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

Contact Us:
Capital Goods Skill Council, C/O Awfis, 1st Floor, L-29 Outer Circle Connaught Place
New Delhi – 110001
E-mail:
inder.gahlaut@cgsc.in

Introduction

Qualifications Pack- Tool and Die Maker

SECTOR/S: CAPITAL GOODS

SUB-SECTOR:

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

OCCUPATION: Fitting and Assembly

REFERENCE ID: CSC/Q0306

ALIGNED TO: NCO-2004/7222.20, 7222.50

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/Q0306**		
Job Role	**Tool and Die Maker** **[Applicable for National Scenarios]**		
Credits	**TBD**	**Version number**	**1.0**
Sector	**Capital Goods**	**Drafted on**	**14/04/2014**
Sub-sector	**1. Machine Tools** **2. Dies, Moulds and Press Tools** **3. Plastic Manufacturing Machinery** **4. Textile Manufacturing Machinery** **5. Process Plant Machinery** **6. Electrical and Power Machinery** **7. Light Engineering Goods**	**Last reviewed on**	**24/11/2017**
Occupation	**Fitting and Assembly**	**Next review date**	**24/11/2021**
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 conventiona lmachines, assemble and prove the tool.
NSQF level	5
Minimum Educational Qualifications **Maximum Educational Qualifications**	10th Standard pass, preferably Not Applicable
Prerequisite License or Training	No Previous Training Required
Minimum Job Entry Age	18 Years
Experience	Minimum 1 year apperenticeship
Applicable National Occupational Standards (NOS)	**Compulsory:** 1. CSC/N0307 Plan and co-ordinate the making of tools and die 2. CSC/N0308 Perform fitting operations on metal components for making tools and dies using hand tools and manually operated machines 3. CSC/N0302 Grind surface using hand and/ or hand-held power tools 4. CSC/N0108 Operate conventional milling machines 5. CSC/N0110 Operate conventional turning machines 6. CSC/N0109 Operate grinding Machines 7. CSC/N0309 Perform assembly operations on metal components to make tools and dies 8. CSC/N1335 Use basic health and safety practices at the workplace 9. CSC/N1336 Work effectively with others
Performance Criteria	As described in the relevant OS units

Definitions

Keywords /Terms	Description
Sector	Sector is a conglomeration of different business operations having similar business 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.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the knowledge and understanding they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria	Performance criteria are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack(QP)	QP comprises the set of OSs, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a 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 quality of performance required.
Knowledge and Understanding	Knowledge and understanding are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual need to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.

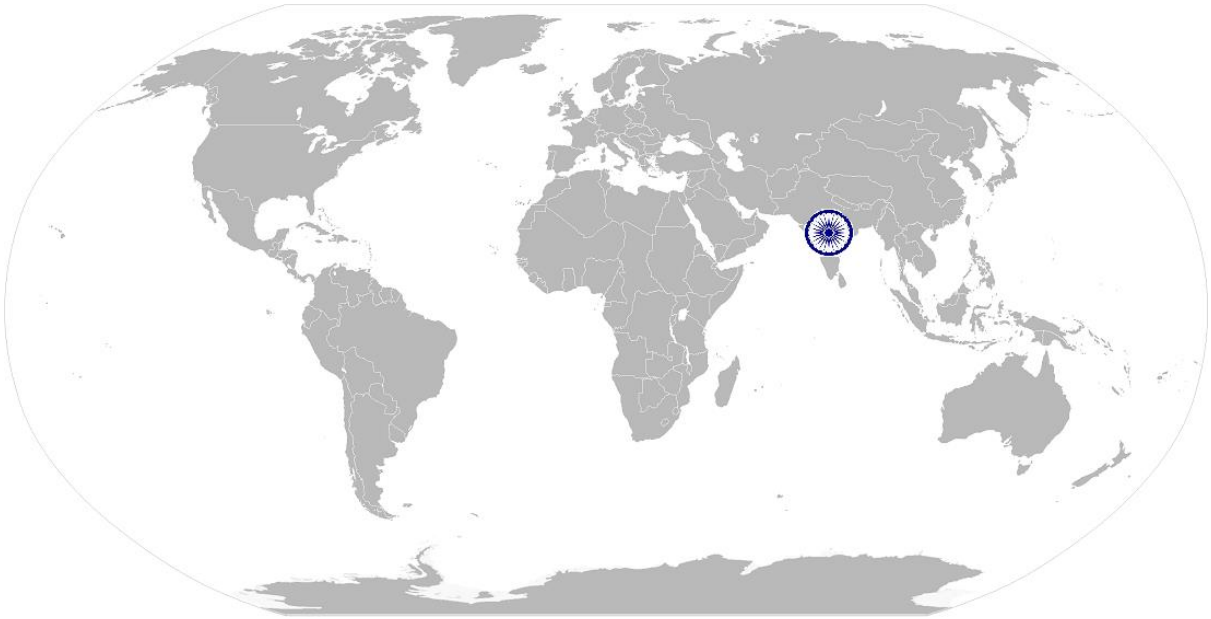
Core Skills/ Generic Skills	Core skills or generic skills are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. In the context of the OS, these include communication related skills that are applicable to most job roles.

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
CO_2	Carbon Dioxide
CPR	Cardiac Pulmonary Resuscitation
PPE	Personal Protective Equipment
ISO	International Organization For Standardization

CSC/N0307 Plan and co-ordinate the making of tools and die

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/N0307 Plan and co-ordinate the making of tools and die

National Occupational Standard

Unit Code	CSC/N0307
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.
Scope	This unit/task covers the following: • Work safely • Identify design requirements and planning • Co-ordinate with others
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Work safely	To be competent, the user/individual on the job must 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
Identify design requirements and planning	To be competent, the user/individual on the job must be able to: PC4. obtain sample parts/ blueprints/ drawings of tools/ dies and other engineering information as per company procedures PC5. identify requirements by analysing 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

CSC/N0307 Plan and co-ordinate the making of tools and die

	design requirements 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
Coordinate with others	To be competent, the user/individual on the job must be able to: 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. 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. 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

CSC/N0307 **Plan and co-ordinate the making of tools and die**

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 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

CSC/N0307 Plan and co-ordinate the making of tools and die

	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 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 jawchuck; 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

CSC/N0307 Plan and co-ordinate the making of tools and die

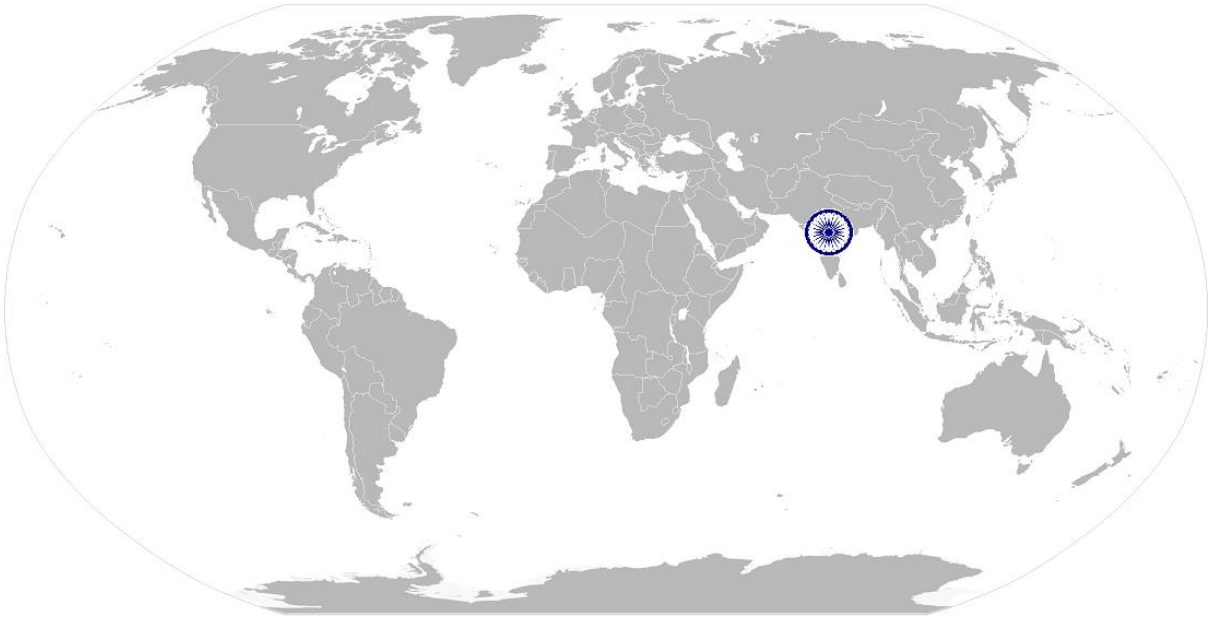
	KB28. properties of metals Properties: plasticity, elasticity, ductility, malleability, toughness, hardness, tensile strength, compressive strength, shear strength, corrosion resistance, density KB29. heat treatment processes of tool steel
Skills (S)	
A. Core Skills/ Generic Skills	**Reading Skills**
	The user/ individual on the job needs to know and understand how to: SA1. read and interpret information correctly from various job specification documents, health and safety instructions, memos, etc. applicable to the job in English and/or local language
	Writing Skills
	The user/individual on the job needs to know and understand how to: SA2. fill up appropriate technical forms, process charts, activity logs as per organizational format in English and/or local language SA3. undertake numerical operations, geometry and calculations/ formulae arithmetic: addition, subtraction, multiplication, division, fractions and decimals, percentages and proportions, simple ratios and averages SA4. use appropriate measuring techniques SA5. 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 places, express a decimal fraction in standard form, express tolerance in terms of limits of size SA6. use a calculator to raise a number to a power and determine square roots SA7. use algebraic expressions to solve linear equations SA8. plot and interpret straight line graphs SA9. apply pythagoras theorem to perform calculations SA10. calculation of the value of angles in a triangle
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA11. convey and share technical information clearly using appropriate language SA12. check and clarify task-related information SA13. liaise with appropriate authorities using correct protocol SA14. communicate with people in respectful form and manner in line with organizational protocol
B. Professional Skills	**Decision Making**
	NA

