Building a 21st Century Workbench

An Odyssey of Woodworking on a Large Scale

With special thanks to Robert Lang, Popular WoodWorking

Presented to Long Island Woodworkers

Nick Pelliccione Feb. 4, 2015

Building a 21st Century Workbench

Woodworking, golf, food and wine, grandchildren – all fun, yes?

- A native Brooklynite
- Work in the pharmaceutical industry about 30 years
- First real job at Estee Lauder R&D, Melville
- Love to play golf but don't get out often
- Food and wine a major factor for me and family
- Started 'woodworking' when I bought our house and had a basement

What do I Build?

- Humble beginnings focused more on home improvements – repairing/replacing panels for garage door; sawhorses
- Moved to breadboards, flag cases, bookcases
- Like Mission and Stickley styles – most ambitious was heirloom cradle
- Have not ventured into carving or very complex pieces

How do I work?

- Power tools do the heavy stuff
- Have graduated from smaller, less expensive tools
- Key to new shop – 3 hp Sawstop and Laguna 14/12 bandsaw
- Like working with hand tools esp. for finer finishing stages of a project
  - Starting to get comfortable with planes, saws, chisels

What did I use before…


WhiteGate
Home Depot or BJs
~$100 at least 20 yrs old

Where I work now!


1-800-350-7734

The Workbench

Where to begin?

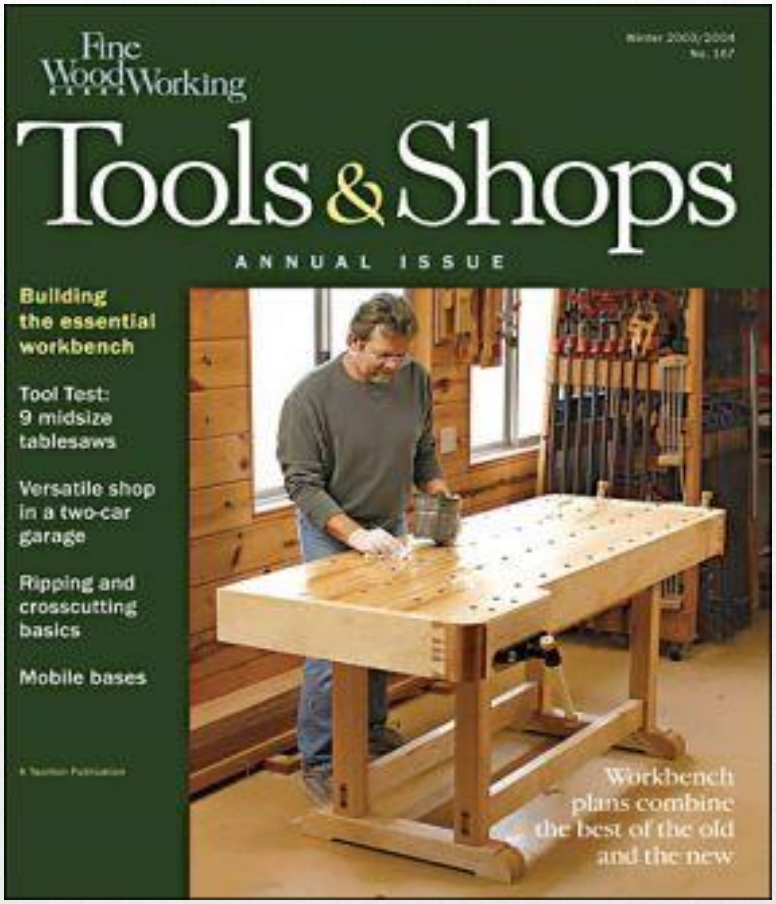
Do I really need one!

Bench Design – What I Considered

- C. Schwarz – "Workbenches"; L. Schleining – "The Workbench" – both good refs. for ideas and planning
- Magazines and the web - FWW, PWW, Workbench, Wood
- Roubo, Ultimate Workbench, M. Fitzpatrick LVL bench, Benchcraft
- To Tray or not to Tray?
- Top flush with legs vs. overhanging apron?
- VISES – a 'vice' all its own……
- KEY QUESTION TO ANSWER – What do you really need?

C. Schwarz, Roubo bench
Pop.WW, Aug. 2010

J. Miller, Modified Roubo
With Benchcrafted vises
FWW Tools&Shops 2013



Megan Fitzpatrick w/C.Schwarz,
Laminated Veneer Lumber
PWW Nov. 2009

Final Answer – Lang's 21st Century Design

Why this bench for me?

- I wanted something that would be a workhorse not a piece of furniture
- Did not seem too fussy or overly difficult to build
- Design provided everything I need for what I do at this time, and appears adaptable for future
- More than enough bulk for stability, yet the design is knock-down – so technically it's portable

The Workbench

Step 1: Material selection and processing

Why did I use Ash?

- You want a straight-grained, tight-pored hardwood; light color is better than dark IMO
- Lang's is ash
- Ash is cheaper than maple
- Dense and heavy enough to contribute good bulk and stand up to abuse, yet very workable with both power and hand tools
- Meets above criteria

Picking the stock

- Bench takes a lot of wood ~120 bf for Lang's 90 inch version; ~100 for my 78 inch bench
- Bought rough-sawn ash at Boards & Beams, Fairfield, NJ
- Took several hours to select necessary boards with a previously determined list of boards required
  - Bought ~20% more than needed
- Had them milled at Boards & Beams– 1 face, 1 edge
- Lumber cost: ~$550 incl. milling

Processing the stock

- Acclimate to your shop for at least 1 week
- Work from cut list; separate & label different parts; clearly mark all boards with chalk and bundle in groups
- I created a story stick with lengths needed for major parts – top, legs, stretchers, rails – using a thin strip of ash cut from a piece that would be used for top
- Plan ahead for where you will store parts before milling and assembly – this stuff is heavy so you don't want to keep moving it around

