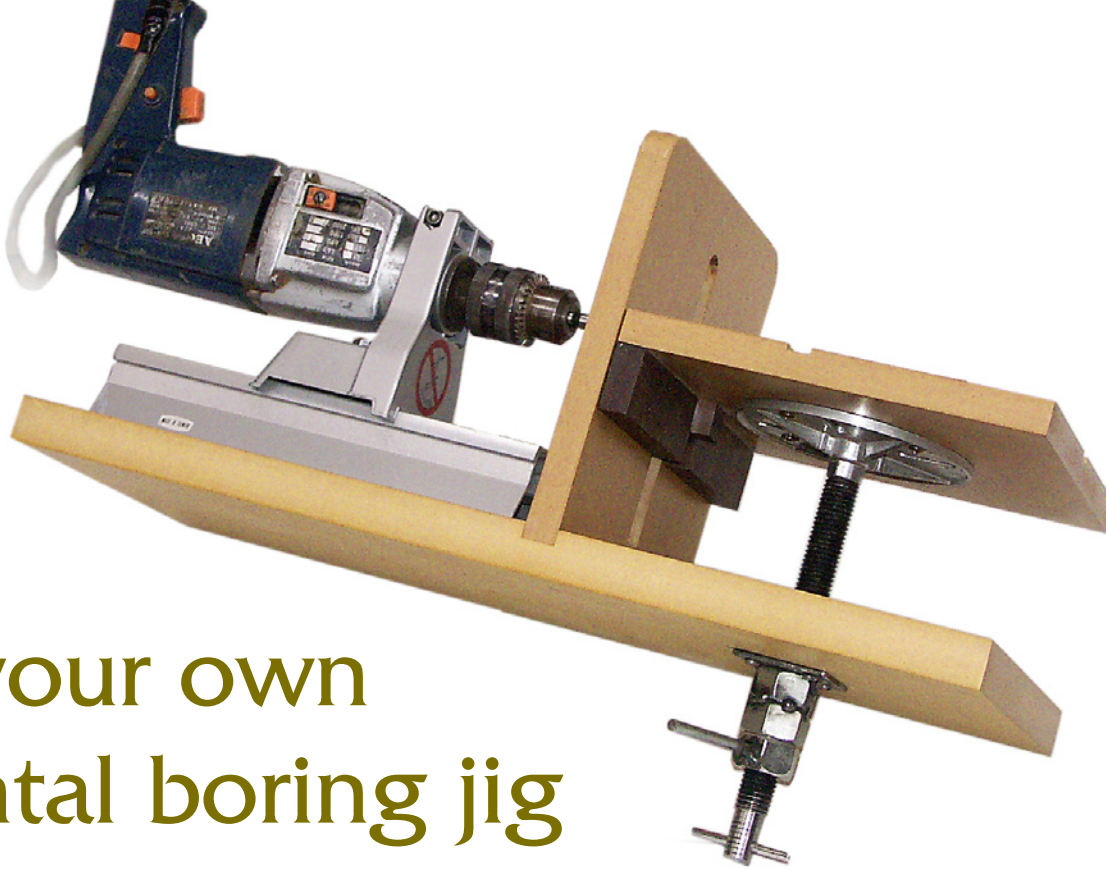


A simple and sturdy shop built device for accurate dowel joinery of fine furniture.

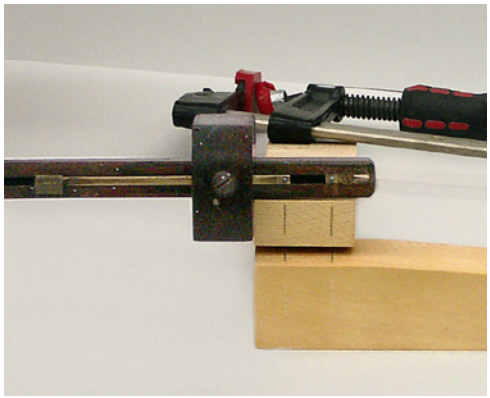
Make your own horizontal boring jig

By Geoff Birtles

Some years ago, when relatively new to fine woodworking I was planning to construct a coffee table out of a protected and expensive wood, "Huon Pine". Huon is Australia's oldest living tree and one of the oldest living organisms on earth. Endemic to Tasmania it is a rich, creamy yellow wood, generally recovered (rather than felled) from areas flooded by Hydro Tasmania schemes and previously heavily cut areas such as the Teepookana State Forest (a World Heritage area) near Strahan in Tasmania.

