

BUILT FOR THE WOODWORKER THAT APPRECIATES HIGH QUALITY.



K3 Winner (12")
Sliding table saw

- 4" Depth of cut
- Scoring unit (optional)
- Professional rip fence
- Three different models



A3 31 (12")
Jointer - planer

- Silent power cutterblock
- Quick changeover
- Solid cast iron tables
- Dual lifting jointer tables



N4400
Bandsaw

- Cutting height 12"
- X-life® ceramic guides
- Large flywheels Dia. 17"
- Tilttable table -10° – 45°



**Stability, functionality and
reliability from Austria**



HAND-TOOL PROJECT

Build a Machinist-Style Tool Chest



Popular Woodworking

JUNE 2019 | #246



MAKE YOUR OWN

WINDSOR CHAIR

WEEKEND PROJECT

+ Walnut Table
With Router Inlay

BUILD IT

Japanese
Writing Box



Grizzly Industrial

**PURVEYORS OF
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SINCE 1983!**

14" DELUXE BANDSAW- 35TH ANNIVERSARY EDITION

- Motor: 1 HP, 110V/220V, single-phase, 11A/5.5A, prewired 110V
- Precision-ground cast-iron table size: 14" x 14" x 1½"
- Table tilt: 10° left, 45° right
- Floor-to-table height: 43"
- Cutting capacity/throat: 13½"
- Max. cutting height: 6"
- Blade size: 93½" (½" to ¾" wide)
- Blade speeds: 1800 & 3100 FPM
- Overall size: 27" W x 67½" H x 30" D
- Footprint: 23½" L x 16½" W
- Approx. shipping weight: 247 lbs.



G0555LA35 ONLY \$655⁰⁰



SUPER HEAVY-DUTY 14" RESAW BANDSAW WITH FOOT BRAKE

- Motor: 2 HP, 110V/220V, single-phase, 15A/7.5A, prewired 110V
- Table size: 21¼" L x 16½" W
- Table tilt: 5° left, 45° right
- Floor-to-table height: 37"
- Max. cutting width: 13½"
- Max. cutting height: 14"
- Blade size: 120" (½" to ¾")
- Blade speed: 2820 FPM
- Overall size: 29" W x 32½" D x 76" H
- Footprint: 24" L x 18" W
- Approx. shipping weight: 388 lbs.



MADE IN AN ISO
9001 FACTORY

G0817 ONLY \$1395⁰⁰



BENCHTOP TABLE SAW WITH RIVING KNIFE

- Motor: 2 HP, 115V, single-phase, 15A
- Brushless DC (BLDC) Motor
- Table size: 22" x 26¾"
- Arbor: 5/8"
- Blade tilt: Left, 45°
- Arbor speed: 2000-4000 RPM
- Max. depth of cut @ 90°: 3½"
- Max. depth of cut @ 45°: 2½"
- Rip capacity: 28" right
- Dado capacity: 1¾"
- Dust port: 2½"
- Overall size: 27" L x 32" W x 21" H
- Approx. shipping weight: 70 lbs.

New!



G0869 ONLY \$299⁹⁵



MADE IN AN ISO
9001 FACTORY

10" 3HP 220V CABINET TABLE SAW WITH RIVING KNIFE

- Motor: 3 HP, 220V, single-phase, 12.8A
- Precision-ground cast-iron table
- Table height from floor: 34"
- Table size with wings: 27" x 40"
- Arbor speed: 4300 RPM
- Arbor size: 5/8"
- Max. dado width: 1¾"
- Max. depth of cut @ 90°: 3½"
- Max. depth of cut @ 45°: 2¾"
- Max. rip capacity: 29½" Right, 12" Left
- Blade tilt: Left, 45°
- Overall size: 62"L x 41"W x 40"H
- Approx. shipping weight: 530 lbs.



FREE 10" X 40T
CARBIDE-TIPPED
BLADE

G0690 ONLY \$1795⁰⁰



14" EXTREME SERIES RESAW BANDSAW

New!

- Motor: 1.75 HP, 110V/220V, single-phase, 15A/7.5A, prewired 110V
- Precision-ground cast-iron table size: 16½" x 21¼" x 1½"
- Table tilt: 5° left, 45° right
- Floor-to-table height: 44½"
- Cutting capacity/throat: 13½"
- Max. cutting height: 12"
- Blade size: 104" to 105" (½" to ¾" W)
- Blade speed: 3000 FPM
- Overall size: 26" W x 31" D x 78" H
- Footprint: 16"L x 18"W
- Approx. shipping weight: 337 lbs.

EXTREME
SERIES



MADE IN AN ISO
9001 FACTORY

G0555XH ONLY \$895⁰⁰



17" BANDSAW - 2 HP

- Motor: 2 HP, 110V/220V, single-phase, prewired 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: 16¼" left of blade
- Max. cutting height: 12½"
- Blade size: 131½" long
- Blade width range: ½"-1" wide
- Blade speeds: 1700 & 3500 FPM
- Overall size: 73" H x 32" W x 32" D
- Footprint: 27" L x 17¼" D x 2½" H
- Approx. shipping weight: 342 lbs.



MADE IN AN ISO
9001 FACTORY

G0513 REG. \$1029⁰⁰ CLOSEOUT \$997⁰⁰



10" HYBRID TABLE SAW WITH T-SHAPED FENCE

- Motor: 2 HP, 120V/240V, single-phase, 15A/7.5A, prewired 120V
- Precision-ground cast-iron table with wings measures: 40½" W x 27" D
- Table height: 35¾"
- Arbor: 5/8"
- Arbor speed: 3450 RPM
- Max. depth of cut @ 90°: 3¼"
- Max. depth of cut @ 45°: 2¼"
- Rip capacity: 31" right, 16¾" left
- Overall size: 64" W x 35½" H x 40¼" D
- Footprint: 21" L x 19½" W
- Approx. shipping weight: 371 lbs.

FREE 10" X 40T
CARBIDE-TIPPED
BLADE



G0771Z ONLY \$895⁰⁰



10" SLIDING TABLE SAW

- Motor: 5 HP, 230V, single-phase
- Precision-ground cast-iron main table
- Main table dimensions: 14¾" x 27"
- Sliding table size: 12¼" x 63"
- Main blade arbor: 5/8"
- Main blade arbor speed: 4000 RPM
- Scoring blade arbor: 22mm
- Scoring blade tilt: 0-45°
- Max. dado width: 1¾"
- Max. depth of cut @ 90°: 3½"
- Max. depth of cut @ 45°: 2¼"
- Max. rip capacity: 33"
- Main blade size: 10"
- Main blade tilt: 0-45°
- Approx. shipping weight: 688 lbs.



EXTREME
SERIES

MADE IN AN ISO
9001 FACTORY



G0623X ONLY \$3375⁰⁰



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20256

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FREE 2019 CATALOG

OVER 802 PAGES OF HIGH QUALITY MACHINES & TOOLS AT INCREDIBLE PRICES

8" DOVETAIL JOINTERS

- Motor: 3 HP, 230V, single-phase, 12A
- Max. depth of cut: 1/8"
- Table size: 72" x 8"
- Fence size: 38" x 4 3/4"
- Rabbeting capacity: 1/2"
- Cutterhead speed: 5500 RPM
- Cuts per minute: 22,000
- Table adjustment handwheels
- 45° and 90° fence stops
- Built-in mobile base
- Approx. shipping weight: 373 lbs.



New!

MADE IN AN ISO 9001 FACTORY!

\$169 shipping

WITH 4-KNIFE CUTTERHEAD

G0855 ONLY \$1150⁰⁰

WITH SPIRAL CUTTERHEAD

G0856 ONLY \$1595⁰⁰

2 HP DUST COLLECTOR WITH ALUMINUM IMPELLER - POLAR BEAR SERIES

- Motor: 2 HP, 240V, single-phase, 9A
- Air suction capacity: 1550 CFM
- Static pressure: 11"
- 6" inlet has removable "Y" fitting with two 4" openings
- Bag capacity: 5.7 cubic feet
- Portable base size: 21 1/4" x 33 1/2"
- Bag size (dia. x depth): 19 1/2" x 33"
- Height with bags inflated: 78"
- Approx. shipping weight: 122 lbs.



G1029Z2P ONLY \$375⁰⁰

\$99 shipping

12" BABY DRUM SANDER

- Sanding motor: 1 1/2 HP, 115V, single-phase, 13A
- Conveyor motor: 1/8 HP, 115V, single-phase, 0.3A
- Drum surface speed: 2127 FPM
- Max. stock dimensions: 12" wide x 3 1/2" thick
- Min. stock length: 8"
- Min. stock thickness: 1/8"
- Sanding drum size: 4"
- Sanding belt size: 3" x 70" hook & loop
- Dust port size: 2 1/2"
- Feed rate: 2.5-17.3 FPM
- Approx. shipping weight: 166 lbs.



G0459 ONLY \$650⁰⁰

\$99 shipping

15" PLANERS

- Motor: 3 HP, 230V, single-phase, 12A
- Max. cutting width: 15"
- Max. cutting height: 6"
- Max. cutting depth: 1/8"
- Feed rates: 16 FPM and 20 FPM
- Cutterhead speed: 5000 RPM
- Number of knives: 3 (G1021Z)
- Approx. shipping weight: 540 lbs. (G1021Z), 581 lbs. (G1021X2)



MADE IN AN ISO 9001 RATED FACTORY!

WITH 3-KNIFE CUTTERHEAD

G1021Z ONLY \$1395⁰⁰

WITH SPIRAL CUTTERHEAD

G1021X2 ONLY \$1995⁰⁰

\$169 shipping

8" PARALLELOGRAM JOINTERS

- Motor: 3 HP, 230V, single-phase, 12A
- Precision-ground cast-iron table size: 76" x 8"
- Max. depth of cut: 1/8"
- Rabbeting capacity: 1/2"
- Cutterhead speed: 5500 RPM
- Cutterhead diameter: 3 1/16"
- Fence size: 38" x 4 3/4"
- Dust port: 4"
- 45° & 90° fence stops
- Approx. shipping weight: 365 lbs.



G0857

WITH 4-KNIFE CUTTERHEAD

G0857 ONLY \$1295⁰⁰

WITH SPIRAL CUTTERHEAD

G0858 ONLY \$1725⁰⁰

\$169 shipping

MADE IN AN ISO 9001 FACTORY!

2HP CANISTER DUST COLLECTOR WITH ALUMINUM IMPELLER - POLAR BEAR SERIES

- Motor: 2 HP, 240V, single-phase, 9A
- Blower/impeller: 12 3/4" aluminum, radial fin
- Air suction capacity: 1700 CFM
- Static pressure: 10"
- Sound rating: 83-85 dB
- 6" inlet has removable "Y" fitting with three 4" inlets
- Canister filter size (dia. x depth): 19 5/8" x 23 5/8"
- Bag capacity: 4.5 cubic feet
- Overall dimensions: 31 1/2" W x 37 3/8" L x 71" H
- Approx. shipping weight: 150 lbs.



MADE IN AN ISO 9001 RATED FACTORY!



G0548ZP ONLY \$535⁰⁰

\$99 shipping

1 HP OSCILLATING SPINDLE SANDER

- Motor: 1 HP, 120V/240V, single-phase, 12A/6A, prewired 120V
- 25" x 25" cast-iron table tilts 45°L, 15°R
- Ten spindle sizes: 1/4", 3/8", 1/2", 5/8", 3/4", 1", 1 1/2", 2", 3", 4", tapered and threaded
- Floor to table height: 35 1/2"
- Spindle speed: 1725 RPM
- Spindle oscillation: 72 SPM
- Stroke length: 1 1/2"
- Approx. shipping weight: 296 lbs.



INCLUDES 10 SPINDLE SIZES!



G1071 ONLY \$895⁰⁰

\$119 shipping

20" PLANERS

- Motor: 3 HP and 5 HP, 220V, single-phase
- Table size w/ rollers: 20" x 55 3/4"
- Max. cutting width: 20"
- Max. cutting height: 8"
- Max. cutting depth: 1/8"
- Min. length of stock: 7"
- Feed rates: 16 FPM and 20 FPM
- Number of knives: 4 HSS
- Knife size: 20" x 1" x 1/8"
- Cutterhead speed: 5,000 RPM
- Overall dimensions: 39" W x 41" H x 58" D
- Approx. shipping weight: 880 lbs.



G1033

WITH 3 HP MOTOR

G1033 ONLY \$1795⁰⁰

WITH 5 HP MOTOR

G1033Z REG. \$1950⁰⁰ SALE \$1750⁰⁰

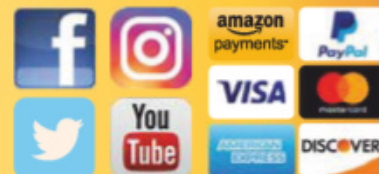
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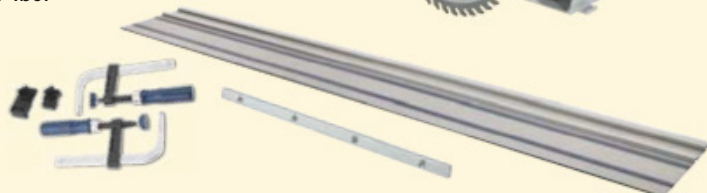


TRACK SAW MASTER PACK

- Motor: 120V, 1.1kW, 5500 RPM, 9A
- Blade rim speed: 9070 FPM
- Max. cutting depth at 45°:
without rail 1⁵/₈", w/ rail 1⁷/₁₆"
- Max. cutting depth at 90°:
without rail 2⁵/₃₂", w/ rail 1³¹/₃₂"
- Includes saw blade:
160mm x 20mm x 48T
- Dust port dia.: 1¹/₂"
- Saw weight: 11 lbs.

W1835 Track Saw

Includes:
Accessory Pack
& 55" Guide Rail



W1832 Track Saw Master Pack

7" 2 HP PLANER MOULDER W/ STAND

- Motor: 2 HP, 240V, single-phase, 10.8A
- Cutterhead speed: 7000 RPM • CPM: 14,000 • CPI: 64-300
- Feed rate: 0-18 FPM • Max. profile: 6³/₄"W x 3³/₄"D
- Planing width: 7" • Min. stock length: 9"
- Min. stock thickness: 1¹/₄" • Max. stock thickness: 7¹/₂"
- Overall dimensions: 36¹/₄"L x 22"W x 34¹/₂"H
- Approx. shipping weight: 324 lbs.

PATENT OWNED BY
WOODSTOCK
INTERNATIONAL INC.



W1812 7" 2 HP Planer Moulder w/ Stand
D3393 Elliptical Jig for W1812



10" TABLE SAW WITH RIVING KNIFE

- 3 HP, 230V, single-phase
- Blade tilt: Left, 0°-45°
- Table height from floor: 34"
- Cast iron table size:
27" x 40¹/₄"
- Table size with extension:
27" x 53⁵/₈"
- Arbor speed: 4300 RPM
- Arbor size: 5⁸/₁₆"
- Max. dado width: 1³/₁₆"
- Max depth of cut
@ 90°: 3¹/₈",
@ 45°: 2³/₁₆"
- Max. rip capacity: 29¹/₂"
- Overall dimensions:
62"L x 41"W x 40"H
- Approx. shipping
weight: 527 lbs.

Includes 10"
Carbide-Tipped
Blade



W1819 10" 3 HP Table Saw with Riving Knife

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

- Motor: 3/4 HP, 110V, 1725 RPM
- Overall height: 38"
- Spindle travel: 3¹/₄"
- Swing: 13¹/₄"
- Drill chuck: 5⁸/₁₆"
- Speeds: 12, 250-3050 RPM
- Table: 12³/₈" dia.
- Table swing: 360°
- Table tilt: 45° left & 45° right
- Approx. shipping
weight: 123 lbs.



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

12" X 15" VARIABLE SPEED BENCH-TOP WOOD LATHE

- Motor: 3/4 HP, 110V, single-phase, universal motor
- 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° increments
- Heavy-duty cast-iron
construction
- Approx. shipping
weight: 87 lbs.

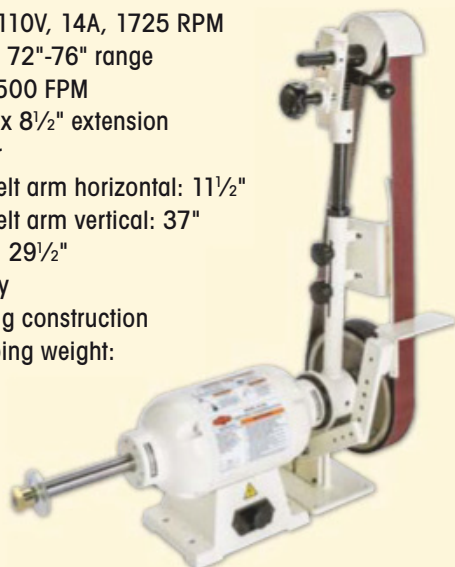


W1836 Bench-Top Wood Lathe

KNIFE BELT SANDER/BUFFER

- Motor: 1 HP, 110V, 14A, 1725 RPM
- Belt size: 2" x 72"-76" range
- Belt speed: 4500 FPM
- Left arbor: 1" x 8¹/₂" extension
with 5⁸/₁₆" arbor
- Height with belt arm horizontal: 11¹/₂"
- Height with belt arm vertical: 37"
- Overall width: 29¹/₂"
- Cast iron body
- All ball bearing construction
- Approx. shipping weight:
113 lbs.

New



W1843 Knife Belt Sander/Buffer

14" SUPER-DUTY RESAW BANDSAW

- Motor: 2 HP, 110V/220V (prewired 110V),
1720 RPM, 15A at 110V, 7.5A at 220V
- Table size: 21³/₄"L x 16¹/₂"W
- Table tilt: 5°, 45°
- Floor to table height: 37"
- Max cutting height: 14"
- Max throat capacity: 13¹/₂"
- Max cutting width with fence: 12"
- Overall size: 29"W x 32¹/₂"D x 76"H
- Dual 4" dust ports
- Footprint: 23"L x 18"W
- Approx. shipping weight: 388 lb.

New

Made in an
ISO 9001 Factory



W1849 14" Super-Duty Resaw Bandsaw

WALL-MOUNT DUST COLLECTOR

- Motor: 1 HP, 120V/240V
(prewired 120V), 7A/3.5A
- Air suction capacity: 537 CFM
- Static pressure: 7.2"
- Filter rating 1 micron
- Bag capacity: 1.5 cubic feet
- Intake hole size: 4"
- Impeller: 10" balanced
cast aluminum radial fin
- Canister filter size (dia. x
length): 15" x 16³/₁₆"
- Height with bag
inflated: 46"
- Sound level: 77-79 dB
- Approx. shipping
weight: 62 lbs.



W1844 Wall-Mount Dust Collector
with Canister Filter

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34 Machinist's Tool Chest

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40 Build a Windsor Chair

Chair making can be an intimidating craft to jump into, but it offers a new set of skills that challenge and refresh any woodworker.

BY ANNE BRIGGS

48 Weekend Walnut Table

This walnut table can be built in a weekend! Use a router with a bushing kit and templates to add beautiful inlay.

BY WILLIE SANDRY



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Number 246, June 2019. *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 10151 Carver Road, Suite #300, Blue Ash, OH 45242. 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 2019 by F+W Media, Inc. 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.

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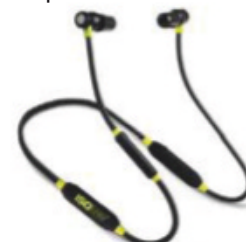


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It's time to give every Dad his due with a month full of top-flight woodworking prizes. From May 18 through June 16 (Father's Day), *Popular Woodworking* and its sponsors are giving away a prize a day to celebrate dads. To earn your chance, you must enter separately for each day's prize. All entrants will qualify for the **Grand Prize: JET ProShop II Table Saw (Model 725000K).**

ENTER NOW for your
chance at **more than**
\$8,700 in prizes with
a winner every day!

