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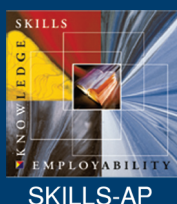


International
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Republic of Korea

REGIONAL MODEL COMPETENCY STANDARD: Manufacturing industry



Regional Skills and Employability Programme in Asia and the Pacific (SKILLS-AP)
Regional Office for Asia and the Pacific

REGIONAL MODEL COMPETENCY STANDARD:

Manufacturing industry

Regional Skills and Employability Programme in Asia and the Pacific (SKILLS-AP)
ILO Regional Office for Asia and the Pacific

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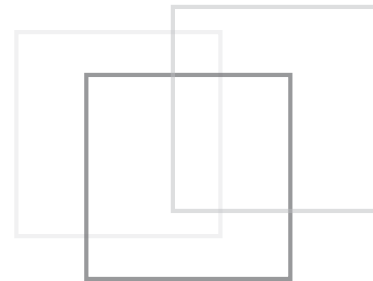
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Foreword



Training systems in the Asia Pacific region are often criticized on the basis that there is a mismatch between the skills offered and the needs of workers and employers. This means that some people are learning skills that are not needed by industry and training organizations are wasting their limited resources providing training that is not used. This is a serious problem for any country and it is a serious problem for developing countries as it holds back the development and growth in productivity and employment.

To address this situation, the ILO Regional Skills and Employability Programme in Asia and the Pacific (SKILLS-AP) has developed a series of Regional Model Competency Standards (RMCS) in a simplified format so that they could be used in discussions between governments, employers, workers and training organizations. In this various sets of competencies, an attempt has been made to minimize duplication and to clearly describe the basic elements in each competency standard.

The competencies are designed so that they can be modified to meet the specific requirements of an employer, job or workplace. Some competency elements will need to be added or deleted depending on the local requirements. This review process must take place to ensure the relevancy of any learning, training or assessment strategy based on the standards. Some competencies can be identified as essential (such as those relating to safety).

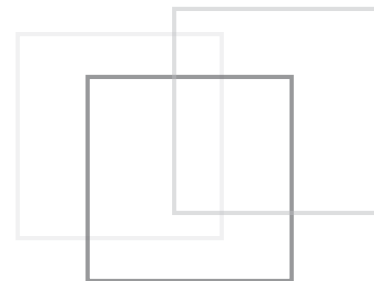
I hope that these can form a starting point for discussion with government, employers' and workers' organizations in countries without any existing competency standards. For those with existing sets of standards these can be used to benchmark or compare the two sets. I also hope that they will be used to assist in skills migration so that receiving countries will be able to clearly specify their skills requirements and that workers returning to their home country will be able to describe the skills that they have to future employers.

Other companion publications are also currently being developed by SKILLS-AP and future publications to support the use of the RMCS will include 'Developing a training programme and curriculum based on competency standards'; 'Developing training partnerships with industry' and using 'Competency standards for workplace learning'.

I would like to express my appreciation to Andre Lewis and Associates Pty Ltd who developed the basic sets of competencies and to Mr Raymond Grannall, Ms Wipusara Rugworakijkul and Ms Alin Sirisaksopit who prepared the final version for publication.

Sachiko Yamamoto
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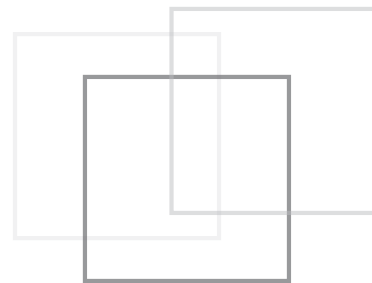
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How to use the RMCS



These competency standards can be used in many different ways for recruitment or the development of job descriptions. However the main use for which they were developed is so that they could be used in discussions with employers to identify and clearly specify the skills needed in the workplace.

The standards define the essential skills required to work in the manufacturing industry and provide a flexible framework that can be used by all manufacturing enterprises, regardless of location or business size. The structure has deliberately made very simple so that they can be easily understood by workers and employers and they do not cover every possible skill that could be needed. However additional elements can be added as required.

After a decision has been made on the competencies needed, teaching learning and assessment materials can be developed. This might include a curriculum, test projects, learner guides, texts, references, teaching strategies, group activities etc. There should also be some sort of assessment strategy which identifies appropriate ways to assess each competency.

The standards are grouped functionally and not as jobs or occupations so they need to be combined to meet local needs.

RMCS structure

The standards are grouped in broad industry category designated A to L.

A – Manufacturing core (4 units)
B – Basic manufacturing processes (21 units)
C – Casting and moulding (14 units)
D – Machine operation and component assembly (12 units)
E – Fabrication and finishing (27 Units)
F – Equipment servicing and maintenance (7 units)
G – Plastics manufacturing (16 units)
H – Textiles manufacturing (17 units)
J – Garment manufacturing (12 units)
K – Footwear manufacturing (8 units)
L – Furniture manufacturing (14 units)

It does not include competencies for specialist trade or advanced manufacturing processes although some included competencies would be common across these areas. The scope of the standards is entry level to basic trade work and encompasses common sector skills plus communication and health & safety in the workplace.

Each unit has a title and a brief description followed by **Performance elements** describing the skills a worker applies when undertaking the work defined in the unit. They set out what is done and the expected level of performance.

This RMCS is wide-ranging enough to apply to the majority of common job roles and trades in the manufacturing industry. The standards provide a broad guide that can be tailored to meet the needs of specific sectors, business enterprises and contractors. This can be through adding more detail on sector and enterprise requirements where appropriate.

While individual units define the competency outcomes necessary for a particular area of work, it is the combination of a number of units that describes a whole job role. The combining of units also captures the need to manage different tasks simultaneously and to adapt to different workplace environments and situations.

No distinction is made between knowledge elements and skill elements. No critical or essential elements have been identified. **However certain competency elements can be categories as essential.**

Assessment of competencies

Competency assessment means making a decision whether the person being assessed is 'competent' or 'not yet competent'. If they are not yet competent they may require additional time for practice or study to meet the necessary standards.

Many different methods can be used to assess competency standards. These include:

- Written or oral questions to test knowledge
- Direct observation of the candidate
- Providing test projects
- Role plays and case studies
- Problem solving
- Critical incident reporting
- Reviewing portfolios of evidence and third party workplace reports of on-the-job performance by the candidate.
- Other ways. As an example if the competency related to welding plumbing components the assessment would involve testing the components welded by the candidate to ensure they worked to industry standards.

A range of assessment methods should be chosen to ensure that all competency elements can be practically demonstrated. Methods must include the assessment of knowledge as well as assessment of practical skills. As far as possible, competencies should be demonstrated within a fully-equipped operational work environment using industry-current equipment, real materials, industry-realistic activities and typical workplace time constraints.

Enterprise methods and standards

In all cases, it is expected that there will be different enterprise methods and standards and that any training provided should reflect the different standards. Similarly there will be different legislation and government regulations that apply in different countries and regions and these also must be taken into account in designing training programmes.

Within this set of competency standards the various competency elements do not specify 'safely', 'correctly' or 'in an environmentally responsible manner' for the various competency elements because it is assumed that words would apply to each competency element.

Functional area A – Manufacturing core

Unit A1 Communicate effectively in the workplace

Communicate with supervisors and work team members orally and in writing in a clear and effective way to ensure work activities and performance requirements are correctly interpreted.

Performance elements

- Communicate information about tasks, processes, events or skills using appropriate choices of communication techniques, e.g. telephone, face to face, written report, sketches, etc.
- Listen to instructions without continuous interruptions of the speaker and question at the end if required to gain extra information.
- Communicate effectively with team members in familiar and unfamiliar situations and take part in group discussion to set and agree on appropriate work outcomes.
- Listen to the opinions of others and reflect their views accurately.
- Participate in group discussions and provide useful input as required.
- Prepare simple written reports on work activities that are accurate and understandable to the reader.

Unit A2 Follow workplace health and safety requirements

Understand and follow workplace health and safety regulations and practices as required by the organization and relevant government legislation. Apply safe work practices to own work and to protect others working in the team and the general community. Safely use of tools, equipment and handling/storage of workplace materials.

Performance elements

- Perform all work tasks in a safe manner and in accordance with legislative requirements, enterprise policies and procedures.
- Select, use and maintain tools, equipment and materials safely in accordance with enterprise procedures.
- Wear correct personal protective equipment and clothing such as overalls, steel capped boots, high visibility vest, jacket, gloves, safety glasses/goggles, hard hat, cap, dust mask/respirator, ear muffs/plugs and store safely after use.
- Use all plant and equipment guards and safety features in accordance with manufacturer's specifications.
- Recognize, understand and comply with all safety signs and symbols.

- Identify hazards in the work area such as chemical spills, gases, liquids under pressure, moving machinery and equipment, hazardous materials, work at heights, work in confined spaces, high temperatures, noise, dust, vapours, fires, protrusions, sharp equipment, overhanging beams and traffic and report any unsafe situations to designated personnel.
- Control risks in work activities by following workplace procedures and safe work instructions.
- Complete accident or incident reports according to workplace procedures and relevant legislation.
- Follow safe workplace procedures for dealing with accidents and emergencies and instructions from workplace safety officers.
- Practice and carry out emergency and evacuation procedures when required.
- Select and use the correct fire fighting equipment such as fire reel, fire hydrant and hoses, fire extinguishers and manual fire fighting instruments to extinguish fires.
- Read and accurately interpret Materials Safety Data Sheets to handle and store all workplace materials safely.

Unit A3 Apply quality procedures in the manufacturing process

Understand and apply organizational quality requirements and procedures to all aspects of work. Recognize quality problems in process or materials used and either correct the problem or report it to a supervisor.

Performance elements

- Continuously assess completed work against workplace standards relevant to the operation being undertaken.
- Carry out relevant visual inspections of materials, component parts and final products to determine any quality issues in finish, size, durability, product variations, materials, alignment, colour, damage and imperfections.
- Understand and comply with the production process or processes used by others to contribute to the quality of final products.
- Identify and isolate faulty pieces/components or final products/batches as required.
- Record and/or report the faults and any identified causes to the supervisor concerned if required in accordance with organizational procedures.
- Continuously check received materials, component parts or final products against workplace standards and specifications for conformance.
- Identify and isolate faulty material or component parts related to own work.
- Identify the causes of any identified faults and take corrective action specified in organizational procedures.
- Measure materials, component parts or products, as required, using the appropriate measuring instruments in accordance with workplace procedures.
- Record basic information on the quality and other indicators of production.
- Recommend suitable preventative action based on workplace quality standards and the identified causes of deviations from specified quality standards of materials, component parts or final products.

Unit A4 Plan manufacturing work tasks

Plan all work tasks before commencing work to ensure tools, equipment and materials are suitable for the work to be carried out. Sequence the work in the most effective and efficient way to meet organizational performance measures and quality requirements.

Performance elements

- Obtain work instructions and operational details, confirm and apply them.
- Select tools and equipment to carry out tasks consistent with the requirements of the job, check them for service ability and rectify any faults or report to supervisor prior to commencement.
- Calculate material quantity requirements in accordance with plans and/or specifications obtain and prepare them ready for use.
- Identify any environmental protection requirements for the work in accordance with organizational and regulatory specifications.
- Determine and, where necessary, modify a work plan so that work is performed in a logical and efficient sequence.
- Complete set tasks to meet work instructions and organizational quality requirements.
- Clean up the work area and dispose of or recycle unused materials in accordance with organizational requirements.
- Clean, check and maintain tools and equipment and store them in accordance with manufacturers' recommendations and organizational work practices.

Functional area B – Basic manufacturing processes

Unit B1 Plan a complete manufacturing work activity

Use basic planning tools and techniques to plan and sequence a complete manufacturing activity or work project. Follow the plan and modify where necessary to maintain the expected production outcomes, time schedule and quality requirements. Evaluate the plan after implementation and identify ways to improve the planning process and effectiveness in future.

Performance elements

- Identify activity outcomes and objectives and clarify as required with appropriate persons such as supervisors or work team members.
- Access and interpret all relevant task lists, instructions, manufacturer manuals, diagrams and schematics, technical drawings and sketches, parts lists and computer records for planning.
- Identify and clarify as required the complete activity requirements, including resources, overall timeframe, quality expectations and criteria for acceptable completion.
- Obtain and confirm relevant specifications and procedures for the activity or project.
- Plan the process for the complete activity with prioritised and sequenced individual components.
- Identify potential hazards and their control measures in planning the complete activity, including housekeeping.
- Select and use planning tools and techniques according to the needs of the activity.
- Check the plan for accuracy and conformance to instructions and requirements.
- Modify the plan as necessary to overcome unforeseen difficulties or developments that occur as the work activity progresses.
- Review the results of the activity against the original plan, and identify possible future improvements to planning of other activities.

Unit B2 Handle, move and store bulk fluids/gases

Efficiently and effectively move and store bulk fluids and gases in appropriate containers following all relevant safety procedures. Check, fill and clean bulk fluid and gas containers and correctly label them ready for use.

Performance elements

- Determine bulk fluid or gas properties from material safety data sheet, dangerous goods codes, manifests or organization's material registers.
- Select the safe and most effective handling methods for various types of fluid and gas containers using labels, colour codes, signage and manufacturer's specifications.
- Identify possible handling hazards of the fluid or gas or clarify/confirm this with appropriately qualified and authorised personnel.
- Implement all relevant safety and emergency procedures for handling fluids and gases before commencing the movement.
- Use the correct and appropriate hand or mechanical handling methods to move the fluid or gas containers to the specified location.
- Store bulk fluids/gases in the correct storage conditions specified by supervisor's instructions and manufacturers' specifications/directions.
- Check the fluid or gas containers are safe and clean ready for use.
- Fill or empty fluid or gas from containers in accordance with organizational standard operating procedures and any applicable regulations and legislative requirements.
- Store fluid and gas containers in accordance with organizational site procedures ensuring necessary separation and segregation of individual containers.
- Correctly label stored fluid and gas containers to organizational standard operational procedures and any applicable regulations and legislative requirements.

Unit B3 Operate mobile load shifting equipment

Select and use a range of load shifting equipment used in manufacturing workplaces safely and effectively and avoiding damage to the equipment and load. Check, shut down and park load shifting equipment according to manufacturer's specifications and organizational requirements.

Performance elements

- Undertake routine pre-operational checks in accordance with manufacturers' specifications and regulatory safety requirements including checking the battery, water, fuel, hazard warning lights, fluid or gas leaks, braking, movement of booms, tyres, emergency device/alarms, log books and any evidence of damage or excessive wear and tear.
- Inspect all load shifting attachments and/or equipment such as hooks, electromagnetic hooks, buckets, slings, tag lines, shackles, lifting lugs and fork arms.
- Prepare to shift loads by inspecting the work area to identify hazards, and take appropriate prevention/control measures as required.
- Conduct pre-operational and post start-up equipment checks in accordance with manufacturers' specifications and/or the equipment operating manual and report all equipment defects and damage to appropriate personnel.
- Select the most appropriate load shifting device such as front end loaders, ride on forklifts and pallet trucks, bobcats or vehicle loading crane to suit load and shifting requirements and operate it within design specifications and the safe working load limit in accordance with organizational standard operating procedures.

- Lift and shift loads, ensuring balance, clear vision throughout the operation to protect the load by selecting a safe and efficient path of movement for the shifting task, checking and monitoring constantly for obstacles and hazards.
- Place loads ensuring safety, stability, protection of material and avoidance of hazards on site.
- Shut down equipment and secure the work site with machinery parked to avoid damage and equipment hazards.
- Complete a post-operational check in accordance with operational procedures and park load shifting machinery in accordance with organizational standard operating procedures, avoiding all site hazards.

Unit B4 Undertake manual handling of materials

Determine the appropriate manual handling equipment to use to move and store manufacturing materials in a workplace. Safely move materials without damage to them or the handling equipment.

Performance elements

- Lift materials manually correctly utilizing the most appropriate technique after assessing any risks associated with the lifting task.
- The load weight is determined using scales or by interpreting relevant signage.
- Use lifting techniques and equipment such as hand trolleys, wheelbarrows, motorised/hand pallet trucks and hand carts considering the type of movement, best methods of movement and the height and position of stored items.
- Place material to be handled and moved safely and securely on moving equipment.
- Relocate material ensuring safety of personnel and security of material.
- Unload material from moving equipment and place in a safe and secure manner.

Unit B5 Order manufacturing materials

Determine material requirements for instructions or requisitions and place orders with suppliers. Receive goods from suppliers, checking for specified quality or any damage and respond accordingly. Complete goods received records.

Performance elements

- Prepare purchase orders/lists with material specifications, price limitations, quantities and delivery requirements based on instructions, company requisitions etc.
- Inform suppliers/vendors of requirements and specifications according to organizational standard operating procedures.
- Follow up suppliers/vendors to achieve delivery as required.
- Receive goods checking for quality or damage and confirm payment or return for credit as necessary.
- Complete goods received records/files accurately according to enterprise standard procedures.

Unit B6 Undertake warehouse receipt of manufacturing goods

Receive goods in a manufacturing warehouse, checking for correct quality and quantity. Unload move and store goods correctly and safely in the warehouse and complete inventory documentation.

Performance elements

- Check supplier documentation on receive goods when delivered against order and according to organizational standard operating procedures.
- Confirm the quality and quantity of received goods against order and supplier documentation.
- Identify incorrect and damaged goods and take appropriate action.
- Arrange unloading of goods including any special unloading procedures required.
- Unload goods using manual handling or appropriate lifting equipment.
- Sign and process carrier or supplier documentation according to organizational standard operating procedures.
- Prepare, locate and store received goods according to organizational standard operating procedures and any relevant dangerous goods acts and regulations for storage of chemicals/poisons etc.
- Apply signs, codes or labels to received goods according as required.
- Complete inventory records documentation.

Unit B7 Undertake warehouse dispatch of manufacturing goods

Manufacturing goods are arranged, packed and readied for dispatch according to customer specifications. Goods are loaded for dispatch including instructing the carrier on any special handling requirements. Goods dispatch documentation is completed according to organizational requirements.

Performance elements

- Arrange and consolidate orders into customer or carrier batches according to organizational standard operating procedures.
- Place consolidated goods into correct dispatch areas for delivery.
- Pack or palletise goods for dispatch with appropriate wrapping, shrink wrapping, bubble wrap, polystyrene packing, pallets, crate and boxes and seal with packing tape or banding.
- Correctly label all goods and attached appropriate documentation.
- Dispatch goods checking carrier and customer documentation.
- Communicate loading and transportation requirements to driver including special loading procedures that may be required with respect to hazardous goods, chemicals/poisons, etc. and for goods where size, shape or fragility require special procedures.
- Load goods onto vehicle using appropriate materials handling techniques and devices.
- Complete inventory records/documentation according to organizational requirements.

Unit B8 Perform production packaging of manufactured goods

Package manufactured goods ready for storage and dispatch using mechanical and automated equipment. Correctly label and stored packaged goods in a manufacturing warehouse and record location for retrieval.

Performance elements

- Undertake packaging of manufacturing goods using manual processes, semi automatic and fully automated packaging equipment.
- Identify the packaged goods safety, storage conditions and organizational requirements.
- Label packaged items using identification labels, tags and stickers that are checked for correctness and appropriately placed/attached.

- Store packaged items in a safe, orderly and retrievable manner and record the location in the warehouse/store for future access.

Unit B9 Inspect pre-packed manufactured items

Check and measure pre-packed manufacturing items to ensure they comply with organizational and legislative requirements. Ensure the pre-packaged items are safely packed, meet specifications and are correctly marked for quality control purposes. Use checking and measuring devices and handling equipment for inspection and complete all necessary documentation.

Performance elements

- Interpret and follow approved markings on all prepacked items intended for sale and inspect pre-packed articles for compliance with the marking requirements.
- Examine pre-packed items for the marking of packer identification, quantity statements and unit pricing in accordance with organizational requirements.
- Check and measure items in accordance with marketplace intelligence and organizational procedures.
- Assess the product handling and disposal requirements to ensure they comply with workplace, health and safety, environmental considerations such as disposal of hazardous materials, weather conditions, storage methods and conditions and auditor's requirements.
- Select and use any specialised equipment and measuring devices such as reference standards and test equipment, safety equipment, product handling equipment and measuring equipment required and document outcomes for further action.
- Complete inspection documentation in accordance with organizational procedures.

Unit B10 Use mechanical hand tools

Use, maintain and store a range of common manufacturing hand tools in a safe and effective manner to perform work tasks.

Performance elements

- Select and use hand tools such as hacksaws, hammers, punches, screwdrivers, sockets, wrenches, scrapers, chisels, gouges, wood planes and files of all cross-sectional shapes and types appropriate to the manufacturing task requirements.
- Use hand tools to produce desired outcomes to job specifications which may include finish, tension, size or shape.
- Follow all safety requirements for the tools used before, during and after use.
- Identify and mark unsafe or faulty tools for repair according to designated procedures before, during and after use.
- Provide routine maintenance of tools, including cleaning, lubricating, tightening, simple repair, sharpening and adjustment using engineering principles, equipment and safe procedures.
- Hand-sharpen tools according to manufacturer's manuals, standard organizational operational procedures, principles and techniques.
- Safely store hand tools in appropriate location according to standard organizational operational procedures and manufacturers' recommendations.

Unit B11 Use power tools for hand held manufacturing operations

Use, maintain and store a range of common manufacturing power tools in a safe and effective manner to perform work tasks.

Performance elements

- Use power tools such as - electric or pneumatic/hydraulic drills, grinders, jigsaws, nibblers, cutting saws, sanders, planers, routers, pedestal drills and pedestal grinders appropriate to the manufacturing task requirements.
- Determine the sequence for using power tools in the manufacturing operation, including clamping using multigrips, vices, jigs and fixtures, clamps and undertake alignment and adjustment to produce desired outcomes
- Produce manufactured material to job specifications including finish, size or shape.
- Identify any unsafe or faulty tools and mark them for repair before, during and after use according to designated procedures.
- Undertake operational maintenance of tools including hand sharpening, cleaning, lubricating, tightening, simple tool repairs and adjustments using engineering principles, equipment to organizational procedures and requirements.
- Store all power tools safely in appropriate location according to standard workshop procedures and manufacturers' recommendations.

