

Draw Your Way to Better Work

Lee Valley
Glue Pot



POPULAR Woodworking MAGAZINE

June 2016 ■ #225

Medicine Cabinet

Ample Storage,
Clean Lines
& Simple Joinery

Sealers: What They Are
& When to Use

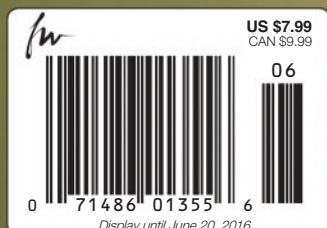
Build a Queen Anne
Honing Box by Hand

Karl Holtey's
Final Handplane

Make a Medieval
Trestle Table with
Modern Appeal



popularwoodworking.com





Grizzly Industrial®

PURVEYORS OF FINE MACHINERY®, SINCE 1983!

SUMMER SALE

April 18–July 31

14" DELUXE BANDSAW

- Motor: 1 HP, 110V/220V, prewired 110V, single-phase, TEFC, 1725 RPM
- Amps: 11A at 110V, 5.5A at 220V
- Table size: 14" x 14" x 1½" • Table tilt: 10° L, 45° R
- Floor-to-table height: 43"
- Cutting capacity/throat: 13½"
- Max. cutting height: 6"
- Blade size: 93½" (½" to ¾" wide)
- Blade speed: 1800 and 3100 FPM
- Overall size: 27" W x 67½" H x 30" D
- Approx. shipping weight: 247 lbs.



G0555LX ~~\$555.00~~ SALE **\$525.00**

ANNIVERSARY EDITION

G0555LANV ~~\$555.00~~ SALE **\$525.00**



30TH ANNIVERSARY 17" HEAVY-DUTY BANDSAW

- Motor: 2 HP, 110V/220V, single-phase, TEFC, prewired 220V, 1725 RPM
- Amps: 20A at 110V, 10A at 220V
- Precision-ground cast iron table size: 17" x 17" x 1½" thick
- Table tilt: 10° left, 45° right
- Floor-to-table height: 37½"
- Cutting capacity/throat: 16½"
- Blade size: 131½" long
- Approx. shipping weight: 342 lbs.

MADE IN AN
ISO 9001
FACTORY!



G0513ANV ~~\$895.00~~ SALE **\$850.00**

19" HEAVY-DUTY BANDSAW WITH MOTOR BRAKE

- Motor: 3 HP, 220V, 3-phase, TEFC, 60 Hz, 1725 RPM, 12A
- Precision-ground cast iron table size: 26¾" x 19" x 1½" thick
- Floor-to-table height: 37½"
- Cutting capacity/throat: 18½"
- Maximum cutting height: 12"
- Blade length: 143" long
- Blade widths available: ½"–1¼"
- 2 Blade speeds: 1700, 3500 FPM
- Fully balanced cast iron wheels & polyurethane tires
- Overall size: 36" W x 76" H x 32" D
- Approx. shipping weight: 512 lbs.



MADE IN AN
ISO 9001
FACTORY!



G0514X2B ~~\$1755.00~~ SALE **\$1675.00**

12 SPEED 17" FLOOR DRILL PRESS

- Motor: 1 HP, 110V/220V, single-phase, prewired 110V
- Swing: 17"
- Drill chuck: ¼"–½" • Drilling capacity: 1" steel
- Spindle taper: MT#3 • Spindle travel: 4½"
- Speeds: 210, 310, 400, 440, 630, 670, 1260, 1430, 1650, 2050, 2350, 3300 RPM
- Quill flange/collar diameter: 2.85"
- Precision-ground cast iron table
- Table size: 13½" square • Table swing: 360°
- Table tilts: 90° left & right
- Overall height: 70"
- Approx. shipping weight: 283 lbs.

INCLUDES
BUILT-IN LIGHT
(BULB NOT INCLUDED)



G7947 ~~\$595.00~~ SALE **\$575.00**

15" PLANERS

- Motor: 3 HP, 240V, single-phase, 12A
- Max. cutting width: 15"
- Max. stock thickness: 8" • Min. stock thickness: ¾"
- Min. stock length: 8" (G0453W), 6" (G0453ZW)
- Max. cutting depth: ½" • Feed rate: 16 and 20 FPM
- Cutterhead diameter: 3" • Cutterhead speed: 5000 RPM
- Solid steel infeed roller • Table size: 41¾" x 16"
- Overall dimensions: 38" W x 42½" H x 42" D
- Approx. shipping weight: 585 lbs. (G0453W), 602 lbs. (G0453ZW)



G0453W
SHOWN



G0453W ~~\$1195.00~~ SALE **\$1125.00**

WITH SPIRAL CUTTERHEAD

G0453ZW ~~\$1895.00~~ SALE **\$1795.00**



12½" LEAN & MEAN PLANER

- Motor: 2 HP, 110V, single-phase, 15A
- Max. cutting width: 12½"
- Max. cutting height: 6"
- Max. cutting depth: ¾"
- Min. board thickness: ¼"
- Feed rate: 32 FPM
- Number of knives: 2 double-edged HSS
- Knife size: 12½" x 2½" x ¼"
- Cutterhead speed: 10,000 RPM
- Number of cuts per inch: 52
- Approx. shipping weight: 78 lbs.



G0505 ~~\$325.00~~ SALE **\$295.00**



1½ HP DUST COLLECTOR

- Motor: 1½ HP, 120V/240V, single-phase, 3450 RPM
- Motor amp draw: 12A/6A
- Air suction capacity: 1300 CFM
- Maximum static pressure: 9"
- Standard bag filtration: 2.5 microns
- 6" inlet "Y" with two 4" openings
- Impeller: 12¾" cast aluminum, radial fin
- Portable base size: 21¼" x 33½"
- Lower bag capacity: 5.7 cubic feet
- Height (with bags inflated): 78"
- Bag size (diameter x depth): 19½" x 33" (2)
- Approx. shipping weight: 118 lbs.



MADE IN AN
ISO 9001
FACTORY!



G1028Z2 ~~\$395.00~~ SALE **\$325.00**

*To maintain machine warranty, 440V operation requires additional conversion time and a \$250 fee. Please contact technical service for complete information before ordering.



1-800-523-4777

2 GREAT SHOWROOMS!
BELLINGHAM, WA • SPRINGFIELD, MO

TECHNICAL SERVICE:

570-546-9663
FAX: 800-438-5901

- ALMOST A MILLION SQUARE FEET PACKED TO THE RAFTERS WITH MACHINERY & TOOLS
- 2 OVERSEAS QUALITY CONTROL OFFICES STAFFED WITH QUALIFIED GRIZZLY ENGINEERS
- HUGE PARTS FACILITY WITH OVER 1 MILLION PARTS IN STOCK AT ALL TIMES
- TRAINED SERVICE TECHNICIANS AT BOTH LOCATIONS • MOST ORDERS SHIP THE SAME DAY



FREE 2016 CATALOG
772 PAGES OF HIGH
QUALITY MACHINES & TOOLS
AT INCREDIBLE PRICES

2 HP PORTABLE DUST COLLECTOR

- Motor: 2 HP, 240V, single-phase, 9A
- Air suction capacity: 1360 CFM
- Max. static pressure: 11.3"
- Filter rating: 2.5 micron
- 6" Inlet and "Y" with two 4" openings
- Impeller: 12 $\frac{3}{4}$ " cast aluminum
- Portable base size: 27 $\frac{1}{2}$ " x 47 $\frac{1}{2}$ "
- Upper bag size (dia. x depth): 19 $\frac{1}{2}$ " x 47 $\frac{1}{2}$ "
- Lower bag size (dia. x depth): 19 $\frac{1}{2}$ " x 33"
- Lower bag capacity: 5.7 cubic feet
- Height with bags inflated: 94 $\frac{1}{2}$ "
- Approx. shipping weight: 137 lbs.

MADE IN AN
ISO 9001
FACTORY!



G0786 ~~\$385.00~~ SALE **\$325.00**



1 $\frac{1}{2}$ HP SHAPERS

- Heavy-duty motor: 1 $\frac{1}{2}$ HP, 120V/240V, single-phase
- Amps: 12A at 120V, 6A at 240V
- Precision-ground cast iron table
- Table size: 20 $\frac{1}{4}$ " x 18"
- Floor-to-table height: 33 $\frac{1}{2}$ "
- Spindle travel: 3"
- 2 interchangeable spindles: $\frac{1}{2}$ " and $\frac{3}{4}$ "
- Spindle openings: 1 $\frac{1}{4}$ ", 3 $\frac{1}{2}$ ", and 5"
- Spindle speeds: 7000 and 10,000 RPM
- All ball bearing construction
- Max. cutter diameter: 5"
- Approx. shipping weight: 243 lbs.

CSF[®] US
177335
G1035 SHOWN
WITH G1706
OPTIONAL WING



G1035 ~~\$595.00~~ SALE **\$555.00**

POLAR BEAR SERIES[®]

G1035P ~~\$595.00~~ SALE **\$555.00**



12" BABY DRUM SANDER

- Sanding motor: 1.5 HP, 115V, single-phase, 13A
- Conveyor motor: 1/8 HP, 115V, single-phase, variable speed 5-55 RPM, 0.3A
- Drum surface speed: 2127 FPM
- Max. stock dimensions: 12" W x 3 $\frac{1}{2}$ " H
- Min. stock length: 8" • Min. stock thickness: $\frac{1}{8}$ "
- Sanding drum size: 4"
- Sanding belt size: 3" x 70" hook & loop
- Dust port size: 2 $\frac{1}{2}$ "
- Feed rate: 2.5-17.3 FPM
- Approx. shipping weight: 166 lbs.

CSF[®] US
177335



G0459 ~~\$695.00~~ SALE **\$585.00**



15" DISC SANDER WITH STAND

- Motor: 1 $\frac{1}{2}$ HP, 220V, 1725 RPM, single-phase
- Disc size: 15"
- Table size: 12" deep x 20" wide
- Table tilt: 15° left, 45° right
- Floor-to-table height: 37"
- Dust port: 2 $\frac{1}{2}$ "
- 15" Cast iron sanding disc
- Cast iron table with X and Y miter slots
- Miter gauge
- Built-in motor brake for quick stops
- Approx. shipping weight: 221 lbs.

BUILT-IN BRAKE
STOPS MOTOR
WITHIN 4 SECONDS



G0719 ~~\$895.00~~ SALE **\$850.00**



1.5 HP DUAL-FILTRATION HEPA CYCLONE DUST COLLECTOR

- Motor: 1.5 HP, 110V/220V*, single-phase, TEFC, 3450 RPM, prewired 110V
- Airflow capacity: 775 CFM at 1.8" SP
- Max. static pressure: 10"
- Primary Filtration: 99.9% at 0.2-2 microns
- Secondary Filtration: 99.9% at 0.3 microns
• Intake port: 6" with included, 5" optional port
- Impeller: 13 $\frac{1}{2}$ "
- Cartridge filter surface area: 48 square feet
- Sound rating: 78-80 dB
- Overall size: 48 $\frac{1}{4}$ " W x 69 $\frac{1}{4}$ " H x 23" D
- Approx. shipping weight: 234 lbs.



G0703HEP ~~\$1225.00~~ SALE **\$1150.00**



3 HP SHAPER

- Motor: 3 HP, 240V, single-phase, with lockable reversing switch, 12A
- Precision-ground cast iron table with extension wing attached: 30 $\frac{1}{2}$ " x 28 $\frac{1}{4}$ "
- Floor-to-table height: 34"
- 3" dust port
- Spindle travel: 3"
- 3 Interchangeable spindles: $\frac{1}{2}$ ", $\frac{3}{4}$ ", and 1"
- Spindle openings on table: 1 $\frac{1}{4}$ ", 3", 4", and 7"
- Spindle speeds: 7000 and 10,000 RPM
- Approx. shipping weight: 392 lbs.

CSF[®] US
177335



G1026 ~~\$1195.00~~ SALE **\$1125.00**



OSCILLATING SPINDLE SANDER

- Motor: 1 HP, 120V/240V, single-phase, TEFC
- Cast iron 25" x 25" table tilts to 45° left, 15° right
- Ten spindle sizes: $\frac{1}{4}$ " x 5", $\frac{3}{8}$ " x 6", $\frac{1}{2}$ " x 6", $\frac{5}{8}$ " x 6", $\frac{3}{4}$ " x 9", 1" x 9", 1 $\frac{1}{2}$ " x 9", 2" x 9", 3" x 9", 4" x 9", tapered and threaded
- Floor-to-table height: 35 $\frac{1}{2}$ " • 1725 RPM spindle speed
- Includes formed and welded steel stand
- Spindle oscillates at 72 strokes-per-minute
- Stroke length: 1 $\frac{1}{2}$ "
- Built-in 4" dust collection port
- Lubricated for life ball bearings
- Approx. shipping weight: 296 lbs.

WOOD
WORK
CENTERS
177335

CSF[®] US
177335



G1071 ~~\$789.00~~ SALE **\$750.00**



18" X 47" WOOD LATHE

- Motor: 2 HP, 220V, 5.3A, 3-phase w/single-phase VFD
- Power requirement: 220V, single-phase, 15A
- Swing over bed: 18"
- Swing over tool rest base: 14"
- Swing over tool rest: 16"
- Distance between centers: 47"
- 1 $\frac{1}{4}$ " x 8 TPI RH headstock spindle
- Variable-speed spindle control w/digital readout
- Speed range: high: 330-3200 RPM, low: 100-1200 RPM
- MT#2 spindle & tailstock tapers
- Spindle bore: 0.393"
- Tool rest post diameter: 25mm
- Overall dimensions: 80 $\frac{1}{4}$ " long x 19 $\frac{1}{8}$ " wide x 48 $\frac{1}{8}$ " high
- Approx. shipping weight: 550 lbs.



G0733 ~~\$1725.00~~ SALE **\$1650.00**



FOLLOW
US:



VIEW VIDEOS AT
grizzly.com



grizzly.com

OVER 15,000 PRODUCTS ONLINE!



SCAN QR CODE TO
VIEW VIDEO LIBRARY



WoodRiver®



WoodRiver® Camp Axe Kit With Sheath

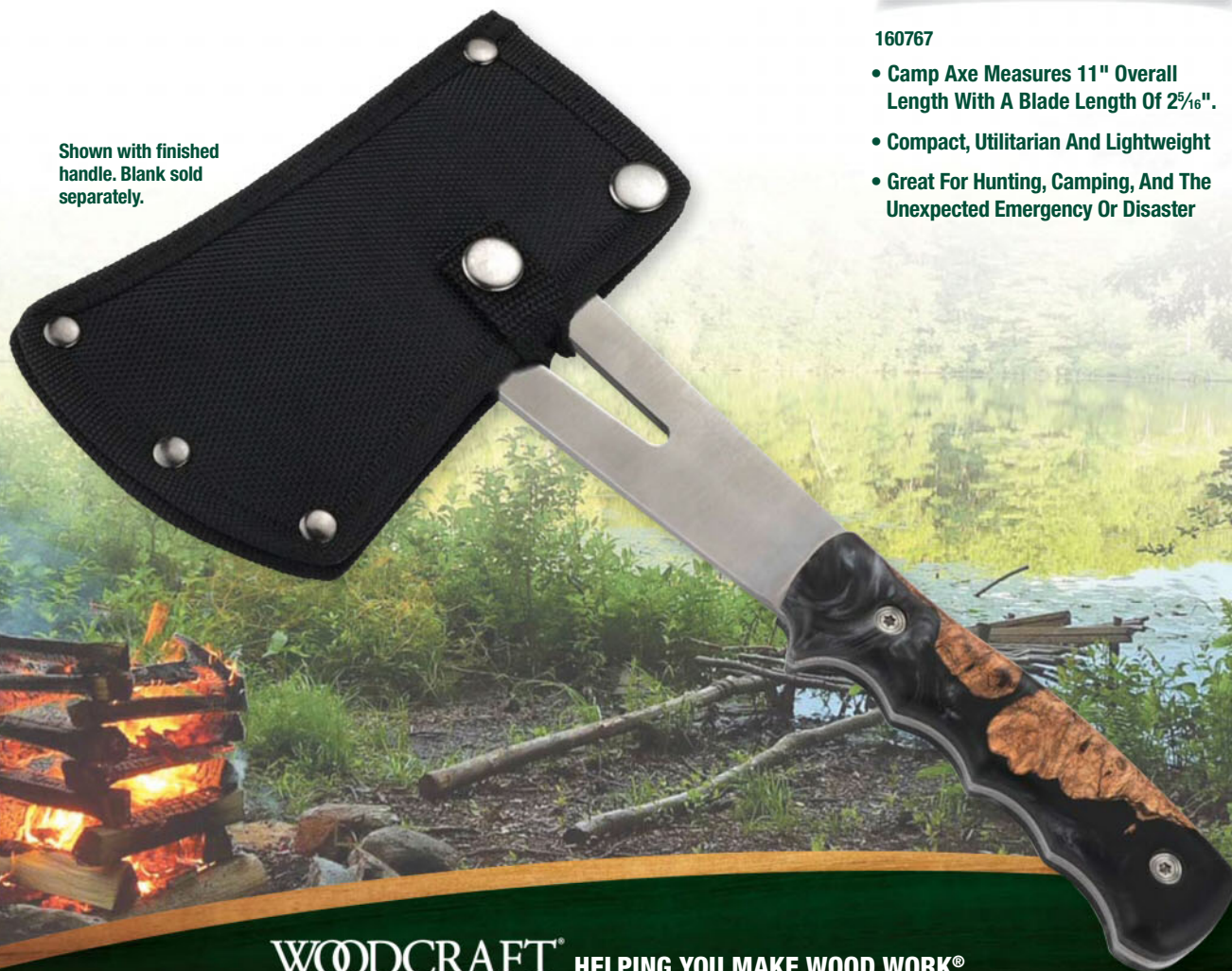
With this simple, utilitarian, yet compact Camp Axe Kit in your backpack, camp or vehicle, you will always be prepared for an unexpected emergency or disaster. At only a little over 1 lb., it is light enough to carry on an extended adventure trip, yet durable enough to handle outdoor chores. Constructed from 420 stainless steel (HRC51-53), it is easy to sharpen but will hold an edge extremely well. Kit includes one camp axe, one black ballistic nylon sheath, two stainless steel rivets, and one wrench. Handle material sold separately.



160767

- Camp Axe Measures 11" Overall Length With A Blade Length Of 2⁵/₁₆".
- Compact, Utilitarian And Lightweight
- Great For Hunting, Camping, And The Unexpected Emergency Or Disaster

Shown with finished handle. Blank sold separately.



WOODCRAFT® HELPING YOU MAKE WOOD WORK®

For A Free Catalog Or To Find Your Local Woodcraft Store, Visit woodcraft.com Or Call 800-225-1153.

For Information On Woodcraft Retail Franchise Opportunities, visit woodcraftfranchise.com 16PW06P



32



38



51

FEATURES

26 Medicine Cabinet

This contemporary maple medicine cabinet (with Arts & Crafts influences) employs a clever technique from David T. Smith that makes the divided-light door simple to construct.

BY MEGAN FITZPATRICK

ONLINE ► SketchUp Model

Download a free model of the medicine cabinet from our SketchUp Warehouse.
popularwoodworking.com/jun16

32 Draw Your Way To Better Woodworking

Using your hands to sketch can teach your eyes to better see what's in front of you – and that means better furniture design.

BY DAVID SAVAGE

ONLINE ► Rowden Atelier

Visit the website for David Savage's school to see more of his drawings, designs and student work, and to read his blog.
popularwoodworking.com/jun16

38 The First Trestle Tables

These versatile tables are portable, sturdy and easy to build – and though the design is medieval, they look positively modern.

BY CHRISTOPHER SCHWARZ

ONLINE ► 'Taquinum Sanitatis'

Visit this Pinterest board for a look at the many interesting furniture forms in a circa 1390 health manual.
popularwoodworking.com/jun16

51 Karl Holtey, Plane Pioneer

This legendary planemaker's career has been dedicated to innovation – and he plans to pursue more of that in his retirement.

BY KIERAN BINNIE

ONLINE ► 'Test-driving Exotic Infills'

Read Christopher Schwarz's article on using high-end planes, including two from Karl Holtey: the A13 and 11-S.
popularwoodworking.com/jun16

44 Queen Anne Strop Box

Sharpen your foundation hand-tool skills as you make a useful and handsome strop for your sharpening stones or honing strop.

BY WILLARD ANDERSON

ONLINE ► 'Make a Shapely Bowsaw'

Build a bowsaw with the help of Willard Anderson in this free article on our website.
popularwoodworking.com/jun16



44

30 Days For Dad

Sweepstakes

It's time to give every Dad his due with a month full of top-flight woodworking prizes. From May 21 through June 19 (Father's Day), *Popular Woodworking Magazine* and its sponsors are giving away a prize a day to celebrate dads. To earn your chance, you must enter separately for each day's prize. All entrants will qualify for the Grand Prize,

a JET 16" x 40" Wood Lathe (Model JW1-1640EVS).

ENTER NOW for your chance at more than \$9,200 in prizes!

May 21

Excalibur

EX-21K Scroll Saw
with Stand & Foot
Switch



www.general.ca
Card #17

May 22

RIKON

10" x 18"
Mini Lathe
(70-105)



www.rikontools.com
Card #42

May 23

Woodpeckers

Precision Router
Lift V2 (PRLV2)



www.woodpeck.com
Card #52

May 24

trend

DWS/KIT/C
Sharpening
Kit



www.trend-usa.com
Card #120

May 25

**Blue Spruce
Toolworks**

4 x 6 Inch
Adjustable
Square



www.bluesprucetoolworks.com
Card #104

May 26

**KNEW
CONCEPTS**

Woodworker
Fret Saw



www.knewconcepts.com
Card #60

May 27

ARBORTECH

Power Chisel



www.arbortechusa.com
Card #99

May 28

M-POWER

MPower CRB7^{MK3} BUNDLE,
CRB7^{MK3} +
Edge Trim +
Edge Guide



www.m-powertools.com
Card #116

May 29

TIMBERLINE

3-Piece Ogee
Raised Panel
Door Making
Set with Back
Cutter



www.timberline-amana.com
Card #115

May 30

**CALCULATED
INDUSTRIES**

AccuMASTER
2-in-1 Digital
Angle Gauge



www.calculatedindustries.com
Card #62

May 31

**KLINGSPOR'S
WOODWORKING SHOP**

\$100 Gift Card



www.woodworkingshop.com
Card #89

June 1

Oneida

Dust Deputy
Deluxe



www.oneida-air.com
Card #35

June 2

WOODCRAFT

WoodRiver
#92 Medium
Shoulder Plane



www.woodcraft.com
Card #49

June 3

BESSEY

BESSEY K-Body
Revo Kit,
KRK2440



www.besseytools.com
Card #101

June 4

DRILLNADO

DRILLNADO
Drill Press
Dust Collection



www.drillnado.com
Card #7

June 5

Titebond

Titebond II
Premium Glue



www.titebond.com
Card #14

Enter today

at www.popularwoodworking.com/30days

for your chance at more than **\$9,200** in prizes!

POPULAR
Woodworking
MAGAZINE

June 6



5/4 Walnut Slab –
88" x 18"



www.horizonwood.com
Card #108

June 7



DEROS Dust
Free Sanding
System



www.mirkawoodworking.us
Card #31

June 8

Woodpeckers®

1281, 851, 641
Precision
Woodworking
Squares



www.woodpeck.com
Card #52

June 9



Mitey Miter
Molding
Angle Tool



www.miteymiter.com
Card #43

June 10



Mini Grinder



www.arbortechusa.com
Card #99

June 11



10-in. DuoSharp®
Bench Stone with
Base



www.dmtsharp.com
Card #92

June 12



Kreg Jig® K5
Master System



www.kregtools.com
Card #107

June 13



RTJ400 Router Table
Dovetail Jig



www.leighjigs.com

June 14



Woodworker II
7.25x30T
Ripping
Saw Blade



www.forrestblades.com
Card #13

June 15



\$100 Gift Card



www.leevalley.com
Card #28

June 16



Drill Press Table



www.woodpeck.com
Card #52

June 17



Bowl & Tray
Package



www.woodline.com
Card #50

June 18



TURBOPlane
Blade



www.arbortechusa.com
Card #99

June 19 Father's Day

GRAND PRIZE

JET 16" x 40" Wood Lathe
(JWL-1640EVS)



www.jettools.com
Card #72

Enter every day

at www.popularwoodworking.com/30days

Popular Woodworking Magazine and its sponsors will award one prize each day from May 21 through June 19. The prize pictured on each day in the calendar above is the prize offered for that day. To register for a chance to win each prize, you must enter on the day the prize is offered, you may enter as many of the daily contests as you like but you are limited to one entry per day. All entries from the first 29 days will be eligible for the Grand Prize: a JET JWL-1640EVS 16" x 40" Lathe.

Registration starts midnight, EDT on May 21 and ends 11:59 EDT, June 19.

CONTENTS

JUNE 2016



16



58



62

REGULARS

8 Might Your Work be Award Winning?

OUT ON A LIMB

BY MEGAN FITZPATRICK

10 2 Sawbench Designs: Same Performance?

LETTERS

FROM OUR READERS

14 Use a Countersink as A Depth Stop

TRICKS OF THE TRADE

FROM OUR READERS

ONLINE ► More Tricks

Read some of our favorite vintage tricks.

popularwoodworking.com/tricks

16 Powermatic Tenon Jig

TOOL TEST

BY THE EDITORS

ONLINE ► Tool Test Archives

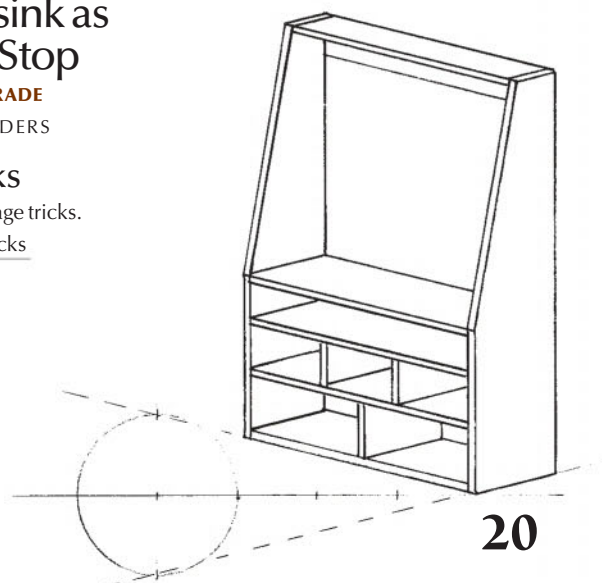
We have many tool reviews available for free on our website.

popularwoodworking.com/tools

20 Ideas that Jump Off the Page

DESIGN MATTERS

BY GEORGE R. WALKER



20

58 Joiners vs. Carpenters, 1631

ARTS & MYSTERIES

BY PETER FOLLANSBEE

62 Sealers – What Are They?

FLEXNER ON FINISHING

BY BOB FLEXNER

64 Jointer Beats Planer for Stock Prep

END GRAIN

BY DEREK COHEN

POPULAR
Woodworking
MAGAZINE

Number 225, June 2016. *Popular Woodworking Magazine* (ISSN 0884-8823, USPS 752-250) is published 7 times a year, February, April, June, August, October, November and December, which may include an occasional special, combined or expanded issue that may count as two issues, by F+W Media. Editorial and advertising offices are located at 8469 Blue Ash Road, Suite #100, Cincinnati, OH 45236. Unsolicited manuscripts, photographs and artwork should include ample postage on a self-addressed, stamped envelope (SASE); otherwise they will not be returned. Subscription rates: A year's subscription (7 issues) is \$24.95; outside of the U.S. add \$7/year • Canada Publications Mail Agreement No. 40025316. Canadian return address: 2835 Kew Drive, Windsor, ON N8T 3B7 • Copyright 2016 by *Popular Woodworking Magazine*. Periodicals postage paid at Cincinnati, Ohio, and additional mailing offices. Postmaster: Send all address changes to *Popular Woodworking Magazine*, P.O. Box 420235, Palm Coast, FL 32142-0235 Canada GST Reg. #R132594716 • Produced and printed in the U.S.A.