WWW.POPULARWOODWORKING.COM/30DAYS

JUNE 1

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JUNE 11

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JUNE 12

Kreg

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JUNE 13

LEIGH

RTJ400 Router Table Dovetail Jig

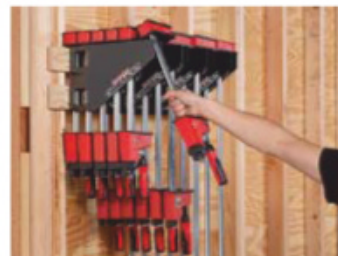


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JUNE 14

Woodpeckers

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JUNE 15

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JUNE 16, FATHER'S DAY

GRAND PRIZE

ProShop II Table Saw (725000K)

www.jettools.com

JET



Popular Woodworking Magazine and its sponsors will award one prize each day from May 18 through June 16. 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 ProShop II Table Saw (725000K)**.

Registration starts 12:01am, EDT on May 18, 2019 and ends 11:59pm EDT, June 16, 2019.

ENTER EVERY DAY AT
WWW.POPULARWOODWORKING.COM/30DAYS

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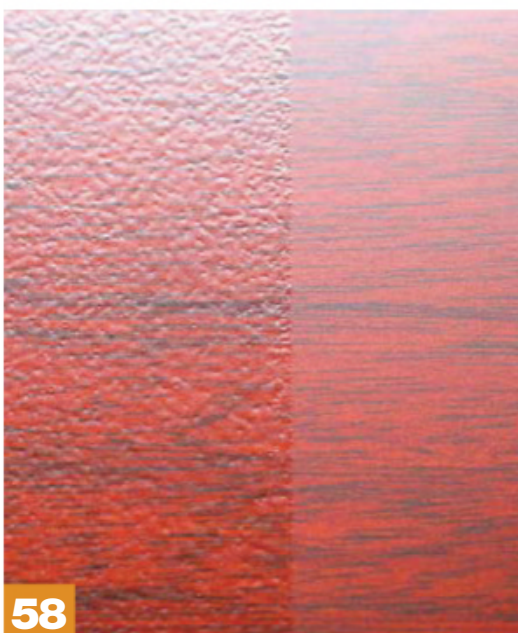
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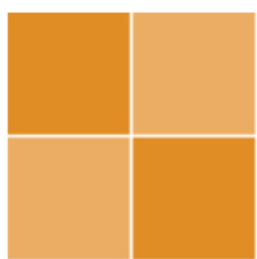
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■ FROM THE EDITOR

Doing More With Less

By Andrew Zoellner

We all face constraints. In the woodworking world, there are three that I'm always balancing: time, tools and space. I don't build things nearly as much as I should. With an old house (circa 1906), much of my woodworking time turns into fixing and matching trim, reframing walls and carefully removing plaster and lathe, so as not to damage more of it than I have to. There's also a fair amount of detective work and bargaining going on: Where did this wire come from? Why are there three doorbell transformers? How far out of level is too far? In essence, a quick home repair quickly turns into a time suck.

On the tools front, I'm very fortunate. Very rarely am I lacking in what I need to make or build or repair something. Do I wish I had a 20" planer and 12" jointer in my garage (like we have in the Pop Wood shop)? Sure. But you can build beautiful furniture without those two tools, too.

Space is a tricky thing, especially having lived in a city apartment for a decade and a half. I'd carve out an area for a modest shop for a bit, but it never lasted more than a few months at a time (until I convinced a buddy that his basement would make a great workshop). It was a lot of shuffling things around, and I'd usually spend more time setting up, finding things and cleaning up than building. But for projects that really needed to happen, I made it work.



This is where I finished things when I lived in an apartment—the living room. It wasn't ideal, but it got the job done. It's helpful to have an understanding partner (and no coffee or side tables in the space yet).

And really, making it work is essential to woodworking. Making Windsor chairs doesn't require a ton of tools or space (page 40). With a few hand tools, a shave horse, a lathe, and a place to clamp things, you're set. And, if you ask Anne Briggs (and many other chairmakers), it's a life-changing experience.

The same goes for building a Japanese writing box (page 28) or a machinist-inspired tool chest (page 34). If you can cut things to length, use a chisel and a plane and have a place to hold work while you cut joinery, you can build both of these projects.

For the lucky ones (myself now included), with a full complement

of power and hand tools and the space for them, time can be the biggest constraint. That's why I really like Willie Sandry's walnut table (page 48), with solid construction, good details and interesting inlay cut efficiently with a router. It can be built in a weekend so you can get back to being the things you are when you're not a woodworker. And if it takes you two weekends, that's two weekends spent doing one of the best things you can do: making cool stuff with your own two hands.

Andrew Zoellner



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INBOX

Simple Outdoor Finishes

I need to build an outside door that will withstand the weather. Do you have simple plans that will work for me?

Larry Butterworth

Here's my finishing contribution to the question. Wood outside needs to be protected against two elements: ultra-violet light from the sun; and water from rain. So if your door is covered, any indoor finish will work well.

Otherwise, to protect against UV light pigment works best, so several coats of paint are best. Paint also protects well against water.

If you want a clear finish, boat varnishes are best because they contain UV-resistant additives. You'll need to go to a marina near a coast to get them. They are rarely sold in common paint stores or home centers. Common brands are Z-Spar, Interlux, Epifanes and Pettit. They all work well. You can get them online from Amazon, Westmarine.com or Jamestowndistributors.com.

To protect well against water, you need to build a thickness, two or more coats that dry hard. So oil finishes, which won't harden, don't perform well. Oil-based and water-based varnish and polyurethane dry hard and hold up better than shellac or lacquer.

Bob Flexner, *Contributing Editor*

Preserving Finishes

Oil finishes are great and Waterlox is one of the best. In your April 2019 article, "Flawless Finishing with Waterlox," however, Mr. Heitzman discusses transferring the finish to smaller containers and then blowing into the jars to displace the oxygen as he closes it. As scuba divers or paramedics know, the air we exhale is NOT oxygen free. We inhale 21% oxygen and exhale about 15% oxygen. His advice is on the right track, but it will not solve the problem.

What about marbles? Some folks try to eliminate the air space in their container by throwing marbles or rocks in the liquid. In addition to contaminating their product, they often find that cleaning the marbles results in lots of wasted time and product. What about a smaller container? Transferring your liquid to a smaller container will reduce the air space, but you'll still have oxygen in there.

Perpetuating these myths confounds the finishing storage process and ends up making things too complicated. Many are dangerous or risky and some, like the ones mentioned here, simply do not work. Bloxygen (an inert gas blanket of ultra-pure heavy Argon), will resolve this issue quickly and easily.

Steven Zawalick, *Owner of Bloxygen*

Old Finishing Recipes

I have used shellac (both flakes in alcohol and canned) for many years. Recently, I found a book called *French Polishing and Enamelling* by Richard Bitmead, that has recipes for spirit varnishes that include additional ingredients (i.e. benzoin, rosin, and gum sandarach). What are the effects of these additional ingredients? Thanks for your *Popular Woodworking* column and blog and for considering this question.

Matt Belovarich

Interesting question, but not something I know a lot about, at least in the sense that I've ever experimented with any of these formulas. Here's what I know.

First, methylated spirits is what the British call our denatured alcohol. It's not methanol, as is often assumed, which is pretty toxic.

Second, the term for shellac used to be spirit varnish, in contrast to oil varnish, which is what we call varnish.

When shellac first started being used, there were lots of other alcohol-soluble resins available. Craftsmen often combined these resins to tweak the qualities they were getting in the shellac, which was the most durable of the resins. Formulas they were using got repeated and continue to appear, as you have discovered from 1949.

Notice that one of the formulas is for darker woods and the other is for lighter woods. Now look at the picture below. I do not know what rosin adds to the finish. Rosin is sap from pine trees. Maybe it adds adhesion because it's so sticky, but I don't know why it's needed. Benzoin adds a pleasant scent, which I guess makes the spirit varnish more pleasant to work with. Sandarach has a lighter color and was often added to shellac to make it lighter.

So that gives you an introduction. The person who might help you more is Don Williams, who has written for *Popular Woodworking*. If you do get some helpful information from Don, please forward it on to me. I'm curious.

Bob Flexner, *Contributing Editor*



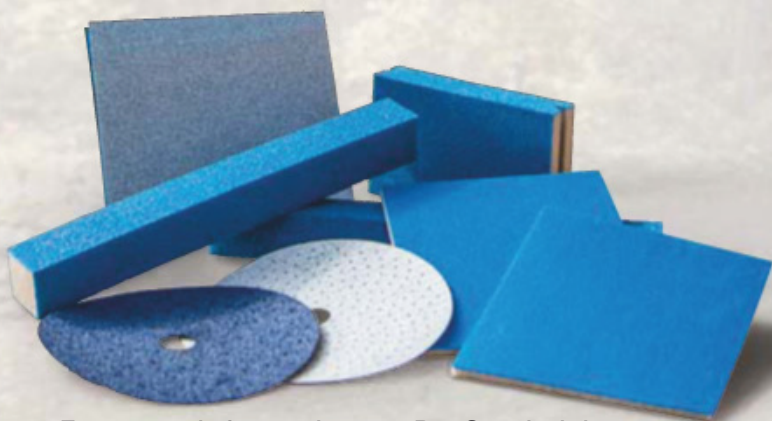
Natural resins include (top, left to right) rosin, copal, benzoin, sandarach, (bottom) mastic, damar and shellac.

PHOTO: BOB FLEXNER



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TOOLS

Woodpeckers Slab Flattening Mill

There's no denying the popularity of live edge slab furniture (I've even seen full slabs wrapped in plastic at the big box store). Just add legs and you've got yourself a coffee table. However, if you don't purchase a pre-flattened slab,

your first task will be to make a flattening jig. While building this jig isn't the most difficult task, there comes a time when you need precision and reliability that doesn't leave you wonder-

ing. I found the Woodpeckers Slab Flattening Mill to be a pretty incredible system.

The extruded aluminum rails are robust. Their profile leaves no possibility for sagging (my main concern with plywood jigs). Once the rails are secured to your worktable, they are rock solid.

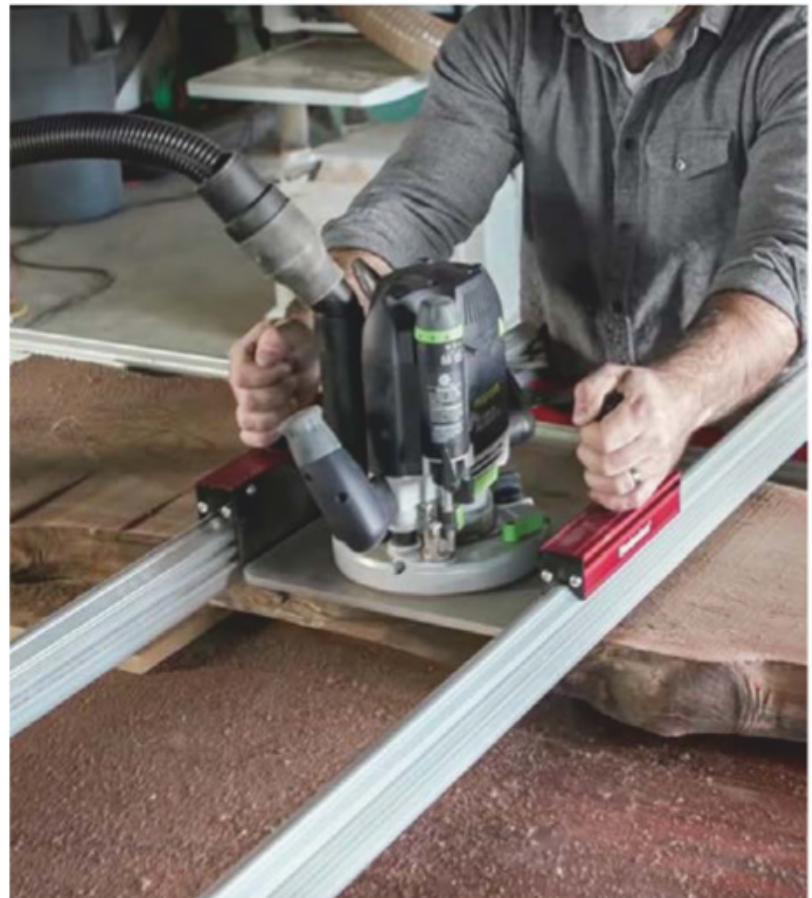
The carriage that rides upon the rails uses the same extrusions as the base rails. Everything slides on top of the extrusions where they peek to a V-shape. The supplied guide blocks have a mating surface with UHMW tape that enables effortless sliding. After testing, it made sense to use this kind of slide over a more complicated bearing solution with the amount of dust and debris kicked around by the flattening process.

The plate that supports the router is substantial. It's built to accommodate up to 3 HP routers (we tested it with a Festool 2200) and has the necessary holes and bolts to accommodate more than 13 of the most popular full-size models. (It felt so luxurious to have the necessary bolts prepared for me in a baggy.)

In use, the mill makes flattening a slab a simple exercise. The carriage can't rack across the rails because everything is locked together by the guide blocks. Essentially, you're providing the X and Y movement and pacing the feed of the cut. There isn't much room for error.

Two considerations: Make sure you have a router bit extension on hand (the router sits just out of reach of the workpiece for the average bit). And second, the standard rails have a slab capacity of 38" x 57", less than then you'd predict by looking at the carriage system (but clearly stated in the manual). The extended version comes with extra rails that can be added to the length or width, 62" x 105" or 38" x 129".

The price on this mill doesn't make it an impulse purchase for many of us. However, if you're regularly flattening slabs with a router or are in a multi-person shop setting, this could be an outstanding next step after a homemade jig.—David Lyell



Amana 1 3/4" Straight Plunge Bit

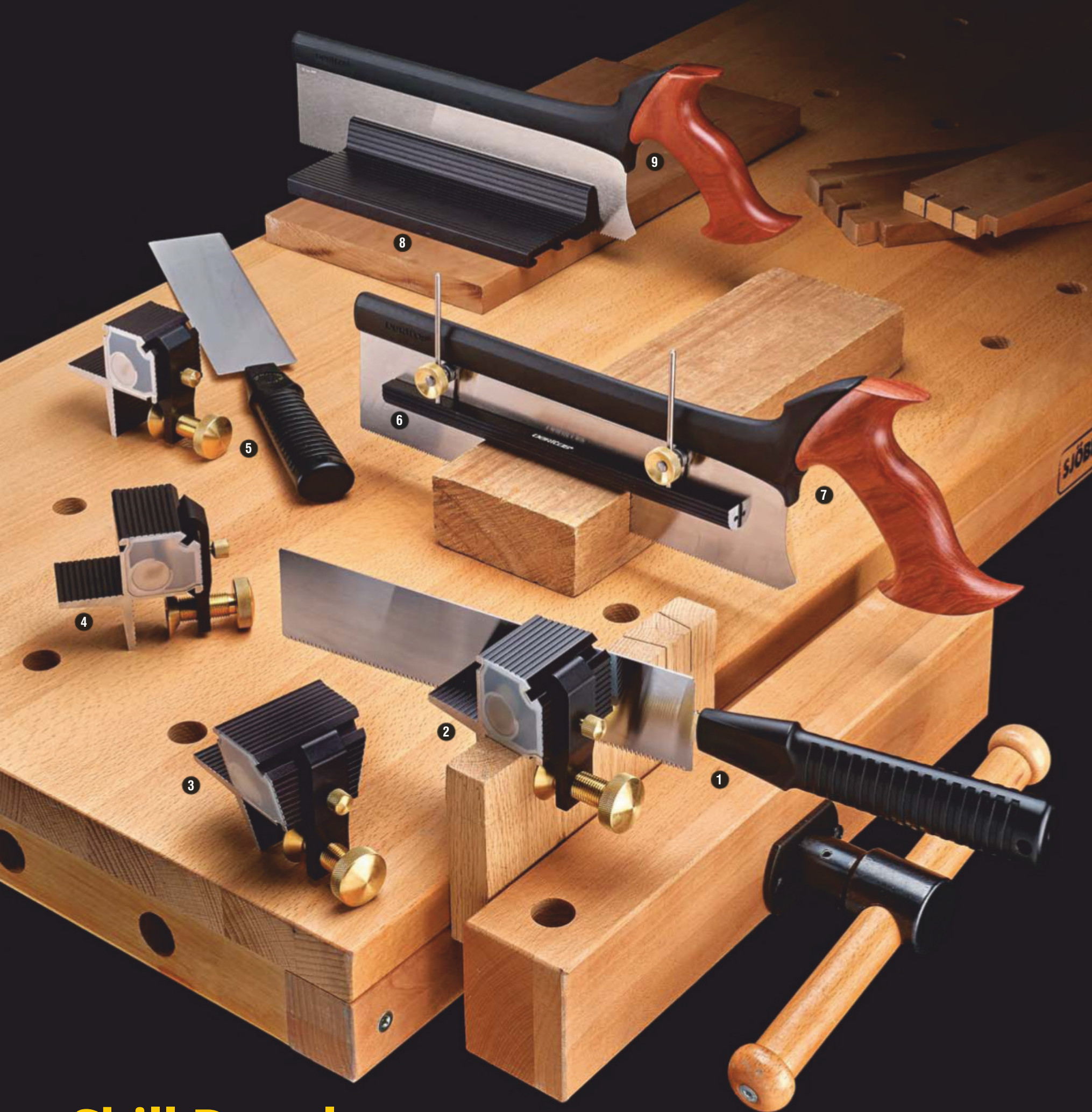
While setting up our flattening mill, we decided to try a router bit that was recommended by Nick Offerman in one of his discussions about flattening jigs. This bit is part of Amana's straight plunge series, with two cutting faces. Our Festool 2200 had no problem plowing through up to 3/8" of walnut per pass with this bit. The result was subtle ridges that were quickly cleaned up with a sander. The generous diameter made quick work of flattening our slab. We had a great experience with this bit, and we wish there were more slabs to flatten.

—David Lyell



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Dremel Digilab LC40 Laser Cutter

A few years ago, Dremel started developing a new line of digital tools with the DigitaLab series of products. Recently they introduced their first laser cutter: The Dremel LC40.

This desktop-size tool has a couple of key features. First, there's special emphasis placed on simplicity of operation and safety. With various safety switches and detectors, the LC40 is the first laser cutter to receive UL approval. Second, with a color, touch-screen control, a web-based interface and a single button to push, it's an easy machine to use.

To setup an operation, no special software is needed. The Dremel is controlled through your computer's web browser. Once you're on the machine's web page, you choose an operation (cutting, scoring or engraving), pick material presets for wood (plywood, MDF, acrylic, leather and more), send the file to the LC40, tap a few touch screen buttons for confirmation and double tap that one button, sit back, and watch it work.

A laser cutter needs digital drawings to cut, but they can also engrave photos, type, scans and sketches. Free, or low-cost designs are available online but likely you'll want to create your own with CAD or design software. The Dremel reads common PDF, JPG, PNG, or SVG files. In my testing, I used the software I'm most familiar

with: Adobe Illustrator and Rhino3D. I created designs that I cut on paper, cardboard, veneers, plywood and engraved photos and designs on plywood and solid woods.

The laser is cooled with a chiller unit and a stream of compressed air blasted across the cutting area to move smoke out the way. The LC40 has designed both functions into a small, outboard unit called the Hex box. Smoke removal is important. You need to place the laser and 4" flex hose close to a window. The Dremel's internal fan worked fairly well, but left the room with a noticeable burnt-wood smell. I'd suggest adding the available booster fan that increases airflow to the outside or the available filtration system that doesn't require an outside connection.

The Dremel LC40 is a well-designed, engineered and tested digital tool. It's simple to operate and small enough to sit on your desk. Like the Dremel 3D45 3D printer, the LC40 just works. Its only limitations are related to the size and power of this class of laser cutters. The 12" x 20" workspace feels a little limiting at times and the 40-watt laser limits how thick of wood you can cut through. But, neither are problems if you're cutting veneers, inlays, thin wood or plywood. And, for that and many other woodworking uses, the Dremel is an excellent digital tool for woodworkers and makers.
—Tim Celeski

■ LC40 LASER CUTTER

Dremel Digilab
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WORKSHOP TIPS

Benchtop Lazy Susan

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The stand is composed of three layers, glued together, and mounted on a 6" lazy susan bearing (www.leevalley.com, #12K01.03, \$4.20). The bottom layer is 2" thick and 8" square; the middle layer is 1" thick and 6" square; the top layer is 1" thick and 4" square. I drilled lots of holes for my tools in the 1" rim on each layer and on top. —*Randall H. Morse*



All Bases Covered

Every few years, I give my shop a thorough cleaning. When I discovered that the base of my drill press had been harboring fugitives — drill bits, driver bits, screws, nails, nuts, bolts, and a mouse that had gone on to his great reward — I decided something had to be done.

