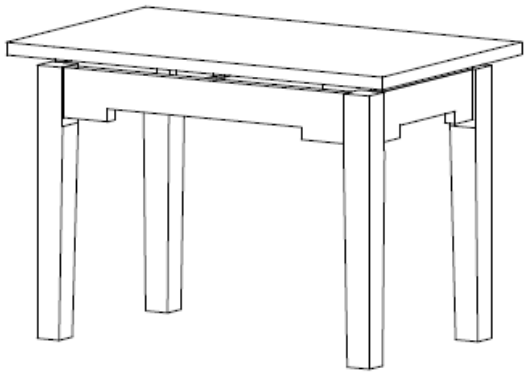
MAHOGANY DISPLAY TABLE
PROJECT JOURNAL

DESIGN PHASE

A small display stand was needed for a very decorative Chinese carved box.



The grain and pore structure of South American mahogany seemed the best wood to complement the wood used in the carved box. Using finish samples, a traditional dark reddish brown finish was chosen.

A couple design strategies for the stand were examined, one reflecting the common design elements of the box and the other incorporating Asian elements. The latter was chosen, and finalized in the accompanying CAD drawing.

LUMBER ACCLIMATIZATION

Because the rough lumber was for sale only a couple miles from the workshop, in similar temperature and humidity conditions, only a couple days of acclimatization was needed after the lumber was on site. When the conditions are more different, a week or more can be required for acclimatization.

ROUGH CUTTING AND SURFACING

As a tree grows, there are stresses that form in the wood. Some trees actually grow in a slight spiral. Changing light conditions, slipping hillsides, and other factors can cause a tree to grow in one direction, then another.

As a result, every board has internal stresses that caused the wood to move (cup, curl, and/or twist) when it was cut from the log. In the full sized board, these stresses have come into equilibrium.

When that board is cut, the stresses in those individual pieces may no longer be in balance. As a dramatic example, when a board is being cut lengthwise, the two parts of the already cut end may move apart, together, one up and one down, et cetera. Therefore boards are cut into slightly oversize pieces before being flattened. The individual pieces likely will develop some additional cup, curl, and or twist as they are freed from the rest of the board.

Surfacing, making the piece flat and straight, also unbalances the stresses in the individual pieces, because wood is not removed equally from both sides. A piece that is cupped, for example, will rock back and forth when the convex side is down. To flatten that side, wood has to be removed only from the middle. To make the other side parallel, wood has to be removed only from the ends.

This uneven removal of wood from the two sides has unbalanced the stresses in the piece. After initial surfacing, the pieces are set aside for a few days to allow for additional cupping, curling, and/or twisting to bring the stresses back into equilibrium.

Each piece is then surfaced a second time. Depending upon the wood species and the amount of cupping, curling, and/or twisting that occurred after the first surfacing, the pieces may again be set aside for a few days and then surfaced a third time.

In this project, the wood species, mahogany, is more stable by its nature. The boards were very flat and straight, so wood removal during initial surfacing was fairly balanced between the two sides. Finally, there was almost no additional curl, cup, or twist after the first surfacing and resting. As a result, the pieces only required one additional surfacing.

Two boards approximately 1" thick with exceptional grain were selected for the top and apron. One had a clear section wide enough for almost 2/3 the width of the top, but some damage to the rest of that board left only enough width for some of the apron pieces. The second board supplied the rest of the top and apron pieces.

The third board, approximately 2" thick, provided material for the legs. One width of the board provided enough material for 3 leg blanks, but one of the blanks had a large knot. As a result, six leg blanks were cut, and the best four eventually selected.

The power jointer has a maximum width of 8”, sufficient for all but the 10” wide piece for the top. Here, the last apron piece is ready to be flattened on one side.

Because mahogany is more stable than many species of wood, it was felt that this piece (about 10” wide) could be kept full width for the top. Having only one glue joint in the top, and well matched grain, will make the top more attractive. (Often especially wide boards of many species will be ripped lengthwise into narrower strips to reduce the likelihood of seasonal curling.)