5 HP, 26" DUAL DRUM SANDER

- Motor: 5 HP, 220V, 25A, single-phase, 3,450 RPM
- Capacity: 4 1/4" thick x 26" wide
- Conveyor motor: 1/2 HP, 2A, universal
- Conveyor table size: 26 1/2" x 30 1/4"
- Footprint: 36 3/4" W x 23 3/4" D
- Powder coated paint
- Surface speed of drums: 2,300 FPM
- Two 6" x 27 1/4" aluminum drums
- Dual 4" dust ports



W1678 5 HP, 26" Dual Drum Sander

1 HP, 14" BANDSAW

- Motor: 1 HP, 110V/220V
- Precision-ground cast iron table size: 14" x 14" x 1 1/2"
- Blade size: 93 1/2" (3/8" to 3/4" wide)
- Cutting capacity 13 1/2" (throat)
- Cast iron frame and wheels
- Ball bearing blade guides
- Includes fence and miter gauge



Feature packed, and an incredible value



W1706 14" Bandsaw

VARIABLE SPEED PLANER MOULDER with Stand

- Motor: 2 HP, 240V, single-phase, 10.8A, 3450 RPM
- Precision-ground cast iron table size: 14 1/8" x 10" x 7/16"
- Max. planing width: 7"
- Max. planing height: 7 1/2"
- Cuts per inch: 64-300
- 2 HSS knives



PATENT OWNED BY
WOODSTOCK INTERNATIONAL INC.

W1812 Planer Moulder with Stand

2 HP, 10" OPEN STAND HYBRID TABLE SAW



- Motor: 2 HP, 15A at 120V, 7.5A at 240V, single-phase, 3450 RPM
- Footprint: 21" L x 19 1/2" W
- Max. depth of cut at 90° angle: 3 1/4", at 45°: 2 1/4"
- Precision-ground cast iron table size: 57 1/4" W x 37 1/2" D x 35 3/4" H
- Built-in mobile base
- 4" dust port



Made in an ISO 9001 factory



W1837 2 HP, 10" Open Stand Hybrid Table Saw

3/4 HP, 13" BENCH-TOP DRILL PRESS

- Motor: 3/4 HP, 110V, 1725 RPM
- Overall height: 38"
- Spindle travel: 3 1/4"
- Swing: 13 1/4"
- Drill chuck: 5/8"
- Speeds: 12, 250-3050 RPM
- Table: 12 3/8" dia.
- Table swing: 360°
- Table tilt: 45° left & 45° right



PATENT OWNED BY
WOODSTOCK INTERNATIONAL INC.

W1668 3/4 HP, 13" Bench-Top Drill Press

POCKET HOLE MACHINE

- Motor: 1/2 HP, 120V, single-phase, 3A, 17,500 RPM
- Two flip stops for drilling consistency
- Auto start/stop motor actuation with pull of handle
- Auto-adjust clamping foot mechanism for workpiece thicknesses between 1/2" to 1 1/2"
- Cuts both diameter holes for pocket screws at the same time
- Ideal for face framing



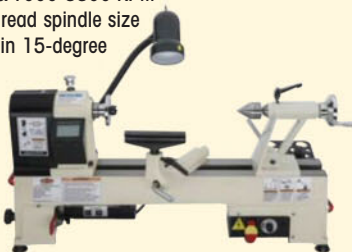
PATENTED!

W1833 Pocket Hole Machine

12" X 15" BENCHTOP WOOD LATHE



- Motor: 3/4 HP, 110V, single-phase, universal motor
- Electronic variable-speed spindle control with digital RPM readout
- 12" swing over bed
- 15" between centers
- Two spindle speed ranges: 500-1800 RPM & 1000-3800 RPM
- 1" x 8" TPI RH thread spindle size
- Spindle indexing in 15-degree increments
- Heavy-duty cast iron construction
- Rubber feet for increased stability



W1836 Benchtop Wood Lathe

1 1/2 HP DUST COLLECTOR Improved Filtration

- Motor: 1 1/2 HP, 110V, single-phase, 3,450 RPM
- Motor Amp draw: 110V - 16A
- Portable base size: 21 1/4" x 33 1/2"
- Bag volume: 5.4 cubic feet
- Height (with bags inflated): 78"
- Bag size: 19" x 33" (2)
- Air suction capacity: Approx. 1,280 CFM
- Static pressure: 10.1"
- Standard bag filtration: 2.5 Micron



W1685 1 1/2 HP Dust Collector

16" SCROLL SAW

- Motor: 1/2 HP, 120V, single-phase, 1.2A, 60 Hz
- Variable speed motor
- No load speed: 550-1650 SPM
- Max. cutting thickness: 2"
- Max. cutting width: 16"
- Blade stroke: 5 1/4"
- CSA certified



Uses Plain or Pin-Type Blades



W1713 16" Scroll Saw

WOODSTOCK® INTERNATIONAL, INC. IS ALSO HOME TO ROMAN CARBIDE®, PLANER PAL®, JOINTER PAL®, AND MANY OTHER FINE BRANDS. PLEASE VISIT OUR WEBSITE OR CALL TOLL FREE TO FIND AN AUTHORIZED DEALER NEAR YOU.

Might Your Work be Award Winning?

The submission period opened on April 1 for the 2016 PWM Excellence Awards—but there's still plenty of time to enter your work (and be in the running for the \$1,000 Grand Prize). Submissions will be accepted at popularwoodworking.com/2016readerexcellence through June 17.

This is the fourth annual PWM Excellence Awards; every year, the competition gets stiffer and more varied—I'm eager to see the stellar work 2016 will bring, and to share it with you in these pages.

So, dig out your best pictures of your best work (from within the last five years), and enter today!

The six winners will be featured in the November 2016 issue, and all entries are available for viewing online for Readers' Choice voting.

The Grand-prize Winner will receive a check for \$1,000. Each of the five Editors' Choice winners, and the Readers' Choice winner with the highest number of votes overall, will win a \$100 gift certificate to ShopWoodworking.com.

You can enter up to five pieces total in the five following categories:

- Casework, Cabinets & Bookcases
- Seating
- Tables
- Boxes & Small (a "small," for example, might be a mantel clock or a beautiful shop-made wooden tool).
- Turnings, Carvings & Objets d'Art ("objets" encompass wall-hung art pieces, sculpture, wooden jewelry, etc.).

The editors and contributing editors to *Popular Woodworking Magazine* will select the Grand-prize Winner, plus the winner in each of the five categories. Your online voting determines the Readers' Choice winner (voting opens June 20).

The 2015 winner was Sharon Mehman of Florence, Mass.—her stunning inlaid maple "Thread Chest" is pictured here (you can see more of her work at sharonmakesfurniture.com).



And on the subject of pictures: No matter how impressive a piece of woodwork might be, if the picture is not good, we will not be able to appreciate it. So I beg you to submit pictures that show your work in all its glory (and be aware that if your work is selected among the winners, you'll need to provide a high-resolution image for the print magazine).

Think clean, flat, uncluttered backgrounds—no crazy wallpaper or paneling, no distracting curtains. Good lighting is also key—but not everyone has a lighting setup. If that's you, I recommend shooting in diffused natural light—avoid harsh shadows. And focus...please make sure your shots are in focus. (Apologies for the pedantry...I just want you to do well!)

You'll find all the contest details, as well as directions on how to enter, on our website at popularwoodworking.com/2016readerexcellence. PWM

Megan Fitzpatrick

PHOTO BY JIM GIPE/PIVOT MEDIA

JUNE 2016, VOL. 36, NO. 3

popularwoodworking.com

EDITORIAL OFFICES 513-531-2690

VICE PRESIDENT & GROUP PUBLISHER ■

Jamie Markle

jamie.markle@fwcommunity.com, x11452

GROUP EDITORIAL DIRECTOR & EDITOR ■

Megan Fitzpatrick

megan.fitzpatrick@fwcommunity.com, x11348

SENIOR ART DIRECTOR ■ Daniel T. Pessell

daniel.pessell@fwcommunity.com, x11596

ONLINE EDITOR ■ Jon Russelburg

jon.russelburg@fwcommunity.com, x11434

CONTRIBUTING EDITORS ■

Bob Flexner, Christopher Schwarz,
Steve Shanley

PHOTOGRAPHER ■ Al Parrish

PROJECT ILLUSTRATOR ■ Donna R. Hill

ONLINE CONTENT DEVELOPMENT MANAGER ■

David Thiel

david.thiel@fwcommunity.com, x11255

ONLINE CONTENT DEVELOPER ■ Jacob Motz

jacob.motz@fwcommunity.com, x11005

ONLINE EDUCATION MANAGER ■ Nick Lieurance

nick.lieurance@fwcommunity.com,

970-279-4254

CONTENT EDITOR, BOOKS ■ Scott Francis

scott.francis@fwcommunity.com, x11327

F+W, A Content + eCommerce Company

CEO ■ Thomas F.X. Beusse

COO & CFO ■ James Ogle

PRESIDENT ■ Sara Domville

SENIOR VICE PRESIDENT,

OPERATIONS ■ Phil Graham

VICE PRESIDENT, COMMUNICATIONS ■ Stacie Berger

ADVERTISING

VICE PRESIDENT, SALES ■ Dave Davel

ADVERTISING DIRECTOR ■ Don Schroder

331 N. Arch St., Allentown, PA 18104

TEL. 610-821-4425; FAX. 610-821-7884

d.schroder@verizon.net

ADVERTISING SALES COORDINATOR ■

Connie Kostrzewa

TEL. 715-445-4612 x13883

connie.kostrzewa@fwcommunity.com

NEWSSTAND

For newsstand sales, contact Scott T. Hill:

scott.hill@procirc.com

SUBSCRIPTION SERVICES:

For subscription inquiries, orders and address changes go to: www.popularwoodworking.com/customerservice

U.S. Subscribers: 877-860-9140

International Subscribers: 386-246-3369

Email: popularwoodworking@emailcustomerservice.com

NEWSSTAND DISTRIBUTION:

Curtis Circulation Co., 730 River Road, New Milford, NJ

07646. PHONE: 201-634-7400. FAX: 201-634-7499.

SHOPWOODWORKING.COM

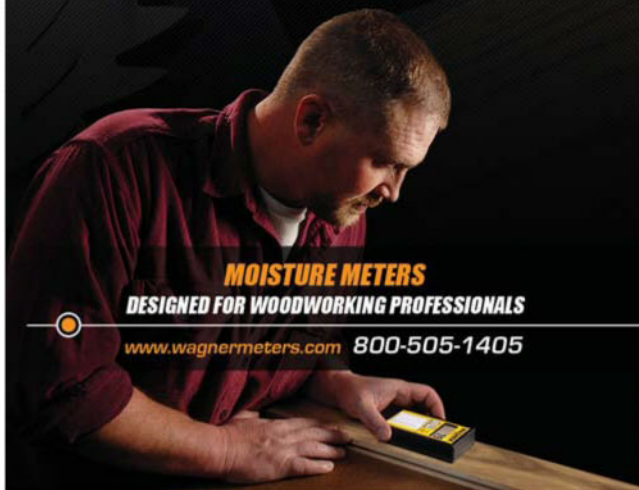
Visit ShopWoodworking.com or call 855-840-5118

for woodworking books, projects, plans and back issues of this magazine.

Copyright ©2016 by F+W Media, Inc. All rights reserved. *Popular Woodworking Magazine* is a registered trademark of F+W Media, Inc.

fw

MEASURE MOISTURE IN THE WOOD NOT ON THE WOOD



MOISTURE METERS
DESIGNED FOR WOODWORKING PROFESSIONALS

www.wagnermeters.com 800-505-1405



VISIT US
AT #1306



CARD #123 or go to PWFREEINFO.COM



98% of orders ship
within 2 days!

Your Corbel & Bracket Source



Lighted Corbels & Brackets • Traditional
• Craftsman • Hand Carved •
Mission • & More!

Order Online or By Phone:
www.customlegs.com 1.866.963.5576

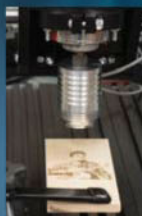
CARD #36 or go to PWFREEINFO.COM



CNC PIRANHA Fx CARVES, LASER ENGRAVES AND 3D PRINTS



3D Printing



Laser Engraving



Metal Carving



Optional Digitizer

AWFS
*Visionary
Awards
Winner*



THE MAKE ANYTHING MACHINE!

- Carve, Laser & 3D Printing Modules
- Copy/Recreate with the optional digitizer
- Works on wood, aluminum, soft metal, and plastic
- Easy to use with robust, professional capabilities
- Design software included

From small shop production
to idea fabrication...

**Next Wave
Automation**

www.nextwaveautomation.com

CARD #127 or go to PWFREEINFO.COM

2 Sawbench Designs: Same Performance?

Two different sawbenches that Christopher Schwarz has built come to mind (and probably more that I haven't seen). One is based on a traditional English form and is in the Autumn 2006 issue of *Woodworking Magazine*; the other is in the June 2015 issue of *Popular Woodworking Magazine* (#218) (and in "The Anarchist's Design Book" (Lost Art Press)) that is a plank with four legs.

Is there a reason to select one over the other?

Kim Howarter,
Elgin, Illinois

Kim,
Functionally, there is no difference between the two sawbenches.

Each build uses different tool sets, skills and materials – so the deciding factor would simply be what you have on hand.

Christopher Schwarz,
contributing editor



ENGLISH SAWBENCH



STAKED SAWBENCH

How to Sand Veneer

I am making a box with a veneered lid glued with epoxy to a plywood substrate. I would like to sand the lid up to #600 grit.

I am reluctant to use a random-orbit sander because I am not comfortable with landing it flat on the workpiece. I don't want to gouge the veneer or round over the edges of the lid

Joe Slaven,
Townsville, Australia

Joe,
I don't understand why you wouldn't just sand by hand. If the surfaces are flat, back

your sandpaper with a flat block, such as the one I wrote about in the February 2016 issue (#223).

As I say in that article, I've never liked using sanding machines. I've almost always done my sanding by hand, even on solid wood. It's just faster, and you don't get squiggles.

I also don't understand why you would sand up to #600 grit – a waste of time.

I've written about this also, many times. If you're applying a film-building finish, you won't see or feel any difference sanding just to #150 or #180 if you sand by hand in the direction of the grain. If

you're applying an oil finish, you can sand between coats (or each coat wet) with #600 grit and get just as smooth a result.

Bob Flexner, contributing editor

Construction-lumber Bench

I'm considering building Christopher Schwarz's knockdown bench (November 2015, issue #221) and have a question. Construction lumber from most sources has rounded edges but from the photos in the article, it looks as if these were planed off to get clean, tight joints – although Christopher didn't mention this in the article.

Do I have this right? I'll probably do it anyway, but I'm curious.

Dave Roach,
Boones Mill, Virginia

Dave,
Indeed, I skipped the boards through my portable planer to remove the rounded edges (I picked flat, dressed boards that did not require face-jointing). It's not necessary to do this to build the bench, but it does make the surfaces easier to clean up with a handplane when everything is assembled.

Christopher Schwarz,
contributing editor

Why Extol Lacquer, Then Not Show it in Use?

I am confused by Bob Flexner's article "Water Based Finish Isn't Lacquer" (April 2016, issue #224). In it, he states all of the great qualities of lacquer over water-based finish, yet in every project article in the issue, the finish is varnish or a water-based finish.

And if lacquer is so great, why is it so hard for a hobbyist like me to find?

Mike Zelman,
via email

Mike,
I apologize for your confusion. Maybe I wasn't clear enough.

The purpose of the article, stated in the title, sub-title and at the end of the first section, was simply to say that water-based finish and lacquer are two entirely different finishes, and that they shouldn't be combined into "water-based lacquer,"

CONTINUED ON PAGE 12

**Keeps Your Filters Clean!
Captures 99% of the waste
BEFORE it reaches your
shop vacuum!**

Dust Deputy® Deluxe

Clean Air
to Vacuum

**Pays you back in
replacement filter
costs alone!**



**Retrofits
to Any
Vacuum.**

- Wet or Dry.
- Easy to Empty Bucket.
- Portable with Casters.

Dust Deputy® Now Available at these fine retailers.



The Viper™ Scraper

Made in the USA.

**Attaches to
your shop
vacuum.**

**Cleans
while you're
using it!
All of the
waste goes
into your
vacuum!**

**See it in action at:
viperscraper.com**



Dust Collection Systems & Components Since 1993.

Call for Information!
1.800.732.4065 www.oneida-air.com

Pat.
Pend.

Hose and
cuff not
included.



**NEW
SYSTEM**

**E
EPILOG
LASER**

LASER IT!

THE FINISHING TOUCHES START HERE



MADE IN USA

Desktop Systems Starting at \$7,995



3D Relief



Inlay Design



Photo Engraving

To request a brochure, DVD, and samples, visit
epiloglaser.com/popwood or call **888-437-4564** today!

or be called “lacquer,” because this causes confusion. I’ve seen it happen many times.

The purpose wasn’t to say how good lacquer is, just to point out the differences.

I’ve written many times in articles and my books about the pros and cons of different finishes. For example, oil-based varnish is more protective and durable than either water-based finish or lacquer, but it dries much slower; that makes it more liable to collect dust, and to run and sag on vertical surfaces—it slows production. But comparing all finishes wasn’t the purpose of this article.

As for your having trouble finding lacquer, I don’t understand this unless you live in California. Somewhere in your area there will be paint stores that cater to the professional trade. They should carry lacquer. Home centers usually don’t.

Bob Flexner, contributing editor

Polyurethane Curing Time

I am refinishing a maple dining table for a family member. All my research has told how me to do the sanding and finishing, applying three coats of polyurethane, with each coat applied 24 hours apart and sanding in between coats.

Recent reads tell me that polyurethane takes 30 days to cure – which I think I knew but that begs a question.

My plan was to go through the process and let the table sit at my house for three days after the last of the coats before taking it to the owner – but if it takes polyurethane 30 days to completely cure, should I let it dry for a month before delivery?

Is it dangerous for children to use the table after three days but before 30 days? Would that use harm the finish? Is there a middle ground?

Guerry Simmons,
Nashville, Tennessee

Guerry,
I’ve heard the instruction to wait 30 days. I think I even used it many years ago. But that’s longer than necessary. The better instruction is to press your nose against the finish to see if you can smell any of the thinner. If you can, let the finish cure

longer. If you can’t, it should be safe to use.

However, last fall I added a coat of oil-based polyurethane (Cabot) to my kitchen floor and it took more than a week to fully harden. I could tell it wasn’t totally hard just by walking on it in my socks. The slower hardening wasn’t because of temperature because it was warm. It could have been because Cabot is playing around with the formula to comply with VOC laws in California and other parts of the country.

Anyway, it causes me to caution you that the finish should be hard before you deliver it. You can test with your fingernail or with the smell test.

All things being the way they should be, your plan sounds correct and three days of drying should be adequate as long as you keep your shop warm.

Bob Flexner, contributing editor

James Krenov Books

I recommend that you expand your reading list (from “Out on a Limb” in issue #224) to include books by James Krenov. He is somewhat of a philosopher, like Eric Sloan, but also has some good practical advice in his books.

Les Cizek,
via email

Les,

“The Impractical Cabinetmaker” would surely be on a slightly longer list. There are simply too many excellent books, and too little space for text in that column! PWM

Megan Fitzpatrick, editor

ONLINE EXTRAS

Letters & Comments

At popularwoodworking.com/letters you’ll find reader questions and comments, as well as our editors’ responses.

We want to hear from you.

Popular Woodworking Magazine welcomes comments from readers. Published correspondence may be edited for length or style. All published letters become the property of Popular Woodworking Magazine.

Send your questions and comments via email to popwood@fwmedia.com, or by mail to 8469 Blue Ash Road, Suite 100, Cincinnati, OH 45236.



Highly Recommended

The closest running water to our shop is 150’ across the parking lot – that would make sharpening (I use ceramic stones) a pain were it not for the pressure sprayer bottle I keep filled at the sharpening station. A few pumps to amp up the pressure, and it’s easy to both wet the stones for use and spray off the swarf after honing and polishing. Check the garden section at the home center for a pressure spray bottle.

— Megan Fitzpatrick



Customer Service

How can I contact customer service with questions regarding my subscription, including a lost or damaged issue?

Visit popularwoodworking.com/customerservice. Or write to Popular Woodworking Magazine, P.O. Box 421751, Palm Coast, FL 32142-1751. Or, if you prefer the telephone, call 1-877-860-9140 (U.S. & Canada), 386-246-3369 (International) and a customer service representative will be happy to help you.

When does my subscription expire?

The date of your subscription expiration appears on your magazine mailing label, above your name. The date indicates the last issue in your subscription.

Can I get back issues of Popular Woodworking Magazine?

Back issues are available while supplies last. Visit popularwoodworking.com/backissues. Or if you know the exact month and year of the issue you want, call our customer service department toll-free at 855-840-5118 to order.

What if I want more information about the projects or tools I read about in Popular Woodworking Magazine? For all editorial questions, please write to Popular Woodworking Magazine, 8469 Blue Ash Road, Suite 100, Cincinnati, OH 45236. Or send an email to popwood@fwmedia.com.

Does Popular Woodworking Magazine offer group discounts?

Group discounts are available by special arrangement with the publisher. For more details, send an email to Debbie.Paoello@debbe.paoello@fwcommunity.com or call 513-531-2690 x11296.

Our Privacy Promise to You

We make portions of our customer list available to carefully screened companies that offer products and services we believe you may enjoy. If you do not want to receive offers and/or information, please let us know by contacting us at:

List Manager, F+W Media, Inc.
10161 Carver Road, Suite 200
Blue Ash, OH 45242

Safety Note

Safety is your responsibility. Manufacturers place safety devices on their equipment for a reason. In many photos you see in Popular Woodworking Magazine, these have been removed to provide clarity. In some cases we’ll use an awkward body position so you can better see what’s being demonstrated. Don’t copy us. Think about each procedure you’re going to perform beforehand.

Thicker. Faster. Stronger.



Triple Thick Poly: 1 coat



Traditional Poly: 3 coats

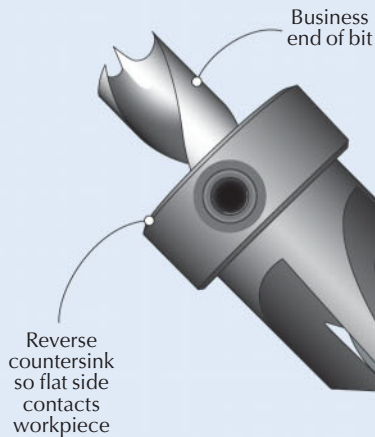
Get the durable finish you expect, faster than you can imagine. With new Varathane Triple Thick Polyurethane. Just one coat of Triple Thick has the strength and thickness of three coats of traditional polyurethane. With an advanced self-leveling formula that's perfect for interior horizontal and vertical surfaces. Get the protection. Get the beauty. And save your valuable time. Varathane Triple Thick Polyurethane. The Ultimate Finish In One Coat. **Staining123.com**

Varathane®



THE WINNER:

Use a Countersink As a Depth Stop



If you have an adjustable countersink bit (like the ones from Insty-Bit), you can loosen the set screw and pull the collar off, then flip it around so the flat side is facing the work. Tighten it where needed to limit your bit travel to the desired depth.

Brian MacAllister,
Salt Spring Island,
British Columbia

Keep Your Nozzles Clear

My projects often use just a small amount of spray lacquer or paint. The common rattle can is the easiest and most economical for this application. However, if I followed the manufacturers instructions to "Turn can upside down and spray until clear..." each time, I would run out of propellant long before the finish in the can was gone.

I found that taking the spray nozzle off the can, putting it on the end of that red straw that comes with a can of WD-40 and spraying that through the nozzle clears it; the nozzle requires no other care.

Before using the finish can again, I just spray a burst of finish on some scrap to clear the WD-40 from the nozzle.

I've been doing this for years and have never had a clogged nozzle or had any contamination of my finish.

Mel Turcanik,
Dodge Center, Minnesota

Plane-adjusting Hammer

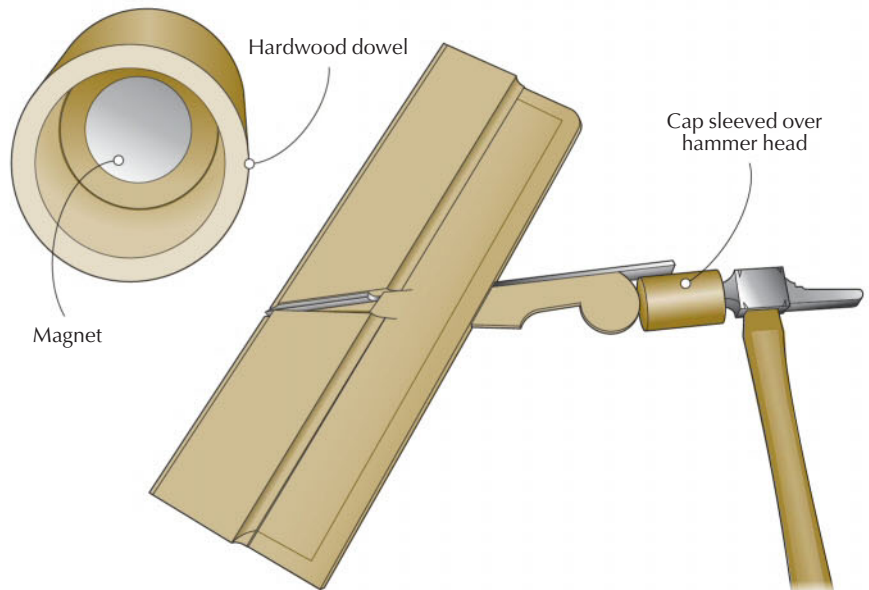
I recently have begun to acquire a few specialized wooden-bodied moulding planes. Not wanting to damage the wooden wedge when adjusting the plane, I began to look into either purchasing or making a dedicated hammer for this purpose.

I do have a nice Gramercy Tools small Kings County Cabinetmaker's Hammer (available at toolsforworkingwood.com) that I use for small adjustment taps on my metal-bodied planes; I wondered if I could make a modification for this same hammer to be used on my wooden-bodied planes.

What I came up with is a small hardwood cap that fits over the steel hammer head to cushion taps on the wooden wedges.

I made my cap out of cherry dowel (I had it on hand) – but it could also be easily turned. Dowel for my particular hammer is 1" diameter and drilled with a 3/4"-diameter hole in the end of the dowel to a depth of 3/4".

At the bottom of the hole, I drilled a recess for a 5/8"-diameter rare-earth magnet and used epoxy to attach it. It keeps the cap in place during the tapping. I left about 1/2" of solid wood under the magnet, enough for cushioning.



All in all, it was less than 10 minutes work and cost almost nothing. Now I have a multi-functioning plane-adjustment hammer that can be used for both metal- and wooden-bodied planes.