With this simple plywood cover, I'll rest easier knowing that the next shop mouse will have to find a new place to hide my tools and hardware. —*Oneil Long*



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Resawing by Hand

Strength, patience and a sharp saw turn scraps into treasure.

By Peter Follansbee

The hardwoods I use are almost always riven or split from a log. When I need thinner pieces than usual, I split them again. But there are times when I have mill-sawn stock and the way to get that thinner is either plane it down or resaw it.

Ripping boards through their thickness rather than their width is resawing. Doing this work by hand is more manageable than you might think; but it does require some strength and patience.

Recently, a shop cleaning uncovered a few scraps of black walnut; quartersawn boards no less. They were 1 1/4" thick, about 6" wide and 20" long. They were ideal for a carved box but needed to be halved, both to get enough material and to reduce the bulk for the scale of the box.

I started by filing and setting the saw. This work is a great test of your sawing, and your saw sharpening. The rip saw is the easiest saw to sharpen. It usually has pretty large teeth, and the shape of them is simple. I clamped the saw in a shop-made saw vise and ran a file along the whole length of the saw. This makes a small flat on the top of every tooth. Next, I took a triangular file and filed across each tooth's front edge. I try to take the same number of strokes on each tooth, filing until the flat I created disappears. Tilt the file so that it creates a front edge of the tooth that's just about plumb. At my age, I wear magnifiers when filing even a large-tooth saw like this.

After filing, I set the teeth so every other one is bent away from its neighbors. Check the "set" at first, you want to be sure to bend the teeth in the same direction they are already headed. There are differ-



1 First order of business is to sharpen the rip saw. Good light is essential for this task. I like to stand to file a saw, and this vise holds the saw at a good height.

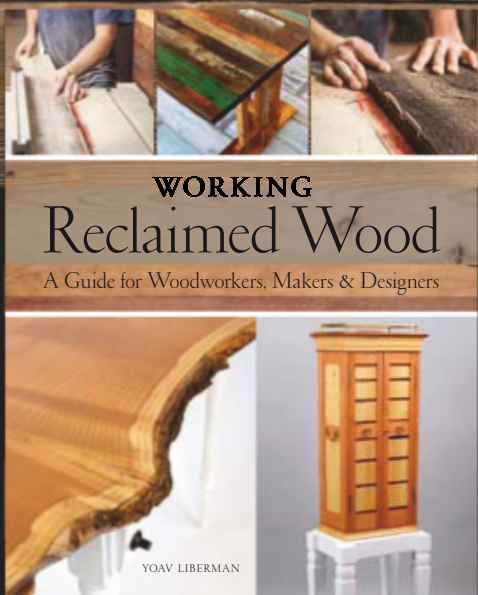
ent kinds of saw sets; many use a squeeze handle to push a small trigger against a solid block or anvil in the set. Pinch the teeth between this trigger and the backing, and give the handle a squeeze. You're not trying to bend the tooth as far as you can but just enough to reduce the saw's tendency to bind in the cut.

Set every other tooth all down the length of the saw, then turn it around and set the others in the other direction. Many saw sets have adjusters so you can create more or less pressure. Too much set means the saw's kerf will be wider. You lose

more wood this way to dust; and spend more effort guiding the saw through the wood. Too little set and the saw will bind in the cut. Aim for something like Goldilocks' "just right." It's easy to reduce the set afterward, so maybe a bigger squeeze at first, until you get a feel for it.

Once the saw was sharpened, I was ready to resaw the walnut. I planed one edge straight and true, and used a marking gauge to scribe a line down the middle of the board's thickness. This scribed line is struck all around the edges and ends. I set the board in the face vise of my

PHOTOS BY THE AUTHOR



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2 Start sawing across the corner facing you. That way, you can sight along the scribed lines on your edge and the top. Don't saw where you can't see.

3 After flipping the board this way and that, you'll progress down each edge. Long smooth strokes are best. Don't force the saw into the wood; let it slide.

4 If the board is pinching the saw, drive a small wooden wedge into the opened end. Just tap it, you don't want to start a split.

5 The third position has the board held vertically in the vise. These cuts are concentrating on the peaked section in the middle of the board, left by the two previous angled cuts.

6 You can "read" the end result and see the continually switching angle of the saw, as well as the split-off end.

cabinetmaker's bench. Tilt the board so you're just sawing across one corner at first. Start the saw right on the corner, and gradually lengthen the stroke so you're reaching down the near side of the board, and across the top end grain. Don't let the saw head down the far edge that you can't see. When you've reached the opposite top corner, stop and turn the board around in the vise. Then start on the near corner again, and repeat the same process. When you reach down as far as is comfortable on the near edge and have hit the far corner, stop and reposition the board again. Then stand it vertically; and saw down the area in the middle of your first two cuts. The saw should pretty well guide itself in your kerfs. From here, it's just repetition.

Keep repositioning the board, extending the cuts down each side. Tilt the board this way, then that way, then upright. Don't saw where you can't see the line. If your sawing starts to drift off the line, turn your wrist just a bit to steer the saw back. The adjustment is in the direction you're heading, so if you're off to the right, twist your wrist a bit to the right. A little adjustment is usually all that's needed.

If the kerf is closing in on the saw; tap a narrow, slender wedge into the top of the kerf to open things up a bit. You'll feel the saw loosen in the kerf when this wedge does its job. Near the bottom of the board, the vise is pinching the board, making it hard to pass the saw through. You can flip the board end-for-end and begin sawing at the new top end. I tend to plan my cuts so I just take the board out of the vise and pry the last bits apart. Re-sawing is good exercise and a nice way to warm up on a cold morning. **PW**

Peter Follansbee has been involved in traditional craft since 1980. Read more from him on green woodworking, period tools and other topics at pfollansbee.wordpress.com.

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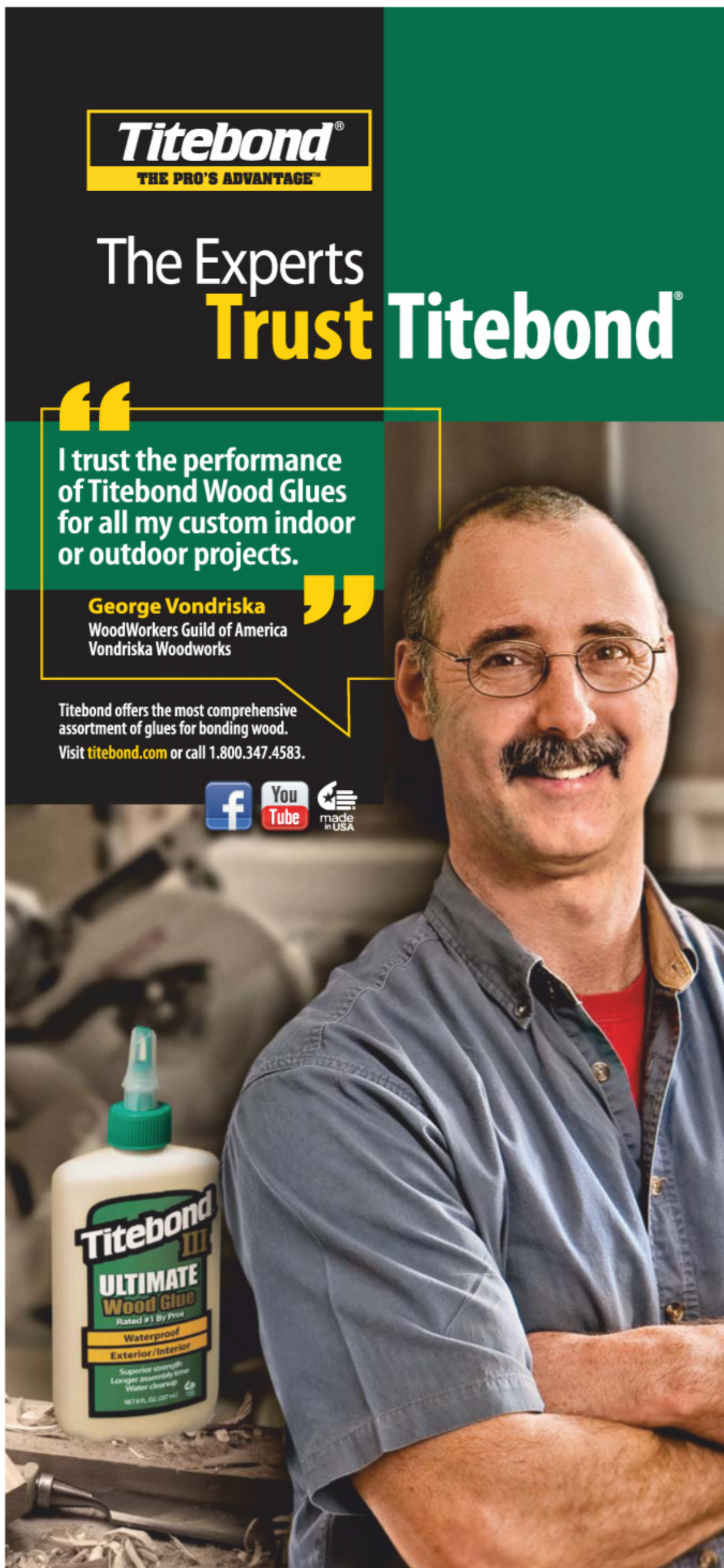
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The Organic Furniture of Wayne Muma

From Dad's Shop to the Toronto Interior Design Show

By George Walker

Author's Note: It's with great sadness that I learned that Wayne Muma passed away suddenly just before this article went to print. I asked Konrad Sauer, a friend of Wayne's and fellow Canadian artisan to share his thoughts:

"He was a deep thinker. He took time to ponder everything—how he wanted to experience the world, and how his work and efforts would impact the world," Sauer says. "He rarely compromised. Wayne was most at home outside, in the woods, and in his shop making things. He had a farmer's approach to problem solving, but the execution was always done to the very best of his abilities—permanent solutions, not temporary fixes. He was incredibly generous with his time and knowledge and came alive when he found a kindred spirit to talk about the outdoors, canoeing, wood-working, farming, the land, the planet and all things that grow."

Wayne Muma, an Ontario-based furniture maker, couldn't recall a time when he wasn't building things. Growing up, Wayne spent time with his dad building projects large and small, including a couple of wooden boats. Boatbuilding later came to play an important role in his design aesthetic. Imagine furniture that reflects the beauty of the Northern forests and the grace of a canoe sliding across still waters.

His goal was always to build furniture that's functional, sturdy and aesthetically beautiful. Muma worked for a time with Lie-Nielsen Toolworks at their weekend tool events in Canada. This accelerated his mastery of handtool skills by teaching techniques to woodworkers at shows. The process of breaking a task down to teach it helped him to deepen his own skills.



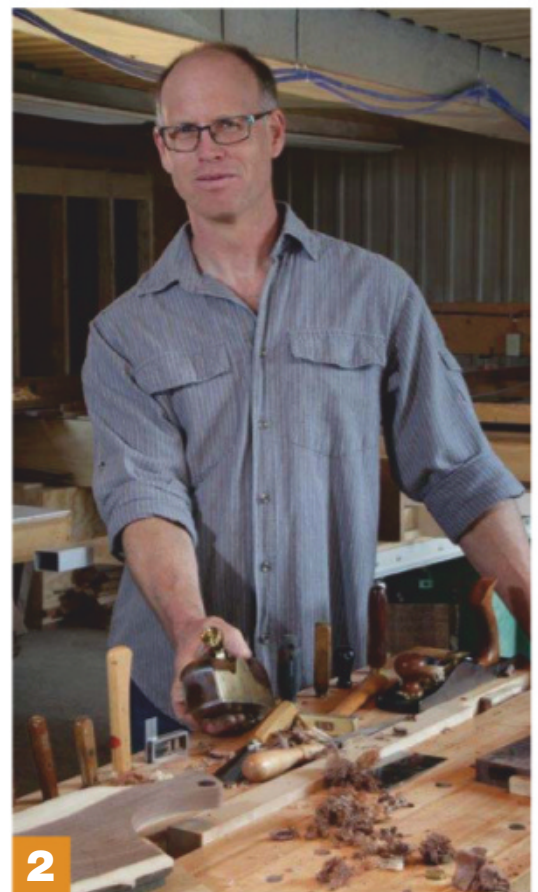
Learning from Masters

Early forays into furniture building included reproducing furniture he admired. Each build offered lessons in how to execute solid joinery, but more importantly slowly developing an aesthetic sense.

Muma took inspiration from iconic furniture designs and made his own interpretations with an eye sensitive to proportions, while showcasing the natural beauty of local timbers. Many of his early designs are his versions of Shaker pieces or furniture forms by Nakashima or James Krenov.

I pressed Wayne to point to the big lessons he gained during his time of building reproductions, and he admitted that his early designs tended to have a heavy feel. He was trying to build designs that had a graceful organic character. He paid attention to that while he worked through a Shaker or Krenov piece and it helped him gain a feel for proportions and begin to move his designs towards a more graceful and lighter stance.

1 This seat combines the natural beauty of wood with a pleasing and comfortable form.



2 Muma at his workbench in his Ontario shop.

PHOTOS COURTESY OF WAYNE MUMA

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3

3 This white oak cabinet showcases Muma's eye for proportions and reverence for the material.

4 The shape of this seat can conjure up memories of loons calling on a northern lake.

5 Light, sturdy and beautiful.



4



5

Back to the Water

Muma saw a real connection with his eye for curves and the graceful lines of a canoe. Many good furniture designers have some sort of connection with boat building and he's no exception, having built several boats and spent this winter building a traditional wooden strip canoe. Boats are all about curves and blending them together to make something both functional and beautiful.

It's difficult to put into words, but he shared that his boatbuilding spilled over into his furniture. That can be as simple as this seat shape on a stool that reflects the bow end on a canoe.

Some of Muma's most successful ideas came from designing strictly for himself. A case in point is this three-legged stool that was showcased at the 2019 Toronto Interior

Design Show. It began as a need for some practical shop seating at his workbench. He wanted something highly functional that he could grab quickly and pull to any workstation. The three-cornered seat makes for comfortable seating from several seating positions.

Pushing Yourself

Another source of growth and inspiration involved a bit of courage and pluck. Muma wondered if his work was good enough to be accepted into the Toronto Interior Design Show (IDS), one of the premier design showcases for makers in North America. Not only did he question whether his work was good enough to hang with designers working at a high level, but more importantly, would the opportunity to interact with

other designers help him grow as a builder and designer?

The answer to both was yes and he acknowledged that the opportunity to share ideas and thoughts with other designers has been positive. One idea, a challenge actually, came from another designer. It's the thought that figured wood can be a crutch. Dramatic visual surfaces can make a bold statement that's not always backed up by the underlying form. If a design cannot stand by itself without the help of any bling, it's far short of where it should be.

If you work that backward it means the bare bones of a design should be solid, it should be able to stand by itself in black and white. In fact, a way to gauge a design is literally by looking at it in a black and-white image where the eye isn't distracted. There's nothing wrong with figured wood, but it should compliment a form, not upstage it. **PW**

George Walker is the co-author of two design books and writer of By Hand & Eye blog with Jim Tolpin. See more of Wayne Muma's work at muma.ca.

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Japanese Writer's Box

Build a traditional *Suzuribako* for your writing supplies or other treasures

By Michael Crow

PROJECT #1908

Skill Level:

Intermediate

Time: One day

Cost: \$75



Asked to imagine a tansu, or Japanese chest, most people probably would picture a large stepped chest. But those *kaidan dansu* are only one expression of Japanese case design. The category includes chests large and small, mundane and elaborate, ranging from utilitarian boxes to elegant cases built to hold a household's most prized possessions. The *suzuribako*, or writing box, is definitely the former: a compact chest designed

to hold the calligrapher's brushes, inks, ink stones and paper. Despite its small size, the *suzuribako* uses much of the joinery as its larger cousins, providing a great introduction to building Japanese cabinetry. The traditional form features a pinned, finger-jointed case with a lidded bin over a bank of drawers. This functional design can be scaled up or down depending on its intended use. I sized the version here to hold

a ream of copy paper and stray office supplies, but the *suzuribako* could be easily built to hold craft supplies or jewelry, too.

Historically, tansu were built with a variety of domestic Japanese woods, including cedar, elm and paulownia. I followed suit, using a wood common here in the Pacific Northwest, Douglas fir, with stock I salvaged when replacing the sub-floor of our Craftsman bungalow. If

PHOTOS BY THE AUTHOR

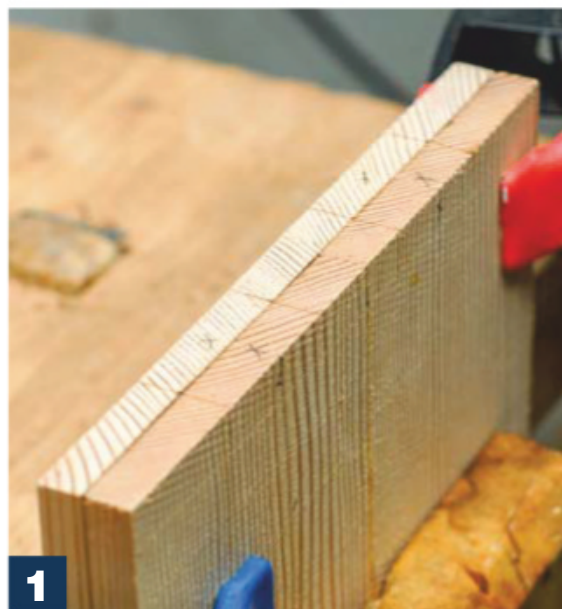
fir isn't readily available near you, take a note from the original makers and use locally available softwood.

Case

Construction begins with the case. Using the cut list as a reference, lay out your parts on your material. For best effect, plan your cuts so that grain wraps around the case. Beginning at the end of a board, mark a length for the first side, then the front (which will be ripped to produce the face frame and drawer fronts), second side and back, leaving a little margin at the ends of each piece for final trimming. Once the sides are cut to final length, it's on to the finger joints.

Tansu cases usually go together with three or five fingers per joint. If you've cut dovetails by hand, these wide finger joints will seem familiar—I tend to think of them as 90° pins and tails. I begin by marking finger joints on the sides. Each side has three fingers joining it to the back, and a single notch at the front to capture the front apron. Instead of trying to calculate the width of the fingers, I laid a ruler across the board so that its length from one edge of the board to the other was divisible by 5 and marked each interval, then transferred these marks to the end of the board. The result is evenly spaced fingers without measuring. A cutting gauge made quick work of marking the shoulder line at the end of the board, and after marking the waste, I was ready to cut my finger joints.

I cut these joints at the bandsaw, first making a series of cuts to define the fingers, then cutting out the waste. Where the waste lies at the edge of the board, it's simple to cut straight down. For interior notches, you can cut in at an angle from both sides of the notch until most of the waste is removed and clean up the joint with a chisel. Once the finger joints on the sides are cut, I use them to mark the complementary fingers on the back and cut the joints. In a similar fashion, cut the



1 Use a long ruler to establish finger spacing. Mark the fingers on the sides and ends of the board. An "X" marks the waste to avoid removing the wrong materials.

