

# CUADC Timber Guide

(Tim's Guide to Timber)

## Why would anyone make anything out of timber?

It is a reasonably cheap building material, it is easy to shape and build structures out of and it can be finished easily by painting or varnishing.

## What different types of wood are there and how much do they cost

### Lengths

Name	Actual size in mm	Finish	Usual Price per metre ex VAT	Use
2" x 2"	45mm x 45mm	Planed-All-Round (PAR)	£1.00	Frames when you need stuff to be very square
2" x 2"	45mm x 45mm	Regularised	£0.79	Frames where things can be a bit squiffy (quite square)
2" x 1"	45mm x 25mm	Planed-All-Round (PAR)	£0.95??	Light-weight frames, is not particularly structural
3" x 1"	75mm x 25mm	Planed-All-Round (PAR)	£1.10	Making custom Fats nicely
3" x 1"	75mm x 25mm	Sawn (Carcassing)	£0.80 ??	Making custom Flats cheaply
3" x 2"	70mm x 45mm	Planed-All-Round (PAR)	£1.57	Structural Frames where you want square edges
3" x 2"	70mm x 45mm	Regularised	£1.44	Structural frames and custom decking

NB. PAR has sharp corners making it harder to handle.

## Sheets (8ft x 4ft/2440mm x 1220mm)

Thickness	Type/Finish	Usual Price per sheet ex VAT	Use
3.6mm	Hardwood faced plywood	£9.20	Facing flat surface e.g custom flats
3.2mm	Hardboard	£5.00	Facing curved surfaces (creates nasty dust when sawn)
6mm	MDF	£10??	Flat Facing which needs to feel solid
9mm	MDF	£12??	Facing where it is too difficult to support thinner material
9mm	Hardwood faced plywood	£18.21	Facing where it is too difficult to support thinner material but plywood is still required
12mm	Wisa-spruce plywood	£14.20	Reasonable inherent strength and thick enough screw into the side of
12mm	Hardwood faced plywood	£25.00	Reasonable inherent strength and thick enough screw into the side of
18mm	Hardwood faced plywood	£30.00	A strong plywood with a hardwood finish used for custom platforms
18mm	Wisa-spruce plywood	£22.40	A strong plywood with a softwood finish used for custom platforms
18mm	Shuttering	£??	Very cheap but very low quality and normally twisted.
18mm	OSB	£22.00	Cheap way of making custom platforms

N.B If wood needs an extra degree of fire retardancy then Class I versions are available at extra cost.

### How do I order my wood?

Phone Travis Perkins (01223 355484) and/or Ridgeons (01223 466000) and ask to speak to Sales, mention you are calling 'from the ADC Theatre to place an order on the account', so they give the correct pricing. Then they are usually very helpful you can order timber length by the metre or by the length (standard lengths: 2.4m/3.6m/4.8m/5.4m) they don't stock every section at every length, but are usually quite helpful. Check what price they are quoting for each item as occasionally they overcharge you, a good thing to do is asking them to e-mail the quote/invoice. Make sure you know which day they are due to deliver, call them and ask the delivery department

if they don't turn up!

### How do I actually make stuff from my wood?

All mains/air powered tools apart from the corded drills require training by ADC Management before use.

### Cutting methods

#### Timber Lengths:

- To cut the wood perpendicular (90 degrees) to its length, the best tool to use the Radial Arm Saw .
- To cut the wood at a different angle then the Mitre saw is the best tool.

#### Sheets:

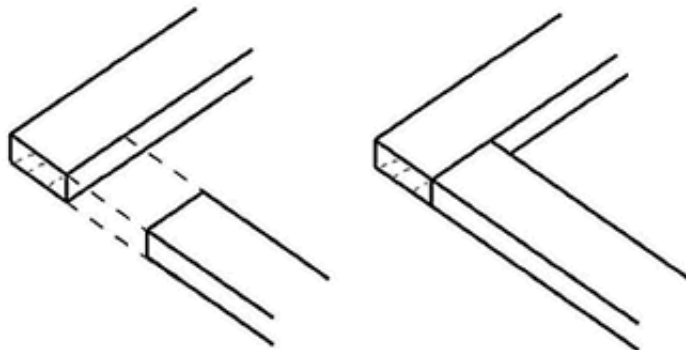
- To cut a sheet down parallel to an existing edge then the Panel Saw is the best tool.
- To generate a straight cut but not parallel to an existing edge the best tool to use is the circular saw mounted on a straight track.
- To generate a curved outline out of a sheet the best tool to use is a jigsaw. If two identical or mirrored outlines are to be cut it is best to clamp two sheets together and cut them both at once to ensure the best symmetry.
- If you want to cut a sheet down to a pre-existing outline which you already have made, eg a Timber frame, the neatest way to cut the sheet is to attach it to the frame/outline with a small overlap and then go round it with the router fitted with a flush trim bit.