Lance Shields,
Salt Lake City, Utah

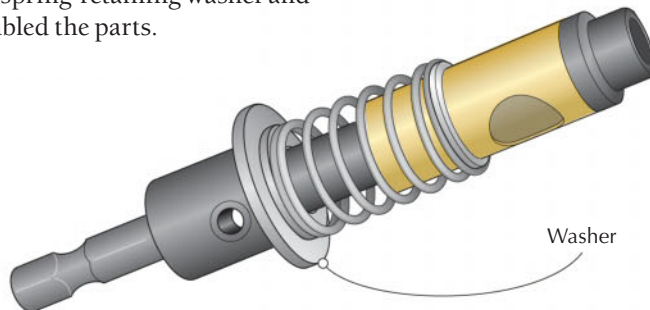
Tweak a Shelf-pin Hole Bit

Recently I was drilling shelf-pin holes on a bookcase I had just completed. The finish had already been applied and buffed out. It was essentially a completed project...or so I thought.

As I plunged the shelf-pin bit into the side panel, I realized that the bit was set from the factory to drill a $\frac{9}{16}$ "-deep hole. However, my shelf pin holes were located in the $\frac{1}{2}$ "-thick panels of my bookcase. Sure enough, the tip of the bit broke through my nicely finished project.

This is a mistake I don't intend to make again, so I modified the spring-loaded drill bit that came with my shelf-

pin jig. I removed the snap ring (also called an E-clip) from the drill-bit assembly. This allows you to remove the spring and the spring-retaining washer from the assembly. I then installed a common hardware store washer behind the spring-retaining washer and re-assembled the parts.



This modification limits the drill bit travel, so you will never drill shelf pin holes too deep.

Willie Sandry,
Camas, Washington

Kitty Litter Dehumidifiers

The costs of silica gel dehumidifiers (40g and 750g) are about \$8 to \$50, depending on the size. As my tool collection increases, my need for more of them became costly.

I found a good way of keeping such costs to a minimum by buying silica gel cat litter (Fresh Step Crystals, Nature's Miracle Just For Cats Easy Care Crystal Litter, etc.), and making a crystal-filled sack from panty-hose socks (the kind you get free from shoe stores when you try on shoes).

A jug of cat litter costs less than US\$20 – and with it you can make 10 dehumidifiers of 300 grams each, or 20 bags of 150 grams each, for tool storage and other household uses.

You can recharge the kitty litter by putting the gel bags in the microwave for 20 to 30 seconds.

And of course, you can size your gel bags to suit any space, from a large tool cabinet to a small tool chest to a small drawer.

Charles Mak,
Calgary, Alberta

Dual-purpose Shelving Solves Storage & Outfeed Problems

Space in my garage shop is at a premium, so not only is storage a challenge, I have no room for an outfeed table.

I found a simple solution to both problems: an industrial-grade wire shelf unit with six 15" x 45" shelves, on wheels.

The shelves are almost infinitely adjustable, so I set the middle one at the outfeed/infeed height for my table saw (and it could easily be set for any other machine). I keep that shelf cleared off, and simply wheel the unit into place when I need outfeed support.

On the other shelves, I store clamps (with bungee cords snugging the long ones in place) along with short pieces of wood and benchtop tools.

If I need more support than the 15" depth provides, I simply remove the long clamps I keep stored on both ends, then turn the unit sideways (though of course that limits me to a workpiece of about 14" wide, to fit between the uprights).

One caution: Store heavy items on the bottom shelves so the unit doesn't tip over when you're moving it. **PWM**

Thomas Stafford,
Eagle River, Alaska

ONLINE EXTRAS

For links to all online extras, go to:

■ popularwoodworking.com/jun16

TRICKS ONLINE: We post tricks from the past and film videos of some Tricks of the Trade in use in our shop. They're available online, free. Visit popularwoodworking.com/tricks to read and watch.

Our products are available online at:

■ ShopWoodworking.com

Cash and prizes for your tricks and tips!

Each issue we publish woodworking tips from our readers. Next issue's winner receives a \$250 gift certificate from Lee Valley Tools, good for any item in the catalog or on the web site (leevalley.com). (The tools pictured below are for illustration only and are not part of the prize.)

Runners-up each receive a check for \$50 to \$100. When submitting a trick, include your mailing address and phone number. All accepted entries become the property of *Popular Woodworking Magazine*. Send your trick by email to popwoodtricks@fwmedia.com, or mail it to Tricks of the Trade, *Popular Woodworking Magazine*, 8469 Blue Ash Road, Suite 100, Cincinnati, OH 45236.



Powermatic Table Saw Tenon Jig

No-measure setup delivers precise, repeatable tenons – fast.

If you cut a lot of tenons, the Powermatic Tenoning Jig (PM-TJ) is worth a close look. While it appears a bit complicated out of the box, the PM-TJ is remarkably easy to use and compatible with any standard table saw with a low-profile riving knife.

Set up the jig for your saw and blade using cam-lever stop No. 1, and index the tenon size by referencing stop NO. 2 off the width of your mortise chisel or hollow-chisel mortising bit. Then put your stock between the handle and the second stop, slide the handle flush to the stock and lock it in place.

Raise your table saw blade to the desired height, and you're ready to cut tenons that perfectly fit the width of the mortises cut with the chisel you used for indexing. (Perhaps obviously, you have to cut the shoulders with the work flat to the saw – this jig is slick, but it doesn't do everything.)

The initial assembly and setup was easy thanks to the detailed directions, and Powermatic thoughtfully includes the necessary tools.

It took me about 5 minutes to get the miter guide bar attached and square the jig to the blade, to attach the stock clamp (which slides in a T-track), to confirm that the angle guide was at a perfect 90°, and make a few minor adjustments to get everything in perfect working order for dead-on tenons. There are micro-adjust features that make this fine-tuning simple.

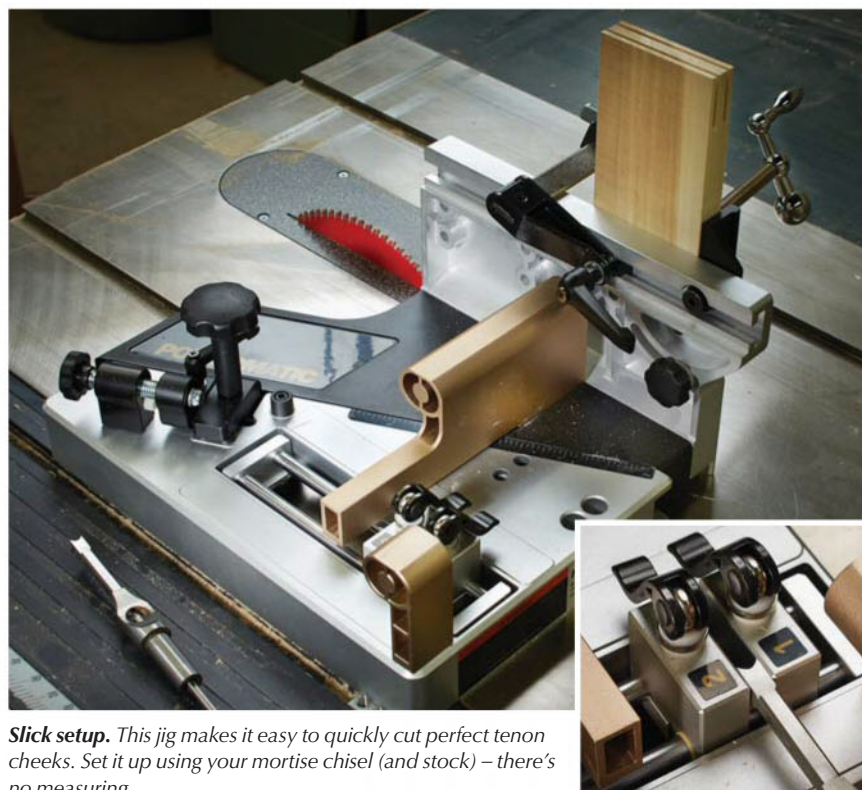
PM-TJ Tenoning Jig

Powermatic ■ powermatic.com or
888-804-7129

Street price ■ from \$329.99

■ VIDEO Watch a short video on setting up this tenoning jig.

Prices correct at time of publication.



Slick setup. This jig makes it easy to quickly cut perfect tenon cheeks. Set it up using your mortise chisel (and stock) – there's no measuring.

It took a little longer (maybe 10 minutes) to cement the tenon setup procedures in my head, but once I ran through the indexing process a few times it all clicked – and I realized just how clever and useful this jig is, particularly for production work.

And the PM-TJ is plenty robust enough for a production environment. It's well machined, mostly of aluminum and steel, weighs in at 17 pounds and slides smoothly in the miter gauge slot.

The fence is 9⁹/₁₆" x 6¹/₄" tall – plenty large enough for most work – but there are tapped holes that make it easy to add an auxiliary fence if need be.

The one thing I don't love is the adjustable clamp (which holds a workpiece up to 3⁷/₈" thick); the foot is grabby, so if you're not careful, it's easy during

tightening to move the workpiece away from the angle guide (which also serves as a backstop for the work). A firm grip is needed to keep the work properly aligned while clamping.

And speaking of that angle guide: While most tenons are cut at 90°, the jig also allows you to make cuts up to a 45° angle.

Do you need a \$330 jig if you have only a couple tenons to cut on occasion? Nope. But it's incredibly fast work to set up for tenons of any width indexing off any chisel, and to center the cut on the stock with no measuring. So if you're in a production environment, or simply build a lot of projects with mortise-and-tenon joinery, the PM-TJ will quickly pay for itself.

—Megan Fitzpatrick

CONTINUED ON PAGE 18

**Maximum Strength
Maximum Control**



Get Control with the Strongest,
Stiffest Fret Saws on Earth
Available in
Titanium or Aluminum

www.knewconcepts.com

CARD #60 or go to PWFREEINFO.COM



**NEW LOCATION
WALK-INS
WELCOME**

1405 Deborah Herman Rd., Conover, NC 28613

We have expanded our inventory of unique
slabs/filitches to include: African Mahogany,
African Teak, Bocote, Granadillo, Guanacaste,
Madre Cacao, Olivewood, Primavera,
Purpleheart, Sapele and Waterfall Bubinga

230 South Clinton Street, Olean New York 14760
Phone: 716-373-6434

Email: support@westpennhardwoods.com

Visit our Website:

www.westpennhardwoods.com

CARD #126 or go to PWFREEINFO.COM

From Lignomat
Pin and Pinless

**Moisture
Meters**

Avoid
Shrinking
Warping
Cracking
Cupping

Buy Quality, Accuracy, Reliability
and Professional Customer Service.



**2-Year
Warranty!**

??? Check out the info Web-site
www.wood-moisture.com

800-227-2105
Call today for more info.
www.Lignomat.com

CARD #124 or go to PWFREEINFO.COM

STEVE WALL LUMBER CO.

Quality Hardwoods and Plywood For The
Craftsmen and Educational Institutions

Alder.....	4/4	Select	3.30
Ash.....	4/4	Select	2.60
Basswood.....	4/4	Select	1.95
Birch.....	4/4	Select	3.50
Butternut.....	4/4	1C	3.25
Cedar.....	4/4	1C+Btr.	2.00
Cherry.....	4/4	Select	4.90
Cypress.....	4/4	Select	2.75
Hickory Pecan.....	4/4	Select	3.00
Mahogany (Genuine).....	4/4	Select	5.10
Maple (Hard).....	4/4	Select	3.65
Maple (Soft).....	4/4	Select	2.60
Oak (Red).....	4/4	Select	2.80
Oak (White).....	4/4	QS	2.90
Poplar.....	4/4	Select	1.80
Walnut.....	4/4	Select	5.75
White Pine (Soft).....	4/4	F.G.	1.40
Yellow Pine (Soft).....	4/4	Clear	2.20

Above prices are for 100' quantities of kiln dried rough
lumber sold by the Bd. Ft. FOB Mayodan, NC. Call for
quantity discounts. Other sizes and grades available.

UPS Specials	\$ 90.00
	\$101.00
	\$ 91.00
	\$115.00
	\$ 98.00
	\$ 85.00
	\$129.00
	\$ 97.00
	\$108.00
	\$122.00
	\$116.00
	\$ 95.00
	\$105.00
	\$105.00
	\$ 85.00
	\$125.00
	\$ 78.00
	\$ 90.00

SEE OUR
CATALOG ON
THE WEB!

Above prices are 20 bd. ft. bundles of clear kiln
dried lumber 3"-10" wide • 3'-5' long (Random
widths & lengths) Surfaced 2 sides or rough. Delivered
Ground prepaid in the Continental U.S.

OLIVER MACHINERY DEALER

HARDWOOD PLYWOOD

CUSTOM RAISED PANEL DOORS

CUSTOM PLANK HRDWD FLOORING

THIN CRAFTWOOD

EXOTIC LUMBER

**STEVE H. WALL
LUMBER CO.**

BOX 287
MAYODAN, N.C. 27027

336-427-0637
1-800-633-4062

FAX 336-427-7588

Email: woodsales@walllumber.com
Website: www.walllumber.com

Send \$1.00 For Lumber Catalog
Prices Subject to Change Without Notice

CARD #47 or go to PWFREEINFO.COM



**YOU TAKE PRIDE IN
MAKING SOMETHING THAT
LASTS. SO DO WE.**



You're all about building things that stand
the test of time. So you'll appreciate the
left-tilt 10" Cabinet Saw (50-270KDL) with
precision ground cast-iron table and the
Deluxe Excalibur multi-position rip fence.
Custom safety features include
quick-remove blade guard and anti-kickback
pawls, and stand-alone European style riving
knife. Add the easy to install Excalibur Blade Cover that
removes sawdust from above, immediately as it comes off the blade.

To learn more about our entire line of woodworking tools,
visit your nearest dealer or www.general.ca.



General® International USA Inc., 760 Jessica St., Murfreesboro, TN 37130

CARD #17 or go to PWFREEINFO.COM

J. Wilding Moving Fillister Plane

Vintage moving fillister planes are easy to find but can be tricky to restore because of all the moving parts and the general wear and tear these tools endure. If you don't want to buy a metal moving fillister, then I highly recommend you check out the work of Jeremiah Wilding, a young planemaker who specializes in 18th-century style planes.

During the last year I have put a handful of his planes to work and have been impressed with the way they function and look—his attention to detail is impressive. This year, Wilding loaned me a moving fillister plane—a design he

had been working on for some time.

It is nothing short of perfect. Wilding managed to engineer out two flaws of many moving fillisters—their tendency to clog in heavy cuts and the fact that the fence-locking mechanism wears out prematurely.

The fence locks down using machine screws and threaded inserts. And the geometry of the escapement, wedge and body of the plane makes the shavings shoot out of the tool in use.

The body is maple with persimmon boxing and a persimmon wedge to secure the cross-grain nicker. The tapered iron is O1 steel, skewed to make clean cross-grain rabbets and can cut a 1"-wide rabbet. The depth stop moves via a brass thumbscrew and locks with a steel screw. Try as I might, I could not make the depth stop slip.



Above and beyond all the functional bits, the woodwork on this plane is spectacular. Unlike many 19th-century wooden planes, Wilding's are exquisitely detailed with beautiful wide chamfers and ogees decorating the body of the tool.

All in all, it's one of the finest wooden planes I've ever used. Highly recommended.

— Christopher Schwarz

J. Wilding Moving Fillister

J. Wilding ■ jwildingplanemaker.com

Street price ■ \$495

■ **BLOG** Read about the author's test drive of other J. Wilding planes.

Price correct at time of publication.

Lee Valley Tools Glue Pot & Tabletop Warmer

This stainless steel replica of a late 19th-century double-boiler cast iron glue pot from Landers, Frary & Clark is both cute and useful—despite its diminutive size (3" diameter x 2³/₈" height).

The outer pot holds 2¹/₂ fluid ounces of water to keep the contents of the inner pot from scorching when it's on a heat source (the warmer). But scald the pot first with boiling water (like you would a teapot), then fill it with hot water and it will keep hot hide glue in the inner pot warm enough to use for a time after you remove it from the

heat source (the amount of time will vary based on ambient temperature).

The removable inner pot holds about 1 fluid ounce of glue—which is the right amount for a face frame glue-up, or for a small case project such as spice box or jewelry box.

Fill up the inner pot about one-third with hot hide glue pearls and soak them overnight, then fill the outer pot with water (hot water will make it warm faster), put the double boiler on the warmer, and the glue will be ready to use in about 45 minutes.

But this little pot is also handy when using Titebond's liquid hide glue in colder temperatures (such as my shop at home, which is at best 50° in the winter) or Patrick Edwards' Old Brown Glue (which must be warmed before use). Again, with water in the outer pot, squeeze some liquid hide from the bottle into the inner pot, and the



glue will quickly heat to a usable viscosity and stay there—unlike with my usual technique of plunking the bottle in a bowl of hot water, which quickly cools. **PWM**

— MF

Glue Pot & Warmer

Lee Valley ■ leevalley.com or 800-871-8158

Street price ■ \$34.50

■ **ARTICLE** Read what Bob Flexner has to say about the pros and cons of hot hide glue.

Price correct at time of publication.

EXCLUSIVE OFFER!
SAVE 10%
off your next purchase



BOOKS • MAGAZINES • WEBINARS
• EDUCATIONAL PRODUCTS
CDS/DVDS • RESOURCES
• PROJECTS • AND MUCH MORE!

Enter code **WOODPUB10** at check-out and
SAVE 10% off educational products,
resources, projects and more. From the
same great providers of education, articles
and inspiration you experience reading
Popular Woodworking Magazine, check out
ShopWoodworking.com and save now!

ShopWoodworking.com

WOODPUB10

Promo Code Exclusions Apply: Your special discount/coupon code will allow you to take 10% OFF many (not all) of the items you find at ShopWoodworking.com. Your discount/coupon code is not valid for purchasing gift cards, subscriptions, pre-orders, value packs, VIP memberships, or items that ship directly from manufacturers. Discounts cannot be applied to previous purchases. Valid for one use per customer only. Other exclusions may apply.

DO IT ALL WITH A SUPERMAX 19-38

19-38 DRUM SANDER

Engineered for ease-of-use and maximum functionality, the 19-38 can tackle any sanding job in your shop!



MACHINE OVERVIEW

- ◆ Sand 19" in a single pass, 38" in a double pass!
- ◆ Sand as thin as 1/32", as thick as 4", as short as 2-1/4"
- ◆ INTELLISAND Technology auto-regulates the conveyor speed, preventing gouging, burning or damaging stock!
- ◆ Power requirements 110 Volt, 20 AMP service



**SuperMax
Tools**

SuperMaxTools.com 888.454.3401

CARD #121 or go to PWFREEINFO.COM

Ideas that Jump Off the Page

Isometric views help keep your designs grounded.

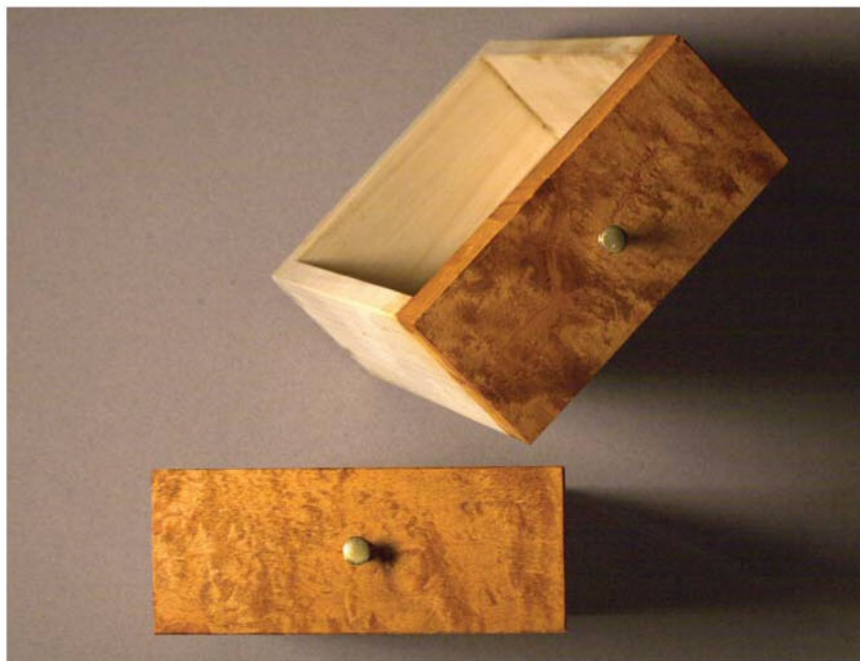
The kite leapt into the wind and I frantically uncoiled string that burned and chafed my hands and fingers. The thin wooden crossbeams bent almost to the breaking point again and again as the wind buffeted the kite, until finally it soared to a height where the breezes were perfect. Up in that zone of sweet steady air, just a twitch on the line made the kite dance and dive. I lost track of time until finally the light failed—and with it one perfect day from my boyhood.

Design can be a lot like flying a kite. All sorts of things can make it go haywire: too much wind; not enough wind; broken string; trees and power lines. Yet when you slip into that creative zone, it can be one of the most satisfying parts of the craft.

There are no magic formulas or equations that can make your ideas fly, but there are some techniques that can help. Among them is to learn to render your designs in an isometric drawing.

The isometric drawing is unique because it helps your eye visualize an idea in space. While not a true perspective image that connects lines back to a distant focal point, it still helps to form a valuable image to push your design forward to completion. The beauty of an isometric view is that it also keeps proportions intact from earlier two-dimensional front or side view drawings, and helps you cross an important bridge where you can judge whether the design is unified.

I'll be clear about this: The isometric, or "iso," drawing is not the first arrow I reach for in my design quiver. Long before I take that step, I use quick rough sketches to get a general shape of the idea (I wrote about that in the December 2015 issue, #222). From there I move to simple two-dimensional front



Choose one. Which view of these two small drawers gives a better sense of the space?

and side drawings that do much of the heavy lifting to flesh out a design.

Front- and side-view drawings help to organize a design both vertically and horizontally, and begin the process of visualization. These two-dimensional drawings focus on proportions and how

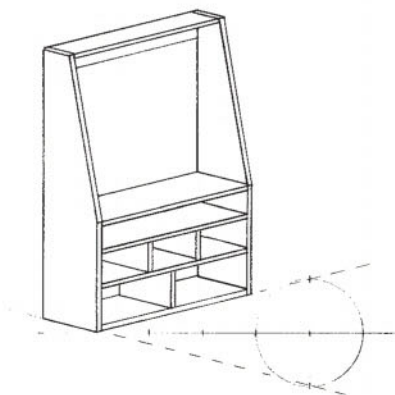
each part fits into the whole.

Yet there is only so far you can take a design with two-dimensional views. We don't live with objects in two dimensions, and how we relate to them in space can only be seen in three. Thus an iso view can give us that layer of depth to make confident design decisions.

Magic of the Penciled Line

You might already use digital drawing programs that can generate perspective views with the click of a mouse. Many of these can be a valuable design tool and I would never discourage their use.

But I do know from experience that there are tactile connections formed in the inner eye by walking through this simple process with a pencil, compass and straightedge. Don't shortchange this development of your eye even if you already use or plan on using a digital drawing program. There are



In space. With this isometric drawing, we are on the final stretch run in the design process; we see it occupy space.

CONTINUED ON PAGE 22



I CAN DO THAT

New Video Series!

Learn the simple skills and tools you need to build great-looking projects in our new "I Can Do That" video series, with host Chad Stanton. Each episode is free on the PWM site for four weeks.



Plus, you'll find articles from the magazine, and the downloadable ICDDT manual. It's all free at:
**popularwoodworking.com/
icandothat**

sponsored by

WOODCRAFT®



800-472-6950

What can we help you make today?

WOODLINE

Quality Carbide Router Bits,
Shaper Cutters & More

www.woodline.com

Free shipping on orders
over \$50.



Also a distributor of



Our bowl & tray bits and more than 60 styles of templates will have you making unique gifts that will surely be appreciated.



Made in

USA

Visit the "INSTRUCTIONS" tab on our website and we'll show you how easy it is.



You **CAN** make this clock with your router! Deluxe kits including pin router, templates, bit, wood and instructions
ONLY \$249

Made in

USA



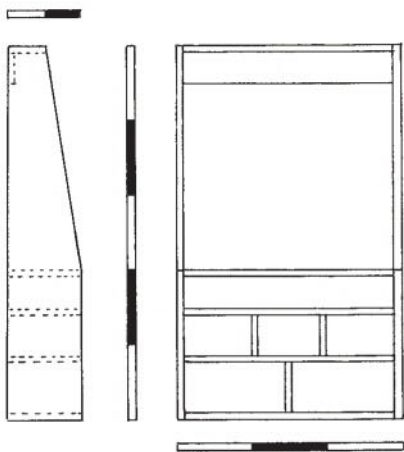
Use the pin router to duplicate the provided patterns.



Wood kits are now
available in 8 species.

Request or view
a catalog online or visit
us at

www.woodline.com



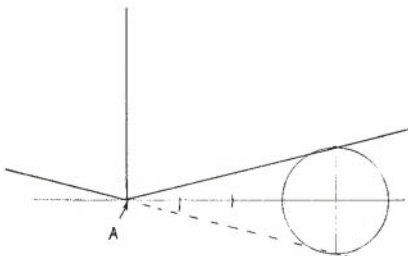
A look at proportions. Simple front and side views solidify our rough sketches and begin to refine proportions.

some powerful links you can forge in your brain that only come off the end of your pencil.

I mentioned earlier that this method does not produce true perspective where the lines project back to an imaginary vanishing point. That's useful in architectural drawings of large objects such as buildings, but not as critical in smaller objects such as furniture. We can still render an image that gives us a sense of depth without the added complications of a vanishing point. It's not necessary for our purposes.

When to Use an Iso Drawing

Iso drawings have little practical value when it comes to actually executing a build. Instead, their role is to refine an idea and bring it to maturity. It's usually one of the final drawing steps before building a mock-up or scaling up a set of full-size drawings. The iso



Compass power. There's no fancy equipment or software needed. Just step out four steps from the spring point (A) and scribe a circle.

acts a marker to confirm whether we are on the right path or need to back up and restart. Better to correct our direction with a small-scale iso, then proceed with a mock-up or full-scale drawing that's at least in the ballpark.

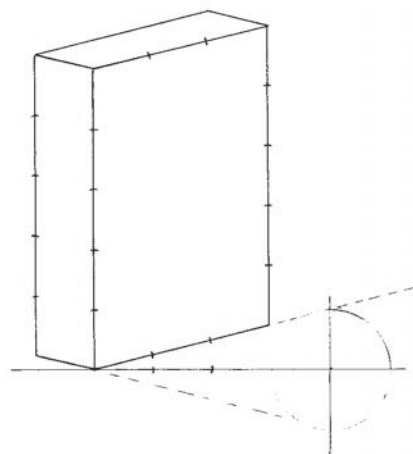
Pull Out Your Drawing Kit

Assuming we already have a front and side view completed, now it's time to see them in perspective. Those front and side drawings are organized around simple proportions that we will transfer to our iso drawing. The basic shape underlying a façade (front view) drawing is often a rectangle governed by a simple ratio.

In our example, the rectangle underlying this tool rack is three parts wide by five parts high, while the side view is one part deep by five parts high. In traditional design, the common part shared in these ratios is called the "module" from which all the proportions are linked.

Take a compass and set it to the module and we are ready to transfer it to our iso. Begin the drawing by penciling in a horizontal line then a vertical line touching it. The point (A) where these two meet is the corner from where our perspective lines spring.

Using the compass still set at the module, step out four times in one



3D consideration. With baselines established we can use our simple proportions to draw a framework to flesh out our design in three dimensions.

direction from our spring point and anchor the point of the compass in the fourth mark. Leave the compass at the same setting and swing a reference circle.

Next, extend a line from the north pole of the circle back to and through the spring point. Then draw a second line that extends from the south pole back through our spring point.

These two lines now extend up at an angle from the spring point and become the baselines that connect both front and side views.

