirements from the job specification document accurately **Job specification documents**: detailed component drawings; approved sketches/illustrations; national, international and organisational standards; reference tables and charts **Job requirements**: raw materials or components required (type, quality, quantity); dimensions; limits and tolerances; surface texture requirements; operations required (list, sequence and procedures where applicable); shape or profiles to be machined; instruments and tools to be used; interdependencies; timelines PC8. report and rectify incorrect and inconsistent information in job specification

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	documents as per organization procedures PC9. prepare the work area for the fitting operations as per procedure or operational specification PC10. ensure that all measuring equipment is calibrated and approved for usage PC11. ensure that the components used are free from foreign objects, dirt or other contamination PC12. obtain correct workpieces/raw materials and consumables as per job requirements PC13. obtain appropriate tools and equipment as per job requirements PC14. set work pieces as per job requirements using appropriate positioning and/or holding devices and support mechanisms **Positioning and holding devices**: belts; braces; clamps; jigs and fixtures; bolt straps; blocks and tables; manual lifts; ropes; jacks
Marking components	The user / individual on the job should be able to: PC15. mark out specified features with the help of marking-out methods and techniques on the workpieces as per job specification by using appropriate measuring and marking out tools and equipment **Features**: datum/centre lines, lines (perpendicular, parallel), circles, profiles (square/rectangular, radial, angles/angular), hole positions (radial, linear), allowances for bending, simple pattern development **Marking-out methods and techniques**: direct marking using instruments, use of templates, tracing/transfer methods **Measuring and marking tools**: scales/tapes, dividers/trammels, scribers, punches, scribing blocks, squares, protractor, depth/internal/external micrometers, calipers (vernier, inside and outside, depth), gauges (height Vernier, feeler, bore/hole, slip, radius/profile, thread, plug), stick micrometers, dial stand and comparator, vee block with u-clamp PC16. mark out templates for tracing/transferring the specified features on the workpieces as per job specification PC17. trace/transfer the specified features from the templates onto the workpieces as per job specification
Performing fitting operations	The user / individual on the job should be able to: PC18. perform fitting operations on various forms of metal components using a range of hand tools and manually operated machines **Forms of metal components**: square/rectangular (eg. bar stock, sheet material, machined components); circular/cylindrical (eg. bar stock, tubes, turned components, flat discs); sections (eg. angles, channel, tee section, joists, extrusions); irregular shapes/profile (eg. castings, forgings, odd shaped components) **Fitting operations**: filing, drilling, chiseling, threading(external, internal), hand tapping, scraping, manual lapping **Hand tools**: hammers; punches; screwdrivers; sockets; wrenches; spanners; scraper; chisels; gouges; files; taps; vices and clamps **Manually operated machine tools**: drills (power drills, pedestal drills),

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	punching machines, threading machines PC19. follow the specified fitting sequence and procedure as per job specifications PC20. interpret in-built fault indicators and error codes of equipment and respond to the same as per operating manual/organizational guidelines PC21. check the fitted products to ensure completeness of work PC22. check the quality of the output as per required standards, using visual checks and measurement of dimensional parameters **Dimensional parameters**: linear dimensions; flatness; squareness; depths; angles; profiles; hole position; hole size/fit; thread size and fit PC23. produce components with various features as per standards applicable to the process **Features**: flat; parallel and angular faces; perpendicular plates; radii and curved profiles; drilled holes(through, to a depth); internal and external threads; sliding or mating parts; counterbore, countersink, or spot face; chamfers; reamed holes; faces which are square to each other; faces which are parallel to each other PC24. work to achieve production targets PC25. report conditions and seek appropriate assistance in a timely manner to address risk of failure to comply with necessary targets and specifications PC26. deal with finished components as per organizational guidelines PC27. complete documentation during and post operations as per organizational procedures **Documentation**: job card, progress records, incident reports PC28. return all tools and equipment to the correct location on completion of the fitting activities PC29. leave the work area in a safe and tidy condition on completion of job 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, fitting procedures and environmental regulations that must be observed

CSC/ N 0308: Perform fitting operations on metal components for making tools and dies using hand tools and manually operated machines

	KB2. hazards associated with carrying out the fitting operations and how can they be minimized KB3. personal protective equipment to be used during the fitting activities and where can it be obtained KB4. types and sources of appropriate job specifications KB5. common terminology used in fitting KB6. importance of following specified fitting sequences and procedures KB7. importance and procedures of ensuring suitability of workpiece/materials and consumables for the specified job **Suitability of workpieces/materials and consumables**: e.g. correct type and code; correct form; correct dimensions; damage free; correctly issued KB8. tools and equipment used for the fitting operations KB9. importance and procedures to ensure that tools and equipment are in a safe and usable condition KB10. correct techniques and procedures to carry out specific fitting operations by hand tools and manually operated machines KB11. importance of securing the workpiece/raw material correctly using appropriate devices and mechanisms KB12. common problems that can occur in the fitting operations and their implications KB13. correct procedures to address problems commonly encountered during fitting operations KB14. importance of reporting problems immediately and accurately KB15. meaning and importance of quality in relation to final and intermediate job output KB16. how to check the quality of the shaped components against the specified quality standards KB17. range of materials used in relevant fitting applications **Range of Materials**: Ferrous metals: eg. carbon steels, stainless steels, cast iron, tool steel, hard metals; Non-ferrous metals: eg. bronze, bronze alloys, copper and copper alloys **Quality standards**: components to be free from damage, false tool cuts, burrs, scratches and non-specified sharp edges; general dimensional tolerance +/- 0.020mm; flatness and squareness 0.05mm; angles within +/- 0.5 degree; screw threads to fit as per standard; reamed and bored holes within interference: - 0.025mm (hole) + 0.025mm (shaft), transition: - 0.1mm (hole) + 0.1 (shaft) , clearance: 50microns; radius: 0.5 r KB18. relevant mechanical properties of metals and implications for job **Mechanical properties**: tensile strength, toughness, hardness, elasticity, ductility, malleability **Identifiable properties**: colour, appearance, sparks KB19. importance of using correct procedures as per type and form of materials and metal components
Skills (S) [Optional]	
A. Core Skills/	**Communication**

CSC/ N 0308: Perform fitting operations on metal components for making tools and dies using hand tools and manually operated machines

Generic Skills	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 numerical operations, and calculations/ formulae **Numerical computations**: addition, subtraction, multiplication, division, fractions and decimals, percentages and proportions, simple ratios and averages SA8. identify and draw 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. interpret and express tolerance in terms of limits on dimensions SA12. calculation of the value of angles in a triangle **Angles in a triangle**: right-angled, isosceles, equilateral
	Learning
	The user/individual on the job needs to know and understand how to: SA13. maintain current knowledge of applicable standards, legislation, codes of practice and product/process developments SA14. participate in on-the-job and other learning, training and development interventions and assessment SA15. clarify task related information with appropriate personnel or technical adviser SA16. seek to improve and modify own work practices
B. Professional Skills	**Problem Solving**
	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

CSC/ N 0308: Perform fitting operations on metal components for making tools and dies using hand tools and manually operated machines

	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
	Initiative and Enterprise
	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
	Self-Management
	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

CSC/ N 0308: Perform fitting operations on metal components for making tools and dies using hand tools and manually operated machines

NOS Version Control

NOS Code	**CSC/ N 0308**		
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	**Fitting and Assembly**	**Next review date**	**30/08/16**

CSC/ N 0302: Grind surface using hand and /or hand-held power tools

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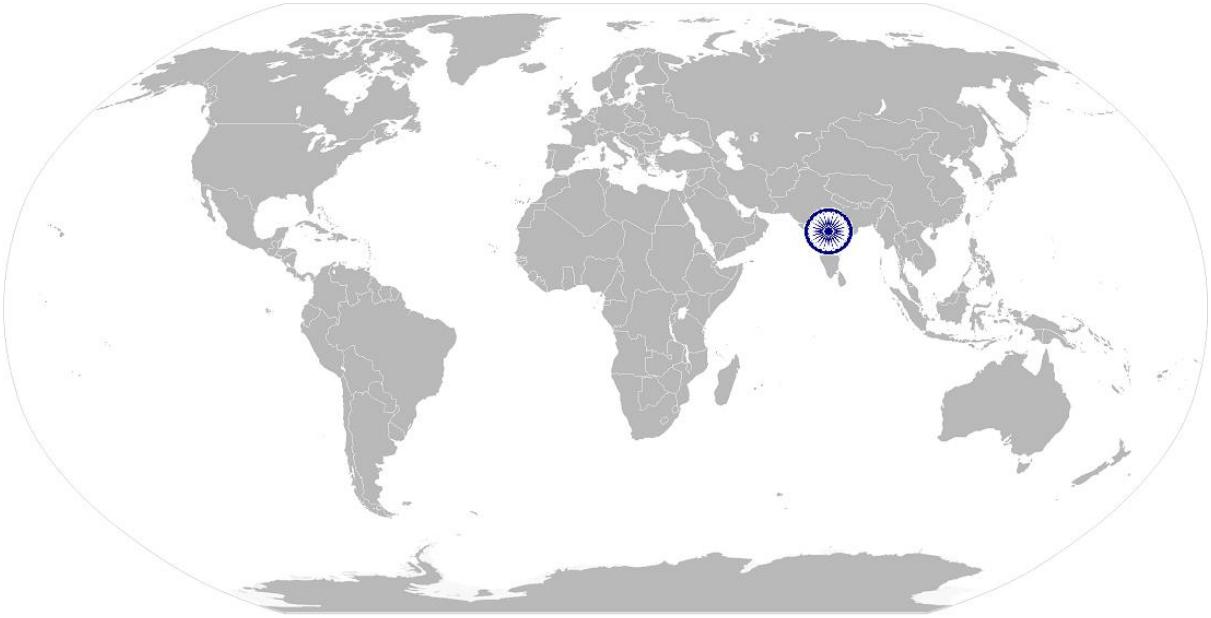
National Occupational Standard



Overview

This unit covers competencies required for grinding surface using hand tools and/or hand-held power tools on a variety of ferrous and non-ferrous materials and components.

CSC/ N 0302: Grind surface using hand and /or hand-held power tools

National Occupational Standard

Unit Code	**CSC/ N 0302**
Unit Title (Task)	**Grind surface using hand and/or hand-held power tools**
Description	This unit covers competencies required for grinding surface using hand tools and/or hand-held power tools on a variety of ferrous and non-ferrous objects. This involves selecting appropriate grinding equipment, tools and methods to suit work requirements; It also includes preparing the tools, applying grinding procedures with these tools for carrying out the grinding operations. The candidate will be expected to perform as per instructions given, work under supervision and take some responsibility for own actions and for the quality and accuracy of the work produced.
Scope	This unit/task covers the following: • Working safely • Prepare for grinding operations • Perform grinding operations Different kinds of manually operated grinders are: • angle grinders • bench grinders • straight grinder • rotary die grinders • disc grinder • electronic grinder/ • electric or pneumatic/hydraulic grinders • pedestal grinders • cylindrical grinders

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 and ensure process compliance PC2. adhere to procedures or systems in place for risk assessment, occupational standards, personal protective equipment (PPE) and other relevant occupational safety regulations PC3. work following laid down procedures and instructions PC4. ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition and are kept at secured location PC5. ensure work area is clean and safe from hazards before and after the job is completed

