

# HSC Industrial Technology Timber: Model Answers

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*Section III (every Q16, 2015–2025) and Section II (every question, 2015–2025), written from the NESA marking guidelines and marking feedback. Codes in [brackets] point to the memorise pack.*

**How long?** Section III (a) 5 marks: about 150–200 words. (b) 10–12 marks: about 300–450 words, with an introduction that states a judgement, one paragraph per point (each with a timber or furniture example), and a conclusion that answers the verb. Section II: 1 mark is about one line; 2–3 marks about 40–80 words; 4–5 marks about 100–180 words. Use the answer space as a guide. The (b) models below are 220–330-word cores built from the memorise pack: add one extra timber or furniture example of your own (for instance a business you studied in the Preliminary course) to reach the top of the range.

*These are high-band model answers, not official NESA sample answers. Official sample answers are in the marking guidelines for each year.*

## Section III model answers (Q16)

### 2025 Q16(a) (5 marks) [S7]

*Describe the effects of legislative requirements on the sustainable practices and environmental impacts of the timber products and furniture industry.*

Federal: the Illegal Logging Prohibition Act 2012 makes it an offence to import or process illegally logged timber, and requires importers and processors to carry out due diligence on where timber comes from. This has pushed furniture businesses towards certified timber (FSC or Responsible Wood/PEFC), reducing support for illegal logging and the deforestation and biodiversity loss it causes overseas.

State: Victoria and Western Australia ended commercial native forest logging from 1 January 2024. This protects habitat and carbon stores, but it forced manufacturers to switch to plantation, imported or recycled timber and caused mill closures and job losses. Pollution control: under the NSW Protection of the Environment Operations Act 1997, sawmills, board plants and finishing operations may need EPA licences and must control dust, noise, solvent emissions and waste. This drives investment in dust extraction, spray booths and low-VOC finishes.

Local: councils require development approval and environmental impact assessment for new factories. Overall, legislation has made sustainable sourcing and pollution control compulsory, improving the industry's environmental footprint at the cost of higher compliance costs.

174 words

### 2025 Q16(b) (10 marks) [S6]

*Analyse how historical developments and advancements in manufacturing processes have affected the timber products and furniture industry. Support your answer with relevant examples.*

Historical developments in manufacturing processes, materials and work practices have moved the timber and furniture industry from hand craft to automated mass production. This has made furniture more affordable, consistent and safe, although it has reduced traditional skills and some jobs.

Before the Industrial Revolution, furniture was made by hand by skilled craftsmen using hand saws, planes and chisels. Production was slow and expensive, and quality depended on the individual maker. The Industrial Revolution brought steam-powered sawmills and machinery, such as the circular saw and powered planers, which greatly increased output. In 1859 Michael Thonet's steam-bent beech No. 14 chair was made from a few standard parts by semi-skilled workers and shipped in parts. This early mass production and flat-pack thinking made furniture affordable.

In the 20th century, electric motors made individual machines and portable power tools (routers, drills, biscuit jointers) common. This improved precision, reduced physical labour and allowed small workshops to mechanise. Manufactured boards were a major materials development: plywood, then particleboard and MDF from the mid-20th century. They used waste and small logs, came in large stable sheets and suited fast assembly with knock-down fittings, which led to flat-pack firms such as IKEA.

In the late 20th century, CNC machining and CAD/CAM allowed highly precise, repeatable and complex cuts and custom sizing at factory speed. Today CNC nesting routers, automatic edge banders and engineered timbers such as glulam and CLT (used in International House Sydney, 2017) continue this change. Work practices changed with the technology: specialised production-line jobs replaced the all-round craftsman, and later multi-skilling, WHS law and training in CNC programming emerged.

Negative effects include loss of hand skills and jobs, environmental pressure from mass consumption, and lower-quality disposable furniture. Overall, historical developments have shaped the industry positively, greatly improving productivity, precision, safety and affordability.

299 words

### 2024 Q16(a) (5 marks) [S10]

*Compare how marketing and advertising may be approached differently by each of these firms (A: partnership, hierarchical; B: sole trader, flat).*

A partnership with a hierarchical structure (e.g. a large furniture manufacturer) has many management levels and specialised departments. Its marketing is formal and planned: decisions pass through several levels, and specialised teams handle market research, branding and larger campaigns (TV, catalogues, showrooms, trade fairs), which is thorough but slow.

A sole trader with a flat structure (e.g. a custom furniture maker) makes marketing decisions personally and quickly. They rely on low-cost social media, a website, word of mouth and their portfolio, and can react fast to trends and client feedback, but have a smaller budget and reach.

Both firms aim to reach clients who want tailored solutions, but they differ in speed, budget and formality. So the hierarchical firm has greater reach and consistency, while the flat firm has greater flexibility and personal service.

134 words

### 2024 Q16(b) (10 marks) [S11]

*Analyse how the organisational structures of the two firms influence their approaches to production and efficiency.*

The organisational structure of a furniture business strongly influences how it organises production and how efficiently it operates. Hierarchical structures favour standardised, high-volume efficiency, and flat structures favour flexibility and speed of response.

Decision-making: in hierarchical Organisation A, approvals for new products, machinery or schedule changes pass through several managers, which slows responses. In flat Organisation B, the owner decides immediately, so it can change a job or accept a custom order the same day.

Specialisation and production: Organisation A can afford specialised departments (design, CNC programming, assembly, finishing, quality control) and mass-production equipment, producing large volumes at low unit cost. Organisation B's few multi-skilled workers do many tasks and suit one-off custom pieces, but at a higher cost per unit.

Quality control: A can run formal QC with inspectors, standards and documented procedures, giving consistency. B relies on the owner's personal checks, which are flexible and personal but less systematic and harder to keep consistent as it grows.

Resources and cost: A's extra management layers add overhead costs, and communication can be slow or distorted. B has low overheads and direct communication, but limited capital limits investment in efficient technology such as CNC routers.

Innovation and motivation: B's workers often have more autonomy and job satisfaction, encouraging ideas. A can fund research and development, but rigid procedures may discourage individual initiative.

Overall, the hierarchical structure is more efficient for high-volume, standardised production, while the flat structure is more efficient for small-batch, customised work. Each firm is most efficient when its structure matches its market.

