

## Commercial Manufacturing, surface treatments and finishes Timbers and Manufactured Boards

### A: Flat pack furniture

Manufactured boards are most often seen commercially in flat-pack products.

As manufactured board is so dimensionally stable it can be processed, transported, stored and assembled without the risk of developing the faults of natural timbers, although it can be prone to absorbing moisture in damp and humid conditions.

Advantages of flat-pack furniture	Disadvantages of flat-pack furniture
<ul style="list-style-type: none"> <li>• Compact for ease of transportation</li> <li>• Low cost compared to traditional furniture</li> <li>• A large choice of styles and finishes</li> <li>• Easy to assemble with limited tools and experience</li> <li>• Can be disassembled for storage/moving</li> </ul>	<ul style="list-style-type: none"> <li>• Needs to be constructed yourself or by someone else at additional cost</li> <li>• Not as robust as traditional furniture</li> <li>• Can be complex to construct for some</li> <li>• Prone to damage by moisture</li> <li>• Can chip and break more easily</li> </ul>

### B: Commercial routing and turning

In industry, most machining and shaping of furniture, artefacts and components is now done using CNC (Computer Numerical Control) routers for flat materials and CNC lathes for cylindrical objects.

- This enables large quantities of equal-sized parts or products to be produced
- Templates can be saved and reused to help minimise waste
- Screw holes, slots and patterns can be cut in one process



Routers are available in very large formats that are capable of producing flat-packed furniture but they can also create detailed ornate profiles if required.

### C: Timber and manufactured board for commercial products

Commercial products are nearly always aimed at a certain price point and this often determines the quality of the chosen construction material. For example a wooden toy for children which is made from a hardwood such as beech would be resistant to splintering and chipping when dropped and thrown. If the same toy were made from a softwood such as pine, the production costs would be reduced, but the toy would be prone to denting and splitting.

### D: Mechanisation and Automation

Automated machinery has changed the way industry manufactures timber based products.

- Improvements in manufacturing methods have been embraced by designers
- Stringent quality control methods have increased consistency and accuracy
- Increased availability of manufactured boards means products can be batch and mass produced

### E: Quality Control

When products are made, checking that they are produced correctly is an essential stage. This is known as **quality control (QC)** and ensures:

- dimensional accuracy is consistent
- the product is safe to use
- the product functions correctly
- the product is free of defects
- the products are consistent and accurate
- the products meet set size tolerances

### Tolerance

The total amount a specific dimension or property is permitted to vary.

- This can apply to hole depth, length, angle, thickness, weight and elasticity
- A gauge can be inserted into a gap or hole to check if the sizes fall within tolerance
- If parts do not fit within the specified tolerances they are discarded or recycled

a Go / No Go Gauge



### F: Surface treatments and finishes

Most woods, whether natural or manufactured, perform better if they have a finish applied to them. The reasons for applying a finish fall into two main areas: aesthetics and protection.

**Aesthetics** can mean colouring or staining to:

- match or contrast with existing materials
- enhance the natural grain of timber
- give it a sheen or shine or even a matt finish

**Protection** can mean making it:

- waterproof
- less prone to fungal or insect attack
- tougher so it resists knocks and bumps
- easy to wipe clean and disinfect

### Tanalising

When buying rough sawn timber, particularly for outside use, there is the option of having it pressure treated or **tanalised**. This is a process of forcing wood preservative into the cell structure of the timber under pressure in a vacuum.

### Common protections and finishes for timber-based products

There are three categories of finishes for woods: oil-based, solvent-based and water-based. Oil and solvent-based are the longest lasting but they are not very environmentally friendly as they contain **volatile organic compounds (VOCs)**. This means they give off fumes that are considered hazardous to health and should be used while wearing a mask in a well-ventilated area. Water-based products are kinder to the environment and should be used where possible around children and animals, as they are non-toxic.

Name	Characteristics	Name	Characteristics
wood preservative	painted on to protect wood from fungal or insect attack and prevent rot or decay, needs reapplication to maintain the levels of protection	paint	painted with a brush or roller, usually needs a primer and undercoat on bare wood, wide range of colours available
varnish	protects from moisture, can be coloured, enhances grain, gloss, satin or matt finish, yellows with age	stain	permanently colours wood, does not protect it, results vary depending on base wood and colour
oil	similar effect to varnish but soaks into the timber rather than sitting on the surface, needs reapplying frequently	wax	rubbed into the wood with cloth or wire wool, enhances natural grain, needs regular reapplication

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### G: Key words

- Mechanisation: the process of using a machine to do something that used to be done by hand
- Automation: The use of control systems for operating equipment such as machinery and processes in factories; this reduces human input
- Quality control: testing and checking that a product meets the specification or a set of defined quality standards
- Tolerance: the allowable limits of variation in the dimensions or physical properties of a manufactured product or part
- Tanalising: the process of forcing wood preservative into the cell structure of timber under pressure in a vacuum
- Volatile organic compounds: compounds which give off fumes that are considered hazardous to health

### H: Video links

- Tanalising: [https://www.youtube.com/watch?v=r2sowY\\_oYrM](https://www.youtube.com/watch?v=r2sowY_oYrM)
- CNC router: <https://www.youtube.com/watch?v=IKuv27hyF9g>
- CNC wood turning lathe: <https://www.youtube.com/watch?v=oQiHYVs-IT4>

### Revision Checklist

I can explain how timbers and boards are selected and processed for commercial products

I can describe the advantages and disadvantages of flat pack furniture

I can explain the advantages of mechanisation and automation in manufacturing including the use of CNC routers and lathes

I understand how materials are cut, shaped and formed to a tolerance

I can identify the aesthetic and functional reasons for applying surface treatments and finishes

I can describe the characteristics of a range of surface treatments and finishes

### Test yourself

1. What is meant by machines being 'computer numerically controlled'?
2. What are the advantages to manufacturers of producing a range of flat pack furniture?
3. Why is flat pack furniture more prone to moisture damage than traditional furniture?
4. What factors make flat-pack furniture cheaper than traditional pre-assembled furniture?
5. What are the benefits of using go/no go fixtures in product manufacture?
6. Why should you re-apply surface treatments and finishes in accordance with the manufacturer's instructions, or when signs of wear occur?