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Prepare for grinding operations	PC6. obtain job specification from a valid and approved source **Valid sources**: instructions from supervisor PC7. ensure that all measuring equipment are within calibration date and are approved for usage PC8. read and establish job requirements from the job specification document accurately **Job requirements**: raw materials or components required (type, quality, quantity); dimensions and surface texture requirements; limits and tolerances; operations required (list, sequence & procedures where applicable); timelines PC9. report and rectify incorrect and inconsistent information in job specification documents as per organization procedures PC10. prepare the work area for the grinding operations as per procedure PC11. obtain correct work-pieces/raw materials and consumables as per job requirements PC12. identify the metals, metal alloys and non-metals accurately PC13. interpret surface finish specifications accurately PC14. select grinding method/technique as per the work requirements PC15. obtain appropriate tools and equipment per job requirements
Perform grinding operations	The user / individual on the job should be able to: PC16. set work pieces as per job requirements using appropriate positioning and/or holding devices PC17. measure and mark equipment, objects, or parts to ensure grinding standards are met PC18. trim or scrape objects or parts, using chisels, scrapers, and other hand or power tools and equipment **Power tools**: electric, pneumatic, liquid fuel, hydraulic PC19. select stones, wheels, files or other abrasives, according to materials, sizes and shapes of work-pieces, amount of stock to be removed, finishes specified, and steps in finishing and grinding processes **Kinds of wheel**: cut-off discs (diamond blade), abrasive grinding discs, grinding stones, wire brush wheels PC20. move controls to adjust, start, or stop equipment during grinding process PC21. load and adjust work-pieces onto equipment or work tables PC22. carry out the grinding process using and/or tools or hand-held power tools in accordance with standard operating procedures PC23. finish job surface to specification according to requirement PC24. perform wheel dressing using diamond cutter PC25. check the surface finish of the object on which grinding is done to ensure completeness of work PC26. identify common surface imperfections and correct errors PC27. ensure that the work-piece achieves the required characteristics and meets the finishing specification **Finishing parameters**: texture, roughness

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	PC28. secure tools and equipment in a safe condition on completion of the processing activities PC29. determine the kind of tools and equipment needed to do a job or repair the tools PC30. perform routine maintenance on equipment and determining when and what kind of maintenance is needed PC31. complete documentation post completion of work, as per procedure **Documentation during and post operations**: job card, progress records, incident reports PC32. refer unresolved job related problems to appropriate personnel for support PC33. monitor the problem and keep the supervisor informed about progress or any delays in resolving the problem
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. relevant 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. own job role and responsibilities and sources for information pertaining to employment terms, entitlements, job role and responsibilities KA4. reporting structure, inter-dependent functions, lines and procedures in the work area KA5. how to engage with specialists for support in order to resolve incidents and service requests KA6. importance of working in clean and safe environment practices and procedures KA7. relevant people and their responsibilities within the work area KA8. escalation matrix and procedures for reporting work and employment related issues KA9. documentation and related procedures applicable in the context of employment and work
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. kinds of common ferrous and non-ferrous metals **Metals**: ferrous metals: e.g. carbon steels, stainless steels, cast iron, tool steel, hard metals, etc.; non-ferrous metals: e.g. bronze, bronze alloys, copper and copper alloys, etc. KB2. hand tool (powered and unpowered) grinding methods & techniques and terminology used in grinding procedures; which tools to use and when KB3. hand and held-held power tools and equipment to be used in grinding for different types of material **Power tools**: electric, pneumatic, liquid fuel, hydraulic KB4. application of hand and powered tools and how to ensure that powered tools are set up, used and closed down safely KB5. procedures, tools and techniques required to set operational performance parameters KB6. reasons for selecting a specific tool, method or technique for grinding operations

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	KB7. correct procedures of tools and equipment usage for the grinding operations KB8. effect of different types and grades of grinding achievable by various tools to achieve required surface finish KB9. importance of following specified grinding sequence and procedures KB10. types and sources of appropriate job specifications **Valid sources**: instructions from supervisor KB11. suitability of work-pieces/materials and consumables for the specified job, its importance and procedures KB12. securing the work-piece/raw material correctly using appropriate tools and mechanisms KB13. various types of substrate that may require preparing and the types of tools and preparation methods that may be used on them KB14. why different types of substrate require different preparation techniques to be used and the damage that may result from using inappropriate tools and techniques KB15. how to identify grinding process faults, methods and techniques to check for common surface imperfections/defects and conformance to specifications KB16. surface imperfections/defects that can be removed/repaired KB17. procedures for handling components with surface imperfections/defects that cannot be removed/repaired and how can they be minimized KB18. importance of tools and equipment being kept in a safe and usable condition KB19. hazards associated with carrying out the grinding process KB20. personal protective equipment (PPE) and clothing that must be worn during the grinding activity and from where can it be obtained KB21. importance of the maintenance of a register of power tools, and the need to check tools against certification KB22. importance of completing the production documentation throughout the grinding process **Documentation during and post operations**: job card, progress records, incident reports
Skills (S) [Optional]	
A. Core Skills/ Generic Skills	**Communication** 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 numerical operations, and calculations/ formulae **Numerical computations**: addition, subtraction, multiplication, division,

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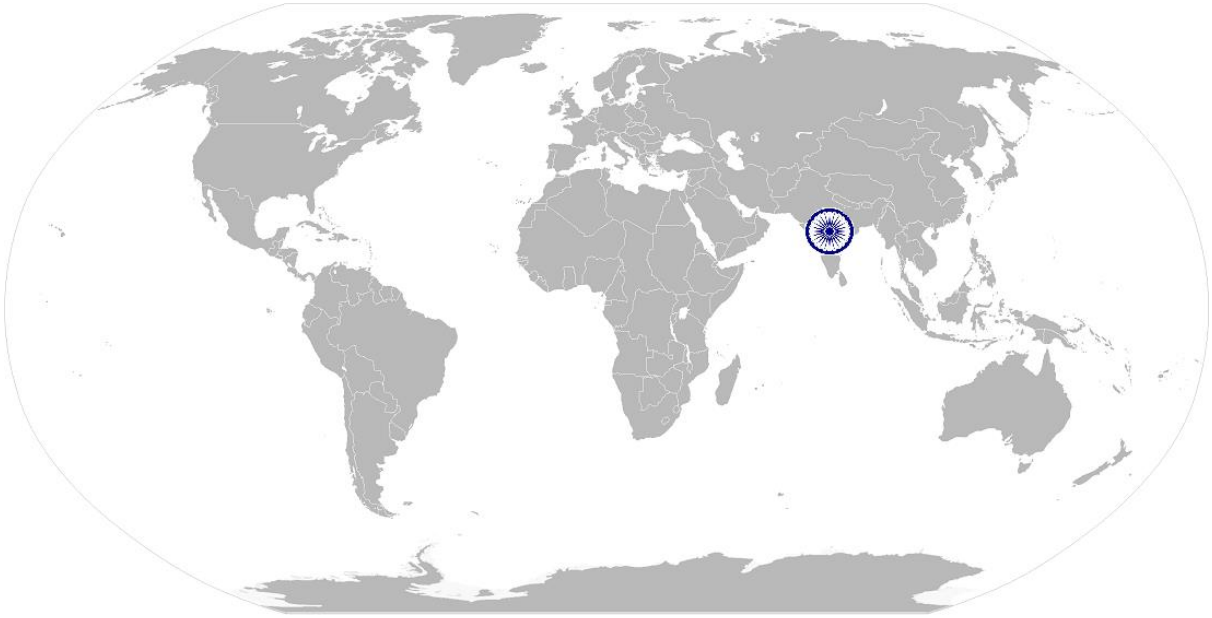
	fractions and decimals, percentages and proportions, simple ratios and averages SA8. identify and draw various basic, compound and solid shapes as per dimensions given **Basic shapes**: square, rectangle, triangle, circle **Compound shapes**: involving squares, rectangles, triangles, circles, semi-circles, 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
	Learning
	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
B. Professional Skills	**Problem Solving**
	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
	Initiative and Enterprise
	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

CSC/ N 0302: Grind surface using hand and /or hand-held power tools

	SB15. one's competencies in new and different situations and contexts to achieve more
	Self-Management
	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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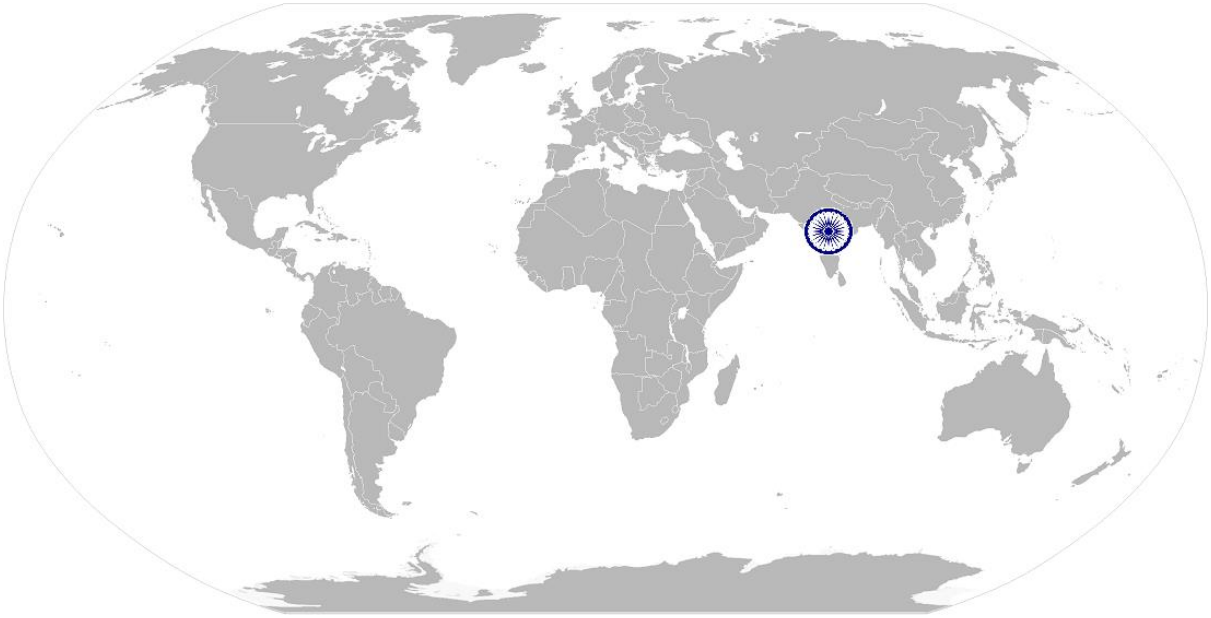
NOS Version Control

NOS Code	**CSC/ N 0302**		
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	**Fitting and Assembly**	**Next review date**	**30/08/16**

CSC/ N 0108: **Operate conventional milling machines**

National Occupational Standard



Overview

This unit covers producing a range of components or performing machining by carrying out milling operations on a milling machine.

