

## Man-made board

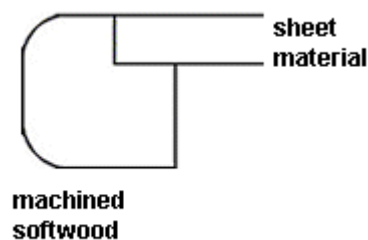
### General

Store any sheet material in dry conditions, stacked flat. Do not place directly on a floor surface (unless a dry, timber floor). Always use sufficient bearers to prevent the panels sagging or distorting. Care should be taken to protect edges. Where the panels are to be stored for a prolonged period, additional bearers should be installed.

Sheet material tends to sag if a load is applied to it (such as books on a bookshelf), the sag does not immediately appear but will gradually develop over time. Where possible, fit a support batten to all sides, This is often fairly easy along the ends and the back of the shelf - the front can be more of a problem.



The picture to the right shows the use of a piece of machined softwood (50x50) along the front edge of a shelf which not only adds an attractive finish, but also provides added stiffening. This shelf is about 1.2m unsupported; for shorter lengths, smaller sized softwood can be used.



Right shows a sectional view of the machined softwood used to support the front of a shelf made from sheet material.

Sheet material is often supplied in large sheets, these can be heavy and awkward to move.

To cut the sheets accurately using a power saw, fix a batten across the sheet to guide the side of the saw's sole plate. Make sure that the batten is not too thin as it may flex sideways as you work along it.

Only cut sheet material which is well supported and stable, remember that having cut through the sheet, there is going to be an offcut; nothing to worry about if it is a 25 mm strip of 3 mm ply (but you will still have to hold it), but it will need full support if it is half a sheet of 32 mm ply. If the offcut is heavy and unsupported, it will twist away before the cut is complete and cause damage to the cut edge, and possible damage to the saw/ injury to the operator. Always take the required safety precautions.

## Plywood

Plywood is probably the most widely available manufactured board material. It is made by bonding together a number of thin veneers of softwood or hardwood - or a combination of each. There is always an odd number of veneers and the direction of the grain runs alternately to give the material strength; the more veneers used, the stronger the plywood. Both the type of glue and veneers determine the suitability of a sheet for a particular application. The finish quality of plywood varies enormously, some have attractive grains while others can have a large number of knots.



- **Exterior grade plywood (WBP - Weather and Boil Proof)** is specially made using a water-resistant adhesive to withstand a certain amount of moisture and can be used for outdoor constructions - sheds etc. and is sometimes used as a cladding material, particularly for insert panels under windows. WBP does require additional protection (paint or varnish) to protect the outer veneer.
- **Internal plywood** is of a similar quality as Exterior grade but it does not use water resistant adhesive. It can be used for wall panelling, flooring and furniture.
- **Shuttering Ply** is used in the construction industry for making shuttering boxes for containing concrete while it goes off. Although water resistance to a degree, the sides of this material are not finished with a decorative veneer and is generally not suitable for use where the a quality finish is required.

**Marine Plywood** is made with waterproof adhesive so that it will stand immersion in water, the veneers themselves will not last forever under water so the material should still be finished with paint or varnish.

Plywood is normally available in 2440 x 1220 sheets (or subdivisions) and in thicknesses from 3 to 35 mm.

### Working with plywood

If the sheets are to be used in a centrally heated room, store them in similar conditions before use so that the moisture content of the sheets will stabilise before installation - this will avoid shrinkage later.

### Cutting

To avoid damage to the finishing face, cut into the panel from that face - for hand sawing have the face upwards, for power sawing have the face downwards. To reduce the damage, score through the outer veneer on both sides of the sheet using a sharp knife before starting to saw.

Thin sheets (upto 3mm) can be cut using a sharp knife. From 3 to 6mm use a tenon saw. From 6 to 12mm thick, use a fine tooth panel saw. For thicker sheets use a coarse tooth panel saw.

Power saws can be used with thicker material but are more likely to damage the outer skin where the saw cuts away from the material.

### Fixing

Plywood may be fixed in place with adhesive and screws or nails.

Generally only small screws grip well in thick plywood itself but even then they will not stand up to repeated changes in force. When fitting hinges to any thickness, use bolts with large washers and nut to 'squeeze' the sheet. It is not practical to screw or nail into the edge of plywood.

Where a corner joint is required, fit a softwood batten in the corner so than both sheets of ply can be fixed to it.