Unit B12 Undertake tool store ordering, issuing and maintenance

Order manufacturing tools and tooling equipment and receive, check and store goods. Issue tools and tooling equipment following organizational procedures and maintain returned tools, reporting any damage or unauthorised use

Performance elements

- Order tools and tooling items such as hand tools, cutting tips for lathes, mills and other machines for metal removal, grinding wheels, special steel, engineering power tools, and electro-mechanical devices (e.g. for lifting, clamping), measuring and marking equipment, templates, jigs, etc. from order documentation, drawings, and liaison with trade and production personnel.
- Identify appropriate tools/tooling from supplier catalogues and manuals, including correct size, hardness, quality, etc.
- Place orders according to organizational operating procedures.
- Receive tool/tooling orders from main receipt warehouse or direct from suppliers and unpack and place stock in correct storage location.
- Confirm all items are checked as ordered and confirm against order with incorrect items processed and returned for replacement or credit.
- Maintain tools and tooling items and clean and protect as necessary.
- Distribute tools/tooling to users according to requisition systems and organizational standard operating procedures.
- Follow enterprise documentation procedures for issuing tools and tooling items including reporting any unauthorized use.

Unit B13 Undertake basic manufacturing process planning

Plan a manufacturing process by examining project specifications and requirements using flow charts and documented steps and milestones. Develop material and parts lists for the process and tool and equipment requirements.

Performance elements

- Examine manufacturing project specifications supporting engineering and production data to determine the production processes to be used.
- Obtain and examine specifications for the manufacturing project and process.
- Plan the work over a specified timeframe, taking into account required and available resources.
- Determine production sequence steps required for the process produce flow charts where required in accordance with organizational standard operating procedures.
- Prepare material and parts lists for the process in accordance with organizational standard operating procedures.
- Document tooling and/or equipment requirements and the quality assurance steps and specifications to be incorporated into the process.
- Document all process steps and milestones against which progress can be checked clearly represented in accordance with organizational standard operating procedures.

Unit B14 Undertake basic manufacturing production scheduling

Identify production requirements for manufacturing component/part production including inventory capacities, procurement requirements and priorities. Schedule and document the work using standard times required by the organization.

Performance elements

- Identify production requirements and capacities from engineering production data obtained in accordance with workplace procedures.
- Identify inventory capacities and procurement and supply requirements and constraints.
- Identify all production capacity and constraints, priorities and standard times for the scheduling.
- Prepare the schedule for production of a component/part in accordance with production, inventory, procurements, time constraints, supply capacities and requirements.
- Document the schedule in accordance with accepted organizational procedures.

Unit B15 Mark off/out (general engineering)

Prepare a marking out process from provided drawings and specifications for an engineering job. Use appropriate methods for establishing datum points and transferring dimensions and mark out using specialist tools and equipment.

Performance elements

- Determine engineering job requirements from drawings, job instructions and specifications.
- Select appropriate methods and sequencing consistent with proposed manufacturing process using organizational standard operating procedures.
- Transfer dimensions and carry out all marking off/out of engineering components, jigs and fixtures, castings, templates, dies and tooling to specifications using appropriate tools and equipment such as marking out tables, surface tables, rotary tables, dividing heads, etc., vee blocks, cylinder squares, sine bars and the like, vernier height gauges, protractors, straight edge and set squares, hammers, scribes, centre punch and marking medium.
- Correctly establish datum points and use appropriate calculations where required.

Unit B16 Use tools for precision manufacturing work

Use manufacturing and engineering tools in a safe and efficient manner for precision tooling work meeting specifications for tolerances, allowances, fit, finish and alignment. Modify tools as required, inspect them for damage before, during and after use, maintain and store them correctly.

Performance elements

- Determine precision job and task requirements from specifications including tolerances, allowances, fits, finishes, alignments and clarify with supervisors.
- Select appropriate processes/techniques for the task, specifications and material including cutting out, drilling, fitting, filing, reaming, lapping, broaching, burnishing, scraping, polishing, hand held grinding, chiselling.
- Prepare tools, tooling, accessories and materials to produce a precision outcome.
- Determine, where applicable, cutting tool modifications necessary to produce outcome using engineering principles and modify and prepare tools/tooling by tool shaping, rake angle and clearance angles as required.
- Use tools to produce work to precise specifications in safe manner and using appropriate engineering principles and methods for selected operation/s.
- Use all tools according to acceptable engineering principles, methods, applications and procedures to produce specified outcome to the required accuracy.
- Inspect all tools and equipment for safe and proper working order before, during and after use.
- Identify unserviceable tools/equipment for repair where appropriate, or marked for repair and/or disposal, according to prescribed organizational procedures.
- Maintain and store tools are stored to ensure serviceability.

Unit B17 Terminate and connect electrical wiring

Safely terminate and connect electrical wiring to equipment and machinery in a manufacturing workplace. Prepare to undertake the work to meet all electrical safety requirements, wiring codes and electrical codes of practice. Mark, tag and label completed wiring work, test and report all necessary documentation for the work.

Performance elements

- Prepare electrical wiring associated with power, lighting, control wiring, machinery, switchboards and other electrical apparatus for termination and connection ensuring work is undertaken safely and to workplace procedures and local electrical regulations, wiring codes, codes of practice (electrical) and international standards.
- Check materials to be used in the job for correct specifications.
- Connect electrical wiring terminations/connections using a range of methods including clamping, crimping, pin connection, soldered joints, plugs, sockets, etc., clamping of cables and wires, sealing entry points where required to specifications, manufacturers' requirements and to meet safety and local electrical regulations.
- Adjust all brackets, clamps, holders, etc. adjusted and fix to specifications.
- Mark, tag and label all cables, wires, conductors and to specification.
- Test all completed wiring and connections for compliance with specifications.
- Complete all reports and documentation correctly and to required specifications.

Unit B18 Use comparison and basic measuring devices

Effectively use a range of manual and electronic comparison devices in a manufacturing workplace for comparing thread angles, tapers, pressure, etc. Effectively use a range of manual and electronic measuring devices in a manufacturing workplace for linear measure, weight, voltage resistance and amperage. Maintain and store devices correctly after use.

Performance elements

- Use comparison devices such as go/no-go devices, thread angle and taper gauges, temperature gauges, pressure gauges, measuring gauges and overlay indicators, templates, digital devices and pre-set verniers and micrometers and/or basic measuring devices such as linear measuring devices measuring to within 1mm graduation and including rules, tapes and retractable tapes to undertake required comparisons or measurements using organizational standard operating procedures.
- Check or sort items using comparison and/or basic measuring devices for comparison of length, angle, size, temperature, pressure, weight, voltage, resistance and amperage.
- Maintain comparison and/or basic measuring devices ensuring basic care and storage procedures to manufacturers' standards or organizational standard operating procedures.

Unit B19 Produce basic engineering drawings

Identify and confirm drawing requirements from specifications. Use a range of drafting equipment, including CAD to produce drawings to specification. Prepare parts/component lists to accompany drawings and obtain approval from supervisors and/or customers. Copy and issue approved drawings in a range of formats and store and catalogue them.

Performance elements

- Identify engineering drawing requirements from customer and/or work specification and associated documents ensuring all data necessary to produce the drawing is identified and collected.
- Confirm the drawing requirements with relevant personnel and establish timeframes for completion.
- Select drafting equipment, including the use of Computer Aided Drafting systems where appropriate for the drawing method chosen and apply drafting principles to produce a drawing that is consistent with standard operating procedures within the enterprise.
- Make any necessary changes to engineering drawing after checking for consistency with specifications.
- Prepare an engineering parts list of components parts organized by component type and/or in accordance with organization/customer requirements.
- Record drawings and or parts lists records such as issuing security classifications, filing and prepared distribution lists for approval by supervisor in accordance with organizational standard operating procedures.
- Copy and issue approved drawings and parts lists to relevant personnel as required in hard copy, photographic, slide or transparency form including presentation as a single drawing or with other drawings and support documentation as a package.
- Store and catalogue approved drawings and parts lists in accordance with organizational standard operating procedures.

Unit B20 Produce basic engineering detail drafting

Produce basic engineering detail drawings to organizational and/or international standards using standard symbols to specify components. Use manufacturer's catalogues and other design specifications to determine correct inclusion of components in the drawing.

Performance elements

- Prepare drawings in plane orthogonal, isometric projection or equivalent including auxiliary views and sections to local or international standards.
- Prepare layout, assembly and component drawings from specifications that are dimensioned and labelled using supplied tolerances in accordance with relevant organizational or international standards.
- Use standard symbols to local or international standards or equivalent to specify requirements in the drawings.
- Determine component and/or material requirements from supplier and manufacturers' catalogues using design specifications.

Unit B21 Create 2D engineering drawings using CAD

Produce accurate 2D drawings of plans, diagrams, charts and electrical/electronic circuits using CAD. Customise the CAD system variable, defaults and menus as required and link drawing entities to database attributes to suit the required job specifications. Produce supplementary data for the drawing in a bill of materials.

Performance elements

- Customise CAD system variables such as menus, drawing defaults to suit organizational standard operating procedures for a drafting job such as plans, diagrams, charts, electrical/electronic circuits.
- Develop macros as required for the drafting job.
- Create 2D drawings using the full capability of the available software system.
- Link drawing entities such as lines, arcs, circles, text, hatch and dimensions to database attributes including layer or level, line type, line width, colour and text to suit job requirements and create detailed views using various scales to meet job requirements.
- Save drawings files in various formats and list linked entities in a bill of materials format to meet job requirements.
- Extract supplementary data from drawing to meet job requirements including area, lengths, angles and perimeters.

Functional area C – Casting and moulding

Unit C1 Operate melting furnace

Select materials and start up furnace, ensuring the furnace is in correct working order. Operate the melting furnace to enterprise standard procedures, monitoring its operating conditions. Unload and shut down the furnace undertaking maintenance where required.

Performance elements

- Requisition materials for operation according to enterprise standard procedures.
- Undertake charge analysis, converting this to furnace charge weight and weighing it.

- Inspect the furnace for defects or damage prior to start up and report any faults.
- Start up and maintain the furnace to enterprise standard procedures.
- Pre-heat materials if required and charge into furnace.
- Identify and follow emergency/safety procedures including provision for the emergency unloading of molten metal.
- Check and adjust furnace operation if required, including sampling for chemical analysis, temperature of metal, drossing and/or degassing.
- Identify the quantity of metal required and unload or tap the required amount according to enterprise standard procedures.
- Shut down the furnace to enterprise standard procedures and undertake any routine operational maintenance.

Unit C2 Perform gravity die casting

Prepare equipment and manually pour die into casts. Die and materials, furnace and work area is cleaned.

Performance elements

- Use appropriate safety clothing and apparatus.
- Mix die coat in correct proportion and apply it in correct sequence ensuring that it is at the correct temperature.
- Close the die and place it in the machine clamping to the required torque.
- Pour the die at a continuous and appropriate rate.
- Make allowance for cooling time.
- Monitor the die coating conditions and respray if required.
- Remove any flash from the die.
- Operate a shot blaster in a safe manner and according to enterprise standard procedures to clean the die.
- Take any remedial action if required based on a chemical analysis of the melt.
- Dross and/or degas furnace to enterprise standard procedures.
- Clean up work area.

Unit C3 Operate pressure die casting machine

Plan efficient flow of finished product i.e. breaking of runners, stacking baskets, bins, conveyors. Conduct pre-operational checks and operate pressure die casting machinery to produce castings.

Performance elements

- Use and apply personal protective equipment and safe work practices and procedures.
- Conduct start-up procedure according to enterprise standard procedures.
- Adjust shot size, nitrogen and/or vacuum systems, picking robot, gripper and spray nozzles as necessary.
- Operate the machine control panel.
- Operate the die casting machine to enterprise standard procedures.
- Break off the runners correctly.
- Visually inspect castings for porosity, cracks, tears, splits, sinks, cold shuts, tinning and die surface crazing according to enterprise standard procedures.
- Handle castings in a manner that minimises risk of damage to the casting and injury to personnel.
- Produce first-off castings, visually inspect and submit for checking against specifications.
- Maintain the furnace at optimum operating condition.

Unit C4 Prepare and mix sand for metal moulding

Prepare, load, mix, sample, discharge and clean-up sand mix for metal moulding.

Performance elements

- Perform all pre start-up checks safely and according to enterprise standard procedures.
- Determine, measure and load formula for sand mix.
- Mix sand for correct time to specifications.
- Monitor and maintain supply.
- Report any material faults.
- Take and test samples in accordance with standard operating procedures.
- Compare test results against specifications and make adjustments to formula/mix as required.
- Discharge load correctly and dispose of unwanted treated sand according to enterprise standard procedures.
- Shut down and clean mixer according to enterprise standard procedures.

Unit C5 Produce moulds and cores by hand (jobbing)

Plan all work tasks to meet job requirements. Select equipment and materials and sequence the work in the most effective and efficient way. Make mould to specification according to enterprise standard procedures. Clean up and restore work area.

Performance elements

- Identify job requirements from drawings, instructions and specifications.
- Select materials appropriate to job requirements.
- Identify, inspect, assemble and set up pattern equipment.
- Position core in prints utilizing chaplets and chills as required and vented to specification.
- Close and check mould for compliance to component specification.
- Select and position appropriate moulding/core making equipment.
- Select and secure moulding media according.
- Select or manufacture pouring basin to specification and positioned.
- Ram up mould and cores with joints and drawbacks as required.
- Utilize parting and stripping systems in.
- Position and secure loose pieces, vents, risers and runners as required.
- Remove pattern and loose pieces are from mould and core box in a safe manner least likely to cause damage to the pattern.
- Inspect and repair mould as required.
- Clean and paint mould and core according to specification.
- Clear all materials/debris and dispose of unwanted treated sand according to enterprise standard procedures and legislative and statutory requirements.
- Leave work site clean and in a safe state.

Unit C6 Operate sand moulding and core making machines

Determine job requirements and conduct pre-operational checks. Operate machine to mould/cores. Assemble mould/cores and clean-up.

Performance elements

- Interpret instructions and specifications correctly.
- Select and inspect pattern/core box to specifications and clean as required.

- Identify damaged patterns/core boxes for repair or replacement to enterprise standard procedures.
- Set up pattern/core box in bolster and core box.
- Select appropriate moulding media to produce mould and core to specification.
- Fill moulds/cores to specification.
- Operate and unload machine in accordance with standard operating procedures.
- Strip, inspect and paint moulds/cores as required.
- Dry, glue and vent moulds/cores as required to specification.
- Set runner bush to specification as required.
- Clear all materials/debris and dispose of unwanted treated sand according to enterprise standard procedures and legislative and statutory requirements.
- Leave work site clean and in a safe state.

Unit C7 Pour molten metal

Prepare for pouring molten metal. Transfer preheated/prepared ladle to furnace. Monitor and maintain quality of metal. Pour molten metal. Empty excess metal from ladle and clean.

Performance elements

- Check the condition of the mould and ladle according to enterprise standard procedures.
- Check the temperature of molten metal for conformance to specification, and sequence pouring method.
- Identify the capacity of the required pour against specification.
- Preheat/prepare the ladle to receive molten metal.
- Check safety clips.
- Fill and transfer the ladle to the pouring area.
- Determine additives from specification and added to molten metal as required.
- Remove slag/dross where necessary.
- Monitor the temperature as required.
- Undertake chemical analysis and apply remedial action as required.
- Inform personnel in the immediate area of the metal pour and that a pour is to take place and use appropriate safety clothing and equipment as specified in standard operating procedures.
- Pour metal safely at an appropriate and continuous rate to specification.
- Pour a test bar in accordance.
- Pour and tag pigs.
- Empty, clean and maintain the ladle according to enterprise standard procedures.

Unit C8 Fettle and trim metal castings/forgings

Determine job requirements. Observe safety requirements ensuring personal protective equipment is selected and used correctly. Identify excess material for removal. Select correct tools and equipment and remove excess material. Assess castings/forgings for quality.

Performance elements

- Determine job requirements correctly from instructions and specifications.
- Locate and arrange correct mouldings and/or castings/forgings for efficient processing.

- Select and use personal protective equipment correctly.
- Handle castings/forgings using manual or mechanical handling methods appropriate to the task.
- Store or position castings/forgings in a safe manner.
- Identify excess material for removal.
- Casting is removed from mould and/or sand media is removed from casting as required.
- Castings/forgings are visually checked as suitable for further processing, and excess metal is correctly identified.
- Select cleaning method appropriate to casting and job requirements.
- Set and use rumbling/shot blast/sand blast equipment to specification and as required.
- Select and use appropriate hand and power tools for the given task.
- Remove excess metal (e.g. runners, risers and flashing) using methods and equipment appropriate to the task.
- Identify excess metal suitable for recycling.
- Identify and isolate excess metallic materials are from specifications as required.
- Visually check castings/forgings for conformance with specifications.
- Reject or set aside and identify non-conforming castings/forgings for further consideration or remedial action.
- Report or record faults as required according to enterprise standard procedures.

Unit C9 Assemble plated patterns

Determine job requirements. Inspect, layout and mount pattern on plates and runner system. Inspect the plated pattern assembly for compliance with specifications.

Performance elements

- Correctly interpret and follow job instructions and specifications.
- Inspect pattern(s) to ensure dimensions and surface finishes conform to specifications.
- Lay out and align pattern and runner system to specifications from drawings, sketches or verbal instructions.
- Attach cope and drag patterns/double sided match plate patterns to pattern plate/s according to specification.
- Inspect cope and drag patterns/double sided match plate patterns for security and alignment.
- Ensure the volume of runner system conforms to specification.
- Attach runner components to pattern plates using appropriate fixing and joining techniques to specification.
- Inspect surface and mould ability of plated pattern assembly for compliance with specifications.

Unit C10 Carry out heat treatment

Determine job requirements, including identifying hazardous conditions. Select and set up equipment. Use safety clothing and personal protective equipment to work with hot metals. Heat treats metals.

Performance elements

- Determine job requirements are from engineering drawings, job sheet, or verbal instructions from metallurgist or supervisor.

- Identify hazardous conditions and implement hazard control measures to maintain a safe work environment.
- Select appropriate equipment for the required heat treatment.
- Set up equipment according to enterprise standard procedures and manufacturers' instructions.
- Correctly use safety clothing and personal protective equipment to work safely with hot metals.
- Demonstrate emergency procedures according to approved safety instructions.
- Identify, understand and follow safety signs and symbols.
- Use equipment according to specifications and standard operating procedures.
- Heat treat material to achieve required result - may include preparation processes.
- Piece or batch load and unload material using equipment appropriate to the situation.
- Maintain correct temperature.

Unit C11 Perform drop and upset forging

Identify and select drop and upset forging equipment and tools for specific operation selecting appropriate equipment. Set up and operate drop and upset forging equipment.

Performance elements

- Identify and select drop and upset forging equipment and tools for specific operation.
- Select appropriate equipment which accounts for size of material and procedures.
- Correctly select dies and punches are for specific operations and equipment.
- Correctly determine die replacement with regard to relief allowances, cracking, dimensions, etc.
- Apply correct die setting techniques in setting correct die and punch alignment.
- Apply correct die preheating procedures.
- Correctly prepared and heat materials are in accordance with job requirements and/or specifications.
- Drop forge material using the correct procedures and techniques.
- Apply correct lubricant for die wear and forging release.
- Determine correct grain flow.
- Identify and adjust galls, folds and cracks if required.
- Remove flash or fin correctly.
- Calculate material amounts making allowance for heat wastage and flash or fin.

Unit C12 Perform heat/quenching, tempering and annealing

Determine job requirements and set up equipment for heat/quenching, tempering and application of personal protective equipment annealing. Operate heating equipment observing all safety procedures, including use and application of personal protective equipment and safe work practices and procedures.

Performance elements

- Determine job requirements from engineering drawing, job sheet or verbal instructions.

- Set up equipment for heat/quenching, tempering and annealing.
- Select appropriate heating process and/or procedure for the given job.
- Set up equipment according to enterprise standard procedures and manufacturers' instructions.
- Operate heating equipment observing all safety procedures.
- Follow appropriate heating equipment operating procedures.
- Make appropriate equipment adjustments.
- Treat material to achieve required result.

Unit C13 Hammer forge complex shapes

Set up and operate forging machine to produce complex shapes and heavy parts. Work and handle hot forgings safely.

Performance elements

- Ensure that set up and operation are in accordance with standard operating procedures and specifications.
- Select and use complex open die tooling following safe operating procedures.
- Position the material to be forged safely and correctly in the forming equipment.
- Mark and measure hot forgings as required making allowance for material shrinkage and oxidization.
- Use hammer tools and fixtures attached to power hammer correctly.
- Check forging conforms to tolerances and specifications.
- Ensure forgings are handled safely and correctly.
- Select heating plant and equipment appropriate to work undertaken.
- Correctly apply techniques used to heat heavy and complex forgings.
- Perform post-forging heating correctly and safely.
- Handle hot forgings safely and according to enterprise procedures.

Unit C14 Hand forge complex shapes

Forge complex shapes using hand tools on an anvil. Perform splitting and bundling on anvil. Produce jigs and tools for complex shapes.

Performance elements

- Identify and clarify task requirements for complex hand forging as required.
- Calculate material volume correctly, making allowances for bending, material shrinkage and oxidization as required.
- Select and use hand tools and formers correctly.
- Follow safe hand forging procedures.
- Apply techniques and principles for producing complex shapes correctly.
- Check forging to ensure conformance to tolerances and specifications.
- Apply hand forging techniques and procedures to forging and opening bundled and split sections.
- Apply and control heat in specified areas of the material to be forged.
- Handle forgings safely and correctly according to enterprise procedures.
- Select tools and equipment required to taper and bend materials appropriate to task requirements.
- Apply techniques for producing jigs and tools correctly.
- Bend and shape jigs and patterns to specifications.
- Forge hand held tools to cut pattern, in accordance with specifications.
- Perform final shaping, heat treatment and sharpening to specifications.

Functional area D – Machining operation and component assembly

Unit D1 Perform operational maintenance of machines/equipment

Undertake programmed safety and maintenance checks. Undertake programmed maintenance.

Performance elements

- Undertake programmed safety and maintenance checks to prescribed procedure.
- Check for damage, wear and out of specification performance.
- Record status/ or report on proforma, or report orally.
- Undertake programmed maintenance to remove/replace consumable components to prescribed procedure and instructions.
- Replace and/or top up fluids and lubricants to prescribed schedule.