CSC/ N 0108: Operate conventional milling machines

National Occupational Standard

Unit Code	CSC/ N 0108
Unit Title (Task)	**Operate Conventional milling machine**
Description	This unit covers performing milling operations on a milling machine, to produce a range of components that combine a number of different features (eg. flat faces, parallel faces, faces that are flat and square to each other, angular faces, steps, slots and special forms). The candidate will be expected to work as per instructions given, taking personal responsibility for own actions and for the quality and accuracy of the work that they produce.
Scope	This unit/task covers the following: • Working safely • Preparing for operating conventional milling machine • Carrying out operations on conventional milling 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 machining operations **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. work following laid down procedures and instructions PC4. ensure work area is clean and safe from hazards PC5. ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition
Preparing for operating conventional milling machine	The user/individual on the job should be able to: PC6. check that all measuring equipment is within calibration date PC7. ensure that the components used are free from foreign objects, dirt or other contamination PC8. ensure availability of job specification from a valid source **Job specifications:** detailed component drawings; approved sketches/illustrations; national, international and organizational standards **Valid sources**: job instruction sheet/job card; work drawings and instructions; planning documentation; quality control documents; operation sheets; process specifications; instructions from supervisor PC9. read and establish job requirements from the job specification document **Job specifications documents:** detailed component drawings; approved sketches/illustrations; national, international and organizational standards PC10. prepare and maintain the work area as per procedure or operation specification

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	PC11. confirm with the machine setter that the machine is ready for production **Checks:** using the appropriate documentation; procedures or systems in place for risk assessment; personal protective equipment is put on; confirm with the machine setter that the machine is ready for production; seek any necessary instruction/training on operation of the machine; check that machine guards are in place and are correctly adjusted PC12. seek any necessary instruction/training on the operation of the various milling machines, where appropriate **Milling machines**: horizontal milling machine, vertical milling machine PC13. ensure that machine guards are in place and are correctly adjusted PC14. identify different types of cutters used in horizontal and vertical milling machines PC15. identify different parts of the vertical and horizontal milling machine PC16. hold components securely, without distortion PC17. ensure that machine settings are adjusted as and when required to maintain the required accuracy and quality standards **Quality standards**: components to be free from false tool cuts, burrs and sharp edges; dimensional tolerance 0.020 to 0.030 mm; flatness and squareness within 0.125mm; surface finish 1.6µm; angles within +/- 1 degree
Carrying out operations on conventional milling machine	The user/individual on the job should be able to: PC18. obtain the component drawings, specifications and/or job instructions required for the components to be machined PC19. use and extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate ISO standards in relation to work undertaken) PC20. operate the machine controls in both hand and power modes PC21. stop the machine in both normal and emergency situations, and use correct procedure for restarting after an emergency PC22. use imperial and metric systems of measurement PC23. perform various milling operations to produce various features on metal and non-metal components **Milling operations**: e.g. milling of flat services; gang and straddle milling; milling of sunk and recessed surfaces, face milling, side milling, angular milling, slotting, slitting, key way cutting, face slot cutting, woodruff cutting, dovetail cutting, etc. **Features:** faces (flat, square, parallel, angular); steps/shoulders, slots (enclosed, open ended, tee slots), recesses, holes (drilled, bored), profile forms (such as vee, concave, convex, gear forms), serrations, forms (indexed, rotated, special) **Metal and non-metals:** Different materials: steel/stainless steel, aluminum/aluminum alloys, copper/copper alloys, cast iron, plastic PC24. produce components as per given quality standards **Components quality standards as per the process**: e.g. components to be free from false tool cuts, burrs and sharp edges; dimensional tolerance 0.020 to 0.030 mm; flatness and squareness within 0.125mm; surface finish 1.6µm; angles within +/- 1 degree, etc.

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	PC25. achieve given production targets PC26. overcome the effects of backlash in machine slides and screws PC27. apply roughing and finishing cuts considering the effect on tool life, surface finish and dimensional accuracy PC28. apply cutting fluids with regard to a range of different materials PC29. clamp the work piece securely and without distortion in a chuck/work holding device such as vice, V-block, clamp, angle plate, etc. PC30. ensure that the quality control procedures are used on the equipment PC31. use range of equipment to check critical parameters **Range of checking equipment:** e.g. tri-square, bevel protractor, vernier caliper, micrometers (internal, external, depth), height gauge, go-no-go gauges, spring caliper, etc **Critical parameters**: dimensions, squareness, hole size/fit, angles, flatness; surface finish; slots; recesses
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

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B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. where personal protective equipment to be worn can be obtained KB2. hazards associated with the milling operations and how they can be minimized KB3. importance of keeping the work area clean and tidy KB4. where to obtain the component drawings, specifications and/or job instructions required for them components to be machined KB5. how to read and interpret first and third angle component drawings KB6. how to extract information from engineering drawings or data and related specifications KB7. how to use imperial and metric systems of measurement KB8. main parts of conventional milling machines and the accessories that can be used **Milling machines**: horizontal milling machine, vertical milling machine **Accessories**: e.g. saddle, compound slide, tailstock, profile attachments, fixed and live stays, etc KB9. purpose and applications of milling KB10. different types of milling cutters and their uses KB11. various milling operations that can be performed, and the features produced on metal and non-metal components **Milling operations**: e.g. milling of flat services; gang and straddle milling; milling of sunk and recessed surfaces, face milling, side milling, angular milling, slotting, slitting, key way cutting, face slot cutting, woodruff cutting, dovetail cutting, etc. **Features**: faces (flat, square, parallel, angular); steps/shoulders, slots (enclosed, open ended, tee slots), recesses, holes (drilled, bored), profile forms (such as vee, concave, convex, gear forms), serrations, forms (indexed, rotated, special) KB12. processes of milling e.g. up milling, down milling, face milling, end milling, etc. KB13. effects of backlash in machine slides and screws, and how this can be overcome KB14. effects of clamping the workpiece in a chuck/workholding device, and how this can cause distortion in the finished components KB15. production cost, machine hour rate, raw material cost, tool cost, coolant cost, overheads, cycle time, idle time, cost of machine idling, part rejection cost KB16. selection of cutting tools, tool materials, chip breaker geometry, selecting cutting parameters from tool catalogues, selecting coolant KB17. relationship between metal cutting results, tool nose radius, speed and feed rate KB18. how to recognize machining faults and how to identify when tools need re-sharpening KB19. problems that can occur with the milling activities, and how these can be overcome KB20. extent of their own authority and to whom they should report if they have problems that they cannot resolve KB21. safe working practices and environmental regulations that must be observed KB22. importance of reporting problems in a timely manner

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Skills (S) [Optional]	
A. Core Skills/ Generic Skills	**Communication**
	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 SA1. liaise with appropriate authorities using correct protocol SA5. 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: SA6. undertake numerical operations, and calculations/ formulae **Numerical computations**: addition, subtraction, multiplication, division, fractions and decimals, percentages and proportions, simple ratios and averages SA7. identify and draw 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 SA8. use appropriate measuring techniques and units of measurement SA9. 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 SA10. use metric systems of measurement
	Learning
	The user/individual on the job needs to know and understand how to: SA11. participate in on-the-job and other learning, training and development interventions and assessments SA12. clarify task related information with appropriate personnel or technical adviser SA13. seek to improve and modify own work practices SA14. maintain current knowledge of application standards, legislation, codes of practice and product/process developments
B. Professional Skills	**Problem Solving**
	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

CSC/ N 0108: Operate conventional milling machines

	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
	Initiative and Enterprise
	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
	Self-Management
	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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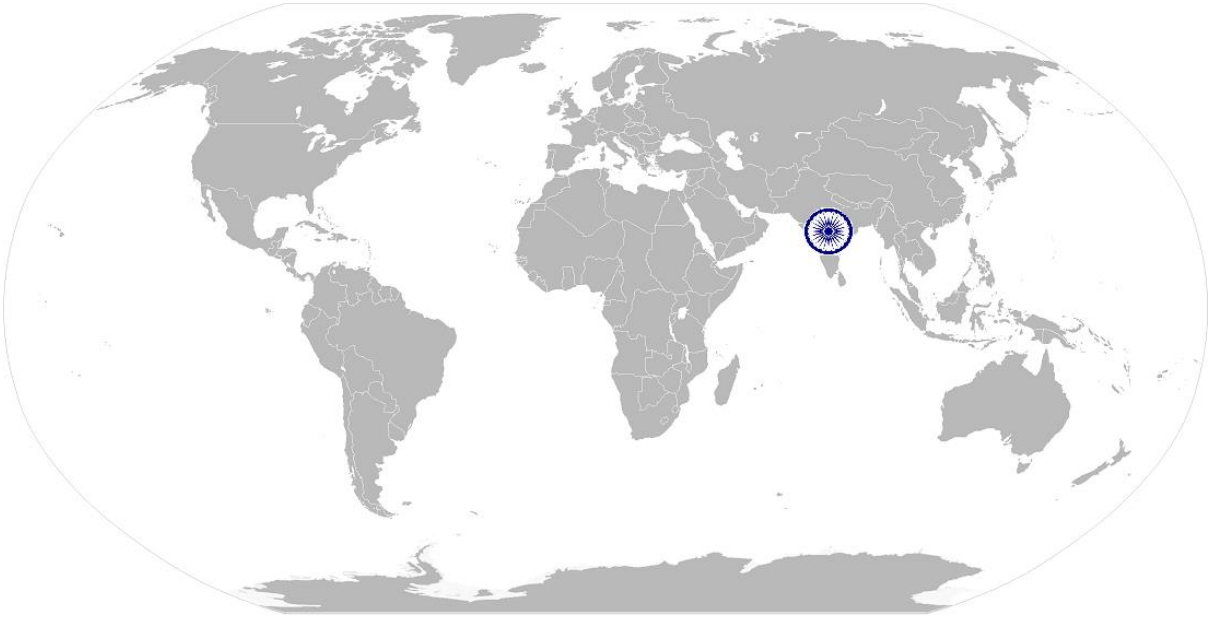
NOS Version Control

NOS Code	**CSC/ N 0108**		
Credits NSQF	**TBD**	**Version number**	**1.0**
Industry	**Capital Goods**	**Drafted on**	**10/4/14**
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	**DD/MM/YYYY**	**Next review date**	**30/8/16**

CSC/ N 0110: **Operate conventional turning machines**

National Occupational Standard



Overview

This unit covers producing a range of metal and plastic components that combine different features by carrying out turning operations on turning machines such as centre lathes.

CSC/ N 0110: Operate conventional turning machines

National Occupational Standard

Unit Code	**CSC/ N 0110**
Unit Title (Task)	**Operate conventional turning machines**
Description	This unit is covers performing turning operations on machines such as centre lathes to produce a range of metal and plastic components that combine a number of different features (eg. parallel, stepped and tapered diameters, drilled, bored and reamed holes, internal and external threads, and special forms/profiles). The candidate will be expected to work as per instructions given, taking personal responsibility for own actions and for the quality and accuracy of the work that they produce. The candidate will understand the safety precautions required when working with the machine, its associated tools and equipment. The candidate will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.
Scope	This unit/task covers the following: • Working safely • Preparing for operating conventional turning machine • Carrying out operations on conventional turning 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 turning operations **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. ensure work area is clean and safe from hazards PC4. ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition PC5. ensure that machine guards are in place and are correctly adjusted PC6. read and understand safety instructions, warning signs on the machine
Preparing for operating conventional turning machine	The user/individual on the job should be able to: PC7. check that all measuring equipment is within calibration date PC8. ensure availability of job specification from a valid source **Job specifications:** detailed component drawings; approved sketches/illustrations; national, international and organizational standards **Valid sources**: job instruction sheet/job card; work drawings and instructions; planning documentation; quality control documents; operation sheets; process specifications; instructions from supervisor PC9. read and establish job requirements from the job specification document **Job specifications documents:** detailed component drawings; approved

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	sketches/illustrations; national, international and organizational standards PC10. ensure that the incoming components used are free from foreign objects, dirt or other contamination PC11. prepare and maintain the work area as per procedure or operation specification PC12. plan to carry out the required turning activities and the sequence of operations as per specifications PC13. apply safe working practices and procedures at all times PC14. obtain all the appropriate materials, tools and equipment required for the turning operation PC15. confirm with the machine setter that the machine is ready for production PC16. prepare for the turning activities by mounting, positioning and correctly setting a range of workholding devices and cutting tools **Workholding devices:** chucks (three-jaw chucks with hard & soft jaws, four-jaw chucks, collet chucks), drive plate and centres, fixtures, faceplates, magnetic or pneumatic devices, fixed steadies or travelling steadies, special purpose workholding devices (eg. wax chucks), tailstock, center and carrier **Cutting tools**: turning, facing, boring, knurling, parting off, forming, recessing/grooving, chamfering, centre drills, twist/core drills, reamers, thread tools and dies PC17. seek any necessary instruction/training on the operation of the machine, where required PC18. hold components securely, without distortion PC19. ensure that machine settings are adjusted as and when required to maintain the required accuracy
Carrying out operations on conventional turning machine	The user/individual on the job should be able to: PC20. obtain the component drawings, specifications and/or job instructions required for the components to be machined PC21. use and extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate IS or ISO standards in relation to work undertaken) PC22. set and adjust the machine tool speeds and feeds to achieve the component specification PC23. mount and set the required workholding devices, workpiece and cutting tools PC24. operate the machine tool controls safely and correctly, in line with operational procedures PC25. control the machine in both hand and power modes for normal operations PC26. stop the machine in both normal and emergency situations correctly, and follow right procedure for restarting after an emergency PC27. use lathes and the accessories that consists of saddle, capstan/turret head, compound slide, tailstock, taper turning attachments, profile attachments, fixed and travelling steadies PC28. position and secure workholding devices to the machine spindle PC29. perform turning operations using various equipments to produce components with various features **Equipment**: solid high-speed tooling, brazed tip tooling, interchangeable tipped tooling, indexable insert tooling