Processing the stock

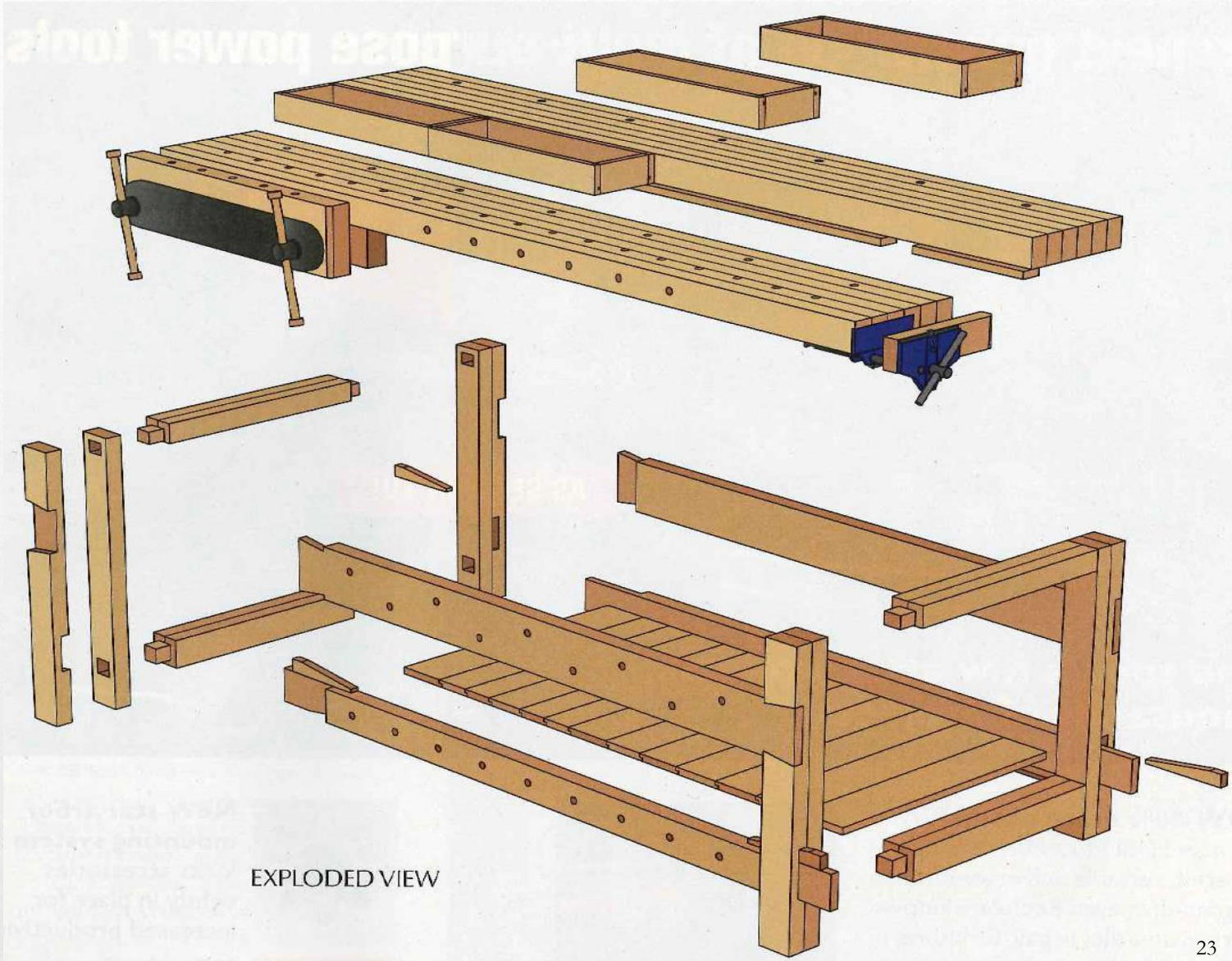
- Jointing first: Assure 1 flat face and edge on all pieces
- Leave longer than needed while milling
  - Assures if you get 'snipe' you can cut it off
- Plane pieces to appropriate thickness – make sure you put ALL pieces that MUST be same thickness through planer at same time
- You can spend an entire weekend jointing and planing all parts – OR - you can break it up and do different groups on different days [that's what I did]

Processing the stock

- Once you have proper thickness for a given set of parts then you can rip to width; again, try to rip all pieces at that width together
- Assure all parts are cut square on all faces then cut to length
- Prepare for glue-up as necessary
- For benchtop and legs determine if flat enough for glue or if hand-planing is needed

