



PHOTOGRAPHS BY MARC FISH

# Three steps to free-form laminating

Unlock your creativity with Marc Fish's 3 step guide to laminating

## Step 1: Choose your lamina

### Flexibly

This material is available in a variety of widths allowing almost infinite final thickness combinations. It has a soft external veneer with an open grain. It is quite susceptible to moisture and can change shape after laminating. Cross veneering the surface during or after forming will help to avoid the coarse grain showing through your top surface.

### Skin ply

Skin ply or Aeroply can be used as a substrate but it is expensive and does not bend well when many layers are used. Its surface is smooth and comes in very thin thicknesses, 1-1.5mm. Ideal for use over flexibly forms to add rigidity to the structure.

### MDF

For economy you can't beat 2mm thick MDF, although it still suffers

from being very stiff when multiple layers are used. Unlike flexibly it is less susceptible to moisture after laminating and therefore very stable. Weight might be a consideration when using this.

### Solid timber lamina

Cut on the bandsaw and then planed by hand or through the planer/thicknesser, lamina around 2mm-thick is ideal. Take care when selecting timber and adjust the thickness as all species have different bend characteristics. Unless the grain is very straight, there's a risk of them disintegrating in the thicknesser. A speed sander will give better results.

### Knife cut veneer

This is a great lamina, but you'll find that it is the most expensive material to use. It enables you to have consecutive leaves, which is ideal if the edge of the piece is on display, but take care with glue lines showing on the joins.



2mm-thick MDF works well; it is cheap and isn't susceptible to moisture

## Step 2: Choose your glue

Through trial and error I have identified two main glues that deliver reliable results: urea-formaldehyde and epoxy resin. I think it's worth mentioning that PVA and aliphatic resins are not really up to the job. Choose your glue carefully and where possible, match the colour of cured glue to the colour of the wood. Having experimented considerably to change the colour of cured glue I have discovered that a contrasting glue line can give an interesting effect.

### Urea-formaldehyde

This is a two-part product, with water being mixed with a powder to form a glue with a long open time. Its need to be combined with water is a downside for two reasons – a comparatively large water content in the mixture will expand veneer or substrates and, as a result, shrinkage can occur on curing. Laminated components can suffer with more spring back when released from the mould. There are UF glues that do not mix with water although still a liquid and powder combination. They are easier to mix, stronger, and

do not expand veneer. You can tint UF glue by mixing small quantities of pigment powders that almost perfectly match the glue colour to your wood choice. This is great for loosing the lines in laminating.

### Epoxy resin

This glue is very expensive pound-for-pound, but worth it. It is particularly good for laminating, as there is virtually no spring back after it has set. If a curve has to be accurate, this is the best choice. It can be tinted using different colours; however, the range is somewhat limited compared with UF glues.

Use a shallow metal tray to mix it in. This stops the glue curing too quickly by dissipating the heat. If your glue-up is complicated and you could do with more time, try putting the tray in the fridge or freezer until required. We have made a makeshift oven that heats our vacuum bag to 40°. This decreases curing time considerably: 20° is eight hours, 30° is half at four hours and 40° is half again at two hours.



You can tint both urea-formaldehyde and epoxy glues by mixing small quantities of pigment powders



Pumps like this one made by West System can be used to ensure the right amount of resin and hardener are dispensed simultaneously

## Step 3: Choose your method



Male and female former laminating is squeezing the lamination between a male and female former made of stacked MDF



A ratchet strap can be used to tighten up the laminates



Here I am using our homemade vacuum bag in the production of my 'Nautilus' table

Your method of laminating is somewhat governed by the equipment available to you. Some shapes work better with a male and female former than a vacuum bag.

### Male and female formers

Male and female former laminating is probably the easiest to use if kit is limited, although a number of clamps may be needed. The process is basically squeezing the lamination between a male and female former usually made of stacked MDF. It produces, if done accurately, a good laminate with thin, barely-visible glue lines.

### Male and clamps

Male and clamps is quicker because only one former is required. The laminates are either clamped with a

spacer usually made of MDF and 'G' or 'F' clamps. A ratchet or band clamp can also be used if the shape permits. This rarely produces a lamination as good as those created using male and female formers, but sometimes it is the only answer.

### Vacuum pressing

Vacuum pressing is my favourite method. A vacuum is drawn out of a clear bag by a vacuum pump, the result is atmospheric pressure holding down your lamination. Vacuum bags are available in sizes 1,220 x 1,220mm up-to custom made bags. My biggest bag is 4,000 x 5,000mm, which is used for veneering. If you have space and money to invest then a dedicated bench membrane press might be worth considering. *F&C*