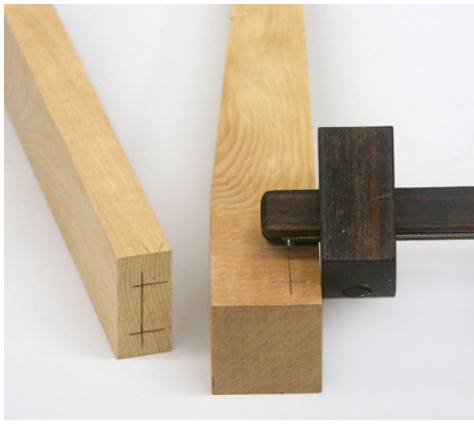
I couldn't afford to make any mistakes as I didn't want to waste wood and the table would be on prominent display. When discussing the difficulties that accurate mortice and tenon joints presented to the recreational wood worker with John David, a professional furniture maker friend in Templestowe he retorted, "Why bother, we hardly ever use them in the shop, we dowel – it's strong, quick and accurate." When I scoffed at this, he promised to prove it.

I was amazed at just how simple and accurate the process turned out to be. Simply cross cut the rails square to overall length, mark, drill and dowel for perfect flush fitting, square joints. The secret was a horizontal borer with a table parallel to the drill bit and importantly, the accurate marking of hole centres.



Pic #1 Cross marking of both dowel centres indexing from top of rails and top of legs.

John used a tenon marking gauge (2 pins) to simultaneously mark two horizontal lines indexing from the top of the table legs and top of the rail-ends (Pic #1) and a single pin marking gauge for a vertical intersecting line, indexing from the outside face of the legs and rails (Pic #2). This ensured dead accurate hole placement (hole centre to hole centre, indexed to the outer side of the work piece ends or faces). The horizontal borer's feed table, together with a 10mm dowelling bit, ensured perfectly placed parallel holes. It was amazingly simple with virtually no finish sanding or scraping required, (I had pre-finished to minimize cross grain sanding on adjacent faces.)



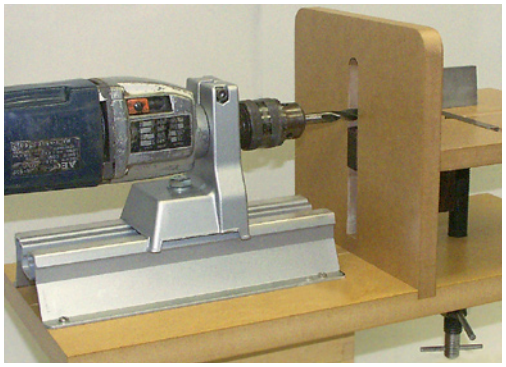
Pic #2 Vertical marking of dowel centres on the inside of a leg, indexing from outside face. Same process for rail alongside.

I just had to have one of these extraordinarily clever devices and immediately started plotting on how to build a home shop version (Main Pic top of page).

Pic #3 Ready for glue -up, outside face of rail flush with outside show face of leg. Top of rail flush with top of leg.

Obviously (with accurate mark up solved, see pic #3), the key to successful drilling of the holes was to be able to feed the work piece square to the drill dowelling bit.

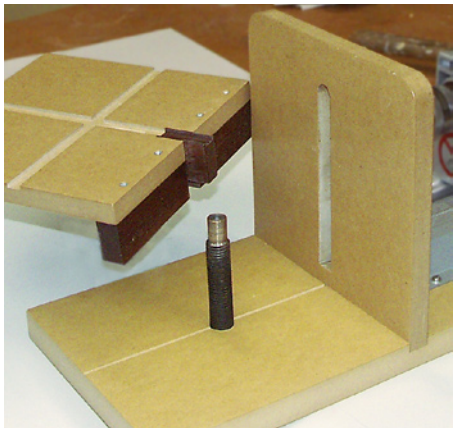
I figured that a drill base with a square fence and vertically adjustable feed table should not be too complex – the difficulty would be to mount the drill horizontal to the base, so that the bit could protrude through the fence dead parallel to the feed table (and square to the fence). None of the work bench drill holders that I could purchase were sufficiently robust. I was almost to the point of making a wooden cradle and collar when I happened across a "handyman" extruded aluminium bench top lathe bed (for portable drills). I suspect it was pretty useless for its intended purpose, but perfect for mine. I cut a 260mm length from the lathe bed on my chop saw, using a metal cutting blade.