The Workbench

Step 2: Construction



EXPLODED VIEW

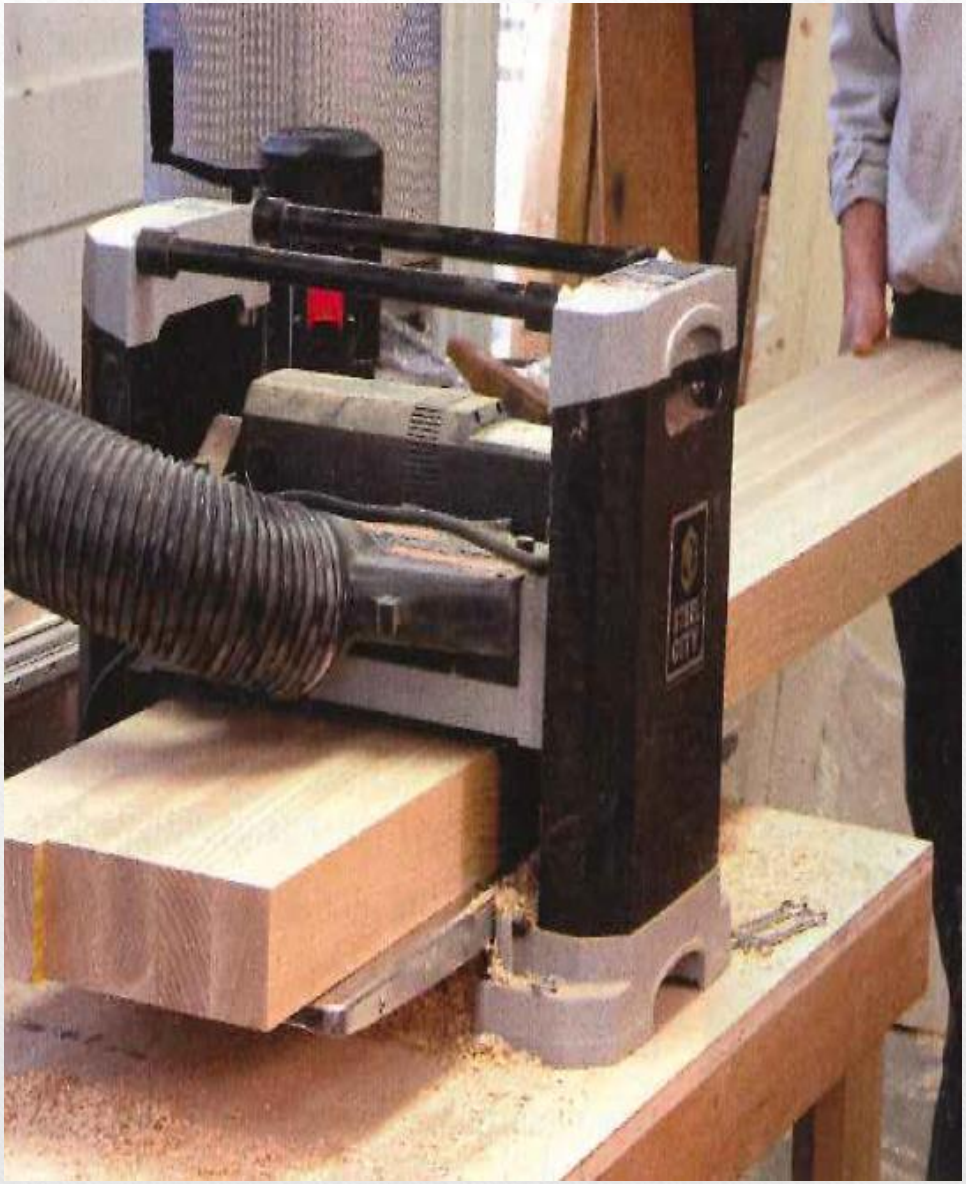
Constructing the benchtop

- Dry-fit boards for both halves of top getting best fit and orientation
  - You can hide small imperfections on bottom
- Mark boards to maintain orientation e.g. triangle
- Glue pairs first; 12 boards = full top
- Glue 3 pairs/half
- **KEY**: glue-up must be on a flat surface

Constructing the benchtop

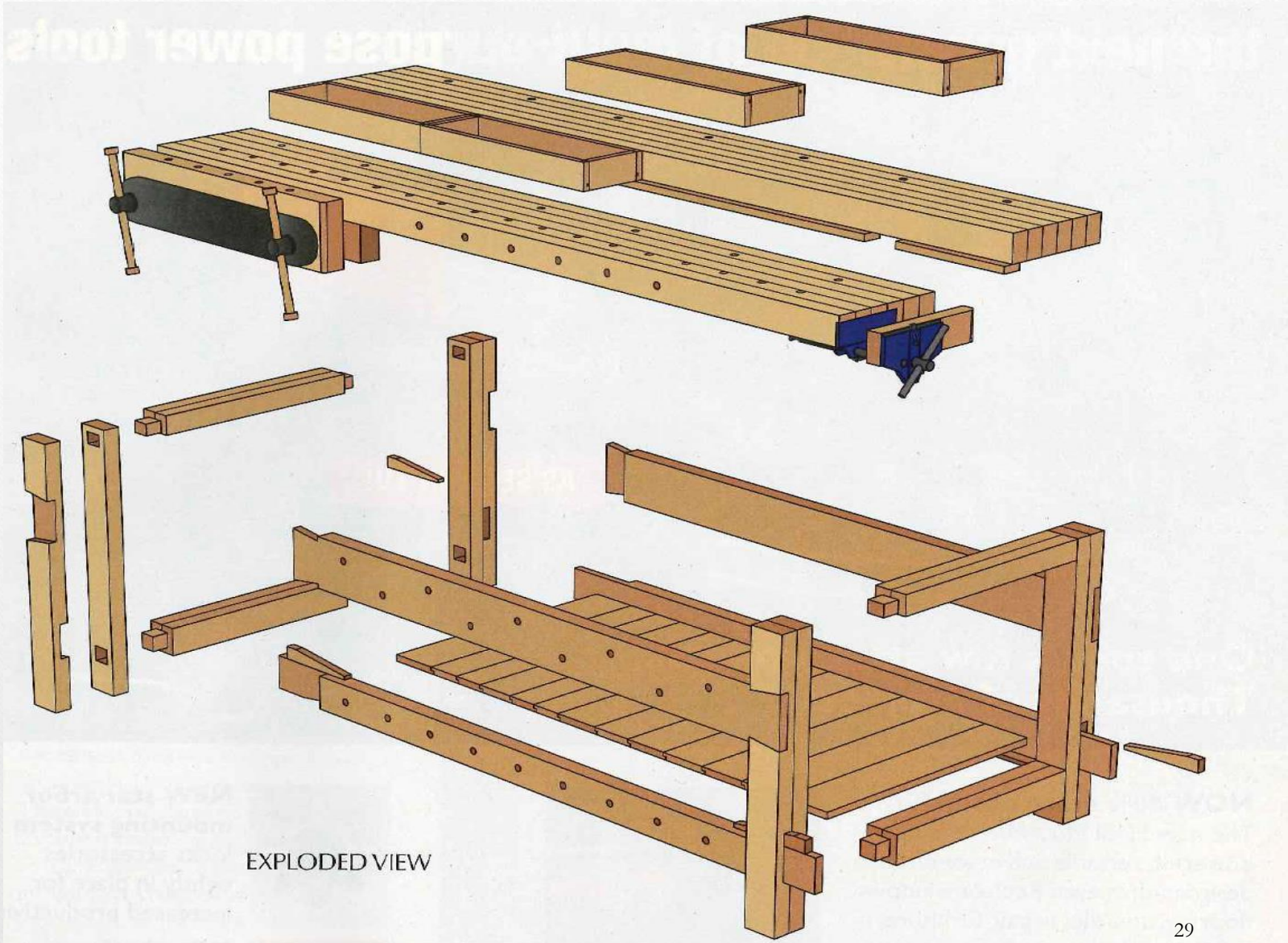
- Gluing frame: Straight, flat lattice on 2 saw horses provide platform for gluing up each half of benchtop
- Do a dry run, including placement of clamps before attempting glue-up of real thing
- Use 3”disposable paintroller to apply glue quickly to one surface. Do not over-glue. I wipe both surfaces with a damp cloth before gluing. Rub boards together to improve bond. Line up marks for proper alignment

