

TOOLS AND TECHNIQUES 1600-1840

by Dr Clive Edwards

Fundamental to the understanding of furniture is an interest in the continuities and changes in the use of tools, and the application of techniques to furniture making. The development of tools over a long period established 'type-forms' that often remain the basis of hand tools (and in many cases powered versions) that are used today. Although most tools could be purchased from tool suppliers, there has been, and still is, a tradition of furniture-makers devising and making their own versions of tools for their own use. These included for example, bevells, braces, clamps, scratch stocks, moulding boxes, saw frames, gauges, lathes, planes and squares. This article briefly traces the development of the various processes and associated tools, from cutting out and shaping, construction and assembly and decoration in the period 1600-1840.



Cutting and shaping

The processes of cutting and shaping timber to the sizes and shapes required for individual pieces are of course many and varied, but they do follow a simple path. Tools such as the mitre and try squares used for setting out are part of the preparation. Home-made wooden versions of these tools were common. The use of marking gauges facilitated preparation. These were marking tools that usually used a fixed pin, a fence and a stem. They were first used in the late sixteenth century with an unfixed fence. By the eighteenth century, the fence was held in place by a wedge (still favoured for home made versions). By the early nineteenth century the thumb screw fixing occurs and has become standard.

Once marked out, the timber needed to be cut to shape. Straightforward cutting to length used an appropriate saw, but if cutting curves, a bow saw was employed. This frame saw (which could vary in size) tensioned its blade by using a twisted cord and toggle stick. The blade is fixed so it can be turned to any angle in relation to the frame. Once used to cut veneers with a very fine saw blade they are now usually associated with cutting curved pieces. They may be made by a craftsman for their own use or factory bought.

Once the shapes had been roughly cut out the pieces were planed smooth.

Planes operate as shaping tools, fitting tools and finishing tools. The use of plane for shaping diminished over the period as sawn timber of a variety of thicknesses became available. For fitting purposes, the trying or jointing plane was most common as they finished the edges of boards to be butted together. The rebate plane was used for smaller work such as cutting rebates. These planes, usually with a wooden stock, were often made by the furniture craftsmen. Another example might be the 'Old woman's tooth', a term for a router plane that removes housing waste from grooved work or deepening flat sections in carving. These again may be home made.

Mechanised saws, and planing machines had been developed by simply trying to replicate the reciprocating human action and in 1776, the first machine was invented by Leonard Hatton. Bentham improved upon this patent, first with a reciprocating plane and then with one based on the rotary principle. Later models, all had horizontal cutter blocks in place of the vertical spindle. All subsequent planing machines were then based on the rotary knife principle.

The introduction of band-saws originated with an invention by William Newberry in 1808. However, it was not until the success of a Msr. Perin of Paris, who produced a band-saw blade that lasted reasonably well, that the machine was viable and operated satisfactorily. The fretsaw, jig, or scroll saw, developed from the simple marquetry cutter's saw during the nineteenth century, was one of the simplest and most useful tools for the cabinetmaker. Often treadle-operated with a single blade, it could cut out intricate shapes, and satisfy the demand for the most elaborate decoration.

Turning was also an important part of the furniture makers' repertoire and was often carried out by a specialist. Until the early seventeenth century, turnings were produced on dead-centre lathes, driven by treadle or wheel or on the pole lathe. For much of the century, knob and ring turning and bobbin turning were repeated but towards the end of the century, there were some contrivances introduced that allowed a twist or spiral to be put in on the lathe rather than by using hand-rasping to achieve the effect.



As changes in the economics of the industry occurred, developments in powered machinery began that had an impact on both preparing and assembling. In 1805, Brunel took out a patent for large circular saws particularly associated with veneer-cutting and in 1807 developed the saw further in association with block-making machinery. However, one of the most important developments was not on this scale at all. The small circular saw of up to seven inches diameter, often operated by a treadle, was one of the keys to the success of small-scale furniture makers. This saw enabled makers of cheap furniture to square up, mitre and rabbet cleanly, accurately, and quickly, allowing the frames of cheap carcass work to be simply rebated and nailed. This method of rebating, using a circular saw, was particularly useful for drawer-making which was traditionally a place for using dovetail joints. The advantage of this cheap method was that a dozen drawers could be made in the time it took to dovetail joint just one.