For thin material, always fix plywood to a pre-made frame, use glue and panel pins (on about a 200mm pitch), use a punch to knock the head of the pins below the surface. The frame should support all edges of each plywood sheet and at about 400mm centres (for 6mm ply), 600mm centres (for 9mm) or 900mm centres for thicker material.

Knocks to the edge of ply can cause damage to all the veneers which is hard to rectify, so fit a thin strip of softwood along the finished edge or put a rebate in the frame so that the edge of the plywood can be recessed. This will also improve the appearance as the edge of plywood is not very attractive.

When gluing plywood, roughen the surface with coarse abrasive paper and brush clean before applying the glue. Spread the glue evenly and apply pressure.

## Finishes

Plywood which is supplied with a decorative veneer can be varnished or painted but to get a really smooth surface will need good preparation as most plywoods are not as smooth as planed timber.

Sheets are also available with pre-printed faces such as mock panelling.

## Chipboard

Chipboard is made by bonding together wood particles with an adhesive under heat and pressure to form a rigid board with a relatively smooth surface.



Chipboard is available in a number of densities; normal, medium and high-density. Normal density is fairly soft and 'flaky', high-density is very solid and hard (often used for worktops and fire doors) - medium density is somewhere in between.

There are exterior grades of chipboard available but most are only suitable for internal use as all but high-density tend to soak up water like a sponge. Once water logged, chipboard tends to swell and breakdown.

Veneered Chipboard is widely used for self-assembly furniture, work surfaces, wall linings and partitions. High-density chipboard is often used as



a basis for the carcasses of kitchen furniture, worktops, and flooring - this is hardwearing, rigid and heavy.

Other grades available are standard, flame-retardant, flooring, and moisture-resistant.

Chipboard is normally available in 2440 x 1220 sheets (or subdivisions), finished veneered sheets are available in smaller sheets so that the four decorated edges do not need to be cut. Thicknesses range from 12 to 25 mm.

Flooring grade chipboard is marked 'flooring' and no other should be used. It is normally available in 2440 x 1200 and 610mm sheets and in 18 and 22mm thicknesses with tongued and grooved edges for easy laying and fixing. Before using flooring grade material check it is suitable for your floor joist spacing.

### Working with chipboard

Apart from high density chipboard, the finish after cutting is generally poor. As with plywood, veneered chipboard should be cut with the saw blade going into the finish face to prevent the finish veneer chipping. To reduce the amount of damage when cutting chipboard, apply a strip of masking tape along the line of the cut and cut through the tape.

A panel, circular or jig saw can be used.

### Fixing

Nails, pins and screws may be used on normal chipboard, but they should always be fixed through the chipboard and into a support. If you pin, nail or screw into chipboard, the fixings may pull out easily. With high density chipboard nails, screws and fixing can be used. The screw-holding power is improved if double-threaded or chipboard screws are used. Follow the manufacturer's instructions for fixing special purpose boards.

Any woodworking adhesive may be used with chipboard although when it does fail, normally the outer 'chips' separate from the rest of the board. Do not rely on gluing only to support heavy weight.

### Finishing

Generally only laminate chipboard will give a satisfactory finish although laminate or self-adhesive decorative film can be used.

Edging (normally self adhesive) strip is available to add laminate type finish to sawn edges of pre-laminated chipboard.

Ordinary chipboard is fairly unattractive on its own but if you want to paint it, use oil based paints - using water based paints can cause chipboard to swell.

## Blockboard

Blockboard is composed of a core of softwood strips (up to about 25mm wide) placed edge to edge and sandwiched between veneers of hardwood, the 'sandwich' is then bonded under high pressure.



An interior grade adhesive is normally used, so blockboard is not suitable for use out of doors.

When using blockboard for such items as a door or a long table, make sure the core runs lengthways to give maximum strength. Blockboard can be used for shelves, doors, panelling and partitions.

Blockboard is normally available in 2440 x 1220 sheets (or subdivisions), thicknesses tend to be limited to around 30mm.

## Working with blockboard

### Fixing

Providing that screws or nails miss the joints of the inner strips and enter the strips in a sound position, they will give good fixings - but it is a bit of a gamble as you cannot see where the fixing is going.