You can never have too many clamps……



Benchtop Construction Lessons Learned

- Dry run is essential before glue-up
- It will take longer than you think
- Clear-up space to work around & clamp the boards
- Once the glue begins to set it's all over – these pieces are too big and heavy, with too much surface area, to successfully move them around
- Don't trim to length until you have legs ready



EXPLODED VIEW

Constructing the Legs and Stretchers

- Legs are two pieces glued face-to-face making final dimension ~4x4
- Each half has joinery components built in
- Mortise and tenon joints between stretcher/leg
  - Mortise only inside half of leg
- Outer leg half has upper and lower dovetail/half-dovetail cut in

Constructing the Legs and Stretchers

- Stretchers also made of 2 boards each
  - Upper slightly thinner than lower
- Tenons cut on stretchers – used both hand and table saw
  - Hand – cut shoulder; cleaner
  - TS dado – clean out waste to end of tenon; faster
  - Hand tools used to clean up and fit tenon – plane, chisel, rasp
  - Wedges hold tenon into mortise for tight, strong joint
- Pictures are worth a thousand words…..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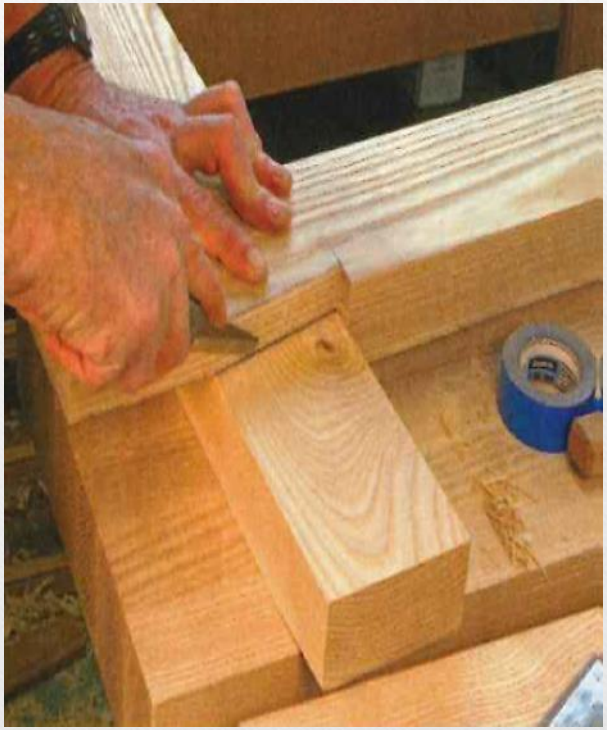
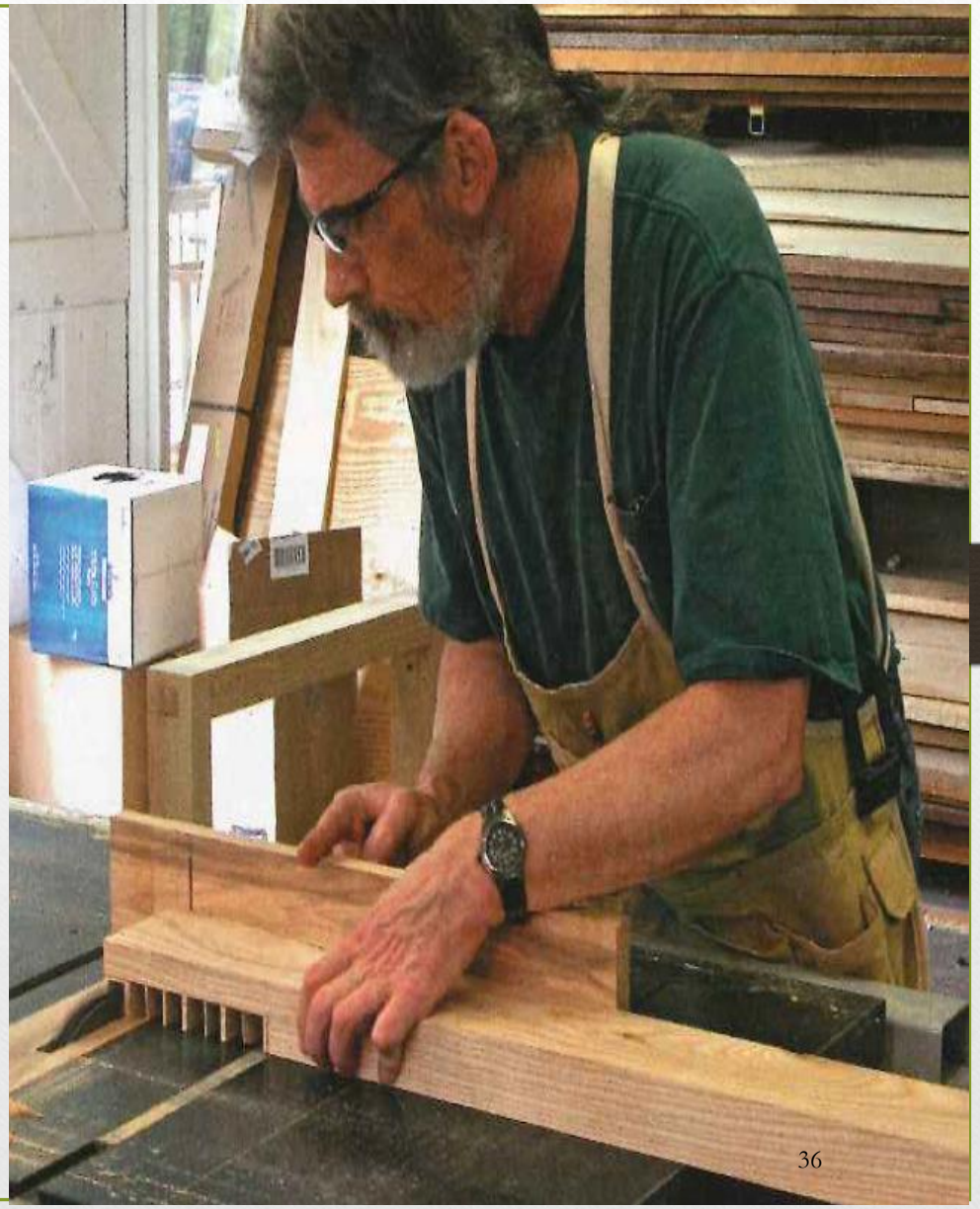
Constructing the Legs, Stretchers and Rails