However, the piece is too wide to flatten with the power jointer. A straight edge is used to find high spots on the surface, and they are removed with a hand plane.

After removing cup and curl, a pair of straight edges (called “winding sticks”) are used to find any twist. From the end of the workbench, the top of the first winding stick is lined up with the top of the second. Any twist in the board is magnified by the length of the sticks.

With one side of each piece flat and straight, the second side is made parallel by the power planer. Its 15" capacity can accommodate even the wide piece for the top.

All the pieces are allowed to “rest” after surfacing for internal stresses to become balanced.

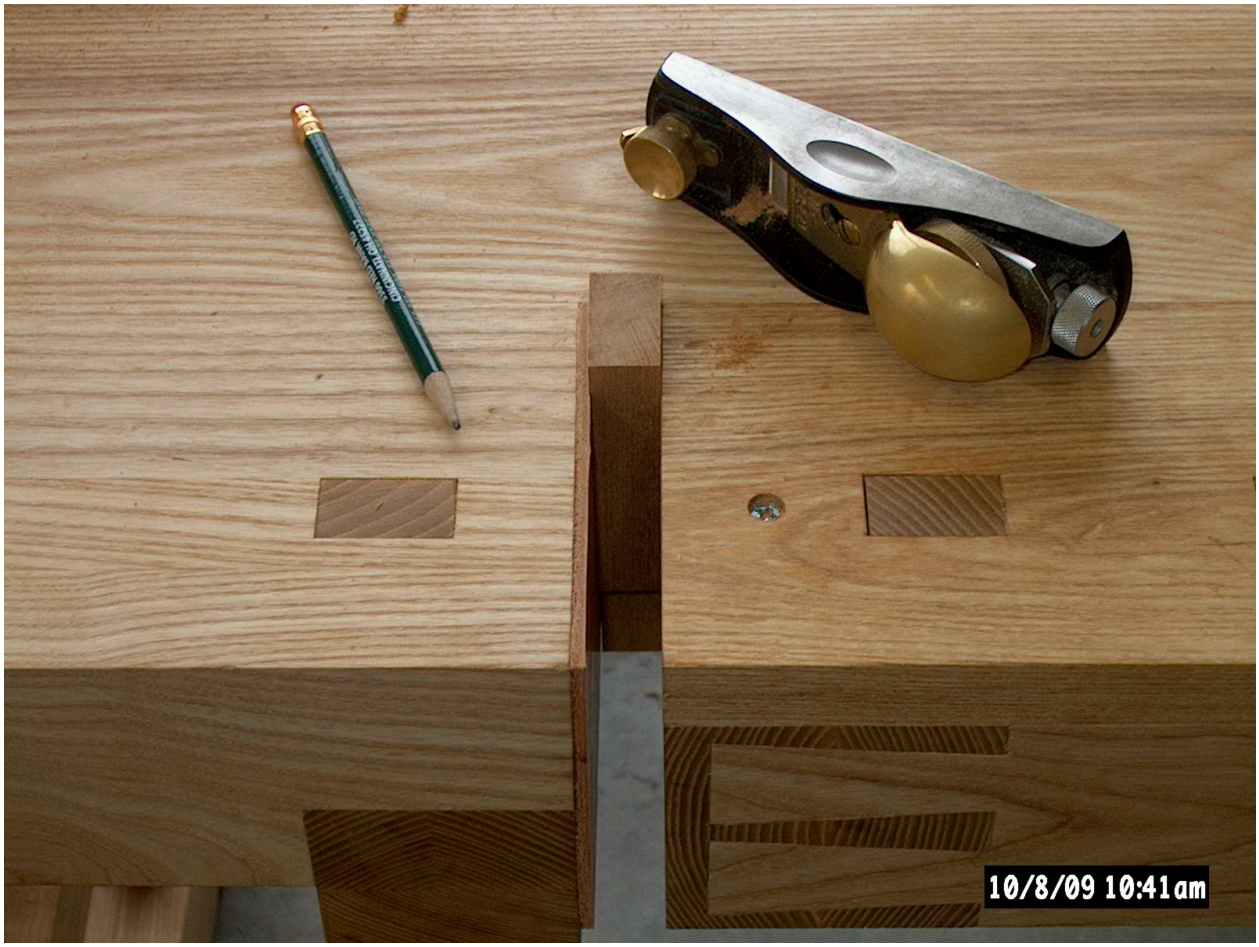
JOINERY

The mortises in the legs are formed using a power mortiser.

The power jointer makes a straight edge perpendicular to one of the sides. However, there will be slight ripples left by the spinning jointer head. A long "jointer" plane leaves a more refined edge, and hence a tighter glued joint.

When the pieces for the top are dry stacked, a straightedge confirms that the two edges are truly perpendicular to the surfaces and that the top will be as flat as possible after glue up.

For the best possible grain match, a narrow strip is sawn from the bottom of each apron piece and cut into three. The outer pieces will make the apron drops, the center piece is waste. Pencil hash marks keep the pieces oriented correctly.



Because the inner end grain of the apron drops will show, it is planed to remove saw marks. Power sanding would almost certainly round over the end. A piece of scrap is behind the drop to prevent chipping and tearout of the back edge.

After the glued joints in the apron and top have cured, they are dressed with a card scraper to bring into perfect alignment. Scraping removes an even finer shaving than a hand plane. Though slower than hand planning, scraping will not tear out reversing grain. Totally unexpected, several of the apron pieces had grain running in opposite directions between the two edges of each surface, so all were scraped for final surface touchup.

The tapers on the two inner surfaces of the legs are made on the table saw, using a shop-made jig for safety and repeatability.

After tapering, the saw marks are removed with a smoothing plane. Where there was grain reversal, a bevel up block plane and a card scraper are used.