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	Component features: flat faces, diameters (parallel, stepped, tapered, eccentric), holes (drilled, reamed, bored), chamfers, grooves/undercuts, profile forms, threads (internal, external), parting off, knurls or special finishes PC30. produce components as per given quality standards **Components quality standards as per the process**: e.g. components to be free from false tool cuts, burrs and sharp edges, general dimensional tolerance +/- 0.05mm, there must be one or more specific dimensional tolerances within +/- 0.1mm, surface finish 1.6µm, reamed holes within H7, screw threads medium fit (to suit mating part / gauge), angles within +/- 0.5 degree, etc. PC31. plan and work to achieve given production targets PC32. overcome the effects of backlash in machine slides and screws PC33. perform the technique of trial cut for checking dimensional accuracy PC34. apply roughing and finishing cuts, considering the effect on tool life, surface finish and dimensional accuracy PC35. use cutting fluids for different materials **Different materials**: steel/stainless steel, aluminum/aluminum alloys, copper/copper alloys, cast iron, plastic PC36. use range of equipment to check critical parameters **Range of checking equipment:** e.g. external micrometers, vernier/digital/dial calipers, dial test indicators (DTI), surface finish equipment (eg. comparison plates), steel rules, micrometers (internal, depth), depth verniers, gauges (slip, bore/hole), thread gauges (eg. ring, plug, profile), gauges (plug, ring, radius/profile), protractors, etc **Critical parameters**: diameters (external, internal, eccentricity), parallelism, bore/hole size/fit, angle/taper, surface finish, linear dimensions (eg. lengths, depths), grooves/undercuts (eg. position, width, depth), concentricity, ovality, thread fit, straightness, squareness PC37. clamp the work piece in a chuck/work holding device PC38. perform the checks to be carried out on the components before removing them from the machine, and the equipment needed for this activity PC39. ensure that the quality control procedures are used while operating the equipment
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

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	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. where personal protective equipment to be worn can be obtained KB2. where to obtain the component drawings, specifications and/or job instructions required for them components to be machined KB3. hazards associated with the turning operations and how they can be minimized KB4. meaning and purpose of turning KB5. safety mechanisms on the machine, and the procedure for checking that they function correctly KB6. how to tighten all the bolts, cam locks or other securing devices securely KB7. importance of keeping the work area clean and tidy KB8. how to use metric systems of measurement KB9. main features of the lathes and the accessories that can be used **Accessories:** e.g. saddle, compound slide, tailstock, taper turning attachments, profile attachments, fixed and travelling stays, etc. KB10. classification and purpose of various accessories KB11. tool materials (classification, properties and use) KB12. how to identify the factors that affect the selection of cutting feeds and speeds, and the depth of cut that can be taken KB13. the Turning operations that can be performed using various equipment, and component features produced on metal and non-metal components **Equipment**: solid high-speed tooling, brazed tip tooling, interchangeable tipped tooling, indexable insert tooling **Component features**: flat faces, diameters (parallel, stepped, tapered, eccentric), holes (drilled, reamed, bored), chamfers, grooves/undercuts, profile forms, threads (internal, external), parting off, knurls or special finishes KB14. effects of backlash in machine slides and screws, and how this can be overcome KB15. safety instructions and warning signs on the machine KB16. types of cutting fluids and their properties KB17. effects of clamping the workpiece in a chuck/workholding device, and how this can cause distortion in the finished components KB18. problems that can occur with the turning activities, and how these can be overcome KB19. correct equipment and procedure to use for checking critical quality parameters **Range of checking equipment:** e.g external micrometers, vernier/digital/dial calipers, dial test indicators (DTI), surface finish equipment (eg. comparison plates), steel rules, micrometers (internal, depth), depth verniers, gauges (slip, bore/hole), thread gauges (eg. ring, plug, profile), gauges (plug, ring,

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	radius/profile), protractors, etc **Critical parameters**: diameters (external, internal, eccentricity), parallelism, bore/hole size/fit, angle/taper, surface finish, linear dimensions (eg. lengths, depths), grooves/undercuts (eg. position, width, depth), concentricity, ovality, thread fit, straightness, squareness KB20. production cost, machine hour rate, raw material cost, tool cost, coolant cost, overheads, cycle time, idle time, cost of machine idling, part rejection cost KB21. selection of cutting tools, tool materials, chip breaker geometry, selecting cutting parameters from tool catalogues, selecting coolant. KB22. relationship between surface finish, tool nose radius, speed and feed rate. KB23. impact of depth of cut on chatter, surface finish. KB24. extent of their own authority and to whom they should report if they have problems that they cannot resolve
Skills (S) [Optional]	
A. Core Skills/ Generic Skills	**Communication**
	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 numerical operations, and calculations/ formulae **Numerical computations**: addition, subtraction, multiplication, division, fractions and decimals, percentages and proportions, simple ratios and averages SA8. identify and draw 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
	Learning
	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

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	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
B. Professional Skills	**Problem Solving**
	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
	Initiative and Enterprise
	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
	Self-Management
	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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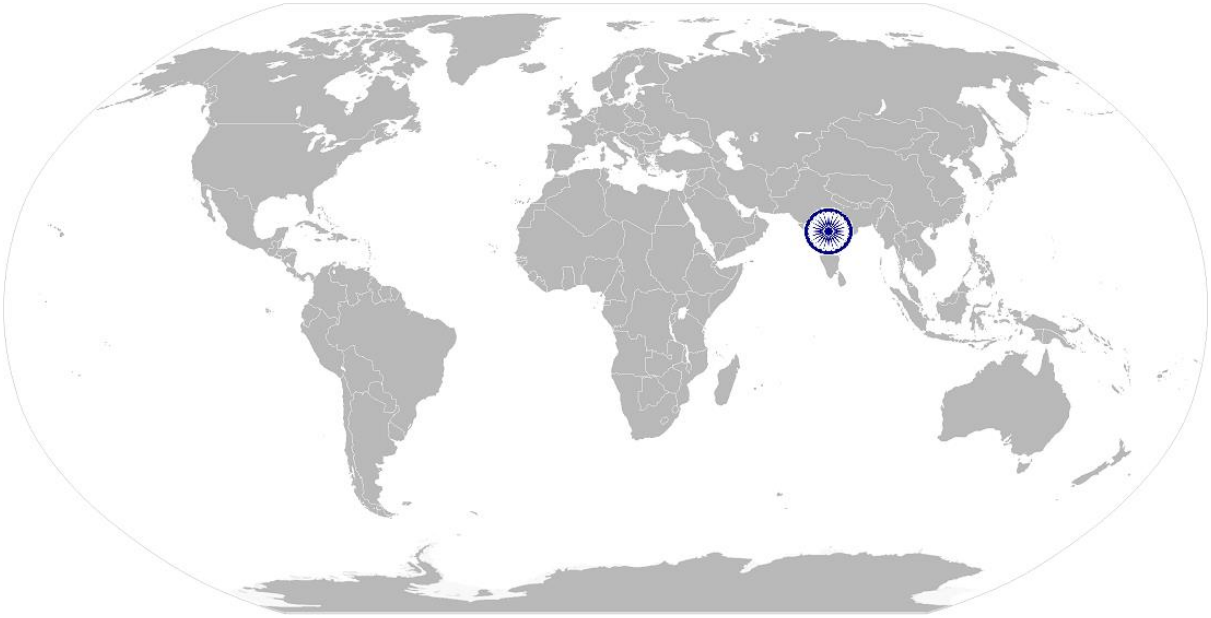
NOS Version Control

NOS Code	CSC/ N 0110		
Credits NSQF	TBD	Version number	1.0
Industry	Capital Markets	Drafted on	10/4/14
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	Fitting and Assembly	Next review date	30/8/16

CSC/ N 0109: **Operate grinding machines**

National Occupational Standard



Overview

This unit covers grinding of various components required in the manufacturing sector using conventional grinding machines.

CSC/ N 0109: Operate grinding machines

National Occupational Standard

Unit Code	**CSC/ N 0109**
Unit Title (Task)	**Operate grinding machines**
Description	This unit covers grinding of various components required in the manufacturing sector using conventional grinding machines. This will involve carrying out the grinding operations, in accordance with approved procedures, using different grinding machines (eg. horizontal or vertical surface, cylindrical or universal grinding machines). The candidate will be expected to work as per instructions given, taking personal responsibility for own actions and for the quality and accuracy of the work that they produce.
Scope	This unit/task covers the following: • Working safely • Operating Grinding Machine • Handling of unresolved problems • Processing Compliances

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 fabrication and fitting operations **Personal protective equipment**: e.g. correctly fitting overalls and safety glasses; long hair is tied back or netted; covered shoes; removing any jewelry or other items that can become entangled in the machinery, etc. PC3. work following laid down procedures and instructions PC4. ensure work area is clean and safe from hazards **Hazards**: revolving/moving parts of machinery; sparks/airborne particles; bursting grinding wheels; insecure components; burrs and sharp edges on components, etc. PC5. ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition **Safe conditions**: correctly isolated; cleaning the machine; removing and disposing of waste correctly
Operating Grinding Machine	The user/individual on the job should be able to: PC6. check that all measuring equipment are within calibration date **Measuring equipment**: external micrometers, surface finish equipment (eg. comparison plates, machines) PC7. obtain and prepare the appropriate materials, tools and equipment **Material**: low carbon/mild steel, cast iron, plastic/nylon/composite, high

	carbon steel, brass/brass alloys, aluminum/aluminum alloys, other specific material PC8. mount the work-piece safely and securely, in line with instructions PC9. set and adjust the machine tool speeds and feeds, in line with instructions PC10. use the machine tool controls safely and correctly, in line with operational procedures PC11. check that the finished components meet the standard required PC12. report any difficulties or problems that may arise with the grinding activities, and carry out any agreed actions **Problems**: defects caused by glazed wheels; inappropriate feeds/speeds; damage by work-holding devices and how these can be overcome PC13. shut down the equipment to a safe condition on completion of the grinding activities **Safe conditions**: correctly isolated; cleaning the machine; removing and disposing of waste correctly PC14. prepare grinding wheels through various methods **Methods**: dressing and `trueing up' grinding wheels; wheel forming (eg. chamfers, radii, angular forms, profiles); relieving the wheel sides PC15. Grind components to produce various features: **Features**: faces (flat, parallel, vertical, angular); steps and shoulders; bores (counter-bores, tapered, parallel); slots; faces square to each other; diameters (parallel, stepped, tapered); profile forms PC16. check the quality of output, using measuring equipment appropriate to the aspects being checked and the tolerances to be achieved. **Checks**: components to be free from false grinding cuts, wheel marks, burrs and sharp edges; general dimensional tolerance as applicable; flatness and squareness as applicable; surface texture as per requirement PC17. check the machined component for accuracy in dimensions, parallelism and surface texture as per job specifications
Handling of unresolved problems	The user/individual on the job should be able to: PC18. refer the problem to a competent internal specialist if it cannot be resolved PC19. obtain help or advice from specialist if the problem is outside his/her area of competence or experience
Processing Compliances	The user/individual on the job should be able to: PC20. comply with relevant legislation, standards, policies and procedures
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. relevant legislation, standards, policies, and procedures followed in the company KA2. legislation, standards, policies, and procedures followed in the company relevant to own employment and performance conditions KA3. relevant health and safety requirements applicable in the work place KA4. importance of working in clean and safe environment KA5. own job role and responsibilities and sources for information pertaining to employment terms, entitlements, job role and responsibilities KA6. reporting structure, inter-dependent functions, lines and procedures in the work area