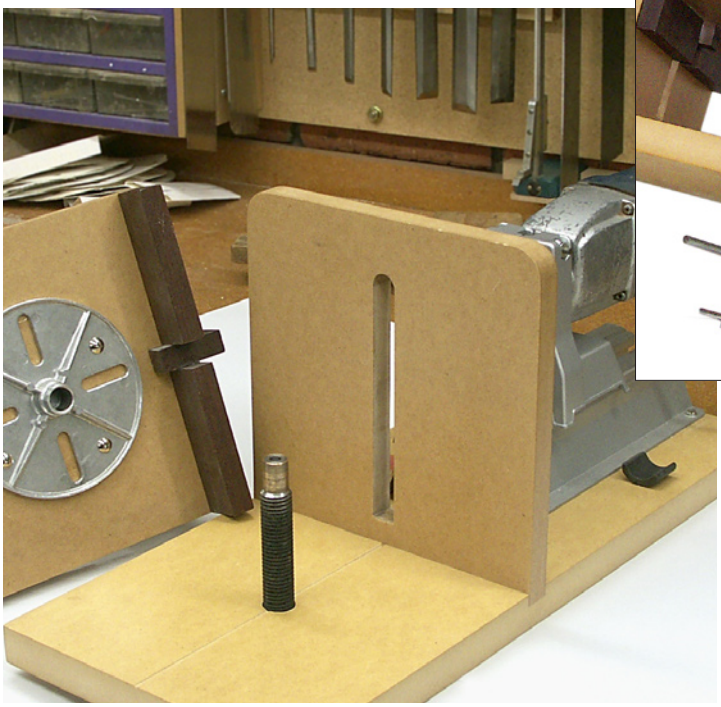
Pic #4 Lathe bed cut-off with drill bracket, sitting astride a scribed jig base centre line. Fixed fence is square to drill. Drill adjusts forward and backward for hole depth adjustment.

I mounted it dead centre, astride a line scribed (on the rip saw) down the middle of a 540 x 220 x 25 mm MDF base. As you can see from pic #4 it provides a strong and accurate mounting for an old power drill (which never thought it would see duty again!). It can also be adjusted fore and aft to set the drilling depth.

The stop fence is another MDF scrap (18mm) with a groove routed vertically down its centre, so that the drill piece can protrude through it from one side and the feed table can index into it (from the opposite side) with a hardwood tongue that slides up and down the groove (Pic #5). The tongue contributes to feed table stability when adjusting its height.

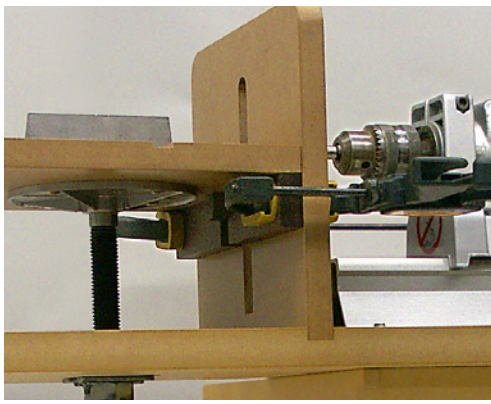


Pic #5 Slotted stop fence and adjustable feed table with return lip and tongue.



Pic #6 Underneath the feed table. The aluminium face plate came with the bench top lathe kit. I bored it out to sit on top of the machined height adjustment rod.
Note everything is aligned along base centre line.

It was important to be able to adjust the feed table in very small increments and lock it square to the fence. Not a problem for a purpose built cast iron construction like a jointer bed but counter productive objectives to this type of workshop construction. I solved it by gluing a hardwood return lip to the front edge of the table (Pics #5 & #6). After adjusting the table for height I simply use two "Ezy Grips" to clamp the lip to the fence (Pic #6).