Maximum joint strength depends in part on a tight fit between the parts.

The apron tenons were cut slightly oversize on the table saw. Each tenon was test fitted to its corresponding mortise, and dressed to final thickness with a shoulder plane.

The aprons and legs have been glued. A center stretcher was attached with pocket screws to provide additional anchoring for the top. The lifting cleats have been shaped, planed and scraped, and secured with screws.

The mortises in the lifting cleats are used to attach the top to the base.

Changing humidity levels can cause some woods to expand and contract **across** their grain as much as much as 3/16" per foot. There is essentially no change **along** the grain.

The apron pieces will not expand and contract along their grain, so the legs will not get closer together or further apart during humidity changes. However, the top will expand and contract across its width. This is a classic example of cross grain.

If the top were "locked" to the apron with no allowance for movement, it might split over time. There must be allowance for movement of the top. One way to allow such movement uses wooden L-shaped pieces called buttons.

The mortises in the lifting cleats are slightly wider than the tenons of the buttons. The buttons are screwed to the top but are not glued or screwed to the aprons. As the top expands and contracts, the buttons can pivot on the screws and/or slide in the mortises.

All of the pieces have been assembled. The display table is ready for finishing.

FINISHING

All of the surfaces are lightly sanded with 400 grit paper to provide a uniform surface, and then vacuumed to remove dust.

Mahogany benefits from a two part dye color application. All surfaces first are colored with a lemon yellow water borne penetrating dye. After drying for 24 hours, all surfaces were lightly sanded to remove any grain raised by the exposure to water.

All surfaces were then colored with a dark red mahogany water borne penetrating dye. Additional sanding was not necessary after drying.

The dyed surfaces were sealed with a thin two pound cut of ultra pale dewaxed shellac.

To achieve the additional depth of a traditional mahogany finish, all surfaces were then covered with a burnt umber glaze.

After drying for several days, an additional seal coat of shellac will be applied. Finally, two coats of water borne satin pre-cat urethane will be applied.