CSC/N0307 Plan and co-ordinate the making of tools and die

	Plan and Organize
	The user/individual on the job needs to know and understand how to: SB1. plan, prioritize and sequence work operations as per job requirements SB2. organize and analyze information relevant to work SB3. basic concepts of shop-floor work productivity including waste reduction, efficient material usage and optimization of time
	CustomerCentricity
	The user/individual on the job needs to know and understand how to: SB4. exercise restraint while expressing dissent and during conflict situations SB5. avoid and manage distractions to be disciplined at work SB6. manage own time for achieving better results SB7. work in a team in order to achieve better results SB8. identify and clarify work roles within a team SB9. communicate and cooperate with others in the team for better results SB10. seek assistance from fellow team members
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB11. identify problems with work planning, procedures, output and behavior and their implications SB12. prioritize and plan for problem solving SB13. communicate problems appropriately to others SB14. identify sources of information and support for problem solving SB15. seek assistance and support from other sources to solve problems SB16. identify effective resolution techniques SB17. select and apply resolution techniques SB18. seek evidence for problem resolution
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB19. undertake and express new ideas and initiatives to others SB20. modify work plan to overcome unforeseen difficulties or developments that occur as work progresses SB21. participate in improvement procedures including process, quality and internal/external customer/supplier relationships SB22. enhance one's competencies in new and different situations and contexts to achieve more
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB23. maintain current knowledge of applicable standards, legislation, codes of practice and product/process developments

CSC/N0307 Plan and co-ordinate the making of tools and die

	SB24. participate in on-the-job and other learning, training and development interventions and assessment SB25. clarify task related information with appropriate personnel or technical adviser SB26. seek to improve and modify own work practices



CSC/N0307 **Plan and co-ordinate the making of tools and die**

NOS Version Control

NOS Code	CSC/N0307		
Credits	TBD	Version number	1.0
Industry	Capital Goods	Drafted on	14/04/2014
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	24/11/2017
Occupation	Fitting and Assembly	Next review date	24/11/2021

CSC/N0308 Perform fitting operations on metal components for making tools and dies using hand tools and manually operated machines

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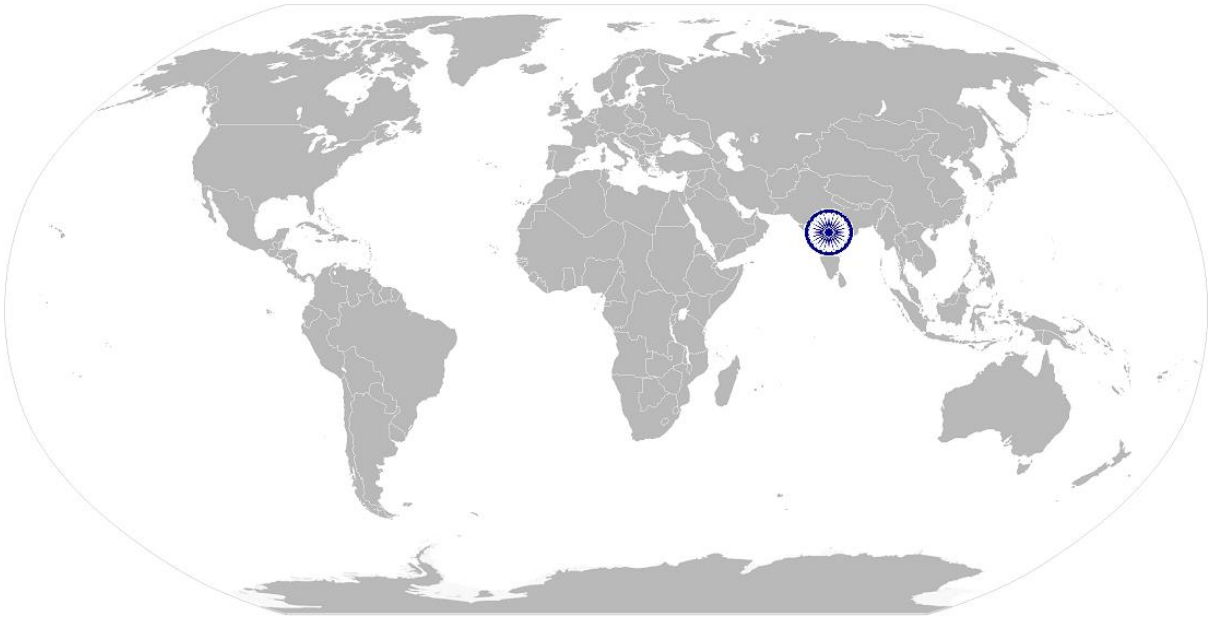
National Occupational Standard



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.

National Occupational Standard

CSC/N0308 Perform fitting operations on metal components for making tools and dies using hand tools and manually operated machines

Unit Code	CSC/N0308
Unit Title (Task)	**Perform fitting operations on metal components for making tools and dies 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.
Scope	This unit/task covers the following: • Work safely • Prepare for fitting operations • Mark components • Perform fitting operations
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Work safely	To be competent, the user/individual on the job must 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
Prepare for fitting operations	To be competent, the user/individual on the job must 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

CSC/N0308 Perform fitting operations on metal components for making tools and dies using hand tools and manually operated machines

	or profiles to be machined; instruments and tools to be used; interdependencies; timelines PC8. report and rectify incorrect and inconsistent information in job specification 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
Mark components	To be competent, the user/individual on the job must 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
Perform fitting operations	To be competent, the user/individual on the job must 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,

CSC/N0308 Perform fitting operations on metal components for making tools and dies using hand tools and manually operated machines

	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),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; counter bore, 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 /	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

CSC/N0308 Perform fitting operations on metal components for making tools and dies using hand tools and manually operated machines

organization and its processes)	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 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

CSC/N0308 Perform fitting operations on metal components for making tools and dies using hand tools and manually operated machines

	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)	
A. Core Skills/ Generic Skills	**Reading 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, health and safety instructions, memos, etc. applicable to the job in English and/or local language
	Writing Skills
	The user/individual on the job needs to know and understand how to: SA2. fill up appropriate technical forms, process charts, activity logs as per organizational format in English and/or local language SA3. undertake numerical operations, and calculations/ formulae Numerical computations: addition, subtraction, multiplication, division, fractions and decimals, percentages and proportions, simple ratios and averages SA4. 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, semicircles, quadrants of a circle

CSC/N0308 Perform fitting operations on metal components for making tools and dies using hand tools and manually operated machines

	Solid shapes: cube, rectangular prism, cylinder SA5. use appropriate measuring techniques and units of measurement SA6. 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 SA7. interpret and express tolerance in terms of limits on dimensions SA8. calculation of the value of angles in a triangle Angles in a triangle: right-angled, isosceles, equilateral
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA9. convey and share technical information clearly using appropriate language SA10. check and clarify task-related information SA11. liaise with appropriate authorities using correct protocol SA12. communicate with people in respectful form and manner in line with organizational protocol
B. Professional Skills	**Decision Making**
	NA
	Plan and Organize
	The user/individual on the job needs to know and understand how to: SB1. plan, prioritize and sequence work operations as per job requirements SB2. organize and analyze information relevant to work SB3. basic concepts of shop-floor work productivity including waste reduction, efficient material usage and optimization of time
	CustomerCentricity
	The user/individual on the job needs to know and understand how to: SB4. exercise restraint while expressing dissent and during conflict situations SB5. avoid and manage distractions to be disciplined at work SB6. manage own time for achieving better results SB7. work in a team in order to achieve better results SB8. identify and clarify work roles within a team SB9. communicate and cooperate with others in the team for better results SB10. seek assistance from fellow team members
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB11. identify problems with work planning, procedures, output and behavior and their implications SB12. prioritize and plan for problem solving

CSC/N0308 Perform fitting operations on metal components for making tools and dies using hand tools and manually operated machines

	SB13. communicate problems appropriately to others SB14. identify sources of information and support for problem solving SB15. seek assistance and support from other sources to solve problems SB16. identify effective resolution techniques SB17. select and apply resolution techniques SB18. seek evidence for problem resolution
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB19. undertake and express new ideas and initiatives to others SB20. modify work plan to overcome unforeseen difficulties or developments that occur as work progresses SB21. participate in improvement procedures including process, quality and internal/external customer/supplier relationships SB22. enhance one's competencies in new and different situations and contexts to achieve more
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB23. maintain current knowledge of applicable standards, legislation, codes of practice and product/process developments SB24. participate in on-the-job and other learning, training and development interventions and assessment SB25. clarify task related information with appropriate personnel or technical adviser SB26. seek to improve and modify own work practices