255 words

### 2023 Q16(a) (3 marks) [S4]

*Describe how ONE new technology is being used to improve the timber products and furniture industry.*

A CNC (computer numerically controlled) nesting router is one new technology transforming furniture and cabinet manufacturing. Parts are designed in CAD, and CAM nesting software arranges them on the sheet with the least

waste. The machine then cuts, drills and grooves whole sheets of board automatically, with vacuum hold-down and automatic tool changes. This improves the industry by increasing accuracy and repeatability, cutting material waste and labour time, and allowing custom-sized kitchen and wardrobe cabinets to be produced quickly at mass-production cost.

82 words

### 2023 Q16(b) (12 marks) [S5]

*Discuss the impact of mass production and automation on the timber products and furniture industry. Support your answer with relevant industry examples.*

Mass production and automation have had a largely positive impact on the timber products and furniture industry. They have greatly increased efficiency, consistency and affordability, although they have reduced customisation and some jobs and require large investment.

Mass production makes large numbers of identical products from standardised parts. Automation uses computer-controlled machines (CNC routers, beam saws, edge banders) with little human input; mechanisation (e.g. a forklift) uses machines operated by people.

Impact on efficiency and cost: a CNC beam saw or nesting router can cut and drill a full sheet of particleboard in minutes, run long shifts and reproduce parts exactly. Flat-pack manufacturers such as IKEA combine mass-produced board components with knock-down fittings, so furniture is cheap to make, store and ship. Lower unit costs mean lower prices and wider access for consumers.

Impact on quality and waste: automation removes human error, so every part is identical and joints fit, improving quality control. CAM nesting software minimises offcuts, reducing material costs and environmental impact.

Impact on the workforce: automation reduces demand for unskilled machine operators and traditional hand skills, causing job losses and resistance. It also creates new skilled roles in CNC programming, CAD design and machine maintenance, and removes workers from dangerous tasks at saws, improving WHS.

Limitations: automated lines are very expensive for small businesses, and mass production suits standard products rather than one-off pieces. Small workshops survive by making bespoke solid-timber furniture.

Overall, mass production and automation have transformed the industry from craft workshops into efficient factories. Their benefits in productivity, consistency, safety and price outweigh the costs, provided businesses retrain workers and keep space for customised, high-value products.

272 words

### 2022 Q16(a) (5 marks) [S1]

*Describe the role of work health and safety (WHS) legislation in a timber and furniture workplace.*

In NSW, the Work Health and Safety Act 2011 and the WHS Regulation make the business (the "person conducting a business or undertaking", PCBU) legally responsible for ensuring, as far as reasonably practicable, the health and safety of workers. The law requires a furniture factory to provide safe machinery with guards, safe systems of work, training and supervision, PPE, first aid, safety signage and consultation with workers through health and safety representatives or committees. For example, wood dust (especially hardwood dust) is classified as a cause of nasal cancer, and noise from saws and planers damages hearing. The legislation therefore requires dust extraction, hearing protection and monitoring to control these hazards. Workers also have duties: to follow safe work procedures, use PPE and report hazards. SafeWork NSW polices the law through inspections, improvement and prohibition notices, fines and prosecution. This gives employers a strong financial and legal reason to comply and reduces injuries and lost time.

156 words

## 2022 Q16(b) (10 marks) [S2]

*Explain strategies that could be implemented to improve safety in a timber and furniture workplace.*

A timber and furniture workplace has serious hazards: rotating blades, kickback, wood dust, noise, manual handling of heavy sheets, and flammable finishes. Safety is best improved by applying the hierarchy of control, backed by training and a positive safety culture.

Elimination and substitution: the most effective strategies remove the hazard. For example, buying panels pre-cut to size removes a dangerous manual ripping task, and switching from solvent-based to water-based finishes removes flammable, toxic fumes.

Engineering controls: these isolate workers from hazards without relying on behaviour. Examples are blade guards, riving knives, and table saws with flesh-sensing blade-brake technology (such as SawStop), which stops the blade on skin contact. Dust extraction and spray booths remove carcinogenic dust and fumes, and vacuum lifters and roller tables reduce manual handling of heavy 2400 × 1200 mm sheets. CNC machining centres also keep operators away from the cutting zone.

Administrative controls: risk assessments and safe work procedures for every machine, induction and machine-specific training with sign-off, signage, lockout/tagout for maintenance, and job rotation to reduce repetitive strain. Regular WHS committee meetings and reviewing the accident and near-miss log help identify hazards early. These are cheaper but depend on people following them, so supervision is essential.

PPE: as a last line of defence, workers wear safety glasses, hearing protection, P2 dust masks, steel-capped boots and gloves where appropriate (never near rotating blades). Culture and consultation: involving workers in identifying hazards, rewarding safe behaviour and making managers model safe practice builds a culture where safety is normal, not an afterthought.

Overall, the most effective strategy is to combine engineering controls, which work every time, with thorough training and consultation. This reduces injuries, lost-time costs, workers' compensation premiums and the risk of prosecution, while improving productivity.

289 words

## 2021 Q16(a) (5 marks) [S12]

*Describe the Industrial Relations issues that could occur as a result of these modifications (significant change in demand).*

If demand falls and the company downsizes, redundancies must follow the Fair Work Act 2009 and the relevant award (e.g. the Timber Industry Award 2020), including consultation, notice and redundancy pay. The selection of who is retrenched must be fair and non-discriminatory. Unions represent workers in negotiating these changes, redundancy packages and new enterprise (group) agreements. Disputes can arise if consultation is poor, possibly leading to industrial action and lost production.

If demand rises and the company expands, it must recruit fairly under equal employment opportunity (EEO) and anti-discrimination law. It may negotiate overtime, shift work and new individual or group contracts. Introducing new technology or roles changes job descriptions and pay rates, so the employer must consult workers and unions to avoid disputes.

124 words

## 2021 Q16(b) (10 marks) [S13]

*Explain career and training opportunities that could be available as a result of these modifications.*

When a furniture company modifies its operations, for example by expanding production and introducing CNC technology, it creates significant career and training opportunities that benefit both workers and the business.

Apprenticeships and recruitment: expansion creates entry-level jobs and apprenticeships, such as a Certificate III in Cabinet Making through TAFE NSW, combining paid on-the-job work with off-the-job study. This builds a skilled workforce for the future.

Upskilling on new technology: introducing a CNC router means existing workers need training in CAD/CAM programming, machine operation and maintenance, through supplier training (e.g. the machine manufacturer) or short courses. This keeps experienced workers employed in higher-skilled, better-paid roles.