- Inner leg half and stretchers are glued in place first
- Tenon wedges: After dry - trim flush
- Outer leg half - Clean up dovetails to make smooth surfaces
  - Use these as templates for layout of upper and lower rail dovetails

Constructing the Legs, Stretchers and Rails

- Rails are cut to length and marked for the dovetails
- Upper rail is a full dovetail that is half-lapped to be flush with outer face of leg
- Lower rail is half dovetail (like a notch) which is also half-lapped, but made slightly thinner than matching dovetail in on inner face of leg
  - This allows the rail to be slid in place after legs glued up





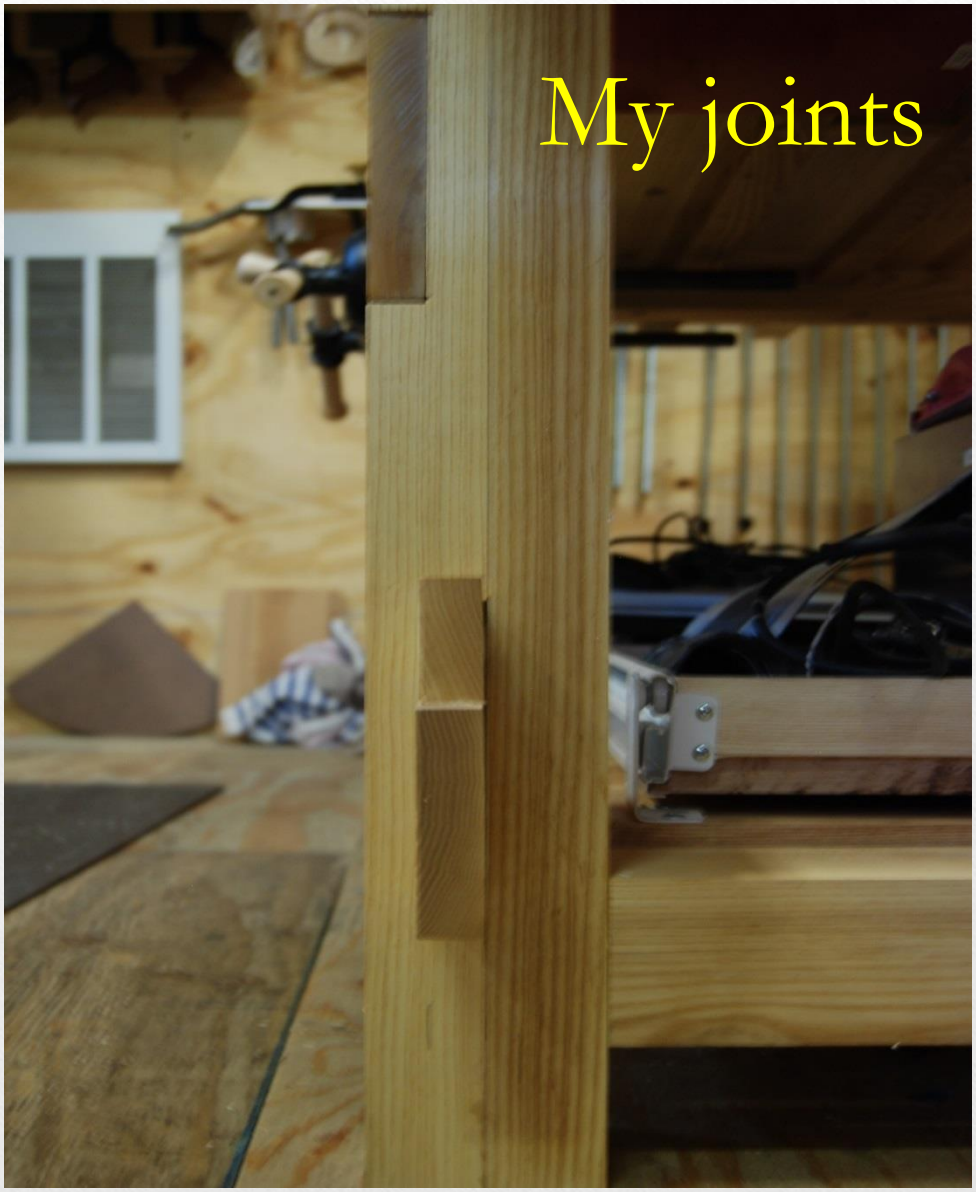
Constructing Legs, Stretcher's and Rails: Lessons Learned

- Practice cutting straight tenons before you work on the actual stretcher
- Glue-up of leg assembly must be square
- Cutting the dovetails was harder than I thought it would be
- Mark each piece before you do any cutting – there are a lot of parts here, and they make the foundation of the bench

My joints

My joints

My joints



The Workbench

Step 3: Assembly

Assembly

- Leg sub-assemblies placed on floor and rails put in place, including wedges
- Drill counter-sunk holes for lag screws to hold upper rails in place
- Place benchtop halves in place then drill holes for lag screws through stretchers and into top
- Level front surfaces to be all in same plane with hand plane


TOTALLY DRY FIT – SOLID AS A ROCK!