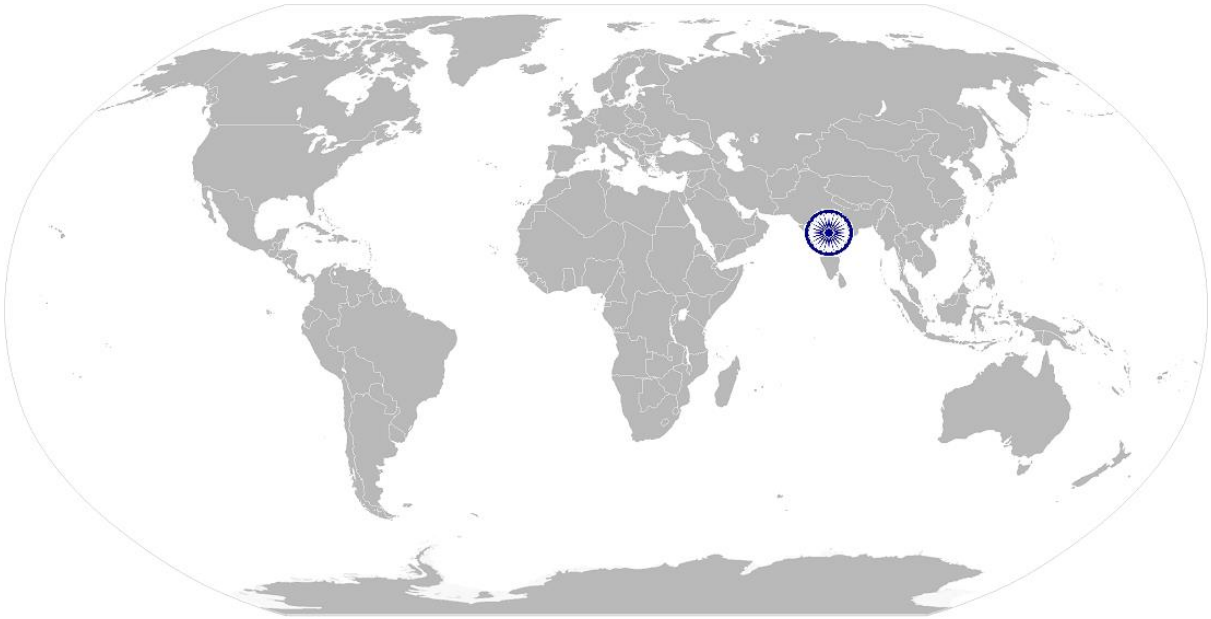
CSC/N0308 Perform fitting operations on metal components for making tools and dies using hand tools and manually operated machines

NOS Version Control

NOS Code	CSC/N0308		
Credits	TBD	Version number	1.0
Industry	Capital Goods	Drafted on	14/04/2014
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	24/11/2017
Occupation	Fitting and Assembly	Next review date	24/11/2021

CSC/N0302 Grind surface using hand and/ or hand-held power tools

National Occupational Standard



Overview

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

CSC/N0302 Grind surface using hand and/ or hand-held power tools

National Occupational Standard

Unit Code	CSC/N0302
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.
Scope	This unit/task covers the following: • Work safely • Prepare for grinding operations • Perform grinding operations
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Work safely	To be competent, the user/individual on the job must 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 that all tools, equipment, power tool cables, extension leads are in a safe and usable condition PC5. ensure work area is clean and safe from hazards before and after the job is completed
Prepare for grinding operations	To be competent, the user/individual on the job must 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. 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 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,

CSC/N0302 Grind surface using hand and/ or hand-held power tools

	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 PC9. report and rectify incorrect and inconsistent information in job specification documents as per organization procedures PC10. prepare the work area for the fitting operations as per procedure or operational specification 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	To be competent, the user/individual on the job must 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 PC28. secure tools and equipment in a safe condition on completion of the

CSC/N0302 Grind surface using hand and/ or hand-held power tools

	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

CSC/N0302 Grind surface using hand and/ or hand-held power 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 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 KB23. different kinds of manually operated grinders Grinders: angle grinders, bench grinders, straight grinder, rotary die grinders, disc grinder, electronic grinder, electric or pneumatic/hydraulic grinders, pedestal grinders, cylindrical grinders
Skills (S)	

CSC/N0302 Grind surface using hand and/ or hand-held power tools

A. Core Skills/ Generic Skills	**Reading 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, health and safety instructions, memos, etc. applicable to the job in English and/or local language
	Writing Skills
	The user/individual on the job needs to know and understand how to: SA2. fill up appropriate technical forms, process charts, activity logs as per organizational format in English and/or local language SA3. undertake numerical operations, and calculations/ formulae Numerical computations: addition, subtraction, multiplication, division, fractions and decimals, percentages and proportions, simple ratios and averages SA4. 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, semicircles, quadrants of a circle Solid shapes: cube, rectangular prism, cylinder SA5. use appropriate measuring techniques and units of measurement SA6. 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 SA7. use metric systems of measurement
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA8. convey and share technical information clearly using appropriate language SA9. check and clarify task-related information SA10. liaise with appropriate authorities using correct protocol SA11. communicate with people in respectful form and manner in line with organizational protocol
B. Professional Skills	**Decision Making**
	NA
	Plan and Organize
	The user/individual on the job needs to know and understand how to: SB1. plan, prioritize and sequence work operations as per job requirements SB2. organize and analyze information relevant to work SB3. basic concepts of shop-floor work productivity including waste reduction,

CSC/N0302 Grind surface using hand and/ or hand-held power tools

	efficient material usage and optimization of time
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB4. exercise restraint while expressing dissent and during conflict situations SB5. avoid and manage distractions to be disciplined at work SB6. manage own time for achieving better results SB7. work in a team in order to achieve better results SB8. identify and clarify work roles within a team SB9. communicate and cooperate with others in the team for better results SB10. seek assistance from fellow team members
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB11. identify problems with work planning, procedures, output and behavior and their implications SB12. prioritize and plan for problem solving SB13. communicate problems appropriately to others SB14. identify sources of information and support for problem solving SB15. seek assistance and support from other sources to solve problems SB16. identify effective resolution techniques SB17. select and apply resolution techniques SB18. seek evidence for problem resolution
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB19. undertake and express new ideas and initiatives to others SB20. modify work plan to overcome unforeseen difficulties or developments that occur as work progresses SB21. participate in improvement procedures including process, quality and internal/external customer/supplier relationships SB22. enhance one's competencies in new and different situations and contexts to achieve more
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB23. maintain current knowledge of applicable standards, legislation, codes of practice and product/process developments SB24. participate in on-the-job and other learning, training and development interventions and assessment SB25. clarify task related information with appropriate personnel or technical adviser SB26. seek to improve and modify own work practices

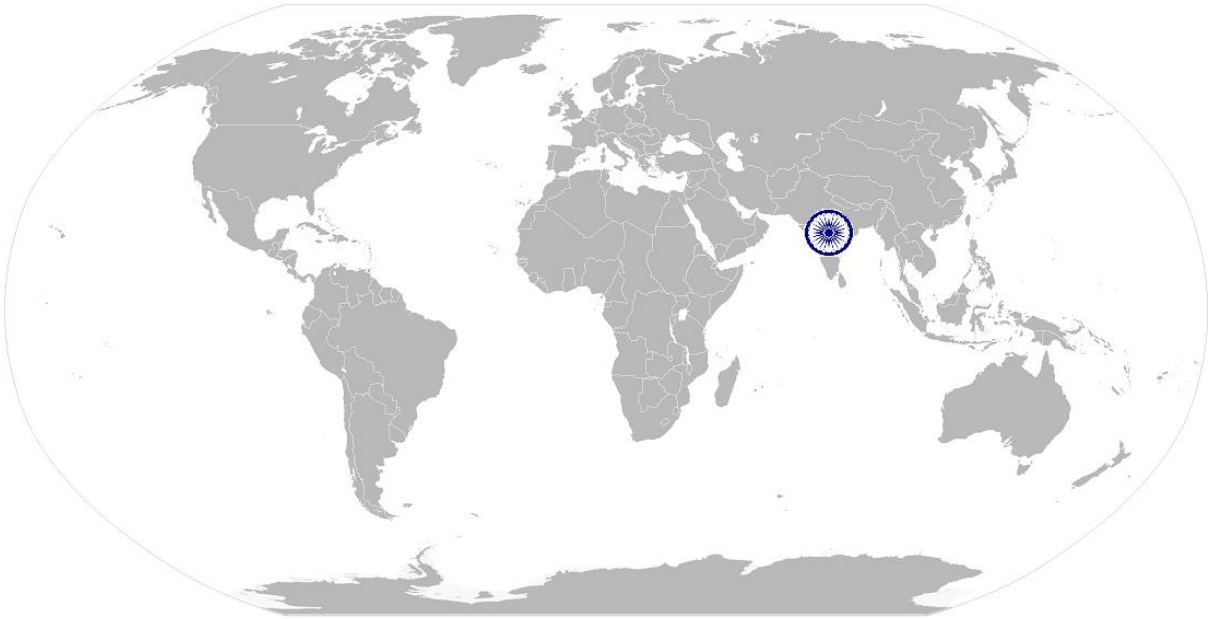
CSC/N0302 Grind surface using hand and/ or hand-held power tools

NOS Version Control

NOS Code	**CSC/N0302**		
Credits	**TBD**	**Version number**	**1.0**
Industry	**Capital Goods**	**Drafted on**	**14/04/2014**
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**	**24/11/2017**
Occupation	**Fitting and Assembly**	**Next review date**	**24/11/2021**

CSC/N0108 **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/N0108 Operate conventional milling machines

National Occupational Standard

Unit Code	CSC/N0108
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).
Scope	This unit/task covers the following: • Work safely • Prepare for operating conventional milling machine • Carry out operations on conventional milling machine
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Work safely	To be competent, the user/individual on the job must 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 mas PC3. work following laid down procedures and instructions PC4. ensure work area is clean and safe from hazards before and after the job is completed PC5. ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition
Prepare for operating conventional milling machine	To be competent, the user/individual on the job must 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

CSC/N0108 Operate conventional milling machines

	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 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
Carry out operations on conventional milling machine	To be competent, the user/individual on the job must 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,

CSC/N0108 **Operate conventional milling machines**

	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. 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. 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. 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

CSC/N0108 Operate conventional milling machines

	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. 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