CSC/ N 0109: Operate grinding machines

	KA7. relevant people and their responsibilities within the work area KA8. escalation matrix and procedures for reporting work and employment related issues KA9. documentation and related procedures applicable in the context of employment and work KA10. 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. safety mechanisms on the machine, and the procedure for checking that they function correctly KB2. correct operation of the machine controls in both hand and power modes; how to stop the machine in both normal and emergency situations, and the procedure for restarting after an emergency KB3. importance of keeping the work area clean and tidy (eg. cleaning the machine, disposal of waste, ensuring any spilt cutting fluids are correctly dealt with) KB4. how to use and extract information from engineering drawings and related specifications (to include ISO standard symbols and abbreviations, imperial and metric systems of measurement, work-piece reference points and system of tolerance) KB5. how to mount the work-piece in the work-holding devices **Workholding devices**: magnetic chuck or blocks; angle plates; chucks; fixed vice; vee block and clamps; centres; swivel or universal vice; fixtures; mandrels KB6. effects of clamping the work-piece in a chuck/work holding device, and how this can cause damage or distortion in the finished components KB7. how to check that the grinding wheels are in a safe and serviceable condition (eg. free from damage, cracks, correctly balanced) KB8. need for `trueing up' and dressing of wheels to prevent glazing and burning of the work-piece, and methods of forming the wheels to the required profile (eg. use of pantograph, diamond dressing units) KB9. effects of backlash in machine slides and screws, and how this can be overcome KB10. techniques of taking trial cuts and checking dimensional accuracy KB11. application of roughing and finishing cuts, and the effect on tool life, surface finish and dimensional accuracy KB12. types of grinding wheels, cutting feeds and speeds to be used, and the depth of cut that can be taken KB13. application of cutting fluids with regard to a range of different materials, and why some materials do not require cutting fluids to be used KB14. how to recognize grinding faults, and how to identify when grinding wheels need dressing KB15. checks to be carried out on the components before removing them from the machine (eg. have all operations been completed, dimensional checks, surface finish checks) KB16. problems that can occur with the grinding activities and how to address them **Problems**: defects caused by glazed wheels; inappropriate feeds/speeds; damage by work-holding devices and how these can be overcome

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	KB17. importance of leaving the machine in a safe condition on completion of activities **Safe conditions:** correctly isolated; cleaning the machine; removing and disposing of waste correctly KB18. safe working practices and procedures to be followed when preparing and using grinding machines **Safe working practices**: e.g. ensuring the correct isolation of the machine before mounting the work-holding devices and work-piece; fitting and adjusting machine guards and dust extraction equipment; work-piece is secure; grinding wheels are free from damage; grinding wheels are clear of the work-piece before starting the machine; etc. KB19. hazards associated with the grinding operations and how they can be minimized **Hazards**: revolving/moving parts of machinery; sparks/airborne particles; bursting grinding wheels; insecure components; burrs and sharp edges on components, etc. KB20. personal protective equipment (PPE) to be worn for the grinding activities and personal safety measures taken **Personal protective equipment**: e.g. correctly fitting overalls and safety glasses; long hair is tied back or netted; covered shoes; removing any jewelry or other items that can become entangled in the machinery, etc.
Skills (S) [Optional]	
A. Core Skills/ Generic Skills	**Communication**
	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 numerical operations, and calculations/ formulae **Numerical computations**: addition, subtraction, multiplication, division, fractions and decimals, percentages and proportions, simple ratios and averages SA8. identify and draw 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

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	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
	Learning
	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
B. Professional Skills	**Problem Solving**
	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
	Initiative and Enterprise
	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
	Self-Management
	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

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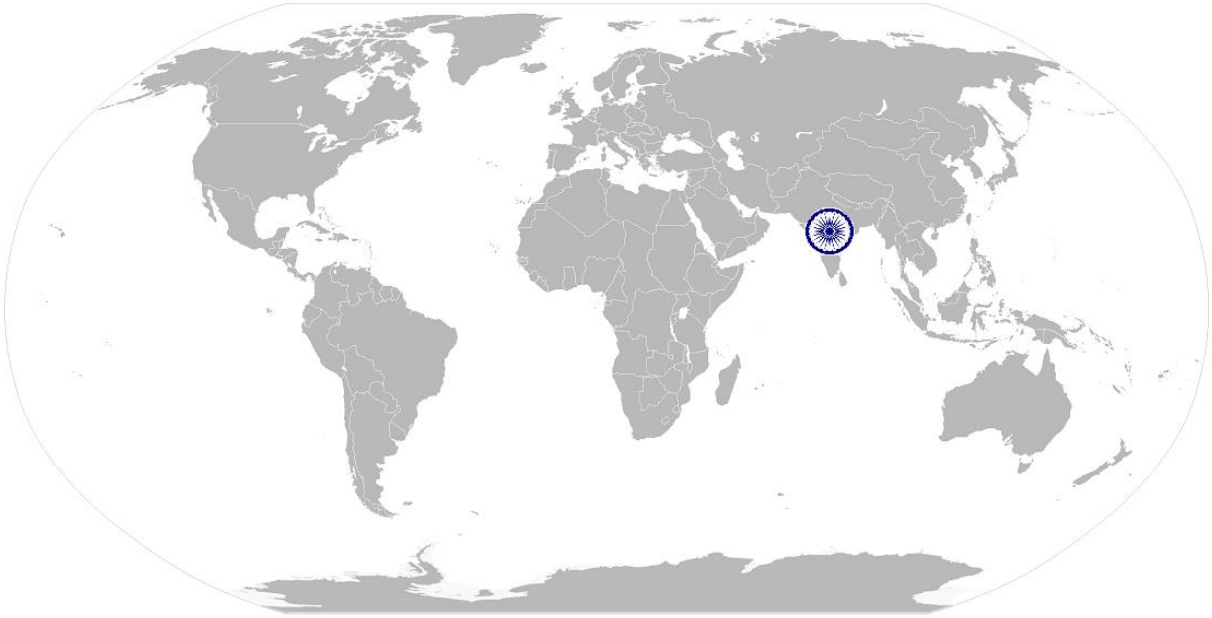
	Teamwork
	The user/individual on the job needs to know and understand how to: SB19. work in a team in order to achieve better results SB20. identify and clarify work roles within a team SB21. communicate and cooperate with others in the team for better results SB22. seek assistance from fellow team members



CSC/ N 0109: **Operate grinding machines**

NOS Version Control

NOS Code	CSC/ N 0109		
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	**Fitting and Assembly**	**Next review date**	**30/08/16**

CSC/ N 0309: Perform assembly operations on metal components to make tools and dies

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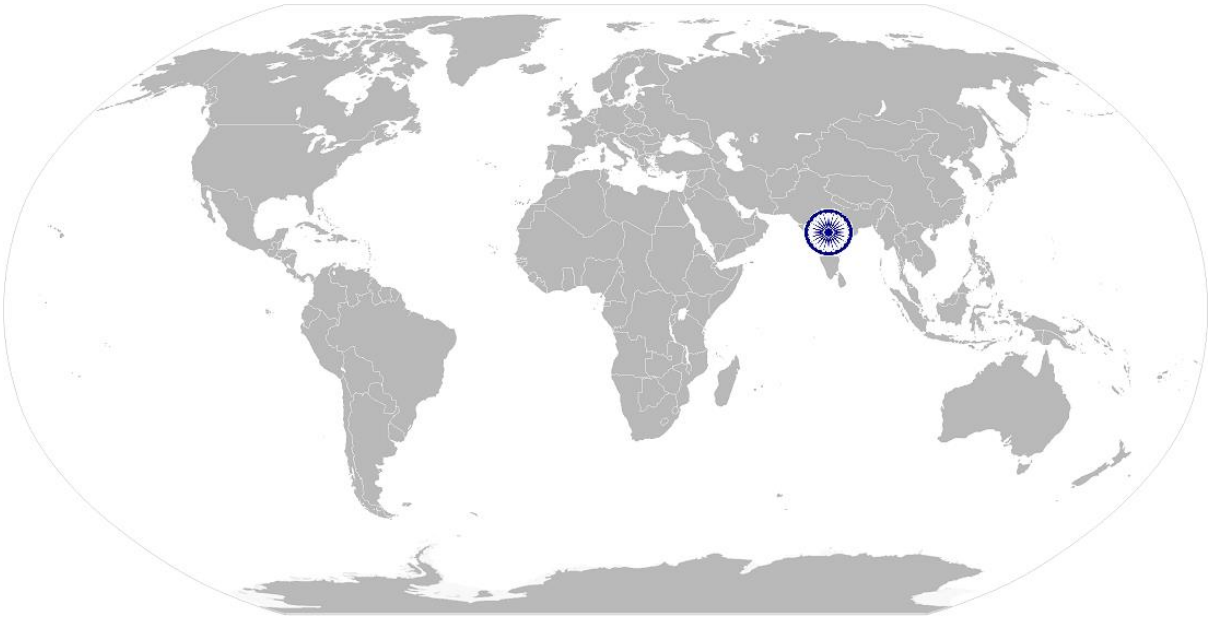
National Occupational Standard



Overview

This unit covers the assembly activities of machinery to make metal tools and dies as per given specifications.

CSC/ N 0309: Perform assembly operations on metal components to make tools and dies

National Occupational Standard

Unit Code	**CSC/ N 0309**
Unit Title (Task)	**Perform assembly operations on metal components to make tools and dies**
Description	This unit covers the fitting and assembly activities to make tools and dies of features as per given specifications. On completion of the fitting and fabrication operations on the metal components, the candidate will be expected to check the quality of the workpieces, using measuring equipment appropriate to the aspects being checked and the tolerances to be achieved; performs the final assembly, and tests the tools. On completion of the activities, the candidate will be expected to return all tools and equipment that they have used to the correct location, and to leave the work area in a safe and tidy condition. The candidate will work under minimum supervision, whilst taking responsibility for their own actions and for the quality and accuracy of the work that they carry out.
Scope	This unit/task covers the following: • Working safely • Checking dimensions of the components of tool or die • Preparing for assembling operations • Perform assembling operations • Measuring and checking component

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, including personal protective equipment and other relevant safety regulations and procedures to contribute to a safe work environment PC4. wear the appropriate protective clothing and equipment, and keep the work area clean and tidy PC5. follow safe practice/approved setting up procedures at all times
Checking dimensions of the components of tool or die	The user/individual on the job should be able to: PC6. select measuring instruments based on tolerances required and application ○ such as internal and external measurements PC7. take measurements using standard and specialized measuring instruments PC8. compare measurements to drawings and sketches to ensure conformity, fits and clearances PC9. record critical dimensions as required by workplace procedures
Preparing for assembling operations	The user/individual on the job should be able to: PC10. 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; surface texture requirements; operations required (list, sequence and procedures where applicable); shape or profiles to be fabricated; cutting, bending and rolling allowances for fabricated forms; instruments and tools to be used; interdependencies; timelines

CSC/ N 0309: Perform assembly operations on metal components to make tools and dies