Multi-skilling: training workers across several machines or stations lets the company move staff where demand is greatest, improving efficiency and making workers more secure and employable.

Career progression: expansion creates supervisor, quality control, production planning and management roles. Workers who complete leadership or project management courses can be promoted, and the firm keeps knowledge in-house.

If the company downsizes instead, retraining and redeployment can replace redundancies, and workers who keep their skills current are less likely to be made redundant. Training is also legally required for WHS: induction and machine-specific competency training reduce injuries.

Overall, training and career opportunities are vital: they increase productivity, quality and safety for the business and give workers job security, higher pay and promotion.

223 words

### 2020 Q16(a) (5 marks) [S8, S7]

*Describe environmental factors the company needs to consider when selecting a new site.*

An environmental impact assessment checks threatened species, waterways and pollution risk, and the site needs waste management and room for dust extraction. Impact on the surrounding population: noise, dust and truck movements mean factories should be in industrial zones away from homes.

Transport facilities: timber products are bulky and heavy, so access to highways, rail and ports cuts freight costs and emissions. A site near the sawmill reduces raw material transport, while a site near the city reduces delivery costs and time to customers.

Land costs and availability: land near Sydney is expensive, while regional land (e.g. near mills in Oberon or Tumut) is cheaper and allows larger factories and storage yards. Workforce and resources: the site needs access to skilled workers (cabinet makers, CNC operators) and reliable power and water.

Legislative requirements also apply: council zoning and development approval, and EPA licensing under the NSW Protection of the Environment Operations Act 1997. Overall, the best location balances land and transport costs with environmental and community impact, which directly affects the viability of the business.

175 words

### 2020 Q16(b) (10 marks) [S9]

*Discuss strategies the company could implement to minimise its continuing environmental impact.*

A timber and furniture company can significantly reduce its continuing environmental impact through sustainable sourcing, waste minimisation, cleaner energy and processes, and responsible finishing. Each strategy has costs as well as benefits.

Sustainable materials: buying FSC or Responsible Wood certified, plantation or recycled timber protects native forests and meets the Illegal Logging Prohibition Act. This also attracts environmentally aware customers, although certified timber can cost more and supply can be limited.

Waste minimisation: CAD/CAM nesting software and economical cutting lists reduce offcuts. Sawdust and shavings can be sold for particleboard, animal bedding or burnt in a biomass boiler to heat kilns. This reduces landfill and saves money, but nesting software and CNC machines need large up-front investment.

Energy: installing rooftop solar with batteries, LED lighting, efficient motors and running energy-hungry kilns off-peak cut greenhouse emissions and power bills. The payback period may be several years.

Finishes and pollution: switching to low-VOC water-based finishes, using filtered spray booths and taking solvents to approved chemical waste facilities reduces air and water pollution and protects workers. Water-based finishes may need more coats.

Product design: durable, repairable furniture, flat-pack transport to reduce freight emissions, and take-back or buy-back schemes extend product life and keep timber out of landfill.

Overall, the most effective strategies are those that cut costs as well as impact, such as waste minimisation, energy efficiency and sustainable sourcing. A formal environmental policy ensures the company complies with legislation and continually improves.

240 words

### 2019 Q16(a) (5 marks) [S4, S5]

*Describe how new and emerging technologies have benefited the timber products and furniture industry. Provide examples to support your answer.*

A CNC (computer numerically controlled) nesting router is one new technology transforming furniture and cabinet manufacturing. Parts are designed in CAD, and CAM nesting software arranges them on the sheet with the least waste. The machine then cuts, drills and grooves whole sheets of board automatically, with vacuum hold-down and automatic tool changes. This improves the industry by increasing accuracy and repeatability, cutting material waste and labour time, and allowing custom-sized kitchen and wardrobe cabinets to be produced quickly at mass-production cost.

Other technologies have also benefited the industry. Drones and LiDAR map forests and count trees, improving harvest planning and sustainability, and 3D printing and CAD allow fast prototypes, so clients can approve designs before production.

117 words

### 2019 Q16(b) (10 marks) [S14]

*Discuss strategies an employer could adopt to overcome employee resistance to the implementation of new and emerging technologies in the timber products and furniture industry.*

Employees often resist new technology such as CNC routers or automated edge banders because they fear job loss, loss of status or having to learn new skills. An employer can overcome this resistance with consultation, training, job security measures and sharing the benefits, though each strategy has costs.

Consultation and communication: involving workers and unions early, explaining why the technology is needed and how it will affect jobs, builds trust and meets legal consultation requirements under the Fair Work Act and WHS Act. It takes time but greatly reduces disputes.

Training and upskilling: providing paid training in CAD/CAM programming and machine operation lets existing workers move into higher-skilled roles. It costs money and lost production time, but keeps experienced staff and their product knowledge.

Job security and redeployment: guaranteeing no forced redundancies, redeploying workers to new roles or offering voluntary redundancies to those who prefer to leave reduces fear. However, it may limit the labour savings from the technology.

Sharing the benefits: point out that automation removes dangerous, dusty, repetitive tasks, improving WHS, and that productivity gains can fund pay rises, bonuses or more interesting work. Trial and gradual introduction: piloting the technology with willing "champions" before full rollout lets others see that it works and lowers anxiety.

Overall, consultation combined with training is the most effective strategy, because it addresses the real causes of resistance. The employer gains efficiency and the workers gain skills and security, so the technology is accepted rather than resisted.

245 words

### 2018 Q16(a) (5 marks) [S8]

*Explain the effects of both land costs and transportation facilities on the viability of a business in the timber products and furniture industry.*

Land costs and availability: land near Sydney is expensive, while regional land (e.g. near mills in Oberon or Tumut) is cheaper and allows larger factories and storage yards.

Transport facilities: timber products are bulky and heavy, so access to highways, rail and ports cuts freight costs and emissions. A site near the sawmill reduces raw material transport, while a site near the city reduces delivery costs and time to customers. The business must weigh cheaper land against higher distribution costs.

For example, a dining furniture maker in Sydney pays high land costs or rent but has short delivery trips to customers. A factory near the mills in Oberon pays less for land and raw-material freight but more to deliver bulky finished products to the city. Whichever balance gives the lower total cost per product improves the business's viability.

138 words

### 2018 Q16(b) (10 marks) [S9, S5, S7]

*Evaluate how changes in resource management have affected the timber products and furniture industry.*

Resource management is the management of all of a business's resources: materials, equipment, energy, people, waste and administration. Changes in each have had a largely positive effect on the timber and furniture industry, although they need significant investment.