CSC/N0108 Operate conventional milling machines

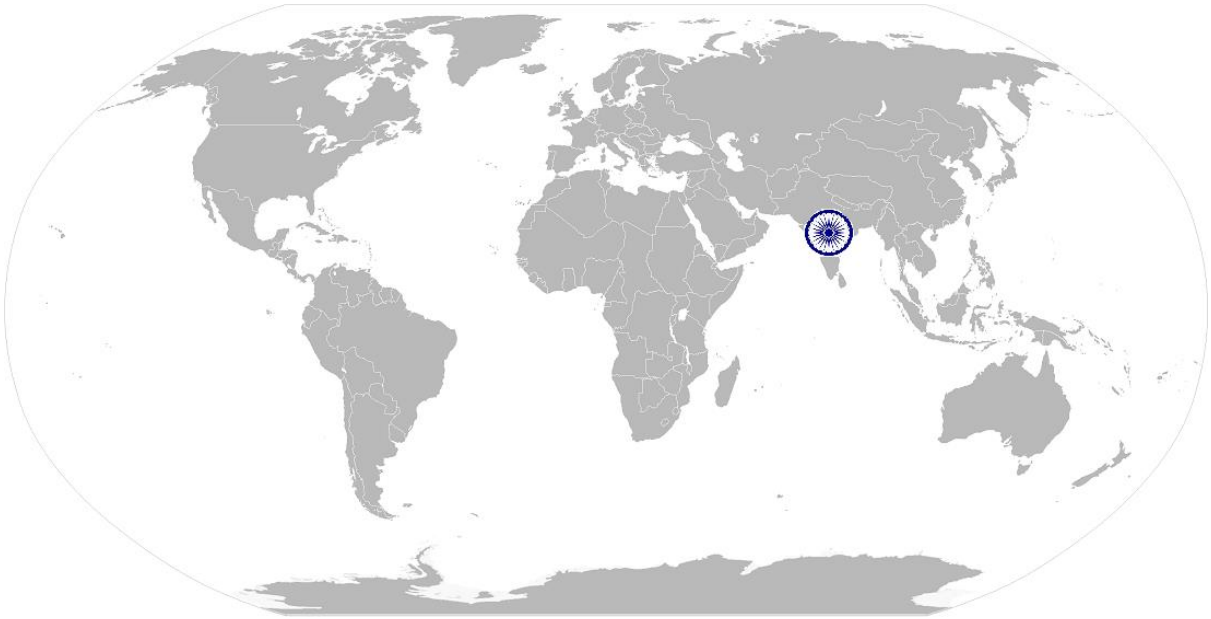
	KB17. relationship between metal cutting results, tool nose radius, speed and feed rate KB18. how to recognize machining faults and how to identify when tools need resharpening KB19. problems that can occur with the milling activities, and how these can be overcome KB20. extent of their own authority 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
Skills (S)	
A. Core Skills/ Generic Skills	**Reading 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, health and safety instructions, memos, etc. applicable to the job in English and/or local language
	Writing Skills
	The user/individual on the job needs to know and understand how to: SA2. fill up appropriate technical forms, process charts, activity logs as per organizational format in English and/or local language SA3. undertake numerical operations, and calculations/ formulae Numerical computations: addition, subtraction, multiplication, division, fractions and decimals, percentages and proportions, simple ratios and averages SA4. 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, semicircles, quadrants of a circle Solid shapes: cube, rectangular prism, cylinder SA5. use appropriate measuring techniques and units of measurement SA6. 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 SA7. use metric systems of measurement
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA8. convey and share technical information clearly using appropriate language SA9. check and clarify task-related information

CSC/N0108 Operate conventional milling machines

	SA10. liaise with appropriate authorities using correct protocol SA11. communicate with people in respectful form and manner in line with organizational protocol
B. Professional Skills	**Decision Making**
	NA
	Plan and Organize
	The user/individual on the job needs to know and understand how to: SB1. plan, prioritize and sequence work operations as per job requirements SB2. organize and analyze information relevant to work SB3. basic concepts of shop-floor work productivity including waste reduction, efficient material usage and optimization of time
	CustomerCentricity
	The user/individual on the job needs to know and understand how to: SB4. exercise restraint while expressing dissent and during conflict situations SB5. avoid and manage distractions to be disciplined at work SB6. manage own time for achieving better results SB7. work in a team in order to achieve better results SB8. identify and clarify work roles within a team SB9. communicate and cooperate with others in the team for better results SB10. seek assistance from fellow team members
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB11. identify problems with work planning, procedures, output and behavior and their implications SB12. prioritize and plan for problem solving SB13. communicate problems appropriately to others SB14. identify sources of information and support for problem solving SB15. seek assistance and support from other sources to solve problems SB16. identify effective resolution techniques SB17. select and apply resolution techniques SB18. seek evidence for problem resolution
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB19. undertake and express new ideas and initiatives to others SB20. modify work plan to overcome unforeseen difficulties or developments that occur as work progresses SB21. participate in improvement procedures including process, quality and internal/external customer/supplier relationships

CSC/N0108 Operate conventional milling machines

	SB22. enhance one's competencies in new and different situations and contexts to achieve more
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB23. maintain current knowledge of applicable standards, legislation, codes of practice and product/process developments SB24. participate in on-the-job and other learning, training and development interventions and assessment SB25. clarify task related information with appropriate personnel or technical adviser SB26. seek to improve and modify own work practices



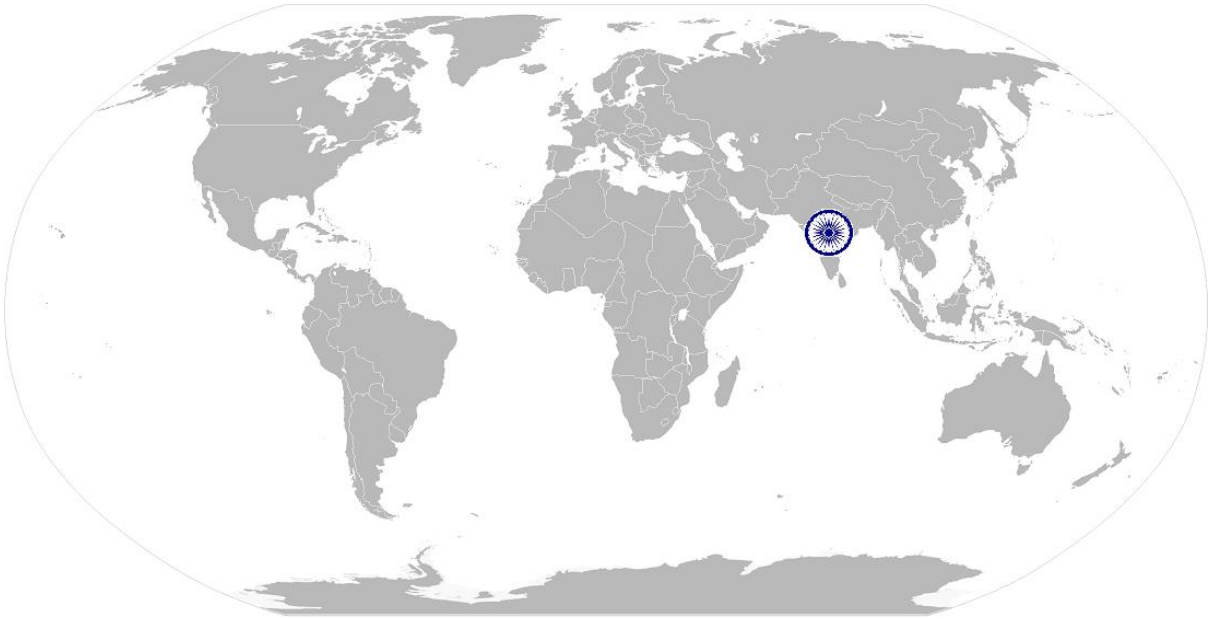
CSC/N0108 **Operate conventional milling machines**

NOS Version Control

NOS Code	CSC/N0108		
Credits	TBD	Version number	1.0
Industry	Capital Goods	Drafted on	14/04/2014
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	24/11/2017
Occupation	Fitting and Assembly	Next review date	24/11/2021

CSC/N0110 **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 center lathes.

CSC/N0110 Operate conventional turning machines

National Occupational Standard

Unit Code	CSC/N0110
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).
Scope	This unit/task covers the following: • Work safely • Prepare for operating conventional turning machine • Carry out operations on conventional turning machine
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Work safely	To be competent, the user/individual on the job must 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 mas 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
Prepare for operating conventional turning machine	To be competent, the user/individual on the job must 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 sketches/illustrations; national, international and organizational standards

CSC/N0110 **Operate conventional turning machines**

	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 jawchucks, 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
Carry out operations on conventional turning machine	To be competent, the user/individual on the job must 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,

CSC/N0110	Operate conventional turning machines
	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 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

CSC/N0110 Operate conventional turning machines

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. 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. wear 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 the component features produced on metal and non-metal components Equipment: solid high-speed tooling, brazed tip tooling, interchangeable tipped tooling, indexable insert tooling

CSC/N0110 **Operate conventional turning machines**

	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, 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)	
A. Core Skills/ Generic Skills	**Reading 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, health and safety instructions, memos, etc. applicable to the job in English and/or local language
	Writing Skills
	The user/individual on the job needs to know and understand how to:

CSC/N0110 **Operate conventional turning machines**

	SA2. fill up appropriate technical forms, process charts, activity logs as per organizational format in English and/or local language SA3. undertake numerical operations, and calculations/ formulae Numerical computations: addition, subtraction, multiplication, division, fractions and decimals, percentages and proportions, simple ratios and averages SA4. 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, semicircles, quadrants of a circle Solid shapes: cube, rectangular prism, cylinder SA5. use appropriate measuring techniques and units of measurement SA6. 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 SA7. use metric systems of measurement
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA1. convey and share technical information clearly using appropriate language SA2. check and clarify task-related information SA3. liaise with appropriate authorities using correct protocol SA4. communicate with people in respectful form and manner in line with organizational protocol
B. Professional Skills	**Decision Making**
	NA
	Plan and Organize
	The user/individual on the job needs to know and understand how to: SB1. plan, prioritize and sequence work operations as per job requirements SB2. organize and analyze information relevant to work SB3. basic concepts of shop-floor work productivity including waste reduction, efficient material usage and optimization of time
	CustomerCentricity
	The user/individual on the job needs to know and understand how to: SB4. exercise restraint while expressing dissent and during conflict situations SB5. avoid and manage distractions to be disciplined at work SB6. manage own time for achieving better results SB7. work in a team in order to achieve better results