CLEATS
HOLD
TRAYS
UNDERSIDE
OF TRAY
LAG BOLTS THROUGH STRETCHERS
ATTACH TOP TO BASE

Assembly: Lessons Learned

- Having a friend would make it a lot easier
- Use clamps to hold pieces while drilling
- As you can see from the photo it might be easier to do this upside down and on a sawhorse – I wasn't that smart!
- Benchtop has to be final size before attaching

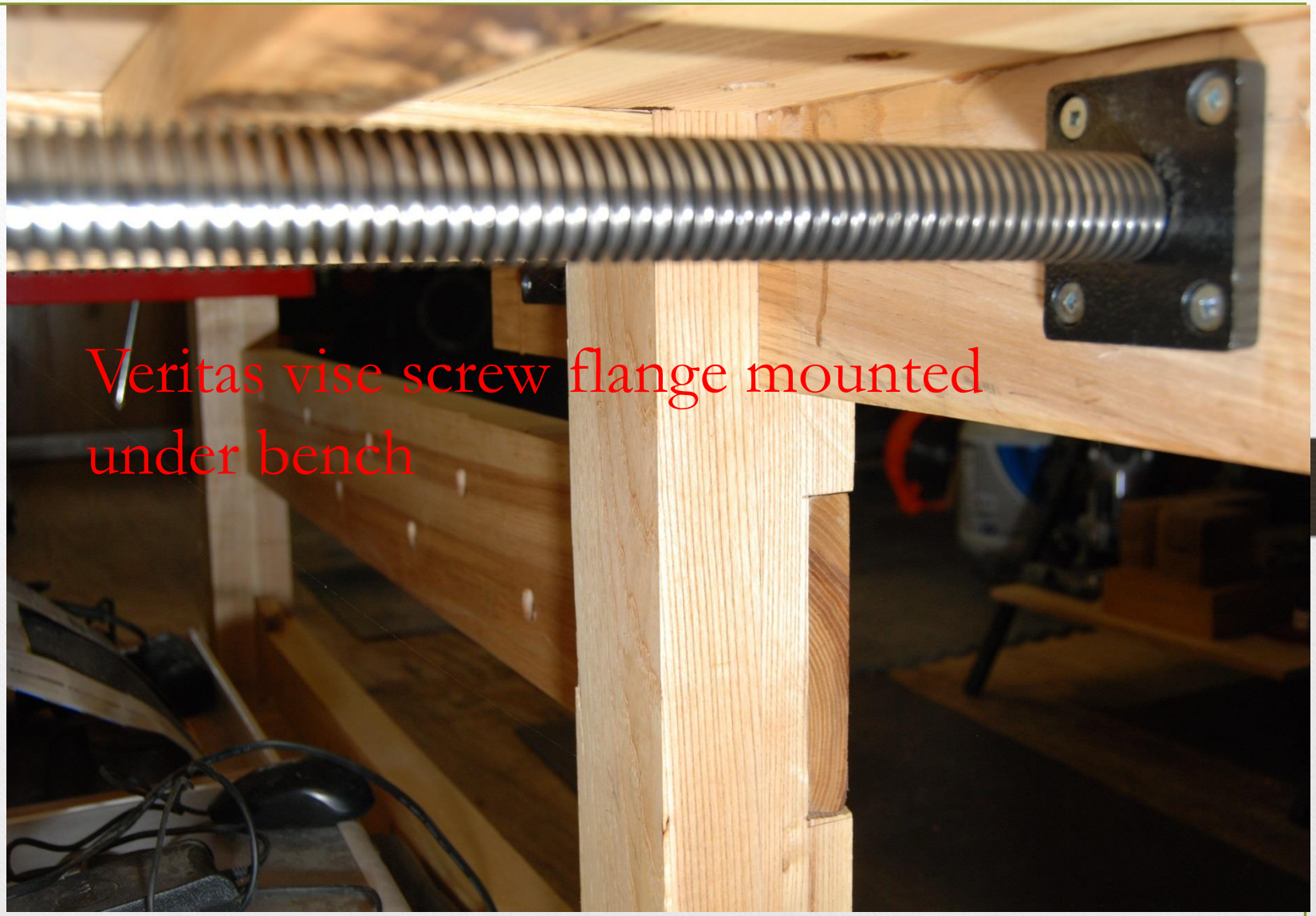
The Workbench

Step 4: Finishing Touches

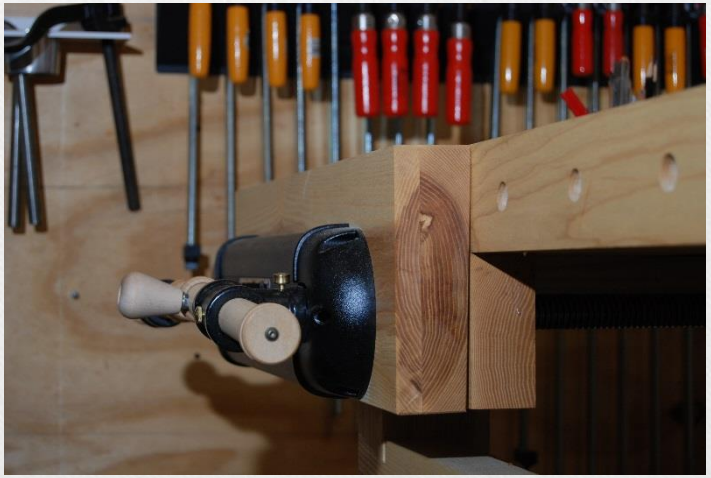
Adding the vises

- Routing insert for End vise was the scariest part – for me not easy to do
- Veritas vise – Follow instructions exactly and it will go smoothly
- Most important is drilling holes in vise block and chop so they line up exactly