	Job specification documents: detailed component drawings; approved sketches/illustrations; national, international and organisational standards; reference tables and charts; fabrication/casting drawings; operational diagrams; contractual specifications PC11. 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; process specifications; instructions from supervisor PC12. establish the procedures to complete the general machining, fitting or assembling operations PC13. obtain the appropriate tools and equipment for the general machining, fitting or assembling operation and parts used in producing assemblies **Parts**: assembly structure (framework, support, casings, panels), pre-machined components, shafts, levers/linkages, springs, fabricated components, chains, keys, belts, bearing, couplings, pulleys, gaskets, seals, sprockets, gears, pipework/hoses, bushes, cams and followers, other specific components **Heavy equipment**: rollers and skates, crowbars, pull-lifts, lubricated plates **Assembling accessories**: hooks, slings, eyebolts, shackles, chains, rings, special-to-purpose equipment, rules for the use of slings, trolleys **Machine tools**: lathes (centre, turret), milling machines (horizontal, vertical, universal), drilling machines (bench, pedestal, radial arm, multi-spindle, co-ordinate table, special purpose), grinding machines [surface (horizontal spindle, vertical spindle), cylindrical (plain, universal), internal, special purpose], electrochemical machining (ECM), laser machining, welding machine, polishing machine **Lubricants**: friction between moving parts, wear, generation of heat, force required to overcome friction; methods of reduction oils (mineral, synthetic, animal and vegetable) greases, copper compound, graphite); application (total loss, re-circulatory, splash, grease guns and nipples); reasons for oil deterioration (excessive heat, oxidation, contamination, breakdown of structure, poor storage conditions) PC14. check that all measuring equipment is within calibration date PC15. fasten or clamp production tool components temporarily as required for final assembly
Perform assembling operations	The user/individual on the job should be able to: PC16. drill, tap and ream locating holes as required to permanently locate components PC17. fasten components permanently using methods such as using engineered fasteners, applying adhesives, soldering and brazing PC18. appropriate methods and techniques to assemble and secure the components in their correct positions PC19. mechanical fastenings and joining techniques: non-permanent - nuts, bolts, studs, screws, pins, springs, keys, bearings; permanent - welded, soldered, brazed, riveted PC20. produce mechanical assemblies using various methods as per job specifications **Methods**: assembling components having interference fits (eg. by pressure, expansion or contraction); securing components using threaded fasteners (eg. nuts, bolts, machine screws, cap screws); securing components using spring clips (eg. external circlips, internal circlips, special clips); using locking and retaining devices (eg. tab washers, locking nuts, wire locks, special purpose types); securing components using rivets (eg. countersunk, roundhead, blind, special purpose types); applying sealing compounds or adhesives; electrical bonding of components; setting

CSC/ N 0309: Perform assembly operations on metal components to make tools and dies

	and adjusting components to give correct working parameters (eg. shimming and packing); torque setting of nuts and bolts PC21. use various types of methods to dismantle mechanical assemblies without damage to components and/or subassemblies **Methods**: procedure for isolation and locking off a device/system; sequence of operations used to dismantle a device/system; proof marking, correct storage procedures for removed parts; release of pressure/force; extraction PC22. 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 PC23. leave the work area in a safe and tidy condition on completion of the manufacturing activities PC24. return all tools and equipment to the correct location on completion of the fitting activities **Various fitting activities**: file flat, square and curved surfaces and achieve a smooth surface finish; select saw blades for different materials, and how to set the saw blades for different operations; produce screw threads on workpieces using hand dies; determine the drill size for tapped holes, and the importance of using the taps in the correct sequence PC25. support the customer remotely over the internet to test potential solutions
Measuring and checking component	The user/individual on the job should be able to: PC26. perform the necessary checks for dimensional parameters and functioning of the tool and die **Dimensional parameters**: linear dimensions (eg. lengths, depths); diameters (eg. external, internal); flatness; squareness; angles; profiles; hole size and position; thread size and fit; surface finish PC27. use the appropriate measuring equipment for checking activities **Measuring equipments**: external micrometers, vernier/digital/dial caliper, surface finish equipment (eg. comparison plates, machines), rules, squares, protractors, depth micrometers, depth verniers, feeler gauges, bore/hole gauges, slip gauges, radius/profile gauges, thread gauges, height gauge, hardness tester, dial test indicators (DTI), surface roughness tester, coordinate measuring machine (CMM), profile projectors PC28. produce components within all of the applying quality standards **Quality standards**: components to be free from false tool cuts, burrs and sharp edges; dimensional tolerance +/-0.020mm; flatness and squareness 0.05mm; angles within +/- 1 degree; screw threads to fit as per standard; reamed and bored holes within interference: - 0.025mm (hole) + 0.025mm (shaft), transition: - 0.1mm (hole) + 0.1 (shaft) , clearance: 50microns; radius: 0.5 r; surface finish 1.6 µm
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 KA6. work area

CSC/ N 0309: Perform assembly operations on metal components to make tools and dies

	KA7. relevant people and their responsibilities within the work area KA8. escalation matrix and procedures for reporting work and employment related issues KA9. documentation and related procedures applicable in the context of employment and work KA10. 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. hazards associated with carrying out the operations and how can they be minimized **Hazards**: use of power tools, trailing leads or hoses, damaged or badly maintained tools and equipment; using files with damaged or poor fitting handles; using machine tools; handling of oils and grease; misuses of tools; not following laid-down maintenance procedures KB2. how to extract and use information from engineering drawings and related specifications in relation to work undertaken KB3. how to interpret first and third angle drawings KB4. the British and metric systems of measurement KB5. geometric dimensioning and tolerancing -- GD&T KB6. methods of holding the workpiece assembly activities KB7. how to mount workpiece KB8. various assembly methods, techniques and procedures to be **Hand fitting methods**: cutting out the rough profile using saws (eg. hacksaw, band saw), cutting a screw thread (eg. tapping or dieing), filing (flat, square, curved), drilling holes, tapping KB9. how the components are to be aligned, adjusted and positioned prior to securing them, and the tools and equipment **Alignment**: slideways: flat, vee, dovetail, cylindrical, comparison of their capabilities, main features, accuracy of movement, means of adjustment, lubrication, protection; stick-slip: definition, recirculating ball leadscrews, hydrostatic slides; typical checks: coaxial alignment between main spindle axis, coaxial alignment between two spindles, alignment of spindle to guideway, squareness of slideways movement, concentricity and end float of spindle, squareness of planes to spindle, setting of guards, stops and automatic safety cut-outs; bearings: plain bush (radial, radial and axial) ball (radial, axial, radial and axial) roller (radial, axial, radial and axial); methods of alignment: standard tests, straight edge, precision level, autocollimator and reflector, roundness measuring machine KB10. various mechanical fastening devices that are used KB11. how to mount and secure the cutting tools in the tool holding devices **Workholding tools**: in a bench vice; machine vice; chuck; collets or clamped directly to the machine table KB12. mount and secure the cutting tools: front or rear tools posts; mounting cutters on long or stub arbors; mounting drills in chucks or by the use of morse taper sockets KB13. the need to ensure that the tool is sharp and secure KB14. types of production tools such as jigs, fixtures, dies, cutting tools and moulds KB15. specifications for standard assembly fits and clearances KB16. various features to be marked out **Features:** datum lines; cutting guidelines; square and rectangular profiles; circular and radial profiles; angles; holes linearly positioned, boxed and on pitch circles KB17. the factors that affect the selection of cutting feeds and speeds, and the depth of cut **Factors**: type of material, size of material, operations being performed, workholding

CSC/ N 0309: Perform assembly operations on metal components to make tools and dies

	method/security of workpiece, condition of machine, finish required, tolerance required KB18. types of fasteners such as screws and dowels KB19. types of adhesives such as temporary and permanent KB20. types of solder such as hard and soft KB21. types of fits such as interference and running clearance KB22. types of joints such as lap and dovetail KB23. types of dies such as cutting, forming, progressive and compound KB24. types of workholding devices such as drill jig, weld jig and assembly fixture **Workholding devices**: bench / machine vice; clamps (eg. toolmaker's); three-jaw chuck; four-jaw chuck; collet chuck; drive plate and centres; magnetic chucks(holding devices); special purpose tool holders (3R for holding electrodes) KB25. clearance-setting practices such as inserting material between working faces and using light source KB26. range of material and their properties such as composition and thickness **Range of Materials**: Ferrous metals: eg. carbon steels, stainless steels, cast iron, tool steel, hard metals; Non-ferrous metals: eg. bronze, bronze alloys, copper and copper alloys ; Non-metallic: eg. hard and soft woods, composites, plastics: thermoplastic, thermosetting **Properties**: plasticity, elasticity, ductility, malleability, toughness, hardness, tensile strength, compressive strength, shear strength, corrosion resistance, density KB27. types of compression aids such as springs, compressed gas cylinders and urethane KB28. types of non-compression devices such as punch retainers, pilots, punches and buttons KB29. pre-loads on die springs, compressed gas cylinders and urethane strippers KB30. optimal sequence of operations for assembly KB31. techniques of taking trial cuts and checking dimensional parameters; the application of roughing and finishing cuts, and the effect on tool life, surface finish and dimensional parameters **Dimensional parameters**: linear dimensions (eg. lengths, depths); diameters (eg. external, internal); flatness; squareness; angles; profiles; hole size and position; thread size and fit; surface finish KB32. how to check the workpiece and the measuring equipment that is used KB33. need to check that the measuring equipment is within current calibration dates, and that the instruments are correctly zeroed KB34. measuring internal and external dimensions KB35. measuring geometric features KB36. how to check surface finish KB37. the importance of leaving the work area and equipment in a safe and clean condition on completion of the machining and fitting activities
Skills (S) [Optional]	
A. Core Skills/	**Communication**

CSC/ N 0309: Perform assembly operations on metal components to make tools and dies

Generic Skills	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 numerical operations, and calculations/ formulae **Numerical computations**: addition, subtraction, multiplication, division, fractions and decimals, percentages and proportions, simple ratios and averages SA8. identify and draw 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
	Learning
	The user/individual on the job needs to know and understand how to: SA1. participate in on-the-job and other learning, training and development interventions and assessments SA2. clarify task related information with appropriate personnel or technical adviser SA3. seek to improve and modify own work practices SA4. maintain current knowledge of application standards, legislation, codes of practice and product/process developments
B. Professional Skills	**Problem Solving**
	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

CSC/ N 0309: Perform assembly operations on metal components to make tools and dies

	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
	Initiative and Enterprise
	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
	Self-Management
	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

CSC/ N 0309: Perform assembly operations on metal components to make tools and dies

NOS Version Control

NOS Code	**CSC/ N 0603**		
Credits(NSQF)	**TBD**	**Version number**	**1.0**
Industry	**Capital Goods**	**Drafted on**	**14/04/14**
Industry Sub-sector	1. Machine Tools 2. Tools Dies 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	**Fitting and Assembly**	**Next review date**	**30/08/16**

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

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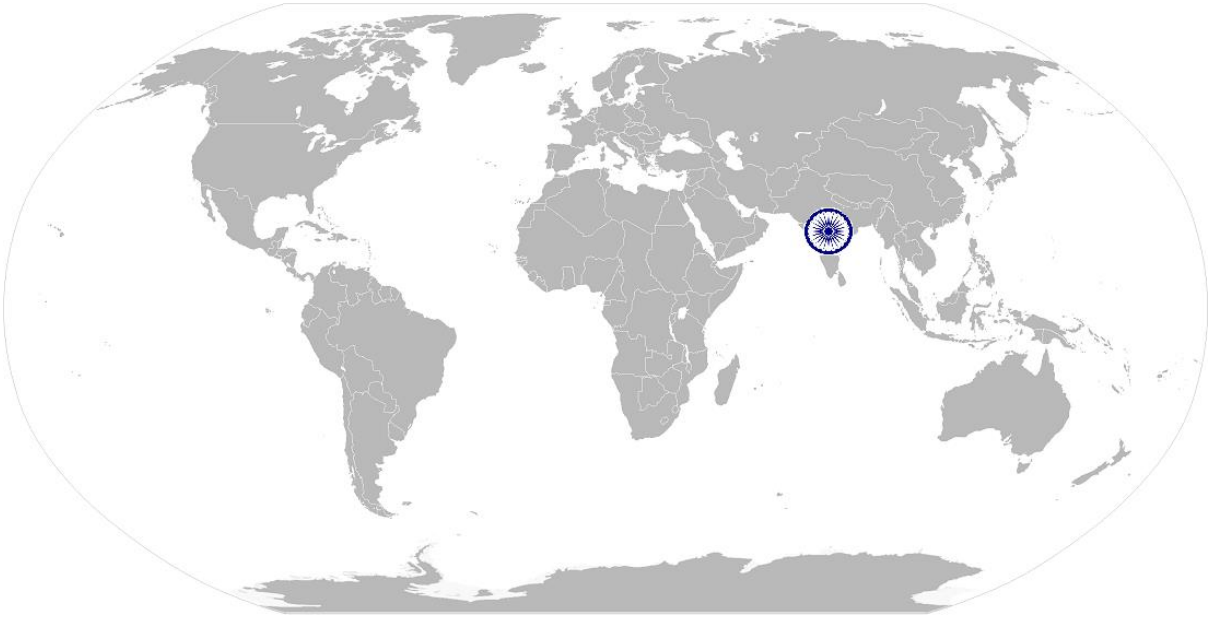
National Occupational Standard



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.)