Construction and assembly



Fundamental changes in construction occurred during the seventeenth century with the use of veneers, dovetail jointing and improved drawer construction. However, distinctions between joinery and cabinet-making can be rather arbitrary as cabinet-makers used mortise and tenon joints for example, and joiners used dovetails, but the refinement was really in the change from working with solid wood, using joinery techniques, to cabinet-making using the skills of fine jointing, veneering and flush-carcass making.

As has been indicated, cabinet-making was based on the application of veneers onto a pre-formed carcass which was hidden beneath the surface. The basic principle of this kind of work is the construction of a rigid carcass, often using dovetail joints, to which a number of other items including doors, drawers and fall-flaps may be fitted. The revival of veneering in association with this method of working meant that less important timbers could be used for the carcass and the expensive exotic timbers could be used sparingly for surface decoration. Once the basic cabinet-making methods were established various developments and changes were made as tastes and demand required.

One process of construction that continued without question was the use of plies and laminates of wood for the construction

of chair splats and fretted galleries. The use of plies in mid-eighteenth century work was merely a solution to a problem; it was not seen as a momentous technical advance. It was evidently common practice for larger plies to be used as well.

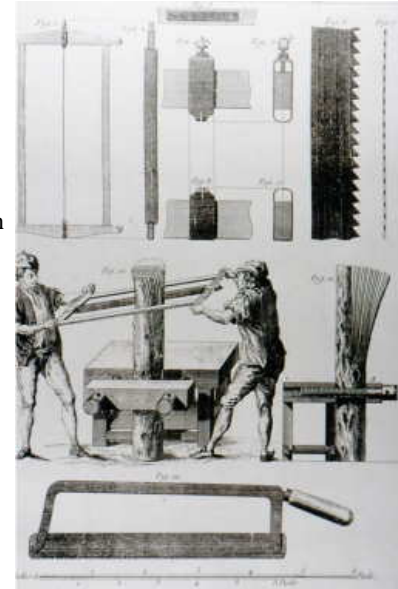
Sheraton describes the construction of his Universal table by saying '...the panels are sometimes glued up in three thicknesses, the middle piece being laid with the grain across, and the other two lengthways of the panel to prevent it warping.' Developments that are more deliberate occurred in the work of Chapius in Belgium, and Samuel Gragg in the United States. Both men made chairs with bentwood components but the process was subordinate to the ruling taste in design terms. Tambour doors were introduced from France in the latter part of the century and were used as decorative falls or covers for night tables, pot cupboards and desks.

The mechanisation of the process of joint cutting that traditionally used saws and chisels originated with Bentham and his comprehensive patents of 1791 and 1793, but the methods were not commercially viable until the 1850s. Developments such as the leg moulding boxes used for holding legs while being moulded, fluted or grooved for inlay were pragmatic examples of solutions to practical problems. In this case, the piece to be worked was held in the box with a screw or wedges so that a scratch stock could mark out the work along the axis of the leg.

Decoration

Decoration includes veneering, carving and the use of mouldings and inlays. Veneering, which has a very long history, was the process that distinguished the cabinet maker from the joiner in the later seventeenth century and onward. The basic process of applying veneers to surfaces involves a few simple tools and the requisite materials. There are two traditional methods of hand laying veneers, by the hammer or by the caul. The hammer method was used for simple flat work with pliable and mild veneers. The process involved the warming of both the veneer and the base, followed by the spreading of glue to both surfaces. The veneer was then rubbed down onto the base and the hammer was applied to the surface, thus removing all the air to obtain a good adhesion. The caul method is based on applying heat and pressure to the veneer in relation to the shape, dimension and form of the base. In the eighteenth century, the cauls would be made of sandbags which were especially suitable for round or hollow work; otherwise, they would be especially constructed, often out of pinewood, to fit those pieces to be veneered. The pressure required to bond the two parts might be obtained by go-bars.

By the nineteenth century, these veneering practices which had endured since the seventeenth century were beginning to be inadequate for the larger volume of furniture being made during the nineteenth century. As with machine tools, large manufactories used steam power to heat the cauls which were largely made up from iron boxes with screws and clamps. Shops without steam power used a thick iron plate heated with gas jets in the same way. In contrast, the manual method which involved the prepared panels being put in a press, and then held down by planks and poles which abutted against the beams of the workshop, continued to be used.