If you are lacking in time or the wood you want to cut is already in a piece of set there are hand-saws available which you do not to be trained in the use of, these can be a great way of quickly fixing a problem or cutting in situ however they lack accuracy and are slow if multiple cuts are to be made.

### How to join

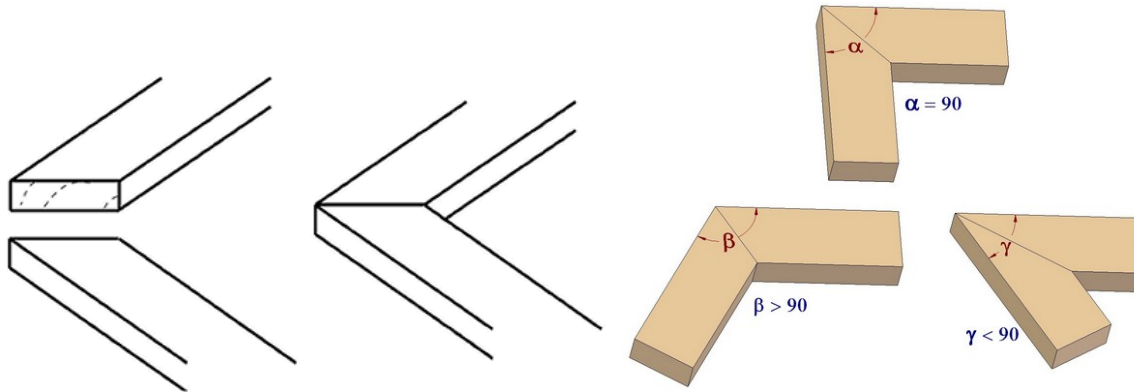
#### Different Joints:

- **Butt joint:** The simplest and quickest way of joining two pieces of timber at right angles to each other is usually the squarest (the closest to a right angle) joint. Disadvantages of this joint are that it can only be used to join pieces at right angles to each other and it aesthetically shows the endgrain of one of the pieces of timber. The joint is strong in most directions but will require a triangular brace (see below) if the joint is loaded in a fashion where one piece of timber is being prised off the other.

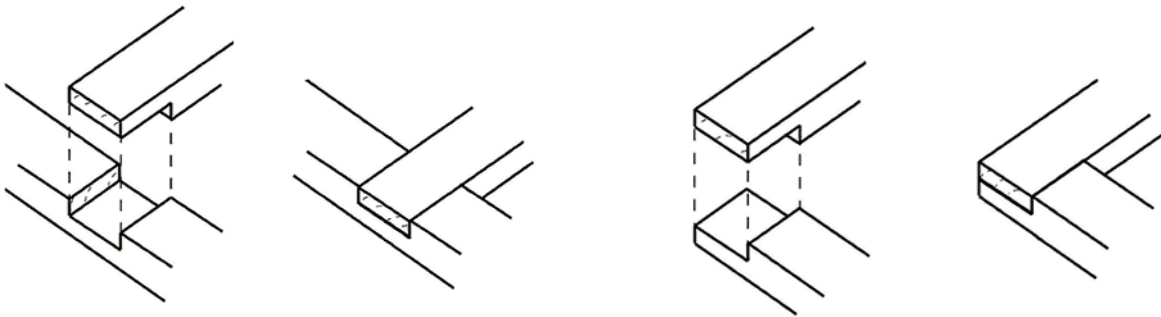


- **Mitre joint:** Generally the most aesthetically pleasing of joints as it hides the endgrain of

both pieces. It also has the advantage of being able to join pieces of wood with good strength at any angle by altering the angle which the two pieces of wood are cut at. The joint is marginally stronger than a butt joint when loaded in a prising, however it is less likely to be square than a butt joint.

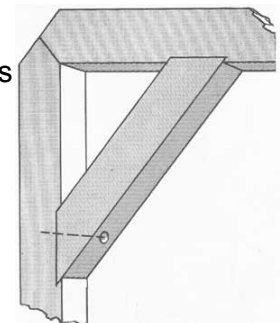


- **Half Jointing:** Half joints are a stronger way of joining two pieces of wood but require significantly more time and care to make. They are easiest to make using the radial arm saw set at half the thickness of the wood and then making lots of cuts in a row to remove



the desired amount.