Unit D2 Perform machine setting

Determine job requirements from job sheets or equivalent instructions. Set the machine and instruct the machine operator/s on sequencing settings and procedures. Replace worn/damaged tooling where required.

Performance elements

- Determine job requirements from job sheets or equivalent instructions and interpret and understand them correctly.
- Set machine implementing safe working practices.
- Set machine in accordance with defined procedures.
- Adjust machine to meet specifications and operational requirements.
- Measure first-off samples for compliance with specifications.
- Instruct machine operator if necessary, on sequencing settings and any required safety procedures.
- Identify and replace worn/damaged tooling as required.

Unit D3 Perform general machining

Determine job requirements and sequence of operations from drawings, instructions and specifications. Select and mount tools to perform machining operation safely. Measure components to ensure compliance with specifications. Make adjustments and maintain machine on a routine basis.

Performance elements

- Interpret drawings, instructions and specifications to determine job requirements.
- Determine sequence of operations including job set-up for maximum efficiency and to meet job specifications.
- Select appropriate material is and established datum as required.
- Select and mount appropriate tools for job.
- Sharpen and shape appropriate tools for job as required.
- Mount and position tools correctly.
- Use basic marking out techniques where required.
- Set machining parameters for job requirements and maximum tool life.

- Clamp or hold work correctly without damage to product, and meet all safety requirements.
- Perform machining in a safe manner utilizing all guards, safety procedures and personal protective clothing and equipment.
- Check and measure components with instruments or gauges to ensure compliance with specifications.
- Adjust and maintain machine as part of a routine maintenance and adjustments as required which may include slide and collar adjustment, cleaning and lubrication.

Unit D4 Perform lathe operations

Job requirements are determined from drawings and work is sequenced. The job is set up and turning operations are performed. Components are checked for conformance with specifications.

Performance elements

- Observe correct safety precautions including wearing of protective clothing and safety glasses.
- Interpret drawings, determine sequence of operation and select tooling to produce component to specification.
- Set up job using instruments such as dial test indicators, and digital read-out equipment.
- Calculate speeds and feeds using appropriate mathematical techniques and reference material.
- Use the full range of accessories on a centre lathe including three and four jaw chucks, centres, face plate, steadies, cross slide and tailstock.
- Perform turning operations to specification.
- Check components for conformance with specifications using appropriate techniques, tools and equipment.

Unit D5 Perform milling operations

Determine job requirements from drawings and select tooling. Determine parameters for cutting and perform milling operations to produce components to specification. Check components for conformance to specification.

Performance elements

- Observe correct safety precautions including wearing protective clothing and safety glasses.
- Interpret drawings, determine the sequence of operations is and select tooling to produce component to specification.
- Determine cutting parameters.
- Carry out milling operations to produce components to specification.
- Undertake operations using conventional and/or climb milling techniques and a variety of cutters including slab, gang, end, shell, slot, form, slitting.
- Use the full range of standard accessories including dividing heads and rotary tables as required.
- Check components for conformance to specification using appropriate techniques, tools and equipment.

Unit D6 Perform grinding operations

Determine job requirements and sequence operations. Select grinding wheels and accessories to perform grinding operations. Check components for conformance with specifications.

Performance elements

- Determine job requirements from specifications, and sequence of operations is determined.
- Observe correct safety precautions including wearing protective clothing and safety glasses.
- Select and apply correct and appropriate holding devices.
- Check machine guards, coolant and dust extraction devices.
- Select grinding wheels, balance and dress based on knowledge of grinding wheel structure and application.
- Select accessories to facilitate production to job specifications.
- Set up grinding machine and adjust in accordance with defined procedures.
- Hold or clamp work piece appropriately to avoid damage.
- Perform grinding operations safely, utilizing all guards, safety procedures and personal protective clothing and equipment.
- Check components for conformance with specifications using appropriate techniques, tools and equipment.

Unit D7 Perform tool and cutter grinding operations

Determine job requirements and sequence operations. Select appropriate tool and cutter grinding wheels and accessories. Perform tool and cutter grinding. Check components for conformance to specification.

Performance elements

- Check machine guards, coolant and dust extraction devices.
- Observe correct safety precautions including wearing protective clothing and safety glasses.
- Interpret drawings and determine sequence of operations.
- Select, balance and dress appropriate tool and cutter grinding wheels and accessories based on knowledge of grinding wheel structure.
- Select accessories to facilitate production to specification.
- Operate universal tool and cutter grinding machines to sharpen and shape the full range of tools and cutters including side and face cutters, end mill, form relieved milling cutters, flat, vee and circular form tools and hobs, slitting saws, and drills.
- Carry out parallel internal and/or external grinding.
- Carry out internal and/or external taper grinding to drawing specifications.
- Check components for conformance to specification using appropriate techniques, tools and equipment.

Unit D8 Machining using horizontal or vertical boring machines

Determine job requirements and sequence operations. Perform boring operations. Check components for conformance to specification.

Performance elements

- Observe safety precautions including wearing protective clothing and safety glasses.

- Interpret drawings, determine sequence of operations and select tools to produce components to specification using International Standard Organization or enterprise operating procedures.
- Determine cutting parameters.
- Perform horizontal and vertical boring operations including parallel line and taper boring, facing, turning, drilling and reaming to drawing specifications.
- Check component for conformance to specification using appropriate techniques, tools and equipment.

Unit D9 Operate and monitor machine/process

Obtain job instructions and conduct pre-start checks. Operate and monitor machine/process.

Performance elements

- Observe safety precautions including wearing protective clothing and safety glasses.
- Interpret job sheets or equivalent instructions correctly.
- Undertake pre-start checks to standard operating procedure.
- Observe safety procedures are and check all safety equipment for correct operation.
- Start up and operate machine/process safely and correctly in accordance with standard operating procedures.
- Operate machine/process in accordance with job instructions or standard operating procedures.
- Load and maintain components/feed stock consistent with production requirements.
- Unload machine/process output safely to enterprise standard procedures, as required.
- Handle and store machine/process output in a manner not likely to cause damage, as required.
- Record production data to enterprise standard procedures.
- Monitor machine/process for safe and correct operation, deviations and identify and report faults in accordance with standard operating procedures.
- Follow emergency procedures in accordance with enterprise operating procedures.

Unit D10 Operate computer controlled machine/ processes

Obtain job instructions and conduct pre-start checks. Operate and monitor computer controlled machine/process.

Performance elements

- Observe safety precautions including wearing protective clothing and safety glasses.
- Interpret job sheets or equivalent instructions correctly.
- Undertake pre-start checks to standard operating procedure.
- Observe safety procedures are and check all safety equipment for correct operation.
- Select and verify installed computer controlled programme in accordance with job instructions.
- Operate computer controlled machine safely to product specifications.
- Identify and report machine malfunctions.
- Check production samples for compliance to specification.

- Monitor tool wear and, where appropriate, replace preset tools, identify and adjust tool offsets in computer controlled programme, or take other corrective action.
- Report product deviation from specification in accordance with standard operating procedures.

Unit D11 Sharpen and maintain production tools and cutters

Obtain job instructions. Observe safety precautions. Disassemble production tooling in preparation for sharpening. Set up machine and perform tool and cutter grinding, checking tools/cutters for conformance to specification. Assemble/reassemble production tooling.

Performance elements

- Observe correct safety procedures such as wearing, protective clothing and safety glasses.
- Obtain job instructions and interpret job sheets or equivalent instructions correctly.
- Check machine guards, coolant and dust extraction devices for proper operation in accordance with standard operating procedures.
- Disassemble production tooling in preparation for sharpening in accordance with standard operating procedures.
- Select, balance and dress tool and cutter grinding wheels in accordance with job instructions.
- Sharpen and mount fixtures for locating tools/cutters in accordance with job instructions.
- Sharpen and mount tools and cutters in predetermined fixtures in accordance with enterprise procedures.
- Visually inspect and check tools/cutters, and measure for conformance to specification in accordance with job instructions.
- Reassemble production tooling, and install inserts in accordance with job instructions.
- Visually inspect and check assembled tooling, and measure for conformance to specification in accordance with job instructions.

Unit D12 Perform metal spinning lathe operations (basic)

Determine job requirements and sequence operations. Perform spinning operations. Check components for conformance to specifications. Remove and store components. Adjust and maintain spinning lathe.

Performance elements

- Observe correct safety procedures such as wearing, protective clothing and safety glasses.
- Interpret drawings to determine job requirements and sequence of operations.
- Select tools to produce components to specifications.
- Determine disc size in accordance with appropriate procedures.
- Calculate spinning speeds for various metals and metal thicknesses using appropriate mathematical techniques and reference materials.
- Select and mount correct back centre and form chucks in accordance with procedures and specifications.
- Mount prepared disc for forming.
- Use a full range of spinning accessories including back centre, various chucks, trimming accessories, blank centre equipment and tee-rest.
- Perform spinning operations to specifications.

- Check components for conformance to specifications using appropriate techniques, tools and equipment.
- Remove and store components from the spinning lathe without marking or any deformation.
- Store and package components correctly to avoid oxidation and damage.
- Adjust and maintain spinning lathe.
- Carry out routine maintenance and adjustments as required.

Functional area E – Fabrication and finishing

Unit E1 Perform manual production assembly

Read and understand job sheets. Select assembly equipment and components. Assemble components and perform tests. Protect assembly from damage.

Performance elements

- Read and follow job sheets and instructions correctly.
- Select assembly equipment according to instructions or job sheets and use to enterprise standard procedures.
- Obtain and arrange components/sub-assemblies for assembly.
- Use equipment/tools in a safe manner.
- Assemble components following correct sequence of operations, using selected equipment to enterprise standard procedures.
- Record/input production data to enterprise standard procedures.
- Test/check assembly for compliance to job sheet requirements, following standard operating procedures as required.
- Handle and store components and/or assemblies safely, in a manner least likely to cause damage.

Unit E2 Perform sheet and plate assembly

Read and understand job sheets to select and use sheet and plate assembly equipment. Assemble fabrications. Protect assembly from damage.

Performance elements

- Interpret and follow job sheets/instruction correctly.
- Select assembly equipment in accordance with instructions on job sheet.
- Use equipment in a safe manner according to enterprise standard procedures.
- Verify products to be assembled against specifications.
- Produce assembly following correct sequence of operations.
- Join assemblies/fabrications to specification using specified joining techniques.
- Test/check assembly for compliance with job requirements.
- Handle and store assemblies/fabrications according to enterprise standard procedures and in a safe manner least likely to cause damage.

Unit E3 Perform electronic/electrical assembly (production)

Read and understand job sheets to select and use sheet and plate assembly equipment. Identify and assemble electronic/electrical components. Perform tests to check compliance.

Performance elements

- Interpret and follow job sheets/instruction correctly.
- Select assembly equipment in accordance with instructions on job sheet.
- Identify common name, appearance, colour of electronic and electrical components.
- Identify polarity indicators on components.
- Select correct components by code/colour or other identification methods.
- Prepare components/devices for soldering or other termination methods.
- Connect cables to plug and socket combinations as required.
- Handle and store components safely using appropriate anti-static handling procedures and techniques in accordance with enterprise operating procedures.
- Produce assembly following correct sequence of operations.
- Test/check assembly for compliance with job sheet requirements.
- Record/input production data as required.

Unit E4 Set assembly stations

Identify job requirements and select and use a range of hand tools and equipment. Set up assembly stations and maintain equipment.

Performance elements

- Identify setting requirements correctly from job sheets/instructions.
- Select and use a range of hand tools and equipment for setting assembly stations in a safe manner, according to instructions and enterprise operating procedures.
- Set up assembly stations for a range of processes and operations according to enterprise procedures.
- Observe and implement safe work practices.
- Adjust assembly stations to specifications and operational requirements.
- Test assembly stations for correct operation.

Unit E5 Perform soft soldering

Identify job requirements from job sheets or instructions and undertake soft soldering.

Performance elements

- Identify soldering job requirements correctly from job sheets or instructions.
- Assemble and prepare tools, equipment and consumables appropriate to the task for use as required.
- Prepare, arrange and check materials to be soldered as required to ensure solder joint meets specifications.
- Use correct techniques to apply soft solder to enterprise standard procedures.
- Clean and check solder joint for conformance to specifications.

Unit E6 Perform routine oxy acetylene welding

Identify weld requirements from job instructions and prepare materials and equipment for welding. Perform routine welding using oxy acetylene.

Performance elements

- Identify weld requirements from job instructions.
- Identify location of welds in accordance with standard operating procedures and job specifications.
- Clean and prepare materials ready for welding.
- Set up welding equipment correctly and use personal protective equipment.
- Select settings and consumables.
- Apply safe welding practices.
- Weld materials to job requirements.
- Clean welds in accordance with standard operating procedures.

Unit E7 Carry out mechanical cutting

Determine job requirements and specifications from job sheets and/or instructions. Select and set up machine tooling. Operate mechanical cutting machine. Check material for conformance to specification.

Performance elements

- Determine job requirements and specifications from job sheets and/or instructions.
- Select appropriate method/machine to meet specifications.
- Load and adjust machine for operation consistent with enterprise operating procedures.
- Select tooling to match job requirements.
- Install tooling correctly.
- Set up and adjust machine.
- Set and adjust appropriate stops and guards as required.
- Secure and correctly position material using measuring equipment as necessary.
- Start and stop machine safely to enterprise standard procedures.
- Operate machine to cut/hole material to specifications.
- Check material against specification and adjust machine and/or tooling as required and carry out in process adjustments as necessary.
- Cut and/or hole to material within workplace tolerances.
- Use material in most economical way.
- Observe industry and enterprise codes and standards.

Unit E8 Perform brazing and/or silver soldering

Determine job requirements from specifications and/ or instructions. Prepare materials and equipment. Braze and/or silver solder. Inspect joints.

Performance elements

- Determine job requirements from specifications and/ or instructions.
- Prepare materials correctly using appropriate tools and techniques.
- Assemble/align materials to meet specifications as required.
- Identify distortion prevention measures and take appropriate action as required.
- Assemble and set up heating equipment safely and correctly in accordance with standard operating procedures.
- Select and prepare correct and appropriate consumables are.
- Undertake and verify test runs as required.
- Select the correct process to meet specifications.
- Preheat materials as required.
- Apply consumables using correct techniques.

- Apply jointing material correctly and in appropriate quantities to meet job/specifications.
- Normalise material temperature using correct and appropriate techniques.
- Remove excess jointing materials using correct and appropriate techniques.
- Inspect joints to enterprise standard procedures.
- Report/record inspection results as required.

Unit E9 Perform manual thermal cutting, gouging and shaping

Assemble/disassemble plant, equipment for manual thermal cutting gouging and shaping. Select equipment settings and consumables. Operate hand held thermal cutting and shaping equipment.

Performance elements

- Assemble/disassemble plant, equipment for manual thermal cutting gouging and shaping.
- Select appropriate cutting process and procedure for material being worked are selected.
- Select and assemble accessories and equipment correctly.
- Select correct equipment settings and consumables.
- Cutting and shaping equipment observing all safety procedures.
- Follow equipment start-up procedures correctly to enterprise standard procedures.
- Cut material to specification with shape/profile/surface finish to accepted enterprise standards.
- Identify cutting defects and take corrective action.
- Remove material with minimum loss of sound metal.

Unit E10 Perform automated thermal cutting

Set up material. Set up and use automated cutting machine. Use automated thermal cutting machine.

Performance elements

- Set up material, including correct procedures for stack cutting and nesting to minimise waste.
- Select appropriate cutting medium and set to specification.
- Determine process requirements from specifications or instructions.
- Set up machine safely to specifications.
- Select and load correct programme to manufacturer's and enterprise operating procedure.
- Establish machine datum to specifications.
- Ignite cutting medium where required.
- Start machine using correct sequence and procedure.
- Use powder marking and other tracing devices as required.
- Undertake correct shut-down procedure in accordance with enterprise operating procedures.

Unit E11 Select welding processes

Identify properties of commonly used metals. Provide for welding work irregularities and contingencies. Identify appropriate welding processes and the cleaning and preparation requirements.

Performance elements

- Prepare the materials to be welded.
- Identify characteristics and properties of commonly used materials.
- Source information relevant to welding processes and consider basic metallurgical characteristics.
- Select appropriate welding processes to achieve specified outcomes with selected metals.
- Check the effects of the welding processes on materials.
- Take distortion prevention measures.
- Use alternative joining methods for job and assess their relevancy.
- Clean and prepare metals to be welded.
- Use appropriate safety requirements for chemicals and other materials in accordance with manufacturers' specifications and enterprise requirements.

Unit E12 Apply safe welding practices

Access and interpret safety information to identify and reduce risks associated with welding.

Performance elements

- Obtain and interpret OH&S information.
- Identify relevant OH&S legislation.
- Obtain and interpret work related safety information.
- Identify pollutants formed by welding processes.
- Identify occupational diseases and injuries which may be associated with welding.
- Identify factors associated with increased risk.
- Identify exposure levels for pollutants.
- Identify risks and potential health effects associated with specific metals, gases and other hazards in welding.
- Use safe manual handling techniques.
- Use personal protective equipment correctly.
- Implement procedures to control hazards.
- Implement workplace safety procedures.
- Report workplace safety non-compliances in accordance with workplace procedures.

Unit E13 Perform manual production welding

Tack and/or weld material using appropriate welding process.

Performance elements

- Prepare material for the process to be used following enterprise operating procedures.
- Check all personal protective equipment and materials to be used in the production welding process.
- Select appropriate welding processes to achieve specified outcomes with selected metals.
- Align material (if required) using dedicated jigs and fixtures.
- Carry out welding to accepted enterprise standards.

Unit E14 Monitor quality of production welding/fabrications

Monitor quality of welded products. Initiate testing when required. Undertake procedures reporting.

Performance elements

- Identify weld requirements from specifications and/or drawings.
- Carry out inspection procedures to enterprise standard procedures.
- Report nonconforming welds and take corrective action according to enterprise standard procedures.
- Use pre-set gauges to monitor quality of product.
- Implement test requirements according to enterprise standard procedures and any legislative or regulatory requirements.
- Collect data to enterprise standard procedures.
- Prepare reports as required.

Unit E15 Weld using gas metal arc welding process

Prepare materials for gas metal arc welding (GMAW). Select welding components. Assemble and set up welding equipment. Minimise and rectify distortion. Weld to job specification to ensure weld conformance. Maintain weld records as required.

Performance elements

- Identify weld requirements from specifications and/or drawings.
- Prepare and assembled/aligned materials to specification where required.
- Identify and select welding machine settings accessories and consumables.
- Assemble and set up welding equipment.
- Select distortion prevention measures appropriate to material and process to minimise distortion.
- Rectify distortion.
- Weld deposit to specifications using GMAW.
- Clean joints to specifications.
- Visually inspect weld joints for conformance to specifications.
- Remove defects with minimum loss of sound metal using correct and appropriate techniques and tools.
- Complete and maintain weld records correctly.

Unit E16 Weld using gas tungsten arc welding process

Prepare materials for gas tungsten arc welding (GTAW). Select welding machine components. Assemble and set up welding equipment. Minimise and rectify distortion. Weld to job specification. Ensure weld conformance. Maintain weld records as required.

Performance elements

- Identify weld requirements from specifications and/or drawings.
- Prepare material correctly.
- Assemble/align materials to specification, where required.
- Identify and select welding machine settings, accessories and consumables.
- Assemble and set up welding equipment.
- Select appropriate distortion prevention measures for weld and material type to minimise distortion.
- Rectify distortion.
- Weld deposit to specifications using GTAW

- Clean joints to specifications.
- Remove defects with minimum loss of sound metal using techniques and tools appropriate to the defect, material and process.
- Visually inspect weld joints for conformance to specifications.
- Complete and maintain weld records correctly.

Unit E17 Apply fabrication, forming and shaping techniques

Select and set up forming/shaping equipment for a specific operation. Operate forming/shaping equipment to form / shape material.

Performance elements

- Select most appropriate tools and equipment.
- Set up equipment correctly and adjust for operation to enterprise standard procedures.
- Make allowances for shrinkage, thickness and inside/outside measurements correctly.
- Start up and shut down machine safely to enterprise standard procedures.
- Position material and safety guards correctly.
- Operate and adjust forming/shaping equipment correctly.
- Level, straighten, roll, press or bend material to specifications/ drawings using fabrication techniques.
- Follow correct procedures for hot or cold forming.
- Check final form/shape for compliance to specification and adjust as necessary to enterprise standard procedures.

Unit E18 Assemble fabricated components

Identify assembly method and construct jigs if required. Ensure all components for assembly are available. Select tools and fixtures for fabrication assembly. Assemble fabricated components.

Performance elements

- Identify method and construct jigs from engineering drawings or according to enterprise practice.
- Apply distortion prevention/control techniques correctly.
- Check all components against drawings and material list to ensure all components for assembly are available.
- Select most appropriate equipment, tools and fixtures for fabrication assembly.
- Position material and/or fabricated components correctly.
- Adjust and apply jigs, fixtures, tools and measuring equipment correctly.
- Determine datum line correctly (if necessary).
- Check assembled components for position including squareness, level and alignment to specification.
- Apply fixing/joining techniques as necessary.
- Check assembly for compliance with drawing.
- Interpret and apply relevant codes/standards.

Unit E19 Repair/replace/modify fabrications

Assess and process repair, replacement, modification requirement. Assess and process material requirements. Prepare materials. Repair, replace or modify fabrication. Finish and inspect repair, replacements and/or modification.

Performance elements

- Determine work requirements from job sheet, instruction or visual inspection.
- Obtain and interpret specifications and drawings where required.
- Inspect fabrication and determine suitability for repair/replacement/ modification.
- Assess material requirements in accordance with relevant codes, manufacturers' specifications and enterprise standard procedures.
- Obtain/requisition materials.
- Assess and obtain tool and equipment requirements, where required.
- Prepare fabrication tools and equipment.
- Mark out and prepare materials to specifications with minimum wastage using correct principles, tools, equipment and procedures.
- Cut, bend, roll, shape or form materials to specifications using appropriate fabrication techniques/procedures, tools and equipment.
- Mark items for identification, where required.
- Use suitable clamping methods, equipment, jigs and fixtures, materials to position/clamp for welding.
- Undertake pre-tack checks and determine compliance with specifications prior to tack welding in position.
- Prepare welding equipment and adjust settings according to requirements.
- Check immediate work site environment to ensure compliance with safety requirements and procedures.
- Tack weld material or item using appropriate distortion minimization techniques and procedures.
- Check material or item against specifications prior to welding.
- Weld material or item to specifications using techniques and procedures appropriate to job requirements.
- Clean and finish repair, replacement and/or modification to specifications.
- Visually inspect welds to assess weld quality against predetermined specifications.
- Assess completed repair, replacement and/or modification against specifications.
- Prepare and lodge maintenance report according to enterprise standard procedures.