Not perfect but still solid


Veritas vise screw flange mounted
under bench

Veritas Vise

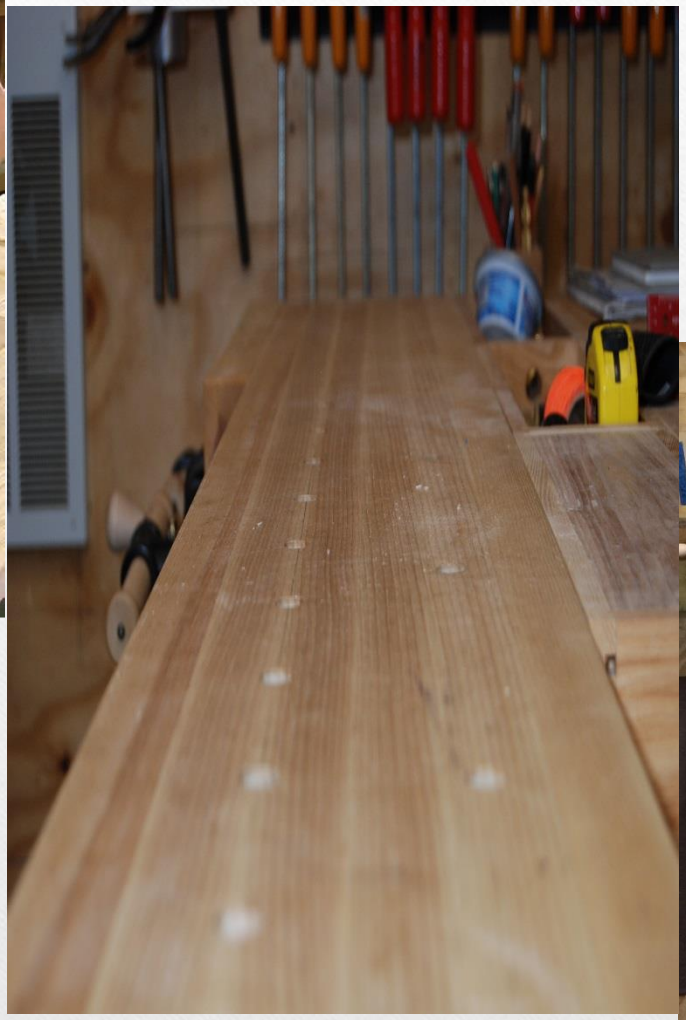


Last items

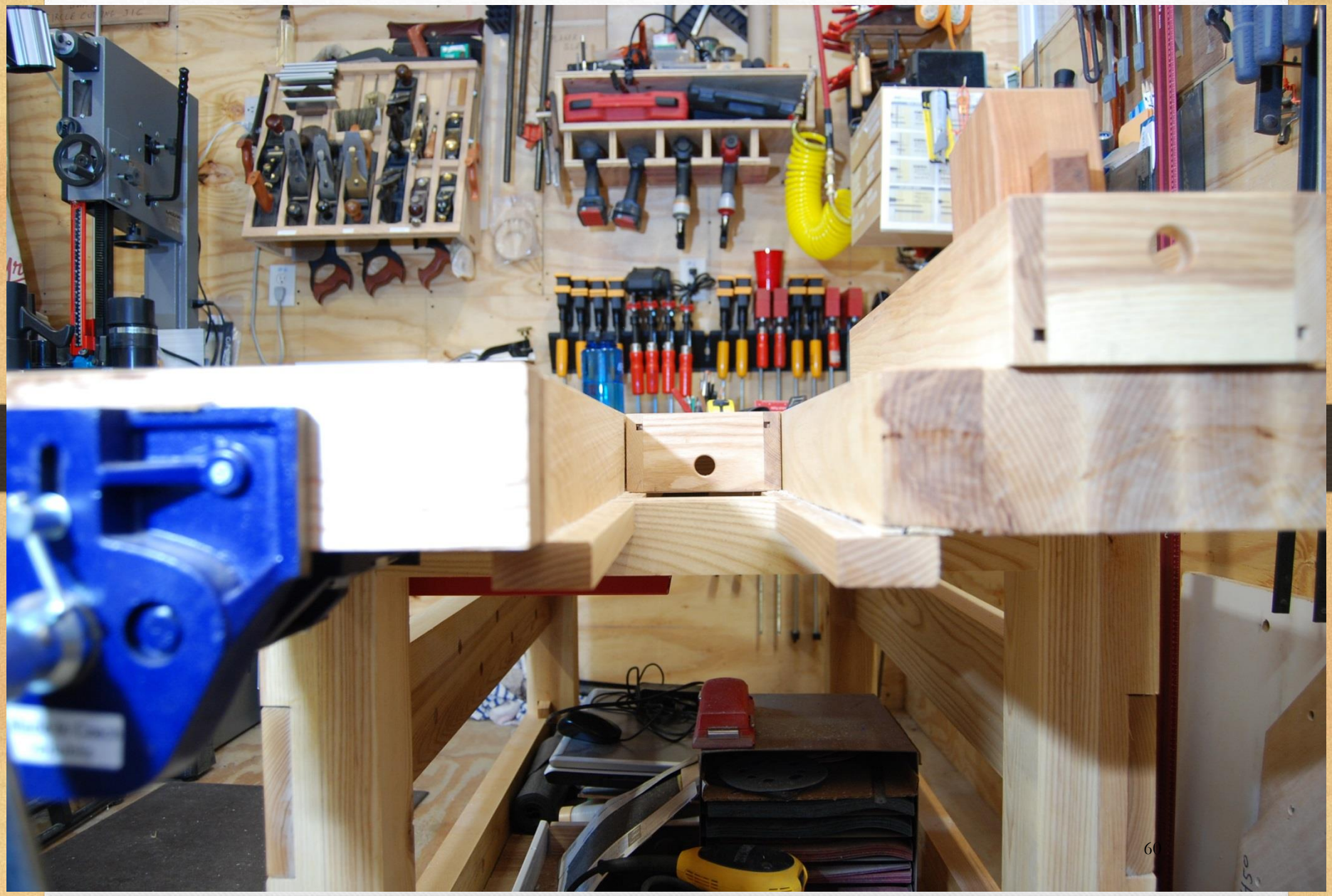
- Drilling benchdog holes – first decide on your layout
- Mark hole locations on top
  - Per Lang, I lined up front row with dog on end vise
- Remove top from base and drill holes on drill press
  - Drill rail holes on drill press as well
  - Alternative method is to use plunge router, ¾" spiral upcut bit and a jig – see photo of Megan Fitzpatrick

Last items

- Build tool trays; simple construction
- Make height flush with top
- I added holes in sides to make it easier to remove tray
- Mill ship-lapped boards to make shelf
- Chamfer all edges – I used block plane
- Smoothing plane used on bench top for final surface prep and any leveling (though not much needed)
- 2 coats of Watco Danish Oil, Natural




DVD



Using the Bench


Thanks for listening
and good luck
making your own
21st Century
Workbench!

Back-ups

And other stuff….

The Kitchen Test

Adapted from Workbenches, C. Schwarz

For Workbenches I wish there were a simple test to separate a good workbench from one that should live the rest of its life as a plant stand. ….. I developed such a test for my book on workbenches. I call it "The Kitchen Test," but I need to come up with a better name for it.