Resource management: CNC beam saws and computerised stock and administration systems track materials accurately and reduce over-ordering, waste and labour. A paperless office and efficient truck routing reduce resource use further.

The value of a CNC beam saw or nesting router is high: it costs a lot to buy, but it produces components faster and more accurately than workers, so labour and material costs per unit fall and profits rise.

Sustainable materials: buying FSC or Responsible Wood certified, plantation or recycled timber protects native forests and meets the Illegal Logging Prohibition Act. This also attracts environmentally aware customers, although certified timber can cost more and supply can be limited.

Waste minimisation: CAD/CAM nesting software and economical cutting lists reduce offcuts. Sawdust and shavings can be sold for particleboard, animal bedding or burnt in a biomass boiler to heat kilns. This reduces landfill and saves money, but nesting software and CNC machines need large up-front investment.

Changes in managing native forest resources have also affected the industry. Victoria and Western Australia ended native forest logging from 1 January 2024, forcing manufacturers to use plantation, imported or recycled timber. This was positive for forests but costly for mills and their workers.

Energy: installing rooftop solar with batteries, LED lighting, efficient motors and running energy-hungry kilns off-peak cut greenhouse emissions and power bills. The payback period may be several years.

Overall, changes in resource management have been highly valuable. They have reduced waste and costs, improved sustainability and made businesses more competitive, although small firms find the up-front costs hard to meet.

297 words

### 2017 Q16(a) (5 marks) [S13]

*Explain the importance of training opportunities for a worker in the timber products and furniture industry. In your answer, use an industry example.*

Training opportunities are important to a timber worker because they lead to higher skills, job security, safety and promotion.

Upskilling on new technology: introducing a CNC router means existing workers need training in CAD/CAM programming, machine operation and maintenance, through supplier training (e.g. the machine manufacturer) or short courses. This keeps experienced workers employed in higher-skilled, better-paid roles.

For example, a machinist in a cabinet factory who completes CAD/CAM and CNC programming training can move from operating a panel saw to programming the CNC nesting router. This is a higher-paid role, and it protects the worker if manual cutting jobs are automated.

Training is also legally required for WHS: induction and machine-specific competency training reduce injuries.

Training such as a project management or supervisor course also shows commitment and can lead to promotion to leading hand or production manager.

139 words

### 2017 Q16(b) (10 marks) [S5]

*Analyse how technical factors affect the efficiency of production in the timber products and furniture industry.*

Technical factors (mechanisation, specialisation, mass production, automation and new technology) have had a largely positive impact on the timber products and furniture industry. They have greatly increased efficiency, consistency and affordability, although they have reduced customisation and some jobs and require large investment.

Mass production makes large numbers of identical products from standardised parts. Automation uses computer-controlled machines (CNC routers, beam saws, edge banders) with little human input; mechanisation (e.g. a forklift) uses machines operated by people.

Mechanisation, such as forklifts, panel saws and powered feeders, lets one worker move and cut far more material than by hand, raising output per labour hour.

Specialisation, where workers repeat one task, increases speed but can cause boredom and repetitive strain, so many firms now multi-skill workers instead.

Impact on efficiency and cost: a CNC beam saw or nesting router can cut and drill a full sheet of particleboard in minutes, run long shifts and reproduce parts exactly. Flat-pack manufacturers such as IKEA combine mass-produced board components with knock-down fittings, so furniture is cheap to make, store and ship. Lower unit costs mean lower prices and wider access for consumers.

Impact on quality and waste: automation removes human error, so every part is identical and joints fit, improving quality control. CAM nesting software minimises offcuts, reducing material costs and environmental impact.

Impact on the workforce: automation reduces demand for unskilled machine operators and traditional hand skills, causing job losses and resistance. It also creates new skilled roles in CNC programming, CAD design and machine maintenance, and removes workers from dangerous tasks at saws, improving WHS.

Limitations: automated lines are very expensive for small businesses, and mass production suits standard products rather than one-off pieces. Small workshops survive by making bespoke solid-timber furniture.

Overall, mass production and automation have transformed the industry from craft workshops into efficient factories. Their benefits in productivity, consistency, safety and price outweigh the costs, provided businesses retrain workers and keep space for customised, high-value products.

326 words

### 2016 Q16(a) (5 marks) [S3]

*Using an example, outline the purpose of risk assessment within the timber products and furniture industry.*

The purpose of risk assessment is to identify hazards, assess how likely and how severe the harm could be, and decide on controls to eliminate or minimise the risk before work starts. It follows four steps: identify the hazard, assess the risk (likelihood × consequence), control it using the hierarchy of control, and review the controls. For example, before a cabinet maker uses a spindle moulder, a risk assessment identifies hazards such as contact with cutters, kickback, noise and dust. It rates the risk as high and sets controls: guards and power-feed, dust extraction, hearing and eye protection, and only trained, authorised operators. This protects workers, meets the employer's legal duty under the WHS Act, and reduces injuries, sick leave and costs, making the business more efficient.

127 words

### 2016 Q16(b) (10 marks) [S6]

*Explain how particular historical developments have influenced the timber products and furniture industry.*

Historical developments in manufacturing processes, materials and work practices have moved the timber and furniture industry from hand craft to automated mass production. This has made furniture more affordable, consistent and safe, although it has reduced traditional skills and some jobs.

Before the Industrial Revolution, furniture was made by hand by skilled craftsmen using hand saws, planes and chisels. Production was slow and expensive, and quality depended on the individual maker. The Industrial Revolution brought steam-powered sawmills and machinery, such as the circular saw and powered planers, which greatly increased output.

In 1859 Michael Thonet's steam-bent beech No. 14 chair was made from a few standard parts by semi-skilled workers and shipped in parts. This early mass production and flat-pack thinking made furniture affordable.

In the 20th century, electric motors made individual machines and portable power tools (routers, drills, biscuit jointers) common. This improved precision, reduced physical labour and allowed small workshops to mechanise.

Manufactured boards were a major materials development: plywood, then particleboard and MDF from the mid-20th century. They used waste and small logs, came in large stable sheets and suited fast assembly with knock-down fittings, which led to flat-pack firms such as IKEA.