Unit E20 Manually finish/polish materials

Select appropriate personal protective clothing and equipment and safe work practices and procedures. Select appropriate finishing/polishing procedure. Install and set up grinding and polishing devices. Identify job materials and job surface conditions. Assess processing hazards associated with work piece size and shape. Grind, finish, brush and/or polish job.

Performance elements

- Select surface finish specifications appropriate finishing/polishing method/ technique for the work requirements.
- Select appropriate finishing/polishing equipment/media for the work material and work requirements.
- Fit endless belt finishers according to enterprise standard procedures.
- Fit and dress grinding wheels and mops.
- Install and set up polishing mops.
- Identify common metals, alloys and non-metals.
- Identify common surface imperfections.
- Finish job surface by grind, finishing, brushing and/or polishing to specification and according to enterprise standard procedures.

Unit E21 Prepare surfaces using solvents and/or mechanical means

Determine job requirements. Set up equipment. Prepare surfaces using solvents and/or mechanical means as required. Inspect prepared surface.

Performance Elements

- Determine surface preparation requirements from job sheet, instructions or other predetermined specifications.
- Select appropriate solvent application to meet job specification, where required.
- Select appropriate mechanical equipment to meet job specification, where required.
- Prepare work site for surface cleaning activities.
- Assemble, set up and prepare appropriate equipment and any required consumables correctly and safely in accordance with manufactures' specifications and enterprise operating procedures.
- Establish safe working environment for solvent use according to regulatory requirements and enterprise operating procedures.
- Apply solvents correctly.
- Neutralise treated surface and make safe to handle.
- Establish a safe working environment for mechanical surface preparation.
- Prepare surfaces using mechanical means.
- Clean and check mechanical equipment for damage and operational faults.
- Record and report equipment faults in accordance with enterprise operating procedures.
- Check surface preparation for cleanliness and conformance to specifications.
- Rectify faults or defects where required and record/report in accordance with enterprise operating procedures.

Unit E22 Prepare surfaces by abrasive blasting

Determine job requirements from job sheet, instructions or other predetermined specifications and set up equipment. Prepare surfaces using abrasive blasting. Inspect prepared surface.

Performance elements

- Determine work requirements from job sheet, instructions or other predetermined specifications.
- Identify appropriate abrasive blasting process, equipment and blasting media to meet job specification.
- Prepare work site for surface cleaning activities.
- Assemble, set up and prepare appropriate equipment and any required consumables correctly and safely in accordance with manufactures' specifications and enterprise operating procedures.
- Select correct rust inhibitor for use in wet abrasive blast methods where required.
- Carry out pre-operational checks on equipment and faults and rectify or report for further action.
- Operate blasting equipment.
- Undertake emergency shut-down procedures, if required.
- Undertake work procedures to appropriate environmental requirements.
- Carry out abrasive media disposal out in accordance with enterprise operating procedures.
- Clean, disassemble and inspect blasting equipment in accordance with manufacturers' specifications.

- Record and report equipment faults are in accordance with enterprise operating procedures.

Unit E23 Pre-treat work for surface coating

Identify job material and surface condition. Perform pre-treatment processes in correct sequence using personal protective equipment and safe work practices and procedures.

Performance elements

- Identify common metals, alloys and non-metals.
- Identify common surface soils and conditions.
- Perform pre-treatment processes in correct sequence.
- Carry out pre-treatment processes to enterprise standard procedures.
- Monitor pre-treatment process parameters to ensure they remain within specified limits.

Unit E24 Finish work using wet, dry and vapour deposition methods

Assess and prepare components for required coating process. Perform simple mixing and estimating operations. Perform coating operation.

Performance elements

- Identify coating specifications from operation sheets/work procedures.
- Check suitability of pre-treated components for finishing process.
- Prepare components as required for finishing application.
- Position/locate components for finishing.
- Calculate mixing ratios and mix and/or thin a range of wet coatings as required.
- Estimate required coating quantities using simple surface area calculations.
- Set up equipment to specification.
- Monitor coating and applied curing technique to enterprise standard procedures.
- Check and maintain coating application, thickness and colour for compliance with specifications.

Unit E25 Produce anodised films on aluminium

Perform a series of anodising steps to produce clear, coloured or sealed anodised films on aluminium. Assess preparation of work for correct jiggging/loading. Anodise work by a series of treatment steps. Seal or dye and seal anodised work. Monitor and control operating parameters.

Performance elements

- Apply masking techniques correctly, where required.
- Minimise contact marks and shielding.
- Connect work correctly for the required current flow and minimum contact marks and shielding.
- Reject all incorrectly loaded work.
- Carry out all treatment steps in anodise work in the correct sequence.
- Carry out all steps on seal or dye and seal anodised work in the correct sequence to enterprise standard procedures.
- Maintain process parameters within specified limits.

Unit E26 Apply protective coatings

Determine job requirements from job sheet, instructions, drawings or visual inspection. Select and maintain personal protective equipment. Prepare work piece for application of protective coating. Prepare equipment for application of surface coating materials. Apply single pack coatings. Inspect finished surface. Clean and store equipment.

Performance elements

- Determine job requirements from job sheet, instructions, drawings or visual inspection.
- Identify required protective coating materials according to job specification.
- Identify required protective coating application equipment according to job requirements.
- Select appropriate personal protective equipment for coating application according to job requirements.
- Use personal protective equipment appropriately in accordance with manufacturers' specifications.
- Identify and use ancillary support attachments.
- Maintain personal protective equipment in accordance with manufacturers' specification.
- Prepare work site for application of protective coating.
- Inspect surface condition for readiness for application of protective coating according to specification.
- Identify unsuitable work pieces/surfaces and fabrication defects and take appropriate remedial action or report in accordance with enterprise operating procedures.
- Mask components where protective coating application is not specified.
- Identify conditions for overspray.
- Select required plant and equipment basic operations.
- Undertake routine maintenance on plant and equipment.
- Record status/reports by proforma or orally in accordance with enterprise operating procedures.
- Assemble conventional coating application equipment in accordance with equipment requirements.
- Identify coating product type, solvent, uses, mixing procedure, clean-up and safety requirements as appropriate.
- Demonstrate correct method of determining wet film thickness in accordance with specified dry film.
- Thin coating material to suit the application method and to achieve required film thickness.
- Apply coating using specified application method and standard operating procedures.
- Outline coating schedules for metal and non-metal materials.
- Clean, disassemble and inspect conventional coating application equipment for damage.
- Record and report faulty equipment to appropriate personnel in accordance with enterprise operating procedures.
- Store coating application equipment.
- Assess surface finish for profile size differences and uses.
- Determine coating thickness using appropriate instruments and compare results with job specifications.
- Inspect total surface for conformance to specification.
- Record and report inspection results in accordance with enterprise operating procedures.

Unit E27 Electroplate protective finishes

Select treatments and processes/equipment for producing protective finishes. Monitor and control protective finish processes and operating conditions. Maintain solutions for protective finishes. Maintain equipment for protective finishes.

Performance elements

- Select treatment processes appropriate to the work requirements.
- Select process parameters to achieve required finish.
- Select appropriate equipment to achieve specified finish.
- Set operating/process parameters to produce required protective finish/specifications.
- Monitor and confirm surface condition of finished components and identify abnormalities.
- Take corrective actions to rectify nonconforming conditions.
- Carry out pre-treatment processes, where applicable.
- Check and confirm solution compositions to specification/ operating range.
- Identify adjustment requirements/additions.
- Make additions to adjust solution composition to correct operating range.
- Carry out purification procedures as necessary.
- Maintain anodes to ensure correct operation.
- Check performance of ancillary equipment and take remedial actions as necessary.
- Maintain electrical contacts.
- Maintain process transfer equipment.

Functional area F – Equipment servicing and maintenance

Unit F1 Perform inspections of engineering test equipment

Test, monitor and verify/certify a range of engineering test equipment to ensure it is fit for purpose and accurate. Ensure the environment in which the equipment is used is suitable for required performance. Record inspection results in appropriate organization information systems.

Performance elements

- Use a range of trade measuring instruments such as length measuring, area measuring instruments, volume measuring, liquid measuring instrument and weighing instruments, liquefied gas flow meters, electronic metering systems, natural gas flow meters, dimensional measuring instruments, supplementary measuring instruments and auxiliary devices for the type of inspection required.
- Assess the instruments to determine whether a verification/certification or in-service tolerance is to be applied for inspection and identify appropriate tolerances for the determined inspection.
- Perform inspection of measuring instruments to determine compliance and analyse and monitor specific test equipment by random inspections, surveillance, complaint inspection, comparison/analysis of data over time, collation of statistical information, and auditing of servicing licensees.
- Assess the environment instruments used in to determine its impact on the instrument.
- Identify any sources of possible operational error in the use of measuring instruments/systems.

- Use the correct specialized equipment in the prescribed manner in undertaking the inspection and conduct the inspection of measuring instrument in accordance with appropriate test procedures, organizational policies and procedures and workplace, health and safety considerations.
- Finalise the inspection and take appropriate action with performance trends of particular models of measuring instruments identified and reported.
- Record the inspection information in the organization's information system.

Unit F2 Maintain and overhaul mechanical equipment

Perform maintenance and overhauling of manufacturing mechanical equipment by testing and determining faults and assessing correct repair techniques and requirements. Isolate machines and equipment to perform repair/maintenance on component parts. Fit and adjust machine components and machine new components as required. Test and re-commission mechanical equipment and document repair/overhaul process.

Performance elements

- Perform preventative maintenance tasks and adjustments on mechanical equipment, components or sub-assemblies using correct tools, equipment and procedures.
- Visually check mechanical equipment, components and sub-assemblies and use test equipment, using prescribed procedures and safety requirements to ensure correct function or determine malfunction.
- Make adjustments to equipment or components to ensure specifications are met using acceptable fitting techniques and procedures, observing all safety requirements.
- Determine equipment component function by reference to engineering drawings, technical manuals and consultation with appropriate personnel.
- Check maintenance reports and review where faults are diagnosed and consult with operators and other relevant plant personnel to assist in locating faults.
- Select test equipment and use in accordance with defined requirements and procedures to assist fault location.
- Diagnose fault conditions and localise at the component level using appropriate test equipment such as engineer's level, laser alignments etc., and appropriate equipment for measurement of alignment, flatness, squareness, straightness, temperature, vibration, load deflection, noise level and RPM according to enterprise standard procedures.
- Evaluate the faulty condition, take appropriate corrective action and document the fault/s to enterprise standard procedures.
- Isolate machines or equipment for safely or check for previous isolation and remove faulty equipment, component or sub-assembly from the system using appropriate engineering principles, tools, equipment and procedures.
- Select replaceable items from manufacturers' catalogues and obtain them by appropriate means.
- Repair or overhaul serviceable items using appropriate engineering principles, designated procedures, correct tools/equipment and safe workshop practices, to manufacturers' or site specifications.
- Check all components with precision instruments to ensure conformance to specifications where applicable.
- Fit and adjust mechanical equipment and sequential assembly using sound fitting principles and techniques in the preparation and assembly of component parts.
- Machine new components as required by marking out, drilling, scraping, filing, reaming, tapping or threading to specifications.

- Use fastening equipment and methods including dowelling, pinning and pegging, keying, thread production and repair, etc. which ensure conformance to specifications, operational performance, quality and safety.
- Use acceptable maintenance practices for correct gland packing, jointing and gasket materials ensuring materials are selected and applied correctly in conformance to specifications and operational requirements.
- Determine correct lubrication requirements mined by appropriate means and attend to where applicable using mechanical or manual applications.
- Use appropriate wedges and levelling devices to level mechanical equipment as necessary and correct alignment and balancing functions where appropriate.
- Perform final adjustments on mechanical equipment to align to operational specifications using acceptable engineering principles, fitting techniques and procedures.
- Test all mechanical equipment for accuracy and correct operation and return to service using acceptable procedures.

Unit F3 Monitor and record equipment condition

Use built-in systems, vibration monitors and other equipment condition monitoring tools and techniques to monitor manufacturing equipment. Record monitoring results. Report deviation from specifications and record monitoring results.

Performance elements

- Select the appropriate condition monitoring technique such as built-in systems (software and site displays), vibration monitors, infra-red and ultraviolet non-destructive testing to achieve the required equipment condition monitoring outcomes and undertake checks correctly, safely and to organizational standard operating procedures.
- Plot monitoring results and report any deviations from specification to appropriate personnel.
- Record equipment monitoring results using appropriate enterprise recording system.

Unit F4 Shut down and isolate machines and equipment

Use correct procedures to shut down manufacturing machines and equipment for service or repair. Use electrical lock-off isolators, mechanical and power driven valves and other relevant components to safely isolate manufacturing machines and equipment. Install safety and security devices and place correct signage on shut down and isolated machines and equipment.

Performance elements

- Perform manual, semi automatic and automatic machines of a standalone, continuous production or process nature machines and equipment shut-down sequenced safely and to organizational standard operating procedures.
- Depressurise/empty/deenergise machines and equipment by bleeding.
- Isolate machine/equipment such as isolation of mechanical, electrical drives, pipework (pressure) rotating equipment etc. utilizing electrical lock-off isolators, mechanical and power driven valves etc., using correct isolation methods and points.
- Verify safe shut-down or isolation of machine/equipment has been successfully completed.
- Install safety/security lock-off devices and signage to organizational standard operating procedures and leave machine/equipment in a clean and safe state.

Unit F5 Maintain tools and dies

Use appropriate checking methods to identify machine tool and die defects. Replace or re-condition tools and dies using hand power tools and tool room machines and heat treatment as required. Measure and check replaced/re-conditioned tools and dies and report any production or maintenance conditions that could lead to future failure.

Performance elements

- Check and identify defects in production components produced, production reports or tools.
- Disassemble and assess tooling components condition against prints, drawings, manufacturers' drawings, etc., marking any worn/damaged components for repair or replacement.
- Replace or re-condition worn/damaged parts obtaining and preparing replacement materials.
- Use appropriate hand and hand held power tools and machining process from a range of standard tool room machines and set machine parameters to produce components to specification utilizing sample components or sections to test the tooling components being manufactured.
- Initiate heat treatment on any tool steels to achieve specified hardness where appropriate and according to specification.
- Check and correctly assemble tooling components using acceptable tool making techniques and procedures and ensure they are in conformance with specifications.
- Measure and check production components with precision instruments to ensure conformance to specifications as required.
- Identify potential production/maintenance problems and any conditions that could lead to tooling failure record them.
- Identify recurrent faults and initiate solutions to redress them.

Unit F6 Maintain production pneumatic systems

Check and test manufacturing production pneumatic systems and equipment for maintenance or fault finding purposes. Repair or replace faulty components after safely isolating and depressurising the system. Re-fit the components or sub-assemblies of the pneumatic system and re-commission. Document all repairs and replacement components and update the system maintenance schedule.

Performance elements

- Undertake preventative maintenance checks/adjustments on pneumatic systems by identifying and preparing system components, assemblies or sub-assemblies for inspection/preventative maintenance.
- Conduct visual inspection and test interacting, interrelated, or interdependent components with appropriate test equipment such as leak testers, escape rate gauges, hand held pressure testers according to fluid power principles, procedures and safety requirements.
- Perform scheduled preventative maintenance tasks including obvious repairs and adjustments according to manufacturers' specification and using fluid power techniques/practices.
- Undertake fault finding on pneumatic systems consulting the system operator where appropriate, and check and review maintenance reports and preventative maintenance schedules for additional fault finding data.
- Use appropriate test equipment and techniques, fluid power principles, test pneumatic systems to identify and verify faults and malfunctions.

- Document and report faults and malfunctions by appropriate means to designated personnel for action.
- Safely isolate system or sub-assembly and discharge residual pressure in accordance with prescribed procedures and check for correct isolation.
- Tag an isolated system or sub-assembly to designated procedures.
- Remove component or sub-assembly from the system using correct removal principles and techniques.
- Dismantle and examine components or sub-assemblies and verify for replacement, overhaul or repair, using correct and appropriate techniques and procedures.
- Select replacement items are manufacturers' catalogues to meet specifications as necessary and repair/replace/overhaul using correct and appropriate principles, techniques and procedures.
- Re-fit component or sub-assembly items to equipment and test for correct operation assessed against specifications.
- Recommission the pneumatic system or sub-assembly according to prescribed procedures and specifications and using fluid power principles and system application techniques, verify the correct operation of the system.
- Update maintenance records/service reports by appropriate designated means.

Unit F7 **Maintain manufacturing hydraulic systems**

Check and test manufacturing production hydraulic systems and equipment for maintenance or fault finding purposes. Repair or replace faulty components after safely isolating and discharging hydraulic fluid from the system. Re-fit the components or sub-assemblies of the hydraulic system and re-commission. Document all repairs and replacement components and update the system maintenance schedule.

Performance elements

- Undertake preventative maintenance checks/adjustments on hydraulic systems by identifying and preparing system components, assemblies or sub-assemblies for inspection/preventative maintenance.
- Conduct visual inspection and test interacting, interrelated, or interdependent components with appropriate test equipment such as leak testers, escape rate gauges, hand held pressure testers according to fluid power principles, procedures and safety requirements.
- Perform scheduled preventative maintenance tasks including obvious repairs and adjustments according to manufacturers' specification and using fluid power techniques/practices.
- Undertake fault finding on hydraulic systems consulting the system operator where appropriate, and check and review maintenance reports and preventative maintenance schedules for additional fault finding data.
- Use appropriate test equipment and techniques while following fluid power principles, test hydraulic systems to identify and verify faults and malfunctions.
- Document and report faults and malfunctions by appropriate means to designated personnel for action.
- Safely isolate system or sub-assembly, drain residual hydraulic fluid in accordance with prescribed procedures and environmental requirements and check for correct isolation.
- Tag an isolated hydraulic system or sub-assembly to designated procedures.
- Remove component or sub-assembly from the hydraulic system using correct removal principles and techniques.

- Dismantle and examine components or sub-assemblies and verify for replacement, overhaul or repair, using correct and appropriate techniques and procedures.
- Select replacement items are manufacturers' catalogues to meet specifications as necessary and repair/replace/overhaul using correct and appropriate principles, techniques and procedures.
- Re-fit component or sub-assembly items to hydraulic equipment and test for correct operation assessed against specifications.
- Recommission the hydraulic system or sub-assembly according to prescribed procedures and specifications and using fluid power principles and system application techniques, verify the correct operation of the system.
- Update maintenance records/service reports by appropriate designated means.

Functional area G – Plastics manufacturing

Unit G1 Prepare plastic production materials to formula

Check job sheets for work to be done and identify the priority in which jobs/product will be made/completed. Assemble materials to formulate for production or production finishing. Identify handling requirements for materials, prepare for the combination of ingredients and collect and assemble the ingredients. Combine the materials according to the provided formula for the process.

Performance elements

- Use required personal protective equipment.
- Calibrate or zero equipment for measurement and/or identify appropriate measurement scales before use.
- Follow storage and mixing requirements for materials to be mixed.
- Assess production workflow in relation to materials supply requirements.
- Avoid contamination of raw materials when mixing using correct proportions from the given formula.
- Use appropriate mixing techniques and utensils for plastics formula.
- Add ingredients to the mixture in the correct sequence.
- Check atmospheric conditions that may affect the combined mixture.
- Clean up the mixing area and utensils.
- Provide completed plastic mixture to the processing area.

Unit G2 Make pattern or plug for composites plastic moulds

Convert the specification or design into a plan for making the tooling and a mould. Check settings and adjustments of mould-making equipment and monitor its operation. Make appropriate adjustments to correct materials, equipment or process variations and identify and solve any equipment, material and process problems, seeking guidance where necessary or appropriate.

Performance elements

- Produce a plan for the plug/pattern according to requirements and identify check points for measurements and tests.

- Identify and locate a work area, tools, materials and equipment for construction including hand tools and power tools for use with composite and other materials (e.g. sheet metal and timber), hand mixing equipment and stirrers, hand application tools (e.g. rollers, trowels, brushes, filleting tools), finishing materials (e.g. gel coat and acrylic finishes, paints), construction materials (e.g. timber, styrofoam, and fibreglass).
- Check polyester, dicyclopentadiene (DCPD) – filled, epoxy and vinylester resin materials including for grades; fillers; cure process; exotherm graph; cure reaction; effects of temperature and effects of hardener.
- Prepare fibre reinforcement, including cutting and trimming and apply composite materials to the mould by hand lay up.
- Complete pattern or plug equipment mould pre-start checks.
- Start plug/pattern construction process, noting key variables and if using styrofoam or polyurethane to construct the plug, coat with an epoxy resin rather than a polyester resin.
- Take mould samples as required and identify product out-of-specification such as gel coat sag, slow curing, blistering, wrinkles, pinholes, brush marks or poor surface finish.
- Complete construction process and treat, prepare and repair the surface of the plug/pattern as necessary.
- Cure mould and release.
- Check and adjust to meet specifications including structural strength, rigidity and stability of the tooling, dimensional accuracy of the allowances in the design for shrinkage, deformations and alterations in the process from tooling to mould to finished composite, placement of flanges, closures, fitments, supports, struts and stiffeners and variations in materials and/or contamination of materials.
- Adjust process to minimise scrap and trim and clean and adjust equipment as required.

Unit G3 Change plastic manufacture extrusion die and setup

Plan and prepare the change setups to meet the production schedule for extrusion line processes involving the extrusion die and sizing equipment, including informing others. Select dies that match product/process specification. Fit replacement dies according to specification. Test the changeover and fine tune as needed. Remove, clean and store the existing dies after production is completed.

Performance elements

- Plan process for closing down machinery and inform relevant personnel.
- Select dies or cores to match product/process specification.
- Stop downstream equipment, including stopping feed, drop temperatures, stop vacuum pump and purge the extruder.
- Activate isolating locks and disconnect power to heaters.
- Remove, clean and store die according to enterprise procedures.
- Fit replacement die ensuring that locating devices and marks are matched and securing devices are installed and tightened to specification.
- Remove and re-fit calibrator sleeve and seals as required.
- Set heats according to pre-start procedures.
- Check operation of die against product quality and compare machine setting ranges against documented requirements.
- Run a first-off sample for required standards and fine-tune settings and other production variables as required.
- Check any variances between standard operating procedures and actual production run and complete enterprise documentation and report die change to appropriate personnel ready for production re-start.

