Manufacturing enterprise — retro furniture

The sample unit of work provides teaching strategies and learning experiences that facilitate students’ demonstration of the dimensions and objectives of Industrial Technology Skills.

This sample demonstrates:

- organisation and development of a unit that could be used within a course of study
- aspects of the underpinning factors particular to this unit
- a focus for the unit, in electives based on engineering and furnishing industry specialisation
- identification of the relevant concepts and ideas, and associated subject matter, from the core topics
- a teaching and learning sequence that:
  - outlines effective teaching strategies
  - supports achievement of the objectives described in the dimensions of the syllabus
  - shows alignment between core subject matter, learning experiences and assessment.
Overview

Unit overview

Title of unit: Manufacturing enterprise — retro furniture

Unit description (focus):
The purpose of this unit is for students to review and build on prior knowledge of manufacturing enterprises and the related engineering, furnishing and building and construction production skills and procedures. Students use their understanding of industry practices and production processes to analyse manufacturing tasks to:
- organise materials and resources
- select and apply production skills and procedures
- plan and adapt production processes.

In this unit, students will work in teams to develop a manufacturing enterprise that produces retro steel and timber cabinets with tiled doors from working drawings.

Time allocation:
Unit 4, Semester 3, 55 hours

Identified curriculum from the syllabus

Dimensions and objectives

| Knowing and understanding | • describe industry practices in manufacturing tasks
|                         | • demonstrate fundamental production skills
|                         | • interpret drawings and technical information |
| Analysing and applying   | • analyse manufacturing tasks to organise materials and resources
|                         | • select and apply production skills and procedures in manufacturing tasks
|                         | • use visual representations and language conventions and features to communicate particular purposes |
| Producing and evaluating | • plan and adapt production processes
|                         | • create products from specifications
|                         | • evaluate industry practices, production processes and products, and make recommendations |

Electives

- Furniture making (Furnishing industry area)
- Welding and fabrication (Engineering industry area)
- Tiling (Building and construction industry area)

Core

Core topic 1: Industry practices

<table>
<thead>
<tr>
<th>Concepts and ideas</th>
<th>Knowledge, understanding and skills</th>
</tr>
</thead>
</table>
| Manufacturing enterprises | • overview of manufacturing industries and their contribution to the economy
| Manufacturing enterprises are important to the economy of Australia and employ a broad range of people in many different occupations (C1.1). | • organisational structure of manufacturing workplaces |
### Work place health and safety
Workplace health and safety legislation, rules and procedures must be followed in manufacturing industry workplaces (C1.2).
- Risk assessments to identify hazards
- Safe working practices and procedures

### Personal and interpersonal skills
Personal and interpersonal skills, including teamwork and communication skills, are essential for effective participation in manufacturing workplaces (C1.3).
- Work-readiness skills
- Workplace communication using industry-specific terminology including written, graphical, verbal and non-verbal

### Product quality
The quality of products depends on customer expectation of value, which affects industry production processes (C1.4).
- Quality standards of products are derived from customer expectations of value based on factors such as needs, trends, budget, product life and competition
- Products are manufactured to specifications that detail the expected quality standards of the final product

### Core topic 2: Production processes

<table>
<thead>
<tr>
<th>Concepts and ideas</th>
<th>Knowledge, understanding and skills</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Specifications</strong></td>
<td>Interpretation of sketches and technical drawings</td>
</tr>
<tr>
<td>Specifications are communicated through industry-specific drawings and technical information (C2.1).</td>
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</tr>
<tr>
<td><strong>Tools</strong></td>
<td>Identification, safety and maintenance of tools and machinery</td>
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<tr>
<td>Tools have specific functions and are selected and safely operated for particular procedures (C2.2).</td>
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</tr>
<tr>
<td><strong>Materials</strong></td>
<td>Types of materials</td>
</tr>
<tr>
<td>Materials are selected and safely manipulated based on industry-specific applications (C2.3).</td>
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<tr>
<td><strong>Materials</strong></td>
<td>Logistics</td>
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<tr>
<td><strong>Materials</strong></td>
<td>Industry applications and manipulation procedures</td>
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<tr>
<td><strong>Materials</strong></td>
<td>Consumables</td>
</tr>
<tr>
<td><strong>Materials</strong></td>
<td>Safety data sheets</td>
</tr>
</tbody>
</table>
### Assessment 1: Trivet (practical demonstration)