In the late 20th century, CNC machining and CAD/CAM allowed highly precise, repeatable and complex cuts and custom sizing at factory speed. Today CNC nesting routers, automatic edge banders and engineered timbers such as glulam and CLT (used in International House Sydney, 2017) continue this change. Work practices changed with the technology: specialised production-line jobs replaced the all-round craftsman, and later multi-skilling, WHS law and training in CNC programming emerged.

Negative effects include loss of hand skills and jobs, environmental pressure from mass consumption, and lower-quality disposable furniture. Overall, historical developments have shaped the industry positively, greatly improving productivity, precision, safety and affordability.

299 words

### 2015 Q16(a) (5 marks) [S10]

*Explain how restructuring a business can affect quality control.*

Restructuring means changing a business's personnel, management levels, systems, processes or physical layout, and it can affect quality control both negatively and positively.

Restructuring and quality control: restructuring (changing roles, teams, machinery or layout) can first lower quality because workers moved to new tasks lack skills and morale drops. With retraining, specialised teams and new machinery such as CNC, it can then improve accuracy and consistency, raising quality.

For example, a furniture factory that restructures into specialised teams (machining, assembly, finishing) with a dedicated quality inspector can catch defects at each stage. New workers may also bring fresh attitudes and less complacency. However, staff anxiety about job losses during a restructure can lower care and quality until roles are settled, so communication and retraining are essential.

126 words

### 2015 Q16(b) (10 marks) [S4, S5]

*Assess the effect of new technology on production and efficiency in the timber products and furniture industry.*

New technology has had a very positive effect on production and efficiency in the timber products and furniture industry, although its high cost and effect on jobs reduce its value for some businesses.

CAD allows designs to be drawn, changed and reused quickly from libraries of standard parts, and sent electronically to clients and factories, saving drafting time and delivery costs.

Parts are designed in CAD, and CAM nesting software arranges them on the sheet with the least waste. The machine then cuts, drills and grooves whole sheets of board automatically, with vacuum hold-down and automatic tool changes. This improves the industry by increasing accuracy and repeatability, cutting material waste and labour time, and allowing custom-sized kitchen and wardrobe cabinets to be produced quickly at mass-production cost.

3D printing and CAD renders allow rapid prototypes that clients can approve before production, reducing costly changes later.

Impact on quality and waste: automation removes human error, so every part is identical and joints fit, improving quality control. CAM nesting software minimises offcuts, reducing material costs and environmental impact.

Impact on the workforce: automation reduces demand for unskilled machine operators and traditional hand skills, causing job losses and resistance. It also creates new skilled roles in CNC programming, CAD design and machine maintenance, and removes workers from dangerous tasks at saws, improving WHS.

Limitations: automated lines are very expensive for small businesses, and mass production suits standard products rather than one-off pieces. Small workshops survive by making bespoke solid-timber furniture.

Overall, the value of new technology is high: it greatly increases productivity, accuracy and material efficiency and makes custom furniture affordable, provided businesses can fund it and retrain workers.

276 words

## Section II model answers (Q11–15)

### 2025

**Q11 (2 marks) Outline ONE critical step necessary when taking measurements from the carcass to produce the drawer. [T15]**

Measure the internal width, height and depth of the carcass opening at several points. Then subtract the clearance required for the drawer runners (from the runner specification) from the width, so the drawer fits the carcass and slides freely without binding.

**Q12 (2 marks) Outline ONE key characteristic of carcass joints in woodworking. [T8]**

Carcass joints join wide boards or panels at right angles to form a box or cabinet: sides, top, bottom and shelves. A key characteristic is that they support load across the full width of the panel and resist racking, so the carcass stays strong and square. Examples are housing, rebate and dovetail joints.

**Q13 (2 marks) What are the differences between the use of a band saw and a table saw? [T15]**

A band saw is used for cutting curves and irregular shapes and for resawing thick stock. A table saw is used for straight, precise cuts, such as ripping boards along the grain to width and cutting sheet material to size.

**Q14 (4 marks) Describe a suitable bending process that could be used to create the curved feature legs for the table shown. [T6]**

Laminating is suitable. First make a former to the curve of the leg from layers of MDF, allowing a little extra curve for springback. Rip thin strips of straight-grained timber that bend easily, keeping them in order, and dry-clamp them to check the fit. Spread urea-formaldehyde or epoxy glue on the mating faces, stack the strips and clamp them to the former from the centre outwards (or use a vacuum bag). Wipe off squeeze-out. When the glue has fully cured, remove the leg, clean the edges with a jointer or router and template, then cut to length and sand.

**Q15 (5 marks) Recommend set-up, startup and maintenance procedures for operating high-risk machinery. [T12]**

Set-up: only trained, authorised operators should use the machine. Check that the area is clear and well lit, dust extraction is connected, and the correct sharp blade is fitted with all guards in place and adjusted. Start-up: wear safety glasses, hearing protection and a dust mask, remove loose clothing and jewellery, test the emergency stop, let the machine reach full speed before cutting, and use push sticks and fences. Maintenance: isolate the power and lock out and tag out before any adjustment or blade change. Regularly inspect and replace worn blades and belts, lubricate moving parts and clean away dust, and record all work in a maintenance log. Report and tag out faulty machines immediately.

### 2024

**Q11 (1 mark) Identify a robust and versatile adhesive that also acts as a feature on a finished project. [T5/notes 3.4]**

Epoxy resin (it can be tinted and used to fill voids as a decorative feature).

**Q12 (2 marks) Outline ONE strategy to minimise wastage and ensure economical usage of materials in woodworking projects. [T14]**

Prepare an accurate cutting list and draw an economical layout of all parts on the boards or sheets before cutting, so parts are nested together and offcuts are kept for small components. This reduces the number of boards or sheets bought and the waste sent to landfill.

**Q13 (3 marks) Describe the difference between a mitre saw and a compound mitre saw in their function and use. [T15]**

A mitre saw cuts across a board at an angle by pivoting horizontally, such as a 45° mitre for a picture frame. A compound mitre saw can also tilt the blade (bevel) while it is pivoted, so it cuts a mitre and a bevel in one cut. This is used for compound angles such as crown mouldings, splayed legs or angled frames.

**Q14 (4 marks) Explain ONE crucial feature that woodworkers should consider when selecting a router for their woodworking projects. [T15]**

Variable speed is a crucial feature. Large-diameter bits, such as panel-raising or large round-over bits, have a much higher rim speed, so they must run at lower rpm to cut safely without burning the timber or overheating the bit. Small bits need high speed to give a clean cut. A router with variable speed can therefore be matched to each bit and timber, giving a better-quality edge and safer operation across a wider range of projects.