Unit G4 Operate plastic manufacturing calendar

Operate calendar equipment to convert plastic or rubber compound into finished or semi-finished rubber or plastic sheets. Maintain feed to the calendar and monitor and adjust its operation. Deal with non-conforming products, waste and scrap a complete logs and reports. Report calendar condition and production rate and any reasons for interruptions to production if they occur.

Performance elements

- Conduct pre-start checks on calendaring equipment and start up. Equipment includes mill knives, thickness gauges, profiling gauges/tools/jigs, nip adjusting bars, strainers and metal detector.
- Check process is operating within required limits and product is in specification and to required quality standard including monitoring the processing behaviour of the polymers and additives.
- Ensure product is consistently ready for next operation and maintain supply of material(s) as required.
- Check for Faults such as short scorch products (if rubber), initial feeding of pelt/pig, uneven profiles or colours, uneven surface appearance or variation in compound grain and nerve making in a non-homogeneous product.
- Collect and segregate scrap, trim and other materials.
- Shut down calendar when production run is completed.
- Clean equipment and work area.
- Complete logs and records according to enterprise requirements.

Unit G5 Operate injection moulding equipment

Use and monitor components of injection moulding machines including the base, material supply systems, barrel and screw plastification unit, injection units and check product for quality and conformity to specifications. Control raw material feed, clean the equipment and work area and deal with any problems and take required action (e.g. reporting). Deal with non-conforming products, waste and scrap and complete production logs and enterprise reports.

Performance elements

- Perform pre-operational checks on injection moulding equipment, dies/tools and pneumatic, or hydraulic actuation of cores, slides ejector systems plus ancillary equipment such as chillers, die heating equipment, hopper driers, mixing hoppers, dehumidifying driers, air compressors, dosing machines, blending and mixing equipment in accordance with enterprise procedures.
- Access and arrange raw materials required, including additives and regrind in correct amounts.
- Calculate and set process settings required for product and set up date, batch and materials markings to specifications, as required.
- Operate injection moulding process monitoring controls/displays/terminals for production and process data to manage machine speed, temperature, pressure, time during cycles on product quality and production output.
- Check process is operating within required limits and product is in specification and to required enterprise quality standards.
- Ensure product is consistently ready for next operation and maintain supply of material(s) as required.
- Collect and segregate scrap, trim and other materials and keep equipment and work area clean during operation.

- Pause machine cycle and perform emergency stop, if required due to variations in cycle time, temperature, pressure, speed, or variations in materials or contamination of materials.
- Recognize known faults that occur during the operation such as short mouldings, flash, sink marks, voids, burn marks, splay/splash, marks/silver streaking, blistering, flow marks, poor surface finish, weld lines, poor colour dispersion, colour contamination, black spots or ejection damage.
- Make adjustments to remedy any faults and nonconformity to compensate for polymer shrinkage, inadequate packing pressure causing voids, excessive packing pressure causing excessive residual stresses or flash.
- Establish a stable injection moulding process and adjust to minimise scrap and trim.
- Complete production run and shut down.
- Select appropriate purging method and purge efficiently and adequately.
- Clean, adjust and lubricate equipment according.

Unit G6 Operate blow moulding equipment

Use and take product off blow moulding machines and monitor ancillary equipment including the bottom blow, top blow, needle blow, tail to tail blow, parison, pre-blow and pre-squeeze, parison stretching and parison orientation type machines. Check product for quality and conformity to specifications. Control raw material feed, clean the equipment and work area and deal with any problems and take required action (e.g. reporting). Deal with non-conforming products, waste and scrap and complete production logs and enterprise reports.

Performance elements

- Perform pre-operational checks on blow moulding equipment, dies/tools and pneumatic, or hydraulic actuation of cores, slides ejector systems plus ancillary equipment such as chillers, die heating equipment, hopper driers, mixing hoppers, dehumidifying driers, air compressors, dosing machines, blending and mixing equipment in accordance with enterprise procedures.
- Access and arrange raw materials required, including additives and regrind in correct amounts.
- Calculate and set process settings required for product and set up date, batch and materials markings to specifications, as required.
- Start up equipment safely and 'dry run' to warm hydraulics and components to operating temperature before production, as required.
- Operate injection moulding process monitoring controls/displays/terminals for production and process data to manage machine speed, temperature, pressure, time during cycles on product quality and production output.
- Check process is operating within required limits and product is in specification and to required enterprise quality standards.
- Ensure product is consistently ready for next operation and maintain supply of material(s) as required.
- Collect and segregate scrap, trim and other materials and keep equipment and work area clean during operation.
- Pause machine cycle and perform emergency stop, if required due to variations in cycle time, temperature, pressure, speed, or variations in materials or contamination of materials.
- Recognize and rectify known faults that occur during the operation short mouldings such as wall thinning, holes, poor surface finish, warping, poor colour dispersion, ejection damage, colour contamination, black spots and or colour dispersion, colour contamination, black spots or ejection damage.

- Identify and take action on causes of routine production faults and log problems as required.
- Complete production run and shut down.
- Clean, adjust and lubricate equipment according to enterprise procedures.

Unit G7 Operate thermoforming equipment

Use and monitor components of thermoforming equipment including heaters, mould, stacker, winder, granulator, conveyors and chutes and check product for quality and conformity to specifications. Control raw material feed, clean the equipment and work area and deal with any problems and take required action (e.g. reporting). Deal with non-conforming products, waste and scrap and complete production logs and enterprise reports.

Performance elements

- Perform pre-operational checks on thermoforming equipment including heaters, mould, stacker, winder, granulator, conveyors and chutes in accordance with enterprise procedures.
- Check process is operating within required limits and product is in specification and to required enterprise quality standards. Clamp pressure should be monitored so that uniform parts are created and variation between cavities is reduced.
- Ensure product is consistently ready for next operation and maintain supply of material(s) as required.
- Collect and segregate scrap, trim and other materials and keep equipment and work area clean during operation.
- Pause machine cycle and perform emergency stop, if required due to variations in equipment including machine malfunction, variations in temperature (such as uneven oven temperatures), pressure, speed (such as cycle times), variations in sheet or contamination of sheet, product tool damage, mould/tooling problems, variations in materials and/or contamination of materials.
- Recognize and rectify known faults that occur during the operation such as sheet sag, non-uniform pre-stretching, non-uniform wall thickness, sheet pulling out, bubbles, blisters or pits, scorching, whitening of formed part, blushing, loss of embossing detail, chill marks, drag-off lines, pinholes/pimples, shiny streaks, shrink marks, plug sticking and sheet tearing during forming.
- Identify and take action on causes of non routine production faults such as warpage or shrinkage after moulding, cracking, surface mark, webbing or wrinkling and mould sticking and log problems as required.
- Complete production run and shut down.
- Select appropriate purging method and purge efficiently and adequately.
- Clean, adjust and lubricate equipment according to enterprise procedures.

Unit G8 Operate extruders

Feed plastic and rubber materials, including compounded PVC to an extruder as pellets and take product off the extruders checking operation of extruder equipment and components such as main drive, gearbox, thrust assembly, adapter, gate, breaker plate, screen pack, doser, screw/s, barrel, heaters, thermocouples. Check extruded product for quality and conformity to specifications. Control raw material feed, clean the equipment and work area and deal with any problems and take required action (e.g. reporting). Deal with non-conforming products, waste and scrap and complete production logs and enterprise reports.

Performance elements

- Perform pre-operational checks on thermoforming equipment including extruders (either single or twin screw), extrusion dies - rod, sheet, film, pipe, profile, tread profile and cable auxiliary equipment - water pump, feeders, hopper loader, pelletiser, dehumidifiers, stackers, haul off, saw/cutter, printing, embossing, coil winder, packaging machinery in accordance with enterprise procedures.
- Check process is operating within required limits and the rod, sheet, film, profile, tread profile or cable product is in specification and to required enterprise quality standards. Clamp pressure should be monitored so that uniform parts are created and variation between cavities is reduced.
- Ensure product is consistently ready for next operation and maintain supply of material(s) as required.
- Maintain and monitor temperature/speed variations, and check for routine product extrusion faults such as wrong dimensions burn marks, flow marks, poor surface finish, poor colour dispersion, blistering, colour contamination and black spots.
- Collect and segregate scrap, trim and other materials and keep equipment and work area clean during operation.
- Pause machine cycle and perform emergency stop, if required.
- Recognize and rectify known faults that occur during the operation such as colour and uniformity, surface finish and appearance and product finished thickness.
- Identify and take action on causes of routine production faults and log problems as required.
- Complete production run and shut down.
- Clean, adjust and lubricate equipment according to enterprise procedures.

Unit G9 Operate blown film equipment

Feed blown film equipment and take product off checking operation of equipment and components such extruder, bubble guides and rollers, film rollers, slitting, trimming and winding gear, coolers, heaters and ancillary equipment, hand tools, knives, adjustment tools. Check extruded product for quality and conformity to specifications. Control raw material feed, clean the equipment and work area and deal with any problems and take required action (e.g. reporting). Deal with non-conforming products, waste and scrap and complete production logs and enterprise reports.

Performance elements

- Perform pre-operational checks on blown film equipment including extruder, bubble guides and rollers, film rollers, slitting, trimming and winding gear, coolers and heaters in accordance with enterprise procedures.
- Check process is operating within required limits and the blown film product is in specification and to required enterprise quality standards.
- Monitor clamp pressure so that uniform parts are created and variation between cavities is reduced.
- Ensure product is consistently ready for next operation and maintain supply of material(s) as required.
- Maintain and monitor extruder control, checking for any contamination or problems with alignment and control of trimming and winding gear.
- Collect and segregate scrap, trim and other materials and keep equipment and work area clean during operation.
- Recognize known faults that occur during the operation such as wrong grade, variations of polymer properties, surface finish and appearance and product finished thickness.
- Identify and take action on causes of routine production faults and log problems as required.

- Complete production run and shut down.
- Clean, adjust and lubricate equipment according to enterprise procedures.

Unit G10 Operate rotational moulding equipment

Feed both rotating and 'rock and roll' modes of rotational moulding equipment (not open flame equipment) and take product off checking operation of equipment and components. Check product for quality and conformity to specifications. Control raw material feed, clean the equipment and work area and deal with any problems and take required action (e.g. reporting). Deal with non-conforming products, waste and scrap and complete production logs and enterprise reports.

Performance elements

- Perform pre-operational checks on rotational moulding equipment in accordance with enterprise procedures.
- Check moulds, closures and fittings for cracks, chips, marks and cleanliness.
- Check process is operating within required limits and the product is in specification and to required enterprise quality standards.
- Ensure product is consistently ready for next operation and maintain supply of material(s) and melt flow as required.
- Maintain and monitor rotational moulding equipment, checking for equipment malfunction, variations in temperature, pressure, rotation, variations in materials or contamination of materials, mould damage, routine rotational moulding faults or mould/tooling problems.
- Collect and segregate scrap, trim and other materials and keep equipment and work area clean during operation.
- Demould products and store as required.
- Recognize known faults that occur during the operation such as, surface finish and appearance and product finished thickness.
- Identify and take action on causes of routine production faults and log problems as required.
- Complete production run and shut down.
- Clean, adjust and lubricate equipment according to enterprise procedures.

Unit G11 Operate polystyrene shape moulding equipment

Start up and use polystyrene shape moulding machine and components such as prefoamer, storage hopper, moulding tool and additional equipment e.g. vacuum system and produce product. Check operation of equipment and components. Check product for quality and conformity to specifications. Control raw material feed, clean the equipment and work area and deal with any problems and take required action (e.g. reporting). Deal with non-conforming products, waste and scrap and complete production logs and enterprise reports.

Performance elements

- Perform pre-operational checks on polystyrene shape moulding machine and ancillary equipment in accordance with enterprise procedures.
- Check process is operating within required limits and the product is in specification and to required enterprise quality standards.
- Ensure product is consistently ready for next operation and maintain supply of material(s) as required.
- Maintain and monitor shape moulding equipment, checking for equipment malfunction, equipment malfunction (e.g. mould damage), variations in temperature, pressure, speed, or variations in materials or contamination of materials.

- Collect and segregate scrap, trim and other materials and keep equipment and work area clean during operation.
- Demould products and store as required.
- Recognize known faults that occur during the operation such as, surface finish and appearance and product finished thickness.
- Identify and take action on causes of routine production faults and log problems as required.
- Complete production run and shut down.
- Clean, adjust and lubricate equipment according to enterprise procedures.

Unit G12 Operate resin infusion moulding equipment

Start up and use resin infusion moulding equipment such as moulds, vacuum pumps and fittings (e.g. hoses and couplings), controller (e.g. PLC if fitted), vacuum bags and hand tools used in the this process (e.g. dispensing equipment) and produce product. Check operation of equipment and components. Check product for quality and conformity to specifications. Control raw material feed, clean the equipment and work area and deal with any problems and take required action (e.g. reporting). Deal with non-conforming products, waste and scrap and complete production logs and enterprise reports.

Performance elements

- Perform pre-operational checks on resin infusion moulding machine and ancillary equipment such as moulds, vacuum pumps and fittings (e.g. hoses and couplings), controller (e.g. PLC if fitted), vacuum bags in accordance with enterprise procedures.
- Check process is operating within required limits and the product is in specification and to required enterprise quality standards.
- Ensure product is consistently ready for next operation and maintain supply of material(s) as required.
- Maintain and monitor resin moulding equipment, checking for equipment malfunction, vacuum leaks, vacuum bag bridging, vacuum switch-off timing, stoppage of resin flow, variations in process conditions, especially temperature variations affecting cure rate, variations in materials or contamination of materials, equipment, tool, or mould damage.
- Collect and segregate scrap, trim and other materials and keep equipment and work area clean during operation.
- Demould products and store as required.
- Recognize known faults that occur during the operation such as, dry spots, resin pooling, under-saturation of resin or poor surface finish.
- Identify and take action on causes of routine production faults and log problems as required.
- Complete production run and shut down.
- Clean, adjust and lubricate equipment according to enterprise procedures.

Unit G13 Operate composite sheeting equipment

Start up and use composite sheeting equipment such as profiling and compaction rollers, formers (e.g. curing equipment) controller, and PLC if fitted and produce product. Check operation of equipment and components. Check product for quality and conformity to specifications. Control raw material feed, clean the equipment and work area and deal with any problems and take required action (e.g. reporting). Deal with non-conforming products, waste and scrap and complete production logs and enterprise reports.

Performance elements

- Perform pre-operational checks on composite sheeting equipment including profiling and compaction rollers, formers (e.g. curing equipment) controller, such as PLC if fitted in accordance with enterprise procedures.
- Check process is operating within required limits and the product is in specification and to required enterprise quality standards.
- Ensure product is consistently ready for next operation and maintain supply of material(s) as required.
- Maintain and monitor composite sheeting equipment, checking for equipment malfunction, profiling rollers damage, variations in materials or contamination of materials.
- Collect and segregate scrap, trim and other materials and keep equipment and work area clean during operation.
- Remove finished product and store as required.
- Recognize known faults that occur during the operation.
- Identify and take action on causes of routine production faults and log problems as required.
- Complete production run and shut down.
- Clean, adjust and lubricate equipment according to enterprise procedures.

Unit G14 Operate centrifugal casting equipment

Start up and use centrifugal casting equipment such as pumps and fittings, such as hoses and couplings, sprays, controller, such as PLC if fitted and produce composite product. Check operation of equipment and components. Check product for quality and conformity to specifications. Control raw material feed, clean the equipment and work area and deal with any problems and take required action (e.g. reporting). Deal with non-conforming products, waste and scrap and complete production logs and enterprise reports.

Performance elements

- Perform pre-operational checks on centrifugal casting moulding machine and ancillary equipment such as pumps and fittings, hoses and couplings, controller, and PLC if fitted in accordance with enterprise procedures.
- Check process is operating within required limits and the product is in specification and to required enterprise quality standards.
- Ensure product is consistently ready for next operation and maintain supply of material(s) as required.
- Maintain and monitor centrifugal casting equipment, checking for equipment malfunction, variations in process conditions, variations in materials or contamination of materials, equipment, tool or mould damage, and incorrect quantity of materials or wrong raw materials/additives.
- Collect and segregate scrap, trim and other materials and keep equipment and work area clean during operation.
- Demould products and store as required.
- Recognize known faults that occur during the operation.
- Identify and take action on causes of routine production faults and log problems as required.
- Complete production run and shut down.
- Clean, adjust and lubricate equipment according to enterprise procedures.

Unit G15 Produce centrifugally cast polyurethane products

Centrifugally cast polyurethane products in horizontal or vertical rotating machinery. Set up the equipment and the mould. Control the temperature and casting of the product, and troubleshoot as required to meet product specifications.

Performance elements

- Check job sheets for work to be done and identify the priority in which jobs/product will be made/completed.
- Set up the equipment and ensure the equipment functions.
- Prepare material prior to conducting casting operations calculating the quantity of material required to produce product of correct shape and physical dimensions, product colour and obtain appropriate agents.
- Ensure mould is secured or adequately restrained to prevent separation of mould and rotational equipment and test run horizontal cylindrical moulds to ensure vibration free running.
- Test run horizontal cylindrical moulds to ensure vibration free running.
- Pour materials at the appropriate rate per minute, angle and quantity using necessary aids and assistance to ensure pour is completed within required times and distribution requirements and using techniques to prevent excessive aeration.
- Check product quality including thickness, weight and product integrity, against specifications.
- Conduct casting operations and remove and inspect a sample product checking materials for conformity to job requirements.
- Correct materials, equipment or process variations making appropriate adjustments.
- Discard waste and scrap in accordance with enterprise instructions.
- Solve routine and non-routine casting equipment and process problems seeking guidance where necessary or appropriate, to maintain operating, speed of rotation or cure, colour, location of pouring basin, cycle time, separating agents, product, integrity and general conformance to specification/sample.
- Complete logs and reports.

Unit G16 Finish plastic products and components

Check job sheets for work to be done. Inspect the product for routine and non-routine finishing processes and apply finishing process to product. Inspect finished product and sort in accordance with job specifications, identifying and taking action on routine product imperfections. Pack and record production data according to enterprise requirements.

Performance elements

- Identify work requirements from enterprise specifications and assemble equipment and consumables for the finishing process.
- Remove products from forming/moulding equipment at end-of-product run.
- Inspect product to identify routine and non-routine finishing requirements including identifying significant finning, flash or other quality problems and report to appropriate person for investigation of mould/ die closure/alignment.
- Undertake the finishing operation, trimming product as required and following waste and recycling procedures.
- Ensure the appropriate surface finish, finning or shuts and that identifying marks and trademarks are visible.
- Inspect finished product and compare to specifications for suitability for further processing or for customer delivery.

- Assemble finished products, sort and pack as required.
- Clean up work area.

Functional area H – Textiles manufacturing

Unit H1 Prepare dyes for textile manufacturing

Select dyes to be used in the dyeing of textile fibres, including polyester, cotton, wool, viscose rayon. Prepare necessary dye materials and chemicals for the dyeing process. Apply dye to sample materials and test for match with specifications. Obtain approval for the dye result from supervisor and/or clients.

Performance elements

- Confirm specifications for dyeing and the textile material such as yarns, including ring spun, open-ended spun, air jet spun, friction spun fabrics with supervisor or client.
- Clarify the end use and performance standards expected of the finished product.
- Analyse a material sample to determine type and composition.
- Identify the expected textile production or reproduction processes and use this to base preliminary dye selection.
- Trial the dye selection/s, specification and recipe using laboratory-based production facilities and equipment such as pad mangles, rota dryers, mini-jets, pilot production plants results and evaluate against specifications.
- Review and test dye selection or recipe as required checking for colour fastness testing and shrinkage testing.
- Seek approval of preliminary dye specification from supervisor or client before implementing a limited production run.
- Sample and test appropriate to evaluation of products including finished products such as socks, sweaters, towels, sheets, blankets, carpets, rope and twine, mops and industrial textiles during a limited production run.
- Analyse test results and review preliminary dye selection/recipe and retest as required.
- Gain final approval of colour specification supervisor or client before implementing bulk production run.

Unit H2 Prepare yarn for textile manufacturing

Prepare, operate, monitor and adjust warping, beaming, winding, sizing, threading, spooling and knitting machines and equipment used to thread, spool, wind, size and beam yarn. Prepare yarns used for production operations such as weaving, knitting or tufting. Check yarns for quality and record in enterprise documentation.

Performance elements

- Check production specifications to identify the requirements for yarn quantity, quality and colour.
- Check the yarn batch or job to ensure conformity to specifications and report non-conforming materials.
- Calculate the warping, beaming, winding, sizing, threading, spooling or machine settings and adjust to meet production requirements.
- Set leasing reed or other mechanisms according to specifications where necessary.

- Thread yarn onto machine as necessary and operate according to manufacturer's requirements and enterprise procedures.
- Monitor the machine operation including yarn, sections, lubrication, height, tension and speed and repair yarn breaks where necessary.
- Report and major machine or product faults are reported.
- Check the yarn product against quality standards and unload or remove according to manufacturer specifications.
- Despatch finished yarn product to next process.
- Clean the work area to ensure work environment is maintained in a safe and productive manner.
- Complete production records and other documentation accurately.

Unit H3 Perform knotting for weaving

Check weaving knotting production specifications. Prepare yarn for the production process. Load beams onto looms for weaving and attaching yarn using a knotting machine, manual knotting processes or a tying stand. Monitor the knotting as part of the weaving or tufting loom process. Clean the work area and complete production documentation.

Performance elements

- Check production specifications to identify requirements for yarn quantity, quality and colour.
- Check yarn batch and pattern to ensure conformity to specifications and report any non-conforming materials.
- Load beams onto weaving machine.
- Prepare yarn for knotting applying appropriate tying-in and knotting techniques and using leases and knot using knotting machine or manual knotting techniques.
- Identify and repair any broken yarn and check and test knots to ensure adequate strength.
- Re-tie yarn using weavers knot or alternative techniques.
- Report any machine or product faults as required.
- Despatch empty beams.
- Clean the work area and dispose of waste to ensure work environment is maintained in a safe and productive manner.
- Complete production records and other documentation accurately.

