

Knowledge Organiser Timber

Resistant Materials

Hardwood
Timber from a deciduous tree. They are slower growing and more expensive.
ash: a pale and attractive hardwood. Tough, flexible. Open grained. Used in furniture, steam bending, wood turning.
balsa: soft and lightweight, the wood is actually from a deciduous flowering plant, not a tree. Very light in colour with a distinct, straight grain. Used in model making, prototypes, craft, model aeroplanes.
beech: hard, tough, strong/close grained, white/pinkish brown. Prone to warping. Used in functional furniture, chairs, tables, tools, veneers.
Iroko: African tropical hardwood. Deep reddish brown, is a less ecologically damaging alternative to mahogany. Also known as African Teak. Used in boat-building, decorative furniture, traditional musical instruments.
mahogany: fairly strong, medium weight, durable. Interlocking grain. Pink reddish brown. Prone to warping. Used in indoor furniture, panelling, veneers
oak: strong, heavy, durable, hard and tough. Open grained. Light brown. Finishes well. Expensive. Used in construction, high-class furniture, boat building, veneers.
teak: very strong, hard, durable. Natural oils make it resistant to moisture. Golden brown. Very expensive. Blunts tools easily. Used in quality furniture, outdoor furniture, boat building, veneers.
walnut: an extremely durable, tight-grained wood. Its hard, dense grain make it ideal for machining and joint making. Polishes to a high quality finish. Used in restaurant tabletops, cabinet making, decorative features such as handles, bannisters, veneers and layers in plywood.

Softwood
Timber from an evergreen or coniferous tree. Fast growing.
Douglas Fir: pale to medium red/brown colour. Works well. Straight grained, dries quickly, fast growing. Used in construction, railway sleepers, joinery, flooring, decking.
Paraná Pine: fairly strong and durable. Straight grain. Pale yellow, red/brown streaks. Almost knot free. Tends to warp. Used in best quality indoor joinery, staircases, built-in furniture.
Scots Pine: pronounced straight grain. Light brown/yellow in colour. Polishes well. Used in general construction work and joinery.
spruce: fairly strong with small, hard knots. Creamy white, resistant to splitting. Not very durable. Used in general indoor work such as stud-walls, shelves.
Western Red Cedar: straight silky grain, dark reddish brown. Lightweight and not very strong. Natural oils make it durable against weather.

Properties of Timber and Sheet Materials		
Property	Definition	Found in
hardwood	Timber from a deciduous tree.	oak, ash, mahogany, walnut, beech, balsa
softwood	Timber from an evergreen or coniferous tree.	pine, red deal, cedar
tight-grained	Timber with a high ring count, slower growing and denser.	oak, beech
loose-grained	Timber with a low ring count- faster growing.	scots pine, red deal
dense	Can be deformed without losing toughness.	oak, beech
straight-grained	Timber which has grown straight, has a uniform grain.	oak, beech, red deal
knot	Irregularity in wood grain, where a branch or offshoot existed.	spruce, ash, some plywood
weather resistant	A tight-grained timber has good water and heat resistance.	oak, beech, ash, plywood
stiff	A timber that does not bend easily.	oak, ash, beech, plywood, MDF
easy to work	A timber that is either low or medium density. Easy to cut and shape.	red deal, scots pine, balsa, MDF
lightweight	A timber that is light in weight.	balsa, plywood, MDF
attractive grain	When polished or varnished, a timber's grain is eye-catching.	walnut, oak, ash, some plywood

Timber products	
Sheet materials manufactured from layers or particles of wood including MDF, plywood and hardboard.	
MDF: mid-brown colour. Will swell if exposed to moisture. Sheets can be heavy. Smooth finish. No grain. Available in a wide range of sheet sizes and thicknesses. Used in flat-pack furniture, vacuum-form moulds, product modelling, architectural models. Often covered in veneer for a natural timber appearance.	hardboard: Made from wood chip and pulp, cheaper substitute to plywood. Used when space filling as opposed to requiring strength. No regular grain. Used in countertops, flooring, flat-pack furniture.
veneer: very strong, hard, durable. Natural oils make it resistant to moisture. Golden brown. Very expensive. Blunts tools easily. Used in table tops, flat pack furniture, plywood, cabinet-making.	plywood: Reddish brown or white in colour. Layered in odd numbered sheets. Strong. Susceptible to splintering Used in sheds and cladding, furniture, flooring, boats (marine ply).



Wasting

Wasting timber by hand

Most solid woods can be easily wasted and shaped using a range of workshop tools.

- **Sawing:** tenon saw, bench saw, coping saw, jigsaw.
- **Filing:** rasp, bastard, second cut, half round, round.
- **Chiselling:** chisels are used along with vices and mallets to remove areas that have been pre-cut.
- **Planing:** shape and finish edges using a plane or spoke-shave. Edges require no further finishing after planing.

Wasting timber using machinery

Using machinery to waste timber can speed up the manufacturing process and give accurate results.