### Finishing

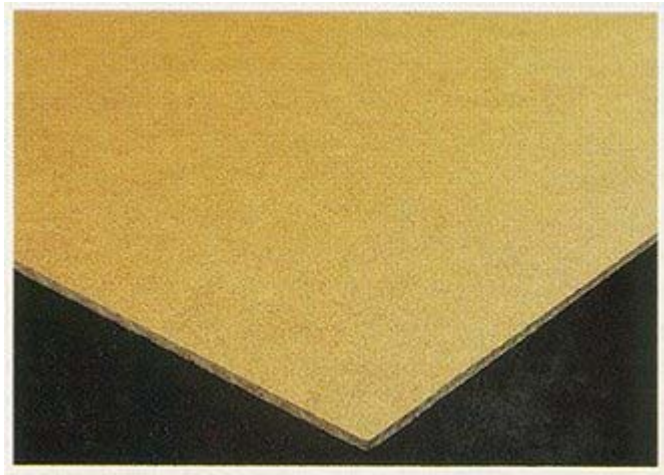
The edges of blockboard do not clean up well and are not very attractive, so cover exposed edges with a decorative strip of softwood or fill and paint them.

The surfaces of standard boards can be painted, while pre-finished boards are available with a variety of applied surfaces such as decorative wood veneers and plastic laminate facings.

Blockboard has a good resistance to warping if both sides are left natural or painted/papered. If only one side is finished, then surface tensions build up which will cause the sheet into a bend.

## Hardboard

Hardboard is a compressed, composite board. Fibre residuals are saturated in a wet process and then compressed to a sheet. A fine fibre overlay is applied (normally to one side) to provide smooth face.



Three basic types are available - standard, medium and oil-tempered. A number of specially finished boards are available for specific purposes.

- Standard  
With a smooth surface on one side and a mesh texture on the other, this can be used for wall and ceiling panelling, floors, door panels, built-in cupboards and fitments etc.
- Medium  
This is less dense than standard hardboard but it is thicker and so more rigid. There are two types: LM (low density) which will take drawing pins and can be used for pin boards and notice boards, and HM (high density) which is suitable for wall and ceiling lining, partitions.
- Tempered Treated  
This is usually treated with oil to give extra strength and water resistance, it is particularly suitable for exterior use.



As well as being supplied in flat sheet form, hardboard is also available with various designs of perforations (to act as peg board or decorative grills) and with 3D decorative designs on one face (usually ridges or similar repeat patterns).

## Working with hardboard

When handling hardboard, take care not to damage the surface of the finish face. If a full sheet twists it can tear across the whole width.

## Conditioning

To prevent sheets buckling due to a change in moisture content, manufacturers recommend they should be conditioned before use. There are two ways of doing this.

- For standard and LM (low density) type medium and tempered boards, scrub the backs with water, using 1 litre to every 2440 x 1220mm sheet. Then stack the sheets flat, back to back, for 24-48 hours (48-72 hours for tempered boards).
- For HM (high-density) type, medium boards and all boards to be used in centrally heated surroundings, stack the sheets on edge in the room where they are to be used, separating them with wood off cuts to allow the air to circulate. Leave HM medium boards for 48 hours and other boards for 72 hours before using them.

Use a fine tooth saw and cut into the face of the board, supporting it on both sides of the cutting line. Pre-decorated and plastic-covered boards should first be scored along the cutting line using a sharp knife and straightedge to prevent the edges chipping.

## Fixing

Hardboard may be fixed by screws, hardboard pins, nails or adhesives; follow the manufacturer's recommendations relating to the particular type of board and its use. The heads of hardboard pins are designed so that they 'disappear' into the surface after they have been hammered home.

You can use general purpose impact adhesive (for instant fixing) and woodworking PVA or synthetic resin-based ones - where possible, pin or clamp the work piece while the glue is setting. Generally the glue only bonds to the top surface of hardboard and if a joint fails, it is generally not the glue but the top surface of the board which separates from the underlying board.

## Finishes



Knocks to the edge of hardboard will cause damage, so fit a thin strip of softwood along the finished edge or put a rebate in the support frame so that the hardboard can be recessed.

Hardboard which is not already primed should be treated with special hardboard primer/ sealer before being painted or papered. Diluted emulsion paint (one part of water to four of paint) or aluminium paint may be used as a primer unless the surface is to be papered. Wood primer should not be used.

Hardboard is normally available in 2440 x 1220 sheets (or subdivisions) and in thicknesses from 2.4 to 13 mm.

### **MDF (Medium Density Fibreboard)**

MDF is a type of hardboard which is made from wood fibres glued under heat and pressure. MDF has many qualities that make it an ideal alternative to plywood or chipboard. It is dense, flat, stiff, has no knots and is easily machined. Its fine particles provide a material without a recognisable "grain". Unlike plywood and blockboard, MDF contains no internal voids, and will produce better edges providing that it is correctly machined.