Unit H4 Set up and operate a dry laid web forming machine

Set dry laid web forming machines for production of layered and cross laid webs using rayon and other cellulose, nylon, polyester, polypropylene, cotton, wool, glass and bi-component fibres. Start-up the web forming machine, undertake first-off runs and adjust as required. Make product changeovers as necessary. Inform machine operators of machine settings and operation.

Performance elements

- Check specifications to identify requirements for production using different types of carded webs, such as, parallel laid web, parallel laid web with spreading device, parallel laid web with scrambling, random laid web and random laid web with scrambling.

- Check all raw materials, containers and quantities for fibre characteristics, absorbency, abrasion resistance, modulus, web 'handle', moisture absorption, chemical and temperature resistance, melting point, fibre measuring units, including decitex and denier and fibre diameter - equation and fibre or filament crimp.
- Adjust machine settings to meet product requirements.
- Clean the area around machine during and on completion of setting and loading.
- Start the dry laid web forming machine according to manufacturer instructions and job requirements.
- Monitor machine operations to ensure safe and correct operation.
- Sort waste and identify and correct any minor product process and machine faults where necessary to meet specified requirements.
- Check formed web against quality standards and production requirements.
- Despatch dry laid web to next manufacturing or packing process.
- Clean the work area to ensure work environment is maintained in a safe and productive manner.
- Complete production records accurately.

Unit H5 Set up and operate a spun bond web forming machine

Set up spun bond web forming machines including machines that include extrusion, spinning, attenuating, and orientation. Lay down, web carrying or web bonding. Start up machines for melt spinning of polymers to produce continuous filaments (threads) of polymer which are laid to form a web and then bonded and finished. Check operation using first-off runs and make adjustments as required. Clean machines/work area and record production documentation.

Performance elements

- Check specifications to identify requirements for spun bond web filament production.
- Obtain raw materials such as polyester and polypropylene and material containers checking for accurate quantities and specified quality.
- Adjust machine settings to meet product requirements including all operational variables, such as polymer throughput, air throughput, spinneret configuration, hole size and distance to collector, spinning, drawing and deposition options.
- Determine the material features including spinnability, filament structure, filament crimp, measuring units, including decitex and denier.
- Start the spun bond web forming machine according to machine manufacturer's specifications and job requirements.
- Monitor the machine operation to ensure safe and correct operation.
- Sort waste and clean machine when required.
- Identify minor product process and machine faults and correct where necessary to meet specified requirements and report any major machine faults.
- Check formed web against quality standards and production requirements.
- Despatch spun bond web to bonding or finishing process.
- Clean the work area to ensure work environment is maintained in a safe and productive manner.
- Complete production records accurately.

Unit H6 Perform web bonding

Determine the specification for foam, spray, or print, thermal and mechanical web bonding processes and obtain raw materials. Perform the web bonding process including chemical, thermal, mechanical and latex bonding. Monitor web bonding machine operation and adjust as required. Clean machines/work areas and record production documentation.

Performance elements

- Check specifications to identify requirements for web bonding process including mechanical bonding that requires needle punch, stitchbond and hydro-entanglement.
- Select correct web bonding process according to product requirements with chemical bonding including solvent bonding, foam bonding, hydrogen bonding, print bonding and latex addition to formed web and inorganic binders.
- Set up the web bonding machine including speed settings for web progression, heat settings, solution settings, needle punch settings and settings made using computer, mechanical and electronic controls.
- Obtain and check bonding raw material such as fusible, bi-component and co-polyester fibres and set machine controls to meet product requirements.
- Monitor formed web supply and speed for conformance to specification and adjust as necessary to meet product requirements.
- Identify minor product process and machine faults and correct where necessary to meet specified requirements and report any major machine faults.
- Check bonded web against quality standards and production requirements and rectify/report any web faults and non-conformance.
- Send completed bonded web for web conversion and finishing or next manufacturing or packing process.
- Clean machine and work area to ensure work environment is maintained in a safe and productive manner.
- Complete production records accurately.

Unit H7 Perform web conversion and finishing

Determine the specifications for coating of webs using closed and open systems for web conversion and finishing. Set up machines including tensions set by mechanical, electronic or pneumatic means. Convert bonded web into product ready for finishing and packing processes. Clean the work area and complete production documentation.

Performance elements

- Check specifications to identify the web conversion and finishing requirements for production.
- Set web guides and tensions for the product according to specifications.
- Check bonded web supply and speed for conformance to specification.
- Perform web conversion including web cutting, slitting and re-reeling.
- Use chemical treatments including fluoro-chemical and silicone treatments for aqueous liquid repellency, anti-microbial treatments, flame retardancy treatment and micro-encapsulation.
- Perform web finishing process including base web micro-creeping, coating, extrusion coating, flocking, corona/plasma and chemical finishing treatments.
- Adjust machine operational parameters to meet product requirements.
- Identify and rectify any problems with mechanical, electronic or pneumatic web guides or cylinder alignment.

- Identify and correct any minor product process and machine faults where necessary to meet specified requirements and report any major machine faults.
- Check finished and converted web against quality standards and production requirements and rectify or report any faults and non-conformances.
- Pack and label finished web or non-woven product according to order and product requirement.
- Clean the machines and work area to ensure work environment is maintained in a safe and productive manner.
- Complete production records accurately.

Unit H8 Perform technical textile mechanical finishing

Check production specifications for technical textile finishing processes. Conduct mechanical finishing processes on textile products that are manufactured for special technical performance and applications such as special fire retardant materials. Set up, operate and adjust specialised machines for the finishing processes. Check the quality of the finished textiles against specifications. Clean the work area and complete production documentation.

Performance elements

- Check that the textile fabric or web is ready for mechanical finishing processes such as heat setting, scouring, calendaring, singeing, impregnation, raising, cropping, and compressive shrinkage and conduct pre finishing tests if required.
- Prepare specialised machine/s and adjust according to product finishing specifications required for work.
- Operate the mechanical finishing machines and check during operation making adjustments to ensure optimum performance.
- Identify any machine or product faults, report and record.
- Assess the technical textile for compliance with quality standards and product finishing specifications.
- Conduct appropriate tests and sampling if required.
- Direct technical textile production to next operation.
- Clean the machines and work area to ensure work environment is maintained in a safe and productive manner.
- Complete production work documentation accurately.

Unit H9 Apply surface coating to technical textiles

Check production specifications for surface coating of technical textiles. Apply surface coating to technical textiles including by lick roll, knife coating, gravure, rotary screen, hot melt and transfer coating. Check the quality of coated textiles against production specifications. Clean the work area and complete production documentation.

Performance elements

- Check to ensure that textile fabric is ready for surface coating process and prepare the work area.
- Obtain surface coating materials and prepare according to manufacturer instructions and specifications required for job.
- Conduct appropriate tests on the technical textile before application of surface coating to ensure coatings will adhere as required.
- Fix the technical textile into position on the machine or conveyor as required.

- Load the coating mix or transfer sheet into the machine reservoir for pick-up by knife, coating roller, gravure roller, rotary screen, laminating or tie coat equipment.
- Set machine to correct heat, speed and thickness according to process and job requirements.
- Monitor the coating process to ensure application is according to job requirements and manufacturer instructions.
- Remove the coated technical textile from coating machine and conduct quality tests as required.
- Direct coated technical textile to next production operation.
- Clean the machines and work area to ensure work environment is maintained in a safe and productive manner.
- Complete production work documentation accurately.

Unit H10 Set up, adjust and operate machines for production of yarn

Check production specifications for spinning operations of yarn that may be wool, nylon, acrylic, polypropylene, polyester, cotton and viscose blends. Prepare, operate, monitor and adjust drawing, roving, spinning, twisting and winding machines to convert slivers to yarn. Check and adjust machines as required to meet product quality requirements. Clean the work area and complete production documentation.

Performance elements

- Check specifications to identify requirements for yarn production including count, twist, ply, tension, weight, lubrication, twist direction, strength and extension.
- Set and adjust electronic, automated or mechanical machine settings to meet product requirements and load product for processing according to manufacturer specifications reporting any non-conforming materials.
- Obtain and check quality/quantity of raw materials such as natural, synthetic or blended fibres, filaments, slivers and rovings.
- Start machine in accordance with manufacturer requirements and monitor the machine operations to ensure correct operation.
- Operate the machine and perform drafting, twisting, splicing, piecing up, joining, fault identification, steaming, vacuuming and oiling as required.
- Produce yarn samples and examine to identify any required adjustments to machine settings or pattern specifications.
- Identify and correct minor product faults such as double ends, high thin places, wrong count, contamination and piecing up.
- Correct any minor machine faults where necessary to meet specified requirements and report any major machine faults.
- Unload product check against quality standards and doff product and replace according to manufacturer specifications.
- Despatch spun product to next production process.
- Clean the machines and work area to ensure work environment is maintained in a safe and productive manner.
- Complete production work documentation accurately.

Unit H11 Set up and operate a tufting loom

Prepare a tufting loom and related equipment such as winding machines and finishing equipment to produce textile products such as carpets to specification. Load the loom with creeling or beaming, primary backing and yarn. Operate the loom constantly checking the quality of tufted products produced. Check and adjust machines as required to meet product quality requirements. Clean the work area and complete production documentation.

Performance elements

- Check specifications to identify product requirements including level loop, cut pile, cut and pile, loop pile, colour, pattern, size, stitch rate, tension, hard twist pile, blends, frieze (textured/bulk), Saxony (plush), Berber (thick yarns) and sisal/cord (textured).
- Set and adjust electronic, automated or mechanical machine settings to meet product requirements according to manufacturer specifications.
- Obtain and check tufting yarns including wool, nylon, acrylic, polypropylene and polyester and load into the loom according to the product specifications.
- Obtain tufting yarn beams, check and join into the loom according to manufacturer specifications.
- Start the tufting loom and monitor to ensure correct operation, cleaning the loom when required.
- Produce samples and examine to identify required adjustments to machine settings or pattern specifications.
- Join tufting using splicing, weavers and double weaver's knots.
- Identify and correct minor product faults such as holes, j-cutting, low-cut yarn, incorrect yarn height, foreign matter, creasing of primary backing or carpet, lines in carpet, marks, broken looper, choppy face or blocked creel tubes.
- Identify and correct minor machine faults where necessary to meet specified requirements and report any major machine faults.
- Unload product ready for next production process and assess for faults and non-conformance with product specifications and quality standards.
- Despatch tufted products to the next production process.
- Clean the machines and work area to ensure work environment is maintained in a safe and productive manner.
- Complete production work documentation accurately.

Unit H12 Perform creeling

Check specifications for creeling and obtain cones and yarns for the specified product. Load multiple cones onto creels in warping or spinning machines or a weaving or tufting loom. Monitor the creeling operations and check and adjust machines as required to meet product quality requirements. Clean the work area and complete production documentation.

Performance elements

- Check production specifications to identify requirements for yarn quantity, quality and colour as required.
- Check the yarn batch to ensure conformity to specifications.
- Load cones onto creeling magazine, tie or splice yarn into creel and enter into the reed, accumulators, tension and clearing devices as required.
- Monitor yarns to ensure they are straight, flat and aligned and adjust tension settings to meet production requirements.
- Check sensors for operation as required and identify any broken yarn and retie using weaver's knots or alternative tying tools.
- Maintain yarn flow according to the need and speed of the machine.
- Re-load creels with cones as required to achieve continuous flow of yarn and despatch empty cones.
- Despatch creeled products to next production process.
- Clean the machines and work area to ensure work environment is maintained in a safe and productive manner.
- Complete production work documentation accurately.

Unit H13 Set up and operate a weaving loom

Prepare and adjust beam or creel fed, broadlooms, narrow looms, shuttle type looms, jacquard weaving looms, sample weaving looms, air jet, rapier and projectile looms used in the production of a range of textile fabrics and materials. Operate the loom to produce a range of textile products from wool, nylon, acrylic, polypropylene, polyester, cotton and blended yarns. Monitor the weaving operations and check and adjust machines as required to meet product quality requirements. Clean the work area and complete production documentation.

Performance elements

- Check the loom settings against product requirements such as yarn combinations and patterns, tension, size, weight, selvedge, type of weave, quality name, pile height, beat-up, width and weaving construction (pattern).
- Obtain wool, nylon, acrylic, polypropylene, polyester, cotton and blended yarns as specified and tie into the loom according to manufacturer specifications.
- Start the weaving loom according and monitor to ensure correct operation.
- Produce a sample woven piece and test, or organize a test, in accordance with enterprise procedures to ensure required standards of quality are met.
- Interpret the test results to make any necessary adjustments to machine settings or pattern specifications.
- Set loom electronic processes such as horseshoe wire, knock offs, photo cells, micro switches, fibre optics and missing end detectors (med) and monitor the correct functions.
- Tie yarns as required using splicing, weavers and double weaver's knots.
- Identify and correct minor product faults.
- Identify and correct any minor machine faults where necessary to meet specified requirements and report any major machine faults.
- Unload woven material ready for next production process and assess for faults and non-conformance with specification and quality standards.
- Despatch woven products to next production process.
- Clean the machines and work area to ensure work environment is maintained in a safe and productive manner.
- Complete production work documentation accurately.

Unit H14 Set up a carding machine and perform carding

Prepare, set up and adjust carding machines and equipment such as burr handling systems, air filtration equipment, carding machine, doffer waste system, blending systems and compressed air used to process natural or synthetic fibres to be used in woven, knitted, tufted and nonwoven products. Operate the carding machine to manufacturer's specification to produce carded fibres. Monitor the carding operations and check and adjust machines as required to meet product quality requirements. Clean the work area and complete production documentation.

Performance elements

- Check carding production specifications to identify requirements for carding, receive raw fibres assessing weight, temperature, moisture content, lubrication, nep/contamination level, web thickness and compression and set up for loading into feed sheet.
- Set up the carding machine for operation.
- Start the carding machine according to manufacturer requirements.
- Conduct quality tests on sliver or web as required ensuring optimal production outcomes are achieved and make any required adjustments to machine settings.

- Monitor blending to ensure blending consistency and feed uniformity and perform routine rectification of any faults such as drafting or twisting, and splice, piece up and join fibres as required.
- Perform product fault identification, heating, steaming, vacuuming and oiling as necessary.
- Monitor the carding operation to ensure correct feed rate and quality of web offtake.
- Sort waste including processed burr, contaminants, processed sweepings and machine waste.
- Check the carded fibres against quality standards and unload or remove according to manufacturer specifications and enterprise practices.
- Send carded fibres for despatch or further processing.
- Clean the machines and work area to ensure work environment is maintained in a safe and productive manner.
- Complete production work documentation accurately.

Unit H15 Correct weaving process faults

Identify product and weaving loom faults in machines typically used in weaving production including microprocessor or computer controlled machines. Analyse the faults and determine their cause. Rectify the faults through re-setting or adjusting the weaving machines settings or repair and replace faulty ancillary equipment. Ensure the machine operator is aware of changed settings and woven product quality requirements. Complete production documentation.

Performance elements

- Check pattern and production requirements and consult with the weaving operator on loom operation and on any operator identified faults.
- Observe the loom operation and woven product for faults.
- Find and correct general faults including incorrect creeling and other set up faults.
- Identify weft faults such as broken picks, missing picks or tight picks.
- Identify warp faults such as wrong draft, wrong dent, wrong reed, ends missing, tight ends, wrong yarn or wrong counts.
- Check for faults such as breaking yarn ends, crossed ends and ends holding down, cords breaking, beam going slack and tight, ends jumping over sley, end smash, shuttle cord breaking, jute breaking or missing shuttle, jute looping on selvedge, jutes slipping over divider bars, gaps in selvedge, poor selvedge, pulling in on selvedge, dragging, lifting, knife marks, tooth off comb, wool on back, full outs, short rows, frames falling out, crossing spools, wrong spools, threading rip backs, chain out of horse shoe, broken horse shoe, rollers off, chain, loops in face, rough face and carpet around roller.
- Determine the cause of faults including poor threading, dirty or oily marks, jute missing shuttle, shuttle cord cutting, jute cutting, narrow selvedges, selvedges looping, selvedges wide, warp ends breaking out, smashing of warps, cloth working forward, short rows, dirty back and trapped yarn on surface, spools falling out of chain, spools coming short and wide shot or open weave.
- Make any changes and adjustments required in the weaving loom and ancillary equipment operation to rectify all faults.
- Ensure the weaving operator understands the faults, revised settings and monitors the loom for quality product production.
- Complete production work documentation accurately.

Unit H16 Perform textile colouration and finishing

Prepare for textile colouration and finishing processes on a wide range of fabric types and fibres, yarns or garments. Undertake colouration and finishing processes using standard procedures to meet design and quality specifications after assessing the impact of textile properties on the finishing process such as type of fibres: plant, animal or synthetic, chemical properties, physical properties and fibre pre-treatments. Clean the work area and complete production documentation.

Performance elements

- Obtain and interpret the textile colouration and finishing specifications and prepare the technical aspects of production.
- Calculate and use colour charts to determine the necessary colour formulas.
- Set up equipment, tools and materials according to specifications for the work and check fabrics to be coloured against quality standards.
- Produce sample pieces using the chosen colourisation techniques to assess compliance with specifications and adjust colour formulas as required.
- Check fabrics for finishing against quality standards and produce sample pieces using finishing techniques to assess compliance with specifications.
- Complete the colouration process including bleaching, skein dyeing, bath dyeing, batch processing, continuous and semi continuous dyeing, drying and curing and thermasol processes.
- Complete the finishing processes, adjusting techniques as required to meet design specifications.
- Analyse the production process to identify opportunities for improvement.
- Clean the colouration and finishing equipment and work area in a safe and productive manner.
- Document formulas, processes and improvements and store for later use.

Unit H17 Prepare stencils and screens for textile printing

Prepare stencils, or silk-screen printing materials to produce designs and artwork for garments, textile products, furnishing fabrics or accessories. Use screen printing manual techniques, tools and equipment to produce quality screens. Check the screens against the design specifications using samples. Identify and correct any screening faults and set up screens for production. Clean the work area and complete production documentation.

Performance elements

- Analyse the screening design specifications such as repeat patterns, border designs, placement prints, engineered designs and banners and confirm the stencil requirements with supervisor/s.
- Set up the stencil/screening work area, tools and equipment including rulers and tape measures, light boxes, graph paper, photocopier, overhead projector, computer and CAD software and tables according to specifications for the work.
- Identify the desired effects of the production screen printing and select appropriate conversion techniques such as basic stencils, hand cut and hand drawn stencils, photosensitive stencils, autographic, digitally generated stencils and multi coloured separations to achieve the required design outcome.
- Prepare and accurately label layouts and select the media to be used including ruby lithe, designers opaque, ink, black wax crayon, digital prints, drafting film and pen to prepare stencils.
- Complete the stencil/s and check against design.

- Select appropriate screen types for the work such as timber, steel, aluminium framed, butt, mitre, nailed, glued, screwed, welded, rectangle, rotary, hat and flat bed for appropriate substrates and white, yellow, red, size and mono or multi-filament mesh types in material, nylon, polyester or metal and prepare for the stencil process.
- Check for mesh tension, degrease and remove haze, apply registration marks and coatings.
- Expose stencil masters according to specifications and develop, dry and finish images.
- Print a strike off and check against design specifications to ensure quality standards are met.
- Identify any screen and stencil faults such as uneven screen coating, incorrectly stretched screen mesh, poorly registered artwork/separations, inaccurate repeat measurements, incorrect exposure time, a wet coating trough causing pinholes, warped screen frames, insufficient print paste, off printing, poorly developed image, poor quality colour separations or insufficient stencil opacity.
- Determine the cause of identified faults and modify screens as required using appropriate techniques, processes or materials.
- Complete screens and prepare for the production process.
- Clean the screen and stencil equipment and work area to ensure work environment is maintained in a safe and productive manner.
- Complete production work documentation accurately.

Functional area J – Garment manufacturing

Unit J1 Lay up, mark and cut fabrics and lays

Interpret a simple pattern and obtain suitable fabric for garment manufacture. Lay up patterns with uncomplicated shaping and few pieces such as T-shirts, straight or A-line skirts, shift dresses, tracksuits, section crowns, brims, tips, side bands, and berets. Mark up manually or by computer single garments or several layers of fabric and cut. Check cut work against specifications and pass on for sewing. Clean work area and maintain tools and equipment.

Performance elements

- Set up the marking/cutting workstation including cutting table and seating.
- Clean, check and service cutting equipment including dressmaker's shears, cutting mats and straight-blade cutters according to manufacturer instructions.
- Prepare the cutting table to suit correct lay length and set up lay-up and marking equipment for use.
- Interpret lay-up instructions, collect fabric such as poplin, drill and flannelette; knitted fabrics such as rugby knit and double knit and designs such as stripes, one-way designs and plaids, marker card or paper, weights and clamps and check width and quality against lay-up instructions.
- Lay up fabric and adjust fabric tension to match expected performance, check for faults and take required action to rectify faults.
- Interpret the cutting order for marking requirements such as fabric type, width, quantity and garment sizes.
- Collect and collate the required pattern pieces and check manually or by computer.
- Manipulate and position the pattern pieces manually on paper or by computer for most efficient fabric use.
- Draw lay marker manually or by computer according to requirements.
- Copy the marker either manually or by computer and place on lay.

- Check marker and lay alignment and take appropriate action according to job specifications.
- Cut lay using cutting equipment according to requirements for the operation.
- Inspect the cut work, identify any faults and take appropriate action to ensure cut pieces meet required quality standards.
- Regularly check performance of the cutting equipment for signs of faulty operation, including evidence from inspection of cut pieces, and take any required action.
- Direct cut work to next operation and clean and prepare the work area for next job.
- Store the master copy of lay marker in filing drawer or computer as appropriate.

Unit J2 Lay up and cut complicated fabrics and lays

Interpret complex patterns for garment production involving a variety of fabrics and lays. Prepare materials for multiple garment pieces with a range of shapes such as shirts/blouses, trousers, jackets, dresses, skirts using fabrics that may be delicate and/or have directional patterns. Lay up multiple garments and layers of fabric to be cut. Cut fabrics according to a marker including two way markers and step layers. Use cutting tools and equipment such as round blade cutters, straight knife cutters, drills, metal dies or a computerised cutting machine. Check for quality of completed cut components and complete production records.