**Q15 (5 marks) Explain TWO work health and safety (WHS) risks that should be assessed prior to preparing and using recycled timber in a project. [T13]**

First, recycled timber often contains hidden nails, screws and bolts. If a saw, planer or thicknesser blade strikes metal, the blade can chip or shatter and throw fragments, or the timber can kick back, causing eye, face and hand injuries. The timber must therefore be inspected, scanned with a metal detector and de-nailed before machining, and eye and face protection worn. Second, old timber may be coated in lead-based paint or treated with CCA (copper chrome arsenate) preservative. Sanding or machining it releases toxic dust that can be inhaled. Its history should be checked and paint tested for lead; CCA-treated timber should not be machined or burnt, and dust extraction and a P2 respirator should be used.

## 2023

**Q11 (1 mark) Name the category of the cabinet fittings shown. [notes 3.5]**

Name the category exactly from the diagram (for example hinges, drawer runners, catches or knock-down fittings). *The diagram is not reproduced here; check the paper and marking guidelines.*

**Q12 (2 marks) Outline an environmental benefit of using manufactured boards. [T5]**

Particleboard and MDF are made from sawmill residues, chips, thinnings and small-diameter plantation logs that would otherwise be wasted. Using them makes fuller use of each tree, so fewer large logs need to be harvested.

**Q13 (3 marks) A 2.5 m × 1.5 m table top requires TWO coats of polyurethane. 1 L costs \$45 and covers 15 m<sup>2</sup>. Calculate the cost. [T16]**

Area =  $2.5 \times 1.5 = 3.75 \text{ m}^2$ . Two coats =  $3.75 \times 2 = 7.5 \text{ m}^2$ . Litres =  $7.5 \div 15 = 0.5 \text{ L}$ . Cost =  $0.5 \times \$45 = \$22.50$ .

**Q14 (4 marks) Describe the process of cutting veneers to produce plywood. [T4]**

Logs are debarked, cross-cut into billets and softened by soaking or steaming so the timber cuts cleanly. Each billet is mounted in a rotary lathe and spun against a long knife, peeling off a continuous ribbon of veneer of even thickness. A pressure bar stops the veneer splitting. The ribbon is then clipped into sheets of the required width, removing defects, and the sheets are dried and graded ready for lay-up. (Decorative face veneers may instead be sliced: flat/crown, quarter or rift slicing.)

**Q15 (5 marks) Explain the process of seasoning timber through natural air drying. [T1]**

Air seasoning removes moisture from green timber until it is close to the outdoor equilibrium moisture content, reducing later shrinkage and warping. The converted boards are stacked on a level, well-drained site on bearers raised off the ground, so air circulates underneath and ground moisture and termites are avoided. Each layer is separated by stickers of equal thickness, lined up vertically, so air flows over every board and the stack stays flat. A roof protects the stack from rain and direct sun, weights hold the top layers flat, and the board ends are sealed to prevent end splits. Over months, or years for thick hardwoods, moisture slowly evaporates. The process is cheap and causes little stress, but it is slow and cannot get below outdoor EMC.

## 2022

**Q11 (1 mark) Identify a machine used in industry to dress timber.** [T15]

Four-sided moulder (or a planer/jointer and thicknesser).

**Q12 (2 marks) Why is equilibrium moisture content (EMC) important when selecting timber?** [T2]

EMC is the moisture content at which timber neither gains nor loses moisture to the surrounding air. Timber should be close to the EMC of where it will be used; otherwise it will shrink (causing gaps and loose joints) or swell (causing cupping and buckling) after the product is made.

**Q13 (3 marks) Calculate the cost of constructing the stool (top  $2 \times 300$ , legs  $4 \times 200$ , rails  $4 \times 200$ ; \$/m given).** [T16]

Top:  $2 \times 0.3 \text{ m} \times \$13.00 = \$7.80$ . Legs:  $4 \times 0.2 \text{ m} \times \$7.25 = \$5.80$ . Rails:  $4 \times 0.2 \text{ m} \times \$1.95 = \$1.56$ . Total = \$15.16.

**Q14 (4 marks) Explain how recycling and reusing can be used to address timber shortages.** [T14]

Reusing salvages whole timber members, such as old beams, floorboards, wharf and bridge timbers, and re-machines them for furniture and flooring. This supplies well-seasoned, often rare hardwood without felling new trees. Recycling reprocesses waste such as offcuts, sawdust and chips into particleboard and MDF, so material that would go to landfill replaces solid timber in carcasses and panels. Both stretch the limited supply of new logs, which became tight after plantations burnt in the 2019–20 bushfires and demand rose during the 2021 housing boom, therefore easing shortages and prices.

**Q15 (5 marks) Explain the benefits of using knock-down fittings.** [T7]

Knock-down fittings such as cam locks, cross dowels and connector bolts let furniture be assembled and dismantled. Because parts can be shipped flat, the packed volume is much smaller, so freight and storage costs fall and products are cheaper (e.g. IKEA flat-pack). Customers can assemble the product with basic tools, and it can be taken apart to move house or replace a part. The holes are drilled quickly and accurately by CNC or multi-boring machines, so parts are interchangeable, which suits mass production and lowers labour costs. KD fittings also work well in particleboard and MDF, where traditional joints are weak, although they are generally less strong and less refined than glued joints.

## 2021

**Q11 (1 mark) Identify the tool shown.** [notes 3.11]

Sliding bevel (2021 marking feedback).

**Q12 (2 marks) What are the advantages of kiln seasoning compared to air seasoning?** [T2]

Kiln seasoning is much faster (days or weeks rather than months or years) because heat, humidity and airflow are controlled. It can also dry timber to a precise, lower moisture content suited to indoor furniture, and the heat kills insects and fungi.

**Q13 (3 marks) Complete the cutting list and costs for the Tasmanian oak coffee table (top  $140 \times 19$  DAR, 40 mm overhang).** [T16]

Work out the top size first: frame length + 80 mm and width + 80 mm (40 mm overhang on each side). Number of top boards = top width  $\div$  140, rounded up. Cost = number of boards  $\times$  top length (m)  $\times$  \$20.00. Add the given leg, long-rail and short-rail costs for the total. *Exact figures depend on the diagram dimensions; check the 2021 marking guidelines.*

**Q14 (4 marks) Describe how plywood is manufactured from a log.** [T4]

Logs are debarked, cut into billets and softened by soaking or steaming. Each billet is rotary-peeled on a lathe into a continuous veneer, which is clipped into sheets and dried to a low moisture content, then graded and patched. Glue is applied and the veneers are laid up with the grain of each layer at  $90^\circ$  to the next, using an odd number of plies.