CSC/N0110 **Operate conventional turning machines**

	SB8. identify and clarify work roles within a team SB9. communicate and cooperate with others in the team for better results SB10. seek assistance from fellow team members
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB11. identify problems with work planning, procedures, output and behavior and their implications SB12. prioritize and plan for problem solving SB13. communicate problems appropriately to others SB14. identify sources of information and support for problem solving SB15. seek assistance and support from other sources to solve problems SB16. identify effective resolution techniques SB17. select and apply resolution techniques SB18. seek evidence for problem resolution
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB19. undertake and express new ideas and initiatives to others SB20. modify work plan to overcome unforeseen difficulties or developments that occur as work progresses SB21. participate in improvement procedures including process, quality and internal/external customer/supplier relationships SB22. enhance one's competencies in new and different situations and contexts to achieve more
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB23. participate in on-the-job and other learning, training and development interventions and assessment SB24. clarify task related information with appropriate personnel or technical adviser SB25. seek to improve and modify own work practices SB26. maintain current knowledge of applicable standards, legislation, codes of practice and product/process developments

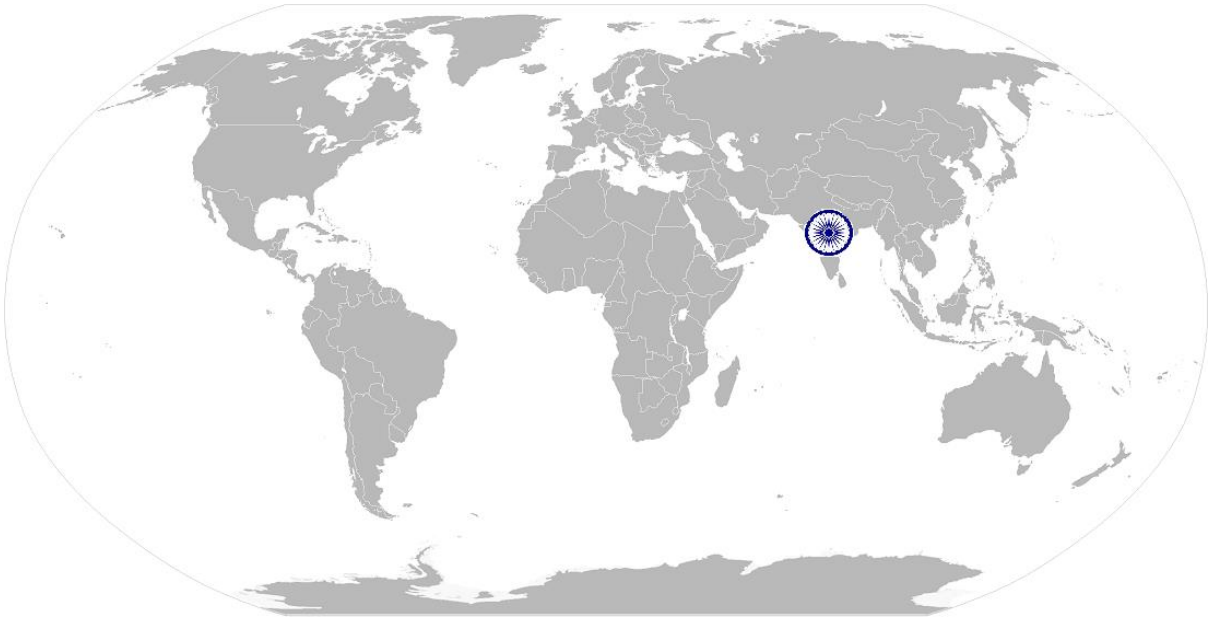
CSC/N0110 **Operate conventional turning machines**

NOS Version Control

NOS Code	CSC/N0110		
Credits	TBD	Version number	1.0
Industry	Capital Goods	Drafted on	14/04/2014
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	24/11/2017
Occupation	Fitting and Assembly	Next review date	24/11/2021

CSC/N0109 **Operate grinding machines**

National Occupational Standard



Overview

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

CSC/N0109 **Operate grinding machines**

National Occupational Standard

Unit Code	**CSC/N0109**
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).
Scope	This unit/task covers the following: • Work safely • Operate Grinding Machine • Handle of unresolved problems • Process Compliances
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Work safely	To be competent, the user/individual on the job must 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
Operate Grinding Machine	To be competent, the user/individual on the job must 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

CSC/N0109 **Operate grinding machines**

	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
Handle of unresolved problems	To be competent, the user/individual on the job must 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
Process Compliances	To be competent, the user/individual on the job must be able to: PC20. comply with relevant legislation, standards, policies and procedures
Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the	The user/individual on the job needs to know and understand: KA1. relevant legislation, standards, policies, and procedures followed in the company

CSC/N0109 **Operate grinding machines**

company / organization and its processes)	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 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

CSC/N0109 **Operate grinding machines**

	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 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)	
	Reading Skills

CSC/N0109 **Operate grinding machines**

A. Core Skills/ 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, health and safety instructions, memos, etc. applicable to the job in English and/or local language
	Writing Skills
	The user/individual on the job needs to know and understand how to: SA2. fill up appropriate technical forms, process charts, activity logs as per organizational format in English and/or local language SA3. undertake numerical operations, and calculations/ formulae Numerical computations: addition, subtraction, multiplication, division, fractions and decimals, percentages and proportions, simple ratios and averages SA4. 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, semicircles, quadrants of a circle Solid shapes: cube, rectangular prism, cylinder SA5. use appropriate measuring techniques and units of measurement SA6. 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 SA7. use metric systems of measurement
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA8. convey and share technical information clearly using appropriate language SA9. check and clarify task-related information SA10. liaise with appropriate authorities using correct protocol SA11. communicate with people in respectful form and manner in line with organizational protocol
B. Professional Skills	**Decision Making**
	NA
	Plan and Organize
	The user/individual on the job needs to know and understand how to: SB1. plan, prioritize and sequence work operations as per job requirements SB2. organize and analyze information relevant to work SB3. basic concepts of shop-floor work productivity including waste reduction, efficient material usage and optimization of time

CSC/N0109 **Operate grinding machines**

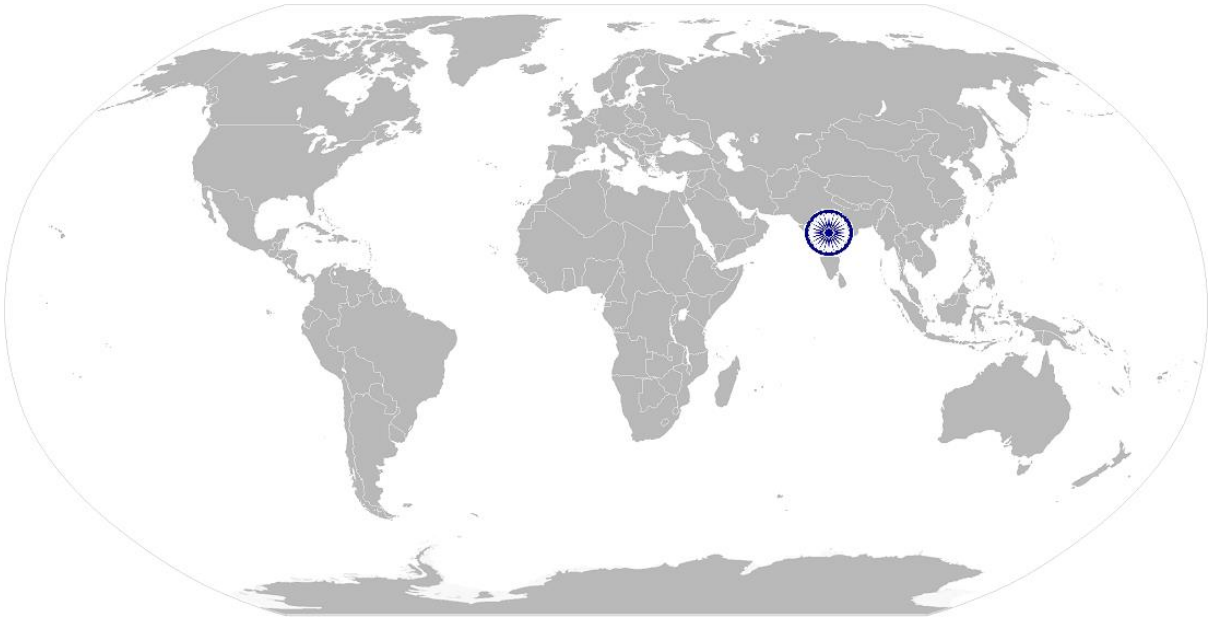
	CustomerCentricity
	The user/individual on the job needs to know and understand how to: SB4. exercise restraint while expressing dissent and during conflict situations SB5. avoid and manage distractions to be disciplined at work SB6. manage own time for achieving better results SB7. work in a team in order to achieve better results SB8. identify and clarify work roles within a team SB9. communicate and cooperate with others in the team for better results SB10. seek assistance from fellow team members
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB11. identify problems with work planning, procedures, output and behavior and their implications SB12. prioritize and plan for problem solving SB13. communicate problems appropriately to others SB14. identify sources of information and support for problem solving SB15. seek assistance and support from other sources to solve problems SB16. identify effective resolution techniques SB17. select and apply resolution techniques SB18. seek evidence for problem resolution
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB19. undertake and express new ideas and initiatives to others SB20. modify work plan to overcome unforeseen difficulties or developments that occur as work progresses SB21. participate in improvement procedures including process, quality and internal/external customer/supplier relationships SB22. enhance one's competencies in new and different situations and contexts to achieve more
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB23. participate in on-the-job and other learning, training and development interventions and assessment SB24. clarify task related information with appropriate personnel or technical adviser SB25. seek to improve and modify own work practices SB26. maintain current knowledge of applicable standards, legislation, codes of practice and product/process developments