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

	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

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

	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

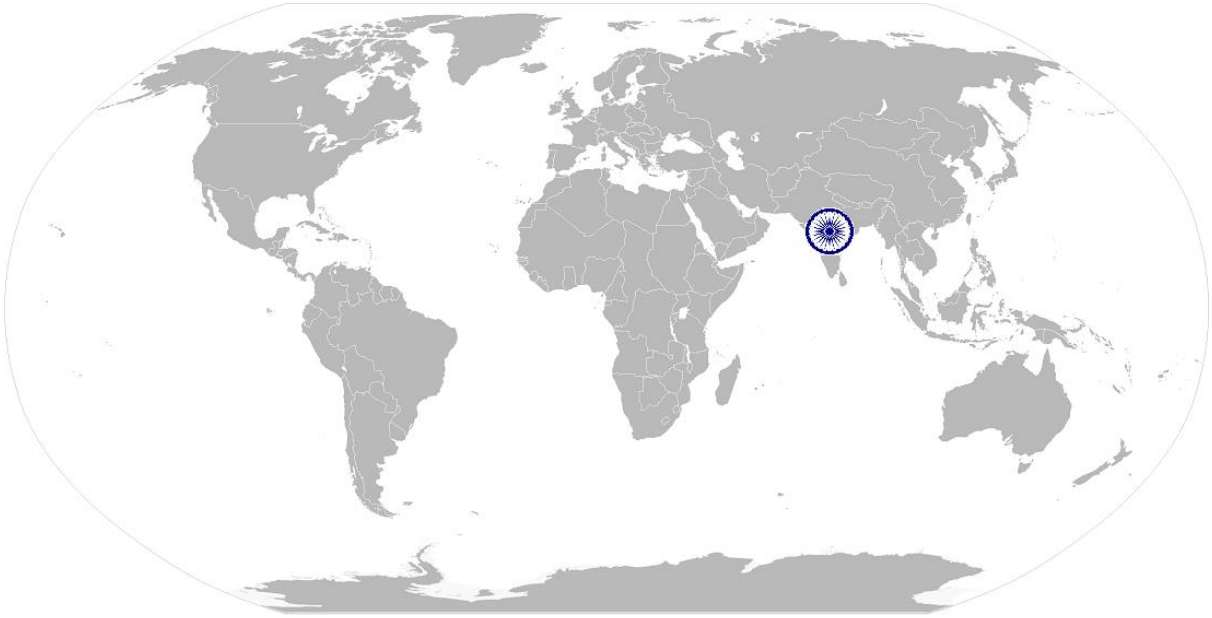
A. Organizational Context (Knowledge of the company / organization and its processes)	The user/individual on the job needs to know and understand: KA1. names (and job titles if applicable), and where to find, all the people responsible for health and safety in a workplace. KA2. names and location of 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

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

	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
	Problem Solving

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

	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



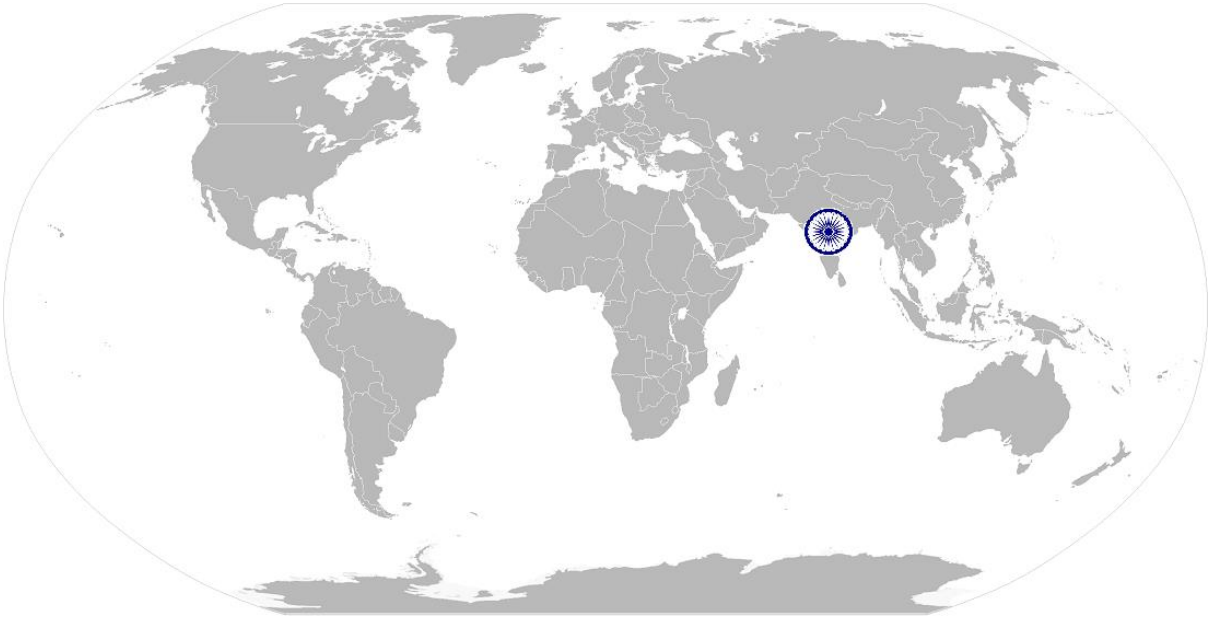
CSC/ N 1335: Use basic health and safety practices at the workplace

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	**Fitting and Assembly**	**Next review date**	**30/08/16**

CSC/ N 1336: Work effectively with others

National Occupational Standard



Overview

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

CSC/ N 1336: Work effectively with others

National Occupational Standard

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**

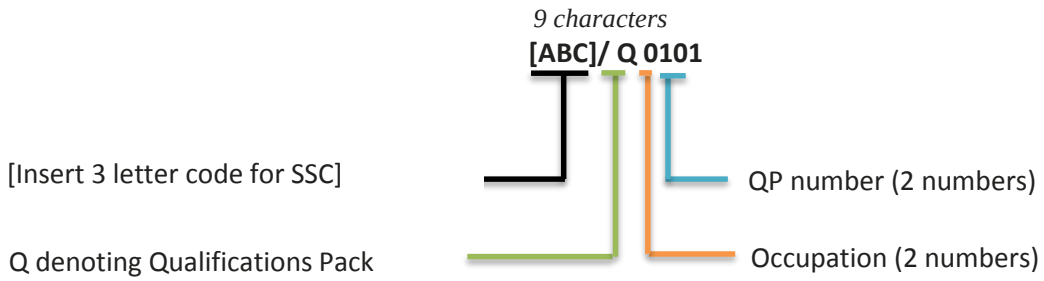
NOS Version Control

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	**DD/MM/YYY**	**Next review date**	**30/08/16**

Annexure

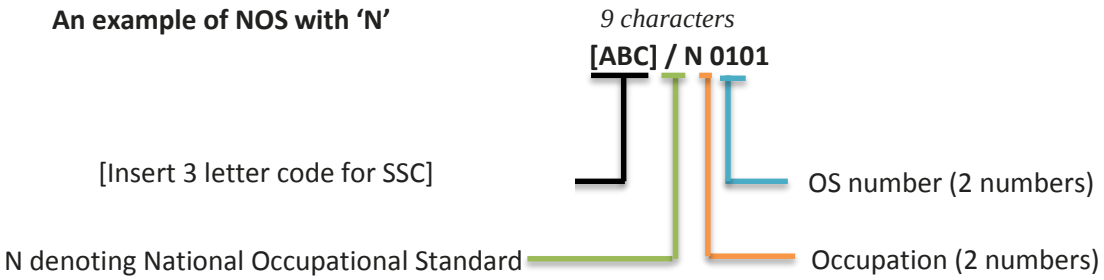
Nomenclature for QP and NOS

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
Plastic 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 : Tool and Die Maker

Qualification Pack : CSC/ Q 0306

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 (800)	Out of	Theory	Skills Practical
CSC/ N 0307 : Plan and co-ordinate the making of tools and die	PC1. adhere to procedures or systems in place for health and safety, personal protective equipment (PPE) and other relevant safety regulations	**100**	4	1	3
	PC2. ensure that all hand tools and equipment used are in a safe and useable condition		2	1	1
	PC3. ensure that all machine tools are correctly guarded at all times		2	0	2
	PC4. obtain sample parts/ blueprints/ drawings of tools/ dies and other engineering information as per company procedures		4	1	3
	PC5. understand requirement by analyzing sample parts, tool design and blueprints		5	2	3
	PC6. plan sequence of operations for tools & dies making		5	2	3
	PC7. report and rectify cases of inappropriate information in design documents as per organizational procedures		2	0	2

	PC8. compute dimensions, sizes, shapes and tolerances of sub-assemblies of the tools and dies as per specifications and as per company procedures		5	2	3
	PC9. determine information such as number of parts to make, engineered components and material to be used, and machines to be used		5	2	3
	PC10. identify the operations that will be required for tools & dies making based on design and blueprints		5	2	3
	PC11. identify the operations that will be required for tools & dies making based on design requirements		5	2	3
	PC12. identify type of equipment required for tools & dies making based on the operations selected		5	2	3
	PC13. estimate timelines for each task accurately		2	0	2
	PC14. establish milestones by determining a schedu le of operations		3	0	3
	PC15. obtain necessary approvals for the plan		3	0	3
	PC16. allocate responsibilities to machine operators as per the operations selected		3	0	3
	PC17. ensure that the machine operators are clear about the sequence of activities, priorities and considerations		3	0	3
	PC19. release drawings and machining specifications to machine operators		4	1	3
	PC20. identify and select tools for tools & dies making based on design and blueprints		5	2	3
	PC21. identify and select lifting and rigging equipment based on design and blueprints		5	2	3
	PC22. select and procure appropriate metals to be used for tools & dies making as per design requirement		5	2	3
	PC23. hand over tools, equipment and metal components to be machined to the machine operators		2	0	2
	PC24. handle all clarifications sought by the operators		4	2	2
	PC25. collect job from all operators		2	0	2
	PC26. check the jobs as per drawing/instruction		5	2	3
	PC27. Ensure in-process inspection of the tool elements and final assembly		5	2	3
		Total	**100**	**30**	**70**
CSC/ N 0308 : Perform	PC1. comply with health and safety, environmental and other relevant regulations and guidelines at work	**100**	4	1	3

fitting operations on metal components for making tools and dies using hand tools and manually operated machines	PC2. adhere to procedures and guidelines for personal protective equipment (PPE) and other relevant safety regulations while performing fitting operations		4	1	3
	PC3. work following laid down procedures and instructions		3	1	2
	PC4. ensure work area is clean and safe from hazards		2	0	2
	PC5. ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition		2	0	2
	PC6. obtain job specification from a valid and approved source		2	0	2
	PC7. read and establish job requirements from the job specification document accurately		2	0	2
	PC8. report and rectify incorrect and inconsistent information in job specification documents as per organization procedures		2	0	2
	PC9. prepare the work area for the fitting operations as per procedure or operational specification		3	1	2
	PC10. ensure that all measuring equipment is calibrated and approved for usage		2	0	2
	PC11. ensure that the components used are free from foreign objects, dirt or other contamination		2	0	2
	PC12. obtain correct workpieces/raw materials and consumables as per job requirements		3	1	2
	PC13. obtain appropriate tools and equipment as per job requirements		3	1	2
	PC14. set work pieces as per job requirements using appropriate positioning and/or holding devices and support mechanisms		4	1	3
	PC15. mark out specified features on the workpieces as per job specification using appropriate measuring and marking out tools and equipment		4	1	3
	PC16. mark out templates for tracing/transferring the specified features on the workpieces as per job specification		4	1	3
	PC17. trace/transfer the specified features from the templates onto the workpieces as per job specification		4	1	3