Now use the module on the compass to transfer the ratio of the governing rectangle from the façade view onto this new baseline and vertical, three parts over on the baseline and five parts up on the vertical. Do the same with the ratio from our side view and establish a framework in perspective that you can render the details from both your front and side views, always keeping the proportions intact.

Confirm or Deny

Once you have drawn your idea, it might encourage you that you are on the right track – or you may see that your kite is snagged hopelessly in a tree. Both outcomes can be successful if you heed what your eye is telling you and listen to your instincts. **PWM**

George is the author of two design DVDs (Lie-Nielsen Toolworks) and writer of the Design Matters and By Hand & Eye blogs.

ONLINE EXTRAS

For links to all these online extras, go to:

■ popularwoodworking.com/jun16

BLOG: Read more from George R. Walker on his Design Matters and By Hand & Eye blogs.

IN OUR STORE: George R. Walker's DVDs.

Our products are available online at:

■ ShopWoodworking.com

About This Column



Design Matters dives into the basics of proportions, forms, contrast and composition to give you the skill to tackle furniture design challenges with confidence.

UNIQUE SOLUTIONS



Other Products We Offer

- 6-mil Poly Bags
- Quick Release Hose Clamps
- Self Adhesive Foam Gasket
- Custom Transfer Sleeves
- Cartridge Filters



Our Dust Bags Feature

- Optimum Performance
- 1-Micron Filtration
- Custom Designs
- Cleaner Air
- Longer Life

Free Design Assistance for All Custom Made Dust Bags

AMERICAN FABRIC FILTER CO.

www.americanfabricfilter.com • Phone: 800-367-3591 • Info@americanfabricfilter.com

CARD #66 or go to PWFREEINFO.COM

Custom Branding Irons

Distinctive marking for your craft



P: 586.484.7713 • www.branding-irons.biz

CARD #93 or go to PWFREEINFO.COM



98% of Orders Ship
within 2 Business Days!

Build the Perfect Farmhouse Table



Dining, Coffee & End Table Heights
Matching Bench Legs
Same Day Shipping Available

1.866.963.5576 www.customlegs.com

CARD #36 or go to PWFREEINFO.COM

Forrest Blades

For building cabinets and fine furniture, nothing beats Forrest saw blades.

Craftsmen appreciate the way our blades deliver smooth, quiet cuts without splintering, scratching, or tearouts. They know our unique grade C-4 micrograin carbide, proprietary manufacturing process, and hand straightening produce exceptional results. In fact, independent tests rate us #1 for rip cuts and crosscuts.

"From the first cut on, I realized that this blade was a bargain at any price! Nothing else I have cuts comparably."

Calvin Brodie, Spanaway, WA

NEW
Website!
More
Blades!



Order from any Forrest dealer or retailer, online, or by calling directly. Our blades are manufactured in the U.S.A. and backed by our 30-day, money-back guarantee.

Forrest Quality Shows

Woodworker II—Best rated, all-purpose blade for rips and crosscuts.

Chop Master—Perfect for tight, perfectly cut miter joints without splinters.

Woodworker II
Fine Woodworking

Chop Master
Woodshop News

Duraline Hi-AT
Woodshop News

Dado King
WOOD Magazine



© 2016 Forrest Manufacturing

Code PW

CARD #13 or go to PWFREEINFO.COM

Our Annual
Hardware
Catalog is
Available
Online.



View the full catalog online at www.leevalley.com or download it to the Lee Valley Library app for iPad®, iPod®, iPhone® or Android™ devices.

1-800-683-8170 www.leevalley.com



Lee Valley

Find us on:



CARD #28 or go to PWFREEINFO.COM

Woodworking in America

SEPTEMBER 16-18, 2016
CINCINNATI, OH

**Registration now open
for your 2016 woodworking getaway!**

***Popular Woodworking Magazine* brings the ultimate woodworking weekend to you!**

- Talk shop with dozens of power tool vendors, woodworking suppliers, hand tool makers and browse the best—all under one roof
- Enjoy in-depth sessions on joinery, furniture design, tool techniques, finishing and more
- Learn new techniques, directly from woodworking's legends and masters of the craft



Save your seat—register today!

WOODWORKINGINAMERICA.COM

Get connected:   

 **f/w events**
a community of passionate woodworkers

Titebond®
THE PRO'S ADVANTAGE™

The Experts **Trust** Titebond®



I've been using Titebond wood glues on my custom projects and in my woodworking classes for years. I rely on Titebond for many different applications. Whether for indoor or outdoor use, I've never had a glue joint failure. I trust the performance from Titebond for all my projects.

George Vondriska

WoodWorkers Guild of America
Vondriska Woodworks



See George discuss gluing tips and woodworking techniques at www.goa.com.

Titebond offers the most comprehensive assortment of glues for bonding wood, including Titebond III Ultimate Wood Glue. For more information on the right glue for your next project, visit titebond.com or call 1.800.347.4583.



Medicine Cabinet

BY MEGAN FITZPATRICK

A slick technique makes the divided-light door a snap.





Efficient setup. I decided on $\frac{5}{8}$ "-thick backboards and a $\frac{5}{8}$ "-thick fixed shelf. That allowed me cut both the rabbet for the backboard (left) and the dado for the shelf (right) with one dado stack setup at the table saw. (I used a similar setup later to cut shiplap joints in the backboards.)

In 2008, I built a contemporary maple chimney cupboard to hold towels in my bathroom. Eight years on, I decided it was time for a matching medicine cabinet—in large part because the house I recently bought has solid masonry walls, so I needed a nice-looking mirrored cabinet that can hang on the wall rather than be recessed.

So, using that 2008 piece as a starting point, along with a similar piece that hangs in a friend's bathroom, here's what I came up with: a simple-to-make maple medicine cabinet that takes its cues from Arts & Crafts, but with joinery and style details that give it contemporary appeal.

Case Construction

When I initially modeled this cabinet in SketchUp, I used dovetails to join the carcass. But when it came time to build, I decided to use loose tenons instead. The resulting clean lines on the sides (no end grain) seem more in tune with an updated look, and loose tenons are plenty strong enough for this application.

But there is, of course, no reason you couldn't use dovetails (tails on the sides), or even dowel joints.

The Festool Domino, however, plus a trick for the divided-light glass door I picked up from David T. Smith (more on that later), allowed me to make this piece in about 12 hours of shop time.

After surfacing and cutting my four case pieces to size (note that the top and bottom are $\frac{5}{8}$ " narrower than the sides), I set up a dado stack on the table saw to cut $\frac{5}{8}$ "-deep x $\frac{1}{2}$ "-wide rabbets on the case sides to house the backboards.

I then laid out the shelf location on

both side pieces so the shelf will be hidden behind the medial rail of the door, and lowered the blades to cut $\frac{5}{8}$ "-wide x $\frac{1}{4}$ "-deep dados.

After checking to ensure the shelf dados lined up across the two side pieces, I laid out the locations of the Dominos.

To do this, butt the matching corners of the sides and top/bottom pieces together, make sure they're perfectly aligned on the front edges, then mark across the end grain of both pieces wherever you want a loose tenon (I



Domino layout. Make sure your lines match up and you can see them—layout (and good cuts) are key to a smooth glue-up.



Get a grip. Ignore that thing that looks like a handle at the back of the Festool Domino. If you grip there while plunging the tool, you're more likely to tip off horizontal. Concentrate on keeping the fence registered flat to the workpiece with your off hand; grip loosely at the base of the cord connection with your dominant hand and push forward.

decided on three at each corner—overkill, really). Separate the pieces, then carefully carry the lines around to the mating surfaces.

The Festool Domino, which is sort of a combination plunge-cut drill and biscuit joiner, can be adjusted for a tight mortise, a slightly less-tight mortise and a loose mortise. At the front edge of every corner, I set the cutter for a tight mortise; for the other two, I changed to the medium mortise (which is but a millimeter or two wider). This ensures that at glue-up, the front edges are perfectly aligned but there's just enough play in the middle and back mortises to get everything together easily.

Now cut the shelf to size and fit it to its dados. I like to plane underneath just at the ends if things are too tight. You're (hopefully) removing such a small amount of material that it's not noticeable to the naked eye.

The last task before gluing up the carcass is to lay out and drill shelf-pin holes for an adjustable shelf. I used a pair of dividers to walk off the hole locations about $\frac{5}{8}$ " off the front and rabbeted edges; the holes are spaced 1" on center. I decided (based on the size of some of my toiletries) on five possible shelf locations in the bottom section



Pinch. While cutting the mortises on the inside face of the sides, it's a bit more difficult to register the fence flat. Extend the support surface for the fence by butting the two sides together (which in this case provides and extra $\frac{3}{4}$ " of bearing surface), and pinch the fence to the work with your off hand.

of the carcase. Your needs may vary.

I then used a drill press to drill $\frac{1}{4}$ "-diameter x $\frac{3}{8}$ " deep holes.

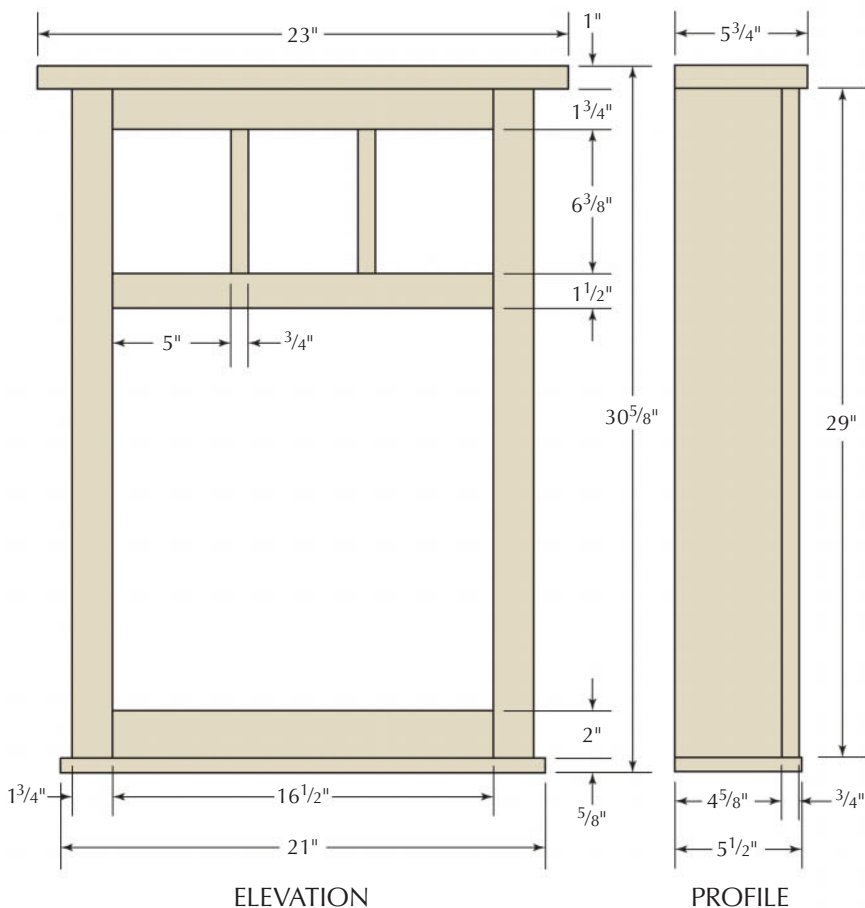
Clean up the interior surfaces of the case, and the top and bottom of the shelf. I used a smoothing plane, though a random-orbit sander works

perfectly well, too.

Start the glue-up by painting glue on the loose tenons and inserting them into one of the side pieces (the tight-fitting tenons at the front edges will require some gentle persuasion), then attach the top and bottom. Add glue

in the shelf dado and put the shelf in place, then glue the other side piece in place on the Dominos, and clamp across the width at the shelf, top and bottom.

Note: Hide glue is more slippery than PVA – I find it makes glue-ups (and cleanup) easier.



Beaded Backboards

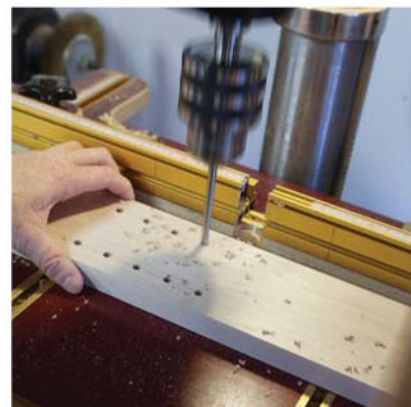
Set the carcase aside for the glue to dry, and move on to the backboards.

Typically, I like painted backboards, but to my eye, that didn't work with this aesthetic. So I used the last of the maple I had in my stash (one of which was a cantankerous piece indeed) to cut a three-piece back with shiplapped joints. And because the table saw was still set up with a $\frac{5}{8}$ "-wide dado stack, the shiplaps are $\frac{5}{8}$ " wide. This build is all about efficiency.

But that doesn't mean I was willing to eschew a traditional bead on the edges – I'll be looking at the interior at least twice every day – might as well enjoy the view.

As I noted earlier, the top and bottom of the carcase are narrower than the sides by the width of the backboard rabbet – that's to allow the backboards to run from top to bottom, so they can be secured to the back edges of the top and bottom.

I drilled countersinks and pilot holes – two at each corner of each of the three backboards, top and bottom,



Level. A drill press makes quick and perfect vertical work of drilling the shelf-pin holes. But if you don't have a drill press, these can easily be drilled by hand – and there are dedicated shelf-pin bits that limit the depth and center the hole, available at any woodworking store.

Medicine Cabinet

NO.	ITEM	DIMENSIONS (INCHES)			MATERIAL	COMMENTS
		T	W	L		
❑ 2	Sides	$\frac{3}{4}$	$4\frac{5}{8}$	29	Maple	
❑ 2	Carcase top/bottom	$\frac{3}{4}$	4	$18\frac{1}{2}$	Maple	
❑ 1	Shelf	$\frac{5}{8}$	4	19	Maple	
❑ 1	Top	1	$5\frac{3}{4}$	23	Maple	
❑ 1	Bottom	$\frac{5}{8}$	$5\frac{1}{2}$	21	Maple	
❑ 3	Backboards	$\frac{5}{8}$	$7\frac{1}{8}$	29	Maple	Shiplap, trim to fit
❑ 2	Stiles	$\frac{3}{4}$	$1\frac{3}{4}$	29	Maple	
❑ 1	Top rail	$\frac{3}{4}$	$1\frac{3}{4}$	$16\frac{1}{2}$	Maple	
❑ 1	Medial rail	$\frac{3}{4}$	$1\frac{1}{2}$	$16\frac{1}{2}$	Maple	
❑ 1	Bottom rail	$\frac{3}{4}$	2	$16\frac{1}{2}$	Maple	
❑ 2	Back bars	$\frac{1}{4}$	$\frac{1}{2}$	$7\frac{1}{4}$	Maple	Oversized, shoot to fit
❑ 2	Muntins	$\frac{1}{4}$	$\frac{3}{4}$	$6\frac{1}{2}$	Maple	Oversized, shoot to fit
❑ 1	Glazing strips	$\frac{3}{8}$	$\frac{1}{4}$	164	Maple	Cut lengths to fit

Beaded. After planing the face of the backboards smooth, I cut a $\frac{3}{16}$ " bead where the shiplap joints meet. Note that the bead is cut on the full $\frac{5}{8}$ " thickness, not on the rabbeted surface of the mating piece.



and used 1" x #8 screws (#6 would do, but I didn't have any at hand) to secure the backboards in place. I reamed slightly all but the four corner holes to allow the backboards to expand and contract with seasonal movement (not to mention the constantly fluctuating humidity of a bathroom).

I also used four screws on each of the two outside edges—be careful there; it's all too easy to poke through the side when drilling into the rabbet.

Divided Door

The door is joined with one Domino at each corner, and one at each end of the medial rail. Again, take the time to get the layout right and register properly on your marks before making the cuts. After the glue dries, rout a $\frac{1}{2}$ "-deep x $\frac{3}{8}$ "-wide rabbet on all four edges of each opening, and square the corners with a chisel.

Now comes the fun part—Smith's quick and clever method for dividing a door—it's most effective for flat muntins, which don't require coping. Each divider is simply two pieces of wood—a front piece, which I'm calling the muntin, and a back bar (or retainer strip) that sits in the rabbet.

First, use dividers to lay out the approximate locations of the two muntins

in the rabbet, top and bottom (it's approximate because the final locations will shift a tad in relation to the width of your muntin stock).

Now prepare enough $\frac{1}{4}$ "-thick stock for the two back bars, plus a piece or two extra, just in case. The width should match (or be just a little proud) of the depth of the rabbet—so in this case, $\frac{1}{2}$ ".

Cut two pieces just a hair overlong, then shoot the length for a perfect fit, and mark a centerline at the top and bottom of each piece.

With the back bars dry-fit, cut the $\frac{1}{4}$ "-thick stock for the muntins (those



Screwed. A screw at each corner (reamed slightly to allow for movement) will keep the back in place. Note the tearout...that would be the cantankerous board I mentioned. The front is smooth; that'll do.

need to match the thickness of the frame in front of the rabbets).

Again you're going for a perfect fit—any gaps will be noticeable.

Now dry-fit the muntins behind the back bars and shift things as needed to get three equal-sized openings. Mark that location on the top and bottom of the opening so you can easily line up



Rout it out. A rabbeting bit and router makes quick (if messy and loud) work of cutting rabbets, but you do have to square the corners with a chisel...or cut your glass with round corners.



SUPPLIES

Horton Brasses

horton-brasses.com or 800-754-9127

1 pair ■ Butt hinges, satin nickel
#PB-408, \$21.50/pr.

1 ■ Round ring pull, satin nickel
#RP-4, \$15.50

Prices correct at time of publication.



Press fit. You want the back bars (or retainer strips) to fit tightly top to bottom in the rabbet. A shooting plane will help you sneak up on the perfect fit.



Pin it. Put a dab of glue in the rabbet, then pin the strips in place. Note: I'm merely holding the muntin in place here with my fingers.

the centerline on the back bars.

Put a dab of glue in the rabbet, then pin the back bars in place.

Flip the door, put a thin bead of glue on the front of the back bar, and center the muntin on it. This long-grain to long-grain glue-up will be plenty strong enough to hold the glass in place.

Top & Bottom

My original design had a coved top to match my chimney cupboard; that shifted in my head to a bevel on the underside as I put together the carcass. So, I cut the top to size, then placed it on top of the carcass to determine where the bevel should terminate. But then I stepped back to have a better overall look at the thing, and realized I liked how the square edges pick up the lines of the flat muntins.

So square edges it is for me – but don't hesitate to add a bevel or moulded edge if you like; that would lighten the cabinet both in looks and actual weight (and a cove would give it a more traditional look).

I finish-planed the top and bottom, then simply glued them in place and clamped them to dry. There's a lot of glue surface; they aren't going anywhere.

I then fit the door with a reveal of about $\frac{1}{16}$ " at the top and bottom, and installed the pull and butt hinges. (See "Hinge Installation" at right if you need help with that process.) I prefer silver over gold tones, so I opted for a satin nickel finish on my hinges and pull; I think dark antique, or even black iron,



Glue it. Glue each muntin to its retainer strip, then secure spring clamps at the top and bottom of each muntin to hold them in place until the glue sets.

would also look nice.

Remove the hardware for finishing.

Finish Details

Ideally, I'd have finish-planed the door pieces before assembly...but I got over-eager to move forward on the build and forgot. So that meant sanding. I started with #80 grit and worked up to #180 grit.

With all visible-to-my-naked-eyes scratches removed, I used a rag dampened with alcohol both to remove the dust, and so I could more easily see if there were any machine marks or plane tracks that I missed. (There is little more disheartening in woodworking than putting on a coat of finish only to have it call attention to a faulty surface.)

The finish is simply three sprayed coats of pre-catalyzed lacquer (which I'll keep a close eye on and recoat if necessary – polyurethane would be better for a bathroom, but I don't like the look). After the final coat dried, I rubbed



Glazed. Thin strips of maple hold the glass in place and provide a clean look on the interior.

"It is only one's thoughts that fill a room with something more than furniture."

—Wallace Stevens (1879-1955),
American insurance executive & poet

down all the surfaces (OK – maybe I skipped the back of the backboards) with a grey Scotch-Brite pad to remove dust nibs and to make the surface feel silky-smooth.

But wait – you still have to install the glass.

Both the mirror and the three clear glass panels are $\frac{1}{8}$ " thick (I had them cut at a local glass and paint store), and are housed in $\frac{1}{2}$ "-deep x $\frac{3}{8}$ "-wide rabbets. So that means you'll need glazing strips no more than $\frac{3}{8}$ " x $\frac{3}{8}$ ". And while it doesn't matter a great deal on the mirrored glass because they won't show through, for the clear glass you'll want to make sure no strip peeks into the opening – so check that before you pin them in place.

The strips are simply butt-jointed and secured with 23-gauge pins. You could use glazing points or silicone to hold the glass in place, but I prefer the clean look of the strips, and it doesn't take much extra time to make and install them.

Before reinstalling the door, screw a French cleat to the top of the carcass (secured at both long edges and in a slightly elongated hole in the middle) and a strip of equal thickness at the bottom of the case; that will keep it at 90° to the wall when you hang it.

Put the hinges back in, hang the door and reinstall the pull.

The door on mine hangs closed, so I didn't add a latch of any kind. If in the future I decide one is needed, I'll simply inset a small rare-earth magnet at the front edge of the side's interior face, right where the screw for the ring pull hits the case.

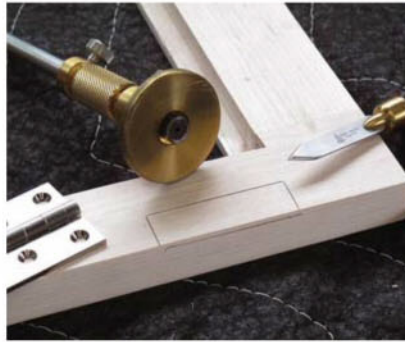
Now you're ready to hang the piece (secure the other half of the cleat to two studs), step back and admire your work – and yourself in the mirror. **PWM**

Megan is the editor of this magazine. She can be reached at megan.fitzpatrick@fwcommunity.com.

BUTT HINGE INSTALLATION



1 Locate. Hinges are typically installed in this type of build with the leaves registering off the door rails. So I use a combination square to line things up. I always start with the door, not the case.



2 Mark. Hold the hinge firmly in place with your off hand, and use a marking knife to score around the edges. A series of light cuts will be more effective than one deep cut. Now set a cutting gauge to the exact thickness of the leaf and mark the mortise depth. (I've penciled in the lines here for ease of viewing.)



3 Chop. Make a series of cuts in the waste with a chisel, and use the tool to deepen the edges you marked with your knife (bevel facing into the waste, of course).



4 Clean. Drop the router plane blade in the baseline then tighten it. A few passes with the plane will lift out the waste and smooth the bottom of the mortise. (You can also set the router plane to the thickness of the hinge leaf, and use the plane to mark the bottom of the mortise, instead of a cutting gauge.)



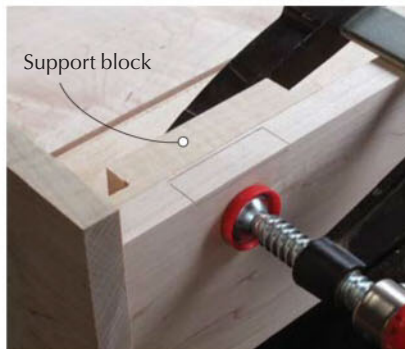
5 Screw holes. Drop the hinge in its mortise and mark the screw-hole locations, then drill. Be careful to not drill through the stile.



6 Screws. Screw the hinges in place; a little wax on the threads will make it easier. (I typically install only the top and bottom screws at this time; it saves time when removing the hardware before applying a finish.)



7 Mark the carcase. Now fit the door to its opening, with the desired reveal shimmed at the top and bottom. Hold the door firmly in place. Register the flat of the marking knife off the barrel of the hinge and make a nick. Do the same for the other hinge(s). I always mark the bottom of the leaf. It's a habit that keeps me from cutting the mortise on the wrong side of my mark (that's more of a fear for me when there's also a middle hinge).



8 Narrow material. The process for the hinge mortises on the sides is the same as for the door – except that, if you want to retain the small amount of wood behind the hinge mortise, clamp a piece behind it for support as you're chopping. If you don't, it will certainly tear out. There is, however, no shame in simply cutting the mortise across the full thickness of the side.

ONLINE EXTRAS

For links to all online extras, go to:

■ popularwoodworking.com/jun16

PLAN: Download a free SketchUp model of this project from our SketchUp Warehouse.

ARTICLE: "Rub to Create a Great Finish," by Bob Flexner – free on our site.

IN OUR STORE: "Making & Fitting Doors," a digital magazine with eight articles.

TO BUY: "Chimney Cupboard" by Megan Fitzpatrick & Glen D. Huey – the piece that inspired the style and wood selection for this medicine cabinet.

TO BUY: "American Country Furniture: Projects from the Workshops of David T. Smith" (Fox Chapel).

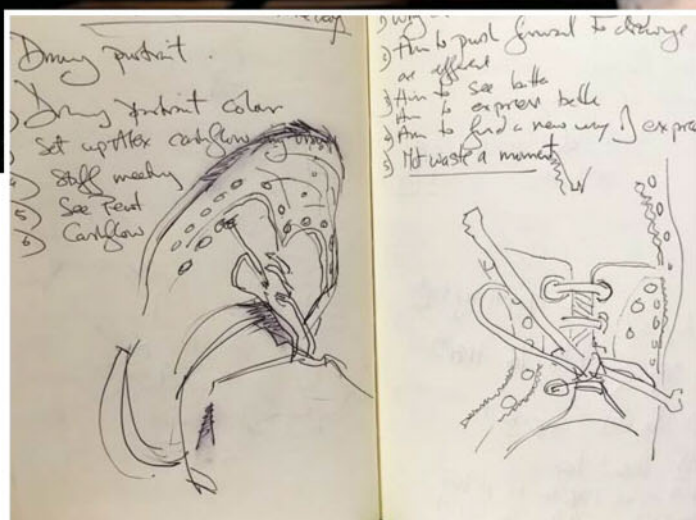
Our products are available online at:

■ ShopWoodworking.com

Draw Your Way to Better Woodworking

BY DAVID SAVAGE

Using your hands to sketch can teach your eyes to really see.



Sketching notes. A notebook goes everywhere with David Savage, who insists that students learn drawing as part of their furniture making courses at Rowden Workshops, his Devon, England, school. While waiting for a doctor's appointment, he wrote a job list and sketched two drawings of his right shoe. Don't wait to draw special stuff, teaches Savage. Just draw what's there.

Most of us use our eyes to avoid bumping into things; we probably are only using 20 percent of our visual ability. I had a student some years ago at Rowden Workshops who had a history in the special forces. "I've never drawn in my life," he said in a deep, dark, threatening voice. Yet within six weeks he was a highly competent draftsman, putting down accurate lines that described what he was looking at. His visual accuracy was trained on the battlefield. He had used his eyes to stay alive.



Yes, you can. These four guys have just started at Rowden, and are each drawing their left hand. Note the frames of clear plastic that have been used to rest on the left hand as an aid to get the drawing going. We have a series of exercises that overcome the “I can’t draw” mindset.



Surround yourself. This is a typical student bench area at Rowden (former student Paul Chilton is pictured). I encourage you to hang your drawings as you do them. This helps you to see them objectively. In a folio, they are out of sight and out of mind. Surround yourself with your drawings; that way you catch them in the corner of your eye, and can really see what is good and what needs work.