- **Triangulating:** To add strength to a joint add a short piece of timber cut at 45 degrees at each end then attach it so that it forms a triangle in the corner. As shown in the image on the right:



### Securing a join:

- **Screws:** When securing a joint with screws it is generally best to drill a clearance hole through one of the pieces of wood to be joined, and then the screw clamps the pieces of wood together. Remember if you only put one screw in a joint it is still able to rotate around that screw, so two screws per joint is recommended. Sometimes depending on the wood and screw used you might find that you need to drill a pilot hole to make it easier to screw the joint together without the wood splitting, a table showing the different clearance/pilot hole is below. To determine what screws to use you need to look at the

depth of the wood that you are joining, e.g if you are joining two pieces of 2x2 together then you will want 5x80mm (10 x 3"), the first number is the gauge of the screw (the larger the gauge the thicker hence stronger the screw) the next number is the length. If you are screwing into end-grain (eg. butt joint) you will need extra length in the screw. The ADC Theatre stocks lots of different sizes however these are the slightly cheaper brand and frequently split the wood you are screwing together which weakens the joint. The CUADC has a large case of various sizes of TurboGold (premium brand) screws which have sharper tips and split the wood on fewer occasions, these are not free and shows will be charged by the amount they used. To gain access to this resource e-mail the CUADC Technician ([technician@cuadc.org](mailto:technician@cuadc.org)).

Metric	Imperial	Length Range	Clearance	Pilot
3.5	6	12-40mm (½" - 1 ½")	3.5mm	2mm
4	8	12-70mm (½" - 2 ¾")	4mm	2.5mm
5	10	25-100mm (1" - 4")	5mm	3mm
6	12	30-150mm (1 ¼" - 6")	6mm	4.5mm

- Air Nails: Air nailing is a very good way of attaching facing to a frame it is very quick as air nailer automatically reloads, air nails are also much cheaper than screws. Air nails come in various different lengths (15mm-40mm) the longer the air nail the stronger the bond. air nails should be combined with glue as they are only very small and have limited strength.
- Air Staples: Air staples are similar to air nails, they are a bit stronger and are the best solution if you want to attach facing to the side of a piece of thick sheet wood as screws tend to split the wood.
- Glue: Putting wood glue in joints greatly increases the strength of the joint, so always glue flown (suspended) items of set. Gluing is however an irreversible process so be sure that your set can get to stage before you glue it together. Wood glue is available in small bottles from the ADC but if you are going to need it in very large quantities it is much cheaper from Toolstation (by the train station).
- Duck/Gaffer Tape: If all else fails, or for proof of concept assembly duck tape could be the solution though it could not be considered a structural building material.

## **Basic Construction norms:**

**Flat:** *Materials:* 3x1 frame with 3.6mm ply facing. *Construction:* air nail and glue butt jointed frame to rear of facing, then reinforce corners by air nailing and gluing triangles cut out of the 3.6mm ply on the opposite side to the facing.

**Custom Deck:** *Materials:* 3x2 frame with 18mm ply floor. *Construction:* Screw butt or mitre jointed frame together, then screw the floor to the frame. If you are concerned about strength then you can glue all the joints though this will make the deck much harder to disassemble. To use standard deck legs/scaffolding poles to support the deck you will need to attach an elephant's foot scaff clamp with two M10 x 50mm coach bolts in each corner.

## **More advanced construction techniques:**

**Curved walls/facing:** *Materials:* 18mm Ply Formers, 2x2 frame, with 4mm hardboard facing. *Construction:* cut the 18mm ply to the profile you are trying to generate, you will need at least two and then a further one for every 4ft of height above 4ft, that the curved wall goes to. Space the 18mm ply formers by using a simple 2x2 frame, then screw/air staple the 4mm hardboard along the edges of the 18mm ply.

Be aware that simply constructing the set in the workshop isn't it finished it needs to be transferred to stage via one of three routes:

1. The main Get In door at the top of the straight flight of stairs. This allows long pieces of set to be carried to stage but their section must be able to fit through the single door (2000mm x 760mm)
2. The PS auditorium doors at the top of the straight flight of stairs. This allows you to fit items with sections slightly larger than a single door however they have to be short enough that you can get them round the corner at the top of the stairs and then in through the doors (2100x1100mm is the maximum section that will go through the door).
3. Trap flying through the stage floor. If you have gone all out and want to get a very large set piece to stage you can winch it up to stage through an opening in the stage. This should be chatted through with management beforehand as they need to operate the winch. You can winch by looping a sling around a structural member or by bolting (M5x50mm CSK Bolts + pronged tee nuts is neat and secure) the flying ring plates to the structure, just ensure your set piece only passes 50kg of weight through each ring plate. The traps allow a section 3.5m x 1m to be passed through but it is recommended that you should give yourself a bit more room than that as the winch does swing a little as it raises.