But use MDF with care - it is manufactured using urea-formaldehyde resin which maybe released in low concentrations over a long period of time. Formaldehyde can cause temporary eye and respiratory irritation, it can also aggravate respiratory conditions or allergies in some people. Proper ventilation and precautions during working and use will reduce the risk of such problems. Some people have been reported as being affected by just a piece of MDF in a room.

### **Working with MDF**

Dust is a major hazard when working with MDF. The large amounts of dust generated by cutting and machining requires the use of proper breathing and eye protection. As a minimum, always use a dust mask while there is dust in the air, not just while actually cutting. A professional style respirator is preferable. Goggles should always be worn while using tools on MDF.

MDF can be cut in the same manner as a fine-grained hardwood although as it does not have a grain, it can be successfully sawn in any direction. MDF can also be machined, drilled and tapped.

Due to its high glue content, steel cutting tools will dull very quickly; the use of carbide tools is preferred.

Being without a grain, cutting or machining MDF will result in a very smooth edge providing that the tools are sharp and used correctly.

## Fixing

Screws and nails can be used to fix MDF, however with these fixings, there is a risk of the MDF splitting if care is not taken. The risk of splitting depends upon the thickness of material, generally fixings should not be less than 25mm from the edge.

When using nails, drive them in at right angle to the surface, this will avoid bending and reduce the chances of splitting. Use ring-shank nails to ensure a good grip.

With screws, always use pilot holes - about 85 % to 90 % of the root diameter of the screw being used and at least as deep as the screw. Straight sheet metal screws with constant size shank give best results, avoid using tapered wood screws.

Because MDF can be milled to just about any profile, many of the traditional woodworking joints can be used as can dowels.

MDF can be glued using gap-filling or PVA glues. Epoxy and hot melt glues are also suitable. The edges of pieces of MDF can be glued to make larger sheets.

## Finishes

As mentioned previously, MDF is typically made using urea-formaldehyde resin which will be gradually released into the atmosphere wherever MDF is used. While this will not affect most people, some people are sensitive to formaldehyde emissions so precautions must be taken. Where possible, use low formaldehyde or formaldehyde-free MDF, or consider methods of controlling these emissions through proper finishing.

Where a finish is applied, it should be applied to ALL exposed surfaces, even those not immediately visible. Finishes that work best at controlling formaldehyde emissions are solid surfaces such as

laminates, vinyl covering, and finished wood veneers. Oil based paints and varnishes can be used. Less effective at controlling emissions are simple wax and oil coatings.

### Stirling Board

Sterling board is a wood-based panel manufactured from softwood strands compressed and bonded together with exterior grade, water resistant resins. It is readily identified by the random pattern of flattened, softwood strands which make up the surface.



It can be used in place of other sheet materials but due to the surface finish, it is generally restricted to areas where appearance does not matter. Tongue and Grooved is also available for use on flat roof decking and flooring applications.

### Working with Stirling Board

Stirling Board can be sawn using either a hand or power saw. No matter how carefully it is cut, the edge will tend to 'lift' on the reverse side. Always make all cuts of a sheet from the same side, then all of the delamination will be on one side.

### Fixing

When fixing with nails, use ring shank nails to increase the grip. When using screws, there is generally no need to countersink the holes, as the screw head will compress the board as it is tightened.

Where Stirling board is to be used for roofing:

1. All edges should be supported on joists or other support.
2. Panel edges should bear approx. 20mm onto joists.
3. Nailing should be at least 10mm from the panel edges.
4. Panels should be fixed using approx. 3mm ring shank nails or screws whose length are 2.5 times the thickness of the panel.

### Finishes

The surface of the ordinary quality is often considered unsuitable for a finished surface, the strands of wood often lift slightly and, if pulled, will 'run'. The edge of the panels can become 'flaky' and are easily damaged by careless handling and knocks. This does not matter too much where appearance is not important or where a physical covering (e.g. roofing felt) is to be fixed to it.

Stirling board can be painted. Where a fine finish is required, factory sanded panels are available. With unsanded panels, the surfaces can be wire brushed to remove any loose wafers and resin deposits. Priming and top coating with oil based timber paint can give a good, although not perfect, finish. Water-based products should be avoided as they may cause some swelling of the surface wafers.

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