Twenty Minutes a Day, Four Times a Week for 50 weeks

All of us can learn to draw. We all have the ability. What we need to understand is that to do this as woodworkers we do not need to draw like Leonardo da Vinci. We need to draw just well enough to put the image down.

I ask students to give it 20 minutes of good time per day four days each week, during their time at Rowden. It’s not hard, but it is demanding. Like going to the gym, it gets easier and more rewarding as you do it. It is important but never urgent – so you need to make it a part of your planned day. If you don’t, that urgent sanding or dovetailing will always get done; drawing won’t. Which is stupid.

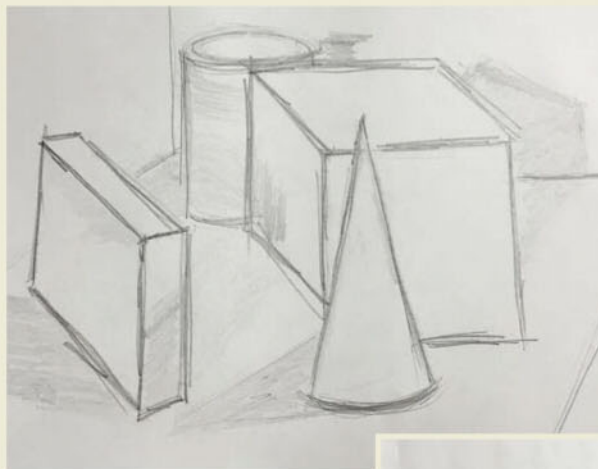
Why Bother

It’s about making something worth making. You might cut lovely dovetails, but is the piece in proportion? Does it look good? Will someone 100 years from now say, “that’s nice,” or did your piece go in the dumpster 50 years ago? Drawing is about your response to the patterns of nature. Seeing things – really seeing things – not just taking phone shots and putting them on Instagram. Drawing allows you to make better visual judgements when planning your piece of work.

Drawing is going beyond “the golden section” and conventional proportioning systems and going to the essence

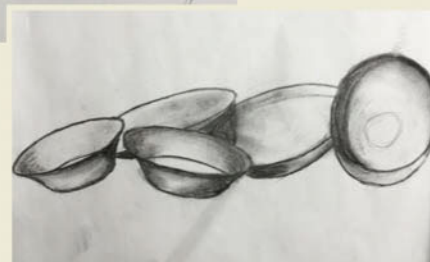
GET STARTED: 8 ‘RULES’

1. Remove from your head all “non visual thoughts”
2. Silence is great
3. Sit down; this puts your head in one place
4. Use a support (such as an easel) to hold your pad or sheet of paper vertically along side the object
5. Draw “sight size”; that is, the same size on your page as the object in front of you appears
6. Choose a simple form to start with; we use a white cube on a white ground
7. Look very, very hard at the object
8. Draw honest lines where the edges are



Where it starts. Just use your eyes to look hard and give me a dozen really honest lines that are in the correct relationship to each other. Keep your head in one place. The objects do not move and there is no color. All you are looking at – and drawing – are the edges.

Next step. Give me circles. It’s like stirring a cup of coffee, but with a pencil. Now add tone; this is light and dark to express volume.



of how they were developed. Drawing takes you to seeing the patterns and essential structures of nature. It enables you to build your pieces “in tune” with nature, not at discord.

Seeing Better

Seeing better is what happens when you draw. You come out of a life drawing session and go home, all the colors of the fields are vivid and sharper, much more than before the class. Drawing is a process of filling up your visual vocabulary, assembling a set of images, shapes you like – anything from sea shells to a woman’s bottom, from the way a leaf joins a twig to the way water flows over a beach. All are gathered into your personal visual language. Again taking photographs doesn’t do this; it shows your interest, but it is outside your mind, still not a part of you.

Like learning language, you need to gather the parts that make up language – the visual equivalent of syllables and words – and put them in the back of your head. That’s where they live. I call it “uploading.” You upload when you sit and draw an object.

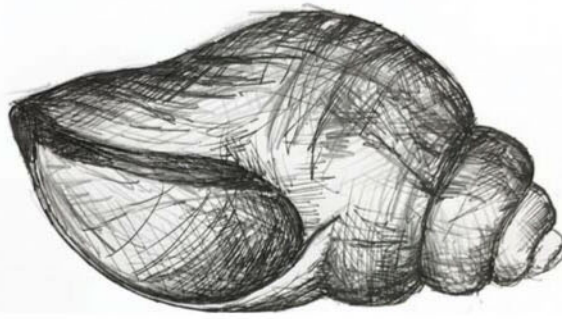


Eye for accuracy. Accurate work demands that you open your eyes and really see. Drawing helps you do that. Here, Steve Hickman is perfecting large dovetails.



Starting young. Nineteen-year-old Josh Reynolds (namesake of a former president of the Royal Academy), is doing everything right to put down a solid personal visual vocabulary.

Patterns of nature. What is essential to good creative expression is that we see and understand more of how nature creates her own patterns. We do this by looking very hard, by drawing. This is also a part of the work in developing your own visual vocabulary.



“When I draw something, the brain and the hands work together.”

—Tadao Ando (1941-),
Japanese architect

I tell students to not wait for significant objects; just draw the damn teacup on the bench. Mundane it may be, but you will soon find visual interest in the shadows, in the way the handle joins the body. You will start to really see that teacup. Upload four times a week, every week, and you will start seeing stuff when you go out. You start bringing stuff back to draw, you start drawing your left foot when sitting waiting for a doctor's appointment. Now your eyes are working for you.

Personal Visual Language

It is personal – powerfully deeply personal. These are images gathered over years to form your individual visual vocabulary. Unlike most ideas that disappear with saddening ease, these are ideas that stay with you. Like a stick stuck in the ground 30 years ago, when you did that quick drawing – five honest lines. Now you go back, dig under the stick to find the original image. The original idea. Still there bright and shiny and complete like buried treasure.

Fail to draw and your ideas will not stop coming, but they will tend to disappear with the morning mist. Nail them down immediately; drawing five honest lines will install the image in your memory system. Thirty years later when you need that idea you “download” it and it pops of the end of your pencil.

This is the creative bit; having put stuff up there in the back of your head you can draw upon it. Notice the language. Sit with the problem and just draw. Be uncritical, just see what pops off the end of the pencil. Paul Klee called it “taking a line for a walk.” Just doodle. If you have done it right something will come pretty quickly. At Rowden, we have a two-week gap between getting the brief and doing the doodles. That allows the brain a time for “unconscious scanning.” Your first ideas will probably be from the front of your head, the area of conscious thought. Those ideas might be OK, but dig deeper and you get to the gold.

These are the ideas you uploaded years ago; it takes the filing system in

the back of your head a while to get to them. A second day at the problem will usually drop ideas off the end of your pencil that will surprise you.

But the brain works a bit like a computer. Rubbish in, rubbish out. It demands that you put down a powerful vocabulary of strong visual images to draw upon. Then all sorts of new and interesting ideas come together.

So that is why. There is no way that gathering images in Instagram or Pinterest will work the same way.

We see student pieces in exhibitions every year sourced crudely from other people's work – the top of this man's table with legs from that woman's table. Digital photographs are great tools, but they are external. Drawing is internal.

CAD is a great tool in the process of developing an idea, but it is fundamentally uncreative. I have a friend who works in the Audi design center; she tells me all the concept work there is still paper and pencil. The great architect David Chipperfield has a studio marked with an absence of computer screens and an overwhelming presence of models of buildings being developed in a series of iterations.

At Rowden we would not employ a maker – however competent – without decent drawing skills. Drawings



Royal Academy Schools. This is where I learned to draw – the life room at the Royal Academy Schools in London. It's the oldest, and in my view still one of the best, art schools in the world.



Visualization. Life drawing helped student Rob Newman develop his ideas he as designed this prototype for a new table.

show they have “good eyes,” and as a consequence he or she is much easier to work with.

How to Start Drawing

Getting started on your own is not easy, but it can be done. You just need a plan. Betty Edwards’ book, “Drawing on the Right Side of the Brain” is a good plan

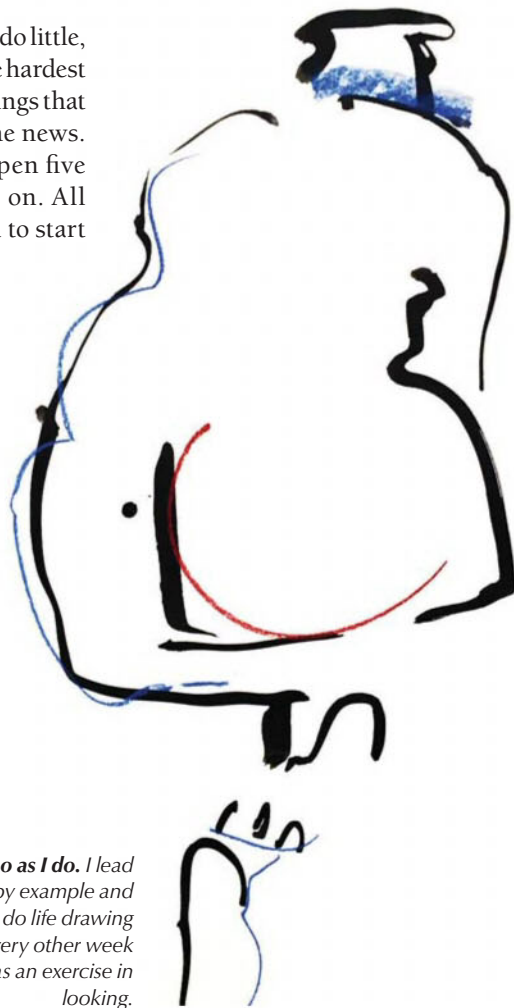
to follow. We use some of her exercises at Rowden.

The essence of doing this to do little, but often. Starting is always the hardest part. I go through a series of things that I call “othering.” I turn off the news. I shut the phones off. I sharpen five pencils and put some music on. All this prepares my visual mind to start



Life drawing. We teach life drawing for all but the very new students; understanding the human form is one of the most visually nourishing activities you can do. Students take from this hour a memory of balance, of how a knee or ankle joint actually looks and works. Patterns of nature.

The guy at the far left back is “sighting” – using his extended arm and pencil to measure and compare distances on Amanda, the model, and on his drawing.



Do as I do. I lead by example and do life drawing every other week as an exercise in looking.

work. I shut down the right side of my head. All the command centers of control, mathematics, language, rational thought, get put to sleep.

You do need to control your thoughts when drawing. The major control center will not find it comfortable at first. That part of your brain is used to providing you with quick visual symbols of things: “Don’t bother looking at that bicycle; I have a symbol of a bicycle already – here you are.”

I set up a drawing session once with students ranged all around a bicycle. One guy was looking right down the side of the bike; all he could see was the tire and handlebars. What he drew was not what he saw, but a full-on side view of a bike. This was the symbol of a bike his left brain provided him with. Shut this side of the brain down; the visual holistic and music centers of the brain

are all in the right side of the head. Let them work.

Start simple and sit down as you draw; this keeps your head in one place at one height. Drawing a white cube and rectangle on a white background – just the outlines, well observed. Honest well-seen lines. The first time, a good

hour looking very hard will exhaust you. With a few weeks of consistent work you should be banging those lines down with the confidence of an expert.

Move on to curves and circles. Drawing an ellipse is like stirring a cup of tea. You need to practice the hand, wrist and arm movements necessary to put the line where you want it. The pencil is the Ferrari of mark-making tools: light, fast, agile. But you need to acquire the skill to drive her, or she will kill you. Like using a chisel, it’s a skill.

Drawing is not just for woodworkers but it does make us all better makers. And you can learn it. I boasted once that I could teach a house brick how to draw; that was a vain boast. The house brick has to really want to learn to draw. **PWM**

David has been designing and making modern furniture for nearly 40 years. He passes on his skill and knowledge at Rowden Atelier in Devon, England, where he runs small classes teaching making and drawing side by side.

ONLINE EXTRAS

For links to all online extras, go to:

■ popularwoodworking.com/jun16

WEBSITE: Visit David Savage’s school website and read his blog at finefurnituremaker.com.

BOOK: Read “Furniture with a Soul,” by David Savage.

CLASS: Take “Learning to Draw,” a new class at Rowden Workshops.

BLOG: See Christopher Schwarz’s pictures from his visit to Rowden Workshops.

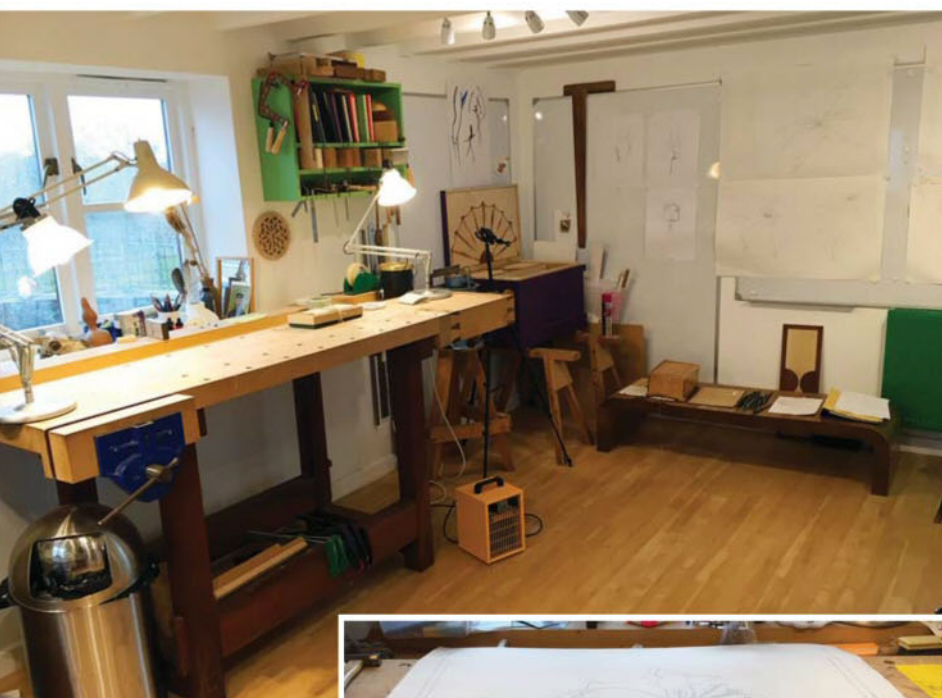
TO BUY: “Drawing on the Right Side of the Brain,” by Betty Edwards.

Our products are available online at:

■ ShopWoodworking.com



Progression. Rose Carter-Stouts is a former student and is now an intern, helping new students and developing her own work. Her bench area displays her range of drawings.



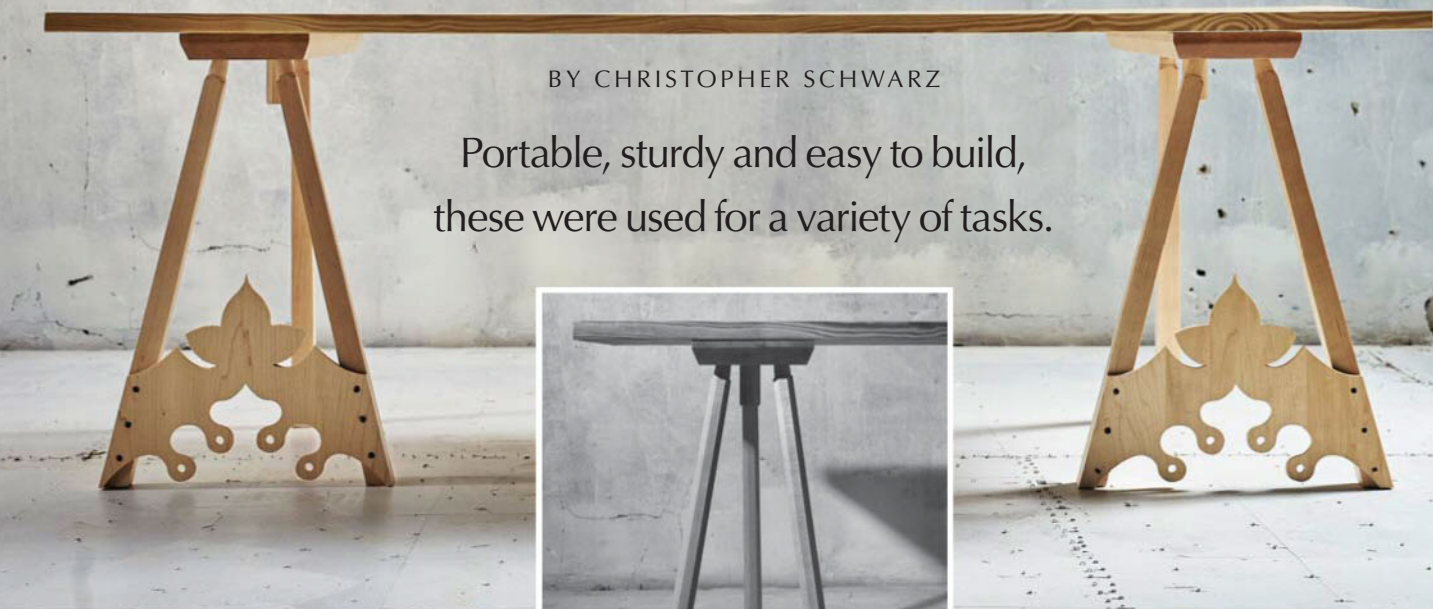
My space. This is my personal workspace, with my bench, tool chest, recent life drawings and a full-size drawing of a marquetry project, which will incorporate lilies in ripple sycamore with rosewood stamens on a poplar veneer background. It will be part of a chest based on Christopher Schwarz “Traveling Anarchist’s Tool Chest.”



The First Trestle Tables

BY CHRISTOPHER SCHWARZ

Portable, sturdy and easy to build, these were used for a variety of tasks.



Many of the fantastic furniture forms of the Middle Ages have disappeared and have been replaced by pieces that are more complex but not necessarily better.

One of my favorites is the early trestle table. It's three pieces – a top and two sawhorse-like things – that can be instantly broken down, moved or stored. The form shows up in early paintings as being used for everything in the household: making pasta, butchering, surgery, writing, woodworking and fine dining.

Last year I built two of these tables for our home and have been delighted with how they look and function. One table is a roomy desk. The other table is used to accommodate extra dinner guests, serve wine on the front lawn and wrap gifts.

Not only are the tables versatile, they are simple and quick to build. The



Second base. If the Mughal base doesn't inspire you, try making the base with a simple turned stretcher, called a "spandrel," that fits between octagonal or square legs.

trestles are built using "staked" furniture technology, essentially a conical mortise-and-tenon joint that is more forgiving than its square-shouldered cousin. Each 8"-wide trestle top receives three legs for stability.

The two front legs are connected by a decorative stretcher, which features Arabic and Mughal motifs. If this stretcher doesn't appeal to you, substitute a simple turned rung or a stretcher that is pierced with Gothic shapes.

The tabletop is a simple flat panel made from three pine 2x12s. The table-

top doesn't have to be pretty because it typically was covered by a linen tablecloth.

Do not let the compound geometry of this project intimidate you. While it looks complex, even a beginner can manage it. Construction begins with the legs.

Tapers on Tapers on Legs

The legs taper on all four faces so they are 1⁵/₈" square at the floor and 1¹/₄" square at the top. This is easily done with a jack plane followed by a jointer plane. Mark out the finished dimension on the tops of the legs and jack plane the tapers. Clean up those tool marks with a jointer plane.

Next is cutting the tapered conical tenon on top of the six legs. The tenon is made using an inexpensive ⁵/₈" tapered tenon cutter from Lee Valley Tools that works exactly like a pencil sharpener.



All downhill. If you use straight (or rived) stock for your legs, planing the tapers should be easy. Plane from the bottom of each leg to the top until the tops of the legs are $1\frac{1}{4}$ " square.



Legs complete. After a trip to the tenon cutter, this is what the legs look like. The chewed up bits at the tips will be sawn away later.



Ready for the tenon cutter. This tenon is $3\frac{1}{2}$ " long, $1\frac{1}{8}$ " at its base and tapers to a little more than $\frac{5}{8}$ " at the tip.

Instant, perfect tenon. The tapered tenon cutter makes a finicky operation easy. Hold the tenon cutter firmly with one hand and the leg with the other. This particular grip allows you to eyeball the gap around the tenon to ensure it is centered on the leg.



To prepare each leg for the tenon cutter, you need to rough in a taper on the top $3\frac{1}{2}$ " of each leg to make it easier for the tenon cutter. You can rough in the tenon by whittling it, turning it or using a drawknife.

The goal is to create a $1\frac{1}{8}$ " diameter at the base of the tenon that tapers to about $\frac{5}{8}$ " at the tip. I used a lathe, which is fast. After roughing in the tenon, shave it to final size with the tapered tenon cutter.

Trestle Tops & Geometry

The trestle tops are the interface between the legs and the tabletop. While you can leave them as square-edged boards, old paintings typically show them with slightly curved edges (and even what appear to be halves of logs). I used a jack plane to round over the long edges and ends of the trestle tops, so the underside was 7" wide x $24\frac{1}{2}$ " long.

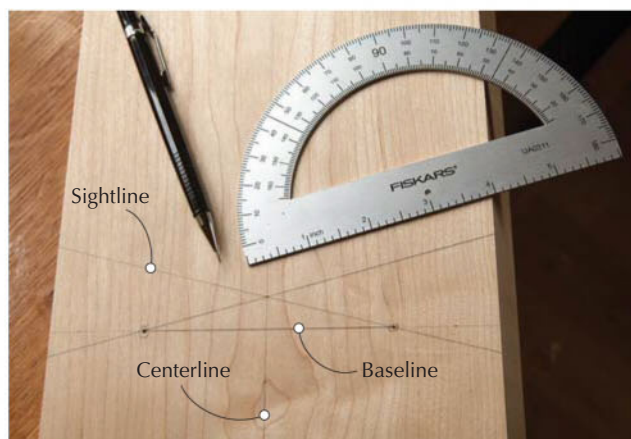
To lay out the locations of the mortises, first strike a centerline on the underside of the trestle top. The mortises for the two front legs are $2\frac{1}{2}$ " from the ends of the trestle top and 2" in from the edges. The mortise for the single third leg is centered on the underside and is $2\frac{1}{2}$ " from the end. (See the drawing at

the top of the next page.)

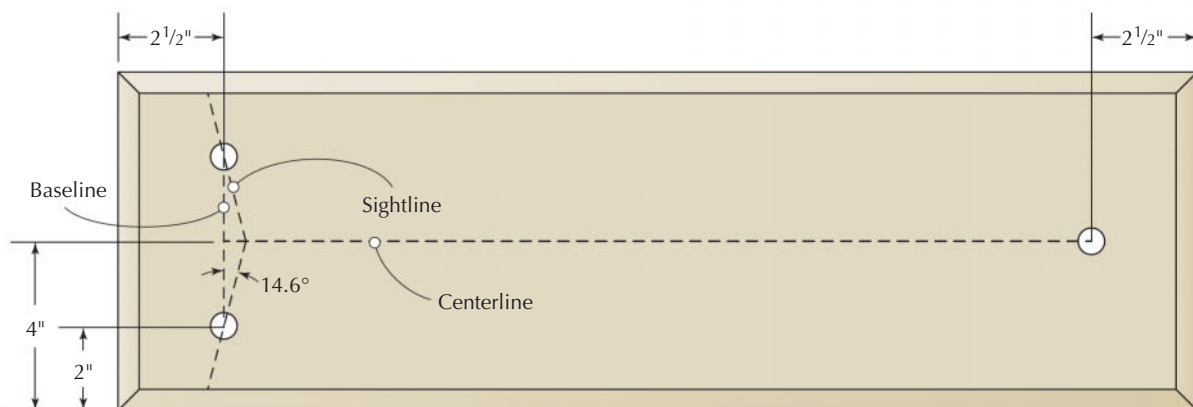
After laying out the mortise locations, draw a baseline that connects the two mortise locations at the front of the trestle top. Then use a protractor to strike a "sightline" from each mortise that is 14.6° off the baseline (study the photo below if you are scratching your head). The sightline is the pencil line that your bevel square will sit on as you bore the mortise.

Set a bevel square for 15.5° off of 90° and tape its stock (handle) to your sightline. Chuck a $\frac{5}{8}$ " auger bit into your brace. You are going to drill a hole through the trestle top that is parallel to the blade of your bevel square.

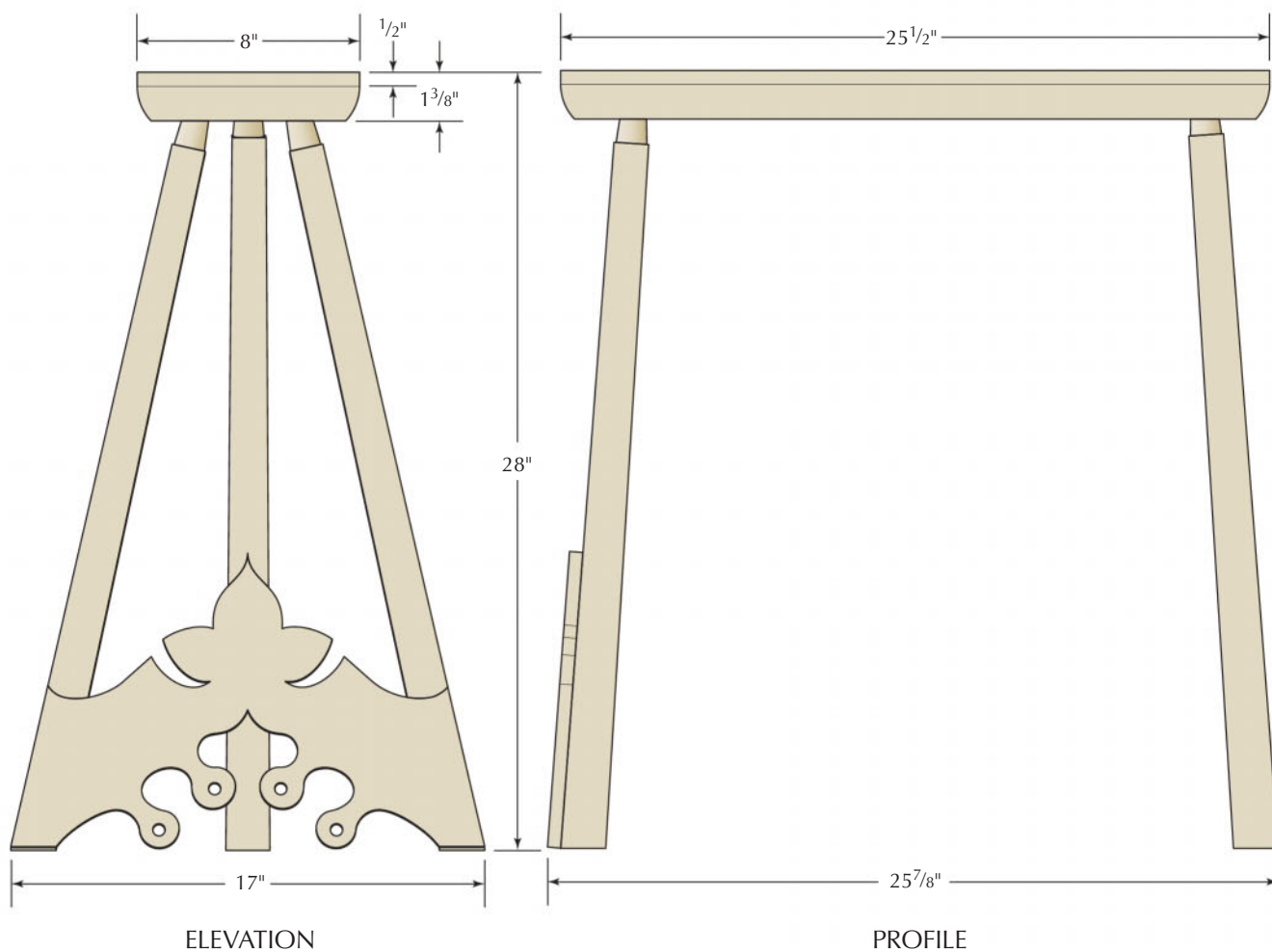
Stand directly in line with the bevel square and put the tip of the auger on the mortise location. Tilt the brace to the same angle as the bevel square's blade and crank the brace until the spurs are buried about $\frac{1}{4}$ " into the work. Stop and check your angle. Crank the brace a few more times and check your work, adjusting the angle as necessary.