<table>
<thead>
<tr>
<th>Assessment technique</th>
<th>Practical demonstration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Students interpret working drawings and produce a trivet.</td>
</tr>
</tbody>
</table>
| Dimensions assessed  | Knowing and understanding  
|                      | • demonstrate fundamental production skills  
|                      | • interpret drawings and technical information  
|                      | Analysing and applying  
|                      | • analyse manufacturing tasks to organise materials and resources  
|                      | • select and apply production skills and procedures in manufacturing tasks  
|                      | Producing and evaluating  
|                      | • create products from specifications  |
| Assessment conditions | A set period of in-class time (approx. 5 hours). |

### Assessment 2: Enterprise to manufacture retro cabinets¹ (project)

<table>
<thead>
<tr>
<th>Assessment technique</th>
<th>Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Work in a team to develop an enterprise, plan and implement a production line to manufacture retro cabinets as specified in the detailed working drawings.</td>
</tr>
</tbody>
</table>
| Dimensions assessed  | Knowing and understanding  
|                      | • describe industry practices in manufacturing tasks  
|                      | • demonstrate fundamental production skills  
|                      | • interpret drawings and technical information  
|                      | Analysing and applying  
|                      | • analyse manufacturing tasks to organise materials and resources  
|                      | • select and apply production skills and procedures in manufacturing tasks  
|                      | • use visual representations and language conventions and features to communicate particular purposes  
|                      | Producing and evaluating  
|                      | • plan and adapt production processes  
|                      | • create products from specifications  
|                      | • evaluate industry practices, production processes and products, and make recommendations  |
| Product component    | Retro timber cabinet with steel base and tiled doors |
| Multimodal component | Individual digital portfolio |
| Assessment conditions | Product component  
|                      | Schools provide students with a set period of in-class time to develop the product component (approx. 35 hours).  
|                      | Multimodal component — non presentation  
|                      | A maximum of 8 A4 pages  |

Teaching and learning sequence

Teaching strategies and learning experiences² (manufacturing tasks)

Unit orientation
Teacher:
- introduces the unit, outlines learning goals and success criteria and links the unit to prior learning
- explains how the structure of the unit will develop real world workplace behaviour and expectations (C1.1)
- presents assessment expectation: students to form an enterprise and work as a team to manufacture cabinets. Students will be expected to participate in a class enterprise. Products should be of high quality so that they can be advertised and sold by the class. Income could be used to fund a class lunch or fund raising activity of their choice (C1.1, C1.3, C1.4)
- discusses the importance of teamwork and the range of skills required in an enterprise to manufacture a product including working cooperatively with others, being involved in group discussions, working with people with diverse abilities (C1.1, C1.3)
- explains workplace reality: linking skills to employment options, expectations of work roles, safe and cooperative workplaces (C1.1).

Students:
- examine examples of manufactured products that involve multiple components manufactured by a team then discuss and describe roles within a workplace required to produce the components (C1.1)
- view Scrapyard challenge video (teams of people create metal products) (C1.3)
- participate in team-building exercises to investigate team work and team roles (C1.3).

Welding revision and risk assessment
Teacher:
- revises safe welding skills and procedures
- explains and demonstrates
  - class workplace health and safety procedures, setup, storage and maintenance of welders (C1.2)
  - a risk assessment of a welder (C1.2)
  - safe operating procedures (SOP) for the set up and use of welders (arc, MIG and spot welder) (C2.2)
  - personal protective equipment (PPE) (C2.2)
  - requirements for machine licences (C2.2).

Students:
- complete a group to risk assessment of one of the welders (C1.2, C2.2)
- watch a welding video and complete a worksheet (C2.2)
- undertake written safety tests (C1.2, C2.2)
- demonstrate SOP for each machine when running a pad and fillet weld (C1.2, C2.2)
- practice arc welding exercises using scrap mild steel, (C2.2)
- practice MIG welding exercises using scrap mild steel (C2.2).

Industry visit to a local production line manufacturing enterprise
Students:
- observe and list current industry practices and production processes used at the enterprise (C1.1)
- complete a work book to identify and describe the roles and responsibilities in the work environment, including safety and shared workspace and effective communication in the workplace (C1.1, C1.2, C1.3).

² Highlighted key verbs relate to the dimensions.
Tiling revision

Teacher:
- revises tiling skills and procedures used in the building and construction industry and how they can be applied in other applications such as furniture
- provides feedback to students about the quality of the demonstrated construction skills and procedures in relation to tiling
- establishes safety rules and regulations and demonstrates how to maintain a safe and clean environment (C1.2).