2 After defining the cheeks, cut across the grain to remove the bulk of the waste.

3 Pare to the shoulder line, cutting from both faces of the board.

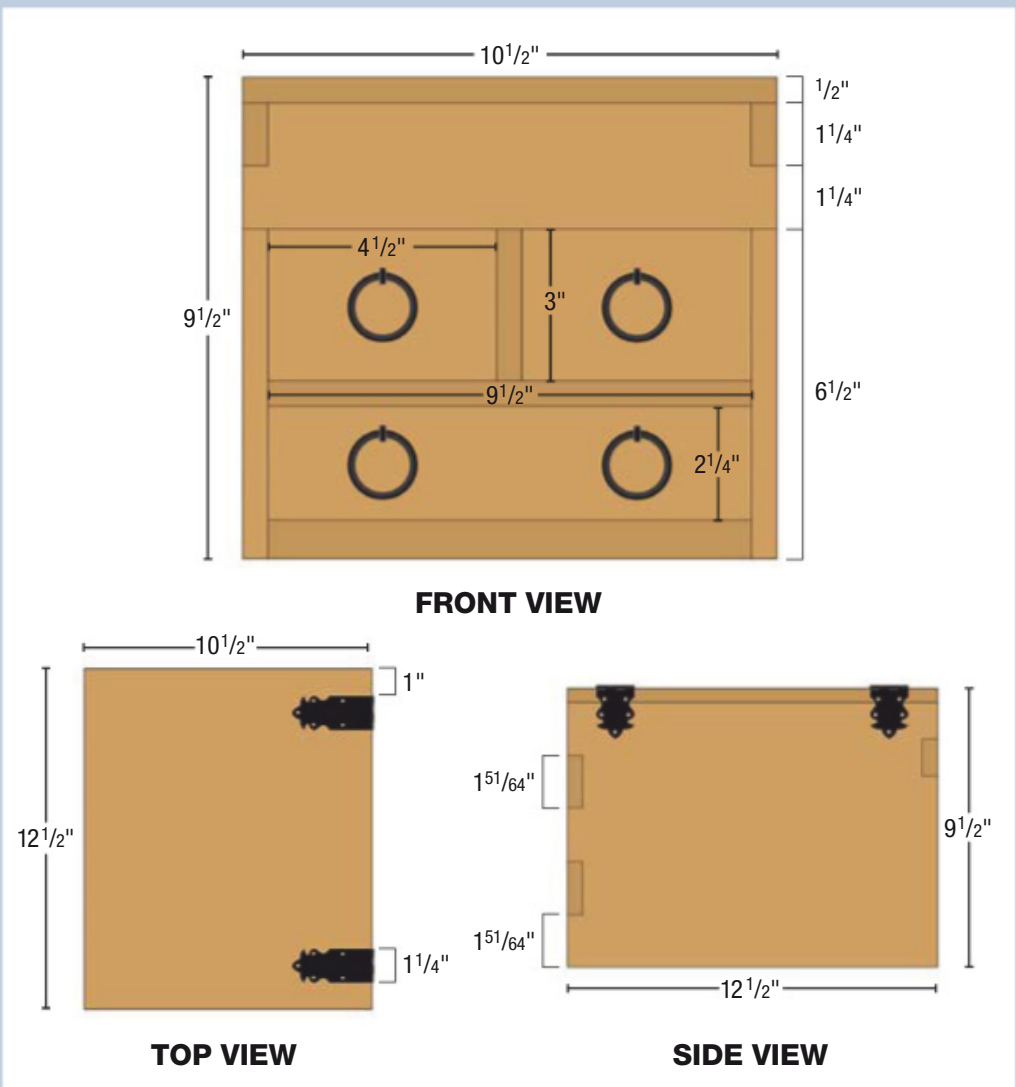
joinery on the front apron first and use it as a reference when marking the notches at the front of each side piece. Some historical versions of the writing box feature feet formed by making a trapezoidal cut in the base of the sides. If you choose to recreate this detail, remember to make the cut shallow enough so that the lower divider is not exposed.

The interior is joined with 1/4" x 1/4" dados and grooves. I make these cuts with a 1/4" spiral upcut bit in a trim router. With a quick jig, two rails join two fences and are spaced to capture the base of the router. To use the jig, align the cut

in the fence with the layout lines on the piece and clamp in place. Guided by the parallel fences, the router plows a perfect dado.

While I debated whether to use solid wood or plywood for the upper and lower dividers, I built a web frame for the middle divider, joining the parts with loose tenons. The next time I build a similar piece, I'll build the middle divider the same way I built the upper and lower dividers: a piece of plywood glued to a strip of solid wood edging. Cut the plywood and edging slightly oversized, and glue them together. After the glue has cured, trim the

Japanese Writing Box



Cut List

No.	Item	Dimensions (inches)			Comments
		T	W	L	
1	Back	1/2	9	10 1/2	Finger-jointed to sides
1	Drawer guide	1/2	1 1/2	10 3/4	Tongue on bottom edge to fit divider dado
1	Front apron	1/2	2 1/2	10 1/2	Finger-jointed to sides
1	Lid	1/2	10 1/2	12 1/2	Breadboard ends
1	Lower horiz. divider	1/2	9 7/8	10 1/2	*
1	Lower rail	3/4	1 1/2	10	*
1	Middle horiz. divider	1/2	9 7/8	11 1/2	*Top face dadoed for drawer guide
1	Middle rail	1/2	1 25/64	9 7/8	*Dadoed for vertical divider
2	Narrow drawer back	1/4	2 3/4	4 1/2	Single finger joint at sides
2	Narrow drawer bottoms	1/4	4 1/2	11 3/4	-
4	Narrow drawer sides	1/4	2 3/4	11 3/4	Single finger joint at end
2	Sides	1/2	9	12 1/2	Finger-jointed to back; notched for front stretcher
2	Narrow drawer fronts	1/2	3	4 1/2	Rabbeted for sides and back
1	Upper horiz. divider	1/2	9 7/8	11 1/2	*Bottom face dadoed for vert. drawer divider
1	Vertical drawer divider	1/2	1 1/2	3 3/8	Tongues at both ends for dadoes in horiz. dividers
1	Wide drawer back	1/4	2	9 1/2	Single finger joint at sides
1	Wide drawer bottom	1/4	9 1/2	11 3/4	-
1	Wide drawer front	1/2	2 1/4	9 1/2	Rabbeted for sides and back
2	Wide drawer sides	1/4	2	11 3/4	Single finger joint at end

*Tongue milled on sides to fit case grooves

divider to final size and rabbet the top and bottom faces with a 1/4" rabbeting bit set to a 1/8" cut to form a 1/4" x 1/4" tongue on each side of the horizontal dividers. Notch these tongues at the front of each divider to accommodate the stopped dadoes. A short stopped dado cut in the bottom of the upper divider houses the vertical divider while a longer dado cut in the middle divider houses both the vertical divider and drawer guide. Once the ends of the vertical divider are tenoned (I use the rabbeting bit here, too), the case is ready for assembly.

After dry fitting the case to make sure everything fits, I assemble the case in stages, checking the case for square at each stage. I begin by gluing the drawer guide in place and then joining the vertical divider to the upper and middle horizontal dividers before gluing the horizontal dividers to the sides. To finish the assembly, I glue on the back and front apron, brushing glue along the sides of each finger joint. After assembly, the finger joints are pinned to reinforce them. With modern glues this step may not be necessary, but the pins are ornamental as well as functional. Instead of looking for narrow dowel stock for my pins, I looked to my local takeout—round chopsticks are an ideal size for pinning the 1/2"-thick case pieces. Trim the chopsticks into 1 1/4" lengths and drill an inch-deep pilot hole through the center of each finger with a bit slightly narrower than the chopsticks. Apply a small amount of glue to the end of the pin and tap it home. Clean up the glue before it has a chance to harden and then trim the pins flush with the face of the case.

Unlike some other small Japanese chests, *suzuribako* omit an upper bank of drawers in favor of an open bin topped with a hinged lid. Lid construction varies, from a simple slab to breadboard ends or the more elaborate mitered breadboard end. I opted for simple breadboard ends attached with loose tenons. To allow



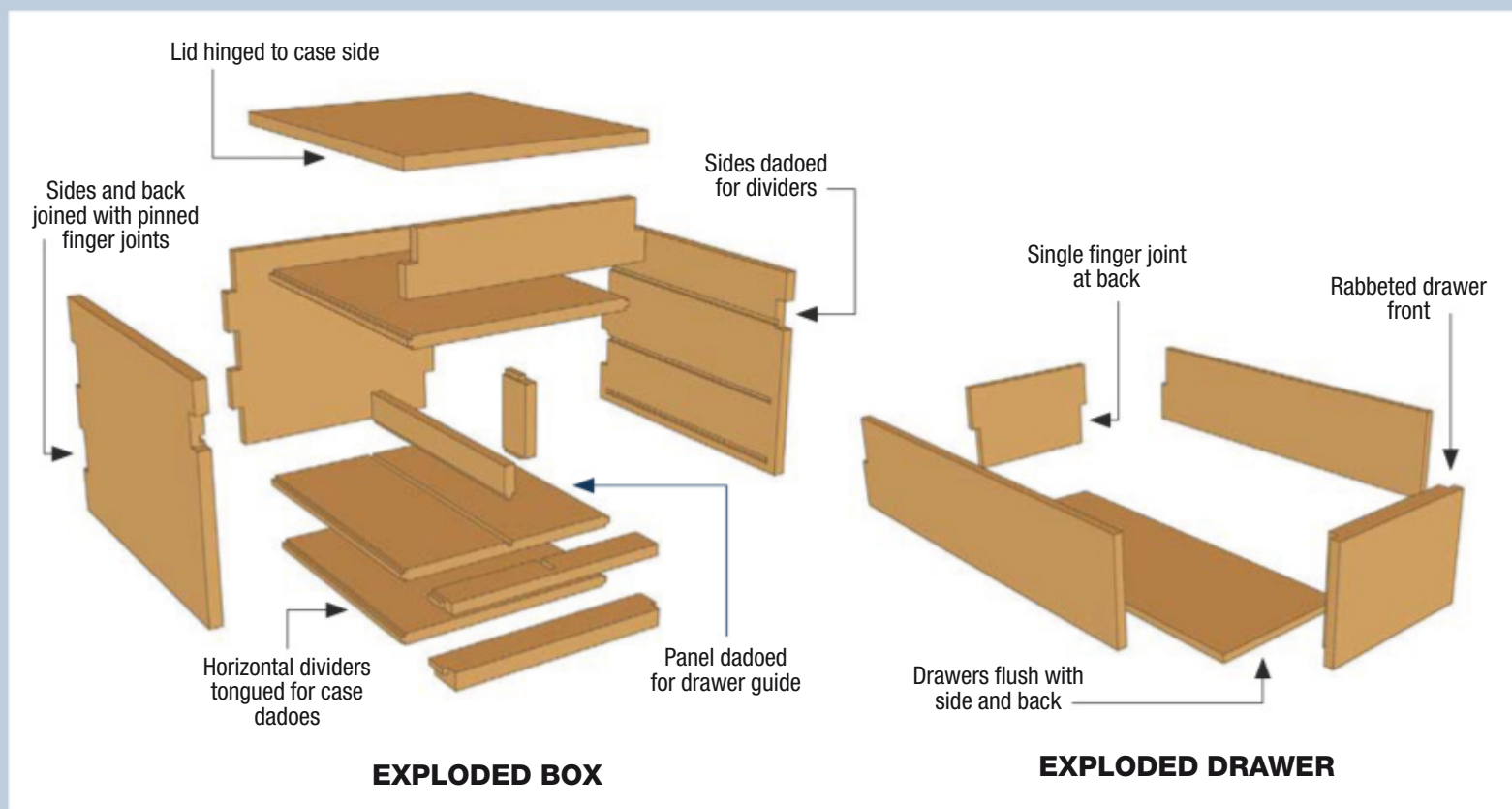
4 A simple jig positions the router for a dado cut and guides it across the board.

5 Guided by the jig's double fence, the router makes a precise cut.

6 Three grooves in each side capture the dividers.

7 Assemble the case in stages, first joining the sides to the dividers. Next, glue on the back and front apron.

Fitting the Pieces Together





8

8 Assemble the case in stages, first joining the sides to the dividers. Next, glue on the back and front apron.

9 Source the stock for your pins at your favorite takeout. Section the chopstick to produce pins.

10 Using a bit just smaller than the diameter of your pins, drill pilot holes centered on each finger. The masking tape helps minimize tearout.

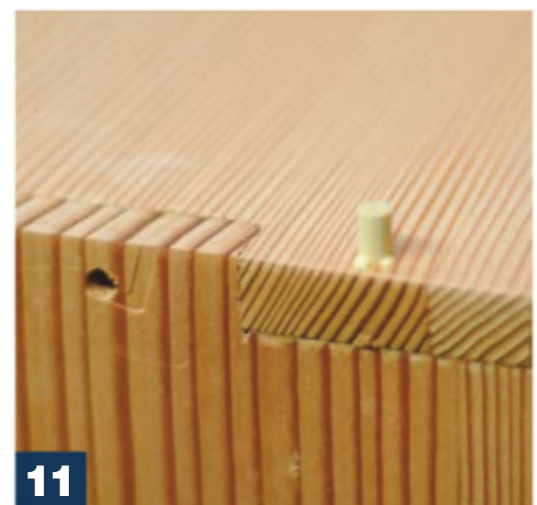
11 Apply a small amount of glue to the pin and tap it home.



9



10



11

for expansion of the top, I cut the outer mortises wide and glued only the center tenon. Alternatively, you could mill a tongue and groove to join the breadboard to lid body, gluing only the center of the joint to allow for movement.

The same rabbet setup used for rabbeting the dividers can be used to mill the tongue, while a slot cutter or mortising bit can be used to groove the breadboard ends, as could the table saw in a couple of passes.

Drawers

The drawer construction may seem almost rudimentary, but it's easy to assemble and robust when complete. Drawer fronts are rabbeted to receive the sides, while the sides and back are butt-joined or joined with

a single finger. Drawer bottoms are cut flush with the sides and back and partially flush with the front.

Begin drawer construction by ripping and crosscutting the fronts to size, then cut out the sides and backs. Use a rabbeting bit to cut a $\frac{1}{4}$ " x $\frac{3}{8}$ " rabbet on the sides and bottom of the drawer fronts' rear side. Then, notch both the sides and back to form finger joints. A bandsaw will make quick work of these finger joints, but it's a low-risk place to practice your handsaw skills. The drawer fronts' rabbeted end grain is less than optimal for gluing, so I start these joints by brushing a thin layer of glue on the end grain and letting it sit for a minute, allowing the end grain to absorb the glue. I then apply another layer of glue to

the rabbets and finger joints at the drawer back and clamp the drawer frame together, taking care to ensure the drawer is square.

Drawer bottoms can be cut from $\frac{1}{4}$ " plywood after the drawer boxes come out of their clamps—the bottoms are glued to the drawers. On drawers these size, glue should be sufficient to keep the drawers together. If you do want to reinforce the joints, they can be pinned like the case. Substitute a bamboo skewer for the chopsticks when pinning the thinner drawer stock.

Finishing Touches

Traditionally, two techniques are used to finish tansu: dry finish or lacquer finish. For a dry finish, chalk or clay is first rubbed into



12



13

12 Rabbet the ends of the drawer front to receive the sides.

13 A single finger on the sides and back join the rear of the drawers.



14

14 Clamp the hinge at the bend line and use a piece of wood to distribute pressure as you bend the leaf.

the wood and then burnished with a reed whisk. A similar effect can be achieved using a polissoir with or without wax. Lacquer is derived from the sap of the Japanese sumac (*Toxicodendron vernicifluum*) and either left untinted to enhance the grain of the wood or tinted to produce an opaque covering. To approximate the former effect on this build, I used blonde shellac.

After sanding the finished piece from #80 grit to #220 grit, I wiped on several coats of shellac. Once the finish cured, I wet sanded using #400 grit paper lubricated with mineral spirits. As with most of my projects, I topped things off with a couple coats of paste wax.

With my finish work complete, I was ready to install hardware. Many tansu feature elaborate hardware. *Funa tansu* (ship chests), for example, were practically ironclad strong boxes. Their elaborate metalwork demonstrated the owner's wealth while the chest protected the contents. *Suzuribako* feature more modest hardware including hinges, a latch, handle and reinforcing plates at corner and joints. Because I don't plan on carrying my box around much, I omitted the handle, latch and reinforcing plates, installing only hinges and drawer pulls.

Lid attachment requires a hinge with a 90° bend in one of the hinge leaves. Unable to source such a hinge, I modified a flat hinge, marking a point 1/2" up from the knuckle before chucking it in my metal vise between cauls and then bending the leaf using a piece of wood as a brake to ensure a smooth bend. Once the hinges were screwed in place, I mounted the simple ring pulls by drilling a pilot hole and tapping the shaft of the pull home, then bending the prongs back against the drawer front.

The pulls are located so that they're centered on the horizontal axis of the narrow upper drawers, and the lower pulls align with the upper. For both lower and upper drawers, the pull is positioned so that the ring (not the shaft) is centered on the drawer fronts. Depending on your intended use, you may want to align the drawers. Adhesive-backed cork liner is a functional and flexible choice, but for a little more pop, consider washi or fabric. The splash of color is a pleasant surprise any time you open the chest, something you'll likely be doing often since this is designed for functional use. **PW**

.....
Michael Crow is a woodworker and writer based in Washington.

Supplies List

No.	Item Description
2	Tansu Strap Hinges 30mm x 110mm (70mm) Item #00D5522
1	7.5mm #1 Round Head Screws (25ct) Item #00D5582
4	32mm Traditional Ring Pull Item #01A6132

*Items purchased from Lee Valley



PROJECT #1909

Skill Level:

Intermediate

Time: 2 days

Cost: \$100

PHOTOS BY THE AUTHOR

Machinist's Tool Chest

A few design modifications turn this garage staple into a great tool chest.

By Zachary Dillinger



A few years ago, I found a dusty, beat-up three drawer machinist's tool box in the basement of my 1900-built farmhouse. Originally made by noted tool manufacturer, C.E. Jennings, it had been modified several times and wasn't in very good condition. After cleaning out the contents, I've used the box to store numerous things over the years, most recently my collection of files and rasps and various other small tools. It's been a valued part of the way I work but it had some limitations that made it less than perfect for a woodworker.

I decided to build a slightly modified version of the chest to address those limitations. The biggest changes are that it has two drawers instead of three, and I made the top well deeper. These changes allow me to store saws, planes, and chisels in the box, something that was difficult to do in the original.

Dowel Joinery

The original box is built from chestnut and finished with a dark stain. When studying the original, I was unable to intuit much about the way the case of the box was constructed. No joinery is visible from the outside. Given that this early 20th century box was produced in a factory, I posit that the box was either splined or doweled together. Due to the ease of doweled construction in a hand-tool only shop, I chose this method.

The construction begins by laying out and cutting the parts to the dimensions listed in the cutting list. To hold the case together, I used 1/4" dowels, two at each of the top corners and three in each of the bottom corners. I like to use a marking gauge to lay out the drilled holes in each piece. There are dowel center points available commercially, but I personally get much better results if I lay out each hole with scribed lines and carefully drill them.

Test fit the two side frames together without glue and make any necessary adjustments. Once that's done, lay out and cut the 1/2" deep x 3/8"



1 I ripped all of the parts for this project by hand. Ripping with a handsaw isn't much fun but a foundational skill. In some cases, I'll knock down stock with a hatchet to move things along quickly before approaching my line with a plane.

2 Cutting the rabbets for the side panels depends as much on layout as it does skill with the cutting tools.

3 Once the side frames are together, plane the outsides flush.

wide rabbets in each of the two top and bottom pieces that make up the two side frames. Then, glue and clamp up the side frames and set them aside to dry. The side panels will simply float in the rabbet and will later be held in place with the drawer runners, so you can make the panels and fit them while the frames are still in the clamps. Aim for a gap-free fit on the vertical pieces and rely on the top and bottom edges to hold the panel in place.

The two front pieces are constructed in exactly the same fashion

as the side pieces. Crosscut and plane them to precise length, then dowel them in place. Dry-fit the joinery using a clamp to draw it all together and make any necessary adjustments to ensure two square sides with gap-free corners. When that is finished, glue up a board wide enough for the case back and carefully fit it into the dry-assembled frame. Once you're happy with the fit, dowel it into place with four 1/4" dowels (one at each corner). With all the corners fit to your specification, glue up the case.



4



5



6

4 The corner brackets were steel on the original but I opted for brass.

5 Pre-drill the ledger strips that will support the well bottom. Once these are in place, you can add the brass brackets for the top of the box.

6 The well-bottom fits under the corner brackets and sits on the ledger strips.

Case Braces

After an hour or so in the clamps, install the four bottom corner braces on the inside of the case. This is somewhat of an unusual technique, but the original has them. The original had steel braces but I chose to spend the extra \$1.29 per four to go with brass to match the rest of the hardware.

The top corners will also get these brackets, but they must wait until the top well's bottom board is in place. The next step is to make $\frac{1}{2}$ " square strips which will support the top

well-bottom from below. These are screwed into place with 1" long #6 woodscrews. To make sure that each strip is installed squarely, I butted each strip against the end of a combination square rule set to the proper depth, with the fence resting on the top edge. Be sure to pre-drill each strip as the wood screws are highly likely to split without pre-drilling.

With the strips in place, cut a piece of $\frac{1}{4}$ " plywood to fit the opening and plane it so that it just drops in and rests on the strips. Once you're happy with that fit,

attach the top corner brackets so that the brackets hold the bottom tightly down onto the strips below. It can be a bit finicky to get the screws installed due to the limited clearance but it's possible if you pre-drill screw holes of the proper size and take your time.

Drawer Runners

The drawer runner which supports the top drawer actually performs four separate duties. In addition to providing the running surface for the top drawer, the runners serve as drawer stops, they help hold the side panels in place and will also ultimately hold the screws which attach the side handles. They're made from $\frac{3}{4}$ " square strips of beech and are placed so that the center of the runner is precisely in the middle of the front drawer opening.

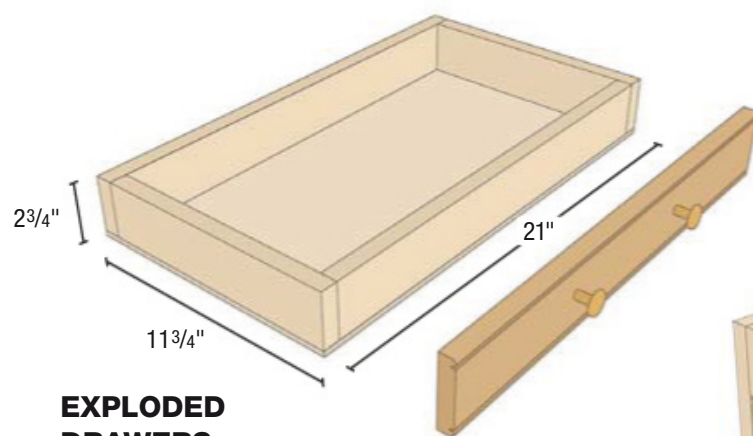
To mark out their precise length, set the case on its back, then take a scrap piece of $\frac{3}{4}$ " material and put it on the inside face of the back-board. A piece of $\frac{3}{4}$ " scrap is used because the drawer faces are $\frac{3}{4}$ " thick, and this will ensure that the drawer stops with the front face of the drawer flush with the case sides. Put the runner in place on top of the scrap, then use a pencil to draw a line on the runner where the runner intersects with the front edge of the case. Cut the runner on this line using a fine crosscut backsaw.

The runners are screwed into place using countersunk $\frac{3}{4}$ " #6 wood screws, one in each of the case side stiles and one into the center of each of the side panels.

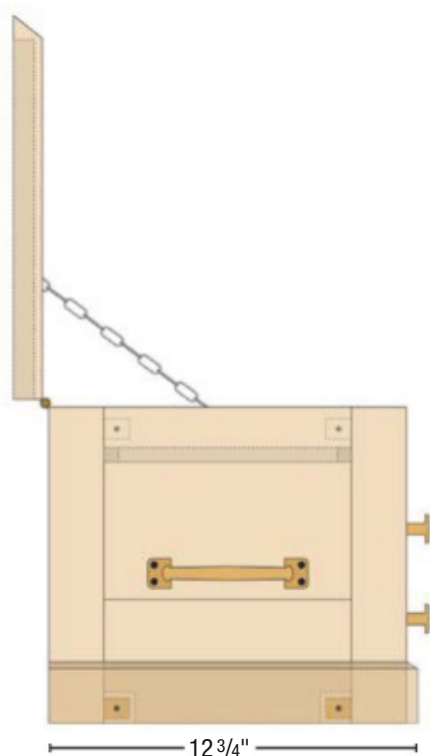
The bottom drawer runners are made to the same width as the bottom front case rail but require a notch on each end to clear the bottom corner brackets.

Once the runners are affixed, rough cut a piece of $\frac{1}{4}$ " plywood to fit the case bottom. Screw it into place using $\frac{3}{4}$ " wood screws. Once the bottom is in place, plane the edges flush to the case using a sharp block plane.

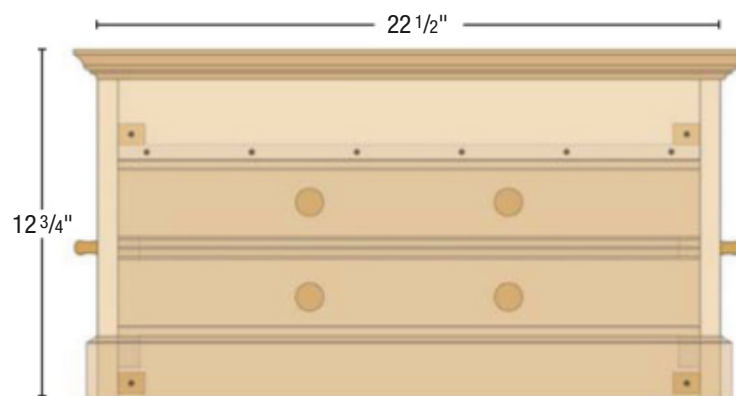
Machinist's Tool Chest



**EXPLODED
DRAWERS**



SIDE VIEW



FRONT VIEW

Cut List

No.	Item	Dimensions (inches)			Material
		T	W	L	
CASE					
2	Side upper rails	3/4	2	9	Chestnut
2	Side bottom rails	3/4	4 1/2	9	Chestnut
4	Side stiles	3/4	2	11 1/4	Chestnut
2	Side panels	1/4	6	10	Plywood
1	Front top	3/4	2 7/8	21	Chestnut
1	Front bottom	3/4	2	21	Chestnut
1	Case back	3/4	11 1/4	22 1/2	Beech
1	Case bottom	1/4	13	22 1/2	Plywood
1	Top well bottom	1/4	11 1/2	21	Plywood
2	Top well side strips	1/2	1/2	10 1/2	Beech
2	Top well F&B strips	1/2	1/2	21	Beech
LID					
2	Subframe sides	3/4	1 1/4	13	Chestnut
2	Subframe F&B	3/4	1 1/4	22 3/4	Chestnut
1	Panel	1/4	13	22 3/4	Plywood
1	Interior facing top	1/4	~10 1/2	~20 1/4	Plywood

No.	Item	Dimensions (inches)			Material
		T	W	L	
DRAWERS					
2	Top drawer runners	3/4	3/4	11 1/2	Beech *
2	Bottom drawer runners	3/4	2	11 1/2	Beech
4	Drawer sides	3/4	2 1/2	11	Chestnut
2	Drawer backs	3/4	2 1/2	21	Chestnut
2	Drawer fronts	3/4	2 1/2	19 1/2	Beech
2	Drawer bottoms	1/4	11 3/4	21	Plywood
CASE MOULDINGS					
2	Case moulding sides	3/4	2	13	Beech
2	Case moulding front	3/4	2	21 1/4	Beech
1	Top moulding front	3/4	1	24 1/2	Beech
2	Top moulding sides	3/4	1	13	Beech

*Centered to opening, screwed to side and set 3/4" from opening



7 Use $\frac{3}{4}$ " scrap to precisely mark out the drawer runner length.

8 Use a piece of sandpaper to ensure that the runner is just slightly higher than the bottom case inside rail. This prevents hangups when fitting the drawer.

9 With the drawers finished, bead the top and bottom edges of both drawers.



Drawer Construction and Mouldings

On the original, the drawers were simply butt nailed together from plywood with an added front made from chestnut. I've chosen to replicate this in my chest (the original did survive a century of use), but you may choose to dovetail them together. To produce nailed-together drawers that approximate the original ones, I planed up stock to the proper width, which must accommodate the $\frac{1}{4}$ " drawer bottoms, and then crosscut them to length. Nail them into a square drawer box and then nail on the $\frac{1}{4}$ " plywood drawer bottoms.

Test fit them into the drawer openings and make any required adjustments to ensure they operate smoothly. The boxes should ideally

stop about $\frac{1}{4}$ " back from the front edge of the drawer runners.

Once the drawer boxes fit properly, it's time to make the faces. Dimension two pieces of beech to match the cut list. Shoot the ends so that they just slip into the opening, and then screw each face onto their respective drawer box. On the top drawer, the face should overhang the bottom of the box by $\frac{3}{8}$ " to engage the drawer runner/stop. On the bottom drawer, the opposite is true, the top edge of the drawer face should stick up that same $\frac{3}{8}$ " over the top of the drawer box. Fit the drawers at the same time to identify any clearance issues. Once any issues have been corrected with a sharp plane, cut a $\frac{5}{16}$ " bead along the top and bottom edge of each drawer, four beads in all. When that is done, the drawers are finished.

The final step on the case is to produce a run of moulding to wrap around the case along the bottom. This helps to hide the plywood bottom and provides a finished look. The moulded board should be slightly narrower, perhaps $\frac{1}{8}$ ", than the bottom front rail. Miter the mouldings and then attach them with wood screws from the inside. You may find it beneficial to temporarily remove the plywood case bottom when attaching the mouldings. If you do so, make sure to use a scrap piece of plywood as a spacer to ensure that you overhang the mouldings over the bottom case edge far enough to account for the thickness of the bottom.

The Tilting Top

The top subframe is made from $\frac{3}{4}$ " x $1\frac{1}{4}$ " beech. Each corner is half lapped and then held together with a single wood screw driven in from the top face (so that no screwheads are visible on the inside). I make the top so that it overhangs about $\frac{1}{8}$ " over the case front and sides while holding the back edge flush with the case back. This will make the top easy to open later on without significantly impacting the top's ability to protect the contents inside from dust and moisture. Begin by measuring the top of the case and then add $\frac{1}{4}$ " to the width and $\frac{1}{8}$ " to the depth and cut the pieces to those newly revised lengths. Half lap the corners by laying the front and back frame pieces on top of the two side pieces in a square frame, then marking the shoulders on the components. You'll be cutting away $\frac{1}{2}$ the thickness of each frame

piece so mark out $\frac{3}{8}$ " away from the bottom face on each using a marking gauge. Using a rip-filed backsaw, remove the bottom $\frac{3}{8}$ " on the front and back pieces and the top $\frac{3}{8}$ " on the two side pieces. Cut the shoulders with a crosscut-filed backsaw. Use a sharp chisel to refine the joint, then test fit the frame. Each corner should overlap properly, producing a flat frame that's square. Then, pre-drill each corner for a screw and drive in a $\frac{3}{4}$ " wood screw.

The frame is skinned on the top with a $\frac{1}{4}$ " piece of plywood. Use whatever species you desire. (I happened to have a good-looking piece of red oak). Cut it to rough size, and then glue it down to the top of the frame using long beads of wood glue. Clamp it down then set it aside to dry. When it's dry, plane all four sides of the top skin flush to the frame using a sharp block plane. Install the top using a continuous hinge, mortising as necessary to ensure a flush, tight fit between the top and the lid.

When you've got the hinge installed correctly, remove the top from the hinge, cut and fit another piece of $\frac{1}{4}$ " plywood to the inside of the frame so that it fits inside the center edge of the frame, and glue it down to the inside of the top skin. This provides a more attractive inside surface than whatever is on the back side of the top plywood skin.

Once the top is reinstalled, make a run of $1\frac{1}{4}$ " tall, $\frac{3}{4}$ " wide moulding. The profile is up to you but I used a small ogee with a fillet. Wrap the moulding with miters around the two sides and front edge of the top then glue and nail it in place with the top edge of the moulding flush with the plywood top skin.

Finishing Touches

Then, install the handles. I used brass sash handles from the hardware store but feel free to be as fancy or as simple as you like. The important consideration here is to ensure that the handle is at least partially screwed into the side drawer runner. This pro-



10 Trim the plywood skin so that it's flush with the frame pieces. Once the whole assembly is square, it's ready to be covered with molding.

11 Scribe the top hinge prior to mortising. Temporarily attach one side to the case, then use spacers to mark out the other half of the hinge.

12 Brass sash handles align with the drawer runner so that the screws have plenty of wood to bite into.

vides a much stronger substrate for the screws over just attaching them into the $\frac{1}{2}$ " side panels. It's acceptable to have a few screws that just go into the panel but at least half of them truly need to enter the runner.

To install the drawer pulls, mark out small pencil marks on the top edge of the case approximately 5" in from the sides of the case. Next, take a square and draw a light pencil line to extend both pencil marks down across both of the drawer faces.

Then, divide each drawer width in half and make a light horizontal line across the previously drawn vertical lines. That intersection marks the point where the pull knobs should be installed. Pre-drill and test fit the pulls to ensure they line up properly.

Remove the hardware before

finishing. Erase any stray pencil lines then sand the entire project to #220 grit. I finished the chest with my favorite wood finish ("boat soup"), which is nothing more than equal parts pine tar, turpentine and linseed oil. I wiped three coats on the exterior and, after it dried, applied a coat of paste wax. I also applied paste wax to the drawer runners to help the drawers operate smoothly.

Once the finish has dried, the fun part begins: filling the chest with your prized collection and figuring out the best way to fit everything inside. Enjoy! **PW**

Zachary Dillinger is the author of With Saw, Plane and Chisel: Building Historic American Furniture With Hand Tools.

A woman with dark hair, wearing a grey hoodie and blue jeans, is smiling and holding a wooden chair. The chair has a dark wood frame and a light-colored seat. She is standing in front of a dark-colored vintage car with a red stripe. The background shows trees and a grassy area with fallen leaves.

PROJECT #1910

Skill Level:

Intermediate

Time: 5 Days

Cost: \$300

■ Why Every Woodworker Should Build a Chair

My life changed under the guidance of a master chairmaker. **By Anne Briggs**

PHOTOS COURTESY OF THE AUTHOR

Have you ever walked into a brand new place and instantly felt completely at home? That's the way I felt the first time I entered Greg Pennington's Windsor chair school just outside Nashville. The building was timber framed by hand out of solid oak Greg milled with his Wood-Mizer. Against one wall is his iconic floor-to-ceiling tool chest. In the center of the room is a Harmon coal stove, and surrounding all three sides of the building are windows, providing perfect raking light during daylight hours, and inviting the world outside into the cozy paradise within at night. Shave horses of all shapes and sizes litter the room, as do several Roubo-style workbenches, and the whole wall behind the fireplace is covered with dozens of antique drawknives, antique axes and saws.

As if the classroom itself weren't inviting enough, Greg's mother also provides a home-cooked meal for lunches throughout the class. There's always hot coffee in the back, and, if you ever run out of wood, you can mosey on back to the slab storage barn, stacked floor to ceiling with all manner of cherry, walnut, oak and maple. Greg's school is what I'd wager most woodworkers would imagine heaven to be like.

It was there, more than a little

burned out on woodworking after five years trying to "make it" as a furniture maker, that my excitement and passion for working with wood was reignited.

Chairmaking is very different than other forms of furniture making. Chairmaking requires its own unique tool and skillset. It is extremely physical, and, while the mind can wander during certain aspects of the build (hello, spindle making), it also requires an intense focus and problem-solving skills. There's more than a little figuring required, but Greg makes the daunting process of finding an entire chair from within a small section of tree stump shockingly approachable.

Building chairs opened up a new, very physical, very engaging side of woodworking I hadn't before experienced. I loved using a wedge and sledge to split the tree. Not only did it make me feel strong, it also helped me to understand better how wood works and how to get the most strength possible out of a single piece of wood.

Design

Though I was at Greg's for a rocking-chair class, I decided to make a second chair in the evenings, entirely out of seasoned wood—

both because of time constraints and because I just wanted to see how it would work. Living in Seattle, I don't have a lot of access to nice straight-grained green wood. Green wood works easier and turns faster, but air-dried wood, especially when selected and sawn in such a way that the grain runs along the entire piece, will retain just as much strength as riven wood and will take on a nicer finish right off the tool.

I patterned this chair off of a Glen Rundell design I'd spotted in Greg's shop. I was drawn to the pom-melled seat, curved back and simple design. I wondered what the chair would look like with some of Greg's double-bobbin legs. I only had three evenings in which to get the chair parts together, so time was of the essence, and the most important thing was getting the curved seat back roughed out, steamed, bent and set on a form to dry as long as possible.

Curved Back

I chose a nice, straight-grained piece from the center of an air-dried walnut slab for the crest rail. I roughed it out on the bandsaw, then brought it down to near-finished shape using a Caleb James Monstershave (also known as an extra large spokeshave). Since the



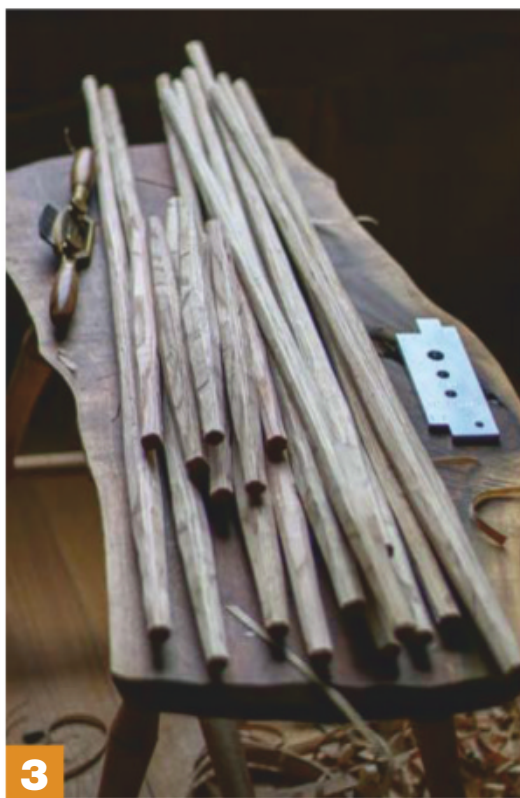
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1 Splitting and riving green stock is typically the first step in making a Windsor chair. This process also helps you learn about how wood works.

2 Shaping a crest rail on the shave horse. Most chair parts are roughed out here.



walnut was dry, it needed to be steamed for about 50 minutes to ensure full penetration. Greg and I teamed up to clamp both sides simultaneously to a laminated melamine form using squeeze clamps. Thankfully, the wood bent without a hitch, and we put it next to the wood stove for a couple days to aid in a quicker drying process.

Turning the Legs

With the back on the form, it was off to the lathe to turn the legs. Greg teaches us to use only five tools at the lathe: a roughing gouge, a Galbert Caliper, a parting tool, a story stick, and for the last step—the groove detail on the bobbins—a nice sharp skew. By the fourth leg, I had my bobbin leg turning down to 6 minutes and 40 seconds—but I think I’m a few hundred legs away from beating Greg’s sub-two-minute

time or perfection level.

The key to turning quickly is training your “eyechrometer” (a favorite Greg-ism) and getting really brave with your rough passes. It’s helpful to make all the matched parts in batches, because all the nuances and wasted movements become more obvious the more times each task is repeated. It took me a while, and a few botched legs, to get the hang of using the parting tool for that V-groove detail on the bobbins. (The key is light cuts and an extremely confident grip on the tool.)

With four legs and three stretchers done, it was time to work on the seat. Greg had a gorgeous two-piece butternut seat blank ready to carve.

The Seat

I patterned the seat as closely as I could to Glenn’s, aiming to achieve that same pommelled look. Because

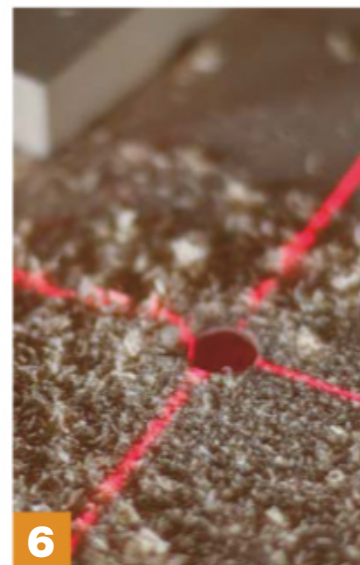


3 Rough parts after a few hours on the shave horse. It’s good practice to make a few extra spindles, stretchers and legs.

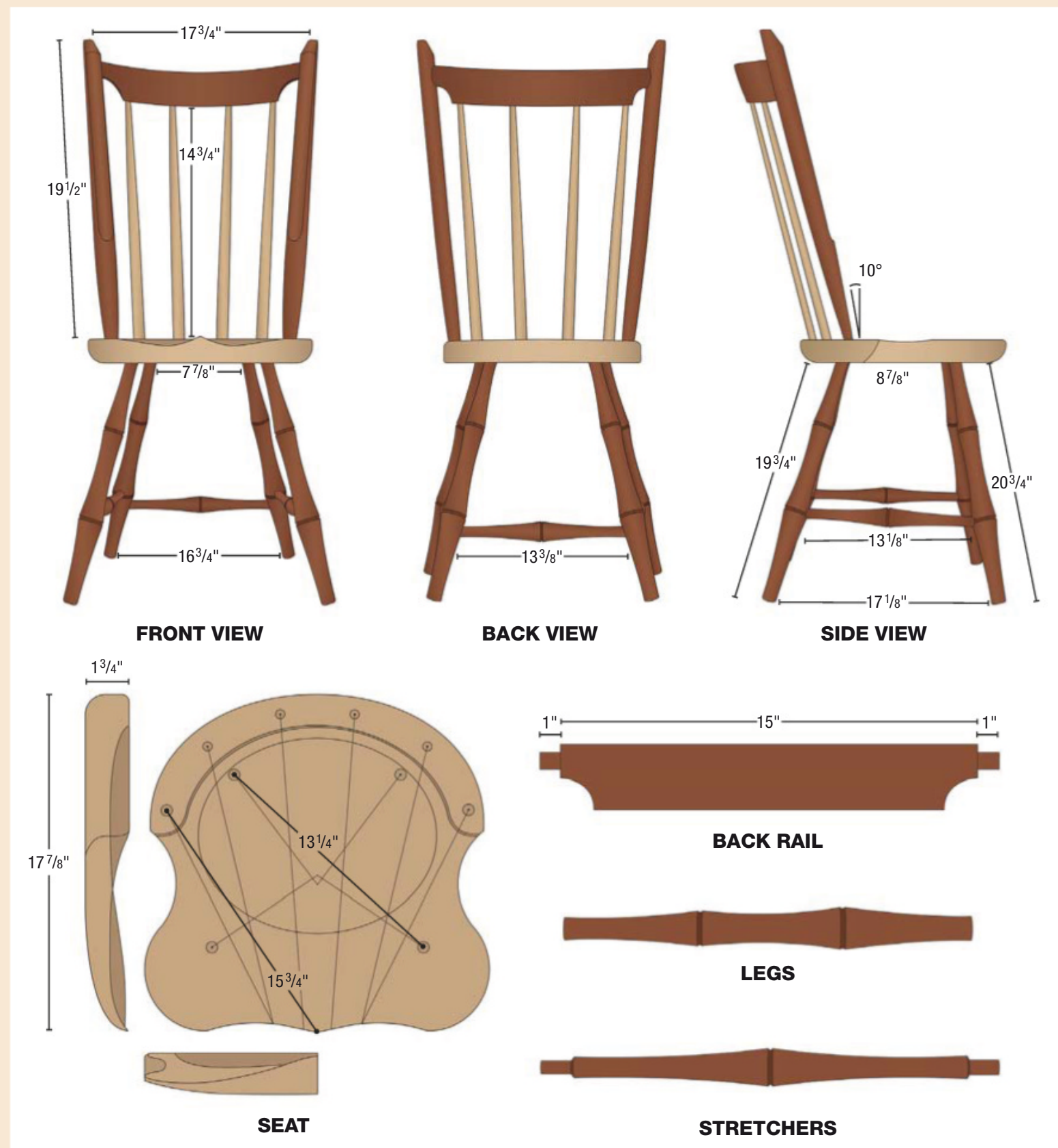
4 Windsor chairs have lots of turnings, so you learn to be efficient.

5-6 Drilling angled mortises is one of the trickier parts of building a chair. First, you drill a hole, then you use a tapered reamer to give it a shape that’ll securely mate with a leg.

7 Scooping out a seat is physical work, but sharp tools and working with the grain make things easier.



Windsor Chair



Cut List

No.	Item	Dimensions (inches)		
		T	W	L
1	Seat	2	20	20
4	Legs*	1/2	1/2	18
3	Stretchers*	3/4	3/4	16
4	Back spindles	3/4	3/4	24

No.	Item	Dimensions (inches)		
		T	W	L
2	Back arms/sides*	2	2	24
1	Back rail	5/8	3	20

These are rough, pre-shaping dimensions.



8



9



10

8 I carved the decorative gullet around the edge of this seat with a small V-shaped gouge.

9 Here I'm using a gouge and mallet to trim the wedged legs.

10 Scooping a seat by hand is vigorous work. Do what it takes to get in the right position.

I didn't have a paper pattern to use, a lot of the seat design had to be done by eye. The thing is, though, a lot of chairmaking can be done by eye. Greg has a phrase he uses quite a lot in his classes: That's chairmaker perfect. It's a freeing thing, to throw some of the machinist-precise measurements and extremely complex compound angles out the window and just eyeball it.

The next step was to drill and ream the seat. Greg figured out a way to make this impossible step just a little more possible, and a whole lot more

exciting and photographable (yes, that's a word) by introducing lasers into the process (see "Shedding Light on Compound Angles" in *Popular Woodworking* #232).

After the seat was drilled, I laid out and carved in the gullet, drilled the low points of the seat to act as a stop point for the rough carving process and got to work roughing out the seat with a nice sharp scorp. Having your work secured well at an accessible height and paying close attention to grain direction at this step is paramount. Once the seat is carved to depth, it's time to take it to the band-saw to cut down to the final shape. It's important to wait until the seat is mostly carved for this step, because removing the front square bits of the seat blank will give you less area to clamp for the carving portion.

With the rough stock removal done, it's time to move to the travisher. Claire Miniham and Alan Williams make excellent tools for seat refine-

ment. Caleb James, HNT Gordon, and Dave's Shaves make excellent round bottomed spokeshaves that help to further refine the seat and get into tricky spots.

A drawknife removes the bulk of the waste from the bottom of the seat and the sides. With all the tricky grain changes, sometimes a sharp-curved scraper is the only way to tame the wild spots.

Legs and Stretchers

After the seat is finished, it's time to test fit the legs and drill out the mortises for the stretchers. It's important at this step to make sure to align your legs the right way with the seat to accommodate wood movement so the seasonal expansion and contraction of your legs doesn't split your chair seat. The proper way is for the long grain of the legs to be oriented perpendicular to the long grain of the seat, with the wedges parallel with the front line of the seat.



Greg uses rubber bands around the chair legs to act as perfect sight lines for the drill when drilling for the stretchers. A piece of blue tape on the drill bit indicates the final depth of the hole and prevents accidentally drilling through the entire piece. The V-grooves in the double-bobbin style legs make this step a breeze, because they give the tip of the drill bit a landing point.

Using two barbecue skewers held parallel to one another, it's easy to ascertain the final length of the stretchers, which were purposefully left long. Those barbecue skewers will come in handy again when determining the final length of the back spindles later on. I cut the stretchers to final length, then glued the two side stretchers to the left and right legs using warm hide glue. The back stretcher will go in simultaneous to the seat/leg glue-up.

At this point, I knew exactly what the final orientation of the left and

right legs in relation to the seat would be, so I marked perpendicular wedge lines and cut them down the length of the mortise with a handsaw. Because I was using ash as a contrasting wood for this chair, I made up some ash wedges and fit them using a small block plane.

Then comes the stressful part: gluing up the seat, legs and stretchers. Remembering all the proper orientations, a second set of hands is helpful for this step, especially when glueing the back stretcher and set in simultaneously. A band clamp can help in a pinch. Glue only one side of the wedges so the tenon can move seasonally and not pop the glue joint. Use a metal hammer to drive in the wedges and listen for the sound change when the wedge is fully seated. Then breathe a big sigh of relief; the hardest part is over.

Back and Spindles

I turned two arms on the lathe

11 Refining the roughed-out seat is done with a travisher.

12 I used ash wedges (sized to fit the top of the tapered mortises) to secure the legs.

13-14 With the seat roughed out, a drawknife is used to refine and lighten the seat, both top and bottom.

and carved the ornamental flats in both arms using a drawknife. Then, I selected a straight-grained ash board and cut spindle material out with the bandsaw. I rough turned them, then refined the shape using a spokeshave. When sizing spindles, the Hamilton Spindle Gauge comes in extremely handy, taking all the guesswork out of the sizing process.

I waited until the last possible second, then removed the curved back from the form by the wood stove, hoping it had had time to dry enough to retain its shape. I finished shaping it and used it to lay out the mortises in the arms. I drilled out the majority

About Greg Pennington

In his past life, Greg was a diesel mechanic. He earned his stripes as a chairmaker studying with Curtis Buchanan and teaching alongside Peter Galbert. To this day, he processes and turns a lot of the chair components for Curtis's classes. To that end, Greg's gotten his production turning game down pat, turning a chair leg at an average rate of one minute forty seconds. After a week in his shop and a lot of patient instruction, I was able to turn a leg in six minutes forty seconds, but I'm not sure I have the tenacity required to turn enough legs to shave five full minutes off my time and simultaneously add any level of Greg's perfectionism into my own turnings.

Perhaps it's his drastic career change, or the fact that humans truly come alive doing what they are "supposed" to be doing, but Greg has a down-to-earth manner about him that makes him a truly gifted teacher. He has an uncanny ability to read people and customize each explanation to cater to the knowledge and experience base of every student with whom he's interacting.



15



16

15 The legs for a Windsor chair are glued and wedged in place from the top.

16 The spindles for the back are just glued in place, but the arms are glued and wedged from the bottom.

of the waste, then chopped it square with a sharp chisel.

Once my mortises were square, I did the final refinement and fitting of the chair back into the arms, did all the final shaping, and drilled offset holes in the arms and back to create a drawbored joint that would pull my chair-back tenons in tight and hold them there for a century or two to come. I made ash drawbore pins, once again as a contrasting detail using a dowel plate. I then set them aside and laid out the spindle placement on the seat and chair back using a set of dividers, my eyechrometer, and a series of visual trials.

I dry fit the arms and curved back, set them in the chair, and used a

spindle balanced on the chair back as a sight-line to drill the spindle holes into the seat. I used my eyechrometer to guesstimate the angle to drill the spindle holes into the curved seat back. I used the skewer stick trick to determine the final length of the spindles, cut them to the proper length, did the final sizing and shaping, then said a little prayer and heated up the glue pot once more.

Finishing Touches

The back spindles are just glued into place, but the arms are wedged from the seat bottom. Thankfully, it all went together without a hitch.

Then came time to level the legs. This chair wants to recline ever so



17

17 Putting all the pieces together. It's surprising how quickly a pile of pieces turns into a chair.

18 One of my fully assembled Windsor chairs. The continuous arm is mortised and pinned in place, ready for final tweaks before finishing.



18

slightly back. That meant cutting the legs in the back down by about an inch and leveling the front legs. This process is done by using wedges to make the chair sit level, then using a scrap piece of wood as a scribing gauge of sorts to leave a “level” mark around each of the four legs. That extra material can be hand sawn off, planed down, or, Gary Rogowski has a handy trick of cutting them level using the table saw.

I did some final seat refinement and sanding, and prepped for finish. I really wanted to let the wood of this chair speak for itself, and Greg recommended an equal three-part blend of mineral spirits, spar varnish, and boiled linseed oil.

Making a chair is, I think for most woodworkers, a major benchmark for progression in their craft, and something I think every woodworker should try—at least once. Understanding the whys and hows of chairmaking will change a “square minded” furniture maker’s craft. From considerations of wood movement to deriving the most possible grain strength out of a piece of wood, designs could become more functional, more graceful, lighter, more elegant, longer-lasting.

Taking a chairmaking class takes an impossibly daunting task and makes it approachable. Spending a week in a quiet chairmaker’s shop with a group of makers is so life-

giving. Even though chairmaking is very physical work, I find these classes to be incredibly restful. There’s time to sit and think, to process. In the company of other like-minded individuals, working toward a similar goal, passions are reignited, new inspirations found and new friendships forged. If you have the chance to take a chairmaking class, I can’t recommend it highly enough. If you have a chance to take a class from Greg, let me know—I’ll probably hop on a plane and join you! **PW**

Anne Briggs is a woodworker, maker and organic farmer. You can learn more about her work at anneofalltrades.com.

Weekend Walnut Table

Router inlay makes a basic table stand out.

By Willie Sandry



PROJECT #1911

Skill Level:
Intermediate
Time: 3 days
Cost: \$250

Sometimes a small project

with a quick turnaround time is just the thing to get us back in the shop. The proportions of this dinette table are petite, and would be useful in a loft or condo. If space is at a premium, this small table might just fit the bill. The table was designed using stock no longer than 30", and can easily be assembled in a long weekend.

I chose walnut lumber for its clean grain lines and good workability. If you don't have enough hardwood to make the base out of walnut, consider paint-grade legs and aprons.

A Leg to Stand On

The leg blanks start out at $2\frac{5}{8}$ " square, and are milled to $2\frac{1}{2}$ " square. If $12/4$ walnut stock isn't readily available in your area, just laminate thinner boards together to achieve the required thickness. Mill some stock to $7/8$ " thick, and rip it into strips $2\frac{5}{8}$ " wide. Arrange the strips for the best grain match possible, and glue three strips together to make a leg blank. Once the glue cures, these rough leg blanks can be jointed and planed to finished dimensions.

Now is the time to square one end of the legs and cut them to finished length. Next, we'll want to take care of all the joinery before introducing any tapers or curves, so choose a method to make your mortises and get to work. I used a hollow chisel mortiser to make the $1/2$ " wide and $1\frac{1}{4}$ " deep mortises. I like to keep the mortises $1/2$ " away from the top of the legs to preserve structural integrity and make sure the joints will last for years to come. The mortises are all the same size, and conveniently centered on the thickness of the legs.

Traditional Table Joinery

Take a moment to mill up the remaining parts of the table. You'll need two long aprons, two short aprons, and enough boards to make the top panel. With the eight



1 Laminate the leg blanks from strips of walnut if $12/4$ material isn't available in your area. Size the blanks so that they can be finished to $2\frac{1}{2}$ " square.

2 Joint the leg blanks square. If you were careful with your clamping, the individual boards start to look like a solid timber.

3 A crosscut sled at the tablesaw is the tool of choice to trim the legs. First square one end, then cut the legs to their finished length of 28".

4 Lay out the mortise locations with a combination square. Pay attention to which side of the leg will be most visible in the finished piece; spend a moment inspecting the grain, too.



5 Each leg needs $1\frac{3}{4}$ " x $\frac{1}{2}$ " mortises, which are $1\frac{1}{4}$ " deep. Here a mortiser with end-stop makes quick work of repeated cuts.

6 Cut the tenon on the table saw with a dado stack. I use a fine tooth stack and a solid miter gauge.

7 The top shoulder is $\frac{1}{2}$ " tall and the bottom is $\frac{1}{4}$ " tall. All of your tenons are the same size, batch them out.

8 Give each tenon a final test fit and now you're ready to move on to shaping the aprons.

mortises complete, try your hand at forming the tenons on the aprons. Using a fine-toothed dado blade and quality miter gauge makes the

job easier. Check your tenon shoulders for square as you go, and creep up on a snug fit. Use the mortise itself as your ultimate gauge as you size the tenons. The top shoulder on each tenon is $\frac{1}{2}$ " tall, while the bottom shoulder is only $\frac{1}{4}$ ". Since all the tenons are the same size, this work proceeds quickly.

With all the joinery complete, we can tackle the more interesting aspects of this project, like shaping the aprons and tapering the legs. The subtle shape on the underside of the aprons lightens the overall look of the table, and adds some grace to an otherwise simple form.

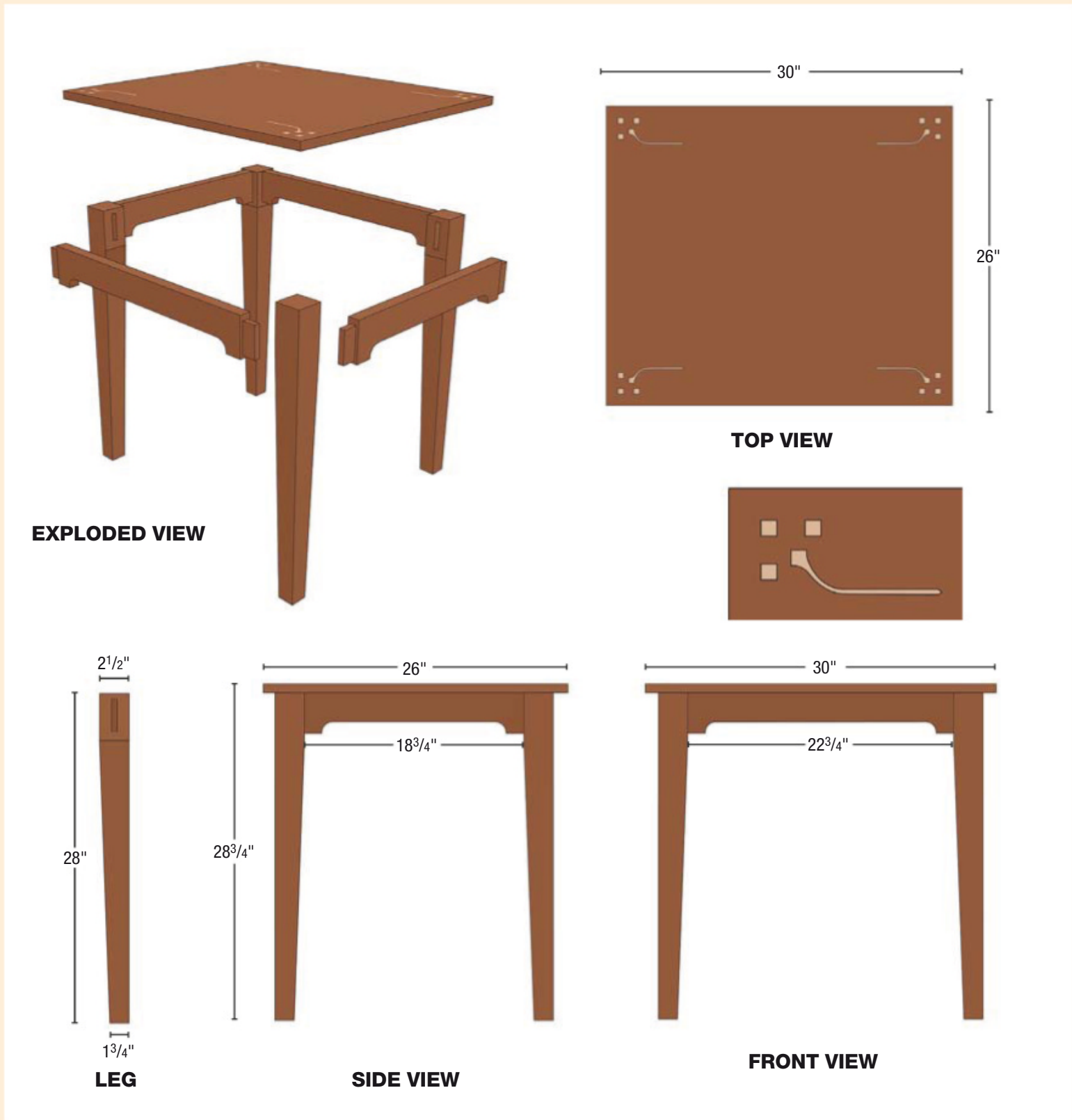
To shape the aprons, I find it easiest to use a jig at the router table.

The jig is a simple matter to construct, and only requires a couple scraps of plywood. Start with a $\frac{3}{4}$ " plywood base, and mark the curved profile before cutting it out at the bandsaw. Sand the curve to your line, and add a $\frac{1}{2}$ " plywood fence. A small stop registers the shoulder of the aprons in the correct position, and a pair of toggle clamps hold it in place.

Taper the Legs

To lighten the look of the $2\frac{1}{2}$ " square legs, they're tapered on two inner edges. I used a commercial tapering jig and a push pad to make the taper cuts at the tablesaw. Then any saw marks can be sanded

Weekend Walnut Table



Cut List

No.	Item	Dimensions (inches)			Material
		T	W	L	
4	Legs	2 1/2	2 1/2	28	Walnut
2	Long aprons	1	3 1/2	25 1/4*	Walnut
2	Short aprons	3	3 1/2	21 1/4*	Walnut
1	Tabletop	3/4	26	30	Walnut
1	Inlay material	3/4	12	24	Maple

* The long aprons are 22 3/4" from shoulder to shoulder. The short aprons are 18 3/4" shoulder to shoulder.

Supplies List

No.	Item
12	Figure 8 fasteners; solid 12 gauge steel variety
12	#6 x 1/2" screws to attach tabletop
12	#6 x 3/4" screws to attach figure 8 fasteners to aprons
1	Threaded leg leveler set, 1" diameter
1	Inlay Bushing and Bit; Purchase item no. 27593 from Rockler (rockler.com) or item no. 9500 from Whiteside Machine Company (whitesiderouterbits.com)
1	Rockler Pattern Flush Trim Router Bits (3/4" D x 1 1/4" H x 1/2" shank); item no. 21046



9



10



11

9-10 To shape the curved aprons, start by cutting close to your pencil line at the bandsaw. Next, install the rough-cut apron into a curved routing jig. Finally, smooth the curve with a bearing-guided bit at the router table.

11 Taper the legs with a tapering jig. Keep in mind you're tapering the inside faces that contain the mortises.



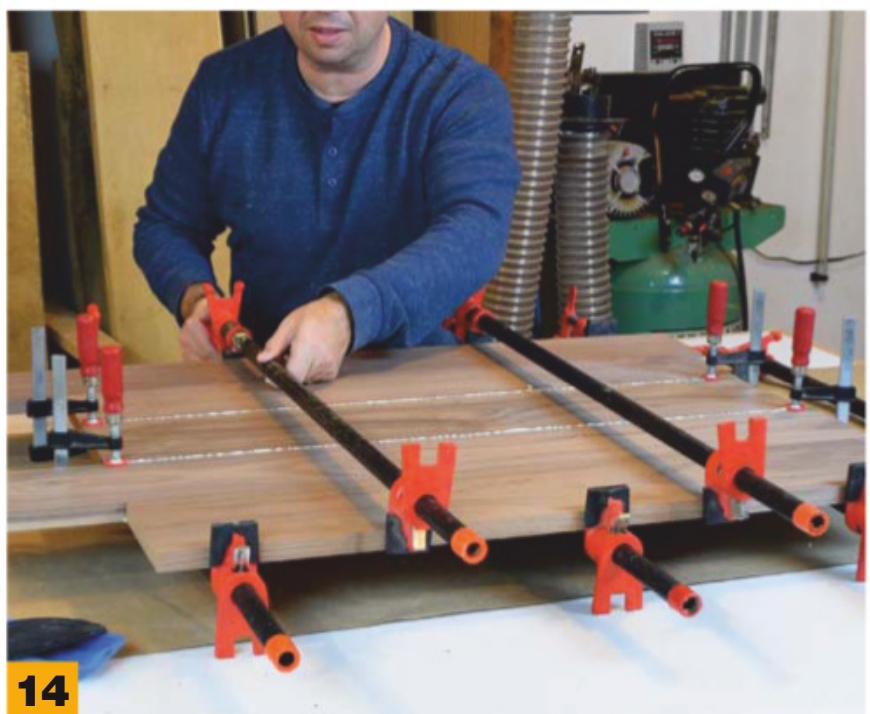
12



13

12 Glue up the base. Parallel clamps will draw the structure square. Clean up any squeeze out.

13 For a wobble-free table that maintains its sleek look, try recessed leg levelers. Use a $1\frac{1}{8}$ " Forstner bit to drill the large clearance hole. Then drill for the threaded insert (usually $1\frac{1}{32}$ "), but follow the manufacturer's instructions that come with the leg levelers.



14

14 Glue two planks together with a central board for the final tabletop assembly. Notice this assembly has only two wet-glue lines.

smooth, and the edges of the legs and aprons are softened with a roundover bit at the router table. Just a couple steps remain before you're all clear to glue up the table frame. Miter the tenons where they intersect and test fit the aprons with a complete dry assembly. Once you're convinced the joint fitment is good, proceed with finish sanding. I sanded with a random orbital sander at #120 and #150 grits, and gave the parts a good hand sanding, with the grain, using #150 grit.

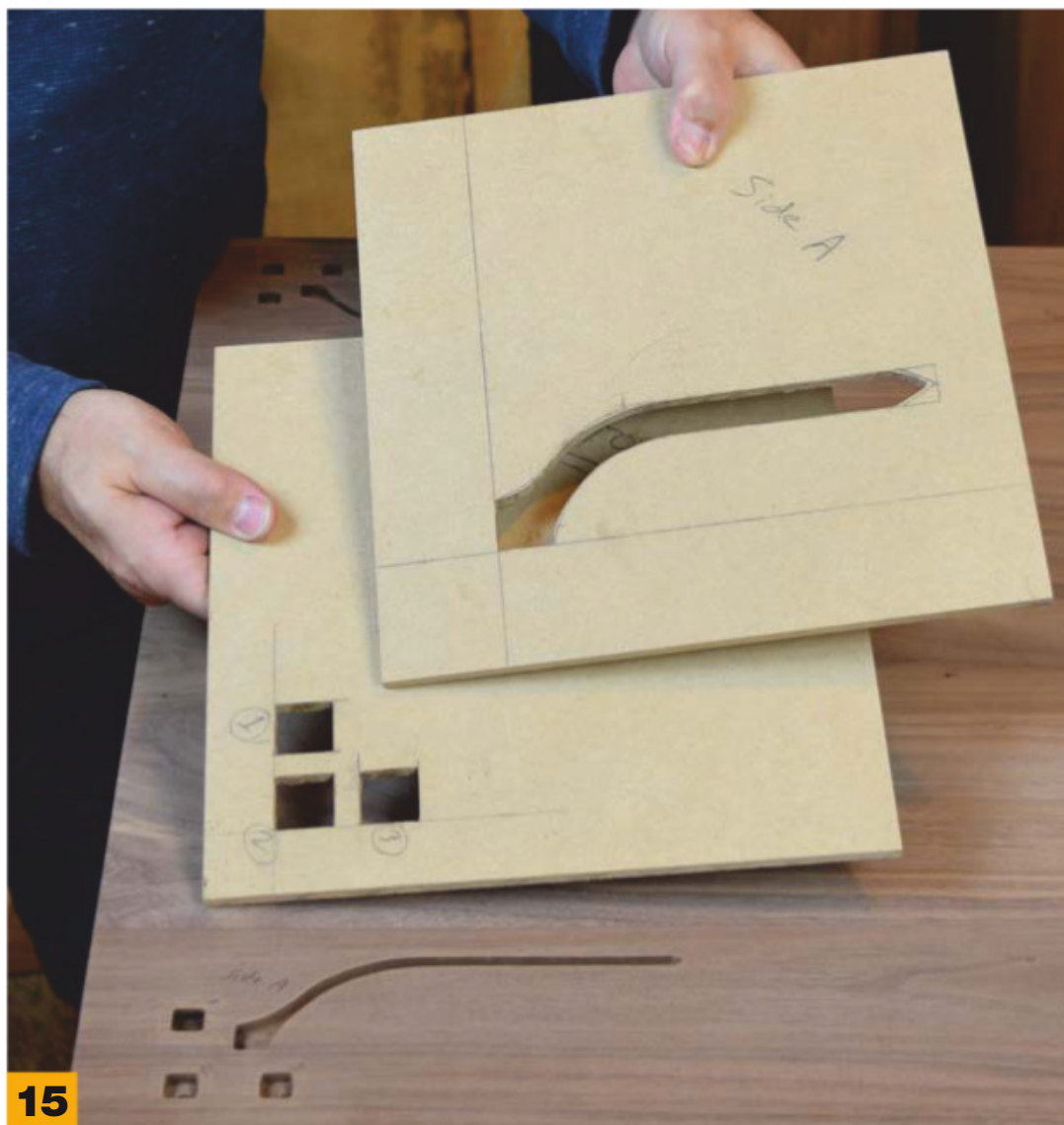
Make the Tabletop

I like to minimize the sanding work required to achieve a smooth, flat tabletop. To that end, I start by gluing two pairs of boards together as an initial assembly. Once the glue has hardened, I scrape the glue and send the planks through the planer. For the final step of building the tabletop, glue the planks together with another board in the middle. This way there are only two glue lines to sand clean, as opposed to four.

Router Inlays

To give the table a decorative element, I came up with a floral motif inlay. I wanted a simple form for the inlay, so it could be completed with a router and inlay bushing kit. To accomplish this I made two templates from MDF; one handles the three squares while the other handles the curved stem design. The openings in the templates are slightly oversized to account for the spacer on the inlay bushing kit.

To make the inlay templates, draw out the designs on 12" x 12" squares of 1/4" MDF. Remove the bulk of the waste with a drill bit or mortiser, and sand or file the openings to size. To start the inlay process, carefully center the guide bushing on a plunge router (some inlay bushing kits come with a helpful centering pin). Then install the removable spacer ring onto the guide bushing, and clamp the "three squares" template flush with a corner of the tabletop. Rout the perimeter of the template, and



15 Two templates are used to make the inlay that dresses up the corners of the table.

16-17 Clamp a template to the table, and rout out the recessed shape. Then switch templates and repeat. Note that this step is done with the spacer ring installed on the router.



18



19



20

18-19 Remove the spacer ring from the guide bushing (inset) and use the same two templates to make matching maple parts. Once the router work is done, place masking tape over the maple inlay parts, and cut them free by resawing the board at the bandsaw. Lift the tape to reveal the newly cut inlay parts. Using a sanding block, round the sharp corners of the maple parts, and begin gluing them in place.

20 Install the solid wood top with figure-8 fasteners to allow seasonal expansion and contraction.

then gradually carve out the center of the recess with your router. Since the design is fairly small, it only takes a couple passes with the router to clean out the recess.

Now switch to the “curved stem” template, and rout the shape in a similar fashion. Repeat the process on all four corners, and then remove the spacer ring from the guide bushing to make some maple pieces for the inlay. Use the same templates to cut the maple stock, but only make one clockwise pass, keeping the router bushing tight to the template. Number the squares to match the template, and pay attention to grain orientation. Remember, this is a hand-cut template, so the size of the three squares may vary slightly. By numbering the squares and template, you’ll ensure each part fits like a glove.

Finishing Up

Round the corners of the tabletop if desired, and ease the edges with a roundover bit. I tested some stains on a sample inlay to get an idea of what the finished product would look like. I found an oil-based stain that subtly darkened the walnut, but maintained good contrast with the maple inlay. My topcoat of choice was two coats of pre-catalyzed lacquer in a satin sheen. Once the topcoat cured, I wet-sanded with a #1500-grit soft sanding sponge and some tap water.

The last detail that remains is attaching the top with figure-8 fasteners. I used 3 fasteners on each apron, for a total of 12. Recess the figure-8 fasteners with a Forstner bit on the inboard side of the aprons for a concealed look. Reinstall the recessed leg levelers, and put your new table on display. **PW**

Willie Sandry is a woodworker and writer with an affinity for Arts & Crafts. He prefers projects that get his wife and twin teenage sons into the workshop with him.

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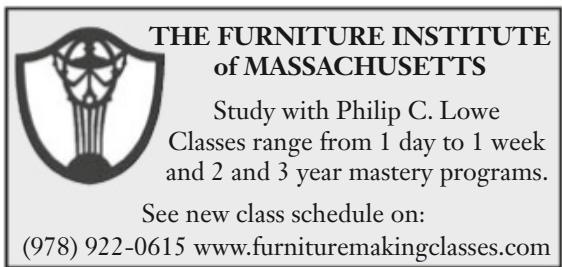
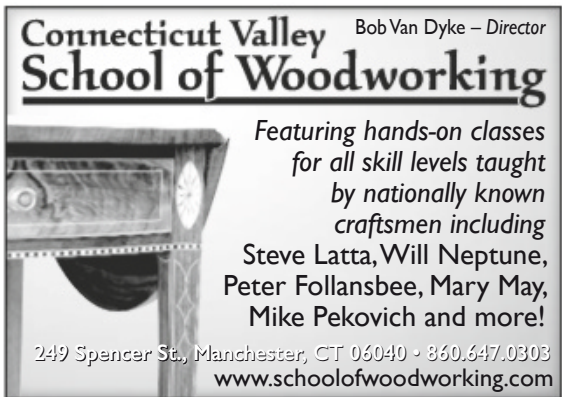
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Five Common Spraying Problems

These are in addition to the spray gun being out of tune.

By Bob Flexner

I've written previously about problems caused by your spray gun (see *Popular Woodworking* #153 and *Flexner on Finishing*). Just because your gun is tuned well doesn't necessarily mean you will always get good results. Other things can go wrong. Here are five of the most common.

Orange Peel

The big one, of course, is orange peel. It's not possible to completely avoid this flaw, but it is possible to come so close that the defect isn't noticeable.

Orange peel can occur with any finish and is usually caused by spraying too thick a liquid with too little air pressure. When stated this way, the solution is obvious: thin the liquid or increase the air pressure.

If you're using a spray gun with air supplied by a turbine rather than a compressor, you won't have much

control of air pressure; you'll probably have to thin the liquid.

Another cause of orange peel is holding the gun too far from the surface or moving the gun so fast you don't deposit a fully wet coat. The best way to determine the proper distance and speed is to watch what's happening in a reflected light.

By arranging lighting and positioning yourself so you can see a reflection on the surface you're spraying, you will see when the finish isn't going on properly. Then you can make the necessary adjustment.

Dry Spray

Dry spray is overspray that settles on the surface after the droplets of finish have dried in the air. Dry spray produces a sandy look and feel and occurs most commonly at the edges of a spray pattern when the finish is drying too fast. It also occurs when the finish bounces off the surface

and then settles back onto it after both the finish and the bounce back have begun to dry.

Dry spray occurs only with fast-drying finishes and is especially likely to happen when spraying the insides of cabinets, boxes and drawers where there's more bounce back and turbulence.

The obvious cure for dry spray is to slow the drying of the finish by adding a retarder—that is, a slower evaporating thinner. Because the finishes that dry the fastest thin with lacquer thinner, the appropriate retarder is lacquer retarder.

Lacquer retarder can also be used with shellac if you want to slow its drying. Xylene can be added to conversion varnish to slow its drying.

Don't add more retarder than necessary, however, or you may extend the drying time so much that the finish will collect dust and show press marks for hours or even days.



1

1 On the left I sprayed a very thick lacquer with too little air pressure, which caused severe orange peel. I cleared this up on the right by thinning the lacquer and increasing the air pressure.



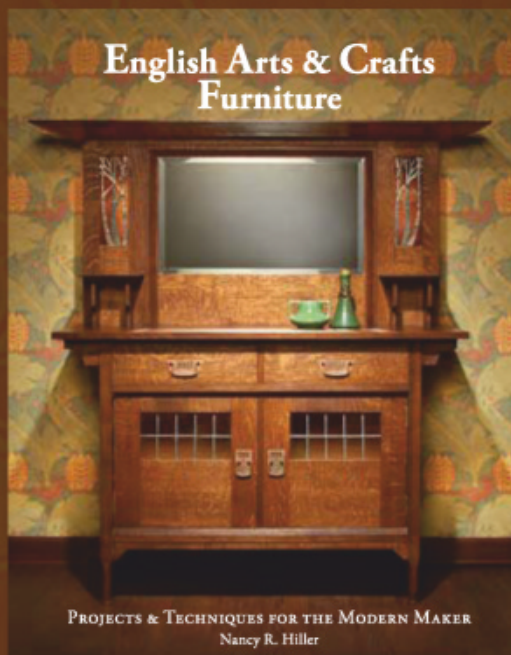
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2 To show what dry spray is, I added some acetone to my lacquer to speed the drying and sprayed it onto the panel at a low angle. The left side looks and feels sandy.

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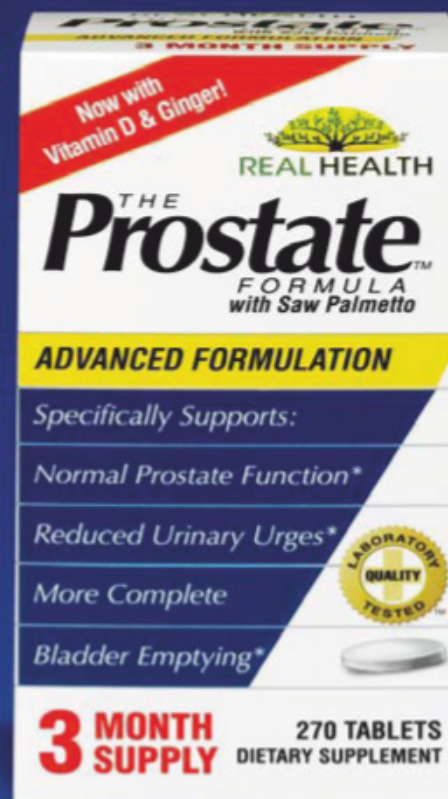
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Blushing

Blushing is a spraying problem because it only occurs with fast-drying finishes that thin with lacquer thinner or alcohol. Blushing doesn't occur with varnishes or water-based finishes that are brushed.

The milky whiteness of blushing is caused by moisture in the air condensing into the finish and then, upon evaporation, leaving air voids that refract the light and prevent it from traveling through the finish. The discoloration is most likely to occur, of course, in humid weather.

Conversion varnish rarely blushes, and oil-based varnish, polyurethane and water-based finish never blush (though water-based finish can turn somewhat opaque if applied very thick).

To avoid blushing in lacquer and shellac, add lacquer retarder to the finish before applying it. The retarder slows the drying process so the finish can still pack down and eliminate the air voids after the moisture has evaporated.

The downside of adding retarder is that it slows the overall drying of the finish, which slows your production and could lead to dust problems, runs and press marks. For

this reason, don't add more retarder than is needed to avoid the blushing.

If you get blushing and it doesn't come out on its own within a couple of hours, spray some retarder (as little as possible to clear up the finish) onto the surface to "open up" the finish and allow it to pack down solid and eliminate the voids. Spraying regular lacquer thinner (or alcohol onto shellac) may also work on a drier day. You can also rub the finish with steel wool or an abrasive pad to remove the finish nearest to the surface, where the blushing occurs.

Finish Doesn't Harden

There are two causes for the finish not hardening within a normal time frame. The first is that you have added lacquer retarder to solve one of the problems described above. The second and most common is that you're working in a cold environment. Either way, the finish will show pressmarks easily.

Cold temperatures slow the drying of any finish. Only finishes that thin with lacquer thinner can be adjusted to dry normally in these conditions. The way to do it is to add a little "fast" or "hot" lacquer

thinner to the finish to get it to dry faster. These lacquer thinners are usually available from auto-body supply stores. You can also add acetone, which is widely available. If you live in an area that complies with strict VOC laws, you can switch to 275 VOC lacquer, which is made with a lot of acetone.

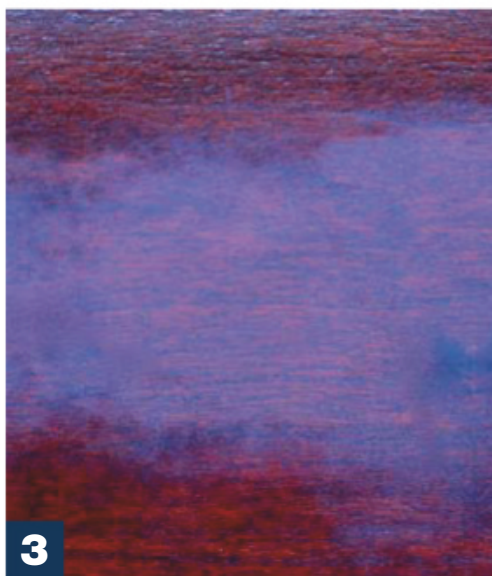
Poorly Coated Edges

Not getting enough finish on the edges of cabinet doors leads inevitably to peeling, especially under sinks. Inadequate build on edges is a spraying problem because it rarely happens when brushing a finish.

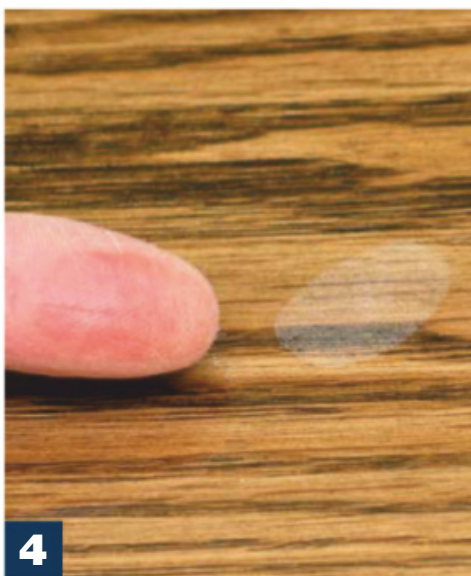
You have to be fully aware of the problem to avoid it, but once you're aware, avoidance is easy. It's just a matter of spraying full coats of finish onto the edges, holding your spray gun at a straight-on angle.

Many finishers hold the spray gun at a 45° angle when spraying edges and this doesn't deposit enough finish. The end user will begin to experience problems within several years. **PW**

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



3 Fast-drying finishes such as lacquer and shellac "blush," or turn milky white when sprayed in humid weather. To prevent this you need to slow the drying by adding lacquer retarder.



4 If you slow the drying too much, or if your shop is cold, the finish won't harden in the normal time, and it will mark when something (like my finger in this case) is pressed against it.



5 A common problem when finishing cabinet doors is not getting a thick enough finish on the edges. Especially under sinks, this can result in the finish peeling long before it should.



His 'Tax Loophole' Can Make Your Fortune!

President Trump's new tax law is fully effective and millions are finding out about the little-known 'Trump Tax Loophole.'

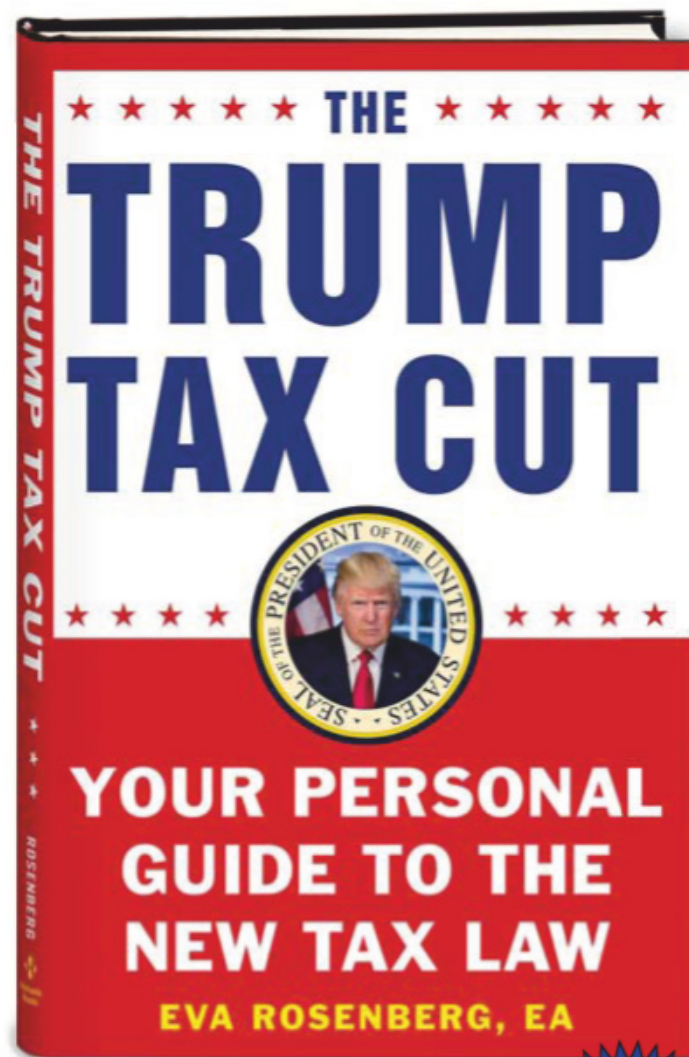
This new loophole will save taxpayers who use it billions in taxes – and slash their personal taxes by 20 percent! This loophole can be used by anyone if they follow several simple steps – dropping everyone's effective tax rate. The highest income-earners can see their tax rate drop to a shockingly low 29 percent!

The Tax Loophole is detailed in the new bestseller *The Trump Tax Cut* by renowned tax expert Eva Rosenberg. *The Trump Tax Cut* is your guidebook to the biggest tax cut in history. But you need to find out how the law works to get its benefits.

Here's the deal: Trump slashed corporate rates to 21 percent, but personal income taxes not so much — to 35 percent for the highest-income level.

But Trump gave you a secret "trap door" for lower taxes. If you're an independent contractor or small business person (many employed people can change their status!) there is a special deduction of 20 percent of your income that makes your effective rate just 29 percent!

Already hundreds of thousands are taking advantage of this loophole. Anyone can grab it but there are requirements, so get *The Trump Tax Cut* for all the facts!



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could help millions.

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- Cosmetic surgery costs you can legally deduct. Tip #207 explains.
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- 3 big state-tax deductions most people miss — including tax pros! The amount you're deducting can easily add up to thousands of dollars. Don't miss Tip #9.
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Newsmax says:

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A New Sex Pill Takes the Spotlight as the Viagra Patent is About to Expire

A patented pill costing less than \$1 a dose stands to help millions of men with failing sex lives; no prescription will be required

By Ray Wilson
Associated Health Press

AHP— A new sex pill is set to take the spotlight with the Viagra patent about to expire. But unlike the former, it won't require a prescription and is priced just under a \$1 a dose.

The new pill called Vesele is part of a new class of performance enhancers for men, which work instantaneously on the body and mind triggering arousal and firmer, harder erections.

Formulated with a special compound known as an "accelerator", Vesele can transport its active ingredients faster and more efficiently into the blood stream, where it begins to work its magic.

The patented ingredient blend initiates a process known as vasodilation, which causes arteries and vessels throughout the body to expand. This allows blood to flow directly to penis and genitals, resulting in harder erections which last longer. Cialis and Viagra are based around a similar concept.

But what makes Vesele so remarkable, and what these other sex pills can't do, is that also directs a small portion of this blood flow to the brain, which creates feelings of intense arousal. In laymen's terms, users become incredibly excited and turned on.

This is why the makers of Vesele say their pill has worked so effectively in clinical trials. It stimulates the two most important organs for great sex, the penis and the brain.

The Brain Erection Connection

Until now, medical researchers did not fully understand the brain-erection connection. It has now been made clear with Vesele. When both are supplied with a constant blood flow, men are harder and firmer for longer...and have unbelievable sex drives.

"Most of the research and treatment methods for men's sexual failures have focused on physiological factors and have neglected the emotional ones. For the leading sex drugs to work, like Cialis and Viagra, you need visual stimulation" explains Dr. Henry Esber, the creator of Vesele.

"And although they work for some men, the majority experience absolutely no fulfillment during sex.

According to research published by the National Institute of Health, 50% of men taking these drugs stop responding or can't tolerate their side effects... and on top of that they spend \$50 per pill and it doesn't even work half the time.

This is what makes Vesele so different and effective. It floods the blood stream with key ingredients which cause arteries all over the body to expand. The patented accelerator speeds up this process even more.

The result is a rush of blood flow to the penis and brain, helping to create an impressive erection and a surging desire for sex. Often, this is all men need to get going. And when taken regularly, many men say they are energized and aroused all day."

Great Sex At Any Age

With the conclusion of their latest human clinical use survey trial, Dr. Esber and his team are now offering Vesele in the US. And regardless of the market, its sales are exploding.

Men across the country are eager to get their hands on the new pill and according to the research, they should be.

In the trial above, as compared to baseline, men taking Vesele saw a staggering 85% improvement in erection hardness over a four-month period. Their erections also lasted twice as long.

These same men also experienced an astounding 82% increase in the desire for sex (libido/sex drive) and an even greater improvement in overall satisfaction and ability to satisfy their partners.

Many men taking Vesele described feeling horny and aroused through the day. The anticipation before sex was amazing. They were also easily turned on. Their moods were more upbeat and positive, too.

Faster Absorption into the Blood Stream

Vesele is made up of three specialized ingredients: two clinical strength vasodilators and a patented absorption enhancer often called an accelerator. According to an enormous amount of clinical data, each is very safe.

Research shows that with age, many men lose their desire and interest in sex. They also struggle to produce an erection firm enough for penetration.

And although there are many theories as to why this happens (including a loss in testosterone) one thing is certain, inadequate blood flow is virtually always to blame. That's why sex drug manufacturers focus on blood flow, it makes your erection hard.

But what's more surprising, and what these manufacturers have failed to consider, is that lack of blood flow can also kill your sex drive. That's because blood supplies energy for the brain. This energy is required for creating brainwaves that cause excitability and arousal.

Studies show the Vesele stimulates the entire cardiovascular system, including the arteries that lead to both the brain and penis. The extreme concentration of the ingredients combined with the accelerator ensures that this process starts quickly.

The sexual benefits of Vesele are also multiplied as its ingredients build up in the system over time. This is why many men take it every single day.

Recent Studies Show Positive Effects on Women

In the same study referenced throughout, Vesele was also shown to have an amazing (and somewhat



Expiring Patent Opens the Door to a New Sex Pill: Vesele is a new pill that cost just \$1 a dose does not require a prescription. It works on both body and mind to increase arousal and erection hardness.

surprising) effect on women too. That's because the same arteries and vessels that carry blood and oxygen to the brain and genitals are the same in men and women.

"In our most recent study, women taking Vesele saw a stunning 52% improvement in arousal and sex drive. Perhaps more impressive, they also experienced a 57% improvement in lubrication.

You can imagine why some couples are taking Vesele together. Everything feels better. Everything works better. Everyone performs better. It's truly amazing."

A New Frontier of Non-Prescription Sex Pills

With daily use, Vesele is helping men (and women) restore failing sex lives and overcome sexual letdowns without side effect or expense.

Through a patented absorption enhancer, the Vesele formula hits the bloodstream quickly, resulting in phenomenal improvements in erection firmness and hardness. By boosting blood flow to the brain, users also experience sexual urges and arousal they often haven't felt in years.

Where to Find Vesele

This is the official release of Vesele. As such, the company is offering a special discounted supply to any reader who calls during this introductory period.

A special hotline number and discounted pricing has been created for our readers.. Discounts are available now and will automatically be applied to all callers.

Your Toll-Free Hotline number is 800-644-7471 and will be open while supplies last.. Only a limited discounted supply of Vesele is currently available so don't miss out.

Call 800-644-7471 today.

Leading Acid Reflux Pill Becomes an Anti-Aging Phenomenon

Clinical studies show breakthrough acid reflux treatment also helps maintain vital health and helps protect users from the serious conditions that accompany aging such as fatigue and poor cardiovascular health

by David Waxman
Seattle Washington:

A clinical study on a leading acid reflux pill shows that its key ingredient relieves digestive symptoms while suppressing the inflammation that contributes to premature aging in men and women.

And, if consumer sales are any indication of a product's effectiveness, this 'acid reflux pill turned anti-aging phenomenon' is nothing short of a miracle.

Sold under the brand name AloeCure, it was already backed by clinical data documenting its ability to provide all day and night relief from heartburn, acid reflux, constipation, irritable bowel, gas, bloating, and more.

But soon doctors started reporting some incredible results...

"With AloeCure, my patients started reporting less joint pain, more energy, better sleep, stronger immune systems... even less stress and better skin, hair, and nails" explains Dr. Liza Leal; a leading integrative health specialist and company spokesperson.

AloeCure contains an active ingredient that helps improve digestion by acting as a natural acid-buffer that improves the pH balance of your stomach.

Scientists now believe that this acid imbalance is what contributes to painful inflammation throughout the rest of the body.

The daily allowance of AloeCure has shown to calm this inflammation which is why AloeCure is so effective.

Relieving other stressful symptoms related to GI health like pain, bloating, fatigue, cramping, constipation, diarrhea, heartburn, and nausea.

Now, backed with new clinical studies, AloeCure is being recommended by doctors everywhere to help improve digestion, calm painful inflammation, soothe joint pain, and even reduce the appearance of wrinkles – helping patients to look and feel decades younger.

FIX YOUR GUT & FIGHT INFLAMMATION

Since hitting the market, sales for AloeCure have taken off and there are some very good reasons why.

To start, the clinical studies have been impressive. Participants taking the active ingredient in AloeCure saw a stunning 100% improvement in digestive symptoms, which includes fast and lasting relief from reflux.

Users also experienced higher energy levels and endurance, relief from chronic discomfort and better sleep. Some even reported healthier looking skin, hair, and

nails.

A healthy gut is the key to a reducing swelling and inflammation that can wreak havoc on the human body. Doctors say this is why AloeCure works on so many aspects of your health.

AloeCure's active ingredient is made from the healing compound found in Aloe vera. It is both safe and healthy. There are also no known side effects.

Scientists believe that it helps improve digestive and immune health by acting as a natural acid-buffer that improves the pH balance of your stomach.

Research has shown that this acid imbalance contributes to painful inflammation throughout your entire body and is why AloeCure seems to be so effective.

EXCITING RESULTS FROM PATIENTS

To date over 5 million bottles of AloeCure have been sold, and the community seeking non-pharma therapy for their GI health continues to grow.

According to Dr. Leal, her patients are absolutely thrilled with their results and are often shocked by how fast it works.

"For the first time in years, they are free from concerns about their digestion and almost every other aspect of their health," says Dr. Leal, "and I recommend it to everyone who wants to improve GI health without resorting to drugs, surgery, or OTC medications."

"I was always in 'indigestion hell.' Doctors put me on all sorts of antacid remedies. Nothing worked. Dr. Leal recommended I try AloeCure. And something remarkable happened... Not only were all the issues I had with my stomach gone - completely gone - but I felt less joint pain and I was able to actually sleep through the night."

With so much positive feedback, it's easy to see why the community of believers is growing and sales for the new pill are soaring.

THE SCIENCE BEHIND ALOECURE

AloeCure is a pill that's taken just once daily. The pill is small. Easy to swallow. There are no harmful side effects and it does not require a prescription.

The active ingredient is a rare Aloe Vera component known as acemannan.

Made from 100% organic Aloe Vera, AloeCure uses a proprietary process that results in the highest quality, most bio-available levels of acemannan known to exist.

According to Dr. Leal and several of her colleagues, improving the pH balance of your stomach and restoring gut health is the key to

revitalizing your entire body.

When your digestive system isn't healthy, it causes unwanted stress on your immune system, which results in inflammation in the rest of the body.

The recommended daily allowance of acemannan in AloeCure has been proven to support digestive health, and calm painful inflammation without side effects or drugs.

This would explain why so many users are experiencing impressive results so quickly.

REVITALIZE YOUR ENTIRE BODY

With daily use, AloeCure helps users look and feel decades younger and defend against some of the painful inflammation that accompanies aging and can make life hard.

By buffering stomach acid and restoring gut health, AloeCure calms painful inflammation and will help improve digestion... soothe aching joints... reduce the appearance of wrinkles and help restore hair and nails ... manage cholesterol and oxidative stress... and improve sleep and brain function... without side effects or expense.

Readers can now reclaim their energy, vitality, and youth regardless of age or current level of health.

One AloeCure Capsule Daily

- Helps End Digestion Nightmares
- Helps Calm Painful Inflammation
- Soothes Stiff & Aching Joints
- Reduces appearance of Wrinkles & Increases Elasticity
- Manages Cholesterol & Oxidative Stress
- Supports Healthy Immune System
- Improves Sleep & Brain Function

HOW TO GET ALOECURE

This is the official nationwide release of the new AloeCure pill in the United States. And so, the company is offering our readers up to 3 FREE bottles with their order.

This special give-away is available for the next 48-hours only. All you have to do is call **TOLL-FREE 1-800-748-5760** and provide the operator with the Free Bottle Approval Code: AC100. The company will do the rest.

Important: Due to AloeCure's recent media exposure, phone lines are often busy. If you call and do not immediately get through, please be patient and call back. Those who miss the 48-hour deadline may lose out on this free bottle offer.



When Irony is Unintentionally Built Into a Coffee Table

By Marci Crestani

My son and daughter-in-law's house

burned to the ground in the voracious California Woolsey fire last November, and they were left, literally, with the clothes on their backs and their pets. The immediate shock left us feeling simultaneously hollowed out and filled with gratitude that they were all alive.

This was their first home and they had owned it for 97 days. Their two-year-old daughter won't remember this house, except through pictures and the stories we'll tell her about it. Fortunately, she was with her other grandparents on that morning and didn't have to experience the trauma of driving down a mountain road with houses burning on both sides.

Over the following days, our minds drifted from the magnitude of their having lost everything to the particular things they lost. And always we circled back to the fact that they all survived—that what was lost was just “stuff.”

Despite this resolute attitude that anchored us through the horror, I admit I felt a tiny pang of sorrow when I realized the coffee table I'd made for my son in honor of his college graduation was gone.

Truth be told, I suspect that my son and daughter-in-law weren't too crazy about the table's design, and that perhaps its loss wasn't something they'd overly mourn. Years earlier, before he met his future wife, my son told me he wanted a *Game of Thrones* coffee table. This is definitely not my daughter-in-law's style.

Nor is it mine. *Game of Thrones*?!? Even though I remain a huge fan of the medieval-fantasy television series—which features fire-breathing dragons, by the way—I didn't have a clue how to create that look.



They didn't have coffee tables back in medieval days. The only thing I knew for certain was that ideally the table would've been made out of forged iron, but I wasn't about to switch hobbies. I was a relatively new woodworking student at that point and a highly polished, precisely joined table was the only thing I knew. Psychologically, I wasn't ready to tackle “rough hewn” yet because I feared other students might mistake it for my best effort and not an intentional diversion.

Fire seems to be a major element in both medieval life and in the *Game of Thrones* plot lines, so I incorporated “flames” into the design of the legs. Using a scroll saw, I cut a flame into the middle of each leg, then tapered them so that the flame sort of disappeared into them. (Heavy emphasis here on “sort of.”) The top of the legs featured an emphatically masculine V-shaped cube

that was double-tenoned into the slimmer bottom.

As painful as it is to admit, the table didn't read “*Game of Thrones*” as much as it screamed “Harley biker.” It was a quirky table, and the upside is that I'll eventually make them a new one more to their liking.

This coffee table had a short life—not even eight years—yet it had endured four moves, dog-nail scratches on its top, cat scratchings on its legs, spilled smoothies, magic markers, and a few refinishing jobs with ever more durable material to thwart its adversaries.

But it couldn't stand up to the fire. I hope, in true *Game of Thrones* fashion, it burned brightly. **PW**

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Marci Crestani is the co-author with Brian Miller of *The Art of Coloring Wood: A Woodworker's Guide to Understanding Dyes and Chemicals*.

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