Performance elements

- Set up the marking/cutting workstation including cutting table and seating.
- Clean, check and service cutting and lay-up equipment such as weights, clamps, spreading table and change blades and drill bits as required according to manufacturer's instructions.
- Prepare the cutting table to suit correct lay length and set up lay-up and marking equipment for use.
- Interpret lay-up instructions, collect fabric including wovens such as denim, wool suitings, corduroy, satins, chiffon and rayons; knits such as polar fleece, double knits, single knits and tricot and check width and quality against lay-up instructions from job cards, cutting orders and customer order breakdown marker.
- Lay up fabric and adjust fabric tension to match expected performance, check for faults and take required action.
- Interpret the cutting order for marking requirements such as fabric type, width, quantity and garment sizes.
- Collect and collate the required pattern pieces and check manually or by computer.
- Manipulate and position the pattern pieces manually on paper or by computer for most efficient fabric use.
- Draw lay marker manually or by computer according to requirements.
- Copy the marker either manually or by computer and place on lay using layering with calico or paper for delicate or difficult-to-manage fabrics.
- Check marker and lay alignment and take appropriate action according to job specifications.
- Cut lay using cutting equipment according to requirements for operation.
- Inspect the cut work, identify any faults requiring splicing (overlap joining) or other appropriate techniques to rectify the fault and take appropriate action to ensure cut pieces meet required quality standards.

- Regularly check performance of the cutting equipment for signs of faulty operation, including evidence from inspection of cut pieces, and take any required action.
- Direct cut work to next operation and clean and prepare the work area for next job.
- Store the master copy of lay marker in filing drawer or computer as appropriate.

Unit J3 Modify patterns to create garment styles

Interpret a pattern and modify according to job requirements for new garment manufacture. Use existing styled patterns to create new styles with minimal modification. Provide manufacturing instructions using correct pattern and garment terminology. Select the correct tools and equipment for pattern modification. Record modified pattern information and store according to enterprise requirements.

Performance elements

- Identify pattern pieces and pattern markings including notches, straight of grain, seam lines, drill holes, darts, cutting instructions, style number, and size.
- Interrupt the required style modifications from job specifications including changing necklines, adding opening or closures, lengthening or shortening, adding flat seaming, applied pockets and flaps.
- Check pattern components against pattern specification sheet and confirm finished garment requirements.
- Identify any fabric performance characteristics that may affect style modifications and select patternmaking tools and equipment.
- Prepare a basic sketch of the required modification and make modifications applying basic pattern making principles.
- Check modified pattern pieces for accuracy, including features such as appropriate seam allowance, ease allowance, notching, pattern information (size, style number, cutting instructions and identity), darts, drill holes, grain line, cutting line and stitching line.
- Produce and pattern specification sheet including the number of pattern pieces, style details, fabric swatches, trade sketch, special pattern information and cutting instructions.
- Label all pattern pieces, including grain lines, notches, pattern information and cutting instructions.
- Store modified pattern pieces according to enterprise procedures.

Unit J4 Apply garment patterns

Prepare pattern application requirements for garment manufacture interpreting a variety of pattern styles. Apply pattern application principles such as dart manipulation, adding fullness and utilising pattern-making terminology and applying the basic principles of pattern making/modification. Apply pattern information and specifications to the relevant processes of garment construction. Check pattern application for suitability to production process. Monitor the quality of garments using the pattern and complete workplace documentation.

Performance elements

- Identify block construction and any pattern-making and pattern-modification processes required.
- Produce pattern pieces and check against the pattern chart including details of pattern pieces, style details, fabric swatches, trade drawing and special pattern information.

- Apply pattern markings including notches, grain line, seam lines, drill holes, darts, cutting instructions, style number, size, seam allowance, cutting line and stitching line and garment style features including garment type, collar, sleeves, yoke, sides, openings, neckline, buttons, seams, zips, gathers, pleats, panels and tucks.
- Prepare pattern information and specifications for the specific garment production.
- Check completed pattern pieces, information and specifications for accuracy of application throughout garment production process.
- Monitor any garment production faults relating to pattern or pattern information and specifications and rectify or report.
- Complete production documentation as required.
- File patterns according to enterprise requirements.

Unit J5 Use sewing machines for simple garment manufacture

Prepare and maintain sewing machines and related equipment for production garment manufacture. Sew pre-cut work using a plain lockstitch machine, zigzag sewing machine or a three thread overlocker and sew straight seams or join flat pieces of stable fabric together. Use sewing techniques including those where the positioning of the work is controlled by guide bars, sensor lights or other guiding devices or where there is uncomplicated feeding of the fabric. Check completed sewn work pieces for compliance with job specifications. Complete production records and bundle work for next manufacturing operation.

Performance elements

- Receive pre-cut work pieces and check for quality requirements.
- Lay out work pieces in sequence of sewing operation and set up the workbench and seating.
- Clean and check machines and set up ensuring correct thread, needle size and type, needle guard, tension setting and attachments and adjust including checking and replacing worn or damaged needles and attachments (feet) according to specifications for work.
- Identify any worn or damaged machine parts and report or replace according to manufacturer specifications.
- Identify any machine tension faults and poor thread performance or incorrect thread selection.
- Sew work pieces including aligning and sewing straight seams or joining flat pieces of stable fabric together using top stitch, edge stitch, open seams, closed seams and lapped seams according to product requirements and quality standards.
- Use the machine according to requirements for speed of the work and control machine speed and work handling according to the type of operation, fabrics and product type.
- Inspect sewn pieces against quality standards and report any faults or pieces that do not meet quality standards.
- Complete production records or packing slips, bundle work as required and direct to next operation or packing section.

Unit J6 Use sewing machines for complex garment manufacture

Prepare and maintain sewing machines and related equipment for complex production garment manufacture. Sew work using machines including a plain lockstitch sewing machine, a three, four or five thread overlocker, a blind hemming machine and a zigzag sewing machine. Use sewing techniques where the

positioning, feeding and handling of work pieces involves discretionary changes, contouring or critical stopping points or involves special handling skills to accommodate fabric variations. Check completed sewn work pieces or garments for compliance with job specifications. Complete production records and bundle work for next manufacturing operation or dispatch.

Performance elements

- Receive pre-cut work pieces and check for quality requirements and that the bundle matches ticket information, checking that previous operations have been successfully completed.
- Lay out work pieces in sequence of sewing operation and set up the workbench and seating.
- Clean and check machines and set up ensuring correct thread, needle size and type, needle guard, tension setting and attachments and adjust including checking and replacing worn or damaged needles and attachments (feet) according to specifications for work.
- Identify any worn or damaged machine parts and check needles which may include size and types such standard, ball point and report or replace according to manufacturer specifications.
- Identify any machine tension faults and poor thread performance or incorrect thread selection.
- Set-up the machine/s including correct thread, needle size and type, needle guard, tension setting and attachments.
- Sew garment components including sleeves, waistbands-straight or shaped, collars, cuffs, plackets, facings-neck, armhole, binds, zips-dress, skirt, trouser, invisible, buttons and buttonholes, pockets-cut away and patch in seam according to specifications and quality standards.
- Control the machine speed and work handling such as gathering, easing, tucking, stitching curves, hems-double fold, rolled, blind, stitched hem, darts and pleats for the specific type of operation, fabrics and product type.
- Inspect the sewn components, identify any faults and take appropriate action to ensure finished pieces meet the quality standards.
- Complete production records or packing slips, bundle work as required and direct to next operation or packing section.

Unit J7 Use sewing machines for woven and stretch knit garments

Prepare and maintain sewing machines and related equipment for woven or stretch knit production garment manufacture of shirts, trousers, dresses, unstructured jackets, skirts, lingerie and briefs. Plan and align patterns for complete stretch and woven fabric garments. Sew work using machines including plain lockstitch sewing machines, three, four or five thread overlockers, zigzag sewing machines, blind hemmers, buttonholers, button sewers, and pocket and collaring machines, elasticators and binders. Complete stretch and woven fabric garments or products including production of samples and assembly of a complete garment. Check completed sewn work pieces or garments for compliance with job specifications. Complete production records and bundle work for next manufacturing operation or dispatch.

Performance elements

- Identify complete garment requirements including work pieces, accessories and trims from production specifications and plan for the garment construction.
- Check work pieces and fabric for readiness for assembly and lay out in sequence of sewing according to the construction plan for multiple pieces such as sleeves, collars and trims to production specifications.

- Clean and check machines and set up ensuring correct thread, needle size and type, needle guard, tension setting and attachments and adjust including checking and replacing worn or damaged needles and attachments (feet) according to specifications for work.
- Identify any worn or damaged machine parts and check needles which may include size and types such standard, ball point and report or replace according to manufacturer specifications.
- Identify any machine tension faults and poor thread performance or incorrect thread selection.
- Set-up machine/s including correct thread, needle size and length needle guard, tension setting and attachments, setting machine tension specific to woven and stretch knit fabrics.
- Sew the garment according to requirements for sewing woven and stretch knit fabrics to quality standards.
- Control the machine speed and work handling for type of operations, fabrics and product type.
- Inspect the sewn components, identify any faults and take appropriate action to ensure finished pieces meet the quality standards.
- Complete production records or packing slips, bundle work as required and direct to next operation or packing section.

Unit J8 Perform garment assembly production tasks

Receive and check bundled garment work for production assembly tasks. Use specialised machines such as buttonholers, fusing, moulding or gluing machines, ticket and label printers to complete the production task/s. Bundle cut work and load and unload machines and place tickets and labels on bundled work. Check work as completed to meet required specifications and readiness for next production task.

Performance elements

- Lay out garment work pieces and materials in sequence according to specifications.
- Prepare the workbench and seating and check equipment including moulding machines, fusing machines, gluing machines, ticket or label printers, button holing machines or specialised machines such as buttonholers, cuff turners, pocket setting and button sewers.
- Set up and adjust machines in accordance to specifications for the work.
- Undertake production garment assembly tasks in compliance with quality standards and production specifications.
- Check completed garments or articles against quality standards, identify any faults and report and record.
- Complete production records or packing slips, bundle work as required and direct to next operation or packing section.

Unit J9 Press garments or garment components

Prepare and maintain pressing machines and equipment. Set up work components/garments to be pressed. Press stable woven and knitted natural and synthetic fabric components to enterprise quality standards and to meet specifications for appearance and finish of the work. Pass on or prepared pressed work for further production or dispatch.

Performance elements

- Set up the pressing work area and clean and check pressing equipment.

- Perform routine minor maintenance on pressing machines including washing out or replacing covers and padding, shaking out rubber mats, brushing and air blowing wire mesh and applying sole-cleaning compounds to hand irons.
- Collect garment components for pressing, quality check and take any follow-up action if faults, spots and marks are identified.
- Select appropriate pressing attachments and sequence the pressing work before commencement.
- Position work for pressing and use equipment including irons, presses, industrial steam irons, suction boards, sleeve board and sleeve rolls according to product requirements.
- Apply heat, steam, vacuum, pressure and time according to product pressing requirements and fabric specifications.
- Inspect pressed work and compare against enterprise pressing standards taking subsequent action to either reject or correct faulty work.
- Pass on pressed work to the next garment manufacture operation or hang/pack for despatch, storage or packing.

Unit J10 Produce bra and swimwear garments

Assemble bra or swimwear garment components for production. Sew, glue and fuse garments using machines including three step, twin needle with binding, channelling, single needle, zigzag sewing machines, bar racks, elasticators and three-thread overlockers with binding, channelling, single needle, bar rack plus fusing, moulding, gluing and ultrasonic machines. Check completed garments against enterprise quality standards and garment specifications. Complete production records.

Performance elements

- Identify complete bra/swimwear garment requirements including work pieces, accessories and trims from production specifications and plan for the garment construction.
- Check work pieces, fabric and components such as straps, hooks, elastic, fasteners, ribbon, underwire, foam padding, oil-filled straps, rings, fine lace and delicate fabrics for assembly and lay out in sequence of sewing according to the construction plan.
- Clean and check machines and set up ensuring correct thread, needle size and type, needle guard, tension setting and attachments and adjust including checking and replacing worn or damaged needles and attachments (feet) according to specifications for work.
- Identify any worn or damaged machine parts and check needles which may include size and types such as standard or ball point and report or replace according to manufacturer specifications.
- Assemble bra or swimwear components according to product requirements and quality standards by sewing, gluing and fusing according to specifications and quality standards.
- Control the machine speed and work handling such as gathering, easing, tucking, stitching curves for the specific type of operation, fabrics and product type.
- Inspect the sewn bra or swimwear components, identify any faults and take appropriate action to ensure finished pieces meet the quality standards.
- Complete production records or packing slips, bundle work as required and direct to next operation or packing section.

Unit J11 Embellish garments by hand or machine

Select components and equipment for embellishment on garments, either at the completion of production, or as a production stage. Add embellishments by hand using methods including beading, smocking, embroidery stitches, and fabric manipulation. Add embellishments by machine using methods including quilting, pintucking, shirring, machine embroidery, appliqué and lace insertion as determined by the design brief. Complete production records and prepare garments/components for further production or dispatch.

Performance elements

- Identify the type of embellishment required from garment specifications including content, colour, size, width and length, stitch type and size.
- Determine the method/s of embellishing by hand or machine to suit the type of fabric, colour of fabric, positioning of design, purpose of garment, suitability of size, design and colour.
- Select and prepare threads including the correct colour, thickness, shine, texture, stability and strength and the types of decorations to be attached.
- Set up the work area and lay out work pieces.
- Prepare equipment and materials and adjust to specifications for the work including correct thread type, needle type, stitch settings, attachments and stabilisers.
- Perform any routine minor maintenance on equipment including sewing machines and attachments such as feet plus garment scissors, tape measures, hand sewing needles, beading and crewel and embroidery hoops according to manufacturer specifications.
- Perform hand and machine embellishment to quality standards and production specifications.
- Inspect the embellished garment or components, identify any faults and take appropriate action to ensure finished pieces meet the quality standards.
- Complete production records or packing slips, bundle work as required and direct to next operation or packing section.

Unit J12 Perform digital embroidery on garments

Select and edit stock lettering and motif designs and monograms to produce digitised embroidery effects on garments such as hats, T-shirts and other simple garments. Prepare and maintain the digital embroidery programmes and equipment. Select appropriate materials to produce embroidery work and set up on machinery. Use digital embroidery programmes and machines and produce embroidered lettering, monograms and motifs. Complete production records and prepare garments/components for further production or dispatch.

Performance elements

- Determine the design for embroidery and required programme features such as file formats, image catalogues and programme tools.
- Select motif or lettering from stock designs and edit including manipulation of height, scale, skew, rotation, width, length, fonts, fill, baseline, envelopes, borders, spacing, needle penetration, stitch size and type and colour to achieve specifications.
- Set up the embroidery programme specifications including content, colour, size, width and length, stitch type and size, font and fill for operation and lay out the work pieces.
- Select backing pieces to suit the type and colour of fabric, positioning of design, suitability of the completed design size and colour.

- Set up the work area and seating.
- Prepare equipment including digital embroidery machine, computer, garment threads, scissors, tape measures and materials and adjust to specifications for the work including correct thread type, needle type, stitch settings, attachments and stabilisers.
- Produce the embroidery using the equipment to manufacturer's specifications and enterprise requirements.
- Inspect the embellished garment or components, identify any faults and take appropriate action to ensure finished pieces meet the quality standards.
- Complete production records or packing slips, bundle work as required and direct to next operation or packing section.

Functional area K – Footwear manufacturing

Unit K1 Perform footwear material cutting

Select and match footwear materials and assess their cutting to specifications and enterprise quality standards. Undertake material (stuff) cutting operations using a range of materials, including EVA, foam, fibreboard, resin, uniform synthetic and printed leather materials that may be oily-finished, raw surfaced or non-uniform in texture and finish. Position work assisted by machine guides or work markers. Monitor and maintain cutting machine performance. Check completed cut materials and leather against quality standards and complete necessary enterprise documentation.

Performance elements

- Set up the work area to perform the material cutting tasks and clean and check machines for any irregularities.
- Obtain necessary materials and assess and grade against specifications.
- Check the types and finish of synthetics, fabrics and leathers required against the work ticket and sort materials according to colour, shade and specifications.
- Start up machines such as swing beam press, full beam presses, travelling head presses and automated presses according to safety regulations.
- Use clicking, cutting and interlocking knives according to job specifications and size requirements for gaining optimal materials use.
- Routinely clean, turn and maintain the cutting board.
- Check the striker plate regularly for distortion and damage and irregularities and report as required.
- Adjust pressures on the press to knife size and shape and cut parts to workplace quality standards.
- Select individual materials, pair and colour and grain match as required to enterprise quality standards.
- Cut pairs to achieve best yield according to appropriate allowance.
- Identify any distortions and defects on press cutting knives, dies and cutting boards and take appropriate action.
- Check finished product against workplace quality standards and record any faults.
- Complete workplace documentation.

Unit K2 Machine footwear uppers

Select and prepare cut footwear uppers for machining by manual and computerised sewing machines. Position the work, control by machine guide or work marker and sew shoe uppers. Use sewing techniques such as sewing in straight lines and corners, curves, complex shapes, and contouring and joining of different materials. Check final sewn product quality against enterprise specifications. Clean and maintain machines and work area and complete production documentation.

Performance elements

- Receive and check footwear component work bundles against quality requirements and specifications.
- Lay out work pieces in correct sequence and set up the work area and seating.
- Clean and check the sewing machine/s and adjust machine settings according to manufacturer instructions and specifications for the work.
- Select threads and check needle types, attachments and parts, replacing worn needles and parts as necessary.
- Set the stitch length and tension and test against specifications.
- Select pieces for machining according to size, colour and style.
- Position the materials accurately to achieve required specifications and machine including lining stitching, back seaming, binding and bar tacking to achieve specific results, trimming all threads as required.
- Check the final product to ensure workplace quality requirements are met.
- Bundle and stack uppers and store or despatch.
- Clean the work area and machines and equipment used.
- Complete production records.

Unit K3 Last shoes by machine

Select and prepare footwear uppers for lasting. Last shoes using toe lasters, side lasters, seat lasters, seat and side lasters, forepart lasters and force lasting machines to meet product specifications. Check final lasted product quality against enterprise specifications. Clean and maintain lasting machines, work area and complete production documentation.

Performance elements

- Receive and check footwear component work bundles against quality requirements and specifications.
- Lay out work pieces in correct sequence and set up the work area and seating.
- Clean and check the lasting machine/s and adjust machine settings in relation to heat, pressure for pulling and for lasting time according to manufacturer instructions and specifications for work.
- Position upper precisely on machine and guide through pulling and lasting operations, checking correct operations and adjusting settings to obtain specified quality outcomes and to reflect construction techniques.
- Monitor the lasting machine/s for correct operation throughout the lasting process.
- Check the final product to ensure workplace quality requirements are met.
- Bundle and stack lasted shoe uppers and store or despatch.
- Clean the work area and machines and equipment used.
- Complete production records.

Unit K4 Perform footwear sole moulding

Prepare for moulding PVC, rubber, polyurethane, dual density polyurethane and thermoplastic polyurethane soles. Set up, operate, monitor and adjust moulding machines to mould and attach soles to footwear. Mould soles to uppers and check for quality requirements and compliance with product specifications. Clean and maintain machines, work area and complete production documentation.

Performance elements

- Check and set machine settings, adjusting to meet the product requirements and specifications.
- Prepare equipment including Allen keys, soft-faced mallets, spanners, gloves, punches, aprons, tape and shaping blocks.
- Check sole mould size, type and date stamp and set according to manufacturer specifications.
- Load lasted uppers onto machine and prepare mould material for production.
- Start up moulding machine according to manufacturer requirements and monitor the machine operation including ensuring that pigment tanks are full and stirred, heads are clear and greased, mould release tanks are full, electrostatic wire is clean and nozzle caps are in good condition to ensure correct procedures and product quality standards.
- Ensure the required flow of moulding material and clean the machine when required.
- Mould soles to uppers identifying any minor product process and machine faults and rectifying them to meet specified requirements.
- Unload footwear from moulding machine according to manufacturer specifications.
- Check the final product to ensure workplace quality requirements are met.
- Bundle and stack moulded soles and store or despatch.
- Clean the work area and machines and equipment used.
- Complete production records.

Unit K5 Perform footwear finishing

Prepare footwear components for final finishing including hand or machine tasks such as attaching buckles, cutting loose threads, lacing shoes, inserting heel pads, attaching labels, polishing, cleaning, spraying, boxing and despatching. Undertake finishing process to meet product specifications and enterprise standards. Clean and maintain machines, work area and complete production documentation.

Performance elements

- Set up work area and seating and lay out footwear components for finishing out in correct sequence.
- Perform finishing operations including trimming loose threads, checking, spraying, cleaning, polishing, hand or machine sewing of buckles, attaching accessories or trims, inserting heel cushion pads, flaring and lining trimming according to product specifications.
- Check the final product against workplace quality requirements and to ensure correct sizing.
- Identify any faults and report or return to appropriate section for repair.
- Attach labels, pair up and box footwear for storage or despatch.
- Clean the work area and machines and equipment used.
- Complete production records.

Unit K6 Cut leather by hand for footwear manufacture

Select, assess and sort leather for cutting by hand to footwear product specifications. Cut simple and complicated pattern pieces using a range of leather qualities of buffalo, cow, calf, kid, deer, fish and reptile leather. Check the cut leather pieces against product specifications and enterprise standards. Clean and maintain the work area and complete production documentation.

Performance elements

- Set up the work area to perform the leather cutting tasks, obtain necessary materials and assess and grade against specifications.
- Check the types and finish of leather required against the work ticket and sort according to colour, shade and specifications.
- Select the cutting equipment and patterns and prepare according to specified work, sizes, and product specifications.
- Assess the leather for scars, marks and faults that will impact on cutting and sort to comply with requirements of different jobs and pattern pieces.
- Identify any problems or faults with patterns, knives and cutting boards and refer for repair.
- Identify scars, marks and fault areas in high-quality leather and position patterns accordingly to allow for identified flaws, nap of suede or other grain or print characteristics.
- Use cutting techniques to match pattern shape and leather quality and cut pieces precisely to size and colour match.
- Clean the work area and machines and equipment used.
- Complete production records.

Unit K7 Hand last shoes

Prepare for hand lasting of footwear components. Check quality and sizing of cut components. Hand last using correct techniques for cement, moulded, welt, veldtschoen, moccasin, Californian slip lasting and string lasting. Check lasted product quality against specifications. Clean and maintain the work area and complete production documentation.