Students
- measure areas to calculate quantities of tiles (C2.1, C2.2)
- identify safe handling, and appropriate disposal of preparatory and undercoating materials, and other hazardous materials (C1.2, C2.3)
- use tile-cutting tools to cut and shape tiles (C2.2)
- align tiles using spacers (C2.2)
- attach tiles to surfaces, using correct adhesive, making sure that patterned tiles match (C2.2, C2.3)
- prepare and apply grout, removing excess grout, cleaning and polishing tiles (C2.2, C2.3).

Assessment 1: Trivet (practical demonstration)

Teacher:
- allocates students to work teams and sets a manufacturing task to produce a class set of tiled trivets with a steel base
- describes the workplace-related learning goals for the task
- manages procedures to ensure all groups can safely complete allocated tasks
- introduces and clarifies the task
- provides a completed working drawing of the trivet
- provides class time for the manufacture of the trivet
- describes, explains and demonstrates safe operating procedures for tools and machinery
- monitors student use of tools and machinery
- gives feedback to students on proposed use of tools, machinery, materials and production procedures
- leads discussion of the standards and where evidence of individual student achievement will be found in the product and multimedia components.

Students:
- join a work team in a class manufacturing enterprise
- manufacture a class set of trivets by individually completing an allocated task which could be to:
  - interpret a plan, measure and mark out
  - cut steel
  - cut fibre cement board bases
  - weld steel bases
  - paint the bases
  - measure bases to calculate quantities of tiles
  - use tile-cutting tools to cut and shape tiles
  - attach tiles to surfaces, using adhesive
  - prepare and apply grout
- discuss and reflect on learning goals and success criteria, answering questions such as: ‘What was successful in our class enterprise? How would this task be managed in a workplace?’
- compile an individual photographic logbook of the manufacturing process.
Using ICTs to prepare a digital folio for the project

Teacher:
- leads class discussion about what should be included in a production plan
- provides feedback to students about the quality of their proposed production plan, e.g. pictures taken and annotations made when describing production processes
- revises ICT skills needed to prepare a digital folio (C1.3)
- revises workplace communication and industry-specific terminology (C1.3).

Students:
- identify and describe key stages of the production process and plan out the sequence of manufacture (C2.1)
- practise taking photographs using supplied devices (C1.3)
- practise annotating selected photographs to provide required detail to describe industry practices and production processes (C1.3).

Finishing

Teacher:
- revises the techniques for preparing surfaces and applying finishes.

Students:
- demonstrate applying finishes to a timber strip (C2.2)
- evaluate the desired finish considering the properties of the materials and purpose (C2.4)
- discuss how sanding and application of abrasive materials can influence the quality of the finish to meet customer expectations (C2.2, C2.3).
Assessment 2: Enterprise to manufacture retro cabinets (project)

Teacher:
- introduces the assessment task and clarifies the group work component
- provides a completed working drawing of a timber cabinet with steel base, including specifications about the tiling required
- leads discussion of the standards and where evidence of individual student achievement will be found in the product and multimedia components
- provides class time for the creation of the product and the multimedia component
- organises students into groups
- describes, explains and demonstrates safe operating procedures for tools and machinery
- monitors student use of tools and machinery
- gives feedback to students on drafts, including proposed use of tools, machinery, materials and production procedures.

Students will:
- work in a team to develop a manufacturing enterprise and production line to manufacture a class set of cabinets from specifications
- compile an individual digital portfolio that includes:
  - a risk assessment for MIG welding and workshop procedures
  - a description of industry-related practices used by the group to manage the team’s work and range of tasks
  - a material list and calculation of cost for the manufacture of the cabinet including materials and labour
  - a step by step plan of work roles and proposed production processes
  - photographs and sketches with annotations of the production sequence that communicates the individual student’s production role. Clearly show the production procedures selected and used to create the cabinet
  - an evaluation of industry practices and production processes and a finished cabinet in relation to the working drawings
  - recommendations for improvements to the enterprise and products.
- create a cabinet from working drawings. This involves
  - demonstrating fundamental welding and fabrication, furniture making and tiling skills
  - interpreting a working drawing
  - organising materials and resources
  - selecting and applying production skills and procedures
  - planning and adapting production processes to ensure a quality product is manufactured by the enterprise and delivered to the client on time and to a quality standard.

Resources
- Access to a range of relevant tools and equipment
- Australian Apprenticeships Pathways website — www.aapathways.com.au
- Manufacturing Skills Australia — www.mskills.com.au
- General information and resources, e.g. Construction Skills Queensland (CSQ) is an independent industry-funded body supporting employers, workers, apprentices and career seekers in the building and construction industry. www.csq.org.au