CSC/N0109 **Operate grinding machines**

NOS Version Control

NOS Code	CSC/N0109		
Credits	TBD	Version number	1.0
Industry	Capital Goods	Drafted on	14/04/2014
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	24/11/2017
Occupation	Fitting and Assembly	Next review date	24/11/2021

National Occupational Standard



Overview

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

CSC/N0309 Perform assembly operations on metal components to make tools and dies

National Occupational Standard

Unit Code	CSC/N0309
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.
Scope	This unit/task covers the following: • Work safely • Check dimensions of the components of tool or die • Prepare for assembling operations • Perform assembling operations • Measure and checking component

Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Work safely	To be competent, the user/individual on the job must be able to: PC1. work safely at all times, complying with health and safety, environmental and otherrelevant regulations and guidelines PC2. check that all safety mechanisms are in place and that the equipment is set correctlyfor the required operations PC3. adhere to procedures or systems in place for health and safety, including personalprotective equipment and other relevant safety regulations and procedures tocontribute to a safe work environment PC4. wear the appropriate protective clothing and equipment, and keep the work areaclean and tidy PC5. follow safe practice/approved setting up procedures at all times
Check dimensions of the components of tool or die	To be competent, the user/individual on the job must 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 andclearances PC9. record critical dimensions as required by workplace procedures
Prepare for assembling operations	To be competent, the user/individual on the job must be able to: PC10. read and establish job requirements from the job specification document accurately

CSC/N0309 Perform assembly operations on metal components to make tools and dies

	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 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; processspecifications; instructions from supervisor PC12. establish the procedures to complete the general machining, fitting or assemblingoperations PC13. obtain the appropriate tools and equipment for the general machining, fitting orassembling 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 purposeequipment, 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, coordinatetable, 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 requiredto overcome friction; methods of reduction oils (mineral, synthetic, animal and vegetable) greases, copper compound, graphite); application (total loss, recirculatory, 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

CSC/N0309 Perform assembly operations on metal components to make tools and dies

Perform assembling operations	To be competent, the user/individual on the job must 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 intheir correct positions Mechanical fastenings and joining techniques: non-permanent - nuts, bolts, studs,screws, pins, springs, keys, bearings; permanent - welded, soldered, brazed, riveted PC19. 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 packing); torque setting of nuts and bolts PC20. use various types of methods to dismantle mechanical assemblies without damage tocomponents and/or subassemblies Methods: procedure for isolation and locking off a device/system; sequence ofoperations used to dismantle a device/system; proof marking, correct storage procedures for removed parts; release of pressure/force; extraction PC21. deal promptly and effectively with problems within their control, and seek help andguidance from the relevant people if they have problems that they cannot resolve PC22. leave the work area in a safe and tidy condition on completion of the manufacturingactivities PC23. return all tools and equipment to the correct location on completion of the fittingactivities Various fitting activities: file flat, square and curved surfaces and achieve a smoothsurface 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 PC24. support the customer remotely over the internet to test potential solutions
Measure and checking	To be competent, the user/individual on the job must be able to: PC25. perform the necessary checks for dimensional parameters and functioning of

CSC/N0309 Perform assembly operations on metal components to make tools and dies

component	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 PC26. use the appropriate measuring equipment for checking activities Measuring equipments: external micrometers, vernier/digital/dial caliper, surfacefinish 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 PC27. produce components within all of the applying quality standards Quality standards: components to be free from false tool cuts, burrs and sharpedges; 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. 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 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

CSC/N0309 Perform assembly operations on metal components to make tools and dies

	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 used Hand fitting methods: cutting out the rough profile using saws (eg. hacksaw, bandsaw), 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 securingthem, and the tools and equipment Alignment: slide ways: 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 slide ways 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 directlyto the machine table KB12. mount and secure the cutting tools: front or rear tools posts; mounting cutters onlong 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

CSC/N0309 Perform assembly operations on metal components to make tools and dies

	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; circularand 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 method/security of workpiece, condition of machine, finish required, tolerancerequired 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-jawchuck; 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 andusing 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, toolsteel, 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, tensilestrength, 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 andbuttons 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

CSC/N0309 Perform assembly operations on metal components to make tools and dies

	finish anddimensional 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, andthat 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)	
A. Core Skills/ Generic Skills	**Reading 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, health and safety instructions, memos, etc. applicable to the job in English and/or local language
	Writing Skills
	The user/individual on the job needs to know and understand how to: SA2. fill up appropriate technical forms, process charts, activity logs as per organizational format in English and/or local language SA3. undertake numerical operations, and calculations/ formulae Numerical computations: addition, subtraction, multiplication, division, fractions and decimals, percentages and proportions, simple ratios and averages SA4. 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, semicircles, quadrants of a circle Solid shapes: cube, rectangular prism, cylinder SA5. use appropriate measuring techniques and units of measurement SA6. 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 SA7. use metric systems of measurement
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to:

CSC/N0309 Perform assembly operations on metal components to make tools and dies

	SA8. convey and share technical information clearly using appropriate language SA9. check and clarify task-related information SA10. liaise with appropriate authorities using correct protocol SA11. communicate with people in respectful form and manner in line with organizational protocol
B. Professional Skills	**Decision Making**
	NA
	Plan and Organize
	The user/individual on the job needs to know and understand how to: SB1. plan, prioritize and sequence work operations as per job requirements SB2. organize and analyze information relevant to work SB3. basic concepts of shop-floor work productivity including waste reduction, efficient material usage and optimization of time
	CustomerCentricity
	The user/individual on the job needs to know and understand how to: SB4. exercise restraint while expressing dissent and during conflict situations SB5. avoid and manage distractions to be disciplined at work SB6. manage own time for achieving better results SB7. work in a team in order to achieve better results SB8. identify and clarify work roles within a team SB9. communicate and cooperate with others in the team for better results SB10. seek assistance from fellow team members
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB11. identify problems with work planning, procedures, output and behavior and their implications SB12. prioritize and plan for problem solving SB13. communicate problems appropriately to others SB14. identify sources of information and support for problem solving SB15. seek assistance and support from other sources to solve problems SB16. identify effective resolution techniques SB17. select and apply resolution techniques SB18. seek evidence for problem resolution
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB19. undertake and express new ideas and initiatives to others SB20. modify work plan to overcome unforeseen difficulties or developments that occur as work progresses

CSC/N0309 Perform assembly operations on metal components to make tools and dies

	SB21. participate in improvement procedures including process, quality and internal/external customer/supplier relationships SB22. enhance one's competencies in new and different situations and contexts to achieve more
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB23. participate in on-the-job and other learning, training and development interventions and assessment SB24. clarify task related information with appropriate personnel or technical adviser SB25. seek to improve and modify own work practices SB26. maintain current knowledge of applicable standards, legislation, codes of practice and product/process developments

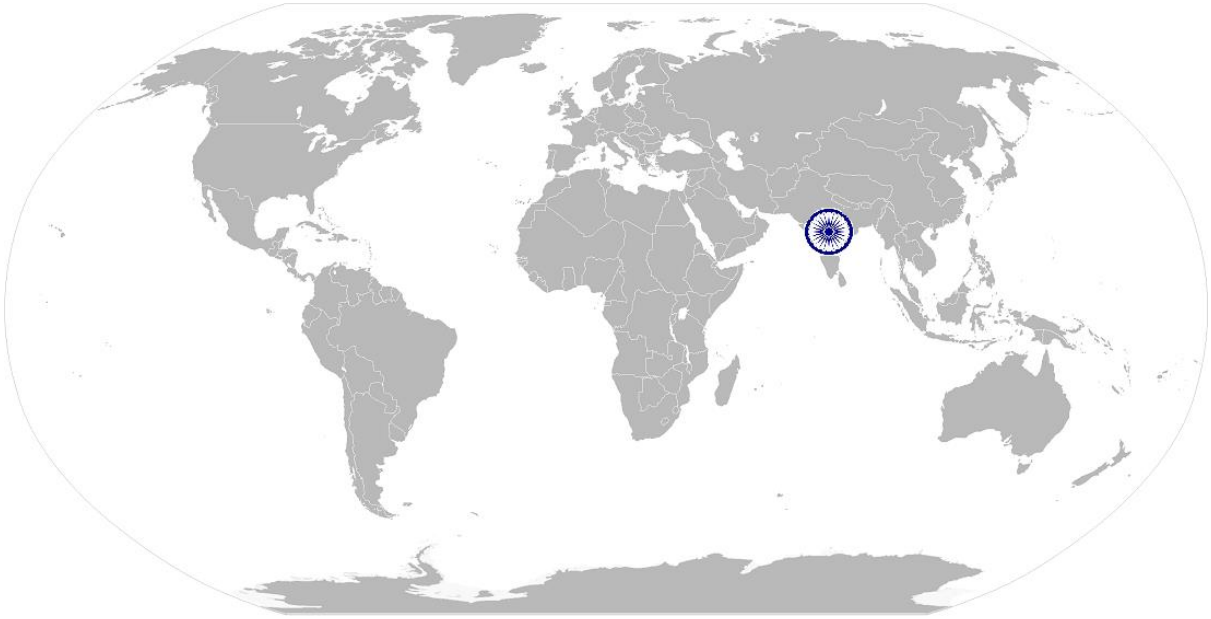
CSC/N0309 Perform assembly operations on metal components to make tools and dies