The lay-up is hot-pressed so heat and pressure cure the glue, then the sheets are trimmed, sanded to thickness and graded.

**Q15 (5 marks) Describe the environmental factors that should be considered when creating timber furniture.** [T14]

Timber selection: use plantation, recycled or certified (FSC/Responsible Wood) timber rather than illegally logged or rare exotic species, to protect native forests and biodiversity. Economical use: plan cutting lists and sheet layouts to minimise waste, and reuse offcuts. Manufactured boards make use of residues, but low-formaldehyde (E0/E1) boards should be chosen to limit emissions. Finishes: low-VOC water-based finishes reduce air pollution, and solvents and rags must go to approved waste facilities. Life cycle: durable, repairable designs and flat-pack transport reduce resource use and freight emissions, and designing for disassembly allows recycling at the end of the product's life.

## 2020

**Q11 (1 mark) Identify a suitable Australian hardwood for making the outdoor bench seat.** [notes 3.1]

Spotted gum (also blackbutt, jarrah, ironbark or tallowwood).

**Q12 (2 marks) The edges of the bench seat are rounded. Outline reasons for this edge treatment.** [notes 3.8]

Rounded edges are more comfortable to sit on and safer, as there are no sharp arrises to cut or bruise users. They are also less likely to splinter or chip, and the finish adheres better and lasts longer on a rounded edge than on a sharp one.

**Q13 (3 marks) Complete the cutting list for the outdoor bench seat.** [T16]

Count each part from the side view and front details (legs, rails, cleats, slats, cross support), take lengths from the drawing, and multiply quantity  $\times$  length to give the total length for each part. *The exact table depends on the diagram; check the 2020 marking guidelines.*

**Q14 (4 marks) Outline a method of production for a suitable joint to attach the cross support to the bottom rails.** [T10]

Use a mortise and tenon joint. Mark the tenon (about one-third of the rail thickness) and the mortise with a mortise gauge set to the chisel width. Cut the mortise in the bottom rail with a mortise chisel or a hollow-chisel mortiser, slightly deeper than the tenon length. Saw the tenon cheeks and shoulders with a tenon saw (or a tenoning jig on the table saw), and pare it to a firm fit. Dry-assemble to check, then glue with an exterior adhesive (e.g. epoxy) and clamp, checking for square.

**Q15 (5 marks) Name a suitable finish for the outdoor bench seat and describe the steps in preparing and applying it.** [T11]

Use an exterior decking oil (a penetrating oil with UV and water repellents). Preparation: fill holes with exterior filler, then sand with the grain through the grits (e.g. 120 then 180). Raise the grain with a damp cloth, let it dry and sand lightly again, then remove all dust. Application: brush or wipe the oil on along the grain, let it soak in, and wipe off the excess after the recommended time. Apply two or three coats, allowing drying time between them, and re-oil regularly as the seat weathers.

## 2019

**Q11 (1 mark) State ONE property of plywood, other than price, that makes it appropriate for this project.** [T5]

Strength in all directions (cross-laminated veneers); also stable, available in large sheets, easy to cut and join.

**Q12 (2 marks) Sketch and label a suitable carcass joint for the fixed horizontal shelf.** [T8]

Sketch a housing (trench) joint: show the side panel with a trench about one-third of its thickness deep, and the shelf end fitting into it. Label the side, shelf, trench and depth; a stopped housing hides the joint at the front.

**Q13 (3 marks) Each sheet is  $2440 \times 1220 \times 16$  mm. Calculate the minimum number of sheets for 150 units. [T16]**

Each box needs 5 pieces of  $590 \times 390$  mm. 12 pieces fit on one sheet.  $150 \times 5 = 750$  pieces.  $750 \div 12 = 62.5$ , so 63 sheets.

**Q14 (4 marks) Describe the processes involved, from log to sheet, in manufacturing one of the plywood sheets. [T4]**

Logs are soaked or steamed and debarked, then peeled into veneers on a rotary lathe. The veneers are clipped to size and dried, which also protects them from fungal decay. Glue is applied and the veneers are arranged with the grain alternating at  $90^\circ$  in an odd number of plies. Heat and pressure in a hot press cure the glue. Finally, the sheet is trimmed to size and sanded to the correct thickness.

**Q15 (5 marks) Explain the processes needed to produce one of the corner rebate joints using hand tools and portable power tools. [T10]**

Mark out the rebate with a marking gauge: the width equals the 16 mm thickness of the mating panel, and the depth is about half the board's thickness. Clamp the panel securely to the bench. Cut the rebate with a portable router fitted with a rebating bit (or a straight bit and fence), taking several shallow passes to prevent tear-out and maintain accuracy. Clean the corner with a shoulder plane or chisel if required. Dry-assemble to check the fit, then apply PVA, assemble, and nail or screw through the side into the rebate. Cramp, check for square by measuring the diagonals, and wipe off excess glue.

## 2018

**Q11 (1 mark) Identify the portable power tool that would produce the most accurate rebate in a frame for glass. [T15]**

Router (with a bearing-guided rebating bit).

**Q12 (2 marks) Outline a method for checking a rectangular table frame for squareness without a right-angle square. [T15]**

Measure both diagonals from corner to corner with a tape measure. If the diagonals are equal (and opposite sides are equal), the frame is square; if not, adjust the cramps until they are.

**Q13 (3 marks) Justify the selection of a specific manufactured board for a bathroom cabinet carcass. [T5]**

HMR (high moisture resistant) melamine-faced particleboard is suitable. It is made with moisture-resistant resin, so it resists swelling in the humid bathroom. It is dimensionally stable, and its melamine surface is waterproof and easy to clean. With the edges sealed by edge banding, it lasts well at low cost. (Marine or exterior plywood would also be justified because of its water-resistant glue.)

**Q14 (4 marks) Describe ONE technique of inlaying timber, including the benefits of using this technique. [notes 3.8]**

A strip inlay can be set using a router. Cut the inlay strip accurately to width and thickness on a saw. Set a router with a straight bit the same width as the inlay and a fence, and test the depth on scrap. Rout a trench parallel to the edge, square the ends of the trench with a chisel, and cut the inlay ends square. Glue the strip in, cramp, and when it is dry plane or scrape it flush. The technique is accurate and repeatable, and it adds a decorative contrasting feature that increases the value of the piece.