Mortise layout. You are looking at the mortise locations for the two front legs. Note the baseline that connects the two mortises and the sightlines that are 14.6° off the baseline.



UNDERSIDE OF TRESTLE FOR LEG LAYOUT



ELEVATION

PROFILE

Trestle Table

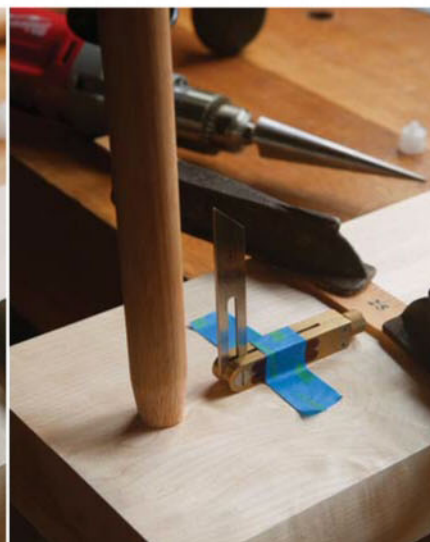
NO.	ITEM	DIMENSIONS (INCHES)			MATERIAL	COMMENTS
		T	W	L		
1	Tabletop	1 1/4	30	84	Pine	
6	Legs	1 5/8	1 5/8	30	Maple	
2	Trestle tops	1 3/8	8	25 1/2	Maple	
2	Decorative stretchers	1/2	20	13 1/2	Maple	Oversized; cut to fit



In line. Here I'm boring the rear leg. The centerline is the sightline. The bevel square is set for 4°.



Ream & verify. After every four rotations of the reamer, remove the tool from the mortise and insert the dummy leg. Make small adjustments to how you tilt the reamer to correct the angle. Note that once you're about 1" deep, the angle is pretty much set.



Once you are about 1" into the wood your angle is fairly locked. If you are off, don't fret; you can fix that when you ream the hole to a conical shape.

Crank until the lead screw pokes out the other side of the board. Flip the board over and finish the cut by boring from the other side.

The single rear leg is simpler. The sightline is the centerline on the trestle top. Change the angle of the bevel square to 4° off 90° and tape it to the sightline for the rear leg. Bore the hole in the same manner as the front legs.

Ream the Mortises

Lee Valley makes an inexpensive tapered reamer that matches the angle of its tapered tenon cutter (see the Supplies box for details). This reamer can be chucked into a brace or an electric drill – I prefer a corded drill for the unfailing torque.

Some scholars have guessed that these conical mortises might have been burned to shape. While I like fire as much as the next overgrown boy, the tapered reamer is more predictable.

Before you ream the mortises, use your tapered tenon cutter to make a dummy tenon on a 1" dowel. It's easier to confirm the angle of your reamer by checking it against a cylindrical dowel than against a tapered leg.

Set your bevel square to the same

angle you used for boring the $\frac{5}{8}$ " holes and tape it to the sightline. Ream each hole in short burst for better control. After four or five rotations of the reamer, remove the tool and place the dummy leg in the hole.

Ream the hole until the opening is $1\frac{1}{8}$ " wide. You will be surprised how quickly this goes, so be cautious as you begin because it is easy to overshoot your mark. Ream all the mortises. Check your work by knocking the legs into their mortises and see if they line up like they should. If things are off a little, don't despair; there is still another chance to make things look right.

Assembly

The tenons are glued and wedged into the trestle tops. To make life easier, do these things before you slather the glue.

- Trim the tops of the legs so they protrude $\frac{1}{8}$ " above the top of the trestle top.

- Saw a $1\frac{1}{4}$ "-deep kerf in the top of each tapered tenon. The kerf receives a wedge. The kerf should be perpendicular to the grain of the trestle top so that the wedge will not split the work.

- Make some hardwood wedges with a shallow included angle – about 4° is right.

- For each trestle, have two clamps and a flat board at the ready.

If you are going to add a flat decora-

tive stretcher to the front legs, you need to keep the front faces of the legs in the same plane when you glue up. That's what the clamps and flat board are for.

Paint glue in the mortises and drive the legs into their mortises. Then clamp the front two legs into the same plane using the clamp and flat board. Don't freak if this makes the legs a little cockeyed compared to the trestle top; it (probably) will not be noticeable.

Drive the wedges into the kerfs in the tops of the tenons. After the glue dries, trim the tenons and wedges flush



Clamped for success. The two clamps and flat board keep the front legs lined up during assembly.



Upside down & backward. This looks odd, but it works quite well to get the trestles at exactly the same height. Clamp a pencil to the drill press table. Show the legs to the pencil.

to the tops of the trestle tops.

After assembly, you need to cut the legs to their final length and get the tops of the two trestles in the same plane. The easiest way to do this is with the drill press. Yes, the drill press.

The drill press has a table that is infinitely adjustable for height. I clamped a pencil to the table and cranked it so the pencil tip was 28" from the floor. Then I turned the trestles upside down on the shop floor and rubbed the legs against the tip of the pencil. Simple.

Saw the legs to final length using a crosscut backsaw. Clean up the feet with a rasp or plane.

The Bottom Stretcher

The decorative bottom stretcher is a bit of a head scratcher. Should its grain run vertical or horizontal? I settled on

SUPPLIES

Lee Valley

leevalleytools.com or 800-871-8158

1 ■ 5/8" Tapered Tenon Cutter
#05J61.09, \$37.50

1 ■ Large Standard Reamer
#05J62.01, \$26.50

Tremont Nail

tremontnail.com or 800-835-0121

1 ■ 4d rosehead standard nails
#CLR4, \$12.17/1-lb. box

Prices correct at time of publication.

Cut vertical. I find that I can keep the coping saw's blade perfectly vertical if the work is horizontal and the blade is vertical.



Rasp horizontal. When I clean up the sawblade marks with a rasp, it's easier for me if the work is clamped in a vise. Here I'm using a fine rasp.

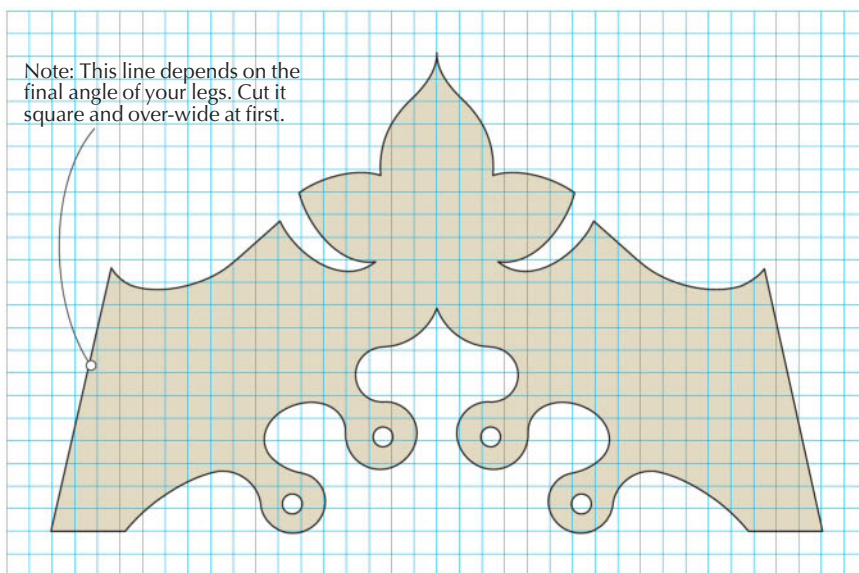
vertical, which I think will make for a stronger trestle and make the decorative details less likely to snap off. I also think it is the best solution to deal with the wood movement of the stretcher and the trestle top during the long run.

Lay out the pattern on your stretcher panel and cut it to shape with a coping saw. Clean off the sawblade marks with a rasp.

The stretcher is both glued and nailed to the legs. I used 4d wrought-head nails from a blacksmith for authenticity. You can substitute cut rosehead nails if you are on a budget.

To attach the stretcher, glue it to the legs then trim away any overhang. Then lay out your pilot holes for the nails. Drill pilots and drive the nails in.

If the flat and decorative stretcher



STRETCHER PATTERN

One square = 1/2"



Decorative strength.
The nails are as much for decoration as for strength. You can see them clearly in paintings of these tables from the Middle Ages.

"Leave your walls bare as a planed board, or build them of baked mud and chapped straw, if need be; but do not rough-cast them with falsehood."

—John Ruskin (1819-1900),
English writer & artist

doesn't appeal to you, consider using a simple round one that is $\frac{3}{4}$ " in diameter with $\frac{1}{2}$ "-diameter tenons. You'll need to bore mortises in the legs for this stretcher. But this is easier than you think.

To bore these mortises, you'll need a $\frac{1}{2}$ " spade bit, a bit extension and a drill. Why a spade bit? It has a long center spur, which allows you some more room to steer in this application. Also, you can easily grind down the sides of the spade bit to make your mortise undersized if need be.

Chuck the bit and extension together and mark the dead center of the mortise on one of the flat faces of one of the legs.

Place a piece of tape on the spade bit that's $\frac{15}{16}$ " from the spurs that cut the circumference of the hole. That will be the depth of the mortise.

Place the lead point of the spade bit on the centerpoint of the leg where the mortise will go. Rotate the leg a tad in the mortise so you are entering that face perpendicularly. Trust yourself a bit on this.

Line up the shaft of the bit extension with the marks for the mortise on the opposite leg.

Run the drill up to full speed without plunging into the leg. Once the bit

is running at full speed, plunge slowly into the leg. Repeat the same procedure for the mortise in the opposite leg. Yes, it really is that easy.

Glue the stretcher in when you assemble the bases.

The Tabletop

The top is merely a plank, usually about 5' to 10' long according to examples in paintings. I made mine 7' long to fit the back of my truck so I could easily transport the table.

My top is three yellow pine 2x12s that are edge-glued. I left the underside rough from traversing it with my jack plane. I use this as a worksurface as things are much less likely to slide around. On the other face, I planed and finished the top smooth so it could be



Hot-doggin'. Line up the shaft of the bit extension with the lines you marked on the leg near the drill. That is all the accuracy you need to drill this mortise.

used for dining by merely flipping the worksurface over.

We have no way to know how these pieces were finished. They could have been left bare, oiled, waxed or painted. Some of the paintings show the tables as dark, which could be the wood, a pigment or the result of the smoky interiors of homes in the Middle Ages. In other paintings these tables look like they have no finish or a clear finish.

I used a homemade oil/varnish blend that I wiped on. The oil gave it a little color; the varnish gave it a little protection against spills.

The end result of this minimal finish is that the tables look shockingly modern, especially to people who don't know they are forms from the 15th century.

While I expected the tables to look contemporary, I was shocked as to how useful they are in a modern, mobile society. I had planned on selling these tables to customers (perhaps some denizens of our local Renaissance fair), but they have become such a part of the fabric of our home I don't think I can part with them. In fact, I'm now making another one these tables—this time with a maple top—to use as a desk in my new workspace. That top will get a traditional Danish finish made from soap flakes—a subject about which you can read in an upcoming issue of this magazine. **PWM**

Christopher is the editor at Lost Art Press and the author of "The Anarchist's Design Book" an exploration of lost furniture forms.

ONLINE EXTRAS

For links to all online extras, go to:

■ popularwoodworking.com/jun16

BLOG: See other pieces of furniture from the Middle Ages.

BLOG: Explore six-board chests, another early form.

BLOG: Learn the toolkit for building staked furniture.

IN OUR STORE: "The Woodwright's Shop," DVDs of this long-running PBS show that explores early woodworking techniques.

Our products are available online at:

■ ShopWoodworking.com



Queen Anne Strop Box

BY WILLARD ANDERSON

Sharpen your hand-tool skills with this useful project.



A bit of evidence. You can still see the marks from the bit spurs in this box lid.

I recently obtained a nice piece of leather about $\frac{1}{4}$ " thick that I wanted to use as a strop for plane irons and chisels. And, I was looking for a simple hand-tool project. So I decided to make a "strop box" in the Queen Anne style.

The examples I studied all have cavities to hold sharpening stones. I needed a platform to which to glue the leather, so I adjusted my design to accommodate that – but the techniques shown here can be used for either type of box.

Most of the boxes I studied are mahogany, though a few are walnut and pine. They all appear to be made from a single piece of wood, or two pieces cut from the same section of stock.

The recesses in the box bottoms and tops are typically drilled out with a brace and bit, and usually to the same depth in both pieces. You can see the remnants of the bit spur and the center point in most of my examples.

Many of these boxes are squared off, but when they do have feet, they are often shaped as a mirror image ogee curve, cut with a band saw or bowsaw, or kerfed then pared out.

For my box, I decided on feet in the Queen Anne style, based on circles and ogee shapes. The strop is mounted on a wooden platform on the base, and the top fits tightly to the base over the strop platform. The top has moulded edges and features some traditional decoration scribed on the surface.

I had a block of quartersawn beech, so that's what I used for the box shown



Bases. Of the vintage stone boxes I studied, most have a squared bottom, though a few have some nice curves.



here. It's a tough wood; that's great for wear resistance, but not so easy to drill. I recommend mahogany as perhaps a better choice for yours; it's easy to work and is historically correct.

Stock Preparation

In antique boxes where the recess walls are the same thickness all around, the end-grain walls are often split out or cracked, so I decided to make my end-grain walls at least 1" thick, in hopes of avoiding a split.

The bottom half needs to be about $1\frac{1}{2}$ " thick (1" for the foot recess, plus $\frac{1}{2}$ " or so for thickness above the feet. The top half needs to be about $1\frac{1}{4}$ " thick ($\frac{3}{4}$ " to accommodate the leather and the base it rests on, plus $\frac{3}{8}$ " for the top of the top). I cut the base for the

leather from the top half of my beech.

So, with the above in mind, I cut my box parts from a piece of $\frac{8}{4}$ stock, about 9" wide x 10" long. But your exact measurements depend on the size of the leather strop (or stone) you wish to put in your box.

I planed a surface and side of each box half to create a reference face and a reference edge, then marked them as such. The final thickness and width of each was scribed off these.

For the bottom piece, I then used a side axe for gross stock removal, followed by scrub, jack and smoothing planes. Bevel the long edge opposite the reference edge to your scribe line



Reference surfaces. With one edge and one faced planed flat and at 90° to each other, you have references surfaces from which to scribe the final dimensions.

before planing to prevent spalching.

On the top piece, I four-squared it with planes, then marked and sawed off the waste; it will become the platform for the leather, and is sized to match.

For perfect crosscuts to get to my final lengths, I used a miter box and saw.

The top face of the bottom is the reference face of that piece, and the bottom face of the top piece is its reference surface. In the end, the two reference surfaces will mate.

Recesses & Leg Layout

Lay out the recesses with a marking gauge and square, registering your tools off the reference edges of each piece. In my case, the layout accommodates the leather platform; keep in mind that your layout should be based on your platform (or stone sizes). The long walls on mine are $\frac{3}{8}$ " and $3\frac{3}{8}$ " from the reference edge; the end walls are 1" and 9" from the same end of each piece.

I made two full templates for the feet – one for the long-grain edge, the



Platform. The waste from the top piece is sawn off; I'll size it to match my piece of leather, and use it as the platform.



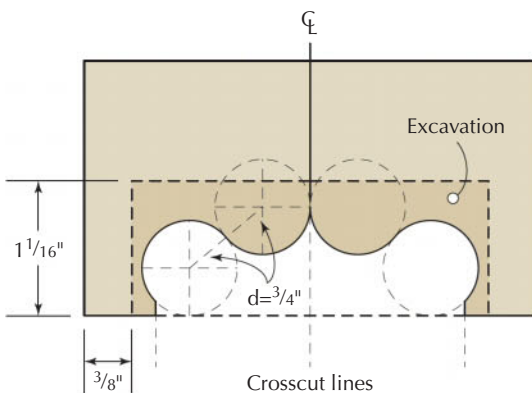
Miter box. Note that the reference edge is against the fence as I crosscut this workpiece to length.

other for the ends.

The long-grain template is derived from a circle, a bird's beak transition and long, shallow quasi-ogee curve. The bird's beak transition is a quarter arc of the same circle as the leg circle. The ogee-type profile was derived from

a circle that looked good to my eye, then I faired it out to end at the bird's beak.

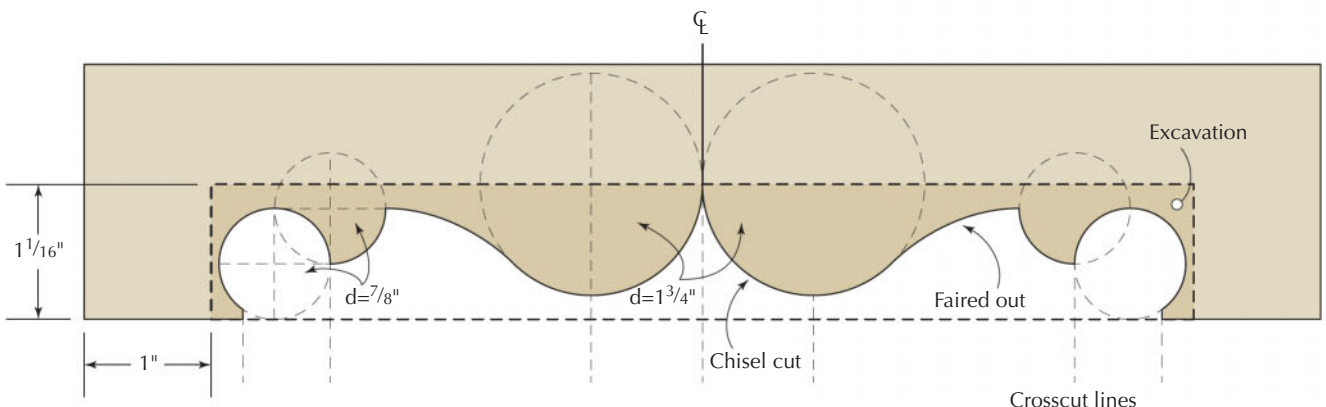
Because the end-grain template is so much shorter, I modified the shape slightly by reducing the profile depth from $\frac{7}{8}$ " to $\frac{3}{4}$ ", and eliminated the bird's beak.



FOOT LAYOUT – END GRAIN



Curve work. Half templates ensure symmetrical layouts, however sometimes I like to make a full template so that I can get a complete idea of the profile.



FOOT LAYOUT – LONG GRAIN

Here's the Drill

Before drilling out the recesses, drill holes to define the eight outside circles of the profiles for the legs. I drilled these circles to a depth greater than the planned wall thickness of the recesses (to about $1\frac{1}{2}$ " for the ends and about $\frac{1}{2}$ " for the sides). The four long-grain holes can be easily drilled with a brace and the appropriate auger bit. In all cases, use a bit diameter smaller than the actual diameter of the circles (by $\frac{1}{8}$ ") so there is no possibility of breaking out the bottom edge of the profile – you need this surface to rest your router plane on.

The end-grain holes need to be drilled with a centerpoint bit. The auger bits that most of us own have a double-cut lead screw; this style will easily clog in an end-grain cut. Some bits have a single-cut lead screw that results in a more aggressive advance to the cut, which is less likely to clog. Unfortunately, I have not been able to snag bits of this style. Centerpoint bits are a good alternative, but because they do not feed, a little more effort is needed. Also, these bits are better designed for shallow cuts. In a deeper end-grain cut, they tend to follow the grain. So for these, I first drilled a pilot hole for the centerpoints to help the bit track better.

For all of the drilling, I clamped a scrap piece on the bottom to give the bottom surface of the box support to prevent breakout (see photos at top right).

I wanted to keep the thickness of the box halves to a minimum, plus I wanted to rout a clean surface after drilling. Deep lead screw (or centerpoint) holes would present a problem for the strop box (though less so for a honing stone box). But fortunately the centerpoint bits can easily be modified to overcome this.

I filed a centerpoint to about $\frac{1}{8}$ " longer than the outside spur, then recreated



Bit selection. A No. 100 Jennings-pattern bit works for the long-grain holes, but for end-grain drilling, a centerpoint is the better choice.

the three-sided point to get it back to the axis of the bit shaft. (It must be perfectly centered to keep the bit from levering out of the circle it is cutting.) Also, the cutter may need to be reshaped in the region next to the centerpoint; it needs to be square to the axis of the bit. I used various “safe” files for this. This is basically a trial and error process, but takes just a few minutes.

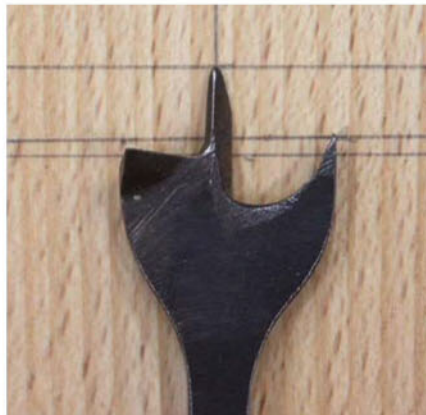
After making the holes for the decorative profile, remove the waste in the center of the base.

For this box, I laid out and drilled 24 holes to hog out the waste. Why “laid out?” You have to identify the centerpoints and leave plenty of leeway

between the box sides and the holes themselves. Generally, I needed about 100 turns of the brace to drill a hole $\frac{7}{8}$ " or so deep. I kept the holes shallow enough so that I could bring them to final depth ($1\frac{1}{16}$ ") with a router plane.

I used a relatively narrow chisel to knock out the bulk of the waste between holes, then a wider chisel to roughly flatten the revealed surface. Here is where straight, flat grain in the stock really pays off. The ends of the recesses and the long edges were defined with V cuts with a wide chisel, then pared straight down.

Note: If you're making a stone box, excavate the cavity on the top side of



Modified. “Safe” files (which have one or more smooth edges) make quick work of modifying a centerpoint bit. On the left is the bit before I shortened the point; on the right I filed the point so it's about $\frac{1}{8}$ " longer than the spur.

“Even a mistake may turn out to be the one thing necessary to a worthwhile achievement.”

—Henry Ford (1863-1947),
Founder of the Ford Motor Co.



Hog it out. It's a lot easier and faster to drill out the bulk of the waste than to remove it with a chisel alone.



Rough removal. Work with the grain with a chisel to remove the waste between the holes



Rout it out. Use a router plane to reach the final depth and remove bit tool marks.

the bottom using the same method, and make sure your stock is thick enough to accommodate both cavities, with at least $\frac{1}{4}$ " of material remaining between.

Now mount the stock between dogs, and use a router plane with a wide, square bit to refine the recesses. I used a depth gauge to check my progress as I planned to a final depth of $1\frac{1}{16}$ " and all of the tool marks from the bits were gone. I made vertical cuts with a wide chisel to clean up the walls, so that the interface between the surface and the walls was sharp and crisp.

Now excavate the waste in the same manner for the underside of the lid.

Shape the Feet

Once the recesses are finished, it's time to shape the feet.

First, rasp out the circles that defined the feet at all four corners. I used a fine modeler's rasp and a rat tail rasp.

Next, I made a series of vertical saw cuts to the profile lines at every transition of the profile, followed by cuts with a coping saw to rough out the curves.

Then I pared with a chisel bevel up, following the grain downhill to give the curves a finished surface.

In hindsight, I recommend skipping the coping saw and just using a chisel—you'll get a finished surface off the tool.

It's a good idea to set the box aside at this point for a week or so. A lot of material has been excavated from the stock, and the box will continue to dry out and move, depending on the grain and moisture content. You might have to make some adjustments for fit after the wood has settled.

Assemble the Platform

The dimensions of the platform need to match the lid recess. First pencil

reference marks on the platform and one end of each recess so that you can fit the parts together the same way each time. Then carefully plane and file the platform so that it fits snugly inside the lid. Don't push the platform all the way in or you might not get it back out again.

Once the platform is sized, verify that the leather strop has the same dimensions, then glue it to the platform with hide glue.

After the glue is dry, re-scribe the top of the bottom with a marking gauge, making just one end-grain mark and one long-grain mark. Apply hide glue, carefully align the platform to these two lines and clamp it to dry.

Now assemble the two halves, and make alignment marks (I use chisel nicks). If the halves don't fit easily, first check that the inside of the walls on the top are vertical; second, consider using a shoulder plane to tweak the edges of the platform until the parts slide together.



Piecework. Here's the rough-sized platform (with leather atop), the underside of the bottom with the cavity drilled and smoothed and holes drilled for the corner curves, and the hollowed-out top.



Curve appeal. After rasping the drilled holes clean, make relief cuts straight down to all profile transition points, then rough out the curves with a coping saw. Follow that with chisel cuts to fair the curves. Or, skip the coping saw and just use a chisel.



Leatherwork. Glue the leather on the platform, then glue the platform to the base.

When the top and bottom half fit snugly, assemble the box, clamp it in a face vise, and plane the long edges with a finely set plane until they are flush. The end grain can be planed with a low angle block plane or filed until they are flush. Reestablish your alignment marks, if need be.

Mould the Top

For the lid, I decided on a wide ovolo profile (really an ellipse), that is relatively shallow, with fillets at the top

and bottom. This profile can be made with a shoulder plane only, which is an advantage on the end grain. If you use a dedicated moulding plane, it will need to be very sharp, and well profiled to work on the end grain.

I blocked out the ovolo shape by eye, with a small shoulder plane held just off vertical.

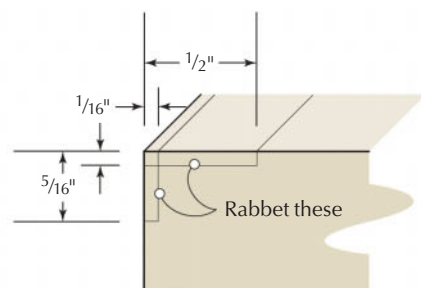
Make a bevel completely around the top, starting with the two end grain ends first. Set the shoulder plane very fine and fair out the bevel to a gentle

curve on top and a sharper curve at the bottom, again working on the end grain first. Finally, carefully remove the facets with sandpaper (I used #150 grit).

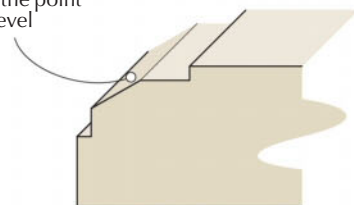
Scratch Decoration

The scratch decorations on my box top are laid out with a compass. Here I wanted to make two circles touching at a single point, with a hex symbol inside each circle.

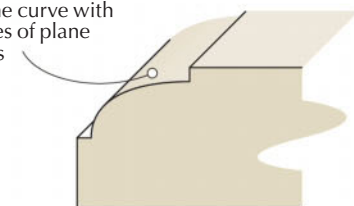
To copy this design, start by laying out two pencil lines—a vertical line and a horizontal line that divide the field into four quadrants. Set one compass point at the intersection of the two pen-



Plane the point to a bevel



Fair the curve with a series of plane passes



LID MOULDING



Shoulder work. I used a small shoulder plane, held slightly off vertical, to first cut flats, then to fair the curve on the box top.



cil lines, and the other to within $\frac{1}{8}$ " or so from the top or bottom of the field.