NOS Version Control

NOS Code	CSC/N0309		
Credits	TBD	Version number	1.0
Industry	Capital Goods	Drafted on	14/04/2014
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	24/11/2017
Occupation	Fitting and Assembly	Next review date	24/11/2021

CSC/N1335 Use basic health and safety practices at the workplace

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/N1335 Use basic health and safety practices at the workplace

National Occupational Standard

Unit Code	CSC/N1335
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.
Scope	This unit/task covers the following: • Health and safety • Fire safety • Emergencies, rescue and first-aid procedure
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Health and safety	To be competent, the user/individual on the job must 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.) 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

CSC/N1335 Use basic health and safety practices at the workplace

	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 Documents: fire notices, accident reports, safety instructions for equipment and procedures, company notices and documents, legal documents (eg

CSC/N1335 Use basic health and safety practices at the workplace

	government notices)
Fire safety	To be competent, the user/individual on the job must 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	To be competent, the user/individual on the job must 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/N1335 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

CSC/N1335 Use basic health and safety practices at the workplace

	Materials: sand, water, foam, CO_2, dry powder KB17. rescue techniques applied during a fire hazard KB18. various types of safety signs and what they mean 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)	
A. Core Skills/ Generic Skills	**Reading 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 an accident/incident report in local language or English
	Writing Skills
	The user/individual on the job needs to know and understand how to: SA4. 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: SA5. question coworkers appropriately in order to clarify instructions and other issues SA6. give clear instructions to coworkers, subordinates others
B. Professional Skills	**Decision Making**
	The user/individual on the job needs to know and understand how to: SB1. 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
	Plan and Organize
	The user/individual on the job needs to know and understand how to: SB2. plan and organize their own work schedule, work area, tools, equipment and materials to maintain decorum and for improved productivity
	CustomerCentricity
	The user/individual on the job needs to know and understand how to: SB3. remain congenial while discussing and debating issues with co-workers

CSC/N1335 Use basic health and safety practices at the workplace

	SB4. follow appropriate protocols for communication based on situation, hierarchy, organizational culture and practice SB5. ask for, provide and receive required assistance where possible to ensure achievement of work related objectives SB6. thank coworkers for any assistance received SB7. offer appropriate respect based on mutuality and respect for fellow workmanship and authority
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB8. think through the problem, evaluate the possible solution(s) and suggest an optimum /best possible solution(s) SB9. identify immediate or temporary solutions to resolve delays SB10. identify sources of support that can be availed of for problem solving for various kind of problems SB11. seek appropriate assistance from other sources to resolve problems SB12. report problems that you cannot resolve to appropriate authority
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB13. identify cause and effect relations in their area of work SB14. use cause and effect relations to anticipate potential problems and their solution
	Critical Thinking
	NA

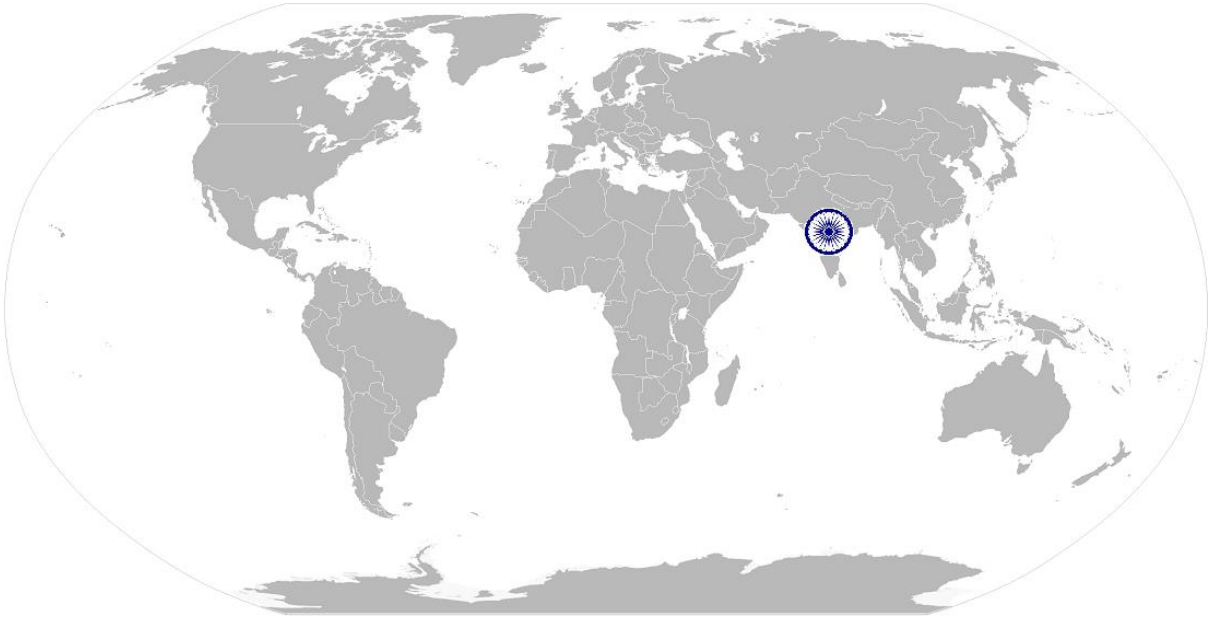
CSC/N1335 Use basic health and safety practices at the workplace

NOS Version Control

NOS Code	**CSC/N1335**		
Credits	**TBD**	**Version number**	**1.0**
Industry	**Capital Goods**	**Drafted on**	**14/04/2014**
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**	**24/11/2017**
Occupation	**Fitting and Assembly**	**Next review date**	**24/11/2021**

CSC/N1336 **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/N1336 **Work effectively with others**

National Occupational Standard

Unit Code	**CSC/N1336**
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 etc.
Scope	This unit/task covers the following: • Work effectively with others
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Work effectively with others	To be competent, the user/individual on the job must 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 /	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

CSC/N1336 **Work effectively with others**

organization and its processes)	work area KA3. relevant people and their responsibilities within the work area KA4. escalation matrix and procedures for reporting work and employment related issues
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)	
A. Core Skills/ Generic Skills	**ReadingSkills**
	The user/ individual on the job needs to know and understand how to: SA1. read basic terms and terminologies to accurately interpret work related documents, labels, supervisor instructions in the local language SA2. read and interpret accurate information from various relevant work instructions and records
	Writing Skills
	The user/ individual on the job needs to know and understand how to: SA3. write clear and legible notes to self, colleagues and seniors to pass messages, keep records, prepare to-do lists, take down instructions SA4. write basic numbers, quantities and work related terminology for operational requirements in the local language

CSC/N1336 **Work effectively with others**

	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA5. interact with the supervisor appropriately (correct protocol and manner of speaking) in order to understand the basic requirements of the product, production plans and other associated requirements SA6. give clear instructions to co-workers about the type of output required and answer queries SA7. display active listening skills while interacting with co-workers and other in the workplace
B. Professional Skills	**Decision Making**
	NA
	Plan and organize
	The user/individual on the job needs to know and understand how to: SB1. use appropriate planning to maintain a smooth relationship with fellow team members SB2. take steps within one's limits of authority to initiate modification in plan if the circumstances require it
	Customer centricity
	The user/individual on the job needs to know and understand how to: SB3. check that work meets customer requirements SB4. deliver consistent and reliable service to internal and external customers
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB5. work with co-workers and supervisor to resolve any issues that threaten disruption, increase risk, cause delays or under-achievement of quality and targets as per the planned schedule
	Analytical Thinking
	NA
	Critical Thinking
	NA

CSC/N1336 **Work effectively with others**

NOS Version Control

NOS Code	CSC/N1336		
Credits	TBD	Version number	1.0
Industry	Capital Goods	Drafted on	14/04/2014
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	24/11/2017
Occupation	Fitting and Assembly	Next review date	24/11/2021

Annexure

Nomenclature for QP and NOS

Qualifications Pack

9 characters

[ABC]/ Q 0101

[Insert 3 letter codes for SSC]

Q denoting Qualifications Pack

QP number (2 numbers)

Occupation (2 numbers)

Occupational Standard

An example of NOS with 'N'

9 characters

[ABC] / N 0101

[Insert 3 letter codes for SSC]

N denoting National Occupational Standard

OS number (2 numbers)

Occupation (2 numbers)

Back to top…

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/Q0306

Sector Skill Council: Capital Goods 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. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criterion.
6. To pass the Qualification Pack , every trainee should score a minimum of 70% of aggregate marks to successfully clear the assessment.
7. In case of *unsuccessful completion*, the trainee may seek reassessment on the Qualification Pack.

