Barefaced cheek

When it comes to making crisp corners the lap joint, and its more complex cousin, the barefaced shoulder joint, can be relied on, says the GW team

Last month we described the nailed butt joint — the most basic method of joining timber at right angles (when sawn across the grain). While this is a useful joint, the butt joint is undeniably crude and not suitable for fine work. One of its weaknesses is the propensity of the two components to slide out of position as the nail finds its way home (the winter growth rings of softwood being tough enough to deflect its course).

Setting a housing — even a shallow one — into one of the components enables them to lap together and be held tightly in place while they are nailed. The lap also lends rigidity to the joint as it restricts movement — at least in one direction. It also increases the surface area of the joint, making glue more effective.

Cutting basic lap joints

The lap joint can easily be cut with a basic tool set. Hold the two components together at right angles and mark the shoulder line for an open housing or measure it off the end. Use a square to emphasise the line with a knife. Alternatively you could use a cutting gauge to mark the shoulder. Mark the depth of the housing along the sides and the end grain using a standard pin marking gauge off the main face.

Saw down the shoulder line with a tenon saw (for small accurate work) or a panel saw. If you find this long shallow cut difficult, cramp a square block of waste wood on the line and run the saw beside it. Chop away the waste by tapping the end grain with a chisel, bevel side down. Straight-grained timber should split away neatly but if any knots or grain irregularities are present a succession of saw cuts should be made to weaken them.

For finer work, chisel the housing a little undersized, then finish it down to the line with a bull-nose plane, working from either side and taking care not to run over the far side where you might splinter the grain. If you don’t have a bull-nose plane, use the same chisel, bevel up. Take light quick strokes across the grain, raising or lowering the handle to adjust the cut.

Tools choice

Here you might finish the housing more precisely using a router. It is possible to cut the entire housing with a router though this is not as easy as it might sound. The router is cutting a lot of end grain and that is its least favourite activity. Don’t even attempt it without a sharp cutter. Secondly, it will make a bit of a frayed mess of the shoulder line — score this line first with a craft knife against a straight edge to obviate this. Rather than set up a fence, the easiest method is to run the router base against a straightedge cramped square across the board and offset by the exact distance between the router base edge and the cutter line. For repetitive work it would be worth making up a jig.

If you are cutting just the occasional set of joints, it may be simpler to saw the shoulder, remove most of the waste with a chisel and clean up the baseline with a hand-held router, bracing your hands on the workpiece to ensure that you don’t slip off into good wood. The fence on the router can be set to eliminate much of this danger, but on the end of the board only half the fence is in contact with the workpiece at any given time, and at either edge, the router is still free to swerve. In addition, only half of the router base is well supported on the workpiece. This is clearly not an operation for beginners!

Alternatively, mount the router in a table and clean up the housing by holding the workpiece face down, sliding it along the table fence.
Advanced methods

The radial-arm saw, wound up from the table, makes light work of waste removal. You can either take a few cuts and break out the waste with a chisel or you can saw the entire housing away slice by slice. The disadvantage of this is that the alternate tooth pattern of the saw blade leaves a ridged cut rather than a flat one, so that the base of the housing remains ripped. It is possible, though not recommended, to move the workpiece from side to side under the blade – held in several positions – thereby smoothing out the ridges. A danger here is the lack of fine control over side-to-side movement and the risk of crashing into the shoulder, though this can be controlled by the use of a stop. It is preferable to take more closely spaced cuts, thereby making a more tightly rippled (flatter) housing. If the housing needs to be smoother, a couple of swipes with a bull nose plane should do it. Too much handwork, however, and you are destroying the point of using such an accurate machine.

For the professional, the only advance on previous methods – apart from a tenoning machine – would be a spindle moulder fitted with a horizontally spinning circular saw blade with which the waste can be sliced away in one perfect action. The same effect could be attempted on a table saw, but the workpiece would need to be slid over the blade on its end grain. For this to be safe, a tall perpendicular fence needs to augment the table fence. Not even this giant saw is amused by cutting end grain; the workshop tends to fill with blue smoke at this point.

Routing the housing will leave possible breakout at the end of the cut. Avoid this by backing up the board with a piece of scrap.