Once the spread is set, swing the compass to the right and to the left along the horizontal pencil line to find the centerpoints of the two circles.

Lightly pencil in a vertical line at each of these points. Reposition the compass to the respective centerpoints and swing circles. Scribe lightly and repetitively to get a good mark. To make the traditional pattern in the center, position the compass point at the intersection of the scribe line and the vertical pencil line for each circle and step out six points around the circle. Reposition the compass progressively at each point on the circumference and scribe arcs across the circle. If you are careful with the compass, these arcs will each pass through the circle center point and drop into a corresponding circumferential point around the circle.

To make the pattern stand out, I



Penciled in. After scratching the design with compass points, use a fine pencil to trace the shallow recesses; this will help the design stand out.

traced the series of circles and arcs with a pencil, then sanded the surface lightly with #220-grit paper to remove fuzz and the surface pencil marks.

Generally I needed to repeat the scribing and penciling-in process at least once or twice more to get a well-defined penciled-in shape. As you do this, always check your compass settings to verify that they will drop into the circumferential points accurately, otherwise you will muddy the design.

To top things off, I simply used my favorite oil finish: Minwax Antique Oil. It is quick drying (less than one day) and builds relatively quickly. I ragged on three coats (buffing in between) then polished things up to a nice shine with a clean soft cotton cloth. **PWM**

Bill teaches hand-tool woodworking at The Woodwright's School and other locations. His web site is edwardsmountainwoodworks.com.

ALTERNATIVE FEET



The most common foot pattern is a mirror-image ogee curve centered on the midpoint of the box bottom, as shown on the period stone boxes at left. These feet are easy to lay out, but if you are making a honing stone box, just make sure that your profile at the midpoint leaves enough material to excavate the recess.

The profile can be cut on a band saw or with a bowsaw. Alternatively, you can define the curves with a series of crosscuts to the profile line, then pare across the grain

with a chisel and clean up the cuts with a fine rasp. Make the saw cuts shy of the midpoint junction, so that you can make that junction very sharp with some bevel-up paring. —WA

A peek underneath. Note on the underside of this example that the curves are cut into a solid piece of stock.



ONLINE EXTRAS

For links to all online extras, go to:

■ popularwoodworking.com/jun16

WEBSITE: Visit the author's website at edwardsmountainwoodworks.com.

TO BUY: "Choosing, Refurbishing & Using Moulding Planes," with Bill Anderson.

IN OUR STORE: Visit Roy Underhill's school site (woodwrightschool.com) for information on taking class on using or making hand tools with Bill Anderson.

TO BUY: "Choosing, Refurbishing & Using Moulding Planes," with Bill Anderson.

Our products are available online at:

■ ShopWoodworking.com

Karl Holtey, Plane Pioneer

BY KIERAN BINNIE

This legendary planemaker's career
has been dedicated to innovation.

There is no straight path between a childhood spent in a camp for displaced persons in Germany's Black Forest at the end of the Second World War, and a workshop in the Scottish Highlands making some of the most desirable handplanes in the world. Nonetheless, that is the path that Karl Holtey (of Holtey Classic Hand Planes) has walked, and after only a few minutes of talking to Karl it is clear that his singular approach to planemaking is born of his equally unusual life. As Holtey nears the end of his final run of planes – the 984 panel plane – now is the ideal time to reassess his career and in particular the impact his innovations have had on modern planemaking.

Changing the Landscape

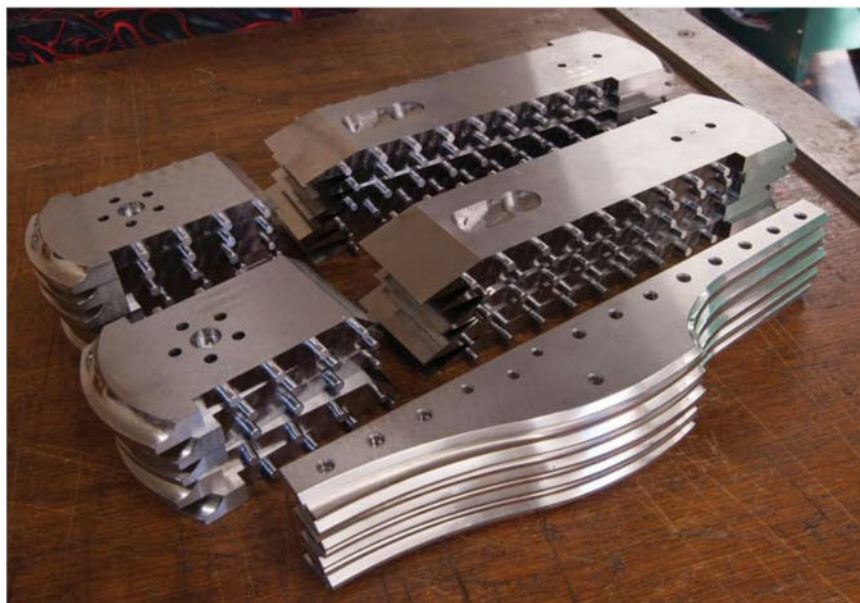
While Holtey might not view his planes as perfect, his peers beg to differ. Planemaker Wayne Anderson characterizes Holtey as having “an ability to produce a plane with utter precision, like a For-



No. 983. Robin Lee convinced Holtey to develop the 983 block plane, show here in disassembled and complete form.



The innovator. Karl Holtey, of Holtey Classic Planes, pictured in his workshop.



Riveting. The integral rivets Holtey uses to join plane bodies are clearly visible in the first run of bodies for the 984 panel plane.

mula One race car [that is] second to none. When I first started planemaking, I printed several of his plane photos to remind me that perfection is an achievable goal,” says Anderson.

Nor have the benefits of Holtey’s innovations been confined to the purchasers of boutique infill planes. Holtey is widely credited in leading the way in utilizing alternative tool steels; Christopher Schwarz says, “there is little doubt that Karl’s efforts are what gave us the choice we have now” – particularly the now widespread availability of A2 steel blades. Similarly, Holtey’s work with bevel-up bench planes prompted a resurgent interest in such designs, culminating in the affordable line of bevel-up bench planes from Veritas. “If it weren’t for Karl, bevel-up tools would still be a backwater of aborted tool designs,” says Schwarz.

Given Holtey’s reputation as an innovator, it is no coincidence that in Rob-in Lee of Lee Valley/Veritas he has found a kindred spirit, with Lee prompting Holtey to develop the 983 block plane. During the two days I spent at Holtey’s workshop, he referred to Lee in warm terms and reflected on his visits to the Veritas manufactory, approving of the innovations Veritas has implemented. Through these conversations it became clear that although the consequences

of Holtey’s innovations have impacted many of the major tool manufacturers, he considers Veritas to be continuing his work at a more affordable price point.

A Constant Prototype

Holtey was born in London, England, in 1948 to an English mother and East Prussian father who had become a prisoner of war while serving in the German army during World War II. The social stigma of having married a member of the German military became too much for Holtey’s mother, who insisted the family leave England and move to Germany.

Life in Germany was not what she expected, and after four years living in a camp for displaced persons the family moved back to England and Holtey was placed in foster care.

Upon leaving school at age 14, he secured an apprenticeship with a French polishing company, which lasted for less than two weeks and involved more in the way of repairing roofs than it did in French polishing.

What followed was a restless period; another unfinished apprenticeship at an office furniture company, employment as a trainee watchmaker, building 30’ ocean sailing yachts and shop-fitting in the construction industry. Throughout this period Holtey found

that his forte was in building prototypes rather than what he viewed as the “repetitive” work of cabinetmaking.

This affinity for prototyping and exposure to a wide range of materials was clearly to serve him well in the future, and he dryly observes that his current planemaking workshop “is effectively equipped as a prototype shop.”

The Start of Planemaking

It is no surprise that the original Norris infill planes were what originally fired Holtey’s imagination for planemaking. Having been captivated by pictures of the Norris planes, Holtey met Alan Beardmore of infill manufacturers Henley Optical, and Bill Carter (the grandfather of modern British infill planemaking) with whom he started attending David Stanley Auctions to obtain working specimens of original Norris planes.

Holtey’s first planes were built on a modelling lathe and secondhand milling machine in an 8’ x 15’ shed. Those early planes rigidly followed the original Norris designs, scaled up from catalog pictures (this was before the Internet made details of classic planes readily available); he focused on reproductions of the Norris A1 panel plane and A7 shoulder plane, followed by the A28 chariot and A31 thumb planes.



Norris reproductions. Shown here are Holtey's versions of the Norris A27 Bullnose and A28 Chariot planes



The original masterpiece. The Holtey 98 Smoothing Plane was the maker's first original design.

"I've always had a fascination with engineering, even though I'm not an engineer. I used to feel embarrassed about what I did – I felt like I was a fraud," says Holtey. "Because I knew what I wanted but I had to move into another world. I knew what I wanted to do but didn't know how to go about it. So I worked in secret so that I could do what I wanted without feeling any pressure."

Steps Toward Innovation

His satisfaction in making pure reproductions was short-lived, so Holtey started to design improvements that addressed what he perceived as deficiencies in the original Norris planes.

The first Holtey original design was the 98 smoothing plane, named after the Exempla 98 fair in Munich, for which he originally designed the tool. Now considered a classic design,

the 98 was for Schwarz "a total revelation," and represents the unveiling of a number of quintessential Holtey design features, including a stainless steel body joined through integral rivets rather than dovetails, bevel-up blade orientation and a rear tote fitted to the plane body with hidden fixtures.

For planemaker Konrad Sauer, of Sauer & Steiner Toolworks, the 98 represents Holtey's "most significant contribution to modern planemaking" specifically thanks to these innovative design choices. That the 98 no longer appears to be revolutionary is testament to the quality of Holtey's designs. "It does not stand out because so many of its features and thinking are [now] in everyone else's work," says Sauer.

Similarly, nearly all modern reproductions of the Norris A13 made since Holtey's A13 plane have adopted Holtey's improved front bun in prefer-

ence to the original design.

The front bun on Holtey's version is "a fantastic piece of design and has been so successful that very few people realize it's not original to a Norris," says Daed Toolworks planemaker Raney Nelson.

"Many newer makers copy [Holtey's] work thinking they are copying 'original patterns,'" says Sauer.

For Schwarz, the redesign of the A13 is emblematic of Holtey's work. While the "original A13 has an ugly front bun, Karl's redesign of it is so perfect that many people now think that's how Norris made them as well," says Schwarz.

Design Process

Holtey comes across as something of a contradiction. Given his reputation for a precision that borders on the obsessive, it is disarming when he explains that his approach to planemaking is based on what he says are hunches. "Some people work things out with mathematics. I work things out with guesswork and gut feeling," he says.

Holtey explains that his designs come from making small but significant improvements to pre-existing designs. In this respect he sees himself as improving the wheel, but not reinventing it. "Everyone has a picture in their mind of what a 'plane' is and looks like," he says. He characterizes his work as innovations to address perceived failings in the functionality of existing planes, rather than changes for the sake of innovation itself.

Remarkably, given the amount of time and effort Holtey expends on every detail of his planes, he suggests that his focus is "to keep things simple and functional."

"He was the first planemaker in several generations who put the functionality of the tools back to the absolute forefront," in an industry that had previously focused on producing infill planes "based on their appearance, and their relationship to the historical record much more than for their abilities as working tools," says Nelson.

Once the outline design has been fleshed out, Holtey undertakes a weight-relieving exercise to remove as much

mass as possible without affecting the mechanical properties of the plane. It is this critical design process, together with Holtey's strong art deco aesthetic, which resulted in the low profile of the 984 panel plane and the distinctive curves of the 983 block plane.

Similarly, Holtey's innovative use of materials, including stainless steel for plane bodies and acrylic for totes, is driven by frustration with what he considers to be the shortcomings of traditional materials. So his decision to abandon the infill pattern planes for which he was known in favor of all-metal designs was prompted by what he perceives as the incompatibility

between high-precision engineering and the seasonal movement of wooden wedges and infills.

Despite enjoying some success in mitigating seasonal wood movement Holtey ultimately observes that, "the dimensional stability of wood has always been the bane of my life." But he explains that even when devising innovative solutions, he tries not to lose sight of tradition, and maintains that Norris and the other classic infill manufacturers would be using stainless steel and acrylics if they were manufacturing today.

Holtey's approach to refining pre-existing designs does not stop with

"The beauty of not achieving perfection is that there is a lot of ground left to cover."

—Karl Holtey

infills. A key feature of his 983 block plane was developed to address the tendency in this style of plane for the blade-clamping mechanism to fall out of alignment when under pressure, resulting in a loss of clamping force. To address this flaw, the 983 has a curved mating surfaces between the blade-clamping wheel and the clamping shoe, which ensures that the assembly is held in alignment and full clamping pressure is transferred to the blade.

This attention to detail has resulted in what Schwarz suggests is Holtey's enduring legacy. "Whether other makers admit it or not, Karl has had an enormous impact on the world of tool making. He set the bar higher than it has ever been set for fit and finish. He changed people's view of the tolerances that are allowable in making tools—for better or worse," says Schwarz.

The Message

In person Holtey comes across as fiercely stubborn and opinionated, a generous host who is eager to learn what others think of his work, and utterly committed to building to an intimidating degree of precision. He swiftly dismisses the need for tight plane mouths, although he offers planes with wafer thin mouths because that is what customers expect, and is equally dismissive of the need for chipbreakers.



Better bun. The Holtey A13 features an improved front bun design over the original Norris plane.



Modern material. Holtey's use of modern acrylics is distinctive. Here are two totes for the 984 panel plane.



Final design. The 984 panel plane will be Holtey's final design for a production run before retiring.



Under pressure. The blade-clamping mechanism of the 983 may not look unusual, but it addresses some common design flaws through meticulous attention to detail.

He is also keen to emphasise “the message” behind Holtey Classic Hand Planes, even if that message is not easily expressed.

“It’s an attitude, but it’s hard to explain. The closest analogy is city people who are happy to get the milk off their doorstep without knowing the effort that went into producing that milk – what was involved,” he says. “My message is the effort that is involved in each of my planes – making things as precisely as I can. My planes are expensive, but I still make a loss on each one. And I respect that people are willing to pay so much money for one of my planes.”

Holtey needn’t worry that his message is being lost; all of the other planemakers I interviewed for this piece remarked on how Holtey’s pursuit of perfection had influenced their own work.

“I soon realized that everyone else was making a Timex, while Karl was making a Rolex,” says Anderson.

What Follows Planemaking?

And so it is that after more than 26 years of planemaking, Holtey is retiring; the 984 panel plane will be his final run. He says that the decision to retire was prompted by the realization that the 983 was the pinnacle of everything he’s worked toward. “With each plane I want to make it better than the one that preceded it,” he says, and the 983 leaves little for him to strive for.

And what of Holtey’s plans for retirement? There is, it seems, no risk of his slowing down any time soon. He will return to a number of orphaned plane projects – curiosities that fell by the wayside as he focused on his core range. Among these is a plane he refers

to as the “Push Me, Pull You” – Holtey’s take on the concept of a variable pitch plane, which he promises will allow the user to switch between two popular pitches without needing to disassemble the tool.

At present, Holtey’s intention for these orphans is to build only a few of each plane, almost as proofs of concept rather than a full production run. During the time I spent at his workshop, Holtey expressed no intention in selling these, so it appears the most Holtey aficionados can hope for at this point is some scintillating glimpses on his blog.

A keen target shooter, Holtey also intends to spend his retirement experimenting with making his own ammunition, and possibly his own rifles. There is also the small matter of a medieval crossbow design, for which he has fabricated the metal parts; all that remains is to work on the wooden elements. If ever completed, I know at least one woodworker who would find the prospect of a crossbow built to Holtey’s usual levels of precision to be very tempting indeed.

Even as Holtey plans his retirement, it is certain that his influence will continue to be felt. As Nelson observes, many of Karl’s innovations have “been so effective that it now looks crazy to approach the tools in any other way.” Schwarz agrees. “Even though Karl is retiring from planemaking, his tools and the ideas behind them will echo in this craft for many generations.” **PWM**

Kieran is a luthier and woodwork writer. Read his blog at overthewireless.com.

ONLINE EXTRAS

For links to all online extras, go to:

■ popularwoodworking.com/jun16

ARTICLE: “Test-driving Exotic Infills,” by Christopher Schwarz.

WEBSITE: Visit holteyplanes.com for a gallery of Karl Holtey handplanes.

BLOG: Read the author’s lutherie and woodworking blog at overthewireless.com.

IN OUR STORE: “Handplane Essentials,” by Christopher Schwarz.

Our products are available online at:

■ ShopWoodworking.com

Taking aim. Holtey already has the metalwork done for a medieval-inspired crossbow.



WOODWORKER'S MARKETPLACE



Cook Woods

Live edge slabs • Custom Cutting • Oversize Bowl Blanks • Craft Wood • Unique Furniture Woods

CookWoods.com 877-672-5275

CARD #111 or go to PWFREEINFO.COM



THE FURNITURE INSTITUTE of MASSACHUSETTS

Study with Philip C. Lowe
Classes range from 1 day to 1 week and 2 and 3 year mastery programs.

See new class schedule on:
(978) 922-0615 www.furnituremakingclasses.com

CARD #16 or go to PWFREEINFO.COM

www.whitechapel-ltd.com 1(800) 468-5534

WHITECHAPEL LTD
est. 1987
Fine Brass and Iron Hardware



CARD #48 or go to PWFREEINFO.COM

POPULAR Woodworking

Follow Us on Social Media!

 @pweditors

 facebook.com/popularwoodworking

 YouTube.com/popularwoodworking

 pinterest.com/popwoodworking

Table Extension Slides



1.866.963.5576
www.customlegs.com

CARD #36 or go to PWFREEINFO.COM

Looking for wood?

VISIT woodfinder



It's fast, easy and FREE!
www.woodfinder.com

No computer? Call toll-free 1-877-933-4637

The Beall Wizard Raises the art of pen turning to a new level



THE BEALL TOOL CO.

541 Swans Road N.E. Newark Ohio
1-800-331-4718 www.bealltool.com Dept. PW

CARD #2 or go to PWFREEINFO.COM

The Web's BEST Woodworking Source!

We now offer one of the largest collections of free woodworking content on the web, all searchable. You'll find fresh project plans, articles and techniques every day of the week at popularwoodworking.com – and these FREE resources are already available for use:

**Streaming Video • Projects
Techniques & Tool Reviews • PW Staff Blogs
Online Bookstore • And More**

Get a daily dose of FREE woodworking insight at popularwoodworking.com!



Make a Traditional English Tool Chest with Christopher Schwarz

Learn how to make this full-size traditional English tool chest based on period examples – Christopher Schwarz guides you step-by-step through the process in this video. The chest has plenty of room for the 50 or so hand tools you need to build just about anything – plus, it will protect your precious tools from harmful dust!



Buy Yours Now
as a DVD or Digital Download at
ShopWoodworking.com

WOODWORKER'S MARKETPLACE

CLASSIFIED

Books

WE HAVE A WIDE VARIETY of woodworking books - from small projects, to home improvement, to enhancing your woodworking skills, and more! To see our full line of books, please visit our web site at ShopWoodworking.com!

Finishing Supplies & Equipment

BLOXYGEN SAVES LEFTOVER FINISHES - Preserve expensive varnish, paint.
www.bloxygen.com or (888) 810-8311.

SHELLAC.NET — WOOD FINISH SUPPLY
Large Shellac Flake Selection - Brushes - Dyes
BEHLEN Finishing Supplies - Stains - Aerosols
RENAISSANCE Wax.
877-245-5611.

Hand Tools

WWW.JIMBODETOOLS.COM The Largest
Antique Tool Website on Earth! Fine Antique
Woodworking Tools of every kind.
845-505-8665.

Kits & Plans

FULL SIZE FURNITURE LAYOUTS Drawn by
Philip C. Lowe. 978-922-0615. 116 Water St,
Beverly, MA 01915.
www.furnituremakingclasses.com

Schools/Instruction

JOHN C. CAMPBELL FOLK SCHOOL,
Brasstown, NC. Courses for all skill levels.
Week and weekend classes year-round,
taught by nationally known instructors.

Friendly, supportive environment. Comfortable,
on-campus housing. Delicious meals served
three times a day. www.folkschool.org.
800/365-5724.

Seat Weaving Supplies

CHAIR CANE & SPLINT, Shaker tape, fiber &
natural rush. Complete line of basketweaving
supplies. Royalwood Ltd., 517-WW Woodville
Rd, Mansfield, OH 44907. 800-526-1630.
www.royalwoodltd.com.

*Classified rate is \$6.00 per word, 15-word
minimum. Order must be accompanied by
payment; ads are non-commissionable. Send to:
Popular Woodworking Magazine, 10151 Carver
Road, Suite 200, Blue Ash, OH 45242 or Don
Schroder, d.schroder@verizon.net. Phone: 610-
821-4425, Fax: 610-821-7884.*

ADVERTISER'S INDEX

	PAGE#	CARD#	WEB ADDRESS
American Fabric Filter	23	66	americanfabricfilter.com
Arbortech USA	4, 5	99	arbortechusa.com
Beall Tool Company	56	2	bealltool.com
Bessey Tools of North America	4	101	besseytools.com
Bloxygen	57	3	bloxygen.com
Blue Spruce Toolworks	4	104	bluesprucetoolworks.com
Calculated Industries	4	62	calculated.com
Cook Woods	56	111	cookwoods.com
Custom Branding Irons	23	93	branding-irons.biz
DMT	5	92	dmtsharp.com
Drillnado	4	7	drillnado.com
Epilog Laser	11	56	epiloglaser.com
Forrest Mfg.	5, 23	13	forrestblades.com
Franklin International (Titebond)	4, 25	14	titebond.com
Furniture Institute of Massachusetts	56, 57	16	furnituremakingclasses.com
General International USA	4, 17	17	general.ca
Grizzly Industrial	Cvr 2, 1	57	grizzly.com
Harbor Freight	59	76	harborfreight.com
Horizon Wood Products	4	108	horizonwood.com
JET Tools	5	72	jettools.com
Jim Bode Tools	57	24	jimbodetools.com
John Campbell Folk School	57	—	folkschool.org
Klingspor's Woodworking Shop	4	89	woodworkingshop.com
Knew Concepts	4, 17	60	knewconcepts.com
Kreg Tools	5	107	kregtool.com
Lee Valley	5, 23	28	leevalley.com

	PAGE#	CARD#	WEB ADDRESS
Legacy Woodworking Machinery	Cvr 4	98	legacyncwoodworking.com
Leigh Industries	5	—	leighjigs.com
Lignomat USA	17	124	lignomat.com
M.Power Tools	4	116	m-powertools.com
Mirka Abrasives	4	31	mirka.com
Mitey Miter	4	43	miteymiter.com
Next Wave Innovations	9	127	ready2rout.com
Oneida Air Systems	4, 11	35	oneida-air.com
Osborne Wood Products	56	36	osbornewood.com
Rikon Power Tools	4, 9, 23	42	rikontools.com
Royalwood Ltd.	57	—	royalwoodltd.com
Shellac.net	57	—	shellac.net
SuperMax Tools	19	121	supermaxtools.com
Timberland	4	115	timberland-amana.com
Trend Routing Technology	4	120	trend-usa.com
Varathane	13	—	varathane.com
Wagner Meters	9	123	wagnermeters.com
Wall Lumber	17	47	walllumber.com
West Penn Hardwoods	17	126	westpennhardwoods.com
Whitechapel Ltd.	56	48	whitechapel-ltd.com
Woodcraft	2, 4	49	woodcraft.com
Woodfinder	56	—	woodfinder.com
Woodline	5, 21	50	woodline.com
Woodpeckers	4, Cvr 3	52	woodpeck.com
Woodstock International	7	114	woodstockinternational.com
Woodworking in America Show	24	—	woodworkinginamerica.com

Joiners vs. Carpenters, 1631

Period woodworking trades in London were strictly regulated.

I've temporarily put down my $\frac{5}{16}$ " joiner's mortising chisel in favor of a 2" chisel for chopping carpenter's mortises. I'm timber framing a workshop, and while whomping away on 2"-wide mortises, I have time to think.

My principal work has always been as a "joiner" in the period sense, what we might now call a "furniture maker." But the trades of joiner and carpenter are pretty similar, so it's not too far-fetched for me to swap out for larger tools, larger joints and a larger project all around. A drawbored mortise and tenon is the same, regardless of scale.

I live in a time and place in which I can tackle whatever form of woodworking I desire, and nobody's nose gets out of joint. This wasn't always the case. Seventeenth-century London was a bustling place, filled with craftsmen of all flavors—but with those large numbers of people came large numbers of regulations.

Joiners' Work

In 1631, Robert Stone, a London joiner, was accused of "intermeddling" in carpenters' work. This led to a dispute between the Carpenters' Company and that of the Joiners' Company that re-



A matter of scale. In the 17th century, the large mortise I'm chopping here for a timber-framed shop would properly be the work of a carpenter, not a joiner.



Joint stool. The name of this furniture form gives us clues that it was built by a joiner, not a turner – despite the turned legs. This is one of my reproductions of a 17th-century joint stool, in walnut.

sulted in a lengthy document drawn up by the city aldermen. To settle things, the aldermen wrote out a piece-by-piece decision itemizing what work each trade could take on.

Among the many works they deemed the joiners' realm were:

"All sorts of Bedsteads whatsoever (onlie except Boarded Bedsteads and nayled together)...all sorts of Chayres and stooles which are made with mortesses or tennants...all tables of Wainscoate Wallnutt or other Stuffe glewed with frames mortesses or tennants...all sorts of formes framed made of boards with the sides pinned or glewed...all sorts of Chests being framed duftalled pynned or Glued...all sorts of Cabinetts

or Boxes duftalled pynned glued or Joyned...all Sorte of Cupboards framed duftalled pynned or glued...all Sorte of presses for wearinge apparell Mercers Silkmen Haberdashers Gouldsmiths Millenors or Napkin presses being pannelled duftalled pynned or Glued"



'Joyned' form. Shown here is a period example of a 17th-century joyned "form" (a bench) in the church at Haddon Hall, Derbyshire.

CONTINUED ON PAGE 61

HARBOR FREIGHT

QUALITY TOOLS AT RIDICULOUSLY LOW PRICES



600+ Stores
Nationwide

SUPER COUPON

3 GALLON, 100 PSI OILLESS AIR COMPRESSORS

A. HOT DOG STYLE
LOT 69269/97080 shown

B. PANCAKE
LOT 60637/61615
95275 shown

SAVE 43%

YOUR CHOICE \$49.99
comp at \$89

CENTRAL PNEUMATIC

36611112

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/26/16. Limit one coupon per customer per day.

SUPER COUPON

16 OZ. HAMMERS WITH FIBERGLASS HANDLE

PITTSBURGH

CLAW
LOT 69006
60715/60714

RIP
LOT 47873 shown
69005/61262

SAVE 83%

YOUR CHOICE \$2.99
comp at \$17.99

36654610

LIMIT 7 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/26/16. Limit one coupon per customer per day.

WOW SUPER COUPON

PACIFIC HYDROSTAR

SAVE \$73

1650 PSI PRESSURE WASHER
LOT 68333/69488 shown
1.3 GPM

\$165.49
~~\$199.99~~
comp at \$149.99

36657311

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/26/16. Limit one coupon per customer per day.

SUPER COUPON

24" CLAMP AND CUT EDGE GUIDE
PITTSBURGH
LOT 66126

SAVE 83%

\$7.99
comp at \$49.23

Customer Rating
★★★★★

36634177

LIMIT 7 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/26/16. Limit one coupon per customer per day.