Total Marks: 900	**Compulsory NOS**			**Marks Allocation**	
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out of**	**Theory**	**Skills Practical**
CSC/N0307 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 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.identify requirements by analysing sample parts, tool design and blueprints		5	2	3

	PC6.plan sequence of operations for tools & dies making keeping in mind various considerations like requirements, timelines, resources available, interdependencies, constraints, compliances, etc.		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 and confirm resources required such as components, machinery,range of materials and processes		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 schedule 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
	PC18.release drawings and machining specifications to machine operators		4	1	3
	PC19.identify and select tools for tools & dies making based on design and blueprints		5	2	3
	PC20.identify and select lifting and rigging equipment based on design and blueprints		5	2	3
	PC21.select and procure appropriate metals to be used for tools & dies making as per design requirement		5	2	3

	PC22.hand over tools, equipment and metal components to be machined to the machine operators		2	0	2
	PC23.handle all clarifications sought by the operators		4	2	2
	PC24.collect job from all operators		2	0	2
	PC25.check the jobs as per drawing/instruction		5	2	3
	PC26.ensure in-process inspection of the tool elements and final assembly		5	2	3
		Total	**100**	**30**	**70**
CSC/N0308 Perform fitting operations on metal components for making tools and dies using hand tools and manually operated machines	PC1.comply with health and safety, environmental and other relevant regulations and guidelines at work	100	4	1	3
	PC2.adhere to procedures and guidelines for personal protective equipment (PPE) and other relevant safety regulations while performing die 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		4	1	3
	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		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		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 with various features 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/N0302 Grind surface using hand and/or hand-held power tools	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 die fitting operations		3	1	2
	PC3.work following laid down procedures and instructions		3	1	2
	PC4.ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition		2	0	2
	PC5.ensure work area is clean and safe from hazards before and after the job is completed		2	0	2
	PC6.obtain job specification from a valid and approved source		3	1	2
	PC7.ensure that all measuring equipment are within calibration date and are approved for usage		2	0	2
	PC8.read and establish job requirements from the job specification document accurately		4	1	3
	PC9.report and rectify incorrect and inconsistent information in job specification documents as per organization procedures		4	1	3
	PC10.prepare the work area for the fitting operations as per procedure or operational specification		3	1	2
	PC11.obtain correct work-pieces/raw materials and consumables as per job requirements		3	1	2
	PC12.identify the metals, metal alloys and non-metals accurately		2	0	2
	PC13.interpret surface finish specifications accurately		3	1	2
	PC14.select grinding method/technique as per the work requirements		2	0	2
	PC15.obtain appropriate tools and equipment per job requirements		2	0	2
	PC16.set work pieces as per job requirements using appropriate positioning and/or holding devices		3	0	3
	PC17.measure and mark equipment, objects, or parts to ensure grinding standards are met		3	1	2

	PC18.trim or scrape objects or parts, using chisels, scrapers, and other hand orpower tools and equipment		3	0	3
	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		3	1	2
	PC20.move controls to adjust, start, or stop equipment during grinding process		3	1	2
	PC21.load and adjust work-pieces onto equipment or work tables		3	1	2
	PC22.carry out the grinding process using and/or tools or hand-held power tools in accordance with standard operating procedures		5	1	4
	PC23.finish job surface to specification according to requirement		4	1	3
	PC24.perform wheel dressing using diamond cutter		4	1	3
	PC25.check the surface finish of the object on which grinding is done to ensure completeness of work		3	1	2
	PC26.identify common surface imperfections and correct errors		2	0	2
	PC27.ensure that the work-piece achieves the required characteristics and meets the finishing specification		2	0	2
	PC28.secure tools and equipment in a safe condition on completion of the processing activities		2	0	2
	PC29.determine the kind of tools and equipment needed to do a job or repair the tools		3	1	2
	PC30.perform routine maintenance on equipment and determining when and what kind of maintenance is needed		5	1	4
	PC31.complete documentation post completion of work, as per procedure		4	2	2
	PC32.refer unresolved job related problems to appropriate personnel for support		3	1	2
	PC33.monitor the problem and keep the supervisor informed about progress or any delays in resolving the problem		4	1	3
		Total	**100**	**23**	**77**
CSC/N0108 Operate	PC1.comply with health and safety, environmental and other relevant regulations and guidelines at work	100	3	1	2

conventional milling machines	PC2.adhere to procedures and guidelines for personal protective equipment (PPE) and other relevant safety		4	1	3
	PC3.work following laid down procedures and instructions		3	1	2
	PC4.ensure work area is clean and safe from hazards before and after the job is completed		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 various milling machines, 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 and quality standards		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 various milling operations to produce various features on metal and non-metal components		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 critical parameters		5	1	4
		Total	**100**	**11**	**89**
CSC/N0110 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 machining 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 To be competent, the user/individual on the job must be able to:		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 equipments to produce components with various features		4	0	4
	PC30.produce components as per given quality standards Components quality standards as per the process		4	1	3
	PC31.plan and work to 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 Knowledge and Understanding (K)		2	0	2
		Total	**100**	**9**	**91**
CSC/N0109 Operate grinding Machines	PC1.comply with health and safety, environmental and other relevant regulations and guidelines at work	100	5	2	3
	PC2.adhere to procedures and guidelines for personal protective equipment (PPE) and other relevant safety regulations while performing fabrication and fitting operations		5	2	3

	PC3.work following laid down procedures and instructions		5	2	3
	PC4.ensure work area is clean and safe from hazards		4	0	4
	PC5.ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition		4	0	4
	PC6.check that all measuring equipment are within calibration date Measuring equipment: external micrometers, surface finish equipment (eg.comparison plates, machines)		5	1	4
	PC7.obtain and prepare the appropriate materials, tools and equipment		6	2	4
	PC8.mount the work-piece safely and securely, in line with instructions		6	2	4
	PC9.set and adjust the machine tool speeds and feeds, in line with instructions		6	2	4
	PC10.use the machine tool controls safely and correctly, in line with operational procedures		6	2	4
	PC11.check that the finished components meet the standard required		5	2	3
	PC12.report any difficulties or problems that may arise with the grinding activities, and carry out any agreed actions		6	2	4
	PC13.shut down the equipment to a safe condition on completion of the grinding activities		6	2	4
	PC14.prepare grinding wheels through various methods		5	2	3
	PC15.Grind components to produce various features:		4	1	3
	PC16.check the quality of output, using measuring equipment appropriate to the aspects being checked and the tolerances to be achieved.		4	1	3
	PC17.check the machined component for accuracy in dimensions, parallelism and surface texture as per job specifications		4	1	3
	PC18.refer the problem to a competent internal specialist if it cannot be resolved		5	2	3
	PC19.obtain help or advice from specialist if the problem is outside his/her area of competence or experience		5	2	3
	PC20.comply with relevant legislation, standards, policies and procedures		4	1	3
		Total	**100**	**31**	**69**

CSC/N0309 Perform assembly operations on metal components to make tools and dies	PC1.work safely at all times, complying with health and safety, environmental and otherrelevant regulations and guidelines	100	5	2	3
	PC2.check that all safety mechanisms are in place and that the equipment is set correctlyfor the required operations		3	0	3
	PC3.adhere to procedures or systems in place for health and safety, including personalprotective equipment and other relevant safety regulations and procedures tocontribute to a safe work environment		5	2	3
	PC4.wear the appropriate protective clothing and equipment, and keep the work areaclean and tidy		3	0	3
	PC5.follow safe practice/approved setting up procedures at all times		3	1	2
	PC6.select measuring instruments based on tolerances required and application such as internal and external measurements		3	1	2
	PC7.take measurements using standard and specialized measuring instruments		4	1	3
	PC8.compare measurements to drawings and sketches to ensure conformity, fits andclearances		4	1	3
	PC9.record critical dimensions as required by workplace procedures		3	0	3
	PC10.read and establish job requirements from the job specification document accurately		4	2	2
	PC11.obtain job specification from a valid and approved source		4	1	3
	PC12.establish the procedures to complete the general machining, fitting or assemblingoperations		4	1	3
	PC13.obtain the appropriate tools and equipment for the general machining, fitting orassembling operation and parts used in producing assemblies		4	1	3
	PC14.check that all measuring equipment is within calibration date		3	0	3
	PC15.fasten or clamp production tool components temporarily as required for final assembly		5	2	3
	PC16.drill, tap and ream locating holes as required to permanently locate components		5	2	3
	PC17.fasten components permanently using methods such as using engineered fasteners,applying adhesives, soldering and brazing		5	2	3

	PC18.appropriate methods and techniques to assemble and secure the components intheir correct positions		5	2	3
	PC19.produce mechanical assemblies using various methods as per job specifications		5	2	3
	PC20.use various types of methods to dismantle mechanical assemblies without damage to components and/or subassemblies		4	1	3
	PC21.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
	PC22.leave the work area in a safe and tidy condition on completion of the manufacturingactivities		2	0	2
	PC23.return all tools and equipment to the correct location on completion of the fittingactivities		2	0	2
	PC24.support the customer remotely over the internet to test potential solutions		2	0	2
	PC25.perform the necessary checks for dimensional parameters and functioning of thetool and die		4	1	3
	PC26.use the appropriate measuring equipment for checking activities		3	1	2
	PC27.produce components within all of the applying quality standards		3	0	3
		Total	**100**	**26**	**74**
CSC/N1335 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		4	2	2
	PC6.state methods of accident prevention in the work environment of the job role		3	2	1
	PC7.state location of general health and safety equipment in the workplace		5	2	3
	PC8.inspect for faults, set up and safely use steps and ladders in general use		5	2	3

	PC9.work safely in and around trenches, elevated places and confined areas		5	2	3
	PC10.lift heavy objects safely using correct procedures		4	2	2
	PC11.apply good housekeeping practices at all times		5	2	3
	PC12.identify common hazard signs displayed in various areas		3	1	2
	PC13.retrieve and/or point out documents that refer to health and safety in the workplace		4	1	3
	PC14.use the various appropriate fire extinguishers on different types of fires correctly		4	1	3
	PC15.demonstrate rescue techniques applied during fire hazard		3	1	2
	PC16.demonstrate good housekeeping in order to prevent fire hazards		4	1	3
	PC17.demonstrate the correct use of a fire extinguisher		4	1	3
	PC18.demonstrate how to free a person from electrocution		4	1	3
	PC19.administer appropriate first aid to victims where required eg. in case of bleeding, burns, choking, electric shock, poisoning etc.		3	1	2
	PC20.demonstrate basic techniques of bandaging		4	1	3
	PC21.respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments		3	1	2
	PC22.perform and organize loss minimization or rescue activity during an accident in real or simulated environments		3	1	2
	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		3	1	2
	PC24.demonstrate the artificial respiration and the CPR Process		3	2	1
	PC25.participate in emergency procedures		2	1	1
	PC26.complete a written accident/incident report or dictate a report to another person, and send report to person responsible		3	1	2
	PC27.demonstrate correct method to move injured people and others during an emergency		3	1	2
		Total	**100**	**37**	**63**

CSC/N1336 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**