

# ⇒ Steam Laminating

## Using the TEP Steam Chest

The history of steam bending wood is a rich one with sound examples of pioneering design and manufacturing from the mid 1850's when Michael Thonet was considered as the first representative of a new type of furniture, construction. His technique was truly revolutionary: machine-formed rods of laminated wood and cane were curved and bent under steam pressure, using strips of metal to hold the stems and bend the wood beyond its natural elasticity without breaking. His forms varied from the simple to the highly decorative, setting a standard that forever changed the furniture industry. Alvar Aalto and Marcel Breuer in the 1920's followed that tradition with modernist, functional furniture designs in bentwood that are still popular today.

Early boat and ship builders would build the hull planking from 'green' timber knowing that with high moisture content the timber had great flexibility. Traditional boat builders still use steaming of timber as a fundamental process today.



⇒ TEP Steam Chest – stock code ST1 001



teaching resources

Famous bentwood chair designed by Michael Thonet ⇒



Modernist bentwood furniture still popular today ✓



⇒ Traditional boat builders planking the hull

### Steam Chest

In response to the renaissance of commercial interest in wood forming, TEP has produced the first small scale steam chest capable of taking lengths of timber up to 550mm in length. Steam to the chest is supplied by a proprietary boiler similar to the sort used by DIY'ers for wallpaper stripping.

The steam chest comes complete with it's own boiler and high temperature connecting hose. It can be stored easily and given that the condensing steam is collecting in the chest, it should be placed on a suitable 'drip' catching tray rather than directly on a bench. Ordinary tap water is used in the steamer. It is not a bad idea to check the water level regularly and top up if necessary, perhaps every 30 minutes or so. The unit is thermally protected so there are no real problems if it does run dry other than slowing down the progress in class.

Steam is continuously fed into one end of the unit at low pressure. Any timber inside, depending on the thickness of the veneers used then softens. It becomes pliable enough to bend into tight curvatures either free-form or in moulds. This process in many ways creates and supports a near 'rapid prototyping' and manufacturing method as once the initial moulds are designed and cut, moulding and shaping can take place.

For schools and departments with a long tradition and expertise in wood based technology work and for departments requiring a low cost alternative to machined products the TEP Steam Chest is a serious option. Its relatively small size means it will fit into a 'desktop' making strategy easily.

The timescale from the ideas stage through to cutting simple formers to moulding is so short that lots of ideas and designs can be explored in just a few lessons.



## Veneers

Several pupils can have their work 'soaking' in the steam chest at any one time, making the management of whole class work on steam laminating easier. Beech and Ash are ideal veneers to use as due to their grain and compliance once steamed they form readily. In fact all hard and softwoods exhibit different qualities for steaming and finished appearance. It is worth experimenting with what is available in the department first. The different striations and colours of different timbers mean that some interesting visual effects are possible when laminating different woods together.

We might consider that constructional veneers purchased commercially are the appropriate materials but in fact 1.5mm to 3mm thick veneers are relatively easy to prepare from larger baulks of timber in a preparation area in school using a decent TCT blade and accurately positioned riving knife. The sawn finish makes the moulded veneers 'take' more readily when glued too.

Pre-forming the laminates without glue is a useful strategy as pupils can go back to the work the following lesson or day and unclamp and remove the moulded veneers from the mould. The benefit of this is that using PVA water based glues is a viable and friendlier alternative to using expensive resin glues. Glued joints on steamed 'wet' laminates will not always be successful because the fibres and cell structure of the wood is modified by steaming and can affect the glued joint strength. Trying to glue wet veneers with water based adhesives is a non-starter as the trapped moisture 'thins' and degrades the glue.



Clamping Blocks used to hold and bend the veneers in place.

## Formers and Moulds

Highly curved work like the bangles (illustrated on page 8) is best achieved by pulling the veneers around a suitable former using webbing and clamping blocks attached as you can see in this photo and holding the blocks ideally in a vice or hand clamp.

Where less strain is placed on the veneers, two mould halves can be simply pulled together in a wood vice forcing the veneers into the two halves.

Once clamped in place the laminated veneers should ideally be left 24 hours or more until they have cooled and dried sufficiently, again the optimum time will depend on the number of laminates and the thickness of the veneer used.

Formed Bangle



Various moulds each one producing a different curve



A simple Salad Spoon mould



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# ➔ Steam Laminating

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## Glueing

Glueing up veneers requires careful rather than excessive use of glue and careful re-clamping with scraps of newspaper to prevent the work adhering itself to the formers and moulds. Wet wood will draw ink stain from the newspaper and should be allowed for. Further shaping individual laminates prior to glueing means a wide range of designs are possible. Pupils can easily design and make simple formers and moulds and take greater ownership of the whole process.



➔ Stylish Trinket Box



➔ Fashion Bangles



➔ Novelty Coat Hook

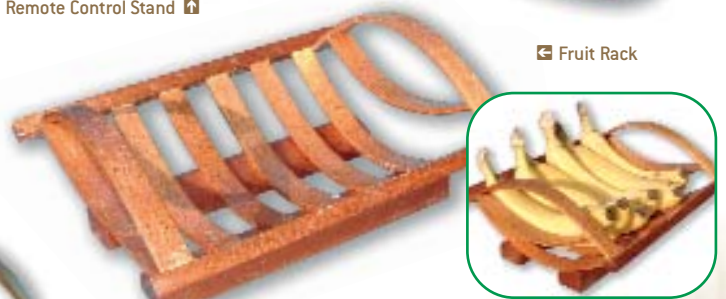


Remote Control Stand ➔

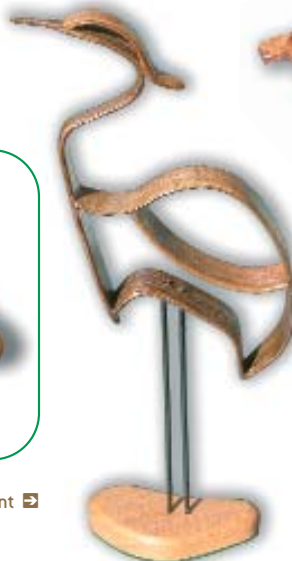
➔ Remote Control Holder



➔ Fruit Rack



Beautiful Bird Ornament ➔



Steaming and laminating is a delightful and engaging process that can add a really new dimension to resistant materials teaching for a little investment with big results.

➔ TEP are pleased to thank Ian Davies formerly from Holywell High School for help and assistance in preparing this article.