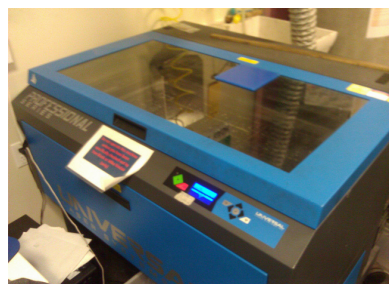
- **Turning:** lathes, used with special chisels, allow the shaping along the profile of a piece of solid wood, or laminated MDF as it is spun. Formers for vacuum forming can be made in this way.
- **Drilling:** chain drilling solid wood and sheet materials can speed up the wasting progress. A series of holes are drilled along a path, the waste is then removed using a coping saw or chisel.



Wasting timber using CAD/CAM

Sheet timber lends itself to being wasted on flat-bed machinery. CAD files can be easily prepared to control these machines.

- **Laser cutters:** can quickly cut thin sheet timber such as MDF and plywood. Precision features such as joints can be cut accurately on a laser cutter.
- **Computer controlled routers and milling machines:** can effectively translate a computer design into a component. Double-sided tape is often used to secure the timber to the machine's



Addition

Addition using adhesives

- **White glue (PVA):** a strong and inexpensive glue to use with all timber.
- **Sheet material:** easily glued surface-to-surface, as the large surface area gives a strong bond.
- **Some decorative detail:** can be added using white glue alone.
- **Cramps:** should be used to tighten the joint whilst the glue is drying.

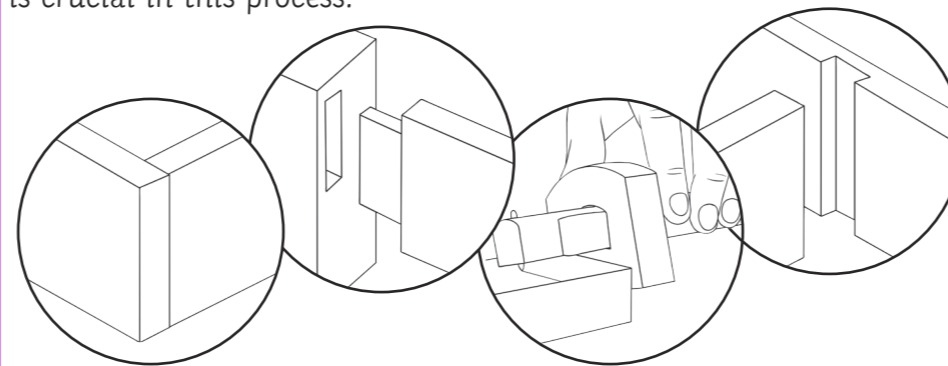
For most other joints, white glue is used in combination with other addition methods.



Addition using joints

Solid wood can be precisely cut using chisels and a tenon saw to create tight-fitting joints which lock together. This can look attractive and give a strong joint, especially when glued.

All joints require careful marking out and cutting. A **marking gauge** is crucial in this process.



Addition using slotting

Sheet timber products can be joined using slots in the same way as sheet polymers. Slots can be cut by hand or cut using CAM machinery.



Timber fastening hardware

The use of fasteners and joining hardware can be used in the addition of timber in combination with joints and adhesives. These include:

- **Woodscrews**
- **Coach bolts**
- **Dowel**

Deforming and Reforming

- **Steaming:** soaking a thin length of solid wood or plywood in a special steamer box makes the timber flexible enough to twist and bend.
- **Laminating:** thin sheets of wood can be pressed together in a mould to form a three-dimensional structure. This technique requires plenty of space, glue and clamps!
- **Kerfing:** a technique which allows a strip or sheet of timber (either solid or man-made) to be deformed into curves and bends. Cuts are made along the inside of the material at regular intervals. The closer together, the tighter the bend. Once the cuts have been made, glue is applied to the cuts and the material is manipulated into shape and cramped to set.



Reforming Timber

The term most commonly applies to the range of timber products that have been manufactured from solid wood. These include:

- **MDF (Medium Density Fibreboard):** this sheet material is reformed from material recycled from solid wood manufacturing. The tiny fibres are pressed together and bonded with a resin which gives the material its density. Easy to shape, but prone to causing dust.
- **Chipboard (Particleboard):** this sheet material is reformed from larger chips left over from solid wood manufacturing. Glue and sawdust is added and these are pressed together to create the sheet material Chipboard. This is a low-grade material and used most commonly in building projects such as barns, garages, flooring.
- **Hardboard:** this sheet material is reformed from pulped wood waste. The pulp is steamed under pressure before glue is added and the material is pressed flat with one smooth, hard side, and one textured surface. Low cost, this material can be used in a range of projects, but is not suitable for outdoor use.

Images courtesy of hackrva, kaktuslamp, nadya, pschlist1972, wwarby, unitedsoybean, via Flickr.com