As one of the most important decorative elements of furniture throughout many periods and in many locations, furniture carving has ranged from the most elementary scratch marks through to full-scale sculptural work. Carving methods varied widely (see below) so that only simple tools were required for basic jobs e.g. gouges and chisels, whilst more complicated work required a range of other chisel types, rasps, and punches. The specialist tools used included the carver's bench screw, designed to hold wood blocks secure with free access; the carver's clip which when used in pairs secured work on a bench; a wider range of carving chisels (over 1000 variations); a carver's clamp; a selection of chip carving knives; a carver's mallet, a router plane for the flat recessed parts of work; a range of carvers' punches (with a variety of designs on their ends), and the riffler (a double-ended file used for smoothing curved parts).

The use of mouldings is generally decorative but they have a very early origin as most designs were based on prototypes established by classical architecture. Originally, they were cut into solid wood, but with the advent of panelled construction, they could also be applied. The application of decorative mouldings to carcass furniture, ranging from a simple cock bead to a drawer front, through to an elaborate built-up cornice, meant that techniques of producing mouldings changed in relation to prevailing styles. Mouldings were usually applied in two forms. In one case they were built up on a backing of inferior wood; alternatively they were produced as a composite of several simpler moulded shapes, thus offering a large variety of decorative possibilities, relatively simply. Particular developments included wave moulding where a wave-moulding machine was developed. It mechanically produced an undulating reeded band by a process akin to copying a template model. This particular moulding was often executed in ebony or ivory or stained sycamore. Moxon described its operation:

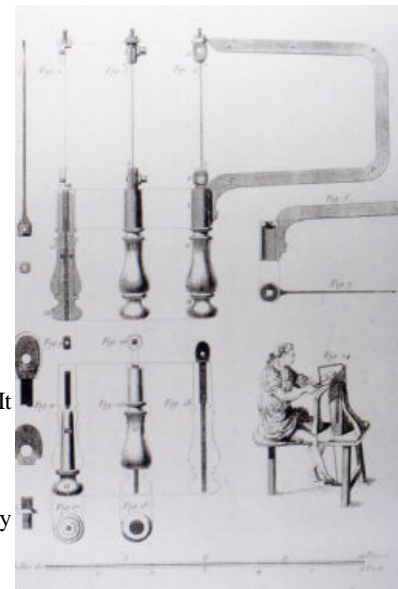
"as the rounds of the rack ride over the round edge of the flat iron, the rack and riglet will mount up the iron, and as the rounds of the waves on the underside of the rack slides off the iron on edge, the rack and riglet will sink and so in progression The riglet will on its upper side receive the form of several waves." (1703, pp. 106-7)

The hand worked moulding tools were initially made by the cabinet-maker himself but as the demand grew, specialist moulding-plane makers set up in business. The plane-maker was usually able to make any profile of cut to a customer's requirements, whilst the home-made scratch stock or standard irons continued to be used for the more simple mouldings. The standardisation of moulding planes occurred around 1770, but this did not mean a limiting of variety. Some American woodworking shops had as many as one hundred and forty-three varieties of moulding plane in their tool collection.

Nevertheless moulding mills were established during the 1840s in England particularly to take advantage of Muir's 1827 patent mechanism and the abundant supplies of Canadian yellow pine that were generally soft to work and free of knots.

Machines that allowed a cabinetmaker to produce the decoration for his own work included the spindle or toupie moulder. It was said that it was particularly useful for Gothic or medieval work 'as more chamfering can be done by it in one hour than could be done by handwork in a day'.

The use of machines in the conversion of raw material and the construction of furniture during the nineteenth century is a story of both important changes and minor developments. The development of machines for preparing and shaping timber. (planers, mortisers, borers, dovetail-cutters and veneer cutters) was the most important change which affected all woodworking industries, including particularly shipbuilding and house building. Machines for processing and shaping parts (band-saws, fretsaws and lathes) were also being used in larger quantities as was the third category of machines, (embossers, moulders, and carving machines), that produced decoration.



The story of furniture making tools is an example of evolution, pragmatic development and eventually, a transition to mechanisation in response to changed demands.

Further Reading:

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