	PC18. perform fitting operations on various forms of metal components using a range of hand tools and manually operated machines		5	2	3
	PC19. follow the specified fitting sequence and procedure as per job specifications		4	1	3
	PC20. interpret in-built fault indicators and error codes of equipment and respond to the same as per operating manual/organizational guidelines		5	2	3
	PC21. check the fitted products to ensure completeness of work		5	2	3
	PC22. check the quality of the output as per required standards, using visual checks and measurement of dimensional parameters		5	2	3
	PC23. produce components as per standards applicable to the process		5	2	3
	PC24. work to achieve production targets		3	0	3
	PC25. report conditions and seek appropriate assistance in a timely manner to address risk of failure to comply with necessary targets and specifications		4	1	3
	PC26. deal with finished components as per organizational guidelines		4	1	3
	PC27. complete documentation during and post operations as per organizational procedures		4	1	3
	PC28. return all tools and equipment to the correct location on completion of the fitting activities		3	0	3
	PC29. leave the work area in a safe and tidy condition on completion of job activities		3	0	3
		Total	**100**	**24**	**76**
CSC/ N 0108 : Operate conventional milling machines	PC1. comply with health and safety, environmental and other relevant regulations and guidelines at work	**100**	3	1	2
	PC2. adhere to procedures and guidelines for personal protective equipment (PPE) and other relevant safety regulations while performing fabrication and fitting operations		4	1	3
	PC3. work following laid down procedures and instructions		3	1	2
	PC4. ensure work area is clean and safe from hazards		3	1	2
	PC5. ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition		2	0	2

	PC6. check that all measuring equipment is within calibration date		3	0	3
	PC7. ensure that the components used are free from foreign objects, dirt or other contamination		2	0	2
	PC8. ensure availability of job specification from a valid source		2	0	2
	PC9. read and establish job requirements from the job specification document		3	0	3
	PC10. prepare and maintain the work area as per procedure or operation specification		4	1	3
	PC11. confirm with the machine setter that the machine is ready for production		3	0	3
	PC12. seek any necessary instruction/training on the operation of the machine, where appropriate		3	0	3
	PC13. ensure that machine guards are in place and are correctly adjusted		2	0	2
	PC14. identify different types of cutters used in horizontal and vertical milling machines		2	0	2
	PC15. identify different parts of the vertical and horizontal milling machine		2	0	2
	PC16. hold components securely, without distortion		4	0	4
	PC17. ensure that machine settings are adjusted as and when required to maintain the required accuracy		3	0	3
	PC18. obtain the component drawings, specifications and/or job instructions required for the components to be machined		2	0	2
	PC19. use and extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate ISO standards in relation to work undertaken)		3	0	3
	PC20. operate the machine controls in both hand and power modes		3	0	3
	PC21. stop the machine in both normal and emergency situations, and use correct procedure for restarting after an emergency		3	0	3
	PC22. use imperial and metric systems of measurement		2	0	2
	PC23. perform milling operations with use of various methods and equipment		6	2	4
	PC24. produce components as per given quality standards		5	1	4
	PC25. achieve given production targets		3	0	3

	PC26. overcome the effects of backlash in machine slides and screws		4	0	4
	PC27. apply roughing and finishing cuts considering the effect on tool life, surface finish and dimensional accuracy		5	1	4
	PC28. apply cutting fluids with regard to a range of different materials		3	0	3
	PC29. clamp the work piece securely and without distortion in a chuck/work holding device such as vice, V-block, clamp, angle plate, etc.		4	0	4
	PC30. ensure that the quality control procedures are used on the equipment		4	1	3
	PC31. use range of equipment to check quality parameters		5	1	4
		Total	**100**	**11**	**89**
CSC/ N 0109 : Operate grinding Machines	PC1. comply with health and safety, environmental and other relevant regulations and guidelines at work	**100**	6	2	4
	PC2. adhere to procedures and guidelines for personal protective equipment (PPE) and other relevant safety regulations		6	2	4
	PC3. work following laid down procedures and instructions		6	0	6
	PC4. ensure work area is clean and safe from hazards		6	0	6
	PC5. ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition		6	0	6
	PC6. check that all measuring equipment are within calibration date		5	1	4
	PC7. obtain and prepare the appropriate materials, tools and equipment		7	2	5
	PC8. mount the work-piece safely and securely, in line with instructions		7	2	5
	PC9. set and adjust the machine tool speeds and feeds, in line with instructions		7	2	5
	PC10. use the machine tool controls safely and correctly, in line with operational procedures		7	2	5
	PC11. check that the finished components meet the standard required		7	2	5
	PC12. report any difficulties or problems that may arise with the grinding activities, and carry out any agreed actions		7	3	4

	PC13. shut down the equipment to a safe condition on completion of the grinding activities		6	2	4
	PC18. refer the problem to a competent specialist if it cannot be resolved		6	3	3
	PC19. obtain help or advice from specialist if the problem is outside candidate's area of competence or experience		6	3	3
	PC20. comply with relevant legislation, standards, policies and procedures		5	2	3
		Total	**100**	**28**	**72**
CSC/ N 0110 : Operate conventional turning machines	PC1. comply with health and safety, environmental and other relevant regulations and guidelines at work	**100**	3	1	2
	PC2. adhere to procedures and guidelines for personal protective equipment (PPE) and other relevant safety regulations while performing turning operations		3	1	2
	PC3. ensure work area is clean and safe from hazards		2	0	2
	PC4. ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition		2	0	2
	PC5. ensure that machine guards are in place and are correctly adjusted		2	0	2
	PC6. read and understand safety instructions, warning signs on the machine		3	1	2
	PC7. check that all measuring equipment is within calibration date		3	0	3
	PC8. ensure availability of job specification from a valid source		2	0	2
	PC9. read and establish job requirements from the job specification document		3	0	3
	PC10. ensure that the incoming components used are free from foreign objects, dirt or other contamination		2	0	2
	PC11. prepare and maintain the work area as per procedure or operation specification		3	1	2
	PC12. plan to carry out the required turning activities and the sequence of operations as per specifications		4	1	3
	PC13. apply safe working practices and procedures at all times		4	1	3
	PC14. obtain all the appropriate materials, tools and equipment required for the turning operation		2	0	2

	PC15. confirm with the machine setter that the machine is ready for production		2	0	2
	PC16. prepare for the turning activities by mounting, positioning and correctly setting a range of workholding devices and cutting tools		3	0	3
	PC17. seek any necessary instruction/training on the operation of the machine, where required		2	0	2
	PC18. hold components securely, without distortion		2	0	2
	PC19. ensure that machine settings are adjusted as and when required to maintain the required accuracy		2	0	2
	PC20. obtain the component drawings, specifications and/or job instructions required for the components to be machined		2	0	2
	PC21. use and extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate IS or ISO standards in relation to work undertaken)		3	1	2
	PC22. set and adjust the machine tool speeds and feeds to achieve the component specification		2	0	2
	PC23. mount and set the required workholding devices, workpiece and cutting tools		2	0	2
	PC24. operate the machine tool controls safely and correctly, in line with operational procedures		3	1	2
	PC25. control the machine in both hand and power modes for normal operations		2	0	2
	PC26. stop the machine in both normal and emergency situations correctly, and follow right procedure for restarting after an emergency		2	0	2
	PC27. use lathes and the accessories that consists of saddle, capstan/turret head, compound slide, tailstock, taper turning attachments, profile attachments, fixed and travelling steadies		2	0	2
	PC28. position and secure workholding devices to the machine spindle		2	0	2
	PC29. perform turning operations using various equipment to produce components with various features		4	0	4
	PC30. produce components as per given quality standards		4	1	3
	PC31. achieve given production targets		2	0	2

	PC32. overcome the effects of backlash in machine slides and screws		3	0	3
	PC33. perform the technique of trial cut for checking dimensional accuracy		3	0	3
	PC34. apply roughing and finishing cuts, considering the effect on tool life, surface finish and dimensional accuracy		3	0	3
	PC35. use cutting fluids for different materials		2	0	2
	PC36. use range of equipment to check critical parameters		3	0	3
	PC37. clamp the work piece in a chuck/work holding device		2	0	2
	PC38. perform the checks to be carried out on the components before removing them from the machine, and the equipment needed for this activity		3	0	3
	PC39. ensure that the quality control procedures are used while operating the equipment		2	0	2
		Total	**100**	**9**	**91**
CSC/ N 0309 : Perform assembly operations on metal components to make tools and dies	PC1. work safely at all times, complying with health and safety, environmental and other relevant regulations and guidelines	**100**	6	2	4
	PC2. check that all safety mechanisms are in place and that the equipment is set correctly for the required operations		3	0	3
	PC3. adhere to procedures or systems in place for health and safety, including personal protective equipment and other relevant safety regulations and procedures to contribute to a safe work environment		5	2	3
	PC4. wear the appropriate protective clothing and equipment, and keep the work area clean and tidy		3	0	3
	PC5. follow safe practice/approved setting up procedures at all times		3	0	3
	PC6. select measuring instruments based on tolerances required and application such as internal and external measurements		4	1	3
	PC7. take measurements using standard and specialized measuring instruments		4	1	3
	PC8. compare measurements to drawings and sketches to ensure conformity, fits and clearnaces		4	1	3
	PC9. record critical dimensions as required by workplace procedures		3	0	3

	PC10. determine job requirement using appropriate sources		4	1	3
	PC11. establish the procedures to complete the general machining, fitting or assembling operations		4	1	3
	PC12. obtain the appropriate tools and equipment for the general machining, fitting or assembling operation		4	1	3
	PC13. check that all measuring equipment is within calibration date		3	0	3
	PC14. fasten or clamp production tool components t emporarily as required for final assembly		3	0	3
	PC15. drill, tap and ream locating holes as required t o permanently locate components		6	2	4
	PC16. fasten components permanently using method s such as using engineered fasteners, applying adhesives, soldering and brazing		6	2	4
	PC17. appropriate methods and techniques to assemble and secure the components in their correct positions		6	2	4
	PC18. produce mechanical assemblies as per job specifications		6	2	4
	PC19. dismantle mechanical assemblies without damage to components and/or subassemblies		6	2	4
	PC20. 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		3	0	3
	PC21. leave the work area in a safe and tidy condition on completion of the manufacturing activities		2	0	2
	PC22. return all tools and equipment to the correct location on completion of the fitting activities support the customer remotely over the internet to test potential solutions		2	0	2
	PC23. perform the necessary checks for dimensional accuracy and functioning of the tool and die		4	1	3
	PC24. use the appropriate measuring equipment for checking activities		3	1	2
	PC25. produce components within all of the applying standards		3	0	3
		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**