**Q15 (5 marks) Describe the advantages of each of the drawer runners shown (full-extension metal; timber runners). [notes 3.5]**

Full-extension metal runners carry heavy loads smoothly on ball bearings and let the drawer open fully, so the whole drawer is accessible. They are fast to install with templates in mass production, and the drawer can be removed without unscrewing the runner. Timber runners are cheap to make from offcuts and can be custom-made for any

drawer size. With kickers and side guides they control sideways and tipping movement, and they are easy to replace when worn. They also suit traditional furniture.

## 2017

**Q11 (1 mark) Identify a portable power tool used to cut an internal curved shape in plywood. [T15]**

Jigsaw.

**Q12 (2 marks) Outline the benefits of using recycled timber in furniture production. [T14]**

Recycled timber is old, well-seasoned and stable, and has an attractive rustic character. Reusing it also reduces the need to fell new trees and keeps timber out of landfill, lowering environmental impact.

**Q13 (3 marks) Describe the practices used to minimise the environmental issues associated with timber finishing. [T11]**

Use low-VOC water-based finishes instead of solvent-based ones to reduce air pollution. Spray only in booths with filters that capture overspray and fumes. Never pour leftover finish or solvents down drains; take them, and used rags, brushes and newspaper, to approved chemical waste facilities. Buy and mix only the amount needed to reduce waste.

**Q14 (4 marks) Describe TWO benefits of using dovetail joints in drawer construction. [T8]**

First, mechanical strength: the flared tails and pins interlock, so the drawer front cannot be pulled off when the drawer is opened, even if the glue fails. This makes the drawer durable through years of use. Second, appearance: visible dovetails are attractive and signal quality craftsmanship, adding value to the furniture. They can be cut by hand or with a router jig for faster production.

**Q15 (5 marks) Describe a process to produce a laminated curved component for a rocking chair. [T6]**

Make a former of the rocker curve from layers of MDF. Rip thin strips of timber on the table saw and keep them in order. Dry-clamp the strips to the former to check the curve. Apply glue (urea-formaldehyde or epoxy) to one side of each strip, stack them, and clamp them around the former from the centre outwards, or press them in a vacuum bag. Remove excess glue and check the curve for twist. Leave the glue to cure, then remove the clamps, clean the edges, shape the ends and finish.

## 2016

**Q11 (1 mark) What is the purpose of the symbol shown on the timber? [notes 3.6]**

It identifies the face side (the face mark), the reference surface from which all other faces, edges and measurements are worked.

**Q12 (3 marks) Describe a process for making a widening joint using a portable power tool. [T9]**

Place the dressed boards edge to edge with the growth rings alternated, and mark the biscuit positions across each joint. Using a biscuit jointer referenced from the face side, cut matching slots in both edges. Glue the slots and edges, insert the biscuits, bring the boards together and cramp with sash cramps, alternating above and below. Check for flatness and wipe off excess glue.

**Q13 (3 marks) Compare the use of oil-based and water-based finishes on timber. [T11]**

Both protect and enhance timber and can be brushed or sprayed. Oil-based finishes give a warm amber depth, level well and are very hard-wearing with fewer coats, but they dry slowly, smell strongly, are flammable and yellow with age. Water-based finishes dry quickly so they can be recoated sooner, stay clear, have low odour and clean up with water. However, they need more coats and lack the rich glow of oil.

**Q14 (3 marks) Describe the process needed to restore the edge of the chisel shown. [T15]**

Grind the bevel on a bench grinder at about 25° to remove the damage, dipping the chisel in water often so it does not overheat and lose its temper. Then hone a secondary bevel at about 30° on an oilstone or waterstone using the correct lubricant. Finally, remove the burr from the back on the stone or a leather strop.

**Q15 (5 marks) Explain the advantages of using manufactured boards rather than solid timber for a dining table top. [T5]**

Manufactured boards are available in large sheets, such as 2400 × 1200 mm, so the top can be made in one piece without widening joints, saving time and avoiding joints opening. They are dimensionally stable because cross-laminated veneers or randomly arranged particles prevent shrinking, swelling, cupping and warping, so the top stays flat. They have uniform strength with no knots or splits, and plywood does not split when fixed near its edges. A veneer of figured timber gives the look of an expensive species economically. They are usually cheaper than solid timber, and they make use of residues and small plantation logs.

## 2015

**Q11 (1 mark) What is a purpose of dry cramping? [notes 3.9]**

To test that all joints fit accurately before gluing (and to set the cramps and rehearse the glue-up).

**Q12 (3 marks) Explain why the growth rings on widening-jointed boards are alternated. [T9]**

Timber moves as its moisture content changes, and back-sawn boards tend to cup. If all the boards are laid with their rings the same way, the cupping adds up across the whole top, causing a large curve. By alternating the growth rings, each board cups in the opposite direction to its neighbour, so the movement is balanced. The top stays flatter and can be fastened securely to the frame.

**Q13 (3 marks) Name an alternative joining technique and outline TWO advantages it has over traditional techniques. [T7]**

The Festool Domino loose-tenon joint. First, it is much faster than a hand-cut mortise and tenon: a machine cuts matching mortises and a ready-made domino is glued in. Second, it is accurate and repeatable, and the large gluing area gives strength similar to a traditional mortise and tenon, reducing production time and cost.

**Q14 (3 marks) Why would a cabinet-maker use quarter-sawn timber when making fine-quality furniture? [T3]**

Quarter-sawn timber has its growth rings close to 90° to the face, so it shrinks less in width and is much less likely to cup or warp. This keeps panels and joints stable. It also shows attractive ray figure and wears evenly, making it worth its higher cost for fine furniture.

**Q15 (5 marks) Describe the steps used to produce the laminated veneer stool shown. [T6]**

Select the veneers and a suitable adhesive (urea-formaldehyde) and make a mould or jig of the stool's shape. Cut the veneers to size, allowing for waste. Lay up the veneers with glue between each layer and press them over the mould, using cramps or a vacuum bag and press. Leave the glue to cure fully, then remove the moulding. Trim the edges to final shape and cut the handholds with a router and template. Sand all surfaces and apply a suitable finish.