SUPER COUPON

12" x 33-3/8" WOOD LATHE WITH REVERSIBLE HEAD
CENTRAL MACHINERY
LOT 34706

SAVE \$118

\$229.99
comp at \$347.99

Customer Rating
★★★★★

36592448

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/26/16. Limit one coupon per customer per day.

SUPER COUPON

20% OFF

ANY SINGLE ITEM

LIMIT 1 coupon per customer per day. Save 20% on any 1 item purchased. *Cannot be used with other discount, coupon or any of the following items or brands: Inside Track Club membership, extended service plan, gift card, open box item, 3 day parking lot sale item, compressors, floor jacks, saw mills, storage cabinets, chests or carts, trailers, trenchers, welders, Admiral, Badland, CoverPro, Daytona, Diablo, Franklin, Hercules, Hot, Jupiter, Predator, Sisk-Vak, StormCat, Union, Vanguard, Viking. Not valid on prior purchases. Non-transferable. Original coupon must be presented. Valid through 8/26/16.

36626542

SUPER COUPON

Customer Rating
★★★★★

RAPID PUMP® 1.5 TON ALUMINUM RACING JACK
PITTSBURGH

- 3-1/2 Pumps Lifts Most Vehicles
- Weighs 34 lbs.

SAVE \$60

LOT 69252
68053/62160
62496/62516
60569 shown

\$59.99
comp at \$119.99

36552286

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/26/16. Limit one coupon per customer per day.

SUPER COUPON

900 PEAK/ 700 RUNNING WATTS 2 HP (63 CC) 2 CYCLE GAS RECREATIONAL GENERATOR

SAVE \$78

\$89.99
comp at \$168.97

LOT 60338
66619
69381 shown

36654900

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/26/16. Limit one coupon per customer per day.

SUPER COUPON

WIRELESS SECURITY ALERT SYSTEM
Bunker Hill Security
LOT 93068 shown
69590/61910/62447

Customer Rating
★★★★★

\$12.99
comp at \$29.99

36646033

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/26/16. Limit one coupon per customer per day.

How Does Harbor Freight Sell GREAT QUALITY Tools at the LOWEST Prices?

We have invested millions of dollars in our own state-of-the-art quality test labs and millions more in our factories, so our tools will go toe-to-toe with the top professional brands. And we can sell them for a fraction of the price because we cut out the middle man and pass the savings on to you. It's just that simple! Come visit one of our 600+ Stores Nationwide.

WOW SUPER COUPON

SAVE 66%

80 PIECE ROTARY TOOL KIT
drillmaster
LOT 97626 shown
68986/69451

\$7.99
~~\$24.15~~
comp at \$24.15

Customer Rating
★★★★★

36561080

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/26/16. Limit one coupon per customer per day.

SUPER COUPON

12" SLIDING COMPOUND DOUBLE-BEVEL MITER SAW WITH LASER GUIDE

SAVE \$264

\$134.99
comp at \$399

LOT 69684 shown
61969/61970
61776

36664352

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/26/16. Limit one coupon per customer per day.

WOW SUPER COUPON

14" ELECTRIC CHAIN SAW
PORTLAND
LOT 61592
67255 shown

SAVE 43%

\$44.99
~~\$54.99~~
comp at \$79.97

36659550

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/26/16. Limit one coupon per customer per day.

SUPER COUPON

FREE

WITH ANY PURCHASE

3-1/2" SUPER BRIGHT NINE LED ALUMINUM FLASHLIGHT
LOT 65020/69052 shown
69111/62522/62573

\$4.99
VALUE

36599490

LIMIT 1 - Cannot be used with other discount, coupon or prior purchase. Coupon good at our stores, HarborFreight.com or by calling 800-423-2567. Offer good while supplies last. Shipping & Handling charges may apply if not picked up in-store. Non-transferable. Original coupon must be presented. Valid through 8/26/16. Limit one FREE GIFT coupon per customer per day.

WOW SUPER COUPON

Customer Rating
★★★★★

44" 13 DRAWER INDUSTRIAL QUALITY ROLLER CABINET
LOT 69387/62270
62744
68784 shown

SAVE \$660

\$369.99
~~\$389.99~~
comp at \$1029.99

36590895

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/26/16. Limit one coupon per customer per day.

SUPER COUPON

POWDER-FREE NITRILE GLOVES PACK OF 100

5 mil thickness
Item 68498 shown

SAVE 59%

\$5.99
comp at \$14.97

36575510

LIMIT 9 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/26/16. Limit one coupon per customer per day.

SUPER COUPON

2500 LB. ELECTRIC WINCH WITH WIRELESS REMOTE CONTROL
BADLAND
LOT 61258 shown
61840/61297/68146

SAVE \$90

\$69.99
comp at \$159.99

36560151

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/26/16. Limit one coupon per customer per day.

- 100% Satisfaction Guaranteed
- No Hassle Return Policy
- Over 30 Million Satisfied Customers
- Lifetime Warranty On All Hand Tools

• HarborFreight.com
• 800-423-2567

This \$9,200 Workshop Could Be Yours!

ENTER ONLINE TODAY

for your chance to **WIN A
COMPLETE SHOP** that
features **ALL** you
see here!

ENTRY DEADLINE:
Midnight, Eastern
Daylight Time,
May 31, 2016



10" Proshop Table Saw
JPS-10



16" Planer
JWP-16OS



Lathe
JWL-1015



6" Jointer
JJ-6CSDX



Bar Clamp Assortment
with Mobile Rack
BTB30A



K-Body REVO JR
4 - 36" Clamps
KRJR-36



DuoKlamp Combo
2 - 6" Clamps
2 - 12" Clamps
2 - 18" Clamps



14" Band Saw
JWBS-14SF



1 1/2-HP Dust Collector
DC-1100VX-CK



Router Table
PRP-4-V2420



Saw Gauge
SG-WP

Woodpeckers®



Coping Sled
COPESLED1



Two Variable Pressure
Featherboards
VPFB



Drill Press Table
WPDPPACK2

ENTER NOW!

Complete prizes and contest rules
are also available at www.popwood.com/winshop.

www.popwood.com/winshop

Popular Woodworking Magazine's "WORKSHOP MAKEOVER GIVEAWAY" SWEEP-STAKES: These are only abbreviated rules. The "Workshop Makeover Giveaway" Sweepstakes is subject to Official Rules available during promotion period (Jan. 1, 2016 - May 31, 2016) at www.popwood.com/winshop. See Official Rules for complete entry details and prize descriptions. **NO PURCHASE OR SUBSCRIPTION NECESSARY TO ENTER OR WIN.** Must be a legal resident of the U.S. or Canada (excluding Quebec) who has reached the age of majority in the participant's jurisdiction of residence to enter. One Grand Prize—Woodworker's Home Workshop valued at US\$9,200. Odds of winning depend on number of entries. Void in Quebec and where prohibited. Sponsor: F+W Media, Inc., 10151 Carver Rd., Suite 200, Blue Ash, OH 45242 USA.

The **WORKSHOP MAKEOVER
GIVEAWAY** is sponsored by:



Woodpeckers®

POPULAR
Woodworking
MAGAZINE

In the case of the tables “of Wainscote,” this use of the term refers to oak timber, often that imported into London from the Baltic. The forms are long benches, built just like a joint stool usually, only 4'-6' long. The presses are large cupboard-like pieces, with doors at the front and shelving inside.

Interior Woodwork

All these items fall under the heading that we today would call “furniture,” but joiners also cornered the market on “all Sorts of Wainscott and sealing of Howses and setling made by the use of Two Iages.”

“Sealing” is making frame-and-panel wainscoting. Another period term for a joiner is a “ceiler.” The two “Iages” are thought to be gauges of some sort; I’m still puzzled after all these years as to what that exactly means. It comes up again, just to keep me awake at night.

The wainscot was not the only interior woodwork they claimed, their works included “shopp windows,” “doores framed pannelled or Glued” and “all pewes pulpitts and seates with the Deskes belonging to them framed pannelled or Glued.”

Just in case the carpenters had any ideas, the aldermen gave the joiners claim to: “All worke whatsoever already invented or that hereafter shall bee invented being made by one or two iages with the use of all manner of nayles”

And the joiners/ceilers were also

the carvers: “All carved workes either raised or Cutt through or sunck in with the grounde taken out being wrought and cutt with carving Toolles without the use of Plaines.”

Turners’ Work

There are other minor forms assigned to the joiners, but what of the carpenters? I’ll look at them in the next issue. Meanwhile, just to keep things hopping, the joiners were feeling the pinch from another direction just a few months later, when the Company of Turners filed a complaint against them, citing that:

“The Compy of Joyners assume unto themselves the art of turning to the wrong of the Turners. It appeareth to us that the arts of turning & joyning are two several & distinct trades and we conceive it very inconvenient that either of these trades should encroach upon the other and we find that the Turners have constantly for the most part turned bed posts & feet of joyned stools for the Joyners and of late some Joyners who never used to turn their own bedposts and stool feet have set on work in their houses some poor decayed Turners & of them have learned the feate & art of turning which they could not do before.

“And it appeareth unto us by custom that the turning of Bedposts Feet of tables joyned stools do properly belong to the trade of a Turner and not to the art of a Joyner and whatsoever is done



Turned work. Jan Joris van Vliet’s 1635 etching of a turner illustrates what is meant by “whatsoever is done with the foot as have treddle or wheele for turning of wood.”

with the foot as have treddle or wheele for turning of any wood we are of the opinion and do find that it properly belongs to the Turner’s and we find that the Turners ought not to use the gage or gages, grouffe plaine or plough plaine and mortising chisells or any of them for that the same do belong to the Joyners trade.”

From the sounds of things, the turners were not fully without blame. Imagine turners using the plow plane! **PWM**

Peter has been involved in traditional craft since 1980. Read more from him on spoon carving, period tools and more at pfollansbee.wordpress.com.



Interiors. Joiners had the license to not only make joined furniture, but also wainscoting and other interior trim. The pulpit and desk in the chapel at Haddon Hall (above), and at St. John the Baptist church in Inglesham, Wiltshire (right), are typical examples of early 17th-century joiners’ work.



ONLINE EXTRAS

For links to all online extras, go to:

■ popularwoodworking.com/jun16

BLOG: Read Peter Follansbee’s blog.

ARTICLE: “The Best Oak Money Can’t Buy.”

About this Column

ARTS & MYSTERIES

“Arts & Mysteries” refers to the contract between an apprentice and master – the 18th-century master was contractually obligated to teach apprentices trade secrets of a given craft (and the apprentice was expected to preserve those “mysteries”).

Our products are available online at:

■ ShopWoodworking.com

Sealers – What are They?

An explanation of this most confusing of finishing treatments.

In the late 1980s, I hosted a local call-in radio show dealing with finishing and restoration. I remember one caller explaining that he had applied four coats of tung oil; he asked what he should use to seal the wood!

OK, so he was probably using wiping varnish falsely labeled “tung oil,” as I’ve explained many times, but four coats of any finish will seal wood quite well. Just one coat, in fact, is enough unless the finish has been excessively thinned.

Clearly, this fellow misunderstood the term “sealing.” But he’s not alone; there’s probably no term in finishing that’s more misunderstood.

A Little History

In the 19th and very early 20th centuries, there was no discussion of sealers and, so far as I can determine, there were no products marketed as sealers. The likely explanation is that almost everyone, including furniture manufacturers and painters, used shellac, which is fairly easy to sand.

But in the 1920s nitrocellulose lacquer was introduced and replaced shellac in furniture factories. Unlike shellac, lacquer is not easy to sand because it gums up sandpaper, causing small lumps called “corns.” Because the first coat should always be sanded to remove the roughness, manufacturers created an easy-to-sand finish, which they called “sanding sealer.” The name is logical enough when you remember its purpose.

Varnish has a similar problem of gumming up sandpaper, so as the market for this finish grew, sanding sealers were developed for it, also.

Sanding Sealer

So what is it that makes sanding sealer different from the finish itself – lac-



Sealers. Many products are marketed and sold as sealers. The purpose, however, isn’t to seal. All finishes seal. It’s to provide easy sanding. The only finishes that are difficult to sand are lacquer and alkyd varnish, so these are the only finishes where a special sanding sealer makes sense.

quer or varnish? It’s the addition of zinc stearate to the finish. Zinc stearate is a type of soap. Think about what would happen to the dried finish film if you added the characteristics of hand soap to the finish.

The film would be slicker, so it would be less likely to clog sandpaper. This is good. But then consider the negatives.

- The film would be less moisture and liquid resistant.
- The film would also be softer, so it would scratch easier.
- The film would crack easier because of reduced plasticity.
- Any finish applied over the sanding

sealer might not bond as well.

These qualities are easy to picture once you know that zinc stearate is soap. Sanding sealer is therefore a trade-off between easier sanding and these four negative qualities. The conclusion is obvious: You put up with the more difficult sanding of lacquer and varnish unless your project is large, in which case the time and effort saved, together with the savings on sandpaper, are worth the trade off.

So factories and cabinet shops typically use lacquer sanding sealer, but there’s seldom a need for you to use lacquer or varnish sanding sealer un-



Lacquer. Nitrocellulose lacquer is difficult to sand because it gums up sandpaper causing little lumps of build-up, called “corns,” that scratch the surface. This happens even when using steared sandpaper, as I’m doing here.



Sanding sealer. Sanding sealers for lacquer and alkyd varnish contain zinc stearates, a type of soap. The stearates make the finish easy to sand, but they weaken the finish by making it less moisture resistant, less scratch resistant, less plastic so it cracks easier, and they weaken the bond of many finishes.

less your project is large. You can make the sanding a little easier by sanding with steared sandpaper.

Polyurethane

If you have been finishing for a decade or longer, you've surely noticed that polyurethane varnish has largely replaced traditional alkyd varnish in the stores. Polyurethane cures harder than alkyd varnish and doesn't bond as well to soapy sanding sealer. If the finish takes a hard knock, the polyurethane can separate.

As the market for polyurethane grew, manufacturers became more aware of this problem and began cautioning against applying it over a sanding sealer. But woodworkers had been conditioned to the need for a special sealer, so shellac was increasingly promoted. After a while, it became apparent that polyurethane didn't bond well to shellac either because of the wax it contains naturally.

So Zinsser (Bull's Eye), the only remaining supplier of liquid (as opposed to flake) shellac, created a dewaxed version called SealCoat, which they marketed as a sealer for polyurethane. It works well enough, but consider how absurd this is.

Polyurethane sands very easily, meaning it powders and doesn't clog sandpaper. So no special sealer is needed. A first coat of shellac, in fact, can only have the effect of reducing the protection and durability of the total film. Why would you want to do this?



Sanding polyurethane. Polyurethane varnish dries hard and is easy to sand, so no special sealer is needed. In fact, using anything other than the polyurethane itself as the sealer weakens the total protection and durability of the polyurethane film.

Water-based Finish

Beginning in the early 1990s, water-based finishes became widely available. Water-based finishes also dry hard and sand easily. But the market was conditioned to need a separate sealer. So manufacturers provided a water-based sanding sealer. Whether this was because of their own ignorance of "sealing" or because they just wanted to sell you another product, or both, you can decide.

They did, however, come up with quite an ingenious reasoning for the sanding sealer. They claimed reduced grain raising. Water-based finish is slightly alkaline, and alkalis increase grain raising. So the sanding sealers were made, or at least claimed to be made, more acidic. This reduced the durability, but it was supposedly worth it to reduce grain raising.

I was never able to tell any difference in grain raising. I have to assume that others had the same experience (or lack of it), because manufacturers seem to have given up on this explanation altogether. Some, targeting the woodworking market, still offer a water-based sanding sealer, but you don't often find it in paint stores or home centers. There's just no need for it.

Thinning

Thinning a finish (varnish or lacquer) also makes it easier to sand because the thinner film hardens faster. So you sometimes see instructions to thin the first coat half with the proper thinner.



Sanding water-based finish. As with polyurethane, water-based finish dries hard and is easy to sand without gumming the sandpaper. So there's no need for a special sealer under water-based finish.



Wooden boats. The wooden boat community, especially, believes it's best to thin the first coat of finish about half to get a better bond to the wood. But there's no evidence for this. It's water getting under the paint or finish that causes it to peel.

But the explanation is rarely easier sanding. Instead, it's better bonding. The wooden-boat community, especially, buys into this explanation.

Though deeper penetration leading to better bonding may seem to make intuitive sense, I've never seen any evidence for this. The reason finishes peel isn't because of lack of penetration. All finishes bond well. It's because moisture gets underneath the finish, and the best way to keep moisture out is with a thicker build. Thinning the first coat reduces the total build unless you apply additional coats.

Summing up, it's best not to use sanding sealer or shellac for your first (sealer) coat unless all your coats are shellac or your project is large and you're finishing with either lacquer or alkyd varnish. And there's no reason to thin the first coat. **PWM**

Bob is author of "Flexner on Finishing," "Wood Finishing 101" and "Understanding Wood Finishing."

ONLINE EXTRAS

For links to all online extras, go to:

■ popularwoodworking.com/jun16

ARTICLES: You'll find many free finishing articles on our web site.

IN OUR STORE: "Flexner on Finishing" – 12 years of columns illustrated with beautiful full-color images and updated, and "Wood Finishing 101."

Our products are available online at:

■ ShopWoodworking.com

Jointer Beats Planer for Stock Prep

Combined with a band saw, this is my go-to machine for wood preparation.

In “Why Portable Planers are Better” (February 2016, issue #223), Christopher Schwarz presents the case for a planer (“thicknesser,” on my side of the Pacific) in a small shop as the main aid in preparing stock. I think a jointer is the better machine for this, especially when paired with a band saw.

The first thought that comes to mind about the lunchbox planer is that they are extraordinarily noisy! The universal motor wails like a banshee in heat, and is a mating call for the environmental police, panicking neighbors, and complaining family.

And flattening one side of a board with a jack plane preparatory to sending it through a planer? It is not usually a case of waving the plane over the board, and all is done in a matter of minutes. It can be hard work.

First off, let’s get past the issue of size – that the portable planer has a small footprint while an 8" jointer takes up more space than Texas. One may indeed tuck a portable planer away in a smaller corner. In use, however, both machines require about the same space for the infeed and outfeed of longish boards.

I am not going to argue for an 8" jointer specifically. These are good machines, and can be found for quite a reasonable price secondhand, even new. Much of the time we do not prepare boards wider than 8". Similarly, rarely do we work with lumber that is 13" or greater in width, as in the case for the lunchbox planer/jointer.

I often wonder why an 8" jointer is teamed with a 13" planer. The rule of thumb I follow is that a jointer needs to be capable of working with the maximum-width board that a band saw is capable of re-sawing. It follows that a planer needs to be wide enough to manage what comes off the jointer. So why

are there no 8" planers?

Frankly, the machine I think most should aim for is a combination planer/jointer (this is what I now have). A 10" machine is adequate, 12" is better; anything past this is just showing off. Part of this ideal scenario is a band saw that can re-saw at least 8" and preferably 10". Again, these are not dear machines, even new. But for the purposes of this debate, let’s stick with the 8" jointer.

OK, so why the jointer and not the planer as an only machine?

Flattening a board can be a simple affair of running a jointer plane, such as a No. 7, along its length. But my world rarely sees such wonders. Usually, there is some twist and some cupping. What really happens is that you place the board cup down on the bench, and begin to flatten the upper side. That might go quickly if the cup is mild, however you are still left with the twist. Out come the winding sticks. A bit off here, a bit off there. Time passes. And then...you are done, and into the planer to get parallel sides and the thickness you seek!

But what if the board is 1" thick and you need a 1/2" thickness? Are you going to machine all that excess away, turning 1/2" into planer chips? Such a waste of good wood.

Why not rather mark the desired thickness, and saw away most of this with a band saw? Well, that would be sensible.

Let’s go with the jointer method.

Step #1. Take the cupped and twisted board to the jointer and machine it flat. I will recast Chris’ words for the No. 5



here: “Any half-witted woodworker” can work the jointer. Flat...without all needing to check with winding sticks, and taking off just enough waste to get it there. For good measure, joint one side square to the face.

Step #2. Score the desired thickness with a cutting gauge. Pretty lines all around the board. Working to lines is what we do in woodworking. It is easy to work to lines – much easier than planing to imagined lines, as one does if starting out with a jack plane.

Step #3. You have a choice – either use your jack plane to remove the waste to the line or, if it is more than 1/2", take the board to the band saw and save the unused section! Then plane the board to the lines with a jointer plane. **PWM**

Derek is a woodworker in Perth, Australia. He mostly uses hand tools—except for routing out.

ONLINE EXTRAS

For links to all online extras, go to:

■ popularwoodworking.com/jun16

WEB SITE: Read Derek Cohen’s blog at inthewoodshop.com.

Our products are available online at:

■ ShopWoodworking.com

NEW! from *Woodpeckers*®

Story Stick Pro-96

WATCH
STORY STICK PRO-96
VIDEO
AT WOODPECK.COM

8 Feet of Flawless, Repeatable, Full-Scale Layout Marking & Measuring

There's a reason story sticks have been in use since before the building of the Egyptian pyramids. They just can't be beat for all sorts of tasks where repeatability of measurements and marks is crucial. That's why the story stick has been an essential woodshop tool for centuries.

Story Stick Pro-96, The Ultimate Evolution of This Trusted Tool! Woodpeckers new SSPRO-96 has all the features and accessories you'd ever want. The generous 8' length is achieved by fastening three sections of super-rigid track together using custom machined connectors. When a shorter story stick is needed, the track is quickly and easily disassembled. An array of fully adjustable measuring and marking tabs make the SSPRO-96 extremely versatile. The removable end-stop allows indexing off the edge of stock. And along the track edges, you'll find laser engraved Imperial and metric scales.

Offset Marking Tabs Means "Center Field" Is Covered. Woodpeckers all-new Offset Marking Tabs allow marking anywhere between stock edges because they step down the track thickness to rest flush on the material. Imagine, now you can make precise, repeatable marks anywhere on a 4 x 8 sheet of plywood or cabinet parts.

Caliper Marking Tabs For Inside-Out Measuring And Machine Setup. With Story Stick Pro's Caliper Tabs you can literally "take off" the actual dimension of a cabinet or box opening or part then use your Story Stick to set your saw fence for the perfect cut. These tabs are ideal for making perfectly sized shelves, drawer bottoms, face frame rails, stiles and more.



But That's Not All! You can use the SSPRO-96 to lay out precise locations for cabinet parts including face frame stiles and rails, partitions, shelves and drawers. Use it to mark precise, repeatable locations of cabinet hardware like door hinges, drawer slides and other decorative hardware such as knobs and pulls. Importantly, you can mark both right- and left-handed locations without making any tab adjustments.

Complete Story Stick Pro-96 Package. Our Story Stick Pro-96 has everything you need. Included are the three sections of track to make up the 8-foot length, four track connectors, four standard edge marking tabs, two caliper arms, four offset surface marking tabs for center of field marking, the end-stop and all the hardware needed for fastening tabs and the end-stop.



See our full line of American made precision woodworking tools at woodpeck.com.

Woodpeckers®

Woodpeckers, Inc. Strongsville, Ohio
(800) 752-0725

CARD #52 or go to PWFREEINFO.COM

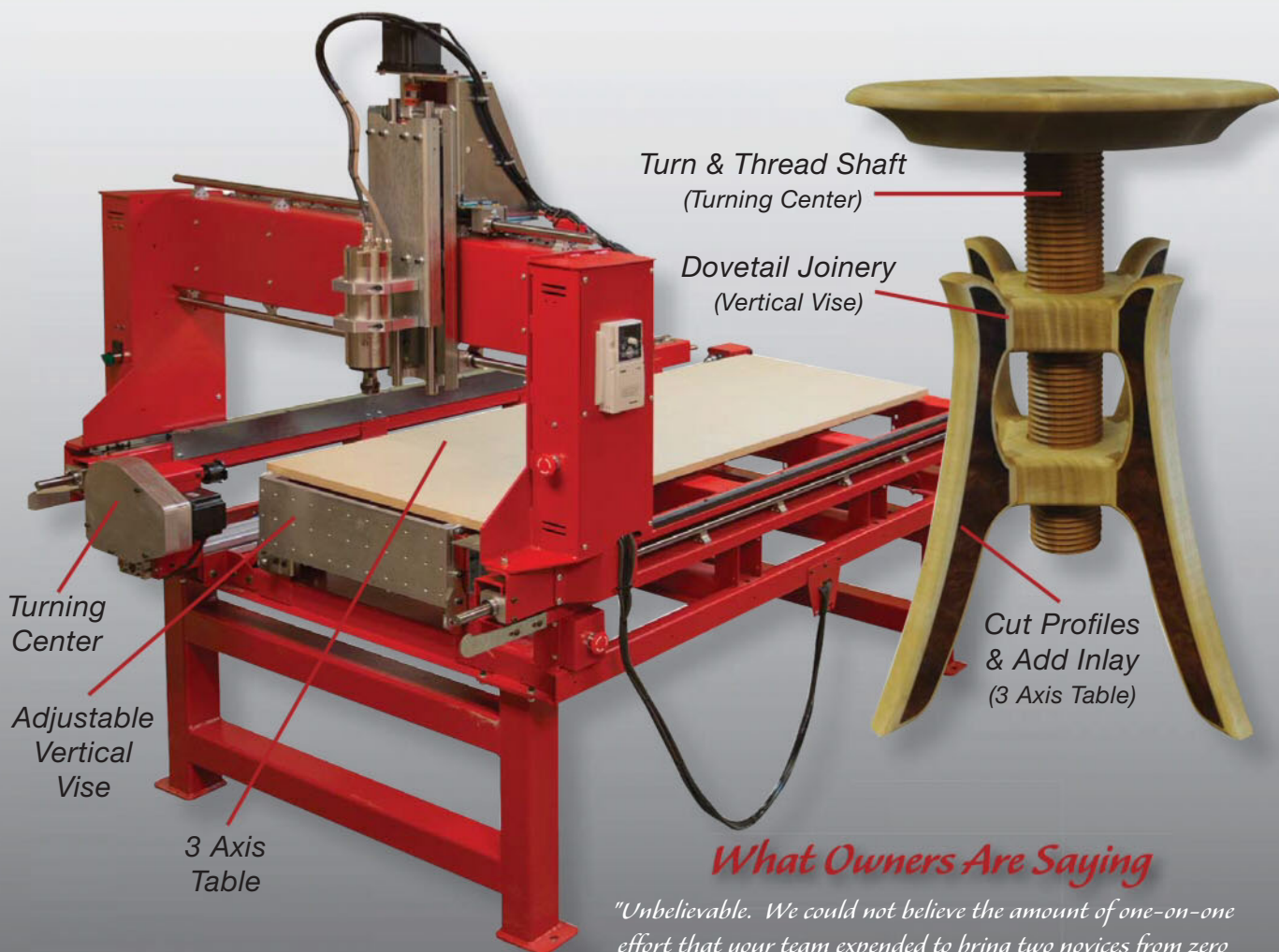
Introducing Legacy Woodworking Machinery's Maverick CNC 3 Station Routing System

3 Independent Work Stations for Machining, Turning, & Joinery

Precision Woodworking at 21st Century Speed

Best Training Program in the Industry

Proudly Made in the USA



What Owners Are Saying

"Unbelievable. We could not believe the amount of one-on-one effort that your team expended to bring two novices from zero knowledge to being comfortable with CNC. You not only have a great product but an exceptional team dedicated to helping customers with their applications and problems. Everyone was not only dedicated to service but also exceptional training..."

— Roy Wilkins

"I love the versatility of the five-axis Legacy designs, and I don't believe one can buy an equivalent-capability CNC system for anywhere near the price." — Howard Schue

See the Maverick CNC in Action

lwmcnc.com/maverick