Performance elements

- Receive and check footwear component work bundles against quality requirements and specifications.
- Lay out work pieces in correct sequence and set up the work area and seating.
- Check lasting tools and last or foot form before attaching insole and upper ensuring correct sizes.
- Attach insole to last by hand, positioning it to shape of last and to match size and pairs.
- Position toes and upper precisely and manipulate through the lasting process, checking for correct operations and adjusting as required to achieve quality requirements and to reflect the correct construction technique.
- Make adjustments to achieve necessary last placement.
- Attach shanks and stiffeners and staples and punch holes in shoe bottom by hand or by machine as required.
- Place upper on the last and secure in place by tacks.
- Stitch opposite holes and pull tight by hand or machine using waxed string before removing tacks.
- Check completed product against product specifications and enterprise standards.

- Clean the work area and machines and equipment used.
- Complete production records.

Unit K8 Hand assemble shoes

Prepare shoe components including soles, shanks, filler blocks, uppers, heels and linings from previous production process for assembly of shoes. Check the quality, sizing and finish of components and materials to meet product specifications. Assemble shoe components using mainly hand processes. Check completed shoes against specifications. Clean and maintain the work area and complete production documentation.

Performance elements

- Receive and check footwear component work bundles against quality requirements and specifications.
- Lay out work pieces in correct sequence and set up the work area and seating.
- Sort footwear components including uppers, insoles, heels and soles and select the correct last.
- Position the shoe components according to construction process to be used.
- Attach and assemble shoe components in correct sequence and slip shoe from last.
- Finish uppers, heels, edges and soles using appropriate hand and machine operations and materials.
- Check completed product against product specifications and enterprise standards.
- Clean the work area and machines and equipment used.
- Complete production records.

Functional area L – Furniture manufacturing

Unit L1 Prepare a cutting list

Interpret plans and specifications for production furniture items to prepare a materials and cutting list. Calculate the geometry, size and sequence of the cutting process and document. Identify and document the quality indicators of the finished furniture item.

Performance elements

- Use job specifications, set-out rods and plans to determine the job requirements, including cutting list, dimension, design, quality of materials and processes for furniture components including solid timber, manufactured board, metal and plastics.
- Calculate the geometry of components according to specifications including allowing for any cupping, expansion, twisting, bowing, spring and grain direction, uses and limitations of the timber components.
- Prepare a cutting list and set out in accordance with the specifications identifying whether back sawn and quarter sawn.
- Select components and establish the sizes, tolerances and processing requirements of components and document.
- Calculate the dimensional allowances for further processing.
- Specify the quality standards and waste factors and establish the average processing time.

Unit L2 Use planing and finishing machines

Set up and use surface planer, panel planer and wide belt sander, multi-drum sander, planer sander and over and under machines for manufacture of furniture items. Trial run items for machining to check specification and quality. Monitor and maintain machines and tooling and document production records and any machine faults.

Performance elements

- Read and interpret cutting list and job specifications, select the material for machining and inspect for required quality.
- Set up planning and finishing machines, cutting tools and jigs and check for safe and effective operation including safety equipment, emergency stops, gauges, guards and controls.
- Make planning and finishing machine settings and adjustments in accordance with job requirements and machine and tool manufacturer instructions.
- Conduct a trial run to check machine operation, accuracy and quality of finished work and make any necessary adjustments to machine settings.
- Feed material into machine in accordance with manufacturers' instructions, tooling requirements, safe handling procedures and enterprise operating procedures.
- Monitor the machine operation to ensure product quality and output with any items that do not meet quality requirements being recycled or discarded according to enterprise procedures.
- Collect and store any material that can be reused and remove waste and scrap.
- Clean and inspect equipment and work area for serviceable condition in accordance with enterprise procedures including changing and monitoring straight cutters and knives, setting pressures, chip breaker and fences, changing abrasive belts and adjusting pressures, feed and belt tracking devices.
- Tag unserviceable equipment with identified faults and complete tooling maintenance documentation.

Unit L3 Use routing and shaping machines

Set up and use spindle moulding machine and overhead or inverted pin routing machines for manufacture of furniture items in solid timber, manufactured board, plastics and laminates. Monitor and maintain machines and tooling and document production records and any machine faults.

Performance elements

- Read and interpret cutting list and job specifications, select the material for machining and inspect for required quality.
- Set up routing and shaping machines, cutting tools and jigs and check for safe and effective operation including safety equipment, emergency stops, gauges, guards and controls.
- Make routing and shaping machine settings and adjustments in accordance with job requirements and machine and tool manufacturer instructions including setting up fences and guides, maintaining cutters, selecting feed and spindle speeds, feed unit, safety pressure devices/ guards, linear, convex and concave shaping tools, rebating, moulding and grooving material and jigs and fixtures.
- Conduct a trial run to check machine operation, accuracy and quality of finished work and make any necessary adjustments to machine settings.

- Feed material into machine in accordance with manufacturers' instructions, tooling requirements, safe handling procedures and enterprise operating procedures.
- Monitor the machine operation to ensure product quality and output with any items that do not meet quality requirements being recycled or discarded according to enterprise procedures.
- Collect and store any material that can be reused and remove waste and scrap.
- Clean and inspect equipment and work area for serviceable condition in accordance with enterprise procedures.
- Tag unserviceable equipment with identified faults and complete tooling maintenance documentation.

Unit L4 Use wood turning lathes

Set up and use fixed knife, rotary knife and copying lathe wood turning lathes for manufacture of furniture items in solid timber. Manufacture templates, free-hand grind cutters, use cutting tools and operate lathes to produce turned timber components. Monitor and maintain machines and tooling and document production records and any machine faults.

Performance elements

- Read and interpret turning component job specifications, select the timber material for turning and inspect for required quality.
- Set up mechanical wood turning lathes for effective operation including safety equipment, emergency stops, gauges, guards and controls.
- Make lathe settings and adjustments in accordance with job requirements and machine and tool manufacturer instructions.
- Conduct a trial run to check machine operation, accuracy and quality of finished work and make any necessary adjustments to machine settings.
- Fix timber onto the lathe in accordance with manufacturers' instructions, tooling requirements, safe handling procedures and enterprise operating procedures.
- Monitor the lathe operation to ensure product quality and output with any items that do not meet quality requirements being recycled or discarded according to enterprise procedures.
- Collect and store any material that can be reused and remove waste and scrap.
- Maintain the lathe components and tools using tension wrenches, pedestal grinder or bench grinder.
- Clean and inspect lathe, tools and work area for serviceable condition in accordance with enterprise procedures.
- Tag unserviceable equipment with identified faults and complete tooling maintenance documentation.

Unit L5 Use edge banding machines for edge finishing

Set up and use edge banding machines including standard automated edger (not fully automatic) and a soft forming machine to apply and finish edge treatments on furniture components. Monitor and maintain machines and tooling and document production records and any machine faults.

Performance elements

- Read and interpret component edging job specifications, select the material for edging process including board products, edging products and adhesives and inspect for required quality.

- Set up automated edge banding machine for effective operation including safety equipment, emergency stops, gauges, guards and controls.
- Make machine settings and adjustments in accordance with job requirements and machine and tool manufacturer instructions.
- Conduct a trial run to check machine operation, accuracy and quality of finished work and make any necessary adjustments to machine settings.
- Edge components on the edge banding machine using solid timber, laminates, plastics and non-ferrous materials and foils in accordance with manufacturers' instructions, tooling requirements, safe handling procedures and enterprise operating procedures.
- Monitor the edging operation to ensure product quality and output with any items that do not meet quality requirements being recycled or discarded according to enterprise procedures.
- Collect and store any material that can be reused and remove waste and scrap.
- Maintain the edge banding machine and tools including the cleaning and refurbishing of the gluing station.
- Clean and inspect edge banding machine, tools and work area for serviceable condition in accordance with enterprise procedures.
- Tag unserviceable equipment with identified faults and complete tooling maintenance documentation.

Unit L6 Use CNC sizing machines

Set up and use CNC sizing machines including CNC beam saws and double end profiling machines to size furniture components in solid timber, manufactured board, laminate, solid synthetic materials and plastics. Monitor and maintain machines and tooling and document production records and any machine faults.

Performance elements

- Read and interpret sizing job specifications, select the solid timber, manufactured board, laminate, solid synthetic and plastic material and inspect for required quality.
- Set up CNC sizing machine for effective operation including safety equipment, emergency stops, gauges, guards and controls.
- Programme the CNC sizing machine in accordance with job requirements and machine and tool manufacturer instructions.
- Conduct a trial run to check sizing machine operation, accuracy and quality of finished work and make any necessary adjustments to machine settings.
- Size components on the CNC sizing machine using solid timber, laminates, plastics and non-ferrous materials and foils in accordance with manufacturers' instructions, tooling requirements, safe handling procedures and enterprise operating procedures.
- Monitor the sizing operation to ensure product quality and output with any items that do not meet quality requirements being recycled or discarded according to enterprise procedures.
- Collect and store any material that can be reused and remove waste and scrap.
- Maintain the CNC sizing machine and tools.
- Clean and inspect the CNC sizing machine, tools and work area for serviceable condition in accordance with enterprise procedures.
- Tag unserviceable equipment with identified faults and complete tooling maintenance documentation.

Unit L7 Use pressure and clamping machines

Set up and use pressure and clamping machines including manual clamps and presses, hydraulic vacuum presses, clamping machines and post forming machines to clamp solid timber, manufactured board and decorative treatments such as laminates. Monitor and maintain machines and document production records and any machine faults.

Performance elements

- Read and interpret furniture component job specifications, select the solid timber, manufactured board and decorative treatments to be clamped and inspect for required quality.
- Set up clamping machine for effective operation including safety equipment, emergency stops, gauges, guards and controls.
- Clamp the relevant material for vacuum formed doors, widening joints, framed construction, drawers and laminating veneers in accordance with job requirements and machine manufacturer instructions.
- Conduct a trial run to check clamping machine operation, accuracy and quality of finished work and make any necessary adjustments to machine settings.
- Monitor the clamping operation to ensure product quality and output with any items that do not meet quality requirements being recycled or discarded according to enterprise procedures.
- Collect and store any material that can be reused and remove waste and scrap.
- Maintain the clamping machine including lubrication and oiling of components.
- Clean and inspect the clamping machine and work area for serviceable condition in accordance with enterprise procedures.
- Tag unserviceable equipment with identified faults and complete maintenance documentation.

Unit L8 Assemble manufactured furniture components

Follow plans and specification for assembly of timber, manufactured board furniture items including carcasses, doors, drawers, frames, shelves, ends and tops. Check for quality and conformance to specification. Clean, maintain and store tools and equipment.

Performance elements

- Interpret work instructions and plans to determine job requirements, including design, tolerances, process, materials, finish and quantity.
- Use and prepare a suitable work area for the assembly task and set out the tools and equipment suitable for the assembly and fixing method including measuring tapes or rulers, hammers, mallets, squares, bevels, chisels, planes, hand saws, power saws, power drills/screwdrivers, clamps, screwdrivers, pincers and pneumatic tools.
- Arrange the fixing and joining devices such as glues, screws, nails, dowels and knock-down fittings, furniture components, hardware, fittings and attachments suitable for the materials to be assembled including jigs.
- Lay out and join components using jigs and appropriate fastenings and assemble frames and components.
- Check components for compliance with specifications alignment such as squareness, correct number and fitting of fasteners, hardware, fittings and attachments, and conformity to quality requirements with frames/items which do not meet quality specifications repaired or tagged for further processing or recycling/disposal.

- Finish assembled items to specification and store.
- Check and tag any faulty and/or defective equipment and report in accordance with workplace procedures.
- Remove waste and scrap following enterprise procedures.
- Clean and inspect tools for serviceable condition and store appropriately in accordance with enterprise procedures.

Unit L9 Apply sheet laminates to furniture

Apply sheet laminates and timber strips by hand to timber and manufactured board to complete furniture items, set up laminating area and check quality of finished items against specifications. Clean and store laminating tools and equipment.

Performance elements

- Interpret laminating job instructions are used to determine requirements, including the process, materials, finish and quantity.
- Prepare a suitable work area for the laminating task ensuring it is clean and of sufficient size.
- Select necessary tools and equipment of laminating and finishing including measuring tapes or rulers, mallets, squares, bevels, chisels, planes, hand saws, power saws, power drills/screwdrivers, pneumatic tools, clamps, screwdrivers, rollers, laminate trimmers and cutters and hand routers.
- Check the laminate sheets for flaws and prepare adhesives and cleaning materials for the application.
- Suitable joining processes are selected and prepared.
- Measure laminates, mark, cut to size and apply to the base material using the appropriate adhesion process avoiding excessive wastage.
- Complete final trim and finishing to specifications and check against required quality standards.
- Clean the work area, hand and/or power tools and other equipment and store.
- Tag any faulty and/or defective equipment and report in accordance with enterprise practices.
- Collect laminate off-cuts and unused materials and store for reuse or disposal.

Unit L10 Construct chair and couch frames

Plan dining chair, office chair, lounge chair, sofa/settee frame construction from plans and specifications. Prepare a cutting list and cut frame components using hand and power tools and machining equipment. Join and finish the frame and check for compliance with specifications. Clean and store tools and equipment and re-use/remove waste materials.

Performance elements

- Interpret job instructions to determine requirements, including design, tolerances, process, materials, finish and quantity.
- Prepare a cutting list for all components and select appropriate materials including timber, manufactured board, adhesives, screws, nails, bolts, dowels, metal fasteners, steel and plastics.
- Set out and mark components and prepare the work area.
- Cut and prepare components using hand tools such as measuring tapes or rulers, hammers, mallets, squares, bevels, chisels, planes, hand saws, power saws, cordless drills/screwdrivers, power drills, fixing and joining devices, jigs, clamping devices and pinches.

- Use furniture making machines such as band saws, cross cut saws, docking saws, mitre saws, panel and rip saws, surface planers (buzzers), panel planers (thicknessers), lacey sanders, horizontal borers, vertical drill presses, edge sanders, pedestal grinders, wood turning lathes and presses for frame cutting and finishing and assemble using jigs and/or clamps and fastenings, checking components before assembly for specified shape, angles or curves against set-outs and job requirements.
- Use appropriate joining process, including adhesives and check assembled chair/couch frame for compliance with specifications including squareness, alignment, hardware, fittings and attachments.
- Finish the furniture item to a suitable state for final surface preparation and rectify any non-conformity with the required quality standards.
- Clean the work area, hand and/or power tools and equipment and store.
- Collect any off-cuts and unused materials and store for reuse or disposal.

Unit L11 Construct furniture using leg and rail method

Plan dining, occasional, hall and side table, occasional chair and cabinet construction by leg and rail method from plans and specifications. Prepare a cutting list and cut components using hand and power tools and machining equipment. Join and finish the furniture item using traditional jointing methods and check for compliance with specifications. Clean and store tools and equipment and re-use/remove waste materials.

Performance elements

- Interpret job instructions to determine requirements, including design, tolerances, process, materials, finish and quantity.
- Prepare a cutting list for all components and select appropriate materials including timber, manufactured board, plywoods, adhesives, screws, nails, bolts, dowels, metal fasteners.
- Set out and mark components and prepare the work area.
- Cut and prepare components using hand tools such as measuring tapes or rulers, hammers, mallets, squares, bevels, chisels, planes, hand saws, power saws, cordless drills/screwdrivers, power drills, fixing and joining devices, jigs, clamping devices and pinches.
- Use furniture making machines such as band saws, cross cut saws, jig saws, panel and rip saws, surface planers, panel planers, belt sanders, horizontal borers, vertical drill presses, furniture mortise and tenoner, dovetailers, pedestal grinders, wood turning lathes, veneer guillotines and presses and presses for cutting and finishing and assemble using jigs and/or clamps and fastenings, checking components before assembly for specified shape, angles or curves against set-outs and job requirements.
- Use appropriate joining processes, including mortise and tenon, mitre, dowel and bridle butt, moulded edge joint (finger-joint, tongue in groove, zig-zag), biscuit joint and slip-tongue joints and adhesives and check assembled furniture item for compliance with specifications including squareness, parallel, twist, and distortion and product faults.
- Check joints for cupping, expansion, twisting, bowing, spring and correct grain direction.
- Finish the furniture item to a suitable state for final surface preparation and rectify any non-conformity with the required quality standards.
- Clean the work area, hand and/or power tools and equipment and store.
- Collect any off-cuts and unused materials and store for reuse or disposal.

Unit L12 Construct solid timber furniture

Construct solid timber and manufactured board angled/curved furniture. Interpret plans for manufacturing angled/curved design furniture and develop set-outs, jigs, templates and shaped cauls for manufacture. Construct and assemble solid timber and manufactured board furniture using angular construction methods. Use hand, power tools and woodworking machinery to produce angled cabinets and curved cabinets with rails, counters and display units. Prepare completed furniture item for final finishing. Clean and maintain work area and tools/equipment.

Performance elements

- Use angled/curved furniture item job requirements, including design, tolerances, process, materials, finish and quantity.
- Select a suitable work area for the task and make preparatory drawings and set-outs for angular structures and curved cabinets incorporating rails and oval design.
- Develop a cutting list for the furniture components and assemble necessary materials including timber, adhesives, screws, nails, dowels, knockdown fittings, glass, decorative finishes, abrasive paper and finishing materials.
- Set out and mark materials and prepare according to specifications.
- Measure, cut and trim components using hand tools such as measuring tapes or rulers, hammers, mallets, squares, bevels, chisels, planes, hand saws, power saws, cordless drills/screwdrivers, power drills, fixing and joining devices, jigs, clamping devices and pinches.
- Use furniture making machines such as band saws, cross cut saws, mitre saws, panel and rip saws, surface planers, panel planers, belt sanders, horizontal borers, vertical drill presses, dovetailers, pedestal grinders, wood turning lathes, veneer guillotines and presses to shape components and prepare joints.
- Bend and form component materials using steam/heat and bend and groove and bend techniques in accordance with the plan and check against set-outs for tolerances, fit and accuracy.
- Assemble frame components, check for accuracy, fit, any twist or distortion and fit doors, drawers and shelves.
- Prepare the furniture item for final finish, including the removal of bruises, scratches, dents and marks and make a final check against plan and specifications.
- Clean work area, hand and/or power tools and equipment and store.
- Collect off-cuts and unused materials and store for reuse or disposal.

Unit L13 Construct cane furniture

Interpret plans for manufacturing cane furniture such as lounge chairs, dining chairs, tables, side tables, coffee tables, entertainment units and bookcases and develop set-outs, jigs, templates for manufacture. Construct and assemble cane furniture using appropriate construction methods. Use hand, power tools and woodworking machinery to produce cane furniture items. Prepare completed furniture item for final finishing. Clean and maintain work area and tools/equipment.

Performance elements

- Use cane furniture item job requirements, including design, tolerances, process, materials, finish and quantity.
- Select a suitable work area for the task and make preparatory drawings and set-outs for the cane furniture item.

- Develop a cutting list for the furniture components and assemble necessary materials including cane, timber, manufactured board, adhesives, screws, nails, binding cane, steel bars, metal recliner actions and finishing materials.
- Set out and mark materials and prepare according to specifications.
- Measure, cut and trim components using hand tools such as measuring tapes or rulers, hammers, mallets, squares, bevels, chisels, planes, hand saws, power saws, cordless drills/screwdrivers, power drills, pneumatic tools, clamps, screwdrivers, pincers, nail guns, pin nailers and glue guns.
- Use machines suitable for cane furniture making such as band saws, docking saws, jig saws, bench saws, vertical drill presses to shape and join components.
- Bend and form component materials in accordance with the plan and check against set-outs for tolerances, fit and accuracy.
- Assemble cane furniture components using jigs and/or clamps and fastenings, apply adhesives as required and check for squareness, parallel, twist and distortion.
- Prepare the cane furniture item for final finish and make a final check against plan and specifications.
- Clean work area, hand and/or power tools and equipment and store.
- Collect off-cuts and unused materials and store for reuse or disposal.

Unit L14 Apply decorative finishes and hardware to furniture

Prepare veneers, inlays and furniture hardware for application to furniture items. Assemble, check and prepare materials for decorative finish and hardware attachment. Use appropriate tools and techniques to apply finishes and attach hardware. Check for finish against specifications. Clean and maintain work area and tools/equipment.

Performance elements

- Use furniture item decorative finish and hardware job requirements, including design, colour, tolerances, process, materials, finish and quantity.
- Assemble necessary materials including decorative items such as timber, manufactured board, veneer, brass, alloys, adhesives, perspex and decorative laminates and hardware such as hinges, handles, drawer-runners, metal drawer systems, sliding rail systems, rotating storage systems and slide-out storage systems.
- Set out and mark materials and prepare according to specifications.
- Measure, cut and trim decorative materials using tools such as measuring tapes or rulers, knives, mallets, squares, bevels, chisels, planes, clamps and portable vacuum presses.
- Clean furniture surfaces to enable accurate colour matching and use machines suitable for working with decorative finishes such as band saws, mitre saws, panel saws, sanders, presses and veneer guillotines to prepare components.
- Apply decorative finish components to the furniture item using appropriate fastenings and adhesives as required and check for quality finish.
- Attach hardware items using appropriate techniques and tools such as power drills/screwdrivers, pneumatic tools, clamps, screwdrivers and pincers.
- Make a final check of the completed furniture item against plans and specifications.
- Clean work area, hand and/or power tools and equipment and store.
- Collect off-cuts and unused materials and store for reuse or disposal.

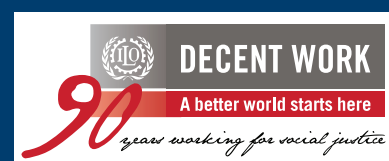
REGIONAL MODEL COMPETENCY STANDARD: Manufacturing industry

This publication includes Regional Model Competency Standards (RMCS) for various manufacturing processes including casting, moulding, machine operation, component assembly, fabrication, equipment servicing. Sectors covered include plastics, textiles, garments, footwear and furniture. It does not include competencies for specialist trade or advanced manufacturing processes.

These competency standards are designed in a simple format so that they can be used in discussions between governments, employers, workers and training organizations. Various competency elements can be added or deleted depending on local requirements. After agreement has been reached about the competencies needed, a learning or training programme can be easily developed without the need for out-dated, time-consuming approaches to developing curriculums.

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