In a nutshell, here it is: Pretend you have three pieces of woodwork in your shop and you need to secure them on your workbench so you can work on their faces, edges and ends.

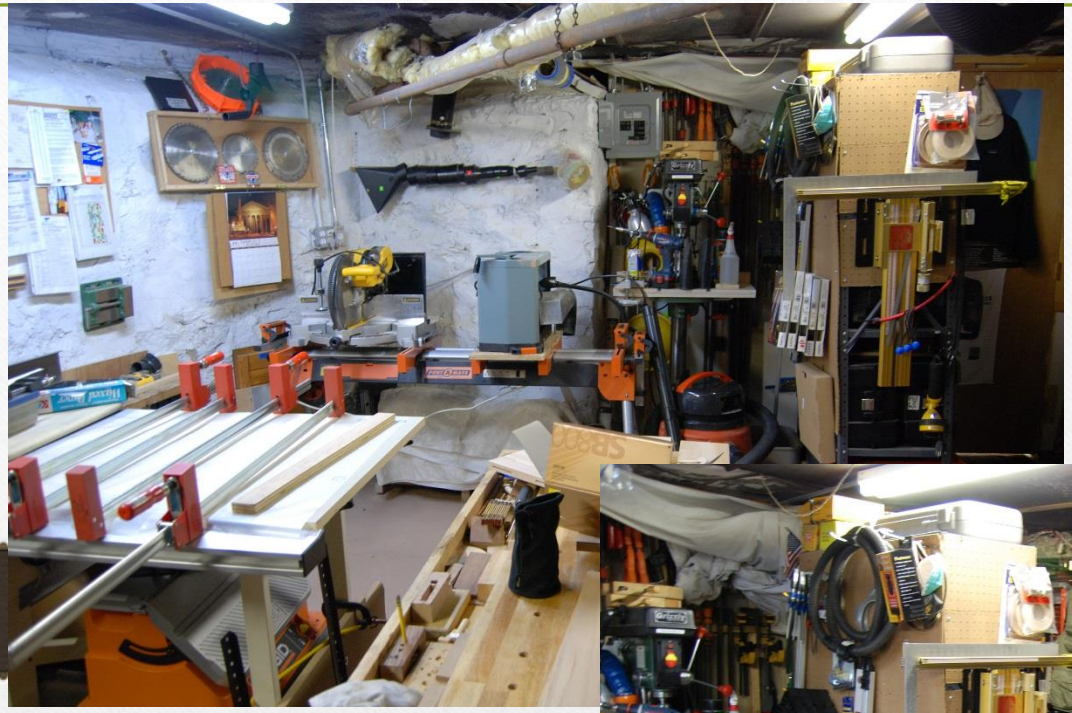
One piece is a kitchen cabinet door that measures 3⁄4" x 18" x 24". The second is a kitchen drawer that is 4" x 18" x 18". The third is a piece of baseboard for the kitchen that is 3⁄4" x 6" x 48".

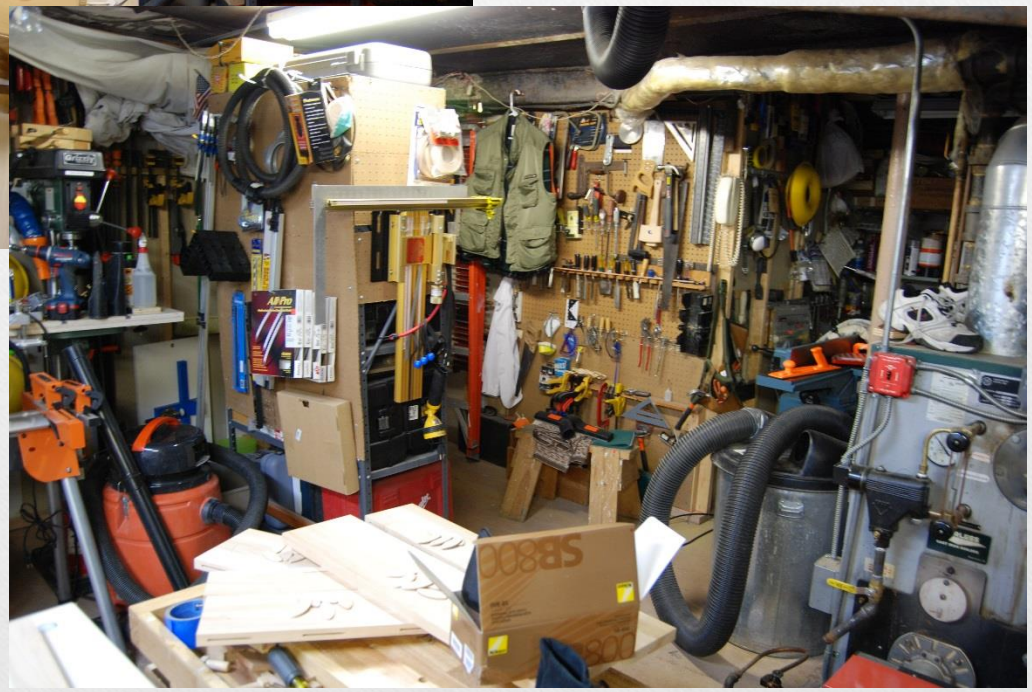
Now pick two (or 10) workbench designs and pit them against one another. Which bench would grip these three pieces of work in each of the three positions (for working the faces, edges and ends) with the greatest ease?

Some benches require a lot of extra accessories (bench slaves, bench hooks etc.), and some don't. But it really is quite surprising how a lot of benches fare in this test. There are significant differences. Some bench designs can handle all nine operations. Some can easily accomplish only about half.

References

- 21st Century Workbench, Robert W. Lang, Popular Woodworking, Oct. 2008 pp. 34 – 43.
- Video – Build the 21st Century Workbench, available from Popular Woodworking
- Slides and other links of a bench building class http://www.popularwoodworking.com/woodworking-blogs/editors-blog/bench-class-wrap-up
- The Workbench, A Complete Guide to Creating Your Perfect Bench. Lon Schleining, 2004, Taunton Press
- Workbenches, from Design & Theory to Construction & Use. Christopher Schwarz, 2007, Popular Woodworking Books





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