Cupped boards

Instead of housing parallel to a cupped face, machines take a dead flat slice, averaging out any irregularities. To work cupped boards, flattening them as you fit them, you will have to revert to basic methods; mark out a housing parallel to the cupped face and chisel to that slightly curved line. To avoid the major problems:

A. Select timber which is unlikely to cup – well seasoned and quarter-sawn boards.
B. Thickness the timber equally from both sides to maintain an equal moisture equilibrium.
C. Between operations, keep boards weighted flat in the stick to allow good airflow around all faces and avoid uneven drying.
D. Cut the housings straight after planing the boards.
E. When housing with a radial arm saw, place the timber cupped face down. This gives two points of contact with the bench, making it more stable.

Nailing the joint

Mark out the positions of the nails accurately whether or not you use the lost head variety – most fillers are a less than perfect colour match no matter which timber type appears on the label. Angle the nails so as to create the far stronger dovetailing effect. Drill the upper, rebated component so as to minimise the risk of splitting it and to help keep the nail from bending.

You could emphasise this method of jointing by using contrasting dowels rather than nails, a feature that would work particularly well with drawers. Consider using a dark wood such as walnut for the drawer front and the dowels, contrasted with a lighter timber such as maple for the (thinner) sides, or vice versa.

Make sure your router does not tilt when routing open housings like these.

▲ Pic.1 Square the shoulder lines on the lapped piece with knife or pencil then gauge the thickness of the lap from the face side
▲ Pic.2 Hold the timber against a bench hook or dog and saw the shoulder to the waste side of the marked line with a tenon saw
▲ Pic.3 Chop away the waste from the end. Hold the chisel bevel side down to control any tendency for the timber to split downwards
▲ Pic.4 Pare down to the gauged line across the grain with the chisel bevel side up, or use a small shoulder plane
Barefaced housing joint
An improvement on the lap joint is to tongue and groove two corner components together to form a barefaced housing joint. This locates the parts more securely, restricting movement between them even more. Unfortunately, the housing creates a band of short-grained wood and undue pressure put on this – even as little as an overtight tongue – will shear it off. Note that this weakness only occurs in a tongue and groove joint when it is cut across the grain. Cut with the grain, it is a strong, useful and relatively easy way of joining solid timber and sheet materials.

A small tongue fitted into a housing in stable timber will survive with glue alone. If you wish to reinforce it with nails or dowels, do so down into the tongue itself, angling nails into the main body of the tongued board. Nail through the weak short-grain, and you are asking for it to part company.

The cutting of the tongue, by whatever method, is identical to the cutting of the lap joint previously described. The tongue is simply what remains when a housing is made on the end. It is vital, however, that this tongue is not cut oversize. If it has to be forced into the housing, the chances of shearing the short-grain are increased.

When marking out this joint, consider the grain strength. Little is to be lost by making the tongue quite slender – its long-grain strength remains intact. By making it slender, the vulnerable short-grain band is made fatter and much safer. Cut the groove slightly deeper than required by the tongue so that it cannot possibly restrict entry.

Radial arm and table saws are both well suited to cutting housings, though setting the latter is slightly more awkward because the cut is taking place face down where you cannot see it. For grooves wider than the kerf of the blade, the radial arm saw can be set with stops so that repeat components – providing that they are cut to the same length – can be treated equally. The saw’s faceted cut may not present a problem here, as the completed joint is often not visible.

If it is necessary to produce these joints in quantity, it makes sense to choose a more complex – and therefore stronger – pattern and to cut both parts with dedicated router or spindle moulder cutters. The difficulty here is that on running the workpiece past the cutter, the grain on the exit side is likely to tear, leaving a ragged finish. Minimise this by holding a block of similarly sized waste-wood behind the work. Cutters must be sharp. Several light passes work better than one heavy one although the spindle moulder will manage this with ease.

Advanced lock joints

Where to use the joint
Barefaced shoulder joints are often seen on quality door linings and are sometimes used to joint the rear components of drawer boxes, though not for fine work.

How to cut the housing
Mark out the housing as for the lap joint, but with two shoulders. Saw either side and chop the waste out with a chisel, taking care not to exert pressure on the short-grain band – you could leave on an extra horn for protection, removing it after assembly. The floor of the groove can be finished with a plane such as an Old Woman’s Tooth, the original router. If you plane the housing floor flat, check the size of your blades before committing yourself to a particular width.

With an electric router, use a cutter of the groove’s finished size so that both sides are cut in one go. Take a couple of passes, setting the depth stop so that the first pass removes the bulk of the waste and the second skims the floor flat. With troublesome timbers, take a light skimming pass first to sever the surface fibres, or knife the lines first. This saves having to sand loose fibres away and risk rounding over the shoulders. If you are setting up for the housing, you may as well rout the tongue, or at least clean it up in the same way as you cleaned up the previous housing.