Pic #7 Adjustable feed table with return lip adjusts up and down stop fence. Tongue sits inside fence slot. Quick action clamps lock feed table.

Pic #8 Feed table height adjustment mechanism with levered locking nut.

The height adjustment mechanism is made of one inch pre-threaded rod with two steel nuts (to minimise slop) welded to a mounting plate. The threaded rod is fed through the mounting plate from underneath the unit's base (Pic #8).

I think I enjoyed building this drilling jig even more than I do using it – because it took two days to design and build, and only takes minutes to use.

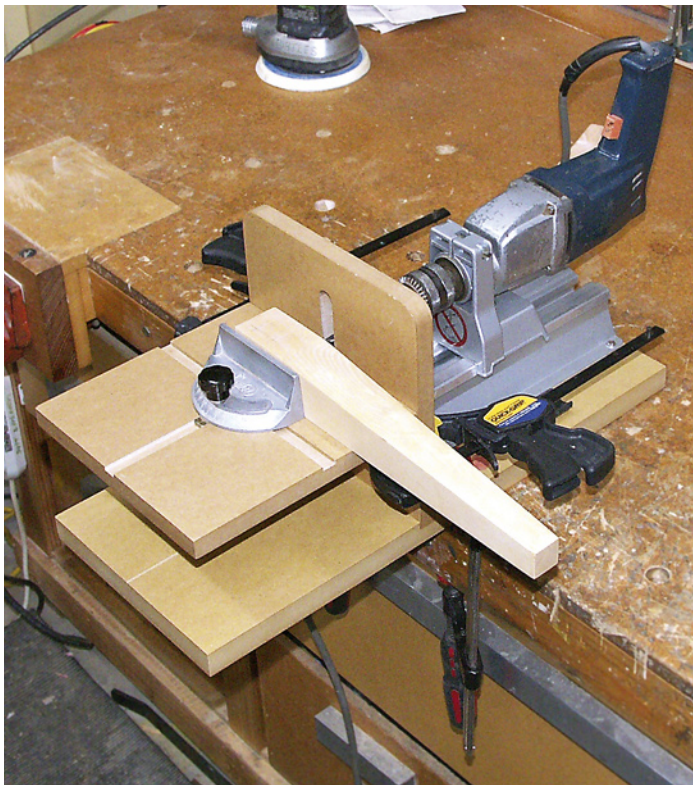
A third nut with a "lever" is used to lock the table height. The lathe bed came with a cast aluminium face plate which I bored to sit on top of the threaded height adjustment rod. The MDF feed table sits on top of this (Pics #3 & 4).

The feed table's return lip was a major breakthrough in solving the problem of a rock steady feed table, but grooving the table for mitre gauge tracks (Pic #2) ensured absolutely accurate drilling of both end and side pieces. (I used one of those cheap mitre gauges that comes with bench top grinding and sanding tools). The gauge also protects fingers!

On finishing the dowelling jig I was immediately inspired to construct a matching end table, this time without assistance.

The results were perfect, and repeatable (Pic #11). Set up time is only minutes. A trial run to check accuracy is an option, rather than a necessity.

The wood cost nothing (all scraps), the threaded rod and nuts less than $15 (a friend did the welding), the lathe bed $45. The 230V drill and mitre gauge were both recovered from the junk box. Design and construction took a weekend. Not bad value for a device that will join four corners of a construction (eight joints) dead accurate, square and flush in minutes. With hours of uncertain mortice and tenoning time saved!



Above Pic #9
Drilling the inside face of a leg. Jig is clamped to front of work bench, feed table's return lip is clamped to jig's fence.

Left Pic #10
Drilling the end of a rail. Feeeding both the rails (Pic #10) and legs (Pic #9) outside face down (ie. index face) on feed table, further assists with accurate mating of work pieces. Note, the mitre gauge ensures square feeding of work pieces.

Below Pic #11
The finished product - all square with perfectly mating faces.

Footnotes:

(1) Many drill holders (for chisel honing) are available and suitable to this task.

(2) This was first written for AWR back in 2004. Since then experience suggests that a small trim router instead of a drill would be a little easier to use with hardwoods. This of course will require fabrication of a rest - more fun! However I'm still using mine as it's described here, unless I'm using my